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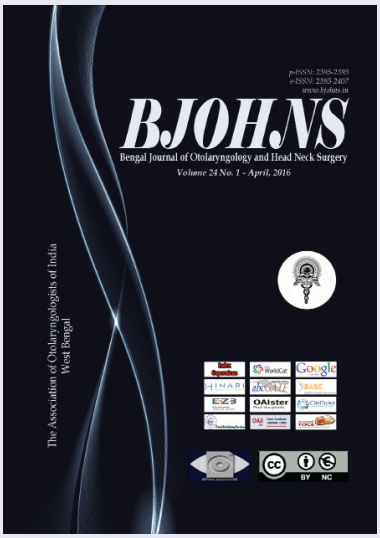

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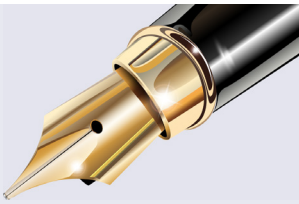
From the Desk of the Editor



The second wave of Covid-19 is sweeping through India with increased vengeance. The daily incidence has already doubled to cross two hundred and thirty thousand, compared to the peak of ninety thousand on September 16, 2020. The daily mortality has also crossed the peak of 1300 mark recorded in 2020. The Covid-19 pandemic has affected more than 140 million people worldwide and has claimed more than 3 million lives as on April 16, 2021. The disease has affected 14.7 million people in India and the death count crossed one hundred and seventy seven thousand. Indian Medical Association registry shows 747 casualties amongst doctors. Most of such deaths were from Tamil Nadu (89) and West Bengal (80). The Covid graph is at its peak in countries like India, Turkey, Iran, Brazil and is still rising. Out of every hundred infections reported around the world, more than 45 are from Asia and the Middle-East, adding a million new infections every two days.

The situation is bad. What can be done to salvage the situation? How best can we manage the pandemic to reduce spread of the disease and its mortality? Experts are of the opinion that vaccination is the only practical option to reign in the virus. You might find it interesting to note that the World Health Organisation (WHO) had been anticipating a pandemic since long. WHO, in 1969, concluded that the nature of the next pandemic virus cannot be predicted. Every pandemic preparedness planning group since then suggested measures to prepare for the unpredictable. It was evident that 'no amount of hand washing, hand wringing, public education, or gauze masks will do the trick.' Prophylaxis with antiviral agents would not be a practical option. The keystone of influenza-like pandemics will be vaccination. Experts suggested genetic reassortment of high yield viruses for potential use in vaccine production, which could be used as 'Barricade Vaccines' in any eventual influenza epidemic, even though the genetic material might not exactly match the newly emerging strain of that subtype. Fifty years later, this goal has not yet been achieved. On the contrary, the world faced a pandemic caused by a new virus SARS-CoV-2.

The scientific community and the multinational pharmaceutical industry have accepted the challenge with financial and logistic support from different Governments and facilitatory boost from the WHO. Canada, for example, decided to fund as many as 96 vaccine research projects at Canadian companies and universities, with plans to establish a "vaccine bank" that could be used if another coronavirus outbreak occurs. Vaccines became a reality and have been approved for emergency use in general population since December, 2020.

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As of April 2021, 13 vaccines are authorized by at least one national regulatory authority for public use: two RNA vaccines (the Pfizer–BioNTech vaccine and the Moderna vaccine), five conventional inactivated vaccines (BBIBP-CorV, CoronaVac, Covaxin, WIBP-CorV and CoviVac), four viral vector vaccines (Sputnik V, the Oxford–AstraZeneca vaccine, Convidecia, and the Johnson & Johnson vaccine), and two protein subunit vaccines (EpiVacCorona and RBD-Dimer) (Ref: Wikipedia). Countries across the world have started vaccination drives with variable coverage achieved till date. While Israel, UK, USA, UAE, Chile, Bahrain and Gibraltar could cover a significant section of their population, more than hundred million jabs in India (upto April 16, 2021) could cover only 1.1% of its population with two doses (7.6% received at least one dose) since the launching of its vaccination programme on January 16, 2021. Greater availability of more vaccines of adequate antigenic potency and wider involvement of the healthcare delivery infrastructure will bring more people under the immunisation umbrella, making the world free again.

Let us hope that the painful experience of this pandemic would make us better prepared to prevent any pandemic in the future.

Dr Saumendra Nath Bandyopadhyay
Editor,
Bengal Journal of Otolaryngology and Head Neck Surgery

Main Article

Radiotherapy Induced Middle Ear Morbidities in Head and Neck Cancer Patients

https://doi.org/10.47210/bjohns.2020.v28i3.322

Adity Chakraborty,[1] Abhinandan Bhattacharjee,[2] Arnab Purkaystha,[3] Aakanksha Rathor,[4] Ridip Mazumdar[2]

ABSTRACT

Introduction

Although post radiotherapy (RT) otological complications are complex and common, there is lack of data on its severity and spectrum. We intend to assess the incidence and severity of such ototoxicities in head neck cancer (HNCA) patients.

Materials and Methods

One year prospective study was conducted on thirty cases of HNCA receiving radiotherapy. Audiometry and tympanometry changes were noted and severity is assessed using Common Toxicity Criteria (CTC) -v2.0 of the National Cancer Institute (NCI). Fisher's Exact Test with two-sided p value was used for comparison of the tympanometric changes.

Results

The mean age was 55.4 years. The commonest site of HNCA was oral cavity (30%) with 46.6 % in stage II. 40% of cases were in grade II, followed by 27% cases in Grade III. The commonest complaint was pain (86.6%), hearing loss (80%) and 40% post-RT cases reporting Type B curve (relative risk 0.67).

Conclusion

Post-irradiation pain and OME are a major concern in HNCA patients having grade II (NCI-CTC). Early detection and prophylactic measures will improve the quality of life in such group of patients. This result validates the need for formulating otological diagnostic strategy & therapeutic measures in patients receiving RT to mitigate post-irradiation ototoxicities.

Keywords

Head and Neck Neoplasms; Radiotherapy; Morbidity, Ear; Prospective Study

Head and Neck Squamous Cell Carcinoma (HNSCC) has a high incidence of 54.48% in North-Eastern India[1] and radiotherapy (RT) is a common modality of treatment. As such, RT induced toxicities like neurological complications and hearing impairment gain particular importance. These toxicities are primarily due to the complex anatomy and unavoidable exposure of non-target organs to irradiation in head and neck region.[2]

Otological morbidities pertaining to the external ear include reactions involving the preauricular region, the auricle, and the external auditory canal (EAC)[3,4] Other complications include eustachian tube dysfunction, OME, transient conductive hearing loss, tympanosclerosis, perforation, middle ear fibrosis and/or ossicular atrophy. Morbidities involving the inner ear include tinnitus, labyrinthitis, canal paresis and vertigo/balance problems.[7] Several studies have also reported RT induced damage to the cochlear nerve leading to sensorineural hearing loss (SNHL).[4,5,7,8]

Despite the diversity, complexity and extent of the functional consequences, post-RT ototoxicity is sparsely

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reported in the radiation oncology literature.[5] There is also lack of clear-cut data on incidence, type, severity and evaluation criteria of radiation induced ear toxicity[2] in the Common Toxicity Criteria (CTC)-v2.0 of the National Cancer Institute.[2] This is partly due to differences in irradiation schemes, dosage, fractionation techniques and lack of awareness of such morbidities. Moreover, in absence of any study on this subject from this region of India, we intend to evaluate the institutional incidence, spectrum and severity of RT induced ototoxicities.

Materials and Methods

Thirty cases of head and neck carcinoma (HNCA), treated with RT were taken up for the study. Informed consent was taken before the study. Patients with primary tumour of the auditory system or suffering from any auditory problem before initiation of radiation were not considered for this study. Patients with the history of incomplete radiotherapy treatment or not available for follow-up for more than 2 months were also excluded from the study.

Study subjects were examined before the start of radiotherapy (pre-RT), at 11th fraction of radiotherapy (2nd week RT) and after completion of radiotherapy (post-RT). Detailed history-taking, otoscopic examination and tympanometry were carried out. The CTC-v 2.0 of National Cancer Institute was used for toxicity grading. All data were recorded in the proforma and Fisher's Exact Test with two-sided p value was used to compare the tympanometric changes of middle ear in RT exposed & non exposed ears. Ethics clearance for the study was obtained before starting the study.

Results

The effects of radiation were studied on 30 patients (60 ears) which included 30 ipsilateral ears and 30 contralateral ears. The mean age of study population and control subjects were 55.4 years and 46.13 years respectively. The commonest site of HNCA was the oral cavity (30%). 46.6 % of patients presented at stage II and 36.6% at stage III & above disease. (Table I)

Table I: Demographic characteristics of study population

	PATIENTS UNDER RT (N=30)	CONTROL (N=30)
Age (Mean)	55.4	46.13
Sex		
Male	22(73%)	
Female	8(27%)	
Ipsilateral ears	30	
Right	18	
Left	12	
Contralateral ears	30	
Right	12	
Left	18	
Site of cancer		
Oral Cavity	9	
Oropharynx	7	
Larynx/pharynx	8	
Esophagus	5	
Stage of disease		
Stage I	5	
Stage II	14	
Stage III & IV	11	

Radiation toxicity assessment grade: Using NCI-CTC, we clinically evaluated the irradiated cases and found 40% of cases in grade II, followed by 27% cases in Grade III. (Fig. 1)

Radiation induced ear morbidities: The commonest ear morbidity noted was pain, seen in 26 patients (86.6%), followed by hearing loss in 24 patients (80%). Radiation dermatitis, OME and ulceration of external ear were other common presentations. (Fig. 2)

Tympanometric evaluation of middle ear:

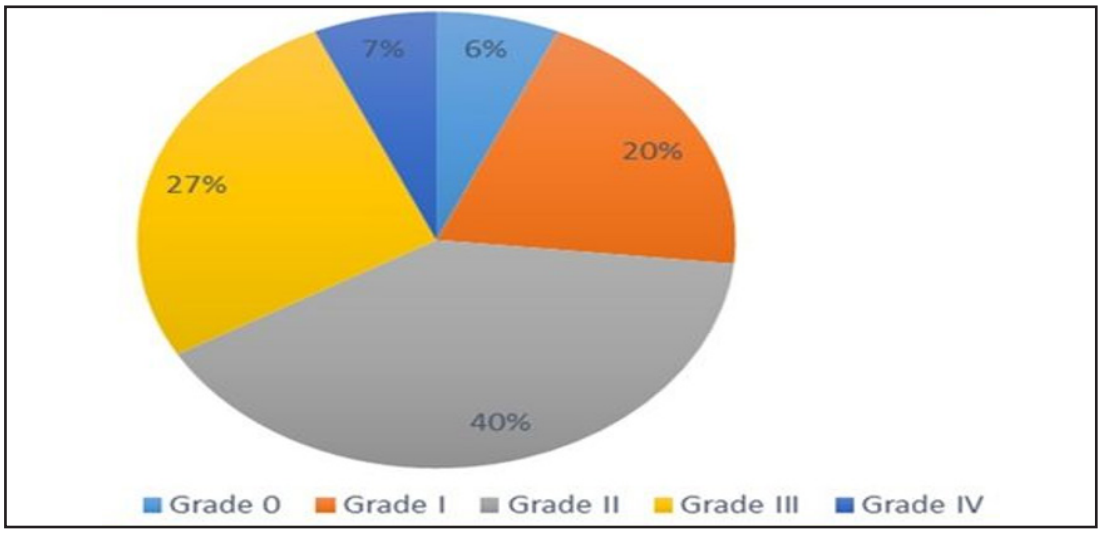

Fig.1. Radiation toxicity assessment grade (NCI-CTC) in study population

Tympanometry curves Type B & Type C were seen in 40% and 20% cases respectively in RT-exposed ears. Fisher's Exact Test showed p value of 0.196 which was not significant. The Relative Risk was calculated to be 0.6667 and 95% Confidence Interval of 0.3936 to 1.129 (Table II)

Discussion

RT is one of the mainstays of treatment for HNCA. Whole or parts of the auditory system receive high doses of RT thereby causing various RT-induced injuries to the external, middle and inner ear.[3] We assessed the effect of radiation on the external ear and middle ear in 30 (thirty) HNCA patients. These cases received RT with once-daily fractionation with the fraction size of 200 cGy receiving a total radiation dose of 65-70 Gy at

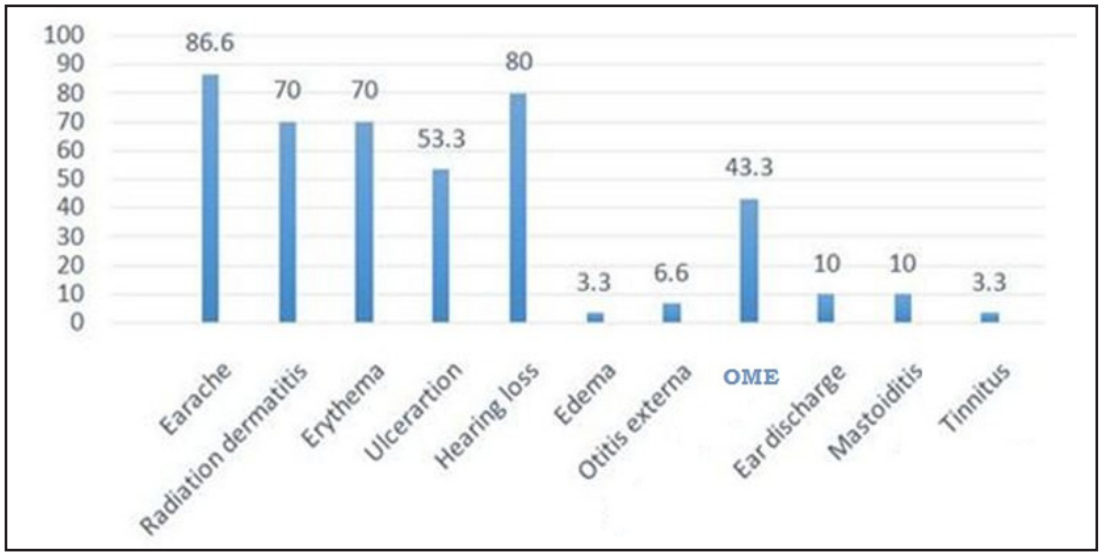

Fig.2. Spectrum of post RT condition of the ears

Table II : Tympanometry results in patients undergoing RT.

TYPE OF CURVE	A	B	C	P VALUE(<.05)
Ipsilateral				
Pre-RT	**18**	**8**	**4**	**0.1213 (ns)**
Post-RT	**12**	**12**	**6**	
Contralateral				
Pre-RT	**18**	**8**	**4**	**0.7075(ns)**
Post-RT	**16**	**10**	**3**	

completion.

Although there are a number of toxicity assessment methods reported in literature, we used the National Cancer Institute Common Toxicity Criteria Grading system (NCI-CTC). Scoring systems like Radiation Therapy Oncology Group (RTOG) criteria and Late Effects of Normal Tissue/Somatic Objective Management Analytic (LENT/SOMA) scoring system are generally suited for late effects which were not assessed in our study. There are also several limitations in this system like lack of distinction between external, middle and inner ear toxicity and too narrow hearing loss category.[2]

The CTC grading has been reported in chemotherapy studies and its use in radiation toxicities is a new application that was taken up in our study. CTC Grade II was the commonest in our study (40%) followed by Grade III (26.6%) (Fig 1). This points to the fact that more than half of the irradiated cases had some form of toxicity like radiation dermatitis, earache, middle ear effusion or hearing loss. We observed that clinical assessment of radiation toxicities using the CTC Grade was beneficial in the comprehensive work-up of the patients and helped to categorise the severity of the different ear toxicities. This system was also practically easy for use by allied health workers involved in cancer care and can be easily interpreted.

External ear morbidities include reactions involving the preauricular region, the auricle, and the external auditory canal (EAC).[3,4] In our study, about 86.6% cases suffered from pain in and around the ear followed by hearing loss (80%), which may be conductive (70%) or sensorineural (30%) (Fig 2). Acute reactions commonly encountered during RT included otitis externa, erythema, dry and moist desquamation, and ulceration of the skin of the pinna and the EAC resulting in mild to severe pain and otorrhea. Radiation may induce osteitis and vasculitis of the surrounding soft tissue of the EAC, deep ulceration of the EAC, and osteonecrosis leading to refractory otitis externa. Damage from osteoradionecrosis to nearby structures may be due to the patients' predisposition to aggressive or chronic infectious processes or tissue destruction by the necrosis.[9]

Pre-existing otitis externa or localised but progressive infections may result from bone necrosis with persistent suppuration. Some studies reported life-threatening complications such as multiple brain abscesses, internal carotid artery aneurysm, aggressive EAC cholesteatoma, sigmoid sinus thrombosis, and otitic meningitis associated with temporal bone osteonecrosis.[10] The incidence of mastoiditis in our study was 10%. However, tinnitus was seen in only 3.3 % cases as compared to 16.2% in other studies5. Although morbidities associated with the inner ear also include a wide variety of manifestations such as labyrinthitis, canal paresis and vertigo/balance problems, we did not encounter any such toxicities in our study subjects. Another study demonstrated statistically significant difference in incidence of toxicity (67%, p = .0085) in patients receiving cochlear dose of greater than or equal to 60 Gy, in comparison to less than 60 Gy (Table I).[11]

In the middle ear, eustachian tube dysfunction and otitis media with effusion (OME) remained the most common complications (43.3%). Type B tympanogram was obtained in 40% of Post-RT cases and Type C curve was seen in 26.6% cases. However, these findings were not statistically significant (Table 2). Some studies reported that Type B curve can be a prognostic factor for significant sensorineural hearing loss (SNHL) than those with type A tympanograms (88% versus 15%, p = .02).[11] Thickening of the tympanic membrane (TM) with sclerosis and perforation in addition to middle ear fibrosis and/or ossicular atrophy has also been reported in higher doses of RT.[11] We found active mucosal otitis media in 10% cases which is due to TM perforation and persistent otorrhea. This follows fibrovascular granulation tissue proliferation, sometimes with inflammatory polyp formation6. RT induced changes in the mucosa of mesotympanum shows marked changes in the epithelium, connective tissue and endothelial cells of blood capillaries. Some studies reported that the prevalence of middle ear complications decreases at 10 years after RT due to resolved inflammatory reaction and improved Eustachian tube function.[12]

Conclusion

Despite the functional consequences, radiation induced otological injuries remain under-evaluated and under-reported. Our study validates the need for formulating otological diagnostic strategy & therapeutic measures in patients receiving RT to mitigate post-irradiation ototoxicities. We suggest routine evaluation of the auditory system during radiation therapy as early detection & prophylactic measures will improve the quality of life in such group of patients. As post RT ear morbidities were noted in a good majority of HNCA patients, adopting CTC grades in the evaluation for ototoxicity alongwith tympanometry assessment should be routinely considered in the follow-up of HNCA cases receiving radiotherapy.

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Main Article

Cerebrospinal Fluid Leak in Transnasal Transsphenoidal Surgery for Pituitary Adenoma and its Management

https://doi.org/10.47210/bjohns.2021.v29i1.409

Sanajeet Singh,[1] Ravi Roy,[1] Vaibhav A Chandankhede,[1] Sunil Goyal,[1] M S Sridhar,[2] Devendra Kumar Gupta[1]

ABSTRACT

Introduction

Over the past few decades endoscopic transnasal transsphenoidal (ETNTS) approach has been practised for excision of pituitary tumours which has minimised the rate of complications and morbidity. However, cerebrospinal fluid (CSF) leak remains a frequent complication requiring efficient management. Various skull-base repair techniques have been described in the literature all along, but there is no universal protocol for the same. Our study aims to determine an ideal strategy for skull-base repair following ETNTS surgery and suggest a protocol at the tertiary centre for the same.

Materials and Methods

In this prospective study, patients with pituitary adenoma undergoing ETNTS excision from January 2017 to May 2019 were included. Data were collected based on the intraoperative findings of grade of CSF leak following excision, surgical method for skull-base repair, biomaterials used, and recurrence of CSF leak postoperatively and its management.

Results

A total of 141 patients between 10 to 74 years of age (mean age 42.6) underwent ETNTS excision of pituitary adenoma. Intraoperative CSF leak was observed in 30.5% patients with 14.1% of grade I, 8.5% of grade II and 7.8% of grade III and repair was done with fat closure, multilayer closure and with naso-septal flap, respectively. Postoperative recurrence of CSF leak was found in 2.83% of total cases and 9.3% of patient with intraoperative leak, which were managed appropriately. Overall closure rate was 100% with no further recurrence of CSF leak.

Conclusion

Surgical repair of skull-base in CSF leak is challenging and requires management in careful and graded fashion for favourable outcome.

Keywords

Pituitary Adenoma; Endoscopic Surgery, Transnasal Transsphenoidal; Cerebrospinal Fluid Leak, Grades; Skull Base Repair Techniques

In the late 20th century, endoscopic transnasal transsphenoidal (ETNTS) approach was first used as a method for excision of the pituitary tumours.[1] Since then it has evolved as a preferred method for excision of the sellar and parasellar lesions, as well as for the repair of skull-base. The advancement in better optics and high-definition technology has enhanced the effectiveness in outcome, hence it has become the method of choice for surgeons over transcranial approach.[2] ETNTS gives safe and direct access to the site of tumour causing comparatively less morbidity. However, cerebrospinal fluid (CSF) leak is an established and grave complication associated with the procedure following excision of the tumour that warrants instantaneous management.[3] There are various techniques for skull-base repair, but there is no universal protocol for repair after ETNTS excision of

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the pituitary tumours. The surgical repair of the skull-base and closure of the CSF leak requires appropriate strategy individualised depending on the eventuality in each case. We aim to determine the ideal strategy for repair of the skull-base following ETNTS excision of the pituitary tumours and suggest a protocol at tertiary care centre for the same.

Materials and Methods

A prospective study was performed jointly at Department of Otorhinolaryngology Head and Neck Surgery and Department of Neuro-surgery of a tertiary centre in North India, after the approval of the institutional ethics committee. All patients of pituitary adenoma undergoing ETNTS excision from January 2017 to May 2019 were included in the study. Patients undergoing microscopic TNTS and medical management were excluded.

Our aim was to determine the strategy for the skull-base repair following ETNTS excision of the pituitary tumor depending on the grades of CSF leak. The objectives of this study includes.

1. to grade the intraoperative CSF leak during ETNTS, and repair the skull-base following excision of the tumour;

2. to evaluate recurrence of the CSF leak postoperatively; and

3. to suggest a protocol at the tertiary centre for skull base repair based on our institutional experience.

After preoperative examination and evaluation of the patients for the symptoms, data were collected including age, gender, complaints, imaging studies, and per-operative findings. Contrast-enhanced magnetic resonance imaging of brain and computerised tomography scan of nose and paranasal sinuses of the patients undergoing ETNTS were analysed and preparedness for the anticipated CSF leak was done.

Standard operating procedure was followed under general anaesthesia for TNTS excision of pituitary tumours, with 4 mm 0° rigid endoscope. After the excision of the tumour, CSF leak, if any, was assessed intraoperatively under direct vision and grading of the leak was done as mentioned in the Table I.[4]

Table I: Grade of CSF leak[4]

GRADE	DESCRIPTION
0	No leak
I	Small weeping leak on Valsalva manoeuvre
II	Moderate leak
III	Large leak

Closure was done using various methods and materials depending on the grade of CSF leak encountered. The autologous graft materials included fat harvested from the thigh or abdomen; abdominal fat was used in cases requiring only fat for closure. Other autologous grafts used in our patients included tensor fascia lata (TFL), pedicled nasoseptal (Hadad's) flap and septal cartilage harvested. Biomaterials like tissue glue (Tisseel®), surgicel and gelfoam were used. Donor sites (abdomen and thigh) for fat and TFL was closed in layers.

Grade 0 CSF leak was managed without any closure and only surgicel was placed in the sellar cavity. Grade I CSF leak was repaired using fat alone with surgicel and tissue glue as required. Multilayer closure using fat, TFL, surgicel and tissue glue was done in Grade II CSF leak. Grade III CSF leak was managed by closure with multilayer and naso-septal flap as required along with surgicel and tissue glue. After closure of the CSF leak, nasal cavity was packed with merocel nasal pack, which were removed after 72 hours.

Postoperative CSF leak was observed in few patients. Patients who had recurrence of CSF leak were managed with combined gasket closure technique using septal cartilage, naso-septal flap and augmenting it with multilayering of fat and TFL. In 4 patients lumbar drain was used, of which one had Grade II CSF leak while the other 3 had Grade III leak.

Results

A total of 141 patients who underwent ETNTS were included in our prospective study from Jan 2017 to May 2019. The patients belonged to the age ranged between 10 to 74 years with the mean of 42.6 years. Eighty-

Table II: Types of CSF leak, its repair and outcome

GRADE OF LEAK	N	TYPE OF REPAIR	RECURRENCE OF CSF LEAK (N)	SUCCESSFUL CLOSURE WITH PRIMARY SURGERY	CONSERVATIVE MANAGEMENT	METHOD OF REPAIR IN RECURRENCE	RE-RECURRENCE (N)	OVERALL CLOSURE RATE
0	98	No	0	98	-	-	0	100%
I	20	Fat	0	20	-	-	0	100%
II	12	Multilayer	1	11	1 x Lumbar drain	-	0	100%
III	3	Multilayer	2	1	2 x Lumbar Drain	1-Hadad's flap, 1-Gasket	0	100%
	8	Hadad flap	1	7	1 x Lumbar drain	1-Gasket		
Total	141	-	4	137		-	0	100%

seven patients were male, and there was marginal male preponderance, with male: female ratio of 1.6.

In our study, intraoperative CSF leak was observed in total of 30.5% patients (n=43), with 14.1% (n=20) of grade I, 8.5% (n=12) of grade II and 7.8% (n=11) of grade III. (Table II)

The various closure method used for intraoperative CSF leak were fat closure in 46.5% (n=20) of patients with grade I CSF leak; patients with grade II CSF leak 27.9% (n=12) required multilayer closure using fat, TFL and other biomaterials, wherein few patients (n=3) with grade III CSF leak were also repaired with the multilayer technique; Hadad flap was used in 18.6% (n=8) of patients with grade III CSF leak. No patient had donor site complication such as haematoma or wound infections.

The postoperative recurrence of CSF leak was found in 4 patients (2.84% of total and 9.3% of patient with intraoperative leak), while no leak was seen postoperatively in patients with no intraoperative CSF leak. All 4 patients with post-operative recurrence of CSF leak were initially managed conservatively, of which only one resolved, [Table II]. Remaining 3 patients were managed with either Hadad Flap or Gasket Technique [Table II]. Overall closure rate achieved after repair of recurrence of CSF leak was 100% with no re-recurrence with a follow-up of ranging from 6 to 18 months.

Lumbar drain was used in 4 patients with postoperative CSF leak during the initial period of this study. One patient recovered, while the other 3 developed meningitis. Thereafter the use of lumbar drain was discontinued at our centre.

Statistical comparison (Table III) using Fisher's exact test, in grade III CSF leak of recurrence with the type of closure was found not significant (p=0.151) in our study, however, studies needs to be carried out with larger sample to obtain true significance.

Discussion

In our study of 141 Indian patients who underwent ETNTS excision of pituitary adenoma, the incidence of intraoperative CSF leak was 30.5% which is comparable to the present literature (11.5 % to 37.4%), but most of

Table III: Statistical comparison in grade III CSF leak

GRADE OF LEAK	N	TYPE OF REPAIR	RECURRENCE OF CSF LEAK (N)	SUCCESSFUL CLOSURE WITH PRIMARY SURGERY	P-VALUE (FISHER'S EXACT TEST)
III	11	3 x	2	1	0.151
		8 x Hadad flap	1	7	
Total	11		3	8	

Table IV: Proposed protocol for skull--base repair in CSF leak following ETNTS excision of pituitary tumours

GRADE OF CSF LEAK	CLOSURE METHOD
0	Surgicel
I	Fat
II	Multilayer
III	Hadad flap
Recurrence	Combined Hadad's flap + Gasket technique

them are analysed retrospectively whereas our study was conducted prospectively.[1,5-7]

Postoperative recurrence of CSF leak was 2.83% (n=4) in our study which is low compared to the existing published data (11.5%).[1,8] Recurrence of the high-low CSF leak such as grade II and III required a step-up closure method which includes use of Hadad flap and gasket method using septal cartilage buttress. Donor sites such as abdomen and thigh for fat and TFL did not have any complication such as hematoma or infection.[9]

No postoperative CSF leak was found in patients with intraoperative grade 0 CSF leak which is significant.[5] No CSF leak was seen postoperatively in patients with no intraoperative CSF leak which is contradictory with the literature.[8,10]

Also, in our study use of only fat for repair of grade I CSF leak was sufficient without any postoperative leak rather than an overdoing repair as described in literature such as multilayer method or dural graft repair.[10,11]

In grade II CSF leak, multilayer method was adequate with minimal (n=1) recurrence rate. Grade III CSF leak required a robust repair with cartilage buttress in recurrence cases.[12,13] Hadad flap repair was found to have more successful closure with single recurrence.

Multilayer method sufficed the repair technique for most cases of high-flow CSF leak. However, augmentation with the Hadad flap showed a fair outcome in our study and reduced the recurrence rate. It is comparable with the present literature.[13,14] Moreover, Hadad flap can be used with caution and maybe preserved for situations of CSF re-leak.[15,16] Its restricted use can help in reducing the morbidity as well.

Intraoperative use of lumbar drain was not necessary as mentioned in literature preoperatively or intraoperatively. Use of lumbar drain in our study showed significant rate of meningitis which is consistent with the present literature of 25% for different grades.[17,18] Hence it can be discouraged as a part of management in post ETNTS CSF leak. Overall successful closure rate was comparable and significant.

In view of the above, considering a significant sample size of the study and the outcome achieved, we propose a protocol for repair of skull-base following ETNTS excision of pituitary tumour in Table IV.

Conclusion

Surgical repair of skull-base in CSF leak is challenging. It has to be managed careful and graded fashion to gain a favourable outcome, reduced hospital stay and less morbidity to the patient, eventually improving the quality of life. Endoscopic repair of the sella following excision of the pituitary tumour has been found to have the desired outcome although there is a learning curve for the surgeon.

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Main Article

A Comparative Study between the Efficacy of Intratympanic Steroid Injection and Conventional Medical Treatment in Resistant Cases of Otitis Media with Effusion

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ABSTRACT

Introduction

Otitis media with effusion (OME) is a multifactorial disease and the treatment options for it are limited and controversial. The aim of the present study was to compare the efficacy of intratympanic steroid injection and conventional medical treatment in resistant cases of OME with hearing loss.

Materials and Methods

A comparative study was conducted among 20 patients of OME with hearing loss, resistant to conventional medical treatment between December 2019 to November 2020. 'Intratympanic dexamethasone injection' (ITDI) was given every week for 3 consecutive weeks to one group and the other group continued to receive medical treatment. Hearing was assessed by performing pure tone audiogram before every ITDI and also at 12 weeks follow up after completion of treatment.

Results

Hearing improvement was found to be better in the group which received ITDI (Mean AC-PTA hearing gain = 22.88 dB) than the group where conventional medical treatment was continued (Mean AC-PTA hearing gain = 6.83 dB).

Conclusion

Intratympanic dexamethasone injection has significantly better outcome in term of improvement of hearing loss in resistant cases of OME than conventional medical management, and is an effective and safe therapy.al.

Keywords

Otitis Media with Effusion; Injection,Intratympanic; Dexamethasone

The Otitis media with effusion (OME) is a multifactorial disease. An acute OME is defined by the presence of middle ear effusion for less than 3 weeks, subacute from 3 weeks to 3 months and chronic for more than 3 months. Pathogenesis of chronic OME is more complex than can be explained by a single cause. It probably represents an interaction between genetic predisposition and triggering factors such as infection and allergy.[1,2]

Pathologically, the disease is characterized by secretory transformation of the epithelium lining the middle ear cavity and subepithelial edema, and infiltration of phagocytes and lymphocytes. The fluid in the middle ear cavity may result from either transudation or exudation

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and active secretion from the epithelial cells.[3]

The prevalence of OME varies widely with age. Though the studies on prevalence of OME in different parts of the world are available, similar studies are limited on Indian population, more so in older age group. Kumari MS et al reported a prevalence of OME (16.6%) in a study on south Indian population.[4]

The prevalence of different varieties of OME (acute, subacute, chronic & resistant) could not be found for Indian / eastern Indian population even with extensive search of the literature.

OME is a leading cause of hearing impairment. Early and proper management of OME prevents its consequences. However, treatment of OME remains a controversial issue.[5,6]

Simple myringotomy and aspiration of effusion do not provide meaningful therapeutic results since their healing duration lasts for only a couple of days.[7,8] Currently, middle ear aeration through tympanostomy or ventilation tube (VT) insertion is the management of choice for chronic effusion that does not respond to medical therapy.[9] But, VT insertion may cause adverse effects, such as tube otorrhea, with a reported incidence rate ranging from 29 to 64%.[10,11,12]

Systemic steroids are known to improve hearing levels in sudden sensorineural hearing loss (SSNHL), Meniere's disease and other inner ear diseases. Intratympanic (IT) steroid injection has the potential to achieve higher steroid concentrations in the inner ear while avoiding the systemic side effects.[13]

Cutler et al & Roland et al opined that direct application of steroid into middle ear mucosa through tympanostomy tube or intratympanic injections of dexamethasone (ITD) were also found more effective in the reduction of granulation tissue than antibiotic therapy alone.[14,15]

The aim of the present study was to compare the efficacy of intratympanic steroid injection and conventional medical treatment (Antibiotic, intranasal cortico-steroid, oral anti- histaminic, systemic steroid) in resistant cases of OME with hearing loss.

Materials and Methods

A randomised, prospective, controlled study was conducted in the department of ENT in a tertiary care hospital for a period of one year from December, 2019 to November, 2020. Probability samples by simple random sampling technique has been adopted for the random assignment of the participants to treatment groups in the present study.

The patients aged more than 10 years of age, attending out patient department (OPD) with persistent hearing loss after conventional medical treatment with antibiotics, nasal topical decongestants, intranasal corticosteroid, antihistaminic with or without systemic corticosteroid for a duration of 6 weeks, an otoscopic examination suggestive of OME in one or both ears, pure conductive deafness with normal bone conduction values at 500 Hz, 1 & 2 KHz and B / C type tympanogram, were included in the study.

The patients with mixed hearing loss, familial Muco-ciliary diseases (like- Kartagener's syndrome), sino-nasal pathology (deviated nasal septum, sino-nasal mass etc.), other systemic co-morbidity (hypertension, diabetes mellitus, congestive heart failure etc.) were excluded from the study.

A detailed history of each case was taken, which included chief complaints, history of present illness, history of past illness, family history and personal history and the data was recorded in a proforma. The onset, duration and the progress of the disease symptoms were enquired for, which included deafness, ear blockage or fullness, earache, tinnitus, vertigo and ear discharge, if any. Otoscopic examination of the tympanic membrane and Tuning fork tests were performed in all the cases followed by pure tone audiometry and tympanometry. Anterior and posterior rhinoscopy were done in all the cases to exclude sino-nasal pathology.

The study included 20 patients aged more than 10 years, with resistant OME. They were assigned randomly into 2 groups (10 patients in each group) for the comparative study, after taking written informed consent. In Group A (study group) the patients received intratympanic dexamethasone injection and in Group B (control group) patients continued to receive

Table I: Distribution of age and sex

AGE INTERVAL		STUDY GROUP		STUDY GROUP TOTAL	CONTROL GROUP		CONTROL GROUP TOTAL
		MALE	FEMALE		MALE	FEMALE	
Age (in Years)	11-20	0	1	1	0	0	0
	21-30	2	1	3	5	2	7
	31-40	2	3	5	2	1	3
	41-50	0	1	1	0	0	0
Total (n=20)		4	6	10	7	3	10

conventional medical treatment for another 6 weeks.

Intratympanic steroid injection was given in the outpatient clinic under vision with a binocular microscope. The patient was placed supine and the head turned to the opposite side, the local anaesthesia of the tympanic membrane was achieved with 2% Inj. Xylocaine. Approximately 0.4 – 0.6 ml of dexamethasone solution (4 mg/ml) was loaded into a 1-mL syringe with a long 25-gauge needle attached on it and injected into the tympanic cavity through a hole made in the postero-inferior quadrant of tympanic membrane. The patient was asked to avoid swallowing and remain in the same position for another 10 minutes after injection to allow contact of steroid with the middle ear mucosa. Subsequently, patients received postoperative prophylactic oral antibiotic and if there was no adverse event, were discharged on the same day of the procedure. These injections were repeated once a week for 3 consecutive weeks.

In Group B, patients received conventional medical therapy for 6 weeks, consisting of antibiotic, intranasal corticosteroid, oral antihistaminic, systemic steroid etc.

All the patients were followed up at 1st week (before initiation of therapy) and at 2nd, 3rd & 12th week by pure tone audiometry. In pure tone audiometry, air conduction pure tone average (AC-PTA) at speech frequencies (0.5, 1 & 2 KHz) were recorded for all the patients at every visit. The hearing gain at 12th week in comparison to 1st week were calculated. The results of both the groups were compared and statistically analysed with the help of students unpaired t-test.

Tympanometry were done in both the groups at 1st week & at 12th week and percentage of change from type B / C to type A / As tympanogram were calculated and compared.

OME resolution (disease-free status) was defined as the disappearance of aural fullness, normal findings on otoscopy, improvement in hearing as less than or equal to 20 dB AC-PTA and type A tympanogram. Patients were also evaluated for complications such as tympanosclerosis, otorrhea, and persistent TM perforation.

Results

Total 20 cases of resistant OME with hearing loss were analysed in the present study. All the patients presented with hearing impairment and aural fullness (100%) as their chief complaints. Tinnitus (20%) and intermittent earache (10%) were other associated complaints.

The mean age of cases in group A was 31.9 years and 29.1 years in group B, with a range from 15 to 45 years. Among 20 cases, 11 (55%) were males and remaining 9 (45%) were female, with a Male: Female ratio of 1.22:1. (Table I)

On otoscopic examination, no significant abnormality was found in external auditory canal. The tympanic membrane was dull with loss of light reflex and mobility in all the cases. Grade I retraction of the tympanic membrane was seen in 20% of the ears.

The patients of group A (n=10, ears=17) were treated with ITDI and group B (n=10, ears=15) patients

Table II: Ears affected with resistant OME

GROUP	AFFECTED EAR			TOTAL NO OF EARS
	LEFT	RIGHT	BILATERAL	
Group – A (n=10)	1	2	7	17
Group – B (n=10)	3	2	5	15

continued receiving conventional medical treatment. (Table II)

All the cases were observed for 3 months in this study. There were no signs of perforation, persistent otorrhea or other complications in any of the patients.

Results were evaluated with pure tone audiometry in 1st, 2nd, 3rd week and at the end of follow up period (12th week) after the treatment. 15 ears (46.88 %) presented with moderate conductive loss i.e. with 30-45 dB of Air Bone Gap at speech frequencies. Severe conductive loss was present in 13 ears (40.63 %) and mild in 4 ears (12.5 %).

The mean air conduction pure tone average (AC-PTA) at speech frequencies improved at 12th week by 22.88 dB in group A and by 6.83 dB in group B in comparison to 1st week. The hearing gain in the study group (Group A) were found to be extremely statistically significant in comparison to the control group (Group B). (Table III)

Tympanometry was done in all patients at 1st week and at 12th week to compare middle ear compliance, middle ear pressure and the curves. All the patients had either type B / C curve at the initiation of therapy i.e. at 1st week. Among 17 ears (n=10) of group A, type B / C curve changed to type A / As curve in 13 ears (76.47 %). Whereas in group B (n=10), only 7 out of 15 ears (46.67%) were found to have changed from type B / C to type A / As curve. (Table IV)

Discussion

Otitis media (OM) is the commonest childhood disease after viral upper respiratory infections (VURI). Unlike Acute Otitis Media (AOM), it does not exhibit acute infection symptoms, and it is the inflammatory response of the middle ear that is defined by effusion in the tympanic cavity.[2]

Han et al. have claimed that an intratympanic injection of dexamethasone can be used as a line of treatment in OME. In their study on 84 patients with OME of no more than 2 months duration, it was reported that both oral administration and an intratympanic injection of glucocorticoid are effective for the treatment of OME.[16]

Paksoy et al. carried out a study on 64 patients of OME, who had been treated previously either by medical or by surgical therapy without resolution. Half of their patients had received another course of medical treatment as a control group and the other half was administered 0.5 ml dexamethasone once weekly for 4 weeks. They noticed more improvement in patients in the study group than the control group.[17]

Table III: Mean AC-PTA at different visits and Hearing gain (in dB) at 12th week in comparison to 1st week.

GROUPS	MEAN AIR CONDUCTION PURE TONE AVERAGE (AC-PTA)				MEAN AC-PTA HEARING GAIN	P VALUE
	1ST WEEK	2ND WEEK	3RD WEEK	12TH WEEK	(AT 12TH W`EEK IN COMPARISON TO 1ST WEEK)	
Group – A	46.89	37.74	29.84	24.01	22.88	Less than 0.0001
Group – B	41.07	38.54	35.99	33.73	6.83	

Table IV: Comparison of tympanogram before and after intervention at 12th week

GROUPS	TYMPANOGRAM				CHANGE FROM TYPE B / C TO A / As
	1ST WEEK		12TH WEEK		
	B / C	A / As	B / C	A / As	
Group A (Number of Ears)	17	0	4	13	76.47%
Group B (Number of Ears)	15	0	8	7	46.67%

Cutler et al. and Florea et al. performed experimental study in an animal model and reported that intratympanic steroid injections reduced lipopolysaccharide, which induces middle ear effusion. They also suggested that their results supported the current use of anti-inflammatory ototopical such as corticosteroids, in the treatment of inflammatory middle ear disease, thereby avoiding systemic side effects.[14,18]

Several studies have concluded that intratympanic injection of long acting steroids is more effective than conventional therapy in the reduction of hearing loss and middle ear pressure.[15,19]

A short course of oral prednisolone is not an effective treatment for most children aged 2–8 years with persistent otitis media with effusion, but is well tolerated.[20]

In the present study, the patients who have received intratympanic steroid injection showed significant hearing improvement compared to the control group who have received conventional medical treatment.

Conclusion

Otitis media with effusion is a multifactorial disease and treatment options for OME are limited in the form of medical treatment, myringotomy with aspiration of fluid and ventilation tube insertion for chronic cases.

We have presented results of intratympanic injection of dexamethasone, which is a safe and effective method for early resolution of resistant cases of otitis media with effusion. Improvement of hearing and tympanogram was found to be better in the group which received ITDI than conventional medical treatment. No complications like tympanic membrane perforation and / or sensory neural hearing loss was seen.

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Main Article

Understanding and Analyzing Prescribing and Prescription Errors in Outpatient Setting of a Medical College Hospital ENT Department

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ABSTRACT

Introduction

A medication error is a failure in the treatment process that leads to, or has the potential to lead to, harm to the patient. In the hospital OPD, errors can occur in deciding on the medication to be prescribed (prescribing error) or in writing the prescription (prescription error).

Materials and Methods

We analyzed 100 prescriptions and case sheets in the OPD of ENT department in a tertiary medical college hospital for a period of one week for errors and assessed the perceptions and attitudes of the residents of the department using a questionnaire.

Result

Several prescription writing errors were found, primarily failure to document non pharmaceutical patient advice and use of generic names. Four prescribing errors were noticed which did not need urgent intervention.

Discussion

Failure modes and effects analysis was done to rank the failures modes; and causes for failure were elucidated using Ishikawa Diagram. Recommendations for preventing errors were made based on these results.

Conclusion

This study illustrates the use of management techniques to identify errors and formulate appropriate preventive responses. Such techniques should be a part of ongoing departmental management; and they provide insights into improving resident training in an ENT residency program.

Keywords

Drug Prescriptions; Prescription Audit; Medication Errors; Treatment Failure; Descriptive Counselling

A medication error is a failure in the treatment process that leads to, or has the potential to lead to, harm to the patient.

Medication errors have been in the limelight following several important reports including the National Patient Safety Agency Report 2004 (UK) and the IOM Report 2000 (USA).[1]

In India, in the inpatient sitting, previous studies have observed medication errors to affect about 8.2% of inpatients.[2]

The U.S. Food and Drug Administration (FDA) receives more than 100,000 U.S. reports each year associated with a suspected medication error.

Medication errors can occur in prescribing, prescription writing, manufacturing, dispensing, administering

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medication or monitoring of therapy.[3]

A significant amount of literature about medication errors is based in the hospital setting, but these studies show variations in the type of clinical problems, classes of medications used and organization of services. This means that - the risks and the solutions required to prevent these er-rors or mitigate the risks will be different in different situations.[4]

It is our observation that at our outpatient department (OPD) majority of outpatient pre-scriptions are written by resident postgraduate students / interns working under the supervision of the faculty. No electronic medical record (EMR) or prescription writing software is used.

A methodology called failure modes and effects analysis (FMEA) is a helpful tool for iden-tifying and prioritizing errors that could occur in a process, rather than just reacting after an inci-dent has occurred. FMEA is already commonly used in hospital transfusion medicine and pharma-cies but can be used to improve any process. To create an FMEA, we brainstorm all of the different errors that could occur in an area or a process.[5,6]

Finding the root cause of a problem is important to devise solutions for preventing errors and solving the problem. When we have many causes leading to errors, standard tools like fish-bone diagram – also known as Ishikawa diagram can be used to simplify and classify the causes. A fishbone diagram is useful for breaking down a complex problem.[7]

The Medical Council of India (MCI) – from time to time- had issued guidelines for pre-scription writing, and also has issued a model prescription format for medical professionals prac-ticing allopathy in India. Although there have been observed deviations from norms observed in previous studies, the elucidation of cause and failure modes analysis in a medical college setting in our country was not found on literature search.

This study aims to identify, classify and analyze the prescribing and prescription errors at Otorhi-nolaryngology (ENT) OPD along with identifying perceptions of resident doctors about prescrip-tion writing to formulate recommendations for solving identified problems.

Materials and Methods

This observational study (Audit) analyzed the data from100 consecutive prescriptions and case sheets of patients treated on OPD basis at Department of ENT at a tertiary care medical college hospital in a metropolitan city of South India - over a period of two weeks were photographed be-tween the second to third week of March 2020 and analyzed to identify prescribing and prescrip-tion errors compared to MCI model prescription[8], institutional prescription guidelines[9], standard textbooks and standard practice.

All the postgraduate resident students of the department of ENT (n=10) were asked for their feed-back and inputs by survey.

Methods of Analysis: Simple measures of central tendency and proportions were used to analyze the data. Failure Modes and Effects Analysis (FMEA) table and Ishikawa diagram were used to analyze the failure modes and causes respectively.

Sampling and Sample size considerations: 102 consecutive prescriptions and case sheets in ENT OPD during the study period were photographed for the study. Two were excluded as the photo-graphs were blurry and not readable. Remaining 100 prescriptions were analyzed. Due to low number of outpatients during the study period, entire population was included in the study and random sampling was not done. Over a longer time period, the selection of the participants can be considered as a systematic convenience sampling. Audits are to be conducted repeatedly to correct identified errors and monitor the quality of work.

Ethical Considerations: No experimentation was done on humans in this study. The study was done as an academic and quality monitoring audit at the institution. Data obtained was from patient pre-scriptions and case records and no patient identifiable information is used. The primary investiga-tor constantly monitored the data being collected for significant errors. Consent was obtained from the residents to share the information obtained by personal interaction and questionnaire.

Results

Ninety nine percent (99%) of the prescriptions had appropriate patient identifying infor-mation. One prescription had incomplete patient identifier and only name was written. Of the pre-scriptions 3% had missing or incomplete date.

Thirty eight percent (38%) prescriptions were written in capital letters, 40 were written in cursive hand but were legible without any problems, 22 prescriptions could be read with little ef-fort. None of the prescriptions were illegible or had problems of confusion with sound-alike medications.

Only 3 prescriptions had generic drug names of the 100 prescriptions studied.

Only one prescription had non pharmaceutical advice documented. All the other prescrip-tions had drug details only.

Only 24 prescriptions had doctor name and Medical Council (MC) number written or im-printed with a seal along with signature. 76 prescriptions had incomplete/ missing doctor identifi-ers.

One each of the following errors in prescription writing were found:

1. Mis-spelt drug name
2. Additional drug in prescription - not mentioned in records

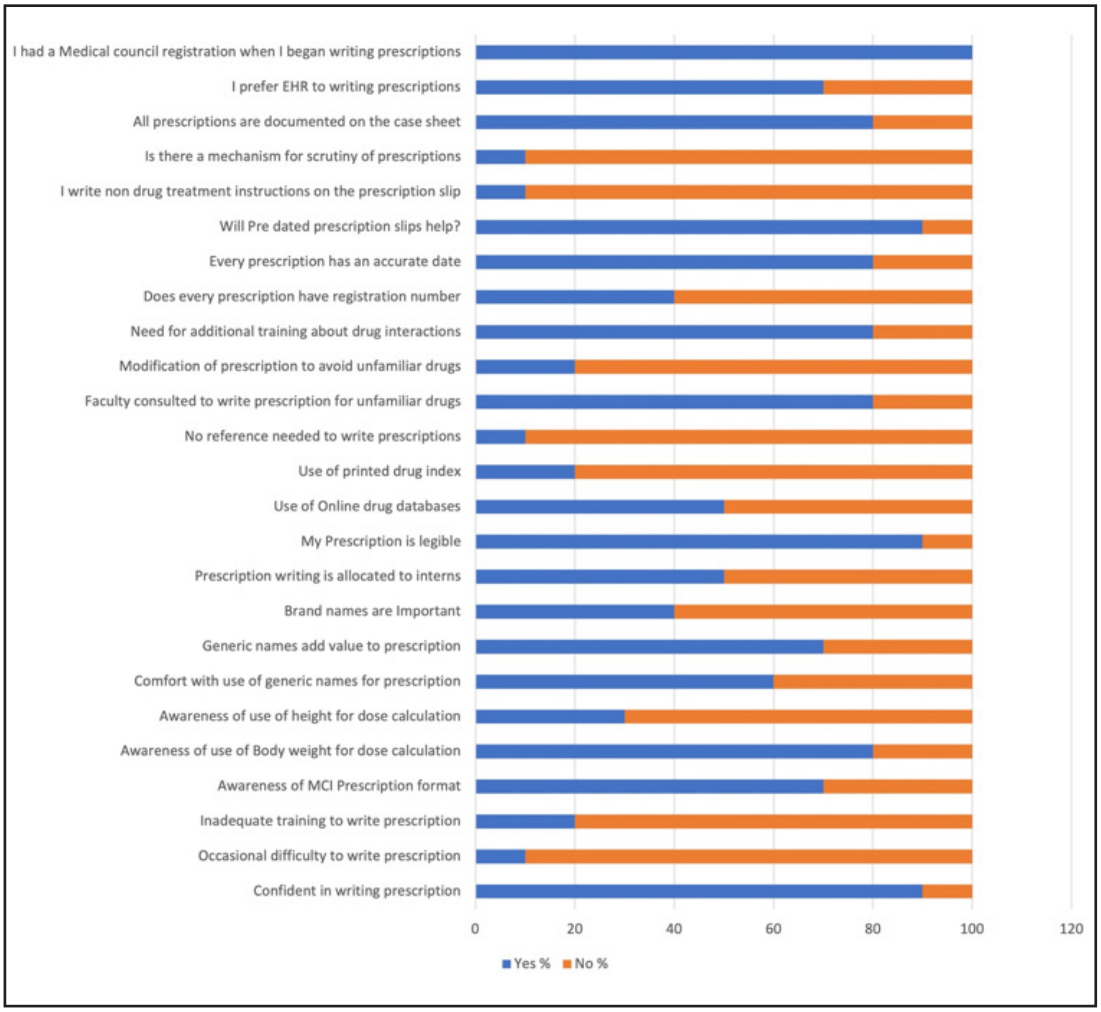

Fig. 1. Residents' perception of prescription writing

3. Additional drug in records - not mentioned in prescription

4. Duration of prescribed drug treatment not written

5. Painkiller drug prescribed on SOS basis but maximum daily dose and dose spacing not mentioned.

Four prescribing errors were found, all were in paediatric age group patients. In all these prescriptions and records weight was not documented and used for dose calculation. In one of these prescriptions and records, there was no justification documented for use of non-standard an-tibiotic as compared to departmental protocol. In two of these prescriptions, maximum dose of an-tihistamine drug was prescribed and reason for the same was not documented. No error which were serious or potentially life threatening was found; hence no urgent corrective action was needed.

No errors of use of abbreviations or non-permitted abbreviations were found.

After initial analysis of the failure modes a survey form was prepared on Google forms and was filled online by all ten of the resident postgraduates of the department of ENT.

The results of survey of postgraduate residents about self-perception and opinion about pre-scription writing are shown in the chart above (Fig. 1).

The most common perception of benefit of using brand names was that it is easy to write for com-bination drugs (90%), followed by perception of control of prescription cost with specified brands (70%), easy recall (60%), easy patient availability (50%), avoidance of confusion (30%), percep-tion of good quality of branded drugs (30%). 30% expressed concerns about issuing errors with ge-neric drugs and 10% distrusted quality of generic drugs.

Discussion

Although a random sampling technique spread out over a period of time would eliminate biases and give a more representative sample, the purpose of the activity was to identify ongoing errors in prescribing and prescription writing, find the cause and give recommendations for inter-ventions to solve the problems found. A longer period of sample collection would defeat the pur-pose of the activity. It is suggested to have prescription audits as an ongoing activity to catch pos-sible failure modes early and have ongoing remedial activities as a dynamic quality improvement and quality sustaining program.

Failure Modes and Effects Analysis was done for all the errors detected and other possible errors not detected. The FMEA table is attached below. Risk priority number (RPN) was assigned by multiplying occurrence which was as per observations mentioned above - percentage reduced to a maximum of 10; as illegible handwriting and drug interactions were other possible failure modes which are possible but not observed occurrence of 0.01 was assumed. Detection score was made subjectively with 1 being not easily detected to 10 being easily detected. For severity of error, Na-tional Coordinating Council for Medication Error Reporting and Prevention (NCCMERP) severity index[10] was available as a tool for ranking severity - however, it was found not to be suitable for this calculation as it correlates severity of error to the effect caused and here the effect of the error was not studied. Hence a subjective rating from 1-10 was used with 10 being most severe and 1 being the least. The FMEA table ordered by descending order of Risk Priority Number is shown in the table (Table I).

Probable causes were attempted to be elicited by personal interactions and survey of the postgraduate residents and the effects are contemplated and discussed. In addition, few additional causes such as difficulty of issuing written instruction in local language were uncovered by the survey.

Although majority of the residents (90%) expressed that they were confident of writing the prescriptions and had received adequate training in writing prescriptions (80%), 30% were not aware of MCI prescription format. All of them wanted additional training in writing prescriptions. This indicates openness to improvement and inadequacy of training of the residents for prescrip-tion writing.

90% of the residents wanted more training about drug interactions and how to avoid them - this seems to be an area to be stressed on in the training program of the residents.

Table I: Failure Modes and Effects Analysis (FMEA)

FAILURE MODE	CAUSES	EFFECTS	OCCURRENCE	SEVERITY	DETECTION	RPN
1. All instructions not written	Prescription paper too small, inadequate time to write, if doctor does not know patient's language - then he/ she cannot write instructions in patient's language.	Patient takes drug incorrectly or does not follow important nonpharmacological advice	9.9	3	10	297
2. Generic drug names not used	Not considered important, not able to recall, patient cost cannot be controlled, difficult to write for combinations.	Increased cost to patient, reduced patient choice, reduced patient access to drugs	9.7	1	10	97
3. Doctor name and MC number not written	Prescription is prepared by junior/intern and not checked; interns do not have MC number stamp	Cannot identify the treating doctor easily for review, pharmacist cannot verify in case of prescription for scheduled drugs	7.6	1	10	76
4. Incorrect dose or duration in children	Body weight/ other dosing considerations not taken, preparations have varying drug concentrations, approximate dosing practice, inadequate familiarity with the preparations	Inappropriate dosing, increased risk of complications or therapeutic failure	0.5	10	6	30
5. Date not written or incorrect	Cannot recall date accurately, Inadequate time to complete prescription, Date field at top of prescription in the printed header	Medicolegal risk, risk of patient refilling prescription, risk of mix-up of medications.	0.3	4	10	12
6. Incorrect dose or duration	Body weight or special conditions not considered, diagnostic uncertainty or error	Increased risk of drug related complications or therapeutic failure	0.2	10	6	12

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Table I (Contd.): Failure Modes and Effects Analysis (FMEA)

FAILURE MODE	CAUSES	EFFECTS	OCCURRENCE	SEVERITY	DETECTION	RPN
7. Mismatch between records and prescription	Forgets to enter record/ prescription as the record is not filled at time of issuing prescription, patient returns after some time of consultation with fresh complaint or demand for medication	Medicolegal risk, risk of further errors of prescription by unavailability of data in records, incomplete therapeutic effect	0.2	5	10	10
8. Drug prescription incomplete	Uncertainty about duration of treatment, Lack of awareness of prescription protocol for SOS medication	Risk of overdosing/ under dosing	0.2	5	7	7
9. Patient identification incomplete	Sticker not available, sticker not printed correctly, patient or doctor unwilling to wait for file, pre prepared prescription issued	Risk of mix-up of prescriptions between patients, risk of missed documentation in case sheet, medicolegal risks	0.1	6	8	4.8
10. Drug interactions not considered	Patient's drug history unavailable/ not asked/ not revealed, Poor knowledge about drug interactions, Newer drug interactions not widely known	Risk of adverse drug reactions	0.01	10	10	1
11. Handwriting is illegible	Doctor in a hurry, poor handwriting and did not use capitals, did not use EHR/ EHR not available	Drug mix-up, drug missed	0.01	4	3	0.12

When in doubt while writing prescription, 80% respondents were comfortable with asking a faculty member or a more senior resident to guide them. Self-help using drug index[11] or looking up online were at 40% and 60% respectively. Having a relatively good access to advice of seniors, few prescribing errors were found. Training regarding use of online prescription aids[12, 13] and drug indexes may be useful in improving confidence and competence of the residents.

Majority of the residents were aware of the required patient identifiers but were unaware of importance of documenting patient data like weight (20%) and height (70%) which are important for optimally prescribing certain drugs whose dosages are body weight or body surface area de-pendent in their effectiveness. Continued awareness improvement and discussion regarding these points may help improve prescribing habits.

Although the Medical Council of India had made it unethical to write prescriptions without generic names[14], it is observed that it is a common practice to use only brand names. Only 3% of the prescriptions studied had drug names in generic. 40% of the residents had some discomfort in using generic drug names although none of them denied the usefulness of writing generic

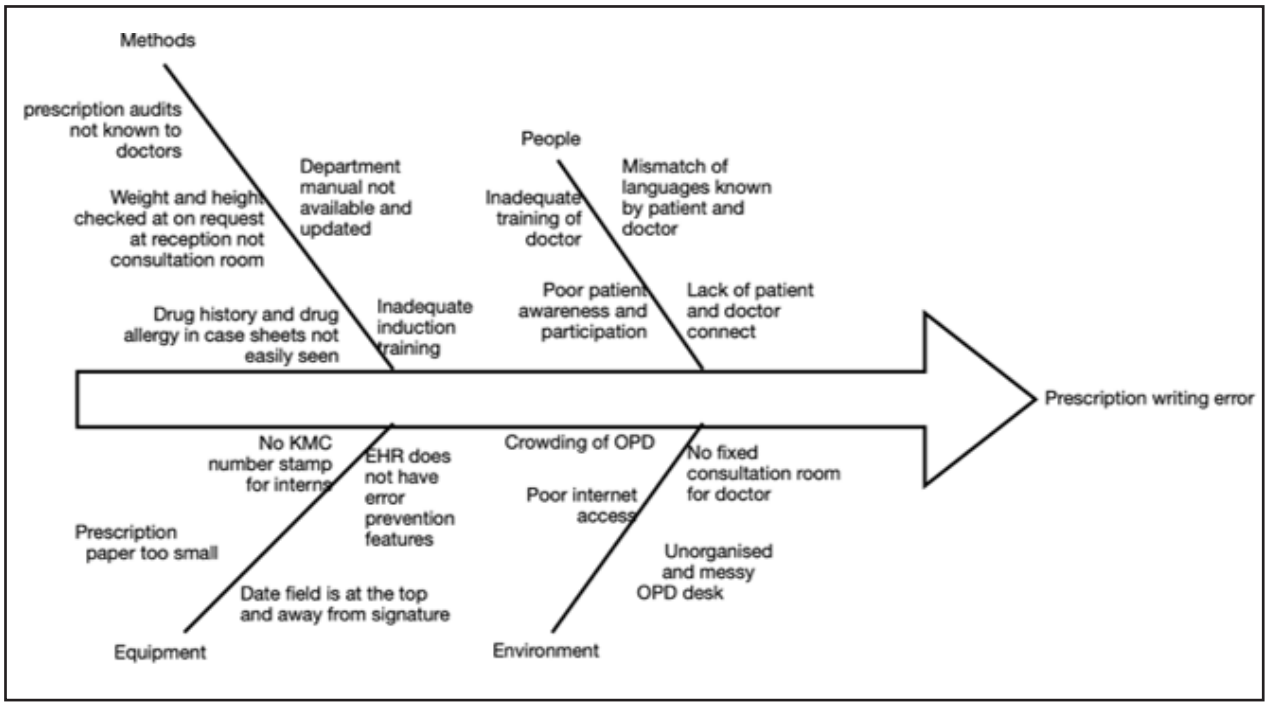

Fig.2. Prescription writing and prescribing error Ishikawa diagram

drug names in the prescription. Common reasons for preferring drug brand names over generic names include difficulty in recalling composition in multi drug combinations, ability to calculate and control the cost of the drugs prescribed by prescribing known brands, difficulty in recall of generic names and availability of generic drugs. These concerns reflect several systemic errors (as already discussed in available literature[15]) in the medical system which need to be addressed to improve use of generic drug names in prescription. Some minor issues also agreed upon were issues of trust in quality of generic drugs, confusions with generic names and lack of trust in the pharmacist to issue correct generic name medication.

The surveyed residents feel that about half of the time they don't write the prescriptions for the patients seen by them and they ask their juniors or interns to write the prescriptions and they also admitted that in such situations they don't always check the final prescription given to the pa-tient. Such delegation of duty may lead to errors creeping in due to communication barriers.[16] Thus the prescription writing training also needs to include all levels of doctors including interns who rotate every 15 days among the departments. Thus, ongoing induction training for interns need to be considered and they should also be issued MC number stamp.

97% of the prescriptions studied had date documented but 20% of the doctors felt that they sometimes miss out writing the date. As a possible intervention to reduce date related errors, ma-jority (90%) were ready to accept date printed prescription slips on which date was printed or stamped before being placed in the OPD.

Although only one prescription had nondrug treatment and advice documented out of the 100 studied, 90% residents said that they sometimes documented the non-drug advice. Some rea-sons elicited with the survey for not documenting all the advice included - too small prescription paper size and difficulty in documenting the advice in a language understandable by the patient. These physical and social limitations need to be considered before recommending any intervention for this problem.

While 74% of the prescriptions studied had missing doctor identifiers (doctor name and MC number), 60%

Table II: Recommendations for Failure Prevention

FAILURE MODE	RPN	ACTION SUGGESTED
1. All instructions not written	297	Increase prescription paper size to letter size from a5 size, prepare and use instruction leaflets for common conditions treated in the OPD and for post-operative care in local languages.
2. Generic drug names not used	97	Additional concerns of the medical professionals need to be addressed to propagate use of generic drug names. As these are systemic errors, correc-tion has to occur at higher level. Brand names may be permitted or stand-ard names to be given to essential fixed combinations like anti cold preparations and cough syrups Generic drug pharmacies may be in-creased in number and made more easily accessible to prevent exploitation of the patient by the pharmacist who may sell more expensive branded drugs to a pa-tient though generic prescription is issued Measures from government/ drugs con-troller of India /generic drugs manufac-turers to doctors to address issues of trust and quality At Institutional level, generic drugs to be stocked in hospital pharmacy - list of the same to be shared to the doctors and above points may be implemented as much as possible at institutional level.
3. Doctor name and MC number not written	76	Interns to be issued MC number identification stamps and included in awareness and training programs for prescription writing. Or else clear policy to be commu-nicated that interns should not write prescriptions. Departmental induction training to be prepared and all new residents, interns and faculty should be trained in prescription writing. At the time of joining MC number stamp to be issued to all the doctors including interns. It may be prudent to organize the workspace to include easy access to the MC number stamp by marking space for the same and ensuring that they are replaced after use. Suggested to allot fixed consultation rooms for doctors – if necessary, by rotation for a reasonable period of time to enable standardization of OPD workspace.
4. Incorrect dose or duration in children	30	“Separate color prescription and file may be considered for pediatric patients and high-risk patients like those with drug allergies or multi system problems. Such pre-scriptions may be checked and signed by two doctors with identification to avoid errors. For high-risk groups, weight of the patient may be doc-umented on the prescription at the department reception before sending the patient inside. Induction training for new doctors to include sensitiza-tion for pediatric and high-risk group prescription writ-ing. Training for use of prescription writing aid software like UpToDate™ or Medscape™ for all doctors. Internet access to be ensured for all doctors in the hospi-tal to enable use of prescription aids/lookup online. Weighing scales and height measuring stand to be avail-able in each OPD room.”

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Table II (Contd.): Recommendations for Failure Prevention

FAILURE MODE	RPN	ACTION SUGGESTED
5. Date not written or incorrect	**12**	**Pre date-stamped prescription papers to be issued with file at reception to the patient. All unused prescription papers to be collected and discarded safely. Prescriptions when printed may be designed to have the date field below the signature field where it will be visible clearly to prevent error of missing the date.**
6. Incorrect dose or duration	**12**	**Induction training for new doctors to include training for prescription of commonly used drugs. Department manual which has treatment protocol to be circulated among all doctors in the department now and at induction. Use of prescription writing aids to be encouraged. Barri-ers for junior residents to approach faculty for clarifica-tions to be identified and addressed.**
7. Mismatch between records and prescription	**10**	**Consider use of non-carbon copy paper / pre inked copy paper for prescriptions which will automatically transfer the written prescription onto the case sheet when placed above the case sheet.**
8. Drug prescription incomplete	**7**	**Consider use of preprinted prescriptions for commonly treated conditions to reduce errors of prescription.**
9. Patient identification incomplete	**4.8**	**Patients not to be seen till case sheet arrives at OPD (but problem is possible increased wait time for patient) - or patient identification sticker printer to be available in OPD to be linked to the registration system to allow printing of stickers of registered patient on demand in the OPD rather than printing stickers at every visit at registration counter and sent with case sheet.**
10.Drug interactions not considered	**1**	**Staff education and training programs to be conducted to improve knowledge of drug interactions. Drug allergy alerts and significant chronic illnesses to be printed in bold on the first page of every outpatient case sheet – this page should not be used for any other documentation.**
11. Handwriting is illegible	**0.12**	**Although all checked prescriptions were legible, few cursive written prescriptions had potential for error of interpretation. All doctors to be encouraged to use capital letters for prescription writing.**

of the residents also admitted that the prescriptions may have these details missing. All those surveyed were aware of these details needed in the prescription.

Two prescriptions had a mismatch with the documentation in the case sheet possible rea-sons include lack of time, patient seen before case sheet arrived and case sheet written later, and patient returns after some time with a request for another drug (e.g. painkiller).

All the residents are experienced with use of EHR at our other associated hospital, yet 30% did not prefer to use an EHR for documenting and printing prescriptions. While electronic records have been proposed as a solution for several prescription error prevention strategies, it has been observed that they come with their own set of limitations and challenges.[17, 18]

Ishikawa (Fishbone diagram) was constructed to organise the causes of prescription writing errors and organise thoughts about the same. (Fig. 2)

Failure prevention and early error identification actions are contemplated to eliminate or reduce the observed failures (Table II).

It is also necessary to have prescription audits which are scheduled, random and ongoing. At present 90% of the doctors felt that the prescriptions were not checked or did not know of any-one checking the prescriptions.

The prescription audit reports may be shared with all doctors to enable recognition of errors and permit improvement of the prescriptions.

Scheduling of OPD visits by giving appointments and displaying estimated waiting time or waiting number will provide enough time to the doctor to see each patient and complete the pre-scription writing. It is also suggested to finish completely the consultation process for one patient before beginning with another patient.

Behaviour change communication and patient awareness posters relevant to the common diseases treated in the ENT OPD to be printed and displayed in the waiting area. Patient rights and responsibilities to be prominently displayed. Information about how patient can participate in his/her own treatment can be designed into posters and displayed in the waiting area. The residents should be exposed early in their training to community problems and given an opportunity to de-velop empathy for the patients.

Many of the errors may be addressed by using appropriate EMR software with error pre-venting mechanisms to detect inappropriate dose and drug interactions. However, the currently available EHR software at our Hospitals[19] does not have error prevention mechanisms. A section of the doctors does not prefer using software for documenting the patient records as shown in the sur-vey (30%). Hence the recommendations made are with a paper-based system in mind.

In addition to RPN, due to the severity of the effects, incorrect dose/duration and drug in-teractions need to be considered as priority for interventions to eliminate the errors.

The recommendations attempt to address the causes contemplated in the fishbone diagram. (Fig. 2)

Conclusion

Prescribing errors and prescription errors are preventable medication errors which can oc-cur in the ENT outpatient department. The errors usually have systemic causes which may be iden-tified by looking for errors, classifying them and analyzing the root cause. In this study, we ana-lyzed the prescriptions and after identifying errors, we identified the root causes – majority of which could be prevented by minor procedural and infrastructure changes. Training of all new res-idents and interns will increase awareness and help reduce the remaining few errors. The frame-work for error prevention and analysis is demonstrated in this paper. Ongoing prescription audits and analyses will improve quality of patient care in the ENT OPD and reduce errors. The goal of such audits should not be to place blame – but to identify and correct the root causes.

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Main Article

Nasal Carriage of Staphylococci among Health Care Workers and Impact of Conventional Decolonisation Methods

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ABSTRACT

Introduction

Staphylococci are one of the most common causes of nosocomial infections. The principal route of transmission of Staphylococci is the contaminated hands of health care workers (HCWs). Staphylococci can also be found as part of the nasal microbiota without causing overt disease. So we undertake the present study to estimate the prevalence of asymptomatic nasal carriage of Staphylococci among HCWs and impact of conventional decolonisation methods in a tertiary care hospital in West Bengal.

Materials and Methods

Nasal swabs were collected from anterior nares of HCWs for culture and antibiotic sensitivity test on day one. HCWs who were found to be carriers of Staphylococci were advised to apply mupirocin ointment to anterior nares twice daily along with chlorhexidine gluconate bath once daily for five days. All HCWs were also advised to practice standard hygiene protocol. All of them were re-tested for nasal swab culture and antibiotic sensitivity on day seven and day twenty eight.

Results

Nasal carriage of Staphylococci in the first, second and third culture report was found to be 64.28%, 7.14% and 24.49% respectively. Cefotaxime, cotrimoxazole and erythromycin were least effective against Staphylococci. There was variable sensitivity to clindamycin, gentamycin and ciprofloxacin. All strains of Staphylococci were highly sensitive to linezolid. All strains of Staphylococci except MRSA were highly sensitive to vancomycin.

Conclusion

The present study re-establishes the fact that HCWs carry Staphylococci in their nose in significantly high proportion. So different measures should be undertaken to minimise Staphylococci related nosocomial infections.

Keywords

Staphylococci; Nosocomial Infection; Health Care Workers; Nasal Carriage; Decolonisation

Nosocomial infections represent an important health problem in terms of morbidity, mortality and cost of treatment. Prevention of these infections is a key priority. Staphylococci are one of the most common causes of nosocomial infections.[1] The principal route of transmission of Staphylococci in the hospital is from patient to patient via the contaminated hands of health care workers (HCWs).[2] Staphylococci can also be found as part of the nasal microbiota without causing overt disease.

This carrier state is an important factor for dissemination from HCWs to patients and vice-versa.[3,4] Another challenge associated with Staphylococci is the development of multidrug resistant strains to various available antibiotics.[5] So we undertake the present study to estimate the prevalence of asymptomatic nasal carriage of Staphylococci among HCWs and impact of conventional decolonisation methods in a tertiary care hospital in West Bengal.

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Materials and Methods

We conducted a prospective study among HCWs over a period of one month from 1st July 2019 to 31st July 2019 in a tertiary care hospital in the northern part of West Bengal. Institutional Ethical Committee clearance and informed consent from each participant were taken. HCWs from medicine ward, surgery ward and critical care unit (CCU) were recruited in the study. HCWs comprised of doctors, nurses and group-D staff. HCWs suffering from fever, upper respiratory tract infection, impetigo, skin and subcutaneous infections, diabetes mellitus, immunocompromisation, were excluded from the present study. HCWs with history of recent nasal surgery, use of nasal antiseptics, or antimicrobial therapy, an MRSA decolonization attempt in the previous 6 months, allergy to mupirocin or chlorhexidine, were also excluded from the study. HCWs who were pregnant, breast feeding, or did not turn up in the follow up were also excluded.

Nasal swabs were collected from anterior nares of the participants using sterile cotton swabs moistened with sterile normal saline on day one. The swabs were then immediately transported with aseptic precautions to the Microbiology laboratory. Specimens were inoculated on 10% sheep blood agar, Nutrient agar and MacConkey's agar plates and incubated overnight at 37˚C. Samples were identified by standard methods based on colony morphology, pigment production, Gram staining, catalase test, slide coagulase test, modified Hugh and Leifson (O/F) test and fermentation of mannitol. All of the isolated Staphylococci strains were tested against different antimicrobial agents by the modified Kirby Bauer disc diffusion method on Mueller Hinton agar following Clinical and Laboratory Standards Institute guidelines. The antibiotic discs used were clindamycin (CLIND) 2mcg, gentamicin (GEN) 10mcg, cefotaxime (CEFO) 30mcg, ciprofloxacin (CIPRO) 10mcg, cotrimoxazole (COTRI) 25mcg, erythromycin (ERY) 15mcg, linezolid (LIN) 30mcg, and vancomycin (VAN) 30mcg. Methicillin resistant Staphylococci were detected by using cefoxitin 30mcg discs.

HCWs who were found to be carriers of Staphylococci in the first culture were advised to apply mupirocin ointment to anterior nares twice daily along with chlorhexidine gluconate bath once daily for five days. All HCWs were also advised to practice standard hygiene protocol including hand washing before and after patient examination, use of sterile aprons, gloves and masks, and avoiding touching one's nose during work. All of them were re-tested for nasal swab culture and antibiotic sensitivity on day seven and day twenty eight.

Results

Total 98 participants were included in the present study. Distribution of methicillin sensitive Staphylococcus aureus (MSSA), methicillin resistant Staphylococcus aureus (MRSA), methicillin sensitive coagulase negative Staphylococci (MS CoNS), and methicillin resistant CoNS (MR CoNS) in the nasal swab culture on day one, seven and twenty eight are shown in Table I. In the first, second and third culture report nasal carriage of Staphylococci was found to be 64.28%, 7.14% and 24.49% respectively.

Comparative distribution of nasal carriage of Staphylococci among the different HCWs in different wards on day one, seven, and twenty eight are depicted in Tables II, III and IV respectively. There were 27 doctors, 58 nurses and 13 group-D staffs in the present study. Nasal carriage of Staphylococci in doctors on day one, seven and twenty eight was 66.67%, 3.70% and 22.22% respectively. Nasal carriage of Staphylococci in nurses on day one, seven and twenty eight was 67.24%, 8.62% and 27.59% respectively. Nasal carriage of Staphylococci in group-D staff on day one, seven and twenty eight was 46.15%, 7.69% and 15.38% respectively. Nasal carriage of Staphylococci among HCWs in medicine ward on day one, seven and twenty eight was 51.22%, 2.44% and 12.20% respectively. Nasal carriage of Staphylococci among HCWs in surgery ward on day one, seven and twenty eight was 72.5%, 7.5% and 35% respectively. Nasal carriage of Staphylococci among HCWs in CCU on day one, seven and twenty eight was 76.47%, 17.65% and 29.41% respectively.

Antibiotic sensitivity of MSSA, MRSA, MS CoNS, and MR CoNS on day one, seven and twenty eight are shown in Tables V, VI and VII respectively.

Table I: Distribution of samples according to culture report on day one, seven and twenty eight

ISOLATE	NUMBER (PERCENTAGE)		
	DAY 1	DAY 7	DAY 28
MSSA	19 (19.38)	0 (0)	2 (2.04)
MRSA	5 (5.1)	1 (1.02)	5 (5.1)
MS CoNS	37 (37.76)	5 (5.1)	15 (15.31)
MR CoNS	2 (2.04)	1 (1.02)	2 (2.04)
Others	14 (14.29)	2 (2.04)	4 (4.08)
No growth	21 (21.43)	89 (90.82)	70 (71.43)

MSSA:methicillin sensitive Staphylococcus aureus, MRSA:methicillin resistant Staphylococcus aureus, MS CoNS:methicillin sensitive coagulase negative Staphylococci, MR CoNS:methicillin resistant coagulase negative Staphylococci

Table II: Distribution of nasal carriage of Staphylococci among the different HCWs in different wards on day one

ISOLATE	NUMBER (PERCENTAGE)							
	DOCTORS (N=27)		NURSES (N=58)			GROUP-D STAFF (N=13)		
	MEDICINE WARD (N=14)	SURGERY WARD (N=13)	MEDICINE WARD (N=22)	SURGERY WARD (N=22)	CCU (N=14)	MEDICINE WARD (N=5)	SURGERY WARD (N=5)	CCU (N=3)
MSSA	3	3	3	4	3	1	2	0
MRSA	1	1	0	1	1	0	0	1
MS CoNS	4	6	9	11	5	0	1	1
MR CoNS	0	0	0	0	2	0	0	0

MSSA:methicillin sensitive Staphylococcus aureus, MRSA:methicillin resistant Staphylococcus aureus, MS CoNS:methicillin sensitive coagulase negative Staphylococci, MR CoNS:methicillin resistant coagulase negative Staphylococci

Table III: Distribution of nasal carriage of Staphylococci among the different HCWs in different wards on day seven

ISOLATE	NUMBER (PERCENTAGE)							
	DOCTORS (N=27)		NURSES (N=58)			GROUP-D STAFF (N=13)		
	MEDICINE WARD (N=14)	SURGERY WARD (N=13)	MEDICINE WARD (N=22)	SURGERY WARD (N=22)	CCU (N=14)	MEDICINE WARD (N=5)	SURGERY WARD (N=5)	CCU (N=3)
MSSA	0	0	0	0	0	0	0	0
MRSA	0	0	0	1	0	0	0	0
MS CoNS	0	1	1	1	1	0	0	1
MR CoNS	0	0	0	0	1	0	0	0

MSSA:methicillin sensitive Staphylococcus aureus, MRSA:methicillin resistant Staphylococcus aureus, MS CoNS:methicillin sensitive coagulase negative Staphylococci, MR CoNS:methicillin resistant coagulase negative Staphylococci

Table IV: Distribution of nasal carriage of Staphylococci among the different HCWs in different wards on day twenty eight

ISOLATE	NUMBER (PERCENTAGE)							
	DOCTORS (N=27)		NURSES (N=58)			GROUP-D STAFF (N=13)		
	MEDICINE WARD (N=14)	SURGERY WARD (N=13)	MEDICINE WARD (N=22)	SURGERY WARD (N=22)	CCU (N=14)	MEDICINE WARD (N=5)	SURGERY WARD (N=5)	CCU (N=3)
MSSA	0	1	0	0	1	0	0	0
MRSA	0	1	1	2	0	0	1	0
MS CoNS	1	3	3	5	2	0	0	1
MR CoNS	0	0	0	1	1	0	0	0

MSSA:methicillin sensitive Staphylococcus aureus, MRSA:methicillin resistant Staphylococcus aureus, MS CoNS:methicillin sensitive coagulase negative Staphylococci, MR CoNS:methicillin resistant coagulase negative Staphylococci

Clindamycin and gentamycin were only effective against MS CoNS. Ciprofloxacin was effective against all strains of Staphylococci except MRSA. All strains of Staphylococci were highly sensitive to linezolid. All strains of Staphylococci except MRSA were highly sensitive to vancomycin. Cefotaxime, cotrimoxazole and erythromycin were least effective against Staphylococci.

There was no adverse effect of the topical decolonisation agents among the participants.

Discussion

Worldwide, most of the literature focuses on carriage of Staphylococcus aureus and impact of decolonisation methods among patients. Other Staphylococci such as (CoNS) are also pathogenic. Methicillin resistant CoNS (MRCoNS) have also been found worldwide. Moreover, CoNS may transfer its resistance to MRSA[6,7]. HCWs are at the interface between hospitals and communities[8]. So periodic screening of HCWs to identify carrier state and measures taken to decolonise them is crucial in prevention of Staphylococci associated nosocomial infection.

Nasal carriage of Staphylococci among HCWs was 64.28% in the present study. It comprised of 24.48% Staphylococcus aureus and 39.8% CoNS. In a similar study by Nadia. E. Al-Abdli et al, nasal carriage of Staphylococci was 83.9%, comprising of 47.5% Staphylococcus aureus and 36.4% CoNS.[9] Staphylococcus aureus and MRSA carriage rate among HCWs in the present study are similar to the internationally reported range which are 19.80% to 48% and 5.8% to 17.8% respectively.[10,11] This wide range can be attributed to variations in sampling technique, culture and method of MRSA identification, local infection control standards and the local prevalence of MRSA.

In the present study nasal carriage of Staphylococci was highest among nurses (67.24%) and doctors (66.67%) followed by group-D staffs (46.15%). Nasal carriage of Staphylococci was highest among HCWs of CCU (76.47%) and surgery ward (72.5%) followed by medicine ward (51.22%). Similar findings were noted in other studies also.[12] Higher rate of nasal carriage of Staphylococci in specific groups of HCWs can be due to frequent contact with infected wounds in specific wards.

Table V: Antibiotic sensitivity of Staphylococci on day one

ORGANISM	ANTIBIOTIC SENSITIVITY (IN PERCENTAGE)							
	CLIND	GEN	CEFO	CIPRO	COTRI	ERY	LIN	VAN
MSSA	57.89	52.63	52.63	73.68	36.84	46.37	100	94.74
MRSA	40	20	0	40	20	0	100	60
MS CoNS	83.78	75.68	59.46	67.57	54.05	48.65	100	100
MR CoNS	50	50	0	100	50	50	100	100

CEFO:cefotaxime, COTRI:cotrimoxazole, ERY:erythromycin CLIND:Clindamycin, GEN:gentamycin, CIPRO:ciprofloxacin, LIN:linezolid, VAN:vancomycin, MSSA:methicillin sensitive Staphylococcus aureus, MRSA:methicillin resistant Staphylococcus aureus, MS CoNS:methicillin sensitive coagulase negative Staphylococci, MR CoNS:methicillin resistant coagulase negative Staphylococci

Table VI: Antibiotic sensitivity of Staphylococci on day seven

ORGANISM	ANTIBIOTIC SENSITIVITY (IN PERCENTAGE)							
	CLIND	GEN	CEFO	CIPRO		ERY	LIN	VAN
MRSA	0	0	0	0	0	0	100	0
MS CoNS	80	48	60	80	60	60	100	100
MR CoNS	0	0	0	100	0	0	100	100

CEFO:cefotaxime, COTRI:cotrimoxazole, ERY:erythromycin CLIND:Clindamycin, GEN:gentamycin, CIPRO:ciprofloxacin, LIN:linezolid, VAN:vancomycin, MSSA:methicillin sensitive Staphylococcus aureus, MRSA:methicillin resistant Staphylococcus aureus, MS CoNS:methicillin sensitive coagulase negative Staphylococci, MR CoNS:methicillin resistant coagulase negative Staphylococci

Table VII: Antibiotic sensitivity of Staphylococci on day twenty eight

ORGANISM	ANTIBIOTIC SENSITIVITY (IN PERCENTAGE)							
	CLIND	GEN	CEFO	CIPRO		ERY	LIN	VAN
MSSA	50	50	0	50	0	0	100	100
MRSA	40	60	0	60	20	20	100	60
MS CoNS	66.67	73.33	53.33	73.33	40	46.67	100	100
MR CoNS	100	50	0	100	0	0	100	100

CEFO:cefotaxime, COTRI:cotrimoxazole, ERY:erythromycin CLIND:Clindamycin, GEN:gentamycin, CIPRO:ciprofloxacin, LIN:linezolid, VAN:vancomycin, MSSA:methicillin sensitive Staphylococcus aureus, MRSA:methicillin resistant Staphylococcus aureus, MS CoNS:methicillin sensitive coagulase negative Staphylococci, MR CoNS:methicillin resistant coagulase negative Staphylococci

United States Food and Drug Administration approved mupirocin for decolonization of the anterior nares.[13] It is a topical anti-staphylococcal antibiotic. Nasal carriers of Staphylococci may also harbour the organism at various extra-nasal sites.[14] It is unlikely that nasal application of mupirocin will have any effect on these sites. Decolonization of the skin can be achieved by washing with chlorhexidine gluconate.[15] The combination of nasal mupirocin ointment along with chlorhexidine bath was preferred over other alternative agents due to strong evidences generated in favour of this combination for reduction of MRSA burden and decolonization of MRSA carriers in Cochrane review,[16] and meta-analysis[17] in recent times. Moreover, education about both hygiene and regular environmental disinfection measures has also been included to reduce carriage and prevent infection. Simple preventive measures like hand washing before and after patient examination, use of sterile aprons, gloves and masks, awareness during the examination of immunocompromised patients, and avoiding touching one's nose during work, can reduce transmission of Staphylococci considerably.

In the present study, HCWs found to carry nasal Staphylococci on first culture report were advised to apply mupirocin ointment to anterior nares twice daily and chlorhexidine gluconate bath once daily for five days

along with maintenance of standard hygiene protocol. After seven days nasal carriage of Staphylococci were found to decrease from 64.28% to 7.14%. After twenty eight days, it was found to increase to 24.49%. This increase may be due to various factors. The HCWs might be re-exposed and become colonized with the same or a new strain of Staphylococci There is also possibility that some HCWs did not follow the hygiene protocol strictly.

Another major issue is the emergence of multi-drug resistant Staphylococci.[18] This is due to misuse of cheap and easily available over-the-counter antibiotics. This causes infections which are difficult to treat which in turn prolongs hospitalization and cost of treatment. In the present study cefotaxime, cotrimoxazole and erythromycin were least effective against Staphylococcus. Clindamycin, gentamycin and ciprofloxacin were effective against limited number of samples. Even vancomycin was not effective against all MRSA. Only linezolid was effective against all samples.

Conclusion

The present study re-establishes the fact that HCWs carry Staphylococci in their nose in significantly high proportion. So periodic screening of HCWs for their carrier state should be done for their own sake, as well as for patients and community as a whole. Decolonisation measures should be taken for carriers of Staphylococci. But this doesn't eliminate the chance of re-infection. HCWs should be periodically educated and trained about the maintenance of personal hygiene measures to be followed within hospital premises. Community awareness programmes on the effects of use or rather the misuse of antibiotics should be held from time to time. Apart from this, time to time disinfection of the healthcare setting may be carried out as per the institutional protocol, to prevent re-colonization by Staphylococci among HCWs.

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Main Article

A Comparison of Efficacy of Nasal Septal Splints with Clip versus Nasal Packing after Septoplasty

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ABSTRACT

Introduction

It has always been a concern of ENT surgeon to prevent post operative complications like nasal bleeding, septal hematoma and septal abscess after septoplasty. Traditionally nasal packing has been done to avoid these complications. Although the nasal pack itself has been a concern for several reasons, packing apart from causing breathing distress, has resulted in epiphora, dysphagia, sleep disturbance, post-operative pain, headache, septal infection, septal abscess and even toxic shock syndrome.

Materials and Methods

This study has compared the efficacy of a newly designed septal splint with clip with nasal packs. This study was done on 60 patients, nasal packing was done in 30 patients and septal splints with clip were applied in 30 patients.

Results

Post-operative pain, epiphora, dysphagia, dryness of mouth and sleep disturbance was found to be significantly less in patients with septal splints with clip as compared to those with nasal packing.

Conclusion

Septal splints with clip is more efficacious alternative to nasal packing in patients undergoing septoplasty.

Keywords

Nasal Septum; Septoplasty; Pain, Postoperative; Epistaxis; Headache

The practice of packing the nose after septoplasty was thought to be indispensable in the past. This was a fundamental step to prevent septal haematoma, synechiae formation and of course, to prevent the post-operative bleeding and was supposed to stabilize the remaining cartilaginous and bony portion of the septum.[1]

Various packing materials have been used with or without lubricants and medications, like fingerstall packs, cotton gauze packs, paraffin packs, Telfa®, cuttings of the suction tube, cellulose and foam and now-a-days Merocel® (a polymer made from hyaluronic acid).

Nasal packing apart from causing breathing distress,has resulted in epiphora,[2] dysphagia,[2] sleep disturbance,[3] post-operative pain,[4-6] headache,[2] septal infection, septal abscess and even toxic shock syndrome.[7]

Different studies have been performed to compare different packing materials,with or without airway, but the complaints of post-operative pain has always been common to every type of packing material.[8]

The present study aims at comparative analysis of the outcome of nasal packing and septal splints with clip application after septoplasty. Various parameters e.g; postoperative pain, epiphora, dysphagia, dryness of mouth, haeadache, sleep disturbance, nasal bleeding, septal haematoma, nasal infections and adhesions are compared in both the modalities.

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Materials and Methods

The present study was carried out in the department of Otorhinolaryngology from January 2016 to October 2019 with a study population of 60 patients, who underwent septoplasty for deviated nasal septum. They were divided into three groups -

1) Group 1: Nasal packing was done in this group after septoplasty.

2) Group 2: Nasal septal clip with splints was applied postoperatively in this group and was removed after 1 day.

3) Group 3: Nasal septal clip with splints was applied in this group and was removed after 3 days.

Technique of Nasal Packing:

Group 1: Nasal packing was done after septoplasty in 30 patients and the pack was removed after 3 days.

Group 2: Septal clip was applied in 15 patients and removed after 1 day.

Group 3: Septal clip was applied in 15 patients who underwent septoplasty and it was removed after 3 days.

Either Bactigras®(tulle gras dressing evenly impregnated with white soft paraffin containing chlorhexidine acetate 0.5% w/w) or Merocel® was used as packing material.

2-3 Bactigras® were folded together to fit the nasal cavity and nasal cavity was held open using a Killian's speculum and the Bactigras® was inserted using Tilley's aural forcep/nasal packing forcep.

Merocel® was similarly inserted into both the nasal cavities and antibiotic solution was injected into the merocel® to make it snuggly fit the nasal cavity.

Application of Septal Splints with Clip:

The spring clip is made from medical grade stainless steel wires.

Splints are made from polyethylene, they are incompletely slit in longitudinal direction. The anterior ends of the two splints are tied together with a silk thread to prevent posterior migration and to facilitate removal. (Fig.1)

Splints, after lubricating with Neosporin® ointment are inserted into both the nasal cavities along the septum

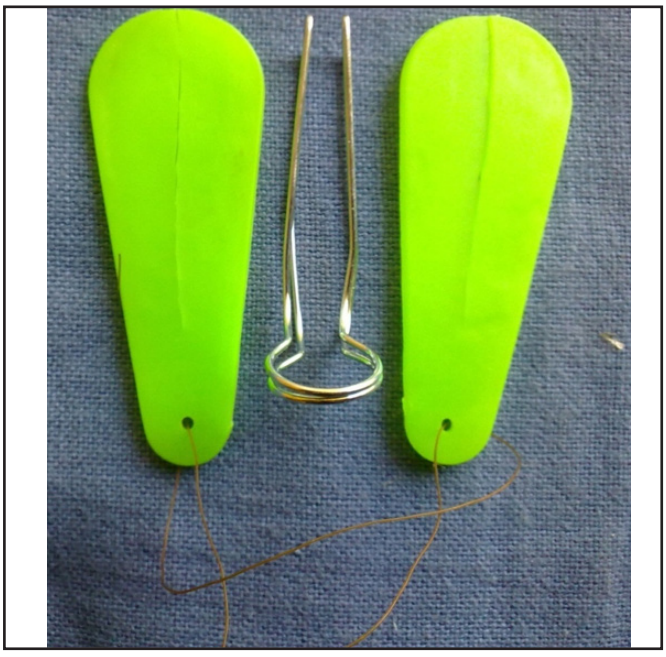

Fig. 1. Septal clip(septal splints are slit longitudinally and tied together at the anterior end.)

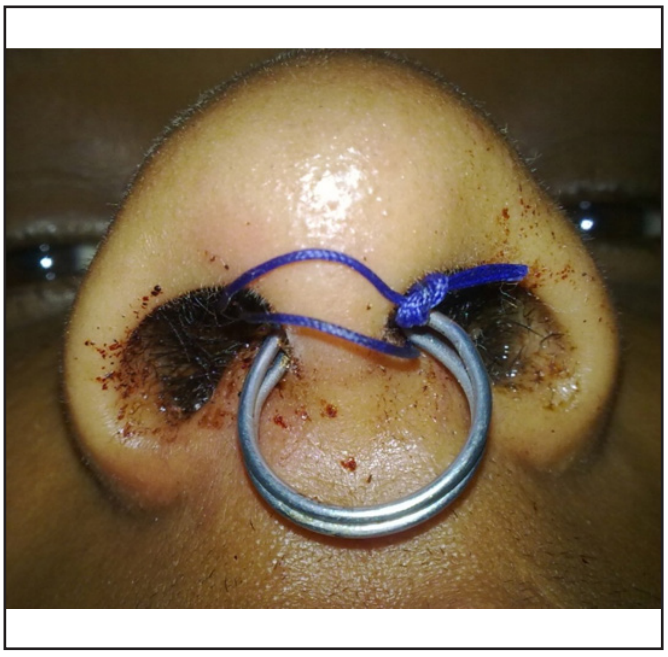

Fig. 2. Septal clip in place

with the help of nasal packing forceps. The spring clip is held open with Hartmann nasal speculum and inserted into the nose to compress the splints and in turn approximate the mucosal flaps. (Fig. 2)

Parameters compared

Following parameters were compared:

Post-operative pain, Epiphora, Dysphagia, Dryness of mouth, Headache, Sleep disturbance, Hematoma, Infection/septal abscess/toxic shock syndrome, Pain while removing (pack/clip), Bleeding while removing(pack/clip), Synechiae, Perforation.

Complaints of post-operative pain, epiphora, dyphagia,dryness of mouth and headache were noted on the day of surgery (6hrs after surgery) and the complaints of sleep disturbance on the same night was asked for.

Other complications were noted at the time of removal of nasal pack (post-operative day 3) or septal clip(post-operative day 1 and day3) and after 1 week and 6 weeks.

Patients in each group were followed-up post-operatively at following intervals:

1) 6 hours post-operatively for assessment of
   a) Pain.
   b) Presence or absence of epiphora.
   c) Presence or absence of dysphagia.
   d) Presence or absence of dryness of mouth.
   e) Presence or absence of headache.
2) Patients were enquired about sleep disturbance on the night following surgery due to the nasal packing or the septal clip in place.
3) At the time of removal of septal clip(after 1 or 3 days)/nasal pack (after 3 days) for assessment of
   a) Pain
   b) Bleeding from the nose
   c) Septal haematoma
   d) Nasal infections
4) After 1 week and 6 weeks for assessment of
   a) Presence or absence of nasal infection
   b) Presence or absence of septal haematoma
   c) Presence or absence of synechiae formation
   d) Presence or absence of septal perforation

The pain at 6th postoperative hour and during removal of clip/pack was measured using visual analogue score.

Bleeding was considered to be present if any blood was noted to be coming out of anterior nares or if seen trickling over the posterior pharyngeal wall after removal of pack/clip.

Presence of septal hematoma, synechiae and perforation was determined by anterior rhinoscopy and diagnostic nasal endoscopy.

Local signs of nasal infection and septal abscess were looked for and nasal swab for culture sensitivity was sent in suspected cases.

Other parameters like intensity of pain, epiphora, dysphagia, dryness of mouth, headache and disturbed sleep were assessed by presenting a questionnaire to patients with specific questions for these symptoms.

Results

Out of total 60 patients 45(75%) were male and 15(25%) were female and highest prevalence was in age group of 11-20yr.This group had 32(53.33%) of total 60 patients.

Statistical calculations:

Unpaired student t-test was applied for deriving the p value in case of postoperative pain (quantitative variable) at 6th postoperative hour and during clip/pack removal.

For all other parameters (qualitative variables) chi square test was used.

P-value of 0.05 or less was considered statistically significant.

From the observed values of different parameters and calculated p-values applying different tests of significance following results are derived:

The mean pain score at 6th postoperative hour (Table I) in nasal packing group (4.53) is significantly ($p<.0001$) higher than that in septal clip group (2.13). Epiphora (Table I) was present in 29 patients of nasal packing group and 3 patients of septal clip group at

Table I: Parameters after 6 hours post-operatively

	GROUP 1 (N=30)	GROUP2 + GROUP3 (N=30)
Mean Post-operative pain(VAS)	4.53	2.13
Epiphora (present in)	29	3
Dysphagia (present in)	24	3
Dryness of mouth (present in)	30	4
Headache (present in)	14	1

Sleep disturbance on following night:

In Group 1- present in 25 subjects

In Group 2 + Group 3- present in 6 subjects

6th postoperative hour, the observed difference is statistically significant (p< 0.001). Dysphagia (Table I) was present in 24 patients of nasal packing group and 3 patients of septal clip group at 6th postoperative hour, the observed difference is statistically significant (p< 0.001). Dryness of mouth (Table I) was present in 30 patients of nasal packing group and 4 patients of septal clip group at 6th postoperative hour, this difference also is statistically significant (p<0.001). Headache was present in 14 patients of nasal packing group and 1 patients of septal clip group at 6th postoperative hour, this observation is statistically significant (p<0.001).

Sleep disturbance during the night following the surgery was present in 25 patients of nasal packing group and 6 patients of septal clip group (p< 0.001).

Mean pain score at the time of removal of septal clip/ nasal pack (Table II) was 6.03 in nasal packing group (Group 1), 2.9 in septal clip group (Group 2 +Group 3), 2.87 in group 2 and 2.93 in group 3.The observed difference in mean pain score between nasal packing and septal clip group is statistically significant(p < 0.0001), while observed difference in mean pain score between group 2 and group 3 is statistically insignificant(p=0.46).

Nasal bleeding was present in 4 patients of nasal packing group, 1 patient of septal clip group 2 and 1 patient of septal clip group 3 at the time of removal of septal clip/nasal pack, the difference observed between nasal packing and septal clip group is statistically insignificant (p = 0.389). Synechiae were present in 3 patients of nasal packing group, none of the patients of septal clip group 2 and septal clip group 3, 1 week after surgery, the difference is statistically insignificant (p = 0.076). Septal perforation was present in 1 patient of nasal packing group, none of the patients of septal clip group 2 and septal clip group 3, 1 week and 6 weeks after surgery, this observation is also statistically insignificant (p = 0.313).

Discussion

History of septal surgery can be traced back to 1800[9],while functional surgery of the nose started in France at the turn of century where different types of nasal packing materials were used after nasal surgery.[10]

While life-threatening complications associated

Table II: Parameters at the time of removal septal clip/nasal pack

	GROUP 1(N=30)	GROUP 2(N=15)	GROUP 3(N=15)
Pain (VAS)	6.03	2.87	2.93
Bleeding (present in)	4	1	1
Haematoma (present in)	0	0	0
Infection (present in)	0	0	0

with nasal packing have been documented, these complications occurred primarily in the setting of posterior packing placed for treatment of epistaxis.[11]The presumed etiology of death in these cases,the nasopulmonaryreflex1[2-15] has not been reported in the modern literature of postseptoplasty packing.

The most common morbidity associated with packing in postseptoplasty patients is postoperative pain.[4,6,7]

Additionally postoperative infection including toxic shock syndrome,[16] worsening of sleep disordered breathing,[3] headache,epiphora,dysphagia,dryness of mouth[2,17] have been documented.

The most annoying clinical feature in this study was pain or discomfort due to the nasal pack or septal clip in place. Most common pain score at 6th postoperative hour was 4 in nasal packing group and 2 in septal clip group. The mean pain score at 6th postoperative hour was 4.53 in nasal packing group and 2.13 in septal clip group. The mean pain score at the time of removal of nasal pack was 6.03 and at the time of removal of septal clip was 2.90.The difference was found to be statistically significant($p<0.0001$).

Veluswamy et al.[17] in their study on 80 subjects, noted mean pain score of 7.23 in packing group and 2.57 in septal clip group. They found that 28(70%) patients in the nasal packing group had VAS score 6 or above, 10(25%) patients had score of 10. Only three patients of septal clip group had score more than 5,the most common score in this group was one (in 50% of patients).

In a study done by Schoenberg et al.[4] on 95 patients, the mean pain score in packed group was 4.2 and 2.8 in unpacked group, they found significantly greater extent of postoperative pain in the packed group, which is very similar to our observation.

Nunez et al.[6] in their study on 59 patients, divided them into nasal packing group and quilting suture group. They recorded pain on visual analogue score on postoperative day one and found it to be significantly higher in packing group ($p<0.05$).

Ardenhali et al.[18] in their study conducted on 114 patients who underwent septoplasty and were subsequently divided into packing and non- packing group, found the average VAS score 5 in packing group and 2.1 in non packing group which is very similar to that of our study.

Gunaydm et al.[19] in their study on two hundred patients who underwent septoplasty, divided them into nasal pack and transseptal suture group. 75 patients (76.5%) in the transseptal suture group had postoperative pain scores of 0 or 1,whereas 89 patients(89%) in the nasal pack group had scores of 2,3 or 4.Nasal packing was found to be significantly more painful than transseptal sutures($p<0.001$).

Epiphora is one of the common complaints of the patient whose nose is packed and it occurs due to blockage of nasolacrimal duct opening caused by pressure from nasal pack. We observed that epiphora was present in 29 (97%) of 30 patients in nasal packing group while in the septal clip group it was present only in 3(10%) of the 30 patients. This observed difference was found to be statistically significant on applying chi-square test($p<0.001$)

The dysphagia is due to the Toynbee phenomenon i.e; during swallowing with the nasal pack in place, the air is forced into the middle ear as it cannot pass through the choana causing discomfort to the patient while swallowing. In our study we observed that dysphagia was complained by 24(80%) of the 30 patients in nasal packing group while it was present only in 3(10%) of the 30 patients in the septal clip group. The difference observed was found to be significant statistically($p<0.001$) on applying chi-square test.

Dryness of mouth occurs in patients with packed nose due to drying effect of mouth breathing on oral, oropharyngeal and laryngeal mucosa. In our study we observed that all the 30(100%) patients in nasal packing group and 4 (13.33%) patients in septal clip group complained of dryness of mouth. The observed difference was found to be significant statistically ($p<0.001$) on applying chi-square test.

Presence or absence of headache at 6th postoperative hour in both the groups was compared. In our study 14(47.67%) patients in the nasal packing group complained of headache while 1(3.33%) patient in the septal clip group complained of headache. This observed difference between the two groups was also found to be significant statistically ($p<0.001$) on applying chi-

square test.

Patients were asked about any sleep disturbance they experienced due to nasal pack or septal clip in place on the night following surgery and we found that 25 (83.33%) patients in nasal packing group and 6 (20%) patients in the septal clip group experienced sleep disturbance. This observed difference was found to be statistically significant ($p < 0.001$)

Awan et al.[2] in their study on 88 patients who underwent septoplasty, divided them into packing and no packing group(in this group septal quilting sutures were applied).They found most common pain score to be 10 in packing group and 1 in non-packing group. They also found higher incidence of headache, epiphora, dysphagia, sleep-disturbance, septal hematoma and adhesions in packing group.

Veluswamy et al.[17] in their study on 80 subjects, found higher incidence of headache, epiphora, dysphagia, dryness of mouth, bleeding and in nasal packing group when compared to septal clip group.

Postoperative nasal bleeding is one of the main concern why many ENT surgeons are still favourably inclined to packing the nose post-septoplasty. We observed the incidence of nasal bleed at the time of nasal pack/septal clip removal. Any blood coming out of the nostrils or trickling over the posterior pharyngeal wall was considered as nasal bleeding present.

In our study we observed that nasal bleeding was present in 4(13.33%) patients of nasal packing group(Group 1) and 2(6.67%) patients of septal clip group. In the septal clip group further subdivision was made based on whether septal clip was removed after 1 day (Group 2) or after 3 days(Group 3). One case of nasal bleeding was present in each of groups 2 and 3. On applying chi-square test the observed difference in the incidence of nasal bleeding between nasal packing group and septal clip group was found to be statistically insignificant.($p=0.389$).

Most of earlier studies suggest that only few patients (if any at all) will require post-septoplasty nasal packing to prevent nasal bleeding and it is not justified to routinely pack patient's nose after septoplasty in light of little advantage and much more distress caused by the nasal pack. But most of the above studies do suggest that nasal bleeding was more common in no-packing group than in packing group even though statistical significance was not reached.

No septal hemaetoma or nasal infections were noted in any of the group at the time of removal of nasal pack/ septal clip, after 1 week and after 6 weeks.

The patients were assessed for presence or absence of synechiae formation at postoperative interval of 1 week and 6 weeks. Three (10%) patients of the nasal packing group had synechiae after 1 week which were released and no synechiae were observed in any patient at 6weeks,while no synechiae were observed even at 1 week in septal clip group patients. The observed difference in synechiae formation between two groups did not reach statistical significance.($p=0.076$).

We found only one patient with septal perforation, who was in nasal packing group. This observation was statistically insignificant. ($p=0.313$)

Conclusion

Septal splints with clip is more efficacious alternative to nasal packing in patients undergoing septoplasty.

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Main Article

Excellency of Converse Scalping Forehead Flap for Reconstruction of External Nasal Soft-Tissue Defects

https://doi.org/10.47210/bjohns.2021.v29i1.456

Gaurab Ranjan Chaudhuri[1]

ABSTRACT

Introduction

Reconstruction of external nasal defects poses a challenge for the plastic surgeons. The scalping forehead flap, first described by Converse in 1942 is a versatile technique for subtotal and total external nasal reconstruction. The flap is extremely reliable with robust vascularity and provides excellent colour and texture match for the external nose with minimal donor-site morbidity.

Materials and Methods

In this series, eleven patients with external nasal soft-tissue defects (post traumatic and post excisional) were reconstructed with scalping forehead flap; among them four presented with congenital naevus, three with post-traumatic external nasal defect, two presented with basal cell carcinoma, and two with arterio-venous malformation. The age of the patients ranged between 24 and 67 years; eight male and three female patients were included in this study. Among them three had comorbidities like diabetes mellitus and/ hypertension.

Results

All the flaps survived nicely. I didn't face any complication in any of my patients. The external nasal defects were reconstructed with scalping forehead flap in two stages with an interval of three weeks in between.

Conclusion

The Converse scalping forehead flap is an excellent option in the armamentarium of plastic surgeons for subtotal and total nasal reconstruction because of its reliability, vascularity, and simplicity even in the era of microvascular free tissue transfer.

Keywords

Surgical Flaps; Forehead; Angiosome; Scalping Forehead Flap; Rhinoplasty

Reconstruction of large external nasal defects remains a challenge for the plastic surgeons. For a satisfactory functional and aesthetic outcome, the flap must have a robust vascularity, needs to match the colour and texture of the nose, should be pliable and have an inconspicuous donor site.

The scalping forehead flap represents one of the best techniques for reconstruction of subtotal and total external nasal defects. The flap is supple enough to be folded; required to reconstruct the lobular portion of the nose, provides perfect colour and texture match for the nasal skin and caters adequate dimension of soft tissue for complete reconstruction of external nose.

The scalping forehead flap was described by Jean Marquise Converse of the New York University School of Medicine, in 1942.[1] It is an axial pattern flap with abundant vascularity from superficial temporal artery as well as from the branches of the ophthalmic artery, the supraorbital and supratrochlear arteries. There is a rich vascular anastomoses between the vessels making the flap robust and reliable.

A pedicle of hair-bearing scalp is used to move soft tissue from lateral forehead onto the nose for reconstruction of large defects. The flap is well

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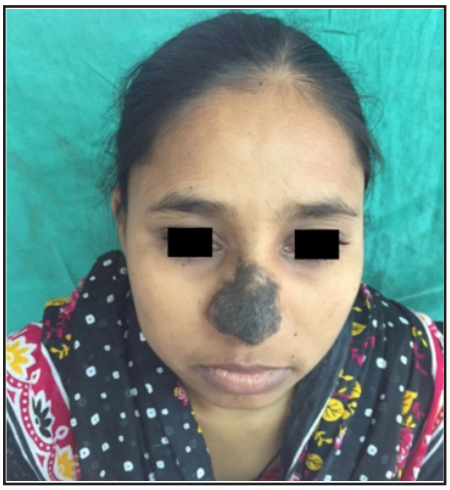

Fig. 1A. Congenital hairy naevus involving external nose

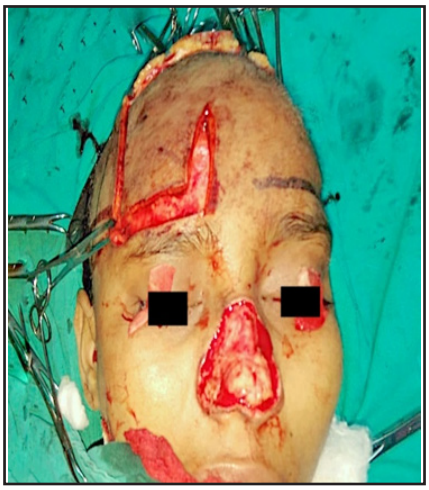

Fig. 1B. Naevus completely excised and scalping forehead flap harvested

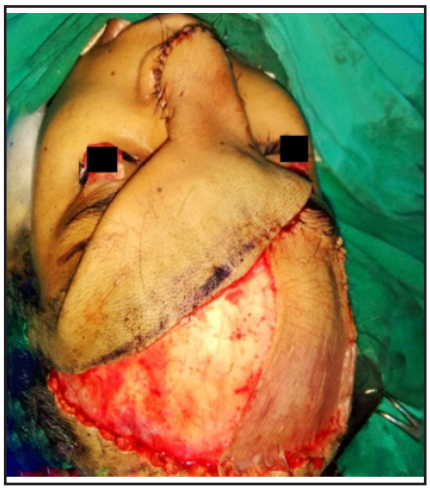

Fig. 1C. Flap inset done over the recipient site and flap donor site covered with skin graft

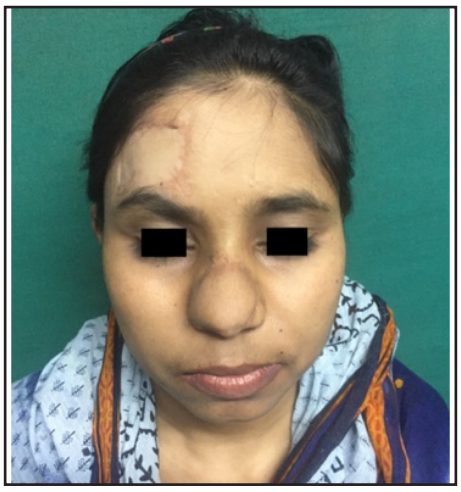

Fig. 1D. Postoperative appearance after six months

vascularised, reliable, easy to perform and results aesthetically pleasing donor site.

Materials and Methods

In this series I have reconstructed external nasal soft-tissue defects (post traumatic and post excisional) with Converse scalping forehead flap in eleven patients; among them four presented with congenital naevus, three with post-traumatic external nasal defect, two presented with basal cell carcinoma, and two with arterio-venous malformation.

The patients were admitted from the outpatient department. The study was done between 2014 and June 2019 in the Department of Plastic Surgery. The age of the patients ranged between 24 and 67 years; eight male and three female patients were included in this study. Among them three had comorbidities like diabetes mellitus and/ hypertension.

The procedures followed were in accordance with the protocols of the ethical committee on human experimentation and the Helsinki Declaration of 1975, as revised in 2000. Informed consent was obtained from the patients included in this study.

Surgical Technique:

After complete excision of the lesions or freshening of the post-traumatic wounds, a pattern of the nasal defect was made with a lint and transferred over the lateral aspect of the forehead. The flap design was made at least 1 cm larger than the defect to allow for flap retraction. The flap was raised superficial to muscle over the frontalis and rest of the flap was dissected in the sub-galeal plane leaving the underlying pericranium intact. (Fig. 1) Motor innervation to the frontalis muscle is via the seventh cranial nerve through the undersurface of the muscle. Therefore one has to remain superficial to the frontalis muscle while raising the flap to preserve this innervation.[2]

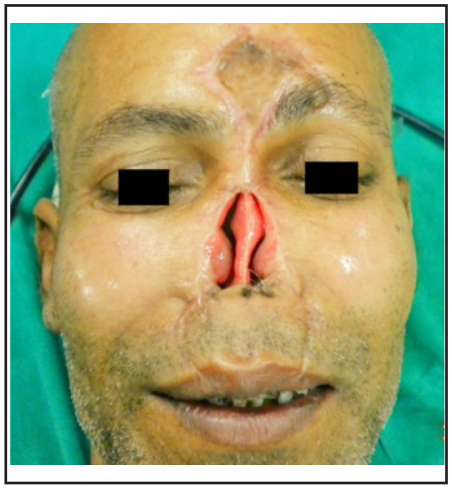

Fig. 2A. Post traumatic total amputation of nose

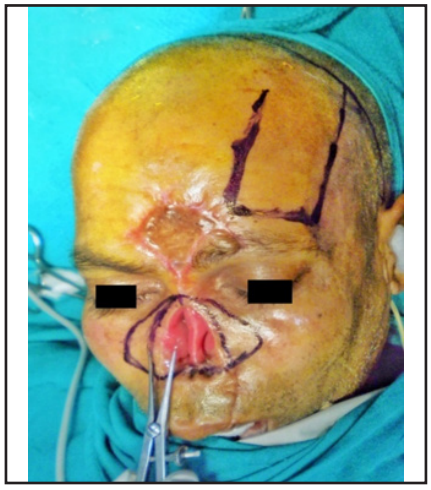

Fig. 2B. Planning of flaps for lining and cover

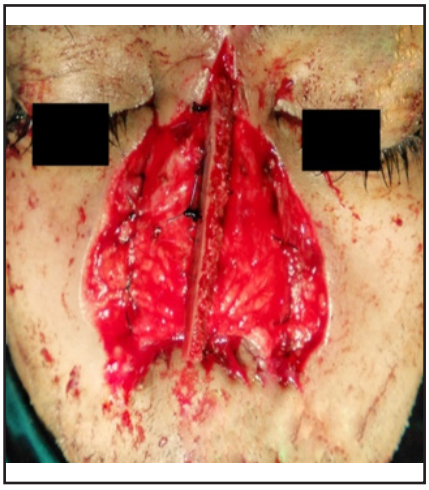

Fig. 2C. Inner lining reconstructed with defect based bilateral paranasal flaps and cantilever iliac crest bone graft for structural support

After completion of flap incisions, the incision was extended from the lateral border of the flap posteriorly with a coronal incision to the apex of the contralateral auricle, incorporating the contralateral superficial temporal vessels. The flap was then harvested and transferred to the external nasal defect without tension. The lateral forehead defect over the frontalis muscle was covered with a full-thickness skin graft. (Fig. 2) The scalp defect was covered with non-adherent dressing.

In all cases I have performed the second-stage procedure after 3 weeks. The flap pedicle was divided and final inset was done; the proximal part of the flap was returned to its original donor site over the scalp and the forehead.

Additional support for the dorsum of the nose or internal lining of the nose can be reconstructed in conjunction with the Converse flap and may include septal composite grafts, bone graft or cartilage graft.[3] I used cantilever bone graft harvested from iliac crest in one of my patients who presented with post-traumatic total amputation of nose. (Fig. 3)

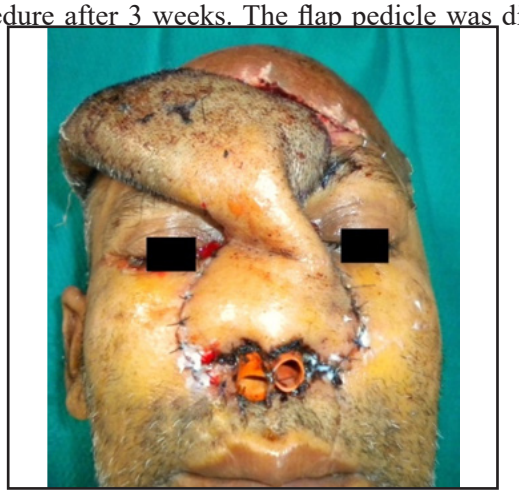

Fig. 2D. Outer cover reconstructed with scalping forehead flap

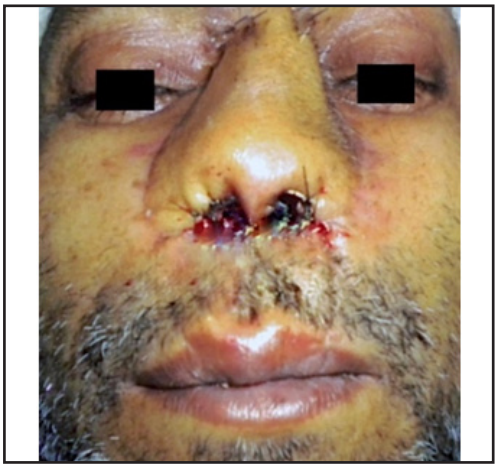

Fig. 2E. After flap division and final inset

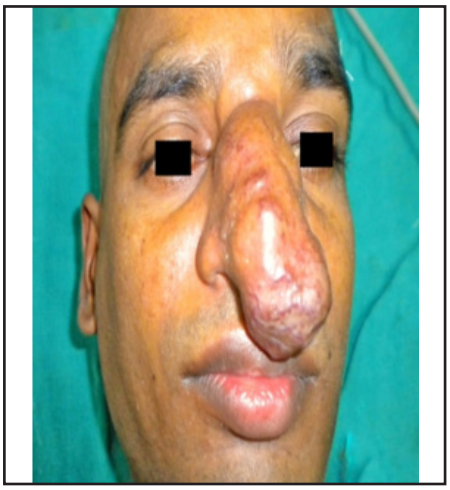

Fig. 3A. Arteriovenous malformation involving external nose

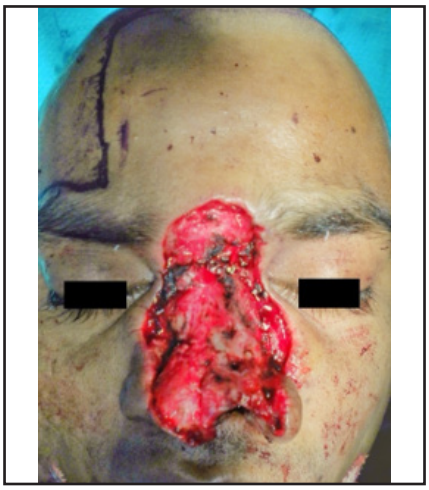

Fig. 3B. Post excisional defect

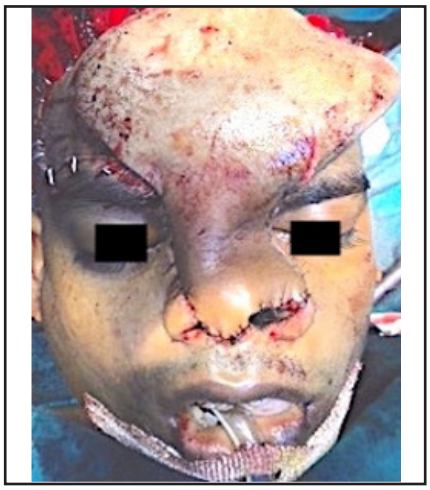

Fig. 3C. External nasal defect reconstructed with scalping forehead flap and flap donor site covered with skin graft

Fig. 3D. Postoperative appearance after three months

When required late revision surgery can be performed, such as flap defatting, reconstruction of the nasal framework and restoration of nostril symmetry to improve the aesthetic appearance of the nose.

Discussion

The use of tissue expanders in the forehead to create 'extra skin' for reconstruction of large nasal defects has been well described,[4] but is not favoured on occasions because of high cost, frequent hospital visits for inflation of the expanders, long duration of treatment and needs multiple stages for reconstruction. The scalping flap is an excellent alternative in regards to reconstruction with 'like' tissue, reliability, simplicity and pleasing functional and aesthetic outcome.

The use of forehead tissue for nasal reconstruction dates back to the India in 600BC.[5] Reconstructive techniques described in literature for external nasal defects include the midline forehead flap, the paramedian forehead flap, the Gilles 'up-and-down' flap and the McGregor transverse forehead flap.[6,7] The main drawbacks of those techniques are difficult to reconstruct subtotal or total external nasal defect and leave a noticeable scar in the flap donor site.

The reliability and versatility of the Converse scalping forehead flap can be explained in terms of the angiosome concept. In 1987 Taylor and Palmer introduced the concept of angiosome as three-dimensional anatomical blocks of tissue supplied by source vessels.[8] Houseman and Taylor applied this knowledge to explore the territories of the superficial temporal and ophthalmic arteries and to explain the differences in scalp and forehead flaps in regards to vascularity.[9] They showed that during design of a flap, an adjacent angiosome can safely be incorporated and that enhances the length:breath ratio safely and successfully; but perfusion difficulties may arise when more successive angiosomes are being

included. The Converse scalping flap is based primarily on the superficial temporal vessels on contralateral side, inviolates the ophthalmic territory on the same side and links with the contralateral ophthalmic and superficial temporal territory to produce a two-territory flap. The galea is supplied from the periphery by deep branches from these vessels along with perforators.

The scalping forehead flap thus has several advantages for reconstruction of large external nasal defects. The 'like' tissue is replaced by the 'like'; forehead skin has properties similar to nasal skin in terms of colour, texture and thickness. The flap has a robust and reliable vascularity and venous drainage. The soft tissue for reconstruction is harvested from the lateral portion of the forehead; thus making the scar less noticeable. The donor-site defect is covered with a full thickness skin graft harvested from the postauricular or supraclavicular region which gives a good colour and texture match. (Fig. 2) Most of the incisions are well hidden within the hair-bearing scalp and once the pedicle of the flap is divided in second stage, the whole hair-bearing scalp is returned to its original position. A large surface area of the flap is available to reconstruct total external nasal defect. The scalping forehead flap has also been used to reconstruct cheeks, eyebrows and orbital roofs.[10]

Conclusion

The scalping forehead flap is one of the best techniques for total and subtotal nasal reconstruction because this flap is extremely reliable and provides supple skin of good quality with excellent colour and texture match. Even in the era of microvascular free tissue transfer the Converse scalping forehead flap is still an excellent option in the armamentarium of plastic surgeons for subtotal and total nasal reconstruction.

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Main Article

Role of a Unique Innovative Device (HEAR-O-SCOPE) in Prevention of Noise Induced Hearing Loss

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ABSTRACT

Introduction

Noise induced hearing loss has great significance in today's world as it comes as an occupational health hazard accompanied with other systemic adverse effects like several neuropsychiatric disorders, cardiovascular diseases, or peptic ulcers. It can be prevented by serial follow up with pure tone audiograms and use of noise protectors like ear muffs or ear plugs. This article demonsrates an easy-to-adopt method of preventing noise induced hearing loss in the form of an electronic device named HEAR-O-SCOPE.

Device Design

This device is essentially a decibel meter which senses sound intensities above 85 decibel and equates it with permissible time of exposure for that decibel range and if permissible time of exposure is crossed, sends alarm signals in the form of buzzer and display, giving the user adequate time either to move away from the noisy surrounding or put in noise protectors. This device also has provision for real-time graphical plotting facilities.

Expected Benefits

Expected outcome by using this device in the long run would be early detection and prevention of noise induced hearing loss and other health hazards of noise pollution.

Conclusion

Regular use of HEAR-O-SCOPE is highly recommendable for prevention of Noise Induced Hearing Loss.

Keywords

Hearing Loss; Noise-Induced; Prevention; Early Diagnosis; HEAR-O-SCOPE

Ear is one of the most neglected organs of our body which get victimized often unnoticeably by the hazardous effects of noise pollution which is quite inevitable in our daily life. Factory workers, people of music industry, or those regularly attending rock concerts, or using earphones at a stretch, pilots, cabin crews and airport and railway station ground staffs, bikers and regular long distance travellers are compelled to work or stay in noisy environments for long duration of time. It is generally agreed that, for the human ear, sound levels below 80 decibel (dB) are unlikely to cause hearing damage, no matter how long one is exposed to them.[1] After noise trauma ear may recover within few minutes to few hours even up to two weeks, this being termed as temporary threshold shift (TTS).

It depends on the intensity, frequency and duration of sound, whether continuous or interrupted sound and the susceptibility of the individual to the sound perceived.[2] But when this TTS is surpassed by chronic exposure to noise of harmful decibels for permissible time of exposure (TOE) (Table I), permanent threshold shift (PTS) sets in. Hair cells in the organ of Corti of inner ear tend to get damaged, outer hair cells being affected

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Table I: The National Institute for Occupational Safety and Health (NIOSH) recommendation for Occupational Safety and Health Administration (OSHA) [US]

TOLERABLE INTENSITY OF SOUND	MAXIMUM PERMISSIBLE TIME OF EXPOSURE
85 dB	8 hours
88 dB	4 hours
91 dB	2 hours
94 dB	1 hour
97 dB	30 minutes
100 dB and above	15 minutes

Table II: Hearing attenuation provided by different devices

DEVICE	HEARING ATTENUATION
Cotton wool	5 dB
Ear plug	15-30 dB (mostly in the range of 3 - 5 kilo Hz)
Ear muffs	30-40 dB (mostly in range of 500 hertz – 1 kilo Hz)
Ear plugs + muffs	More than 40 dB

before inner hair cells, resulting in permanent hearing loss which could not be reverted unlike in TTS.[2]

For people working in noisy environment, screening should be done with pre-employment pure tone audiograms followed by repeat audiograms usually done annually for early detection of noise induced hearing loss (NIHL). The pure tone audiogram in NIHL will essentially be of sensorineural type. Classically, the audiogram presents a dip or notch at 4000 Hertz (Hz) for both air conduction and bone conduction.[3] The notch in audiogram, common in early and acute cases, may be present anywhere between 3000 Hz and 6000 Hz.[3] In advanced cases of long standing noise assault a steeply sloping audiogram starting from 3000 Hz and gradually increasing in the higher frequencies is found.[3] Noise protectors like ear muffs or ear plugs are in use which may provide noise reduction up to 40 dB (Table II).[2] If NIHL has already occurred the person is rehabilitated as in other forms of sensorineural hearing loss (SNHL) including permanent dependency on hearing aids.

Here we describe an easy to adopt method of preventing NIHL in the form of an electronic device named HEAR-O-SCOPE that senses intensities of sounds of all decibels, and equates it with total TOE. If the permissible TOE is surpassed for the harmful decibel of sound, the device sends an alarm to its user in the form of light, buzzer and gives alert message in its display screen.

Device Design

The device is essentially a decibel meter. The heart of the device is formed by the microcontroller unit (MCU) having integrated circuit (IC) chip embedded in Arduino Mega or Uno board. It is connected to a microphone which receives and senses sounds of all intensities in the nearby surroundings and converts of sound energy to electrical energy and sends it to the MCU (Fig. 1). The MCU is enabled with such a coding in the Arduino board so that it screens all intensities of sound of and above 85dB, and then equates it with its TOE. If the time crosses the "safe time limit" for that particular decibel range of sound (as in Table I), the MCU sends a signal to the buzzer and to the Organic Light Emitting Diode (OLED) display screen which produces alarm sound and alert message like "DANGER", respectively, 15 minutes before (Fig. 2).

Over and above this alarm signal, we also have made provision for a real time monitoring of an individual's daily TOE to the harmful decibels of sound on 24 hours basis in the form of a graphical plotting taking TOE in "X" axis and decibel of sound in "Y" axis (Fig. 3). The entire data of the graph along with being displayed in the liquid-crystal display (LCD) display of the device,

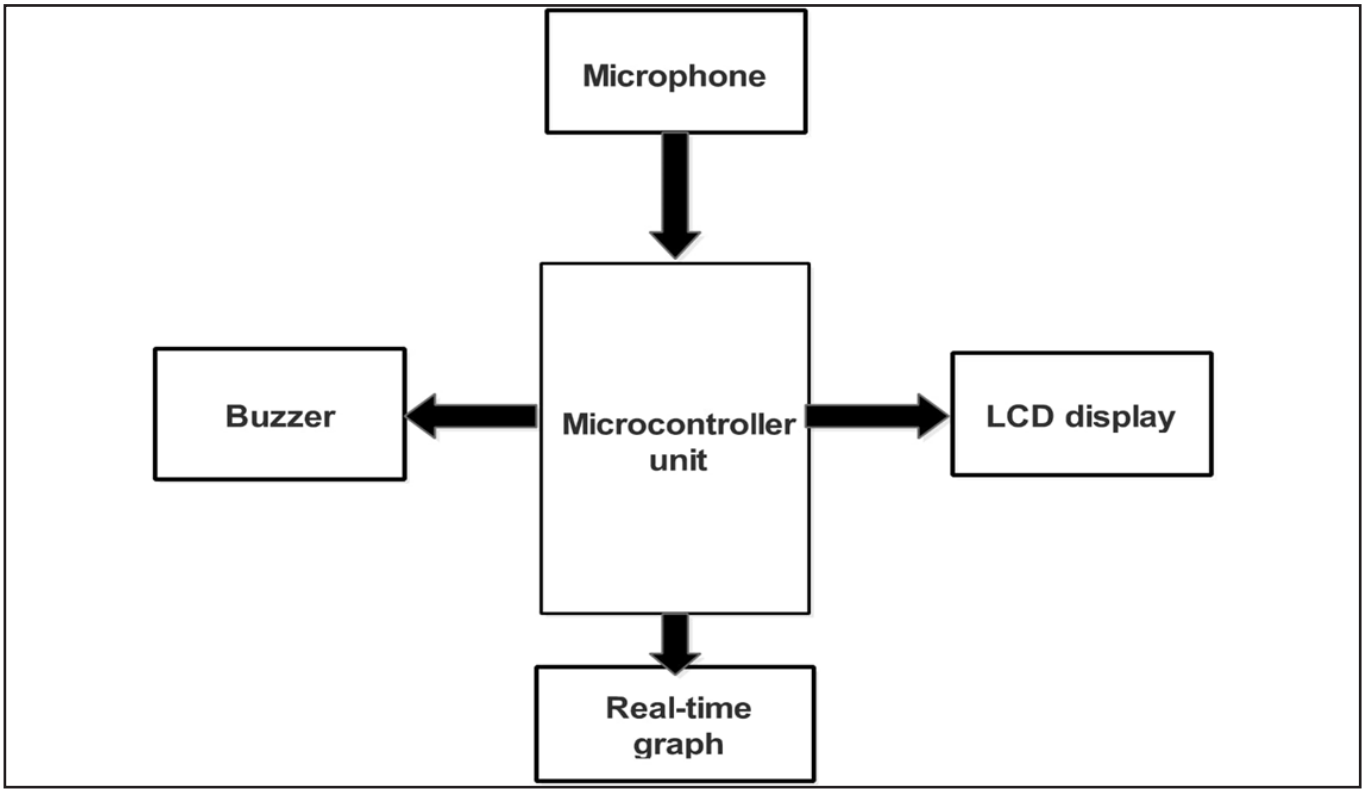

Fig. 1. Device design

also gets stored in a "cloud" in the MCU for later survey and surveillance by the person or his attending clinician, in case any hearing disability is suspected or detected.

The entire electronic device has been made portable with ease of handling and can be embedded in daily usable entities like bluetooth headsets, car dashboards, hearing aids. It can be carried in wallets or pockets. It can be connected to laptop, tablet, mobile phone for alarm signal in the form of text message or alert calls and screen display of the graph.

Expected Benefits

The actual benefit of an individual from this device in preventing NIHL and other health hazards of noise are still under the scope of research.

The wide range of expected outcomes includes the following.

a) Early detection of SNHL caused by noise exposure.

b) Easy means of prevention of NIHL.

c) To cut down the systemic adverse effects of noise pollution.

d) To improve an individual's work productivity.

e) Long term use of HEAR-O-SCOPE is expected to cut down requirement and use of hearing aids.

f) The real time monitored data stored in the device for future reference could lead to better treatment options and outcome when the individual presents later to his attending clinician.

g) Provides the treating clinician an extra edge for choosing treatment modalities by studying the patient's saved data to give his patient maximally beneficial treatment.

h) The cost effectiveness, portability and easy connectivity of the device to mobiles, laptops, tablets, would enable every individual to afford and use it on regular day-to-day basis as a weapon against noise

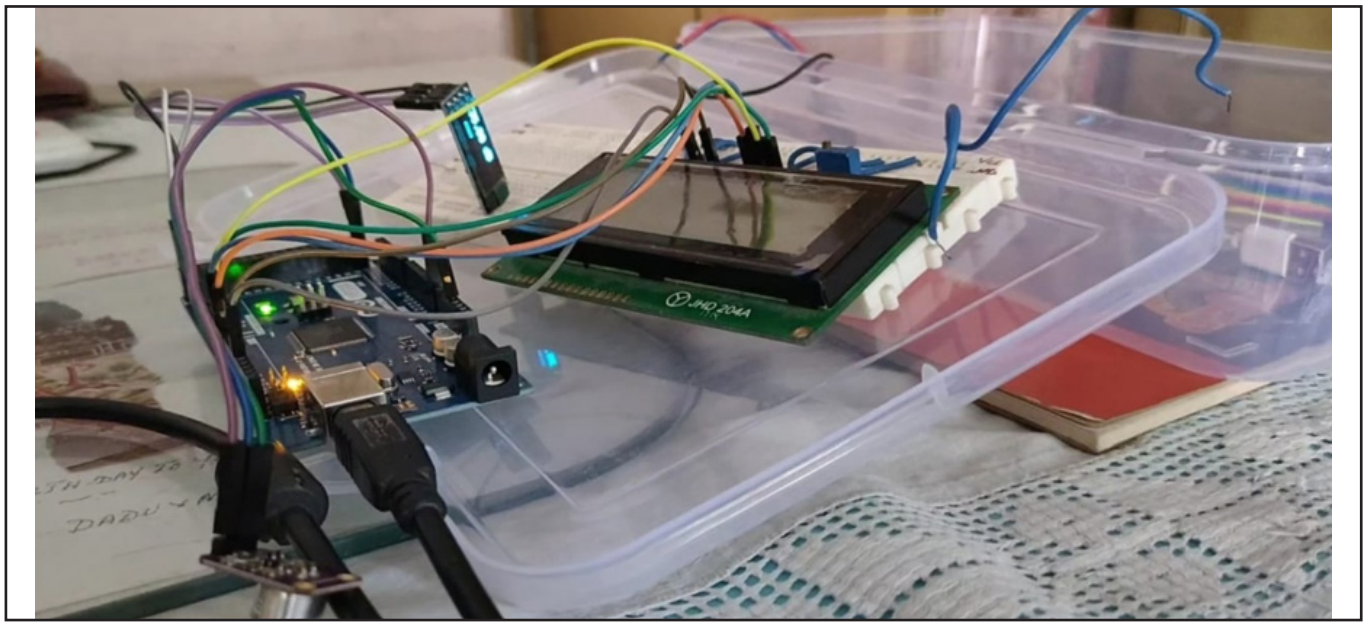

Fig. 2. Microcontroller with microphone, buzzer and OLED display

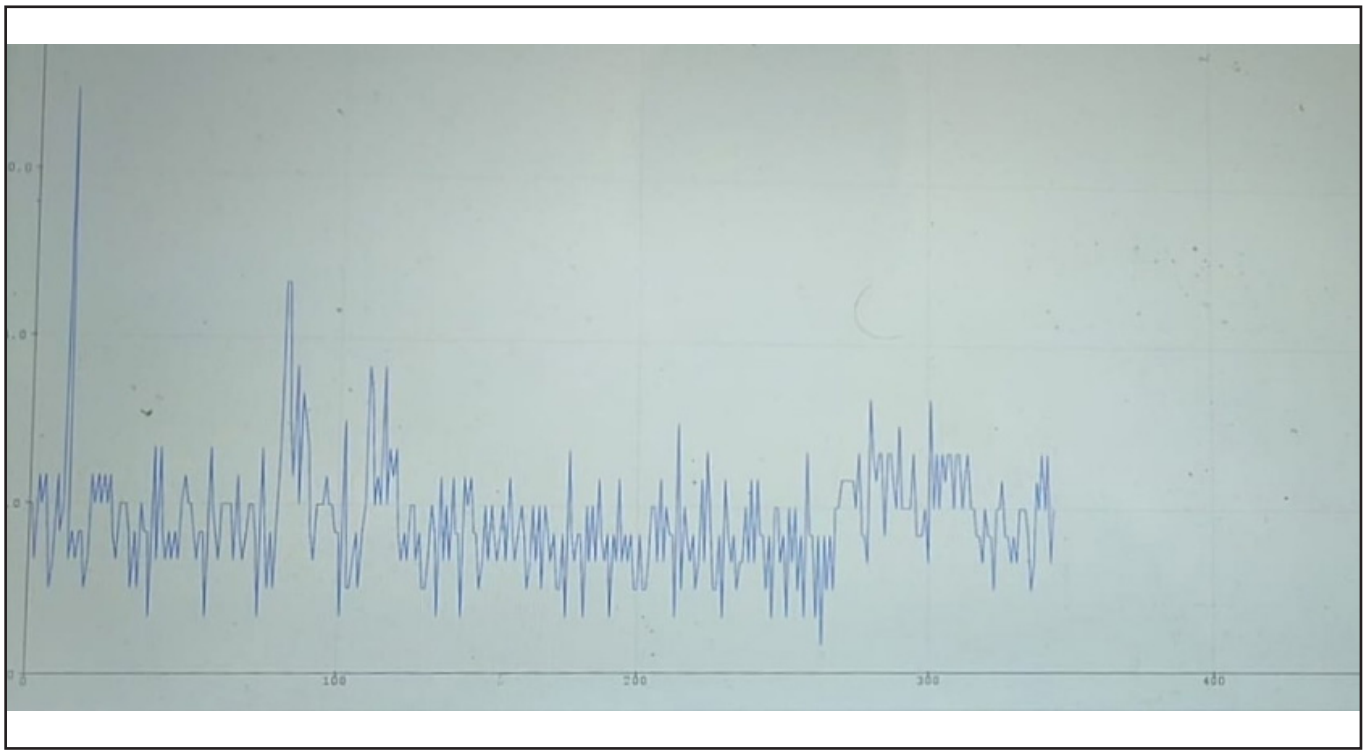

Fig. 3. Graphical plotting

pollution.

i) Last but not the least, this device can be used as a surveillance tool by the government for prolonged surveillance of the noise level in factories or industries with high noise level at minimal cost.

Discussion

Some forms of noise are practically unavoidable like city-street noises, noises produced by machineries in factories and industries, noises at airports, noises produced in rock concerts and music industry or by constant use of headphones or earphones. Noise pollution not only causes hearing disability in the form of NIHL but other health hazards like mental stress, lack of concentration, anxiety, depression, easy fatigability, insomnia or more serious issues like cardiovascular diseases, hypertension, peptic ulcers and even cardiovascular accident.

Early detection of NIHL is important as measures can be taken to stop its progress, reverse it or start an early rehabilitation programme. Hence the successful implementation of this innovative electronic device (HEAR-O-SCOPE) in day-to-day life for noise decibel monitoring and its unique concept of alarm system being activated 15 minutes before permissible TOE is crossed for that decibel range, allow the individual to either move away from the source of sound or cut down the sound if possible or use noise attenuation devices like ear muffs or ear plugs and provides easy means of prevention of NIHL.

Moreover, the data storage facilities of the 24 hour monitoring of total cumulative TOE of an individual to the obnoxious decibels of noise along with its real time graphical representation would give immense value for future reference of treatment by any clinician and would also allow for surveillance in factories and industrial belts for noise level monitoring,

Its portability, unique design and cost effectiveness is expected to make it suitable for daily use by every individual and aid in prevention of NIHL on mass scale.

Conclusion

Going by the famous saying “prevention is better than cure”, it would be highly recommendable to use this economic, user friendly, cost effective, easy to use electronic device as a means of preventing NIHL and other health hazards of noise enabling people to increase work productivity and improving quality of life as a whole and helping the society to be triumphant over noise pollution.

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Main Article

A Retrospective Study on Clinico-Pathological Presentations and Complications of Parotidectomy

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ABSTRACT

Introduction

Salivary gland tumors are rarely seen. It constitutes approximately 3% of all head-neck tumors. 75-80% of these tumors originate from the parotid gland. In this study, 98 patients who underwent parotidectomy in a tertiary otorhinolaryngology clinic were analyzed retrospectively, the frequency of different pathologies and our treatment modalities for parotid masses are presented in the light of current literature.

Materials and Methods

In this study, 98 patients who underwent parotidectomy in our clinic between 2011 and 2018 were retrospectively analyzed, the frequency of different pathologies, our treatment approach, and complications of treatment for parotid masses are presented in the light of current literature.

Results

The mean age was 48 years (between the range of 7-82 years). 41 cases were female and 57 cases were male. In the results of FNAB, there were 65 (66%) benign cases, 28 (29%) malignancy suspects and 5 (5%) malignant cases, 68 (69%) benign cases, and 30 (31%) malignant cases in surgical pathologies. The most frequent lesion of all parotid masses was pleomorphic adenoma (24%). The most common benign lesion was pleomorphic adenoma (35%) and the most frequent malignant tumor was mucoepidermoid carcinoma (27%). The most common surgery type was superficial parotidectomy (82 cases). The most common complication was marginal mandibular nerve paresis (6).

Conclusion

The treatment modality of the parotid tumors varies from case to case according to the nature of the tumor and extension.

Keywords

Parotid Gland; Parotidectomy; Pleomorphic Adenoma

Salivary gland tumors arise most commonly (85%) from the parotid gland. The most frequent benign tumor of the parotid gland is a pleomorphic adenoma. Mucoepidermoid carcinoma is the most common malignant tumor.[1,2] For parotid tumors, the main symptom is mass in the preauricular region, other symptoms are pain, facial paralysis, and skin ulcer, especially in malignant tumors.[3] The treatment modality for these tumors is superficial or total parotidectomy depending on tumor extension and preoperative fine-needle aspiration cytology (FNAC) results.[4-7] In this study, 98 patients who underwent parotidectomy in a tertiary otorhinolaryngology clinic were analyzed retrospectively, the frequency of different pathologies, our treatment modalities, and complications of treatment for parotid masses are presented in the light of current literature.

Materials and Methods

Patients who underwent parotid surgery in a tertiary

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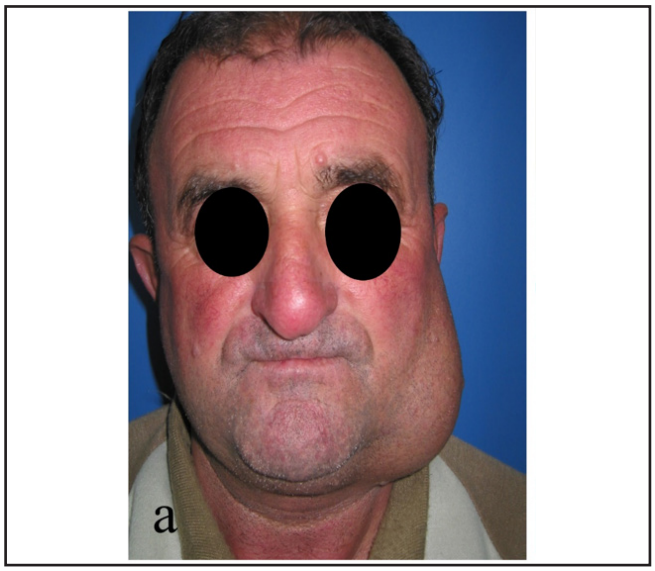

Fig. 1a. Image of mass on the neck

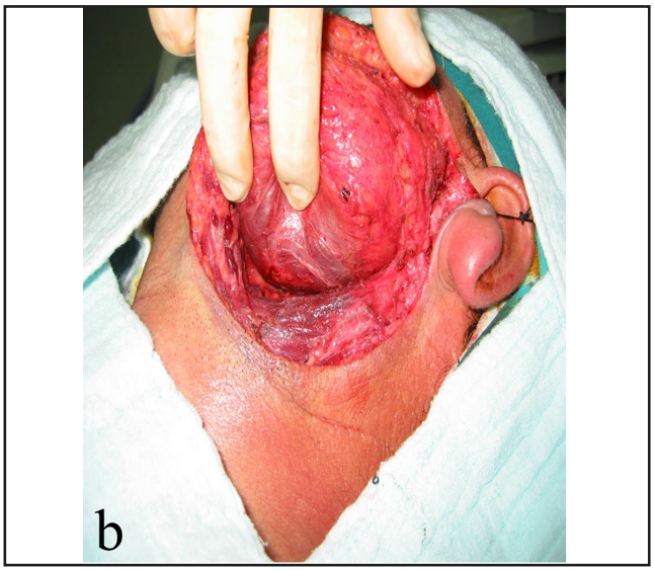

Fig. 1b. Intraoperative image of mass (Warthin tumour)

otorhinolaryngology clinic, between 2011 and 2018 were analyzed retrospectively. The anamnesis and examination findings of the subjects were reviewed. Before surgery, appropriate radiological examinations (ultrasonography, computerized tomography, or magnetic resonance imaging) and fine-needle aspiration cytology (FNAC) of all patients were performed. For treatment, superficial or total parotidectomy was performed according to cytological examination. Intraoperative facial nerve monitoring was performed in all patients. Monitoring was performed with a NIM-Pulse dual-channel electromyography (EMG) device (NIMPulse 2.0; Medtronic Xomed, Jacksonville, FL, USA).

Age, gender, side of the mass, whether the mass involves the deep lobe, preoperative FNAC result, postoperative histopathology results, and complications were noted. All patients who underwent parotidectomy among the specified time range were included in the study. Patients who we operated on for sialolithiasis and whose records that we could not reach properly were excluded.

Results

Ninety-eight patients were included in this study. The primary complaint of the patients was a mass in the neck. (Fig. 1) The mean age was 47.64 ± 15.8 (7-82) years. Forty-one cases were female and 57 cases were male. The tumor was on the right side in 45 (46%) of the patients and on the left side in 53 (54%). Twenty-eight (30%) patients had a tumor in the deep lobe of the parotid or extending into the deep lobe. Seventy of the masses were arising from the superficial lobe.

According to FNAC results, there were 65 (66%) benign cases, 28 (29%) malignancy suspected cases, and 5 (5%) malign cases. Postoperative histopathological results were 68 (69%) benign cases and 30 (31%) malignant cases. Although FNAB results were suspected as malignancy in three patients, the postoperative pathological evaluation was benign. The most common lesion in all parotid masses was pleomorphic adenoma (24%). (Fig. 2) The most common benign lesion was pleomorphic adenoma (35%) and the most common malignant tumor was mucoepidermoid carcinoma (27%). (Table I)

The most common surgery was superficial parotidectomy (82 cases). Among these 82 cases, 6 patients underwent superficial parotidectomy together with simultaneous neck dissection due to low-grade malignancy. Total parotidectomy together with simultaneous neck dissection was performed in 8 patients operated on for malignancy. Four patients who had pleomorphic adenomas and two patients who had

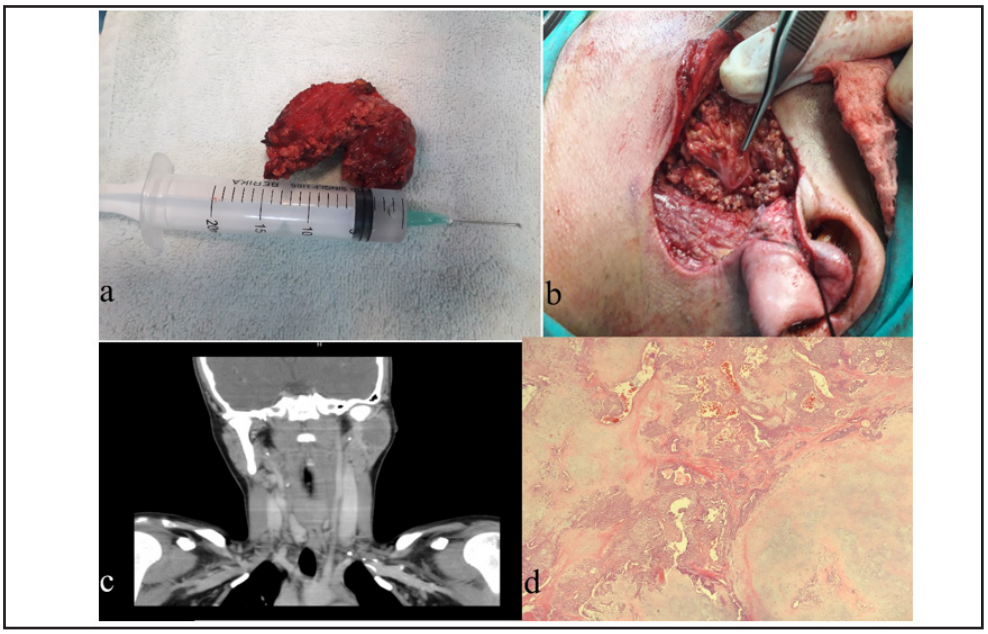

Fig. 2a. Specimen of pleomorphic adenoma Fig. 2b. Intraoperative image of parotidectomy indicating the trunk of the facial nerve Fig. 2c. CT image of mass Fig. 2d. Typical histological view of pleomorphic adenoma; chondromyxoid stroma, epithelial and myoepithelial cell layers (H&E x40)

Warthin tumors underwent total parotidectomy due to deep lobe extension. Radical parotidectomy was performed in 1 malignant patient with perioperative facial nerve invasion and 1 patient with schwannoma originating from the facial nerve trunk. (Table II)

The most common complication in our patients undergoing parotidectomy was marginal mandibular nerve paresis (6 cases). Buccal branch paresis was observed in 5 patients. The surgery performed in 9 of 11 patients who developed paresis was total parotidectomy. All patients completely recovered in the follow-up period. Two patients undergoing radical parotidectomy had permanent facial paralysis despite graft repair. The salivary fistula was observed in 1 patient, seroma in 2 patients, and hematoma in 3 patients and improvement in these complications was achieved with printed dressings. (Table III)

Discussion

Salivary gland tumors constitute 3% of all tumors in the body and 5 to 10% of tumors seen in the head and neck region. Tumors originating from the salivary gland are seen equally in men and women, and the period between the ages of 20 and 60 years is the most common. Most of these tumors (75-80%) originate from the parotid gland.[8] The most common benign tumor is a pleomorphic adenoma, and the second most common benign tumor is the Warthin tumor.[9,10] In our study, benign tumors were more with 69%, and the most common result was pleomorphic adenoma. The second most common benign tumor was the Warthin tumor. Malignant tumors were 31%, and the most common pathological type was mucoepidermoid carcinoma. Our benign and malignant lesions frequently seen in the parotid were compatible with the literature.

Parotid gland tumors are more common in men than in women.[10-11] In parotid salivary gland tumors, benign lesions are mostly seen in the 5th decade of life and malignant lesions in the 6th decade of life.[12] In our study, the mean age of patients was 48 years (between the range of 7-82 years). Forty-one (42%) patients were female and fifty-seven (58%) patients were male.

The parotid gland is surgically divided into superficial and deep lobes. This distinction is made according to the facial nerve, which emerges from the stylomastoid

Table I: Distribution of patients according to benign and malignant parotid tumors

BENIGN PATHOLOGICAL DIAGNOSIS	NUMBER OF PATIENTS
Pleomorphic adenoma	24
Warthin tumor	22
Chronic sialadenitis	9
Chronic granulomatous inflammation	7
Schwannoma	2
Lipoma	1
Basal cell adenoma	1
Oncosytoma	1
Monomorphic adenoma	1
Total	68
MALIGNANT PATHOLOGICAL DIAGNOSIS	**NUMBER OF PATIENTS**
Mucoepidermoid carcinoma	8
Acinic cell carcinoma	6
Diffuse B cell lymphoma	4
Squamous cell carcinoma	4
Adenoid cystic carcinoma	4
Adenocarcinoma	4
Total	30

foramen and travels through the parotid gland. The superficial lobe is closely related to the skin, while the deep lobe forms a small part of the parotid. 90% of the parotid gland tumors originate from the superficial lobe and 10% from the deep lobe.[13] Following the literature, in our study, 28 (30%) patients had deep lobe placement or deep lobe extension. Seventy of the masses were located in the superficial lobe.

Table II: Distribution of patients according to surgical methods applied

SURGERY	NUMBER OF PATIENTS
Superficial parotidectomy	82
Total parotidectomy	14
Radical parotidectomy	2

Superficial parotidectomy is the most preferred surgery in parotid benign tumors and is generally preferred for patients limited in the superficial lobe. Total parotidectomy is generally preferred in malignant parotid tumors.[14] Total parotidectomy can also be performed in some deep lobe benign tumors. Neck dissection should be added to surgery due to the risk of cervical metastasis in malignant parotid gland tumors.[15] In the literature, it has been reported that superficial parotidectomy is adequate in malignant tumors with low grade, for tumors limited in the superficial lobe and lateral to the facial nerve.[9] Superficial parotidectomy was the most commonly applied surgery in our clinic (82 cases). Six patients underwent superficial

Table III: Distribution of patients according to postoperative complications

COMPLICATIONS	SUPERFICIAL PAROTIDECTOMY	TOTAL PAROTIDECTOMY	RADICAL PAROTIDECTOMY
Marginal mandibular nerve paresis	1	5	
Buccal branch nerve paresis	1	4	
Facial paralysis			2
Salivary fistula		1	
Seroma		2	
Hematoma	1	1	1

parotidectomy and neck dissection together due to low-grade malignancy. Total parotidectomy together with simultaneous neck dissection was performed in 8 patients operated on for malignancy. Four patients who had pleomorphic adenomas and two patients who had whartin tumors underwent total parotidectomy due to deep lobe extension.

In parotid surgery, a correct preoperative histopathological evaluation is important for determining the extent of the surgery, whether important structures such as the facial nerve will be sacrificed, whether neck dissection will be added to the surgery, or if the patient is in a position that can't be removed by surgery and if the tumor is benign. It was stated that FNAB had a crucial role in the preoperative evaluation.[16,17]

Complications that may occur in patients undergoing parotid surgery are facial nerve injuries, bleeding, hematoma, seroma, sialocele, infection, salivary gland fistula, and Frey syndrome. Also, the intra-operative opening of the pseudocapsule of pleomorphic adenomas is traditionally held to increase the risk of recurrence. The main reason for pleomorphic adenoma recurrence is

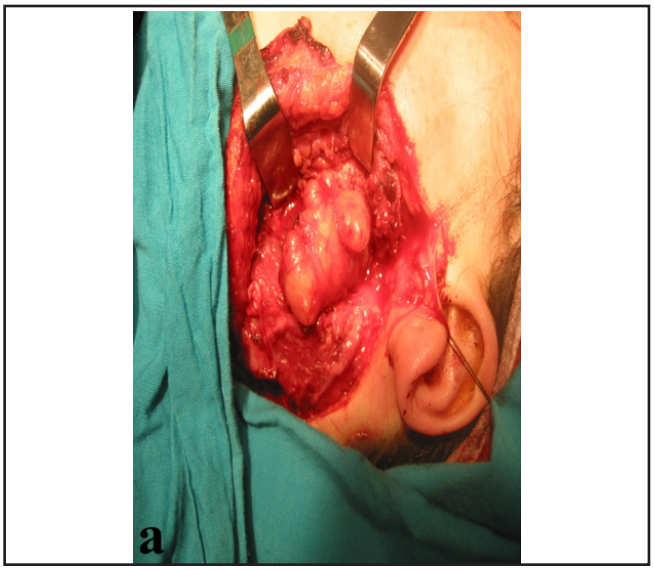

Fig. 3a. Schwannoma of facial nerve extending to the deep lobe of parotid

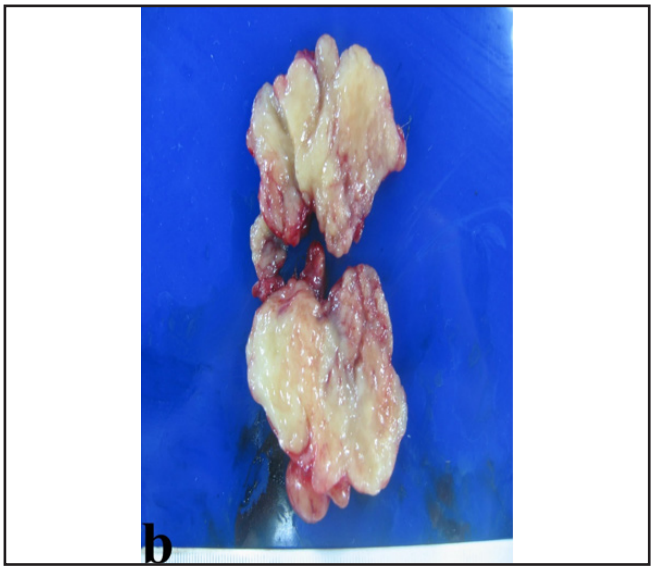

Fig. 3b. Cut surface of Schwannoma

incomplete surgical resection. An amputation neuroma of the greater auricular nerve can occur the following parotidectomy and can be managed by simple excision. The 'surgical depression' caused by the removal of the parotid gland is most noticeable immediately after the operation, when the surrounding skin is slightly oedematous, enhancing the contrast. This depression also decreases with time but does not disappear entirely. The magnitude of this depression depends on the amount of gland removed. Mild trismus may be related to inflammation and fibrosis of the masseter muscle. This complication is usually mild and transient and improves with jaw-opening exercises. Hypoesthesia of the greater auricular nerve is a frequent consequence of parotidectomy. Patients are told that they will feel numbness around the ear, especially at the lobule. The area of numbness will improve within one year of the operation but a small area of skin may remain anesthetized.[18,19]

To reduce the risk of facial nerve damage, intraoperative facial nerve monitoring utilization can be very useful.[20] In our study, intraoperative facial nerve monitoring was performed in all surgeries.

In their prospective study of 20 cases, Öztürk et al. found that 8 of the 20 patients (40%) who underwent superficial parotidectomy had temporary paresis of the marginal mandibular (MM) branch of the facial nerve and reported that they completely recovered during follow-up.[20] Saliva fistula can also be seen after superficial parotidectomy and can be corrected with printed dressing.[21] In our study, the most common complication in our patients undergoing parotidectomy was marginal mandibular nerve paresis (6 cases). Buccal branch paresis was seen in 5 patients. The surgery performed in 9 of 11 patients who developed paresis was total parotidectomy. All patients completely recovered in the follow-up period. Two patients undergoing radical parotidectomy had permanent facial paralysis despite graft repair. The salivary fistula was noted in 1 patient, seroma in 2 patients, and hematoma in 3 patients, and improvement in these complications was achieved with proper dressings. These results show that superficial parotidectomy is an adequate surgical option in benign parotid tumors.

Conclusion

Most of the parotid tumors were benign (pleomorphic adenoma most commonly). The preferred treatment modality was often superficial parotidectomy. Preoperative histopathological sampling has a crucial role in planning the surgery. Using intraoperative facial nerve monitoring gives the surgeon a sense of confidence during the operation. The findings were compatible with the literature.

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Main Article

Cut Throat Injury: A Tertiary Care Centre Experience

https://doi.org/10.47210/bjohns.2021.v29i1.381

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ABSTRACT

Introduction

Cut throat injuries are one of the challenging emergencies encountered in clinical practice. This study evaluates the causes and management of cut throat injuries.

Materials and Methods

This was a retrospective study of total 100 cases of cut throat injury presented to the department of ENT in a tertiary care hospital in Ahmedabad between June 2017 and June 2019. Majority of patients were managed by suturing.

Results

In our study 69% were males,31% were females. The peak age of incidence is 4th decade (55%). 70% of them have injury in Zone II. Seventy eight percent of the patients presented with active bleed without major vessel injury. The most common cause of cut throat injury had been found to be accidental (75%), 54% had injury up to muscular layer. Five patients were managed by laryngotracheal stent placement.

Conclusion

The middle aged males were mostly affected. The majority had zone 2 injury. The most common cause was Accidental (seasonal manja/ kite thread cut). Primary repair is the best way to avoid complications.

Keywords

Neck Injuries; Cut Throat; Kite Thread; Manja cut; Stent, Laryngotracheal

Cut-throat injuries form a major group in the casualties, especially in tertiary care set up. Cut throat injuries can be a life threatening. Profuse hemorrhage, shock, embolism due to major vessels or asphyxia resulting from aspirated blood are common cause of death and may lead to permanent sequalae, decreasing quality of life. Prevention of these untoward sequalae can be established either via endotracheal intubation or by tracheostomy and then surgical repair of transected tissues along with prompt control of hemorrhagic blood loss and blood replacement. The management of these injuries demands a multidisciplinary approach. As Otorhinolaryngologists, our aim should be towards restoration of swallowing, phonation and breathing functions. Psychiatric consultation will be needed to rule out underlying mental illness in case of suicidal attempts.

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The etiology of cut throat injuries are divided into three main groups: suicidal, homicidal and accidental. Accidental factors are mostly related to the road traffic accident and fall injuries. Apart from these, one of most common for accidental cut throat injuries in Gujarat, India is 'MANJA (kite thread) CUT INJURY', that occurs during regional festival famed as Uttarayan where people fly kites as a symbol of celebration and get accidently injured with strings of flying kites.

A sudden increase in number of admissions of patients with cut throat injuries prompted us to analyse this problem. The present study was done to assess the socio-demographic profile of patients of cut throat injury treated in our institute and triggering factors behind such injuries, anatomical structures injured by the cut throat

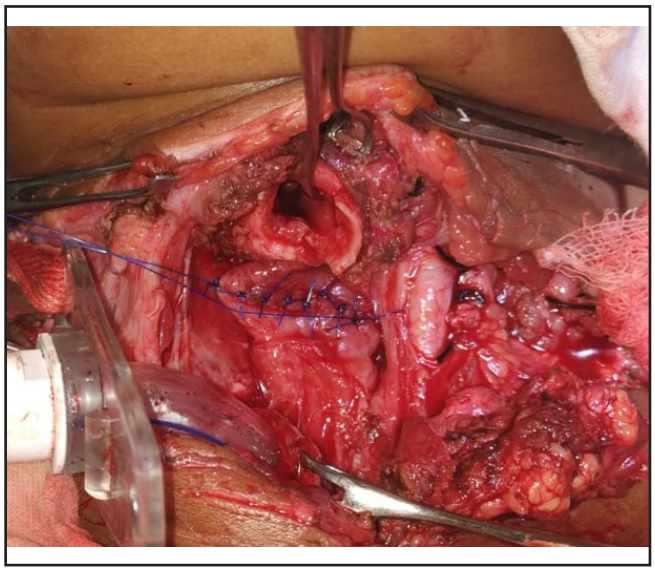

Fig. 1. Tracheo-oesophageal repair after cut throat injury

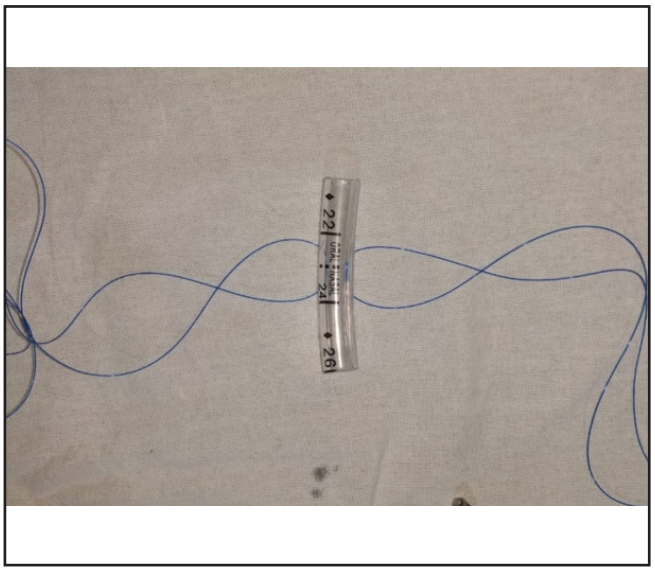

Fig. 2. Stent made up of Endotracheal tube

injury, treatment protocol of cut throat injury patients followed in our hospital and its results and complications encountered in the patients treated while understanding different sequalae of injury and ways to prevent it to improve the quality of life.

Materials and Methods

This was a retrospective study of total 100 cases of cut throat injury presented to us directly or referred from various primary and secondary health care units, to the department of ENT in Civil Hospital Ahmedabad between June 2017 and June 2019.

They were analysed for details of age, sex, aetiology, types of injury, anatomical zone of injury, surgical procedures and their complications. The evaluation of a cut throat injury starts on the basis of ATLS (Advanced Trauma Life Support) guidelines of A B C D E (Airway, Breathing, Circulation, Disability and Exposure). After stabilization of the patient, a complete history is taken and thorough physical examination is done. Blood transfusion with whole blood was carried out in patients who had severe bleeding and those were brought in the state of shock. Suction clearance of the secretions and blood from the wound was done to prevent aspiration. The debridement and repair of wound with or without tracheostomy was done depending on the severity of injury. (Fig. 1)

Injuries of neck are divided into three anatomical zones according to Roon and Christensen's classification:
1) Zone I injuries occur at the thoracic outlet, which extends from the level of the cricoid cartilage to the clavicles.

2) Zone II is superior to zone I injuries occur in the area between the cricoid and the angle of the mandible. Injuries here are the easiest to expose and evaluate.

3) Zone III injuries are between the angle of the mandible and the base of the skull. Although zones I and III are protected by bones and the vital structures in the zone II are not protected by bone, so the risk of injury is different in three zones.

Evaluation of extent of injury starts with assessment of vocal cord mobility and anatomy of laryngeal framework, arytenoid fixation and oesophagus. Exploration under GA/LA is done depending upon severity of injury. After thorough wash, wound was explored and bleeding points were ligated or coagulated by electrocautery. In patients with involvement of thyroid cartilage, and other laryngeal cartilages, repair was done approximating the

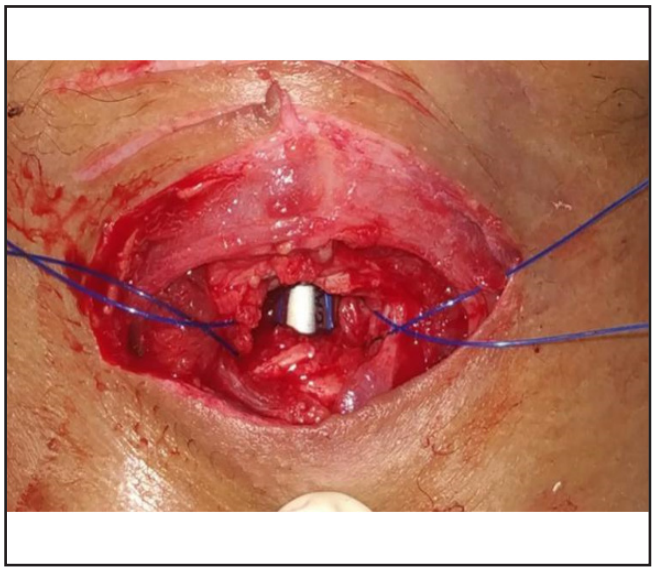

Fig. 3. Laryngotracheal reconstruction using stent

cut ends with 3-0 Prolene®.

In cases of transected trachea, it was sutured circumferentially with interrupted 3-0 Prolene®. when part of tracheal cartilage was lost completely or irrepairable, resection and end-to-end anastomosis to be done, however not done in our study. In apt cases where one or more cuts were present over larynx and trachea, we used stent made up of endotracheal tube (Fig. 2) which was placed just above tracheostomy tube and secured in the neck. (Fig. 3)

Absorbable sutures were used to suture the fascia, muscles and soft tissue of the neck. Skin was closed in two layers by 3-0 Vicryl® for subcutaneous tissue and 3-0 Ethilon® for epidermis. RT was inserted in all patient of laryngeal and tracheal injury to prevent tracheo-oesophageal fistula and provide rest to injured trachea.

Regular dressings were done. Suture removal was done after 10 days. Follow up for 3 months was done along with endoscopic evaluation of airway. Psychiatrist consultation was taken in needed cases. Average hospital stay was less than 2 weeks.

Result

Among 100 patients there were 69 male and 31 female. Majority of the patients (70%) had injury in zone II while 22 patients (22%) in zone I; and 8 patients (8%) had zone III neck injury. (Table I)

Among all causative factors, accidental and that too because of injury while kite flying were attended in majority (38%)patient. 18% patients were found to be victim of homicidal factors. Minority 7% were presented with self injured causes. (Table II)

Majority of patients (54%) presented with injury upto muscular layer with platysma and sternocleidomastoid muscles being common muscles to get severed. 28% patients presented only with superficial injury involving skin and subcutaneous tissue layer. Trachea was exposed and injured in 5% patients who also had difficulty in breathing. 1% patients were having oesophegeal injury. 10% patients were having active uncontrolled bleeding due to injury to major vessels including carotid artery and jugular veins. (Table III)

Intubation was done first in patients with breathing difficulty who didn't have any laryngeal and tracheal injury. While with compromised airway tract, patients were directly tracheostomised and thereby airway was secured. After maintenance of 100% oxygen saturation on air with normal vocal cord mobility, they were given temporary tracheostomy closure followed by permanent closure.

In 5 patients, we placed laryngeal and tracheal stent under endoscopic guidance for stability and to prevent collapse following laryngotracheal reconstruction. We recommend stent removal between 3–6 months after insertion, with regular monthly follow up.

In 2 patients stent removal was done after 6 months and airway was normal. In our study one patient developed obstructive granulation tissue at the end of

Table I: Distribution of patients according to anatomical zone of injury

ANATOMICAL ZONE	NO. OF PATIENTS	PERCENTAGE (%)
Zone –I	22	22
Zone –II	70	70
Zone –III	8	8

Table II: Distribution of patients according to mode of injury

MODE OF INJURY	FACTOR	NO. OF PATIENTS	PERCENTAGE (%)
Accidental	Kite flying Road	38	38
	Road traffic accident	21	21
	Fall from height	16	16
Homicidal	Robbery	10	10
	Land dispute	8	8
Suicidal	Low socio-economic condition	3	3
	Substance abuse	2	2
	Family abuse	2	2

the stent after 3 months requiring further treatment with LASER excision or Tracheostomy. Stent dislodgement occurred shortly after the procedure in 1 patient which was treated with new stent insertion. 1 patient was lost during follow up.

Major complication we found was Secondary wound infection and scar in 5% patients. Tracheo-esophageal fistula was seen in only 1% patients. 2% presented with difficulty in phonation having (vocal cord paralysis). 2% patients came with difficulty in breathing due to Laryngo-tracheal stenosis which were further treated with stenting or T-tube insertion later on. Subcutaneous emphysema seen in 5% due to apical lung injury. (Table IV)

Discussion

According to World Health Organization (WHO), worldwide mortality rate of cut throat injury is 5 million. It is estimated that for every death only 15% gets hospitalized and 80%-85% receives emergency care that demands improvement in urgent access to emergency medical care in our country.[1]

In this study, age incidence of the victims were 10 to 70 years. Most of the patients were males in their fourth decade of life belonging mainly to rural area which is similar to studies of Bhattacharjee et al., Panchappa et al. and Manilal et al.[2,3,4] Male preponderance in

Table III: Distribution of patients according to structure involved

SITE OF WOUND	NO. OF PATIENTS	PERCENTAGE (%)
Skin and subcutaneous layer	28	28
Muscular layer	54	54
Injury to larynx and recurrent laryngeal nerve	2	2
Tracheal injury	5	5
Injury to major vessels of neck	10	10
Injury to oesophagus	1	1

Table IV: Distribution of patients according to complications

POST OPERATIVE COMPLICATIONS	NO. OF PATIENTS	PERCENTAGE (%)
Secondary wound infection and scar	5	5
Decannulation problems and permanent tracheostomy	1	1
Tracheo-esophageal fistula	1	1
Laryngo-tracheo stenosis	2	3
Neurological deficit (vocal cord paralysis)	2	2
Subcutaneous emphysema	5	5

this age group is due to their active participation in risky behaviours and their frequent involvement in interpersonal conflicts. In our study we have noticed a sharp rise in incidence of cut throat injuries in the month of December and January because of regional kite flying festival (known as Uttarayan or Makarsankranti) which is celebrated widely across the entire Gujarat state similar as Panchappa et al. study.[3] Psychiatric illness was the most frequent cause for suicidal attempts. Similar findings were found in study done by Gilyoma et al.[5] In our study males out- numbered the females among the victims of suicidal cut throat injuries. Our result is similar to the study by Bhattacharya et al.[2]

Regarding the site of injury, majority of our patients had injury in zone II i.e. in the region between the cricoid cartilage and the angle of mandible as it is usually the most frequently involved (60-75%) site in penetrating neck injuries. Zone II is not protected by bony structures thus making it prone for injuries more commonly than zone I and III, findings similar to studies of Manilal et al. and Parajuli et al.[4,6] In our study the most commonly performed surgical procedures were primary repair of the wound, tracheostomy and laryngeal/ hypopharyngeal repair. Patients with injury to the hypopharynx, larynx and trachea underwent tracheotomy to protect airway. Similar results were reported by studies of Bhattacharjee and Gilyoma.[2,5]

Majority of patients in our study presented with open wounds and active bleeding, treatment outcome was better in those people who were given emergency treatment early (within 12 hours). We have noticed that as the treatment delays, the chance of wound infection and pharyngo-cutaneous fistula rises.

In our study total 5 (5%) victims required tracheostomy and was lifesaving in them. Regarding treatment outcome some patients are living normal life after treatment, some patients are living with minor disability like change of voice and mild dysphagia. Worst complications seen were Laryngeal stenosis, pharyngeal stenosis and pharyngo-cutaneous fistula. In our study two patients had tracheal stenosis which were then managed with 'T' tube insertion. Also we had noted the usefulness of stent insertion (created by ET tube) as in all the patients of laryngeal injury in whom the stent was inserted, no stenosis seen and post-operative results were excellent. Pharyngo-cutaneous fistula can be effectively prevented by Ryle's tube feeding and avoiding oral feeds in the post-operative period. Patients with suicidal and homicidal injury were evaluated by psychiatrist. This is because the act of suicide is a sign of an underlying mental illness and there may be a possibility of a second attempt.

Conclusion

Accidental cut throat injuries have become a major cause of morbidity and mortality among young males in our society due to accidental cause and psychiatric illness caused by high rates of unemployment, poor socioeconomic status, poor education, poverty and substance abuse. Multidisciplinary approach required in the management of cut throat injury patients. The timely

and correct management is essential for a successful clinicaloutcome. Preliminary tracheostomy needed in those patients presenting with injury involving the larynx or upper trachea. The patient's feeding are better managed with Ryle's tube in post operative period. Post-operative endoscopy identifies the nerve injuries and stenosis problems. It is important to record protocols used and correct operative findings for medico-legal purpose and future reviews.

Kite-flying and kite-string injuries can have severe consequences although kite flying cannot be banned in a country like India where it is seen as enjoyable leisure time, symbol of celebration and part of tradition. We can make common people aware of its sequel, through electronic media and also by information booklets and pamphlets and encourage people to wear hand gloves and cover the exposed parts while flying a kite. Morbidity and mortality among injured patients could be reduced by increasing the emergency health care services, ambulance system, first aid.

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Main Article

Itchy Ears: Evaluation of Predisposing Factors and Treatment Outcomes

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ABSTRACT

Introduction

Though itchy ears cause significant discomfort, patients generally do not consult a doctor till it becomes chronic. Moreover, itching as a symptom hardly receives any attention in non-dermatological clinics and is generally not considered as a condition worth evaluating. Thus, this study was performed to examine the predisposing factors of itchy ears and the outcomes of corresponding treatment.

Materials and Methods

This was a prospective observational study carried out over a period of 12 months (July 2019 to June 2020). The study included 200 patients belonging to the age group ranging from toddler to elderly (≤70 years) and presenting at the ENT OPD of a Tertiary Care Teaching Institute with the complaints of itching in one or both the ears. Following the diagnosis, appropriate treatment was started. The patients were then followed-up after 10 days, to note if symptom of itchiness in the ear(s) had relieved.

Results

Out of 200 patients, 89 presented with itchy ears due to various etiology, of which most common were otomycosis (N=30), allergic rhinitis (N=15), and keratosis obturans (N=10). However, majority of the patients (N=111) had impacted wax as the predisposing factor (trauma (N=27), abnormal anatomy (N=65), or hereditary (N=19)), resulting in itchy ears. On the 10th day, complaint of itchy ears was relieved in majority of the patients. However, amongst 30 patients, 3 patients with fungal infection of the external auditory canal still complained of itchy ears and thus, were referred to dermatologist.

Conclusion

Impacted wax was the most frequently observed predisposing factor and was commonly observed across all the age groups. Majority of the patients responded well to the treatment and were relieved of itchy ears.

Keywords

Pruritus; Ear; Rhinitis, Allergic; Cerumen; Otomycosis; Keratosis

As per the recent data of Global Burden of Skin Diseases, skin disorders were responsible for 1.79% of the total global burden of disease and ranked 4th leading cause of non-fatal disease burden.[1] Amongst various skin disorders, itching is one of the most commonly reported symptoms and is defined as an undesirable sensation on the skin evoking an eagerness to scratch.[2] Itching has been known to adversely affect the quality of life (QoL) in patients with both primary dermatoses and systemic disorders and lead to problems associated with anxiety, attention, sleep, and sexual functions.[1]

In an ENT out-patient department (OPD), an itchy ear is one the most common presenting symptom and patients of all age groups, ranging from infants to elderly, experience it during their lifetime.[3] The skin in the ear canal is richly supplied by nerve fibers, thereby making it very sensitive to the touch.[4] Thus, even a modest aggregation of debris or presence of a dead hair elicits a sensation of itch in the ear canal. Other scenarios resulting in patients turning up at ENT OPDs with itchy ears are patients with frequent and inappropriate cleaning in the form of getting water in their ear canals,

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Table I: Distribution of males and females on the basis of age

AGE	MALES (N=125)	FEMALES (N=75)
Toddlers	10 (8%)	15 (20%)
Pre-School kids	10 (8%)	15 (20%)
School going children	30 (24%)	10 (13.33%)
Adolescents	30 (24%)	15 (20%)
Adults	30 (24%)	10 (13.33%)
Elderly	15 (12%)	10 (13.33%)

or inserting paper clips, safety pins, ear buds or an assortment of other items.[5] Moreover, people with hearing aids often report itching in ears and this could be due to either increase in humidity, skin irritation due to occlusion, or allergic contact dermatitis.[5,6] Similarly, itchy ear canals could also be a result of inflammation, or infection (e.g., fungus).[7,8] In many patients, the cause of itching largely remains unknown, however, role of histamine and leukotrienes has been suggested.[9]

Available data suggest that patients generally do not consult a doctor for acute itch, but more commonly do for chronic itch.[10] Moreover, itching as a symptom receives only negligible consideration in non-dermatological specialties and is generally not recognised as a condition worth evaluating.[11] As a result, there is a relatively little literature available on this clinical condition. Thus, this study aimed to examines the causes of itchy ears and the effect of corresponding treatment.

Materials and Methods

This was a prospective observational study performed, in the ENT OPD of a Tertiary Care Teaching Institute located in Southern India, over a period of 12 months (July 2019 to June 2020). The study included 200 patients belonging to the age group ranging from toddler to elderly (≤70 years) and presenting with the complaints of itching in one or both the ears. While, the patients with perforation of tympanic membrane were excluded from the study. Prior to initiation of the study, the study protocol was approved by the Institutional Ethics Committee and written informed consent was obtained from all the patients.

Amongst the randomly selected 200 patients, 125 were males and the remaining were females. A detailed history was taken and careful clinical examination was performed. Following the identification of causes resulting in itchy ears, based on the diagnosis, appropriate treatment was initiated. The patients were then followed up after 10 days, to note if symptom of itchiness in the ear(s) had reduced. During this visit, patients were counselled regarding the precautions to be followed to counteract itchiness in the ears, secondary to the disease they had been diagnosed.

Results

Amongst males, majority of the patients belonged to the age group of school going children, adolescents, and adults [N = 30(24%) each]. While, amongst females, majority of the patients belonged to the age group of toddlers, pre-school kids, and adolescents [N=15(20%) each]. (Table I)

Distribution of patients according to age groups revealed that, amongst toddlers, impacted wax was the most common predisposing factors for itchiness in the ears. While, amongst pre-school and school going children, upper respiratory catarrh [allergic rhinitis (AR), otitis media with effusion (OME)] was the most common predisposing factors. However, amongst adolescents and adults, fungal infection of external auditory canal (EAC) was the most common reason resulting in itchy ears. While, in the elderly patients, itchy ear was frequently attributed to neurodermatitis. (Table II)

Amongst 200 patients, 89 patients had itching in the ears due to varied etiology, of which most common were otomycosis (N=30), AR (N=15), and keratosis obturans (N=10). However, majority of the patients (N=111) had impacted wax as the triggering factor, due to either trauma (N=27), abnormal anatomy (N=65), or hereditary (N=19), resulting in itchy ears. (Table III)

Treatment given to all the patients varied based

Table II: Common predisposing factors for itchiness in ears with respect to age

AGE	N	PREDISPOSING FACTORS FOR ITCHINESS IN EARS
Toddlers	25	Impacted wax
Pre-School kids	25	Upper respiratory Catarrh (Allergic rhinitis, otitis media with effusion), caries tooth, impacted wax
School going children	40	Upper respiratory Catarrh (Allergic rhinitis, otitis media with effusion), caries tooth , impacted wax
Adolescents	45	Fungal infection of EAC, Allergic rhinitis, impacted wax
Adults	40	Fungal infection of EAC, GERD, globus pharyngis, elongated styloid process, cancer hypopharynx, Allergic rhinitis, neurodermatitis, Use of ear buds, safety pins, impacted wax, keratosis obturans, psoriasis, atopic dermatitis, contact dermatitis, seborrhoeic dermatitis
Elderly	25	Neurodermatitis, use of hearing aids

on the predisposing factors identified for itchy ears. Subsequently, patients were asked to return for review on 10th day to find out the treatment outcome. On the 10th day, the patients with impacted wax, keratosis obturans, caries tooth, OME, AR, gastroesophageal reflux disorder (GERD), elongated styloid process, and globus pharynges had no complaints of itchy ears. However, amongst 30 patients with fungal infection of the EAC, 3 patients still had symptom of itchy ears and were referred to dermatologist. Similarly, patients with seborrheic dermatitis (N=1), and atopic dermatitis (N=1) continued to suffer and thus, were referred to dermatologist. However, a patient with hypopharyngeal carcinoma (N=1) was lost to follow-up. (Table III)

Discussion

Amongst various symptoms of ear diseases, itching remains one of the most discomforting. In daily ENT practice, large number of patients present with incessant itching of the ears. While, some of them have an underlying pathological condition, the predisposing factor in others remain unknown. It may even be psychological. Itchy ears are generally associated with redness, swelling, flakes, and scarring in the adjoining area. Moreover, intense itch may drive the patient to use instrumentation, thus resulting in trauma to the EAC.[12]

In this study, impacted wax was the most common predisposing for itchy ears and affected all the age groups. Symptoms as a result of impacted wax include dizziness, tinnitus, itching, pain, hearing loss, and increased risk of infection.[13] Ear wax is a combination of secretions from ceruminous and pilosebaceous glands with dust, squamous epithelium, and various foreign debris. Wax accumulation is a result of the inability of the secreted wax to be dislodged from the outer ear. This is frequently observed during the extremes of life, but probably due to variety of reasons.[14]

Retention of wax is a result of obstruction in its clearance and in both the extremes of ages, improper cleaning of ears with 'Q-tips' or 'cotton buds' result in impaction. Increase in age lead to decrease in both the number and the activity of ceruminous glands and thus, wax tends to become drier.[14] In a randomized controlled trial evaluating the effective of ear syringing reported that 29% of the participants had itchy ears due to impacted wax and upon syringing 39% of them reported improvement.[15] However, in this study, on 5th day, following the syringing, ear itch was relieved in all the patients (N=111). It is worth mentioning that ear wax drops were used for 5 days prior to syringing and thus, resulted in a significantly better outcome.

AR affects around on 10–30% of the normal population and is most frequently observed in children and adolescents.[16] Patients with AR frequently experience the itch not only in eye or nose, but also in

Table III: Treatment and outcomes in patients with itchy ears

PREDISPOSING CONDITIONS FOR ITCHY EARS	TREATMENT GIVEN	FOLLOW-UP VISIT ON 10TH DAY
Impacted wax (N=111)	Wax ear drops followed by syringing on 5th day	Satisfactory with nil itching in the ears
Keratosis obturans (N=10)	Aural toilet and debridement	Satisfactory with nil itching in the ears
Caries tooth (N=2)	Dental Reference	Satisfactory with nil itching in the ears
Otitis media with effusion (N=5)	Antibiotics and nasal decongestants	Satisfactory with nil itching in the ears
Allergic rhinitis (N=15)	Antihistamines, oral decongestant (± steroidal nasal spray)	Satisfactory with nil itching in the ears
Fungal infection of the EAC (N=30)	Thorough cleaning of the ears with prescription of otomycotic ear drops and antihistamines	97% patients had Satisfactory outcome with nil itching in the ears while 3 patients still had symptom of itching
GERD (N=5)	Anti-reflux medications	Satisfactory with nil itching in the ears
Hypopharyngeal Carcinoma (N=1)	Referral to Higher centre	Could not follow up
Elongated styloid process (N=1)	Removal of styloid process	Satisfactory with nil itching in the ears
Globus pharyngeus (N=5)	Reassurance, H2-blockers, ± Antacid suspension	Satisfactory with nil itching in the ears
Neurodermatitis (N=9), Psoriasis (N=1), Atopic dermatitis (N=1), Contact dermatitis (N=2), Seborrheic dermatitis (N=2)	Canal pack with ichthammol glycerine for 2 days followed by Neosporin H ointment for topical application daily with oral antihistamines for 10 days, dermatologist reference	Satisfactory with nil itching in the ears (N=13); patients with Seborrheic dermatitis (N=1), and Atopic dermatitis (N=1) were referred to dermatologist

the ears and palate. A recent survey involving patients with AR (N=3562) reported that majority of the patients (54%) experienced itch in the ear and palate and rated it as mild (23%), moderate (21%), or severe (10%).[17] In another study involving patients with AR, amongst patients with sneezing and rhinorrhoea as predominant symptoms, 43% and 67% experienced itch in ears and throat or palate, respectively. On comparison, it was found that patients with predominant symptoms of nasal congestion had significantly lower incidence of itch in ear (17%) or throat or palate (31%).[18]

Moreover, intranasal steroids have been found to be effective in treating itchy ears in patients with seasonal AR.[19] Antihistamines by blocking H1 receptors relieve the symptoms of AR. They also retard the increase in vascular permeability. Studies have demonstrated that antihistamines decrease the AR symptoms by 50-60% in contrast to placebo (30-40%). They are more effective in relieving rhinorrhoea, nasal itch, and sneezing than in decreasing congestion. Simultaneously, they also decrease itching of the throat and ears; itching, watering and redness of the eyes; and other systemic symptoms.[20] Similarly, in this study, patients with AR (N=15) were treated with oral antihistamines, decongestant (± steroidal nasal spray) and on 10th day, all the patients were relieved of itchy ears.

Acute otitis media (AOM) and otitis media with effusion (OME) are frequently observed in the young children. In children under 5 years, the OME that lingers following the onset of AOM is more common (20% at 2 months) than the chronic OME (4.4 to 10%).[21] In this study, in all the patients, treatment of OME (N=5) with antibiotics and nasal decongestants was associated with significant relief in itchy ears.[22]

The treatment of otitis media and otitis externa with widespread and occasionally non-essential use of antibiotic eardrops has been related to the increase in the prevalence of otomycosis. Moreover, use of broad-spectrum antibiotics like quinolones is associated with the secondary overgrowth of fungi.[23] The most frequently observed fungal agents responsible for otomycosis are Aspergillus niger (80%), Candida albicans (second most common), Actinomyces, Trichophyton, Aspergillus fumigatus, and Candida tropicalis.[24] A study evaluating the microbiology of itchy ears reported that 48%, 33%, and 19% patients had growth of no microorganism, aerobic bacteria, and fungi, respectively.[12] Topical antifungals are potentially safe treatment options for the treatment of otomycosis, particularly in patients with a perforated eardrum.[25] In this study, we found that 30 patients had itchy ears of fungal origin and on treatment with anti-fungal ear drops and oral antihistamines, 97% patients were relieved of itchy ears.

In patients with GERD, with each episode of acid eructation, itching in both the ears and throat usually increases. Thus, treatment with antacids and/or proton pump inhibitors helps the patients significantly. This sensation of itching is mediated through the 9th, 10th, or 5th cranial nerve, particularly if the eructated acidic fluid reaches the pharynx or oral cavity.[22] Similarly, in this study, all the patients with GERD and itchy ears (N = 5) were successfully treated with anti-reflux medication. Occasionally, globus pharyngeus with a stimulus in the pharynx, especially lateral pharyngeal bands, is linked with itchy ears.[22] In this subset of patients, in the absence of alarm symptoms, a trial of acid-suppressive therapy may be reasonable and successful.[26] Similarly, in this study, patients with globus pharyngeus (N=5) were successfully treated with reassurance, and H2-blockers (± antacid suspension).

In patients with tooth caries, ear itching may precede or coexist with reflex otalgia. There may be a solitary complaint of itchy ears and is mediated through 5th cranial nerve. Dental treatment is helpful in these patients.[22] Similarly, in this study, children with tooth caries (N = 2) were referred to dental surgeon and the complaint of itchy ears was successfully relieved.

Rarely, 9th cranial nerve is stimulated by elongated styloid process that results in itchy ear, which may occur prior to or simultaneously with stylalgic pain. In these patients, non-response to medical treatment is an indication for styloidectomy.[22] Similarly, in this study, patient with elongated styloid process (N=1) underwent styloidectomy and was relieved of itchy ears.

Finally, non-organic causes of itchy ears should be considered and amongst them neurodematitis is a well-known entity. In this study, ear canal of patients with neurodermatitis (N=9) was packed with ichthammol glycerine for 2 days followed by Neosporin H® ointment for daily topical application with oral antihistamines for 10 days.

In some patients with desquamated epithelial debris in the ear canal, use of keratolytic and/or antibiotic-steroid drops following cleaning is useful. In patients with no observed predisposing factors, empirical antihistaminic drugs may be successfully tried. Moreover, reassurance is beneficial.[22]

Conclusion

We observed that impacted wax remains the most common predisposing factor resulting in itchy ears and was commonly observed across all the age groups. Amongst infectious causes, fungal infections were found to be most prevalent amongst adolescents and adults. Majority of the patients responded well to the treatment and were relieved of itchy ears. However, certain patients required dermatologic consultation. Thus, in order to accomplish quick relief and have a stress free life, it is vital for the patients with itchy ears to consult the ENT specialist to get diagnosed and treated without neglect.

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Ethical Standards

The authors assert that all procedures contributing to this work comply with the ethical standards laid down by the Indian Council for Medical Research (ICMR) on human experimentation and with the Helsinki Declaration of 1975, as revised in 2008.

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Main Article

Approaches to a Successful Myringoplasty – Which Factors Make a Myringoplasty Difficult?

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ABSTRACT

Introduction

Myringoplasty has often been viewed as a "basic" ENT procedure. This paper will discuss the factors that can make a myringoplasty more challenging and suggest some techniques to overcome these.

Affecting Factors

Patient factors

The age of the patient, their habitus and co-existing co-morbidities are usually the factors affecting the choice and outcome of the procedure.

The ear

Anatomical variations, the nature of the pathology itself and the condition of the remnant tympanic membrane and the middle ear are important factors for consideration.

Other factors

Equipment availability, expertise of the surgical team and anaesthetic support can also influence the surgical procedure.

Surgical Procedure

The actual procedure can be done in a variety of ways including but not limited to different approaches, different techniques and using different equipment like microscopes, endoscopes, LASER, etc.

Results and Complications

The primary author reported a success rate of about 95% in her series. Complications of myringoplasty include myringitis, residual perforations, otitis externa and epithelial pearl formation.

Keywords

myringoplasty; Otologic Surgical Procedures; Ear

Chronic otitis media can result in a tympanic membrane perforation that fails to heal spontaneously. Philip Robinson et al published a study performed over 20 years in Bristol in the UK where they observed the natural history of 2865 episodes of perforation to study the rate of natural closure.[1] After two and a half years observation a staggering 90% of children under 7 had spontaneous closure of the perforation and even those aged 7 to 12 years had a 75% spontaneous closure rate. The study recommended that in children there was little point of waiting more than 2 and a half years, the median time for closure overall being 13 months but this is age dependent.

By closing the defect, the patient can return to life without the need for water precautions when showering, washing hair or swimming. Although myringoplasty is not "sold" to improve hearing, closure of posterior or large perforations can improve the conductive hearing

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loss. Philips et al analysed 495 primary myringoplasties from data entered into the Common Otology Database and found an overall improvement in the hearing of those that were successful to be 9.14 dBHL ± 10.62 dBHL.[2] Perhaps the only contra-indication to myringoplasty is a dry tympanic perforation in the only hearing ear or in patients with significant co-morbidities.

Myringoplasty has often been viewed as a "basic" ENT procedure and is allocated to junior doctors with little training or supervision resulting in poor success rates. To successfully perform a myringoplasty surgeons need to master many of the principles of good tissue handling and exposure techniques applied in more major ear surgeries. This paper will discuss the factors that can make a myringoplasty more challenging and suggest some techniques to overcome these.

So, can one technique be used for all myringoplasties? If not how do we decide what technique should be used for each patient? As surgeons we make hundreds of decisions subconsciously based on our experience and this may only become apparent when supervising our trainees when we are surprised by their decisions. Factors that need to be considered include those related to the patient, the ear, the surgeon and anaesthetic technique, equipment available and more recently the impact of the Covid-19 pandemic.

Patient factors

The age of the patient: Patients who are very young or old will present different challenges. Older patients may have very limited neck movement so if it is difficult to perform microsuction in the clinic with the patient on a couch, patient positioning in the operating theatre is likely to be suboptimal.

The minimum age the patient should be before a myringoplasty is offered has been debated. Vrabec performed a meta-analysis which suggested that myringoplasty success improves with age and so it may be better if the child is more than 6 years old however there are very few studies with children less than 6 years.[3] Vrabec also found no correlation of success based on the presence of contralateral ear disease. It is reasonable to consider a myringoplasty in children who despite adequate water precautions still have recurrent ear infections and if hearing loss is present closure of posterior or subtotal perforations may in itself improve the hearing or at least enable the use of a conventional hearing aid without increasing the risk of infection. Hardman et al found in a meta-analysis that adenoidal hypertrophy and surgeon experience can influence the outcome.[4]

In 1983 Singh and Raine recommended surgery to be performed in children over 12 years of age whereas the more recent studies found age did not affect the success of myringoplasty.[5] Recently more surgeons are performing myringoplasty in younger children the author has successfully operated in those over 6 years old.

It is difficult to determine the success rates of paediatric myringoplasty since a review of the literature identifies studies, all of which have been retrospective, with rates varying from 35 to 93% with different success criteria. Comparison of the studies is complicated due to inclusions of perforations due to different aetiology which may also influence the success rates. An intact TM appears to be achievable in 60-93% however if success includes an improvement in hearing with no middle ear disease the success rate falls to 50-70%. In addition, re-perforation, glue ear formation and atelectasis can occur in a fifth of patients.

The patient's habitus: Some patients have short, fat necks and large chest and shoulders. This impacts firstly on access, where it may be difficult to use instruments in the correct position and secondly with a raised BMI, there is an increase in the basal metabolic rate as well as other anaesthetic considerations. In these patients, access can be improved by gently pulling down on the shoulder and rotating the table. Suboptimal positioning of the patient can result in a strain on the surgeon's neck and arm especially if the procedure is a longer one.

Other co-morbidities that can affect the surgical outcome: Patients who have had cleft palate repair surgery still have reduced eustachian tube function which will have implications for the success of a myringoplasty. Patients with syndromes such as trisomy

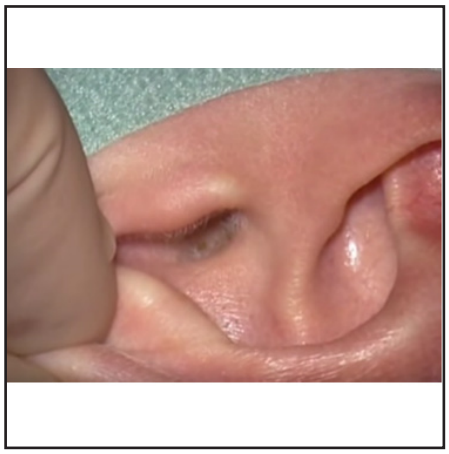

Fig. 1a. A narrow ear canal

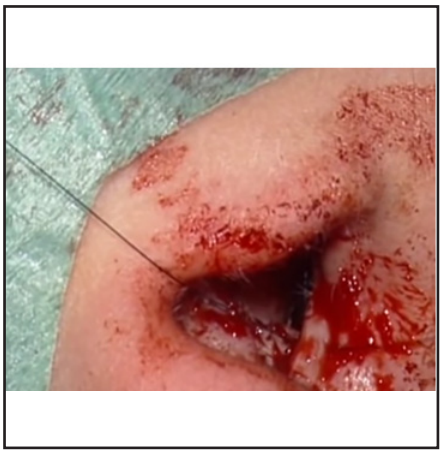

Fig. 1b. Flap shift technique soft tissue meatoplasty

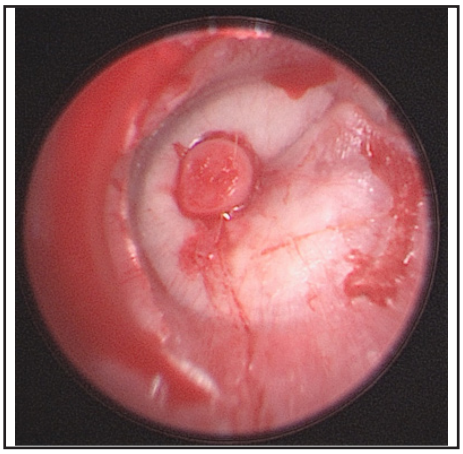

Fig. 2. Butterfly cartilage graft technique

21 may have congenital narrowing of the ear canals as well as eustachian tube dysfunction. Conditions such as scleroderma may present with additional challenges since their tissue quality is poor, not only making lifting of the tympanomeatal flap more difficult, but also affecting the quality of the graft. Patients on anti-coagulants are more likely to bleed making a bloodless field more of a challenge to achieve. Patients who are diabetic or are immunocompromised may have higher rate of post-operative infections and prophylactic antibiotics could be advisable.

The ear

Co-existing ear pathologies: The anatomical sequalae of chronic otitis media varies from a simple central perforation seen after an acute otitis media, trauma, removal of a ventilation tube or be complicated with other conditions such as erosion of the ossicular chain, formation of tympanosclerosis, epithelialization of the middle ear and everted mucosa. These pathologies can affect the surgical procedure of myringoplasty. The middle ear must be carefully inspected to determine the appropriate surgical option not just on the size and position of the perforation but on such complicating pathologies.

The ear canal: Good visualisation is essential and so access via the ear canal must be optimised. Ear surgery in patients with narrow rather than wide ear canals will obviously be more challenging to perform. Although there is a natural tendency to limit the amount of local anaesthetic and adrenaline infiltration to reduce narrowing the ear canal further, this is a mistake and can result in more bleeding. Instead a Lempert endaural speculum can be inserted after injection to gently dilate the ear canal and massage excess infiltration from the skin of the canal. The ear canal be further enlarged after the tympanomeatal flap has been raised using a curette. If the ear canal is very narrow, a soft and/ or a bony canaloplasty may be required. Depending on the soft tissue meatoplasty technique employed, (the author prefers a "flap shift" technique as shown in Fig. 1a and b)[6] a staged procedure or an endoscopic butterfly cartilage graft technique to repair the perforation may need to be used as shown in Fig. 2.[7]

The presence of a prominent anterior canal wall may prevent visualisation of the perforation especially when using a microscope. To close a perforation successfully without complications, the grafting material and meatal skin flaps need to be positioned correctly so a bony canaloplasty may be necessary. The author prefers to use a 2mm diamond burr and with a size 18 fine end on a Zollner sucker, the latter is used to retract the tympanomeatal flap that has been raised and reflected superiorly like a bucket handle. Irrigation is not used whilst drilling since this seems to attract the tympanomeatal skin to the drill. Some otologists use

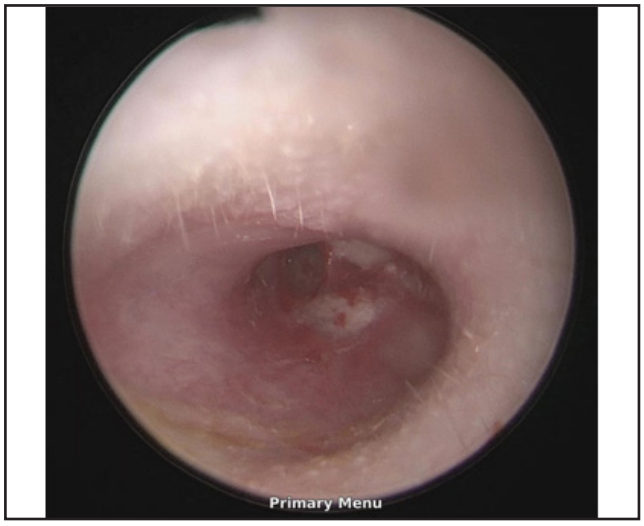

Fig. 3a. Endoscopic view of perforation

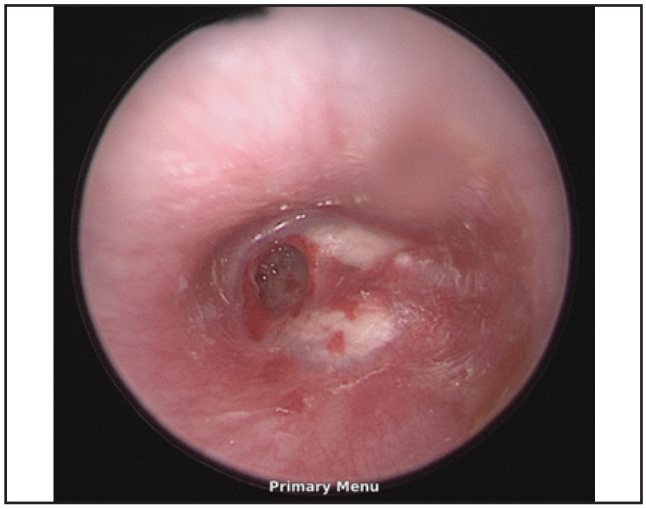

Fig. 3b. improved by lowering hand with the endoscope.

foil or silastic sheeting to protect the ear canal skin.

Another way to improve visualisation is using the endoscope. In Fig. 3a the anterior border of the perforation cannot be seen, however just by dropping the hand holding the endoscope, the view is improved as seen in Fig. 3b. With experience, the endoscopic approach can be used to repair the more difficult anterior, subtotal and total perforations.

Sometimes there are co-existing lesions in the ear canal. A patient with a subtotal perforation had a fatty lesion in the ear canal (Fig. 4a) which was removed (Fig. 4b) before repairing the tympanic membrane during the same operation. Other lesions such as exostosis and osteomas may be encountered and need to be removed prior to performing the myringoplasty, if necessary, as a staged procedure.

Another challenge to the otologist is patients with active otitis externa in the presence of a perforated tympanic membrane. Myringoplasty should only be attempted after treating the otitis externa using

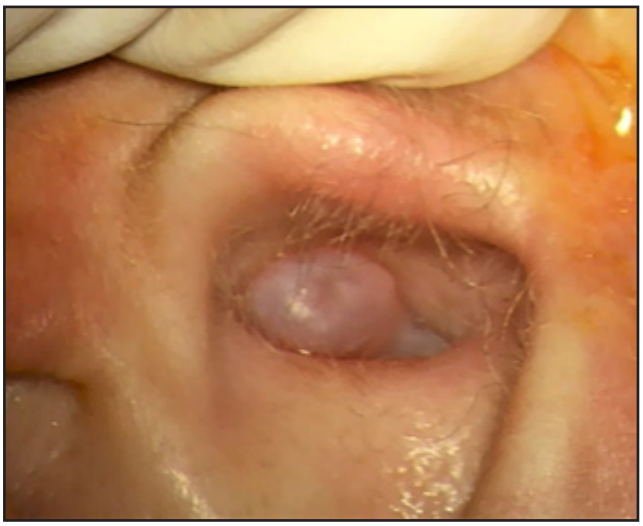

Fig. 4a. Lesion in ear canal

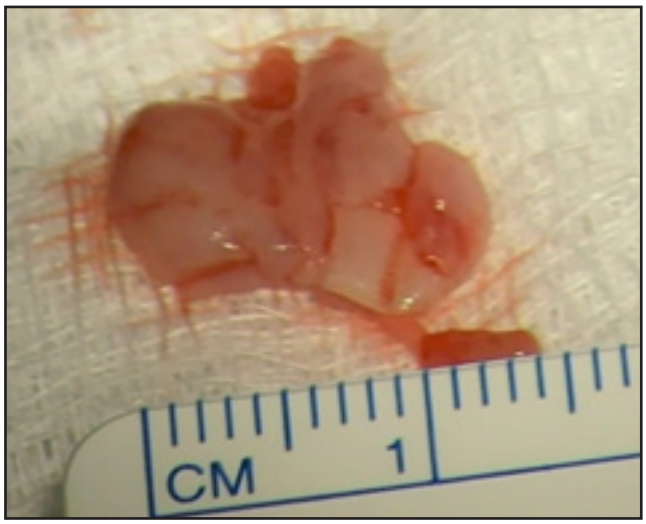

Fig. 4b. A "fatty lesion" was excised

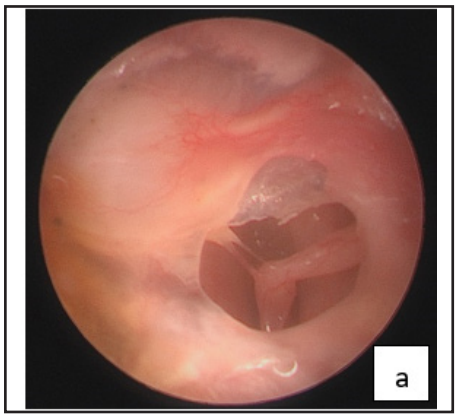

Fig. 5a. A posterior perforation in a left ear with the incudostapedial joint seen along with some adhesions

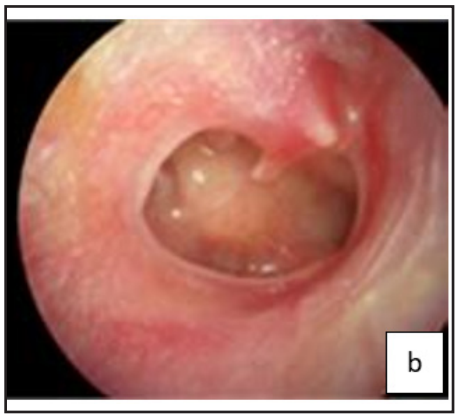

Fig. 5b. The subtotal perforation is complicated further with a medialised malleus

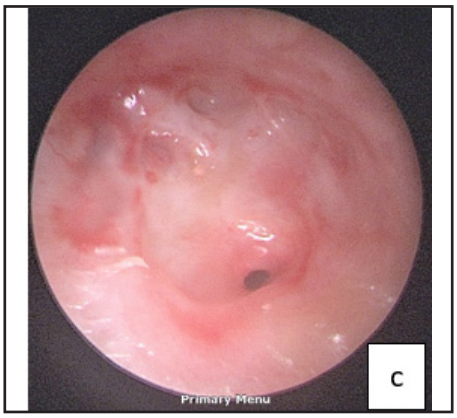

Fig. 5c. A small posterior perforation with perhaps a degree of myringitis

appropriate topical drops (according to swab sensitivities) and water precautions.

The perforation itself and the status of the remaining tympanic membrane: Figures 5a, b and c show 3 different perforations varying in size and position each with their own challenges.

The size and site of the perforation needs to be considered. Anterior perforations are more difficult to access, and the blood supply is poorer and this affects whether the myringoplasty is likely to be successful. Singh et al had a 34% success for anterior perforation but 91% and 100% for inferior and posterior perforations, respectively.8 The size of the perforation seems to affect the success rate for some but not others. Lee et al had a success rate of 74% for small perforations but only 56% for larger ones whereas Yung did not find size to be a factor.[9,10]

Inflammatory episodes may induce tympanosclerosis

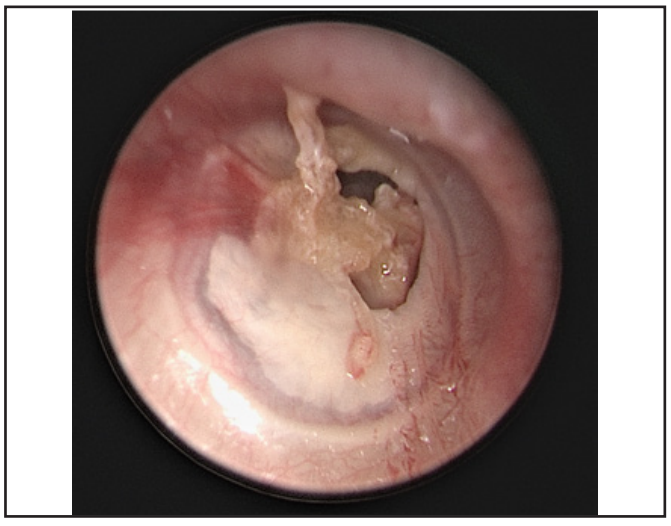

Fig. 6. Squamous epithelium migrating into the middle ear

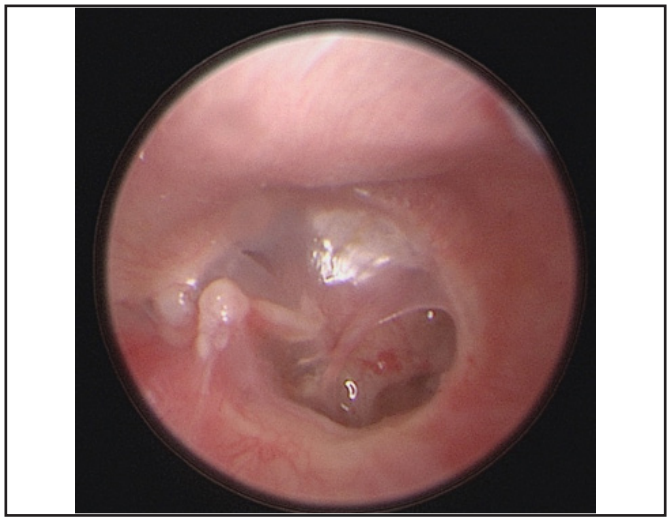

Fig.7. Posterior perforation complicated with medialisation of the handle of malleus and tympanic membrane adherent to promontory

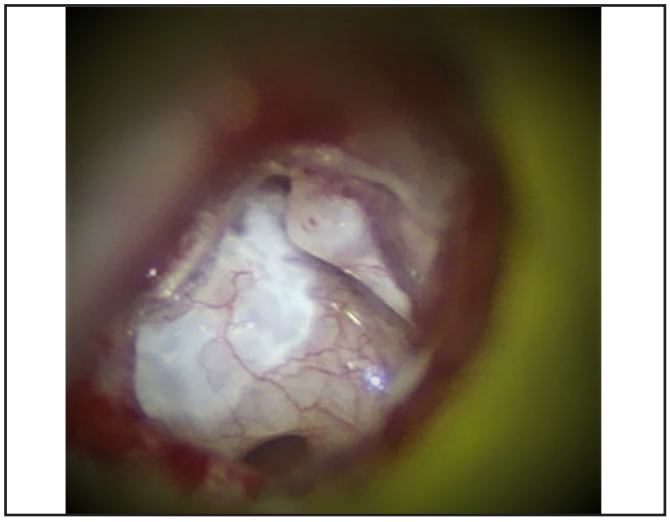

Fig. 8. Tympanic membrane adherent to incudostapedial joint

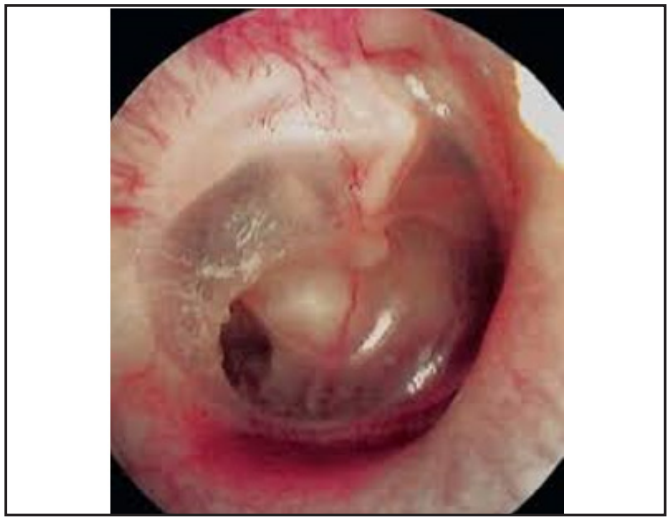

Fig. 9. Tympanic membrane adherent to the promontory.

which histologically is characterized by devascularization and hyalinization of the of the middle ear. The author believes that removal of the tympanosclerotic plaques improves the success rates for myringoplasty perhaps by improving the blood supply to the graft. A tympanosclerotic plaque can be removed from the medial surface of the tympanic membrane without disturbing the epithelial layer or by total removal of the involved tympanic membrane.

Squamous epithelium on the lateral tympanic membrane may advance into the middle ear forming a cholesteatoma (Fig. 6). Sometimes the mucosal layer of the tympanic cavity can advance over the edge of the perforation towards the epidermal layer replacing the squamous epithelium.

The position of the handle of the malleus can make surgery more challenging. In Fig. 7, there is a posterior perforation, the superior margin of which is adherent to the promontory and the malleus handle is medialised. The pre-operative audiogram is an important consideration. If despite the malleus being medialised, the hearing is 30 dB HL efforts should be made to keep the ossicular chain intact. If a conductive hearing loss of more than 30 dB is present, then disarticulation of incudo-stapedial joint followed by gently lateralising the malleus enables better placement of the graft. An ossiculoplasty could be performed if necessary.

Where the graft cannot be place using an underlay technique with graft under the malleus- (there is tendency for the malleus to pull the graft from the anterior and posterior malleus ligaments), the malleus handle can be cleaned and a hole or large cut in the in the fascia made so the manubrium can be exteriorised.

Unfortunately, the tympanic membrane can retract onto the incudo-stapedial joint even with a perforation present to ventilate the middle ear as seen in Fig. 8. Experience and patience is required to lift the often very thin tympanic membrane off the ossicular chain without causing a traumatic hearing loss or leaving an epithelial layer from which cholesteatoma can develop.

In Fig. 9 the tympanic membrane is adherent to the promontory but careful elevation of this thin tympanic membrane is necessary to enable graft placement.

The status of the middle ear: Chronic inflammation often causes erosion and/or fixation of the ossicular chain which may be surrounded by hard fibrous scar tissue. This can lead to difficulty raising the tympanic membrane and erosion of the incus and the possible benefits of an ossiculoplasty may need to be considered, taking into account the health status of middle ear. The presence of granulations in the middle ear also leads to more bleeding which can make the surgery more challenging.

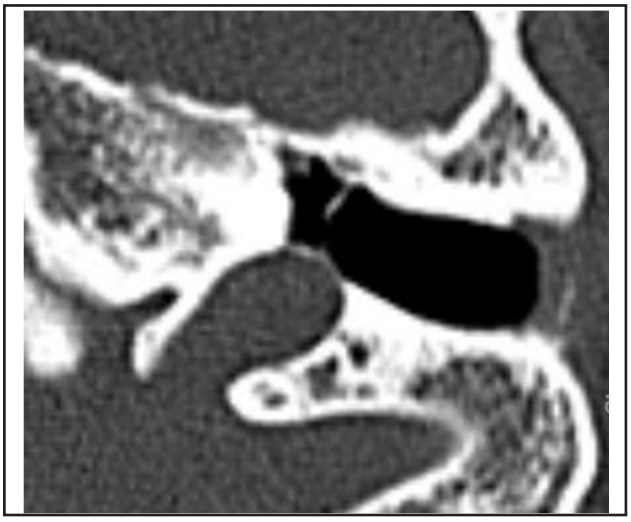

Fig. 10 a. CT scan showing a high jugular bulb

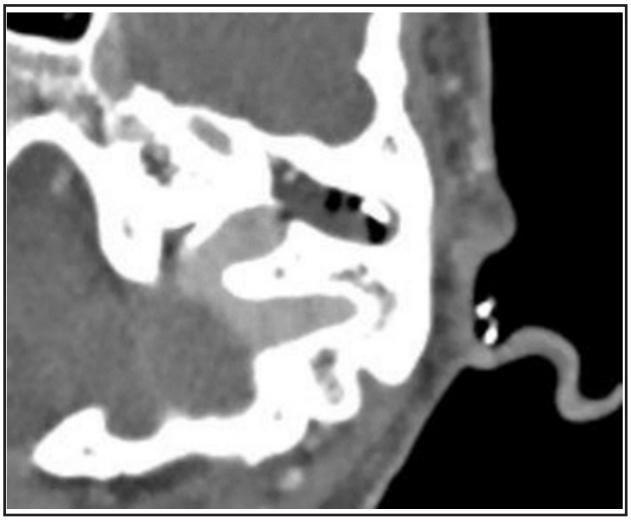

Fig. 10 b. with contrast following surgery

Some patients with tympanic membrane perforations seem to have a continuous discharge from the ear despite attempts to clear it pre-operatively. Tawab et al found that an additional mastoidectomy performed in ears with chronic otitis media without cholesteatoma gave no statistically significant benefit over a simple myringoplasty with regards to graft success rate, discharge and hearing results.[11] CT and MRI scans may be required to exclude an underlying cholesteatoma.

Does co-existing cholesteatoma affect the success rates of myringoplasty? Yoon et al did not find the presence of cholesteatoma or in fact presence of discharge in the ear to impact on success rates of myringoplasty.[12] The author included all pars tensa perforations with and without cholesteatoma present on the common otology database and found no difference in the myringoplasty success rate of over 95% in over 400 cases. It is important to ensure all cholesteatoma is removed from the undersurface of the tympanic membrane. Sometimes it is best to excise the affected tympanic membrane and the need for follow-up non-EPI DWI MRI scan or second look surgery may be required.

A high dehiscent jugular bulb: Figures 10 a and b are the CT scans of a male who had a successful combined approach tympanoplasty on the right ear and wanted a myringoplasty so he could finally go swimming. Unfortunately the scans were not reviewed prior to the myringoplasty and during elevation of the tympanomeatal flap, heavy bleeding was encountered from the exposed high jugular bulb.

So how do you deal with the high dehiscent jugular bulb? If known pre-operatively by reviewing any CT scans you could consider a technique not raising the tympanomeatal flap. After freshening the edge of the perforation, the middle ear below the perforation can be filled with gelfoam/spongostan and then fat or fascia can be tucked under the edge of the perforation to close it. This has been done on 3 occasions having stopped the bleeding using ribbon gauze soaked in adrenaline to pack the ear canal. After 10 minutes pieces the packing is carefully removed from the ear canal and pieces of surgicel inserted in the hypotympanum to stop the bleeding so the operation could be completed.

The myringoplasty technique

The graft material: Several different biological and non-biological graft materials are used by surgeons. B Nicholas and R O'Reilly reviewed the literature in 2010 and found no significant difference in hearing outcome but cartilage may have better closure rates in the paediatric population.[13] Fat plug myringoplasty technique has largely been employed for small central

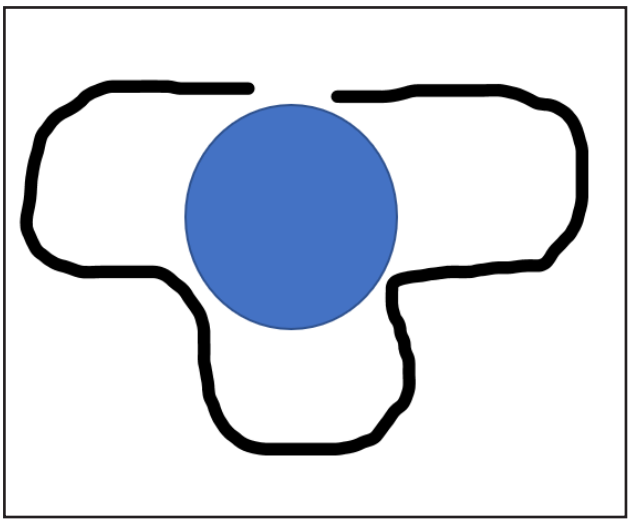

Fig. 11a. Temporalis fascia with 3 "outpouches"

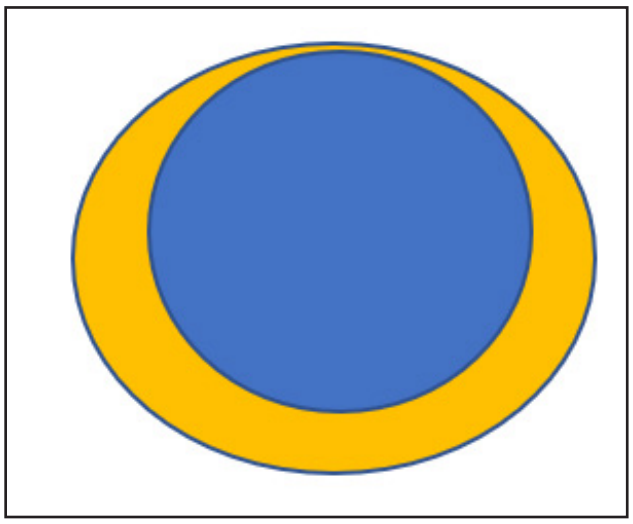

Fig. 11b. Cartilage on pericartilagenous flap

posterior or inferior perforations. Lee et al in 2018 carried out a systematic review and found that fat plug myringoplasty success rates were indeed inferior to those using fascia and perichondrium especially in larger and anterior perforations.[14] Others have found that the hearing outcomes are worse for those with larger perforations.

The author favours the use temporalis fascia if a postaural approach has been used but tragal cartilage in permeatal surgeries whether using the endoscope or microscope. Biodesign has been chosen when previous surgery had utilised the available fascia and cartilage. Biodesign is natural extracellular matrix derived from porcine small intestinal submucosa that acts as a scaffold for the body's cells to infiltrate and remodel into vascularised tissue. Closure rates are reported to be comparable with temporalis fascia, ranging from 83% –100% across published literature.[15-17]

When harvesting tragal cartilage, the skin incision is made a few mm below the rim of the tragus and 3-4mm of cartilage is kept laterally which improves the cosmesis but should the patient require a conventional hearing aid in the future, this retained cartilage improves the fitting of the aid. Sometimes only perichondrium is required. When cartilage on perichondrium is used, a rim of perichondrium is fashioned which then lies on the bony annulus. The amount of cartilage required depends on the size of the defect in the tympanic membrane and the status of the ossicular chain including the presence and position of the handle of the malleus. Spongostan may be placed in the middle ear with this graft.

In Fig. 11 a and b if the blue circle represents the area of the tympanic membrane then the graft shape used for a total, subtotal or large anterior perforation is shown here. Three "outpouches" are created in the temporalis fascia which are then placed on the anterior, inferior and posterior ear canal walls. This appears to successfully support the graft and often no spongostan™ (absorbable haemostatic gelatin sponge) is required in the middle ear.

The graft positioning: In the underlay technique, a graft to repair the perforation is laid medial to the position of the tympanic annulus. Since stable structures such as the annular ligament and anterior wall of the protympanum are present lateral to the graft, this technique eliminates the possibility of blunting. In the overlay technique the graft is placed lateral to the position of the tympanic annulus, but this technique has the risk of blunting of the anterior angle.

The author uses an underlay technique and after the edge of the perforation is freshened, the tympanomeatal flap is lifted 2 to 10 o'clock like a bucket handle (Fig.12a). An anterior bony canalplasty may be

required to improve visualisation and access to place the temporalis fascia graft. The graft is then inserted over the incus, under the malleus and once covering the anterior, inferior and posterior ear canal walls the tympanomeatal flap is replaced (Fig.12b).

The overlay technique is also popular although it may be more challenging than the underlay technique if blunting and lateralization of the graft are to be avoided. The graft is placed on the lateral surface of the tympanic membrane after the squamous layer of the remaining tympanic membrane has been carefully removed. A slit in the graft can accommodate the malleus but if the graft is to be placed lateral to the malleus, care must be taken to ensure the malleus is also free of squamous epithelium.

The challenge in myringoplasty is how to secure the grafts anteriorly. One technique "the pocket handkerchief technique" involves making a tunnel in the anterior canal wall and a tag of fascia or perichondrium is then pulled through. It can be a difficult manoeuvre especially when there is a prominent anterior canal wall so an alternative technique using an anterior bony canaloplasty and larger fascia grafts can be employed.

Iain Swan described a technique of making an incision in the tympanic membrane anterior to the perforation through which a tag of fascia or perichondrium passes through and lies on epithelial surface of the tympanic membrane. Various techniques have been utilised over the years to improve the success rates of myringoplasty for total and subtotal perforations.[18] Pfleiderer and Moffat in 1987 described a technique utilizing a total tympanic graft of formalized autologous temporalis fascia in 29 patients with total closure of the defect being achieved in 93% of cases.[19] The overlay technique is used by some in this situation but again by performing an anterior bony canaloplasty and using a large enough graft that can cover the anterior, inferior and posterior ear canals a successful myringoplasty can be achieved. The endoscopic technique gives great visualisation but can be challenging at times having to manipulate the graft one handedly.

Butterfly grafting is increasing in popularity especially as the endoscopic myringoplasty is being employed7. The cartilage is harvested using a punch biopsy and the rim split so that after the edge of the perforation has been freshened the graft is inserted so a phlange is inserted either side of the tympanic membrane (Fig. 13). This technique enables placement of the graft without raising tympanomeatal flaps.

Surgeon and anaesthetic factors

Surgery is an apprenticeship and we have all been taught different techniques by our mentors, taking to heart their

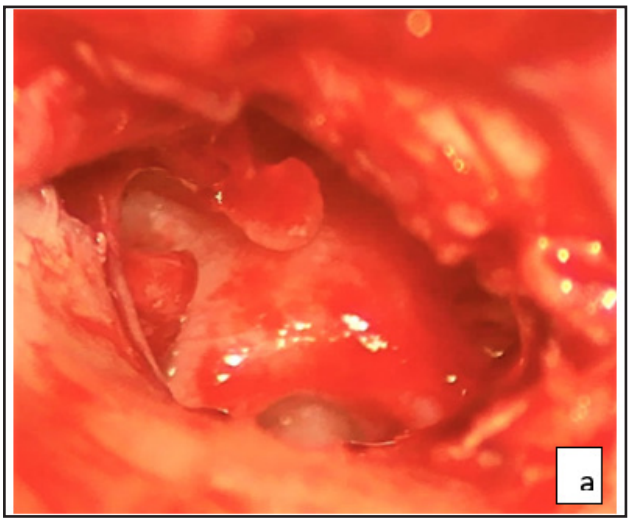

Fig. 12a. Tympanmeatal flap raised 2 to 10 o'clock

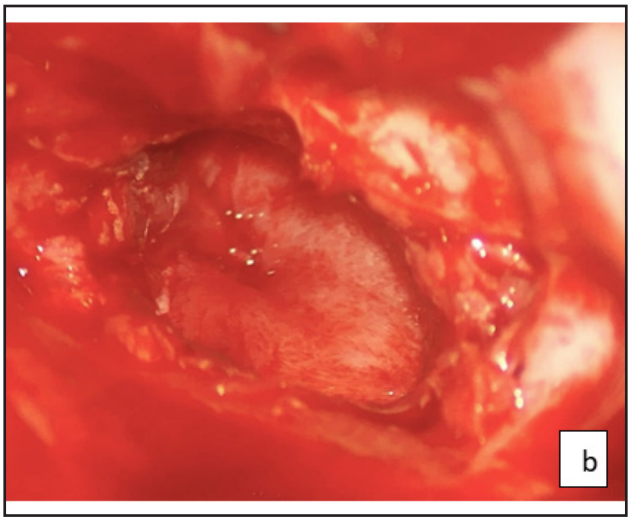

Fig. 12b. Replaced over temporalis fascia

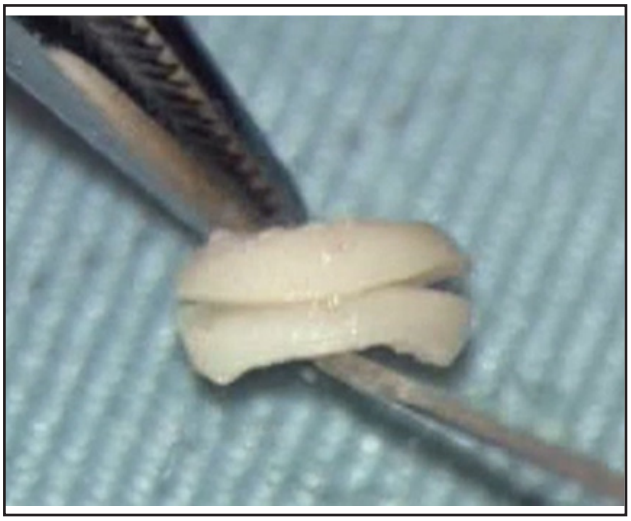

Fig.13. The punch biospy produces a disc which is partially split to form 2 phlanges that lie either side of the tympanic membrane to close the perforation

advice and beliefs depending on our experience at the time and the status of our teacher. We therefore become familiar and comfortable with these techniques. The introduction of endoscopic ear surgery has highlighted other surgeon factors. Interestingly, the handedness of the surgeon can affect the preferred surgical approach. For a right-handed surgeon there is a preference to operate on inferior and posterior perforations in a right ear since the endoscope is held in the left hand out of the way of the instrument hand. The left ear however is preferred by a right-handed surgeon when performing a tympanoplasty to remove cholesteatoma since once again the endoscope is out of the way.

Less experienced surgeons may find permeatal surgery using the microscope challenging but with surgical experience it becomes easier to work in a confined space often operating with only one hand. Many of these skills and those learnt for FESS are transferable to learning endoscopic ear surgery.

The surgeon plays an important contribution to the bloodless field. It was found that when the ear canal was injected with lignocaine and adrenaline, the patient's pulse and blood pressure increased perhaps due to pain. This is prevented by placing putting a cottonoid soaked in lidocaine and adrenaline into the ear canal in the anaesthetic room prior to induction. A small volume, single very slowly administered lidocaine and adrenaline injection in the so called "vascular strip" avoiding blebs is required. The tragus is also injected when cartilage and perichondrium are to be harvested. By removing hair from the ear canal the number of passages of the scope to clean it of blood on passing it down the ear canal is reduced and so this saves operating time in the long run. Care must be taken not to cause trauma to the ear especially the first few times the endoscope and instruments are inserted or removed for each ear before a "memory" of the action is made. Warm saline irrigation can also be useful to reduce bleeding. Patience is required as well as Adrenaline soaked cottonoids.

The key to successful myringoplasty and particularly in Total Endoscopic Ear Surgery (TEES), is a bloodless field and the role of the anaesthetist should not be underestimated. Wormold had shown that TIVA using remifentanil and propofol significantly reduced bleeding during FESS.20 A pulse of 50bmp and a mean arterial pressure of 50mm Hg has been advised. Further vasoconstriction is achieved when the anaesthetist hyperventilates the patient so the expired PCO2 is reduced to 4. The use of tranexamic acid also plays a significant role and it should be administered soon after induction since it takes 20 minutes to work. The use of endotracheal tubes makes it easier for the anaesthetist to hyperventilate the patient and this also avoids the placement of a poorly sitting laryngeal mask which can result in venous engorgement.

Equipment availability

This can influence the surgical approach. Some units have limited resources and by expanding the repertoire of surgical techniques, additional lists may be able to be run concurrently. Permeatal myringoplasty can be performed using the microscope or endoscopically, the microscope is usually used when a postaural approach is necessary.

Fortunately, EES can be set up without the need to purchase new equipment. FESS endoscopes of 4mm diameter can be utilised initially. Endoscopes are available in 2.7mm, 3mm and 4mm diameter. The larger diameter improves the quality of the image obtained however the relative bulk within a narrow

ear canal can be prohibitory and so a 3mm scope is usually recommended. A 0 degree scope is easiest initially especially for straight forward myringoplasties. Standard ear instruments can be used and as well as employing the use of an artery clip to bend fine ends (Fig.14).

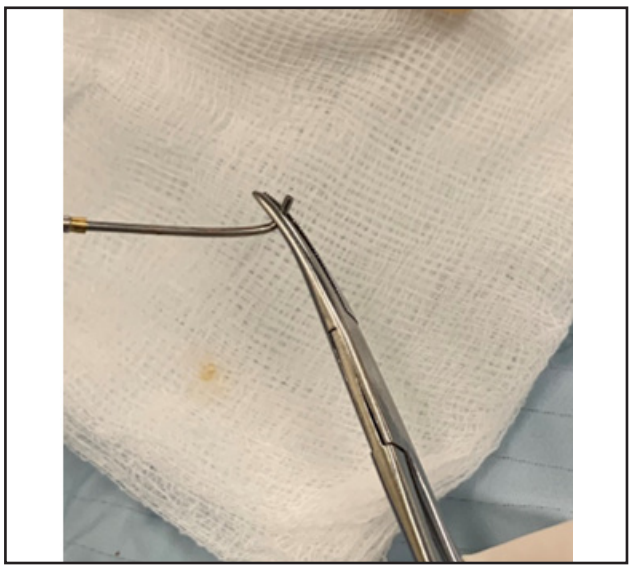

Fig. 14. Using an artery clip to bend a fine end to enable suction around a corner.

The impact of the Covid-19 pandemic

This pandemic has impacted on the delivery of elective surgery in a number of ways. Hospitals have stopped elective activity, diverting staff and estates to meet the demands of patients with severe symptoms from Covid-19 infections. As activity returns the delivery of elective surgery including myringoplasty is likely to change. Firstly, there is the need to protect patients and staff. It is recognised that patients developing Covid-19 shortly after having a general anaesthetic have a significant mortality (up to 23.8%).[21] Pre-operative isolation of the household and swabbing regimes has been advocated as well as considering using local and avoiding general anaesthesia. It is recognised that the virus Covid-19 can be found in the nasopharynx even in asymptomatic patients and it is known that other coronaviruses can be found in the middle ear mucosa of patients with infection.[22] Concern has therefore been raised about the risk to surgeons and other members in the operating theatre of exposure to the Covid-19 virus when carrying out surgery in patients with perforated tympanic membranes. A viral plume could potentially occur during diathermy, suction irrigation and high-speed drilling. Full PPE is advocated but presently the use of visors and goggles is difficult when using a traditional microscope. Some centres are assessing the expensive exoscope systems whilst others are forming a "tent" to exclude the surgical field from the rest of the operating theatre.[23] Other surgeons are adopting the endoscopic surgical approach wherever possible.

Examples of different approaches to myringoplasty

A permeatal microscopic approach favours posterior perforations as shown in figure 8. This ear is more challenging due to retraction of the tympanic membrane onto the stapes. The endoscopic approach provides better visualisation although depth perception can be difficult when initially using an endoscope. The author found that by using the first canal incision knife with a 3mm diameter as a guide, the incision can be made about 6mm from the annulus. The tympanomeatal flap should be raised on a broad front using a cottonoid soaked in adrenaline to reduce bleeding, protect the fragile tympanomeatal flap when using suction and as a retractor. When using the endoscopic approach it may be easier to use a smaller graft, often cartilage on a perichondrial flap.

The post aural approach is favoured in young children and in other patients where the ear canal is narrow or if it is tortuous as shown in Fig. 15, particularly if combined with an anterior, subtotal or total perforation.

In revision surgery where tragal cartilage and perichondrium has already been utilised and if Biodesign is not available, a post-aural incision in part to obtain temporalis fascia may be preferred.

If a tympanomeatal flap is raised, the bony meatal wall needs to be covered either with skin or fascia optimizing epithelization and to prevent canal stenosis occurring. It is important to carefully replace the skin to avoid epithelial pearls forming in the ear canal. Many regimes of packing the ear are used varying in the materials being used from gelfoam only to BIPP

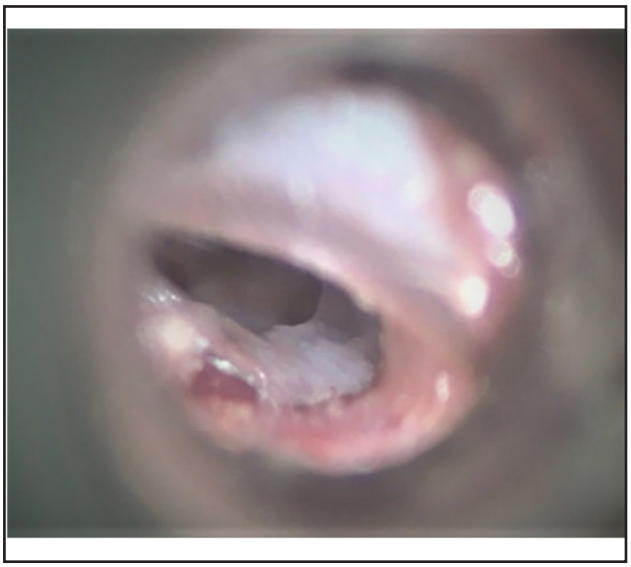

Fig.15. A postauricular approach is easier when there is a tortuous ear canal.

with variation in the length of time the packing is to stay in situ. The author covers the graft with gelfoam soaked in Gentisone HC™ which is then covered with two Betnovate C™ ointment-soaked ribbon gauze inserted into the ear canal. All are daycase procedures and if a postaural incision has been used, the head bandage is removed by the patient the day after surgery. The Betnovate C ribbon gauze is removed at 7 to 10 days. Gentisone HC is used for 4-5 days, the ear is otherwise kept dry for 6 weeks when they are reviewed with a hearing test. If healed no water precautions are required. I then see them at 6 months and at a year with a repeat hearing test on both occasions before discharge from the clinic.

Results of myringoplasty

The author's ear surgery data has been contemporaneously entered on to the common otology audit. The residual perforation rate is 4.8% ie over 95% success rate in over 400 pars tensa perforations. A review of the results of myringoplasty using an endoscopic approach introduced to the author's practice in May 2018, found that in 38 procedures with at least 9 months follow-up, there was a failure of the 4th procedure and another at 6 months post-operatively indicating a 94% success rate.

Complications: following myringoplasty do occur and myringitis can be more troublesome than a residual perforation. Myringitis is an inflammatory condition of the tympanic membrane and may result from trauma to the tympanic membrane resulting in de-epithelization of the outer surface. Blevins et al in 2001 found 45 ears with chronic (ie more than one month) of myringitis in 750 patients, 60% had had otological procedures.[24] Levi et al in 2013 found a history of previous myringotomy or myringoplasty in 80% of children with this granular myringitis.[25] This disease is otherwise rare in children. Kim et al in 2011 found it was more common in females.[26]

Blevins reported that topical treatment with antibiotic ear drops was the treatment of choice.[24] Jung in 2002 described diluted vinegar,[27] van der Meer in 2010, diluted hydrogen peroxide[28] although this and silver nitrate may increase the risk of iatrogenic perforations.

Carbon dioxide laser has been used by Jang et al in 2006 and surgical excision and reconstruction with underlay or overlay technique results in a recurrence rate of 1 %.[29]

If a residual perforation if present the question arises as to when one should perform revision surgery. In children under 12 years it may be prudent to wait at least a year to see if spontaneous closure occurs. If the graft was successful initially but failed after a further ear infection a review of the frequency of ear infections and whether this is better following the myringoplasty needs to be considered. Prinsley et al in 2017 found the success rates for revision surgery to be like those of primary surgery.[30]

Perhaps it is surprising that only a few patients develop otitis externa following a myringoplasty considering the numbers that occur after ear syringing and the use of cotton buds and other foreign objects placed in the ears. The author's practice of swabbing ears peri-operatively found some correlation of post-operative infection with those with cholesteatoma or peri-operative ear discharge. Myringoplasty on dry perforations do not require peri-operative antibiotics unless otherwise indicated by other patient factors.

Otitis externa usually settles quickly after aural toilet (but care must be taken not to micro-suction the

graft) and topical antibiotic with steroid ear drops. Occasionally infection may result in loss of the graft.

Myringoplasty is not "sold" to improve hearing however hearing can improve especially in posterior, subtotal or total perforations.[2] Hearing can deteriorate post-operatively if excessive manipulation of the ossicles has taken place or glue ear develops.

Very occasionally small epithelial pearls may form and If small these can be removed in the clinic after local anaesthetic cream has been applied. If cholesteatoma has developed within the middle ear then further pre-operative investigations is required prior to removal in the operating theatre.

Conclusion

A number of factors are taken into consideration often subconsciously, when planning whether and how to perform a myringoplasty. It is useful to have the ability to use a range of techniques, being aware of their limitations and to participate in audit to know personal success rates especially when new techniques are adopted.

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Laryngeal Trauma

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ABSTRACT

Introduction

Laryngeal trauma can be an immediately life-threatening entity. Failure to recognize such injuries and delay in securing the airway may have fatal results. Early diagnosis and accurate evaluation with proper treatment is vital.

Materials and Methods

Fifteen patients with laryngotracheal injuries were analyzed prospectively. The outcome was assessed both in terms of voice and airway, on short term and long term basis.

Result

Commonest cause of injury was suicidal followed by road traffic accidents and strangulation. The main presenting symptoms and signs were stridor, hoarseness, haemoptysis and odynophagia. Five patients suffered penetrating trauma and ten patient sustained blunt trauma. Sites of laryngeal injury included; hyoid bone fracture, mixed soft tissue and cartilaginous injuries, thyrohyoid membrane and cricothyroid membrane injuries. Eleven patients presented within 24 hours of the injury. Outcome (airway and voice) was good in ten patients whereas it was poor in three patients. Poor results were seen in patients who had delayed surgical intervention.

Conclusion

Early surgical intervention is recommended for traumatic laryngeal injuries to ensure a good outcome; which further depends upon patient's condition, injury and treatment-specific factors.

Keywords

Neck Injuries; Larynx; Wounds, Penetrating; Wounds, Nonpenetrating

Laryngeal trauma can be potentially life-threatening. Injuries can be blunt, penetrating, inhalational, injury caused by caustic ingestion, post intubation and iatrogenic. Blunt injuries represent only 5% of all neck trauma, but can be very challenging to assess since its presentation is often delayed. Penetrating injuries, on the other hand are more common and even when they seem to be only superficial and minor, always need thorough investigation and observation.[1]

Acute blunt laryngeal trauma can be a life threatening event and often poses a difficult airway problem. Blunt injuries to the anterior neck are most commonly due to road traffic accidents. This occurs when the driver's extended neck hits the steering wheel or dashboard. The incidence of such types of injuries are decreasing probably due to strict laws pertaining to seat belts, presence of airbags and decreased drunken driving.[2]

External laryngeal trauma, which is often a part of head and neck trauma, per se is a relatively uncommon injury estimated at approximately 1 in every 22,900 emergency room visits.[3] The anterior neck injuries are accidental, suicidal or homicidal in nature. The individual with penetrating anterior neck injury (cut throat injury) presents with airway compromise, aspiration or acute blood loss with hypoxemia because of the airway injury and the injury to major vessels in the neck.[4] The time since injury till patient lands in emergency has a big prognostic value in regards to decreasing morbidity and mortality.

The presenting symptoms often do not correlate well with the severity of the injury and injuries may range from an endolaryngeal hematoma to a complete tracheal transection. Injury to the larynx can result in serious airway problems and impaired voice production if not

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Table I: Schaefer classification system for determining the severity of laryngeal injuries

GROUP	SEVERITY OF INJURY
1	Minor endolaryngeal hematomas or lacerations without detectable fractures
2	More severe edema, hematoma, minor mucosal disruption without exposed cartilage, or non-displaced fractures
3	Massive edema, large mucosal lacerations, exposed cartilage, displaced fractures or vocal cord immobility
4	Same as group 3, but more severe with disruption of anterior larynx, unstable fractures, two or more fracture lines, or severe mucosal injuries
5	Complete laryngotracheal separation

diagnosed promptly. Accurate diagnosis of the extent of the injury can be achieved with a combination of high resolution computed tomography, flexible fibreoptic laryngoscopy and flexible bronchoscopy.

The most important goal in management is to first secure and reconstruct the airway. Once this has been achieved, the long-term goal of treatment is to restore the voice, breathing and swallowing mechanism. Through this article we wish to audit our approach to this relatively infrequent injury and to share our experience.

Materials and Methods

The present study analyses our experience with fifteen cases of external laryngeal trauma both blunt and penetrating seen over a period of five years. Fifteen patients with external laryngeal trauma from 2014 to 2019 were managed and prospectively followed for 1 year.

All patients initially presented to the emergency department of GGS Medical College and Hospital, Faridkot and were referred to the ENT department for management. Patients were evaluated for their airway and voice quality.

The following features were noted:

Underlying cause of the injury, airway management, symptoms, severity of injury, site of injury, treatment and outcome.

Schaefer Classification System was used to grade the severity of laryngeal injury.[5]

We analysed retrospectively their clinical presentation, diagnosis, management, sequela and final outcome both in terms of voice and airway on short term and long term basis.

Results

A total of fifteen patients with ages between 8 to 50 years were assessed and formed the basis of the study. There were eleven male (73%) and four female (27%) patients. Five patients suffered penetrating injury and ten patients sustained blunt trauma.

The commonest cause of laryngeal trauma was suicidal; seen in 33% of patients followed by road side accidents and accidental strangulation.

Out of total fifteen cases, five cases were suicidal (33%), three cases were road side accidents (20%), three cases of accidental strangulation(20%) and two patients sustained injury following assault (13%). One patient (7%) presented with dog bite on anterior aspect of the neck causing penetrating injury. One patient (7%) presented with accidental ingestion of hot boiling water causing laryngopharyngeal burns. (Fig. 1)

Out of total three road side accidents (20%) one case of vehicular accident suffered blunt trauma and two cases suffered penetrating trauma. Accidental strangulation in three patients (20%) was due to a loose cloth (dupatta) worn around the neck causing strangulation.

Out of total fifteen patients, eight presented with stridor. Emergency tracheostomy was performed in these eight patients. In rest seven patients, airway was adequate and no tracheostomy was required.

Hoarseness was found in seven patients. Other symptoms suggesting laryngotracheal injury included haemoptysis (5 patients) and odynophagia (10 patients). (Fig. 2)

According to the Schaefer's classification, five

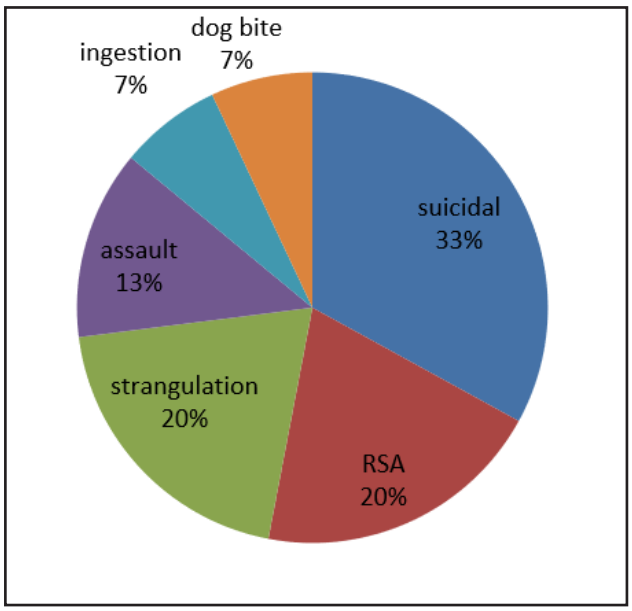

Fig. 1. Causes of laryngeal trauma

patients classified under the grade 1 injury, five patients under grade 2 injury, three patients under grade 3 and two patients under grade 5 injury.

On indirect laryngoscopy, we found two patients had left vocal cord palsy. Only one patient had fracture of hyoid bone. Nine patients had soft tissue injuries alone. Disruption of cartilaginous framework (including thyrohyoid membrane, cricothyroid membrane) was found in six patients.

However, out of all fifteen patients, three patients again landed in the emergency ward with distress and we have to do the revision tracheostomy. We further investigated these patients and found the cause of respiratory distress to be subglottic stenosis with varying grades. Fig. 3a showing endoscopic picture of subglottic stenosis of 12 year old girl child presented with respiratory distress in emergency after getting accidental strangulation by dupatta during playing. Her preoperative lateral and anteroposterior neck X-ray views were normal. (Fig. 3b)

Patients underwent either medical or surgical treatment or both, depending on the type or severity of the injury. Medical treatment consisted of observation, voice rest, oral steroids, antibiotics, antireflux, humidified oxygen and saline nebulisations. Five patients were managed conservatively.

Fig. 4a shows an 8 year old girl presented with abrasions and bruise over the anterior aspect of neck during accidental strangulation by dupatta during playing. Her lateral view neck X-ray was normal. (Fig. 4b) She was managed conservatively and was followed

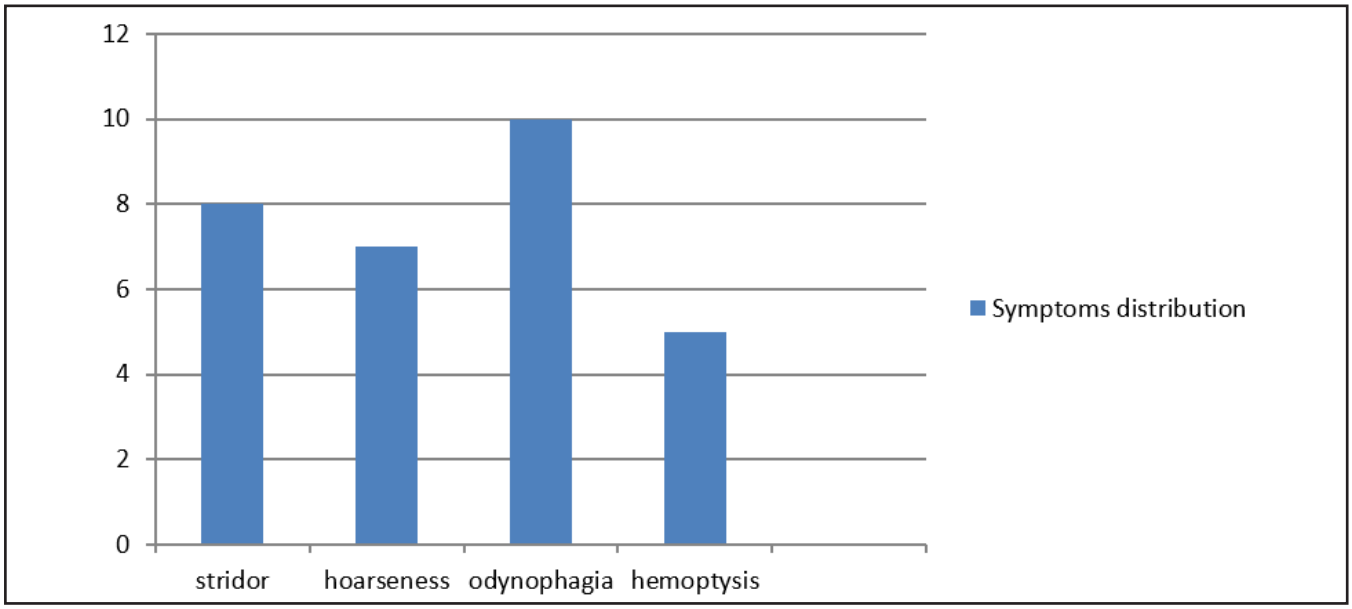

Fig. 2. Symptoms distribution among patients with laryngeal trauma .

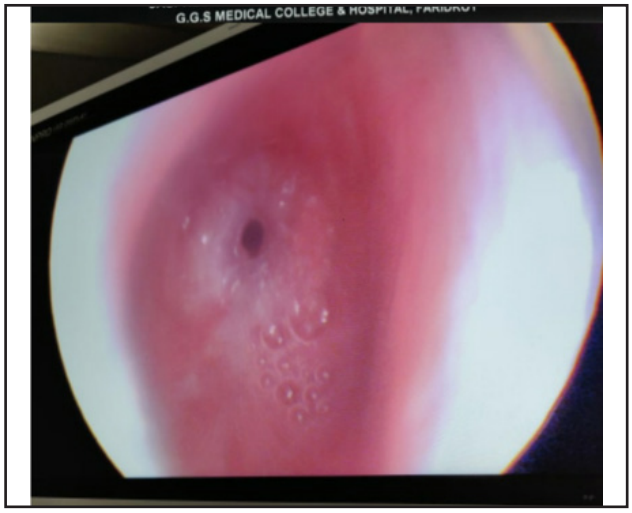

Fig. 3a. Endoscopic picture of subglottic stenosis in 12 yr old girl.

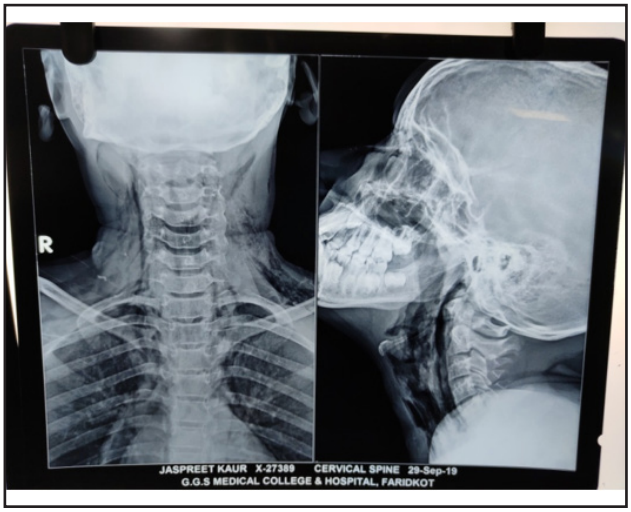

Fig. 3b. showing lateral and AP neck X-rays of the same patient presented with distress.

up monthly for 6 months. (Figs. 4c and 4d)

Surgical treatment consisted of tracheostomy and/or laryngeal exploration and repair. Out of total ten patients whom we managed surgically, only tracheostomy was required in two patients with severe laryngeal oedema or large haematoma. Two patients required only primary suturing. (Figs. 5a, 5b and 6a,6b) Two patients required both tracheostomy and primary suturing as in Figure 7a and 7b.

Four patients required laryngeal repair. This included repairs of mucosal tears and reduction of fractures. Out of these four cases, three cases required partial cricotracheal resection and anastomosis. (Figs. 8a & 8b)

In our study, three patients presented within one week of the trauma. Majority of patients (73%) presented within 24 hours of the injury. Only one patient presented late (>1 month).

The follow-up period ranged from one month to one year. There were 2 mortalities one owing during resuscitation and other due to associated chest and head

Fig. 4a. Accidental strangulation

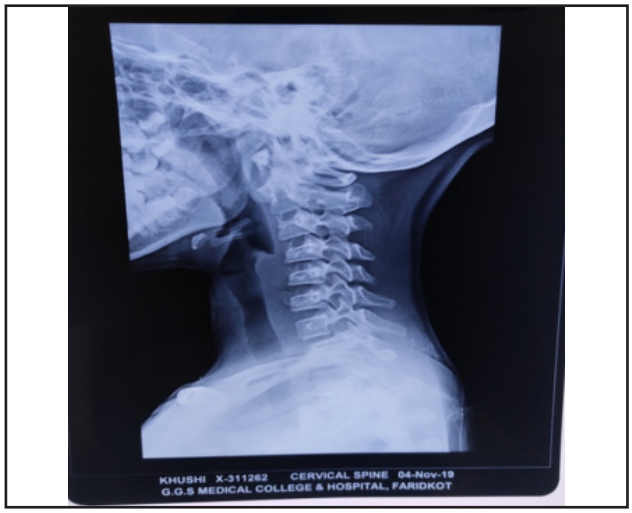

Fig. 4b. showing normal lateral view X-ray neck of the same patient.

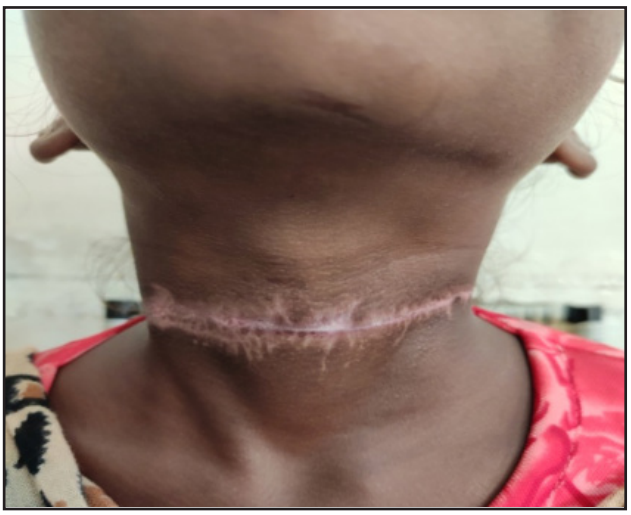

Fig. 4c. during follow up period of 2 months.

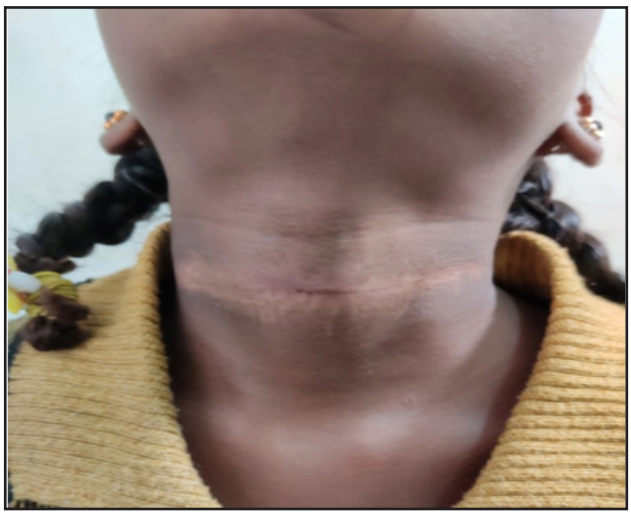

Fig. 4d. during follow up period of 3 months.

trauma.Outcome was assessed in terms of airway and voice. A good outcome was defined as that in which the patient had a normal airway or could be decannulated along with a good or fair voice. Patient's voice was evaluated regularly after 3 months.

All five patients who were managed conservatively had a good outcome.Out of total eight patients who were managed surgically, five patients who had early surgical intervention (within 7 days) did well while three patients managed by delayed surgery had poor outcome. Thus early surgical intervention was associated with a significantly better outcome.

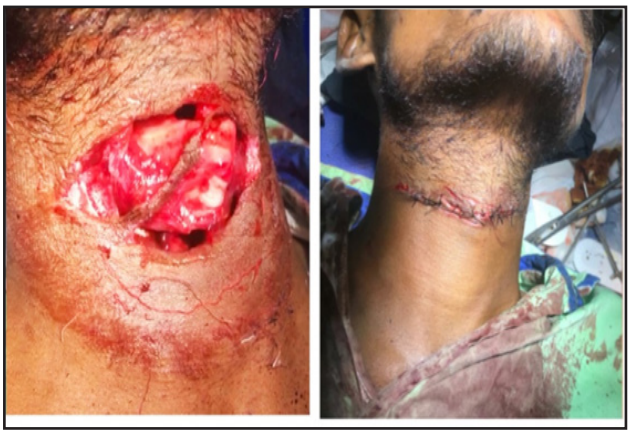

Fig. 5a & 5b. Primary suturing

Discussion

Experience in managing laryngeal trauma is limited even in many major trauma centres due to the rarity of injury. In this study, we aim to summarize the current knowledge of blunt and penetrating injuries to the neck. Laryngeal injury is uncommon as anteriorly the inferior projection of the mandible affords significant protection and posteriorly the larynx is protected by the rigid cervical spine.

The reported overall incidence of traumatic laryngeal injuries is relatively low and ranges between 1 in 5000 to 1 in 137 000 emergency room admissions.[5,6,7] These

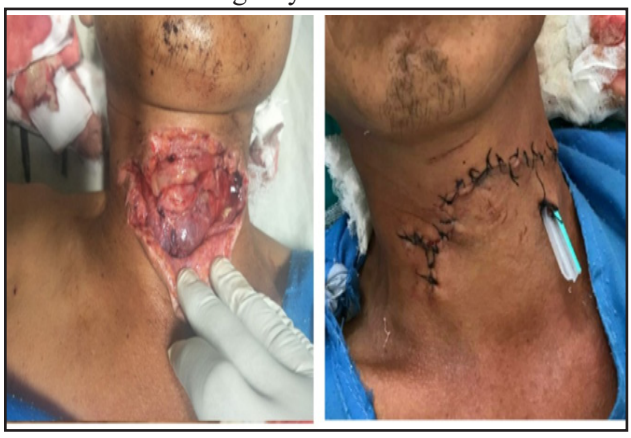

Fig. 6a & 6b. Primary suturing

Fig. 7a & 7b. Managed by tracheostomy and primary suturing

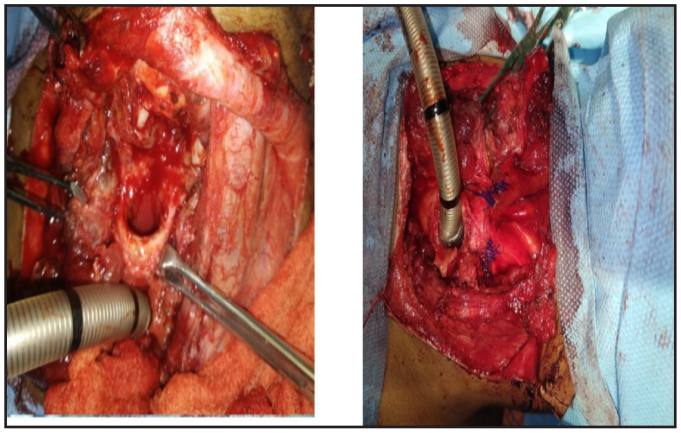

Fig. 8a & 8b. Intraoperative picture of cricotracheal anastomosis

injuries occur most commonly in young males (80 per cent) ranging in age from 24 to 37 years and usually result from blunt trauma or a penetrating wound.[5,6] Females tend to have slimmer, longer necks, predisposing them to a higher susceptibility to laryngeal injury, in particular supraglottic injury. However, males (77% vs. 33%) tend to present with the highest percentage of traumatic laryngeal injuries, secondary to greater participation in violent sports and other activities as fighting.[6,8,9] In our study also males were predominantly involved.

Mortality rates from injury involving the laryngotracheal complex range from 2 to 18 percent.[6] Although blunt laryngeal trauma is associated with significant sequelae. Chagnon and Mulder reported that penetrating wound injuries were more likely to result in death.[10] This mortality rate may be related to the higher likelihood of concomitant injury involving critical organs or tissues including the chest, skull base and/or critical neurovascular structures from gun or knife injuries.[11,12,13,14] This is in contrast to the review by Bhojani et al. who reported a higher mortality rate in patients with blunt trauma.[15]

In our experience there were two mortalities in patients, one was because of associated chest and head injuries and other was due to late presentation to hospital from the site of injury and hence delayed resuscitation. The patient is examined for evidence of airway obstruction, which may present as stridor and use of accessory muscles. A cervical collar or sandbags should be used to stabilize the neck until cervical spine injury is excluded.

Treatment for primary airway control includes simple endotracheal intubation, fibreoptic awake intubation and/ or tracheostomy under local anaesthesia. Occasionally, an emergency cricothyroidotomy may be required and/or an open tracheostomy to secure the airway and to exclude any significant injury, such as cricotracheal separation.[5] Gussack et al. recommend that endotracheal intubation is performed by the most experienced anaesthesiologist using a small-sized tube under direct visualization for minor laryngotracheal disruption and/or a supraglottic haematoma.[16] This study reported successful intubation in eight of 11 patients with acute laryngeal trauma. Because endotracheal intubation is extremely challenging and difficult in these patients, Schaefer recommends a tracheostomy under local anaesthesia in patients with signs or symptoms of potential airway obstruction.[17] A failure rate as high as 76 per cent of cases of laryngotracheal injury has been reported with intubation.[18] There is also a significant risk of iatrogenic injury to the already compromised airway and/or other neurovascular structures (cervical spine), which may lead to potentially devastating sequelae.[17] In cases of cricotracheal separation, blind' placement of an endotracheal tube across the area of separation can convert a stable situation to one that is life threatening. In our scenario we did tracheostomies in all cases which proved to be successful. In one of the case with blowing wound we did intubation to prevent bleeding into the airway as patient was unconscious.

Once the airway has been established, further evaluation of the laryngotracheal injury can be performed. A variety of laryngoscopes, microlaryngeal instruments and rigid telescopes facilitate the precise examination of the endolarynx.

In patients with acute traumatic injuries, the goal of treatment is to stabilize the fracture and to promote normal soft tissue healing. Schaefer and Close reported good functional outcome following a non-operative approach in patients with minor mucosal lacerations (excluding the anterior commissure region or free edge of the vocal fold) and undisplaced, single fractures of the laryngeal cartilaginous framework.[7] Bent et al. reported normal airway and phonatory function in patients with non-displaced thyroid cartilage fractures and minimal intralaryngeal injury who were treated without surgery.[5] This approach included at least 24 hours of close observation in an intensive care or high dependency unit constant humidification, voice rest and elevation of the head of the bed. A subset of patients may require establishment of a safe airway (intubation or tracheostomy) and a panendoscopy to rule out concomitant injury to structures within the upper aerodigestive tract. If this examination is negative and no other indication for surgical exploration is found, these patients can be effectively managed non-operatively.

Close observation and frequent reassessment by those experienced in managing these patients are required to ensure satisfactory healing and successful extubation or decannulation. In 1956, Fogelman and Stewart reported that mortality for patients not explored immediately was 35 versus 6 percent for those who had been explored promptly. They concluded that all penetrating neck wounds that violated the platysma required surgical exploration.[19] Mandatory exploration of the neck whenever the platysma muscle had been breached became common practice. Stone questioned the need for mandatory exploration for civilian injuries in 1963.[20] Since that time there has been controversy about the relative merits of mandatory exploration versus selective exploration for low velocity gunshot and sharp penetrating wounds of the neck. The majority of trauma centres now advocate some form of selective conservative management.[21] In our scenario we did exploration in patients who presented with distress after tracheostomy and in rest of cases it was either conservative or tracheostomy with primary suturing.

The goal of surgical intervention involving the laryngotracheal complex is to restore primary function, including ventilation, airway protection and phonation. Significant debate and controversy exists in the literature regarding the indications for surgery, its timing, method of repair and the use of intraluminal stenting. The surgical procedures used for laryngotracheal repair can range from simple suturing of cut ends i.e circumferential tracheal anastomosis to combined cricotracheal resection with anastomosis with or without use of endoluminal stents, Vocal cord repair via open approach, reduction and fixation of fractured and displaced cartilage .

The ideal timing for surgical intervention is associated with significant controversy and debate in the literature. Some recommend that a period of observation is required prior to surgery to allow any significant oedema in the upper aerodigestive tract to subside. However, others recommend exploration within 24 to 48 hours, to avoid the establishment of active infection and early scar formation.[7,22] The potential long-term result of significant delay are airway and voice dysfunction.[16,23] A recent multi-institutional review of 392 patients with external laryngeal trauma reported that 80 per cent of surgical interventions were performed within 48 hours of the injury, supporting early surgical exploration as the preferred standard of care.[6]

Conclusion

Advancements in the assessment and management of patients with trauma to the laryngotracheal region have led to enhanced patient outcome and health-related quality of life. Improvements in imaging and fibreoptic endoscopy have facilitated the evaluation of patients with acute trauma and more chronic stenotic lesions. Successful outcome following traumatic laryngotracheal injuries depends upon patient, injury and treatment-specific factors.

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Case Report

A Colossal Rhinolith

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ABSTRACT

Introduction

Rhinolith is a calcic deposition formed by mineralization of salts in an impacted nasal foreign body. It is a benign condition that can be troublesome owing to its size and extent of impact.

Case Report

A 35-year-old man with a history of right nasal obstruction with occasional foul-smelling discharge and right eye pain since ten years was diagnosed with rhinolith. During its removal, it was three times bigger than what could be visualized in nasal endoscopy.

Conclusion

Proper history, examination, and a high suspicion can clinch the diagnosis in almost all cases. A rigid diagnostic nasendoscopy is an important tool in the diagnosis. The treatment of choice is endoscopic removal under local or general anaesthesia.

Keywords

Rhinolith; Foreign Bodies; Nose; Nasal Obstruction

The Rhinolith gets its name by a conjoint of two separate words i.e. “Rhino” and “Lith” implying a “stone in the nose”. Rhinolithiasis had been described by Bartholin way back in 1654. It is an entity formed by gradual deposition and coating of different salts of calcium and magnesium over an endogenous or exogenous nidus in the nasal cavity.[1] A variety of exogenous nidus may be seen ranging from small to large size i.e. paper, stone, grain, seed, grass, glass, wood, rubber medications etc. These are the most common cause of rhinoliths seen. Endogenous nidus can be dried up secretions, blood clots, pus, mucosa necrotic debris, hair follicles, or tooth remnants.[2]

The most common location is floor of nose, at the junction of anterior and posterior nares. Normally they sit anteriorly but due to normal physiological action they tend to shift posteriorly and retain a more favourable position. Local inflammatory reaction leads to a deposition of salts of calcium phosphate, magnesium, calcium carbonate, and aluminium. All these changes around focal nidus make it hard in texture and the size of the rhinolith increases gradually.

The type, size and duration of the rhinolith lead to multiple types of presentations. The insidi-ousness and gradual development leads to the symptoms gradually developing years after the process begins, causing persistent or recurrent nasal infections. The most common clinical pic-ture is that of a unilateral nasal obstruction and foul smelling discharge. The patient may pre-sent with symptoms such as cacosmia, epistaxis, headache, facial pain and even epiphora.

If a routine anterior rhinoscopy is unable to make a diagnosis, endoscopic examination can lead to diagnosis. Radiology also plays an important role. If the rhinolith is highly radiopaque they can be identified in conventional x-rays. If rhinolith is small or less radio opaque, then CT can be helpful in localizing it.

Early diagnosis is needed to prevent late sequelae. The gold standard of management of these rhinoliths is endoscopic removal. The rhinolith size and extent helps us in deciding on the approach.[3] A more impacted and larger rhinolith should be removed under sedation as

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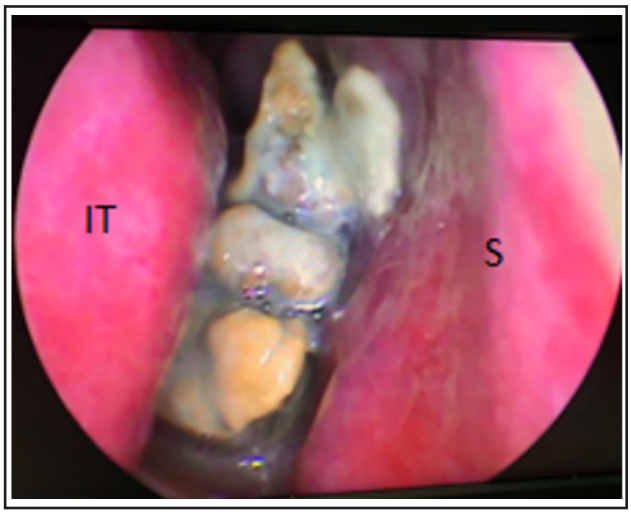

Fig.1. Zero degree nasendoscopy showing grayish-yellow rhinolith in the right nasal cavity.

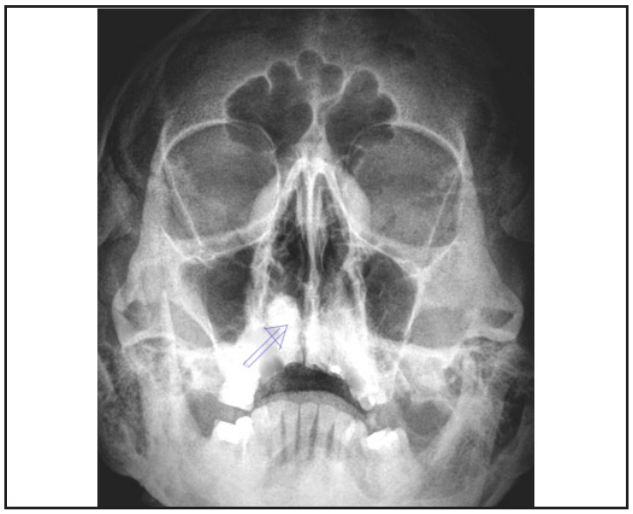

Fig.2. X ray PNS showing radio-opaque mass in floor of right nasal cavity.

they are extremely painful. In this report we describe a giant rhinolith, which was likely caused by a nidus of a foreign body. We also discuss the surgical management that was performed to cure the patient.

Case Report

A 35 year old healthy man reported to the Department of Otorhinolaryngology. He had right nasal obstruction with occasional foul smelling discharge and right eye pain since 10 years. There was no history of foreign body insertion or nasal trauma. Treatment till date had been chiefly antibiotics and nasal decongestants intermittently but the patient had no significant re-lief.

Anterior rhinoscopy revealed secretions in right nasal cavity. On performing rigid nasendoscopy on right side, after suctioning out the secretions, an irregular yellowish gray friable mass was visualized with contact bleeding at the level of half way of inferior turbinate. It was extending superiorly up to middle meatus. (Fig.1)

Septum was also deviated towards left side due to the mass effect. The left side nasal cavity was patent with no abnormality. Patient was advised for x-ray which was suggestive of radiopaque mass in right side floor of nose. (Fig.2) Rest of the sinuses was normal. The history, clinical findings and radiology suggested that the cause of the unilateral nasal obstruction was a rhinolith.

Endoscopic removal of rhinolith was planned under local anesthesia. To our surprise it was three times bigger than what could be visualized in nasal endoscopy. Ideally a large and friable rhinolith should be fragmented and removed in piecemeal. It was occupying whole of the right nasal cavity. Minimal bleeding was also encountered which was addressed with local anesthetic and adrenaline patties. The rhinolith was removed in piecemeal. (Fig.3) Inferior and middle tur-binate were found atrophic after complete removal. Middle meatus was found free of any debris or collection. Nasopharynx was inspected and was found to be normal. Merocel® was utilized to pack the right nasal cavity and a nasal bolster was applied. Post-operative period was unevent-ful. Pack was removed after 24 hours and he was advised saline nasal douching. The specimen was handed over to the patient and it could not be sent for the histopathology. Patient is doing fine at 16 months of follow-up.

Discussion

Rhinolith is a rare entity in this era of increasing awareness and hygienic habits. They are de-fined as nasal calculi formed by calcareous deposition over

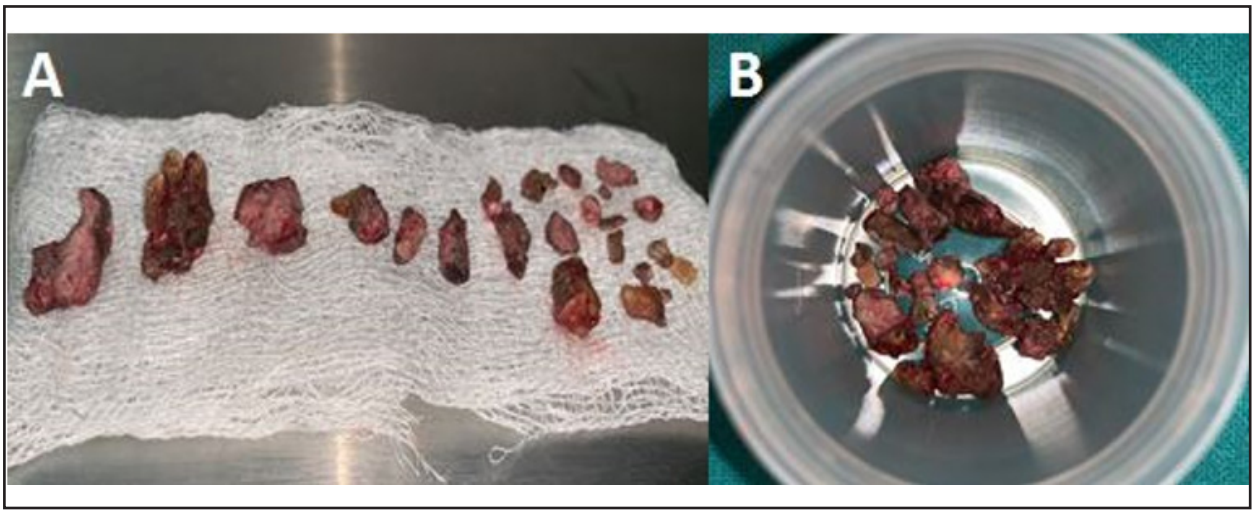

Fig.3. (A) Rhinolith retrieved in piecemeal (B) Total weight of 20gms.

retained intranasal foreign bodies. Polson in 1943 reported a giant rhinolith of around a size of pinecone. It's removal was wit-nessed and documented by a colleague.[4]

As mentioned above, it is unclear, what is the pathogenesis of a rhinolith. It is suspected that a retained foreign body acts as a foci or nidus over which inflammatory process sets in and depo-sition of mineral salt occurs.[2] Axmann was the first to do a chemical analysis of a rhinolith and determined that a rhinolith consists of 90% inorganic material and 10% organic substances.[5] The mode of entry of foreign body can be anterior or posterior depending upon the act of inser-tion. Most common site is anterior but due to coughing, eating and talking they lodge posteriorly. Depending upon the characteristics of any foreign body- the foreign bodies are classified to be True i.e. endogenous or False i.e. exogenous.[6] A rare case of opioma has been reported to cause rhinolith formation.[7] It is more commonly seen in females.[4] The age ranges from 3 to 76 years with peak incidence between 4th to 5th decades. Rhinolith are mostly single and unilateral. The size can vary from few mm to cms. They often extend to occupy the whole of the nasal cavity and usually take its shape. There is literature available of a rhinolith appearing like the egg of a hen weighing 115 gms.[6] The most common site of a rhinolith is at inferior turbinate, abutting the nasal septum.[5]

In our case, we assume the possible etiology could be a retained foreign body accidentally in-serted in the childhood. The patient does not gave history regarding recurrent allergies, epistaxis or sinusitis like symptoms. So it is unlikely because of retained secretions or blood clots.

Some common alternate differential diagnosis causing unilateral nasal obstruction are calcified polyps, odontomes, granulomas, granulomatous dissemination, sequestration following osteomyelitis, osteomas, calcified otogenic cysts, chondrosarcoma, osteosarcomas and sinonasal ma-lignancies.[8] Other possible etiologies of unilateral nasal obstruction can be physiological, structural or pathological. It can be partial or complete, intermittent or continuous. Physiological causes include blockage at intervals due to nasal cycle. Structural causes include deviated nasal septum, hypertrophied inferior turbinate or choanal atresia. Pathological causes include sinusitis, polyps, neoplasms or granulomatous diseases.

Diagnosis is usually done by anterior rhinoscopy and confirmed by using a diagnostic nasal en-doscopy which is minimally invasive procedure. It also avoids exposure to any radiation. So, preferably it should be done prior to radiology. If necessary, an orthopantomogram or x-ray of the paranasal sinus, or a non-contrast computed

tomographic scan may be done. In 1900, MacIntyre described the radiology of rhinolith for the first time. The features were mixed radiopaque and radiolucent mass which are arranged in a concentric circle or lamellas.[9] In case of small and impacted rhinolith, computed tomographic scan plays an important role as it can localize the extent and can warrant any complication. Long standing cases can lead to multiple complications including serous otitis media, sinusitis (of either bacterial or fungal origin), perforation of the septum or palate or, chronic dacryocystitis.[9]

The ideal management is surgical removal either in local or general anesthesia depending upon the nature and extent of rhinolith. Post-operative douching is important to prevent further crust-ing and reduce complications.

Conclusion

Although rhinolith is a rare entity but a good clinical history, physical examination and a high suspicion can clinch an early diagnosis and prevent complications. Rigid diagnostic nasendoscopy plays an utmost role in the management. Treatment of choice is removal of rhinolith keep-ing the structural and functional integrity of the nose intact.

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Case Report

Atypical Presentation of Goldenhar Syndrome

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ABSTRACT

Introduction

In 1952 Goldenhar described a case with triad of pre auricular tags, mandibular hypoplasia and ocular (epibulbar) dermoid and described the case as Goldenhar Syndrome.

Case Report

A case of Goldenhar Syndrome without ocular involvement is presented.

Discussion

Goldenhar syndrome is also known as oculoauriculovertebral dysplasia due to presence of additional vertebral anomalies. Exact etiology of this disease is not known. Most of the cases are sporadic, though autosomal recessive/dominant and multifactorial inheritance has also been suggested. Chromosomal analysis shows no abnormalities.

Keywords

Goldenhar Syndrome

Goldenhar syndrome is a rare disorder with an incidence of 1 in 5800 live births with male: female ratio 3:2. It is presumed to be an inherited condition causing morphological abnormalities of the parts developed from the first and second branchial arch during blastogenesis.[1] Goldenhar first described the case in 1952 as a disease that presents as a combination of several anomalies such as epibulbar dermoids, preauriclar appendices and malformation of ears. It is also referred as oculo-auriculo-vertebral (OAV) dysplasia and hemi facial microsomia. Most of the cases are sporadic, though autosomal recessive/dominant and multifactorial inheritance has also been suggested. Chromosomal analysis shows no abnormalities.[2]

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Some associations recorded in the literature are microstomia, micrognathia, high arched palate, cleft palate, bifid tongue, malocclusion and other dental anomalies.[3] Some authors also pointed out facial muscle hypoplasia, vertebral anomalies, eye anomalies,[1] and disorders of central nervous system, visceral anomalies,[4] cardiovascular[5] and genitourinary abnormalities.[6] The presence of anomalies of the ears and limbs are necessary for the diagnosis of this syndrome.

In this article we are presenting an interesting case of neonate diagnosed as Goldenhar syndrome without ocular involvement.

Case Report

A 2.5 Kg, male preterm baby (gestational age 36 weeks) delivered by elective caesarean section (indication: fetal distress), cried immediately after birth & transferred to NICU (neonatal intensive care unit) with multiple congenital anomalies.

Antenatal history: A 26 years old, primigravida with a history of intake of oral abortificiant (Levonorgestrel - 1.5

Fig. 1. Showing Right ear-grade 2 microtia, preauricular tag, sinus and pit

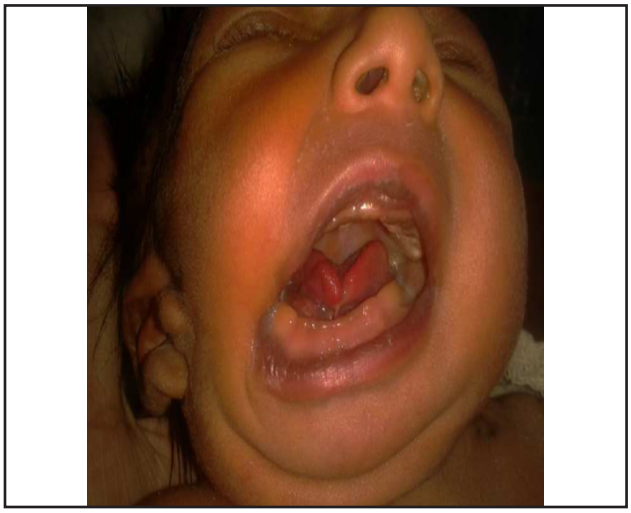

Fig. 2. Macrostomia, tongue tie, bifid tongue, right sided deviation of the angle of mouth.

mg) during her first trimester as per advised by medical practitioner. But as the abortion did not occur, mother continued the pregnancy. She had irregular antenatal checkups. First antenatal ultrasonography done on 23rd week of gestation, revealed major congenital anomalies. Mother was non smoker and non alcoholic without any significant illness.

Neonatal period: Baby had feeding difficulty without any jaundice or convulsion.

Clinical examination: Baby had dimorphic facies, vitals - stable, cardinal clinical signs – normal.

Head to foot examination:

Head Circumference- 33cm, anterior fontanel –normal, Chest circumference- 30cm, Length-48cm

Ears

Right ear-grade 2 microtia, preauricular tag, sinus and pit. (Fig. 1) Left ear-normal

Nose: normal

Oral Cavity: macrostomia, tongue tie, bifid tongue, right sided deviation of angle of mouth with bifurcation of lower lip at right angle of mouth.

Face: Micrognathia.

Neck: Short neck.

Eye: No obvious anomaly seen.

Upper Limb: Right upper limb deformed with short forearm, hypoplastic right thumb & radial deviation of hand, fixed flexion deformity of elbow joint. (Fig. 2)

Chest, Abdomen and Genitalia: Normal.

Lower Limb: No obvious deformity

Investigations:

Complete Blood Count: Normal.

Echocardiography: Small PDA with left to right shunt, osteum secondum type ASD.

Ultrasonography: Hypoplasia of right parotid gland & irregularity in right half of mandible seen. No abnormality of abdominal organ seen.

USG brain: Normal.

Skiagram: Hypoplastic right half of mandible, absent radius in right forearm. (Fig.3) Lower cervical vertebral body (C6, C7) was fused and bifid left 3rd & 4th rib were seen. (Fig.4)

Karyotyping: Normal.

Discussion

The physical findings of the baby had some similarities with Treacher Collins Syndrome which is characterized by bilateral affection without any aural or ocular abnormality.[7]

But the above finding of the baby clinched us to

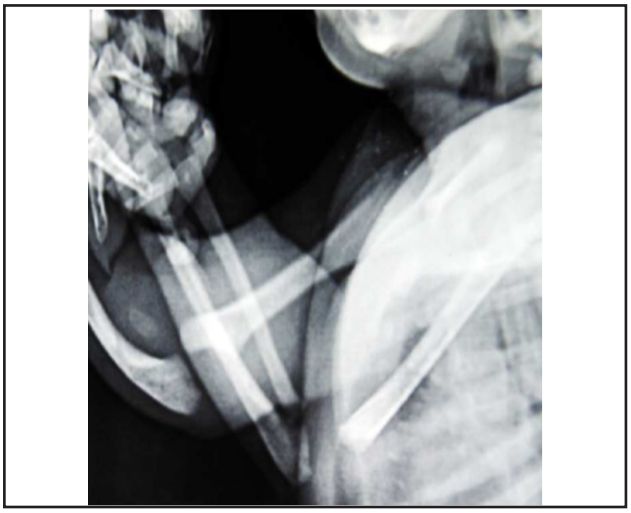

Fig. 3. Skiagram showing absent radius in right forearm

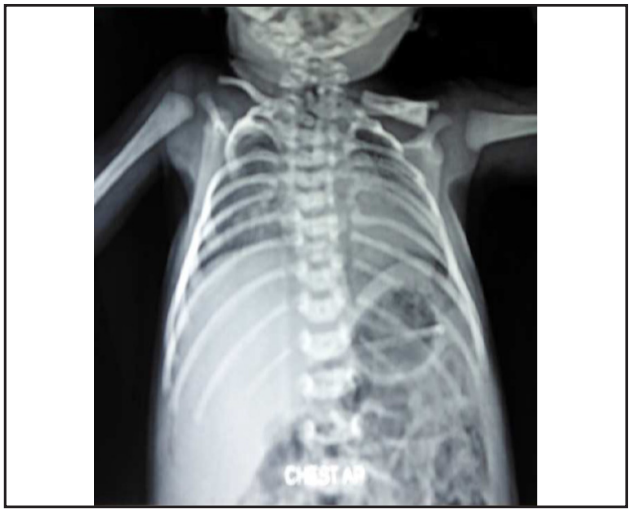

Fig. 4. Skiagram showing lower cervical vertebral body (C6, C7) was fused and bifid left 3rd and 4th rib

the diagnosis of Goldenhar syndrome. Hemifacial microsomia or Goldenhar syndrome manifests itself in degrees ranging from nearly unnoticeable to extremely severe. The classic symptoms of Hemifacial microsomia include: underdevelopment of the jaw on one side (micrognathia), underdeveloped cheek bone on the affected side, underdeveloped or deformed an outer ear (microtia) and a missing or undersized ear canal (congenital aural atresia).

Additional symptoms of Goldenhar syndrome include: anomalies of the spine (most typically cervical vertebrae deformities), narrowing of one eye, a soft white or yellow nodule located in the eye (epibulbar dermoids) and notched eyelids.

Most individuals with Goldenhar syndrome or Hemifacial microsomia have a malformed outer ear, a condition called microtia. In approximately one third of cases of Goldenhar syndrome, the microtia is bilateral. Microtia is rated on a four-point scale. In Grade 1 microtia, the ears look almost normal but are smaller than average. Grade 2 microtia is characterized by having a curved mass of tissue rather than a formed outer ear. Grade 3, which is the most common form of microtia, consists of having only small bumps of skin. Grade 4, sometimes referred to as "anotia", consists of having no external ear at all.[8] In this child it was grade 2 microtia.

The abnormalities are found to be unilateral in 85% of cases and bilateral in about 10-33% cases.[9] In asymmetric involvement right side is more affected than left side.*10* Our reported case had similar involvements. The reported frequency of cardiovascular abnormality ranging from 5-58%. This baby also had cardiac lesion in the form of ASD & PDA. Some association was found between maternal intake of some drugs like retinoic acid, thalidomide etc with development of Goldenhar syndrome.[11] Our case had a history of abortificiant drug (Levonorgestrel - 1.5 mg) intake in first trimester whose association with this syndrome was not reported earlier.

In Goldenhar's syndrome ocular anomalies especially bilateral dermoid present in 60% of cases and vertebral and ear abnormalities are present in 40% cases.[12] The characteristic vertebral, ear, cardiac, facial, rib, Mandibular anomalies all were present in our case. But surprisingly we didn't find any ocular abnormalities, which were reported in maximum cases in literature. So the salient features of the patient presented here are:

I. May present without ocular involvement.

II. Association with intake of abortificiant.

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Case Report

Melioidosis – A Rare Cause of Neck Abscess in Immunocompromised

https://doi.org/10.47210/bjohns.2021.v29i1.405

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ABSTRACT

Introduction

Melioidosis is an infectious disease caused by Burkholderia pseudomallei, a saprophytic bacterium found in soil and water. Though multiple abscesses are a common presentation of melioidosis, isolated neck abscess due to B. pseudomallei is extremely rare and it is more prevalent in immunocompromised people.

Case Report

A young woman with uncontrolled Type II diabetes presented with neck abscess. Abscess was drained and culture showed Burkholderia pseudomallei. Appropriate treatment was given, including 3 weeks of parenteral antibiotics and 3 months of oral prophylactic antibiotics to prevent relapses. Patient responded well to treatment.

Discussion

Increased awareness of opportunistic infections like melioidosis is essential in the present era as diabetes is emerging as a global pandemic. It clinically resembles tubercular neck abscess. Strong clinical suspicion, early intervention and long term antibiotics can cure the disease completely without relapse.

Keywords

Melioidosis; Abscess; Immunocompromised Host; Burkholderia pseudomallei

Melioidosis, a multisystem disease is caused by a gram negative saprophytic bacteria, Burkholderia pseudomallei. It has a wide range of clinical presentation ranging from a localized abscess to severe multisystem infection. This environmental bacteria seen in the wet soil of the tropical region, especially in paddy fields.[1] Melioidosis is an endemic disease in the geographical belt of southeast Asia and northern Australia, but recently many cases have been reported in South India, China, America and Taiwan.[2] Melioidosis occurs both in humans and animals. Melioidosis is an opportunistic infection seen in immunocompromised individuals and diabetes mellitus is a single strong risk factor for the same.[3] Systemic disease is associated with very high mortality.

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Melioidosis presenting as an isolated neck abscess is scarcely reported in English literature. Early diagnosis is very important as antibiotic regimen and duration of treatment is different from other common neck abscesses. Patient requires prolonged treatment failure of which may lead to relapse of the disease

Case Report

A 33 year old woman, hailing from the coastal belt of south east Asia, presented with a painful swelling on the left side of the neck. She was diagnosed with type II Diabetes Mellitus 6 years back and was on oral hypoglycemic agents. The case is being reported after obtaining informed consent from the patient for publication. She was a dairy farmer and was rearing cattle at home. Her symptoms started two weeks prior to presentation, as a small swelling which gradually progressed and was associated with fever. She had received parenteral broad spectrum antibiotics (Piperacillin + Tazobactam and Metronidazole) from another hospital however her

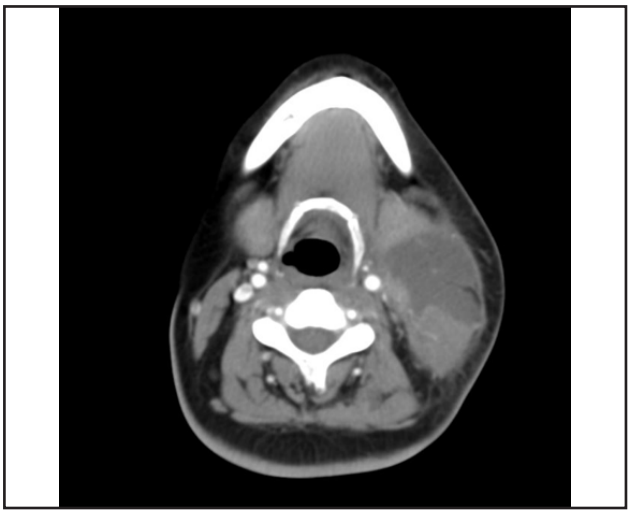

Fig. 1. Contrast enhanced CT scan Neck Axial section collection in left side of neck with central necrosis abutting parotid gland

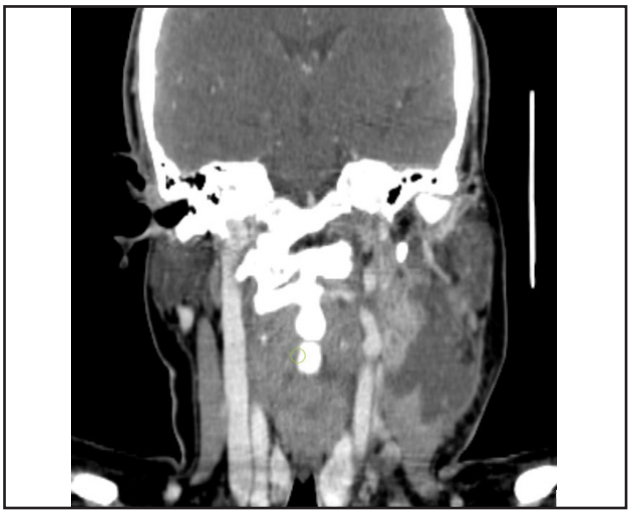

Fig. 2. Contrast enhanced CT scan Neck coronal section collection in left side of neck with central necrosis abutting carotid artery

symptoms did not improve. She did not give history of dental caries, tuberculosis or recurrent infection in head and neck region. On examination, there was a smooth swelling of 10 x 8 cm on the left side of the neck with local rise of temperature and tenderness. She had grade 2 trismus.

Haematological investigations were done and she was found to have very poor control of blood sugar (Glycosylated hemoglobin = 12.1%). She was started on insulin for better control of blood sugar. Rest of the investigations were normal. Ultrasonogram of the neck revealed a thick collection on the left side of the neck closely abutting the parotid gland. 10 ml pus was aspirated with ultrasound guidance and sent for culture and antibiotic sensitivity. Swelling reduced in size and trismus improved following aspiration. Contrast

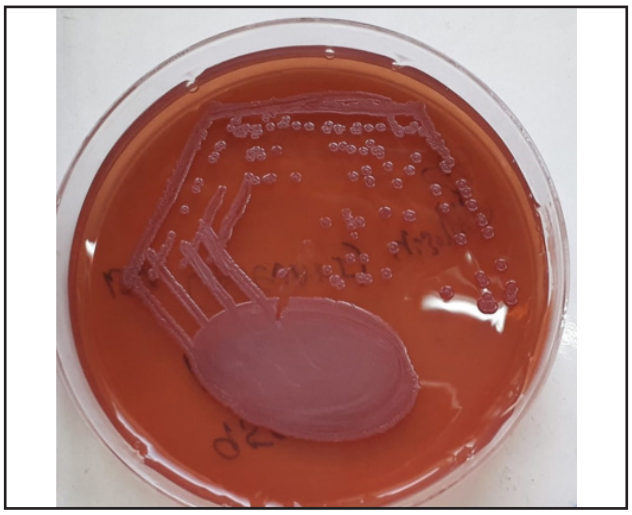

Fig. 3. MacConkey agar showing dry wrinkled colonies with metallic sheen

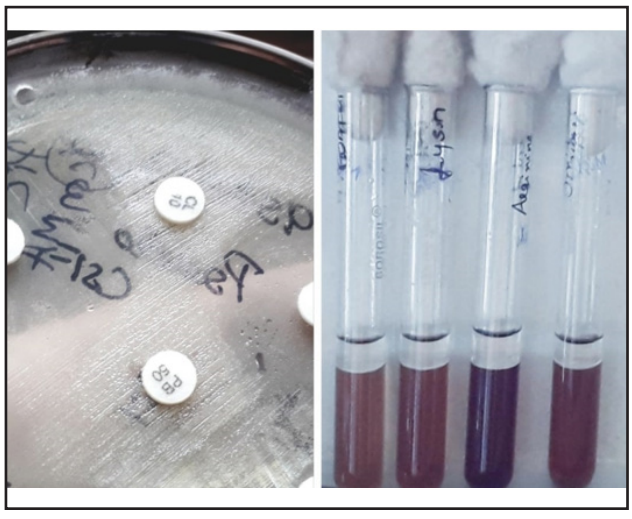

Fig. 4. Bacterial colonies showing Polymyxin B and Colistin resistance

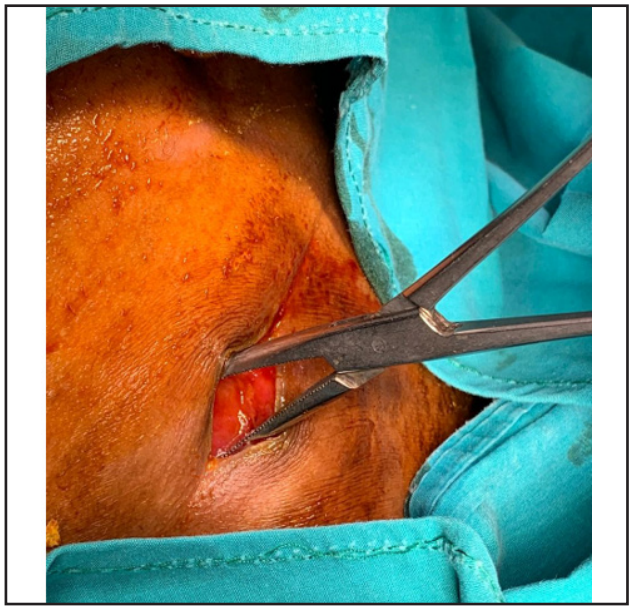

Fig. 5. Clean wound after 2 weeks of incision and drainage

enhanced computed tomography (Iohexol 1mg/kg) of neck showed an ill defined necrotic peripherally enhancing collection in the left side of neck involving sternocleidomastoid muscle and closely abutting carotid sheath and internal jugular vein. (Figs. 1,2)

Abscess was managed by incision and drainage under general anesthesia. Skin crease incision was made and all loculated collections were opened up without injuring the carotid sheath. Thick pus of approximately 10 ml was drained and sent for culture and sensitivity. Pus culture showed growth of Burkholderia pseudomallei,(Figs. 3,4) sensitive to Ceftazidime and Imipenem. Gene-Xpert for tuberculosis was negative.

Full evaluation for systemic manifestations of melioidosis was done, including blood culture and sonogram of visceral organs, which was normal. She was treated with Intravenous Ceftazidime 2gm every 8 hourly for 3 weeks. Daily dressing of the wound cavity was done. Swab was taken from wound cavity 2 weeks later, which was sterile. Wound was clean (Fig. 5), and secondary suturing was done. Oral Cotrimoxazole twice daily for 3 months was given as maintenance therapy. She was followed up for 1year. Her symptoms had resolved completely with no clinical evidence of relapse

Discussions

Burkholderia pseudomallei was discovered by Major Alfred Whitmore and CS Krishnasami in Rangoon, which is present day Burma, in 1912, hence Melioidosis is also known as Whitmore's disease/Rangoon's disease.1 B. pseudomallei belongs to Burkoholderia genus which contains upto 40 species. B. mallei which is responsible for Glanders disease in horses and highly virulent diseases in humans also belongs to the same family.[4]

B. pseudomallei grows in humid environment and wet soil and hence is commonly seen among farmers. Incidence of infection peaks during rainy seasons. It is more commonly seen in adults but also reported in children.[5] The patient in this case study was a dairy farmer and she gave history of recent unnatural cattle death at home. Incubation period of disease varies from 1 day to 3 weeks. Sometimes bacteria may lie dormant in host for many years and manifest disease when immunity is compromised.[3] The modes of transmission of infection are percutaneous inoculation through skin injuries, inhalation of aerosolised bacteria and even ingestion of mastitis-affected breast milk.[6]

Clinical features depend upon the mode of inoculation, strain of bacteria and risk factors of the host. Melioidosis is an opportunistic infection and hence is more frequently seen in patients with immunosuppressive illness like diabetes mellitus, chronic pulmonary disease, chronic renal failure, or cancer.[7] A very strong association between diabetes and melioidosis is observed. This patient in this case report was diabetic with poor blood glucose control which probably was the predisposing factor.

Melioidosis is referred as a 'remarkable imitator'.[1] Clinical manifestations may vary from acute fulminant disease or a chronic debilitating localized infection. It may present as pneumonia, musculoskeletal infections, abscess (skin, dental and visceral) or acute fulminant septicemia. Pneumonia is the most common presentation.[8] Head and neck abscesses are very rarely observed. Systemic disease is associated with very high mortality

Melioidosis is diagnosed by growing the bacteria in culture media from the clinical sample. Since it is an uncommon bacterium with a very high chance of misidentification in laboratory, a proper communication between clinician and microbiologist is needed in suspicious cases. Another test is Polymerase Chain Reaction test of serum, which is not useful in endemic areas where there are more than 50% asymptomatic seropositive cases.[9]

Treatment regimen of melioidosis is quite different from other commonly seen neck abscesses. It consists of 2 weeks of intensive phase and 3-6 months of eradication phase of antibiotics. Antibiotics are given for longer duration due to protracted course of the disease and to prevent relapse. Neck abscess is managed by surgical drainage along with antibiotics. Intravenous Ceftazidime, Meropenem or Imipenem are given during intensive phase and Co-trimoxazole is recommended for eradication phase. Garas et al has reported a case of discharging meliodosis neck abscess treated with vacuum assisted closure device which helped in quick healing of abscess.[10] Amoxicillin-Clavulanic acid is advised for children and pregnant woman, for whom cotrimoxazole is contraindicated nevertheless, it is associated with a high relapse rate.[11]

Compliance to eradication phase is very important to prevent the relapse of disease. Increased awareness and clinical suspicion of opportunistic infections like melioidosis is paramount as diabetes mellitus is becoming a global pandemic. Early diagnosis of melioidosis is very important as antibiotic regimen and duration of treatment is different from other pyogenic neck abscess. Patient requires prolonged treatment, failure of which may lead to relapse of the disease

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Case Report

Test, Track and Treat the Devil in the Paranasal Sinuses

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ABSTRACT

Introduction

Complications of rhinosinusitis result from progression of acute fungal or bacterial rhinosinusitis beyond the paranasal sinuses, potentially causing significant morbidity from either local or distant spread.

Case Report

A 45year old male patient presented with left sided headache since 8 days, left sided facial pain and swelling since 4 days which rapidly progressed to have pre-maxillay pus pointing and cellulitis. Functional endoscopic sinus surgery (FESS) was planned and intraoperatively inferior turbinectomy and maxillary clearance through the necrosed inferior turbinate was performed.

Discussion

The management of acute fungal rhinosinusitis is surgical debridement by doing FESS. This case report highlights that it may not be the case always. The treatment in the form of maxillary clearance and debridement of necrosed area need to be tailor made according to the disease and involvement as suggested on radiological imaging..

Keywords

Sinusitis; Mucormycosis; Subcutaneous Cellulitis

Complications of rhinosinusitis result from progression of acute fungal or bacterial rhinosinusitis beyond the paranasal sinuses, potentially causing significant morbidity from either local or distant spread.[1] An infection from sinuses can easily spread to the orbit and to the intracranial cavity as these anatomical structures are very closely interrelated. If it occurs in elderly individuals the cause may be due to uncontrolled diabetes, immunocompromised status, fungal infections, untreated long-standing disease, late presentation and inappropriate medical line of management. Acute invasive fungal rhinosinusitis (AIFR) is a potentially fatal infection that affects immunocompromised patients. If AIFR is not treated promptly it can lead to serious complications. One of the most important complications include orbital cellulitis. The commonest clinical manifestation would be proptosis with or without restricted eyeball movements, in some cases proptosis may not be evident and computed tomography (CT) orbit will help to know the extent and involvement of orbital contents.[2]

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Case Report

A 45 year male patient presented with left sided headache since 8 days, left sided facial pain and swelling since 4 days. The facial swelling was diffuse over the left cheek region which rapidly progressed to involve the left eye.

Patient was not a diabetic or hypertensive. His random blood sugar was 395mg/dl and a physician referral was given for the same. Patient was conscious and oriented.

On examination there was a diffuse swelling over the left middle third of the face which extended mediolaterally from the lateral aspect of the nose to the lateral canthus of the eye and superoinferiorly from the infraorbital region to 1cm above the left corner of the

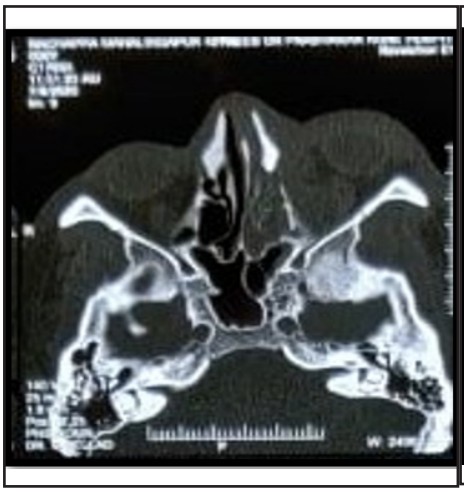

Fig. 1. CT PNS axial view showing collection in the left ethmoids with periorbital edema

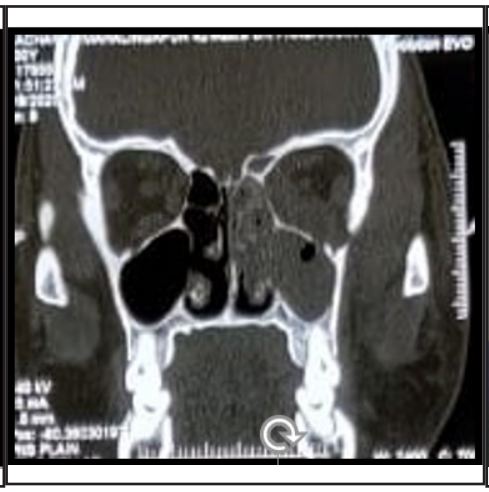

Fig. 2. CT PNS coronal view showing involvement of left inferior turbinate, middle meatus and maxillary sinus with no involvement of orbital floor and lamina papyracea

Fig. 3. Image showing swelling with pus pointing in left infraorbital region

mouth. The skin over the swelling was erythematous and tense. On palpation the swelling was tender with local rise of temperature. Left sided periorbital oedema was also noted and eye opening was reduced. However, eye movements were normal and pupils were reactive. Intraoral examination did not reveal any abnormalities apart from tobacco stained tooth. Intranasal examination showed enlarged inferior and middle turbinate with bulge in the lateral wall of the nose touching the septum on the left side. The inferior turbinate was insensitive to touch. No purulent nasal discharge was seen. Mucosa was congested. Right nasal cavity was normal and right sided ocular movements were normal.

A CT scan of paranasal sinus (PNS) showed features of left sided frontal, maxillary and ethmoidal sinusitis. (Figs. 1 and 2)

Lab investigations revealed elevated sugars of 390mg/dl, urine ketone bodies 3+ and HbA1c of 16.8 % was noted. All other blood parameters were within normal limit. The patient was tested for COVID 19 and was found to be negative. He was started on broad spectrum antibiotics. Blood sugars were managed as per physician opinion. Daily inspection showed a progressive increase in the size of the facial swelling and increasing periorbital oedema.

On the 4th day of admission, a pus point was noted in the left infraorbital region with the overlying skin being tense. (Fig. 3) Patient was taken up for Functional Endoscopic Sinus Surgery (FESS) under general anaesthesia.

Intraoperatively, the whole of the inferior turbinate was medialised due to the extensive collection in the maxillary sinus and pus pointing was noted. (Fig 4) On giving a nick, thick mucopurulent pus was suctioned and whole of the inferior turbinate was found to be necrosed. On further clearing the pus, the maxillary sinus was opened. The medial and antero-lateral wall of the maxillary sinus was necrosed and pus filled curdy white debris were removed. (Fig. 5) Complete debridement was done along with left inferior turbinectomy and whole of the maxillary sinus was cleared. Tissue was sent for Potassium hydroxide (KOH) staining, fungal culture and histopathological examination. Lamina papyracea was not breached.

On the first post-operative day the facial swelling had reduced, and eye opening had improved. KOH report was positive and patient was started on intravenous Amphotericin B at a dosage of 0.25mg/kg/day for 14 days with regular renal function test and electrolyte testing on alternate days and fluconazole nasal wash as

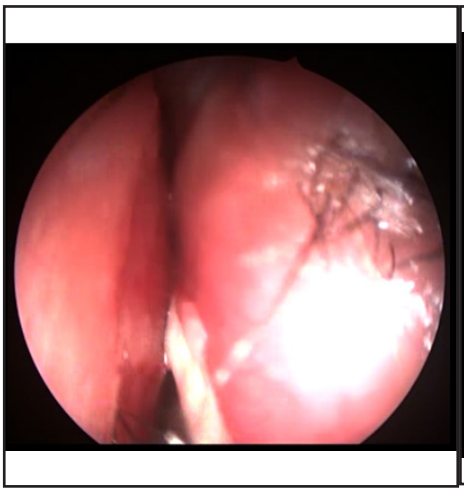

Fig. 4. DNE image of left nasal cavity showing pus filled inferior turbinate which is pushed medially touching the septum.

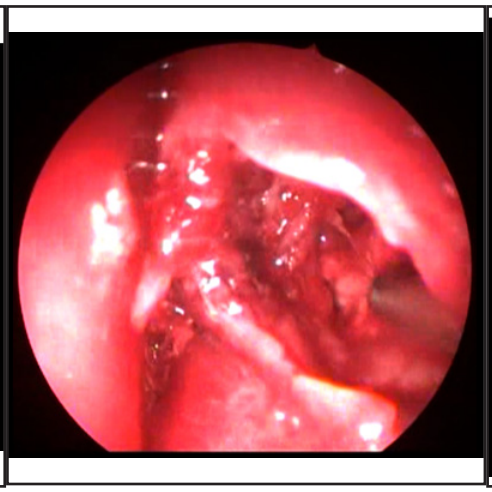

Fig. 5. DNE image of left nasal cavity showing complete necrosed inferior turbinate and medial wall of maxillary sinus.

Fig. 6. Post-operative image showing complete reduction of the infra orbital swelling

per our institutional protocol. The facial swelling had resolved almost completely in the next 48 hours and the periorbital oedema was minimal. Eye opening had progressively improved. (Fig. 6) The organism isolated was Mucor species.

Discussion

The complications of acute invasive fungal rhinosinusitis are potentially life threatening. Complications are generally classified as orbital, intra-cranial, bony or chronic. Complications may be caused by either local progression or distant spread via the bloodstream. Local progression is typically through areas where the surrounding bone is thin such as the porous lamina papyracea, where there is a direct anatomical connection or through osteitic bone.[1,2]

The most common complication of sinusitis is orbital cellulitis followed by intracranial complications like meningitis, brain abscess and cavernous sinus thrombosis. If intra-orbital complications are not treated in time, they can progress to life-threatening complications such as optic neuritis, cavernous sinus thrombophlebitis or intracranial complications. A significant proportion of patients (5–40%) can be affected by sinusitis, mostly due to the delayed diagnosis of the disease.[3,4]

Acute invasive fungal rhinosinusitis (AIFR) is a potentially fatal infection that affects immunocompromised patients. Multiple fungal species have been identified in patients with AIFR among which Aspergillus and Mucoraceae are the most common pathogens.[5,6]

In a 15 year review of 90 patients with orbital cellulitis complicating sinusitis done by Nwaorgu (2004), sinuses were the origin of the infection in 57% patients.[7]

In a study of 218 patients of orbital cellulitis, done by Choudhary et al. (2007), it was found that sinusitis was the most common predisposing factor.[8]

Based upon the anatomical sites and the degree of involvement, the patient can have various presentations in complicated sinusitis. Along with a proper history and clinical examination, extensive radiological evaluation CT scan/magnetic resonance imaging (MRI) of the paranasal sinus and brain is always mandated in patients with suspected complications. Conservative treatment is offered as the first line of treatment for all complicated sinusitis. Endoscopic/open surgical drainage is warranted in progressive disease which does not respond to medical treatment.[9,10]

In our case, upon seeing a pus pointing area from a necrosed inferior turbinate, with a detailed pre-operative imaging and knowledge of anatomical structures in the close vicinity, an attempt was made to clear the maxillary sinus directly and later proceed with other conventional steps of FESS as required. The benefits were an immediate reduction in the volume occupied by the disease which hampered visualisation of the nasal cavity and the lateral nasal wall. Upon clearing the contents from the maxilla, the visualisation of the lamina papyracea was more clear and a wise decision was made to not proceed with orbital decompression as it was not affected.

If appropriate treatment is not done, acute invasive fungal sinusitis can lead to intra orbital and intracranial complications such as orbital cellulitis, orbital apex syndrome, cavernous sinus thrombosis etc. If untreated, 50-80 % mortality rates from intra orbital and intra cranial complications are reported.[9]

Conclusion

Although the conventional protocol of managing these cases is by doing functional endoscopic sinus surgery (FESS) and proceeding with orbital decompression if the orbits are found to be involved on radiological imaging or during endoscopic visualisation, this report highlights that it may not be the case always. Attempt should be made to clear the disease directly and later proceed with other conventional steps of FESS as required thereby preventing the damage to vital structures. Hence, we suggest a tailor-made concept of clearing the disease in the nasal cavity and the para nasal sinuses in order to achieve the prime objective of disease clearance and also aid in better visualisation of the more posterior and superior structures in the lateral nasal wall thus preventing unnecessary iatrogenic potentially lethal complications.

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Case Report

Spontaneous Transection of a Retained 16 Year Old Nasogastric Tube

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ABSTRACT

Introduction

The insertion of nasogastric (NG) feeding tube or Ryle's tube is a common procedure for treating patients in different medical or surgical conditions. One of its indications is in patients who can't eat or swallow due to obstruction in upper digestive tract.

Case Report

We encountered a 71 year old female patient with stricture in mid to low esophagus, who presented with a retained NG tube in situ for more than 16 years. Post admission, an NCCT scan of neck, thorax and upper abdomen showed about 30cm long retained tube with its lower end in the body of stomach. Upper gastro-intestinal endoscopy was subsequently performed and the retained tube was carefully removed in toto.

Discussion

Insertion of nasogastric tube is a frequent and well tolerated day to day procedure though it can produce unexpected complications like stricture, perforation or haemorrhage and even spontaneous transection in a few patients with prolonged indwelling Ryle's tube. Long term placement of nasogastric tube is thus not recommended to avoid complications.

Keywords

Tube, Nasogastric; Complications

Amongst various uses, nasogastric tube (NGT) is used for enteral feeding for the patients who present with stricture in upper digestive tract and provides access to the stomach for diagnostic and therapeutic purposes. Current recommendation, long term NGT should be changed every 4-6 weeks swapping to alternate nostril.[1] There aren't many reported cases of retained / transected NGTs, probably any for such a long duration. The case illustrated is unique with respect to retention of NGT for 16 years, though the patient could swallow food or liquid per orally. Spontaneous transection of the tube, resulting in expulsion of the proximal part, with part of the NG tube in the esophagus and stomach being still retained, prompted the patient to seek medical attention.

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Case Report

A 71 year old female patient was admitted to Department of ENT through emergency department with retained NGT in esophagus. The NGT was present in situ allegedly, for last 16 years. The NGT had spontaneous transection on following which the patient rushed to the hospital. In 2004, i.e. 16 years back, the patient presented with dysphagia, subsequently the patient was diagnosed with esophageal ulceration and stricture at 30 cm from upper incisor, with inflamed ulcerated mucosa. Histopathological examination at that time suggested, "Epithelial hyperplasia with acute inflammatory changes" most probably due to persistent gastric reflux. Barium swallow also suggested "persistent narrowing of the lower part of esophagus with prestenotic dilatation".

The patient was managed conservatively along with 14 Fr NGT insertion for enteral feeding. (Fig 1) Thereafter, was lost follow up after one month and was allegedly doing well with the NGT in situ. The patient

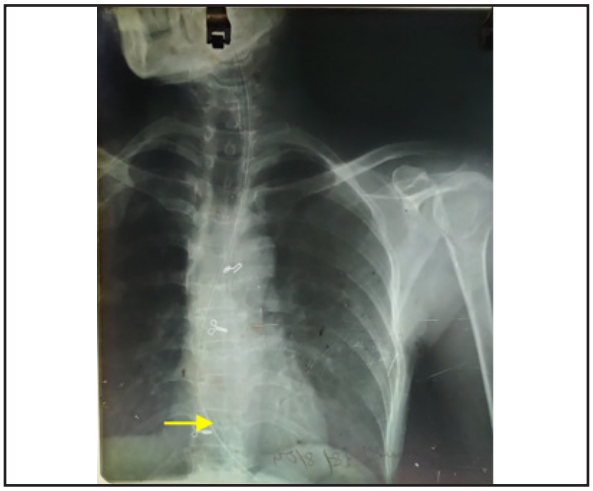

Fig. 1. NGT in situ in esophagus as shown in Chest X-ray PA View

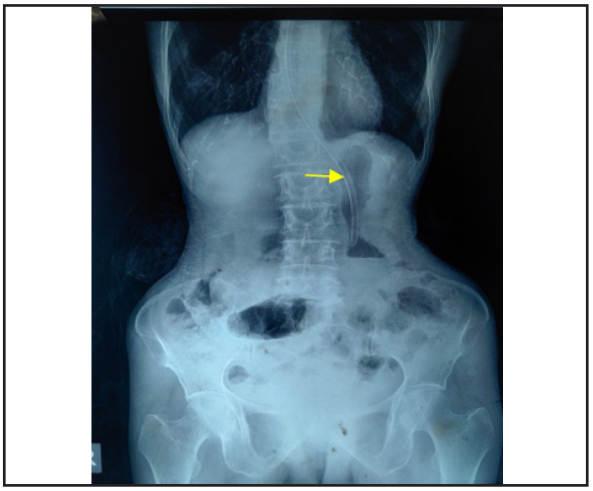

Fig. 2. Retained part of the NGT in stomach as shown in x-ray abdomen (yellow arrow head)s

began to take food and liquids perorally after one month and continued to do so though the NGT was there. After an uneventful period of 16 years, the patient had spontaneous transection of the NGT, following which the patient presented to us for further management. The mechanism of transection still remains unclear.

Post admission, basic blood investigations were all within normal limits. Chest X-ray (PA view) and X-ray abdomen (Erect posture) showed the presence of NGT from the hypopharynx upto the body of stomach. (Fig 2) A non-contrast computed tomography scan showed about 30cm long retained tube with its lower end at the body of stomach. (Fig 3) The American Society for Gastrointestinal Endoscopy recommends urgent endoscopy for objects >6 cm above proximal duodenum, which was performed in this case.[2]

Upper gastrointestinal endoscopy (UGIE) was subsequently performed on an emergency basis; the patient was awake while lubricating the flexible upper gastrointestinal endoscope with 2% lignocaine jelly. A

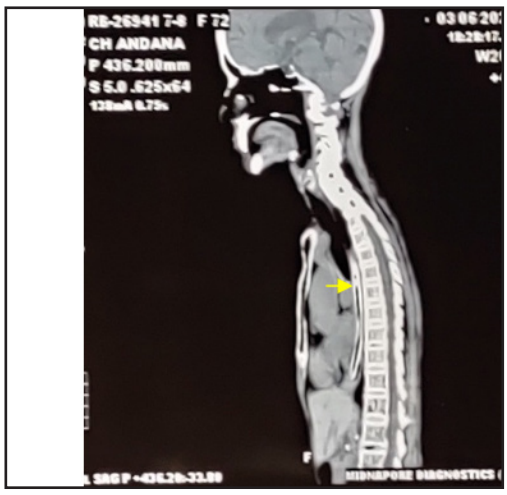

Fig. 3. Retained part of the NGT in esophagus as shown in NCCT thorax sagittal view (yellow arrow head)

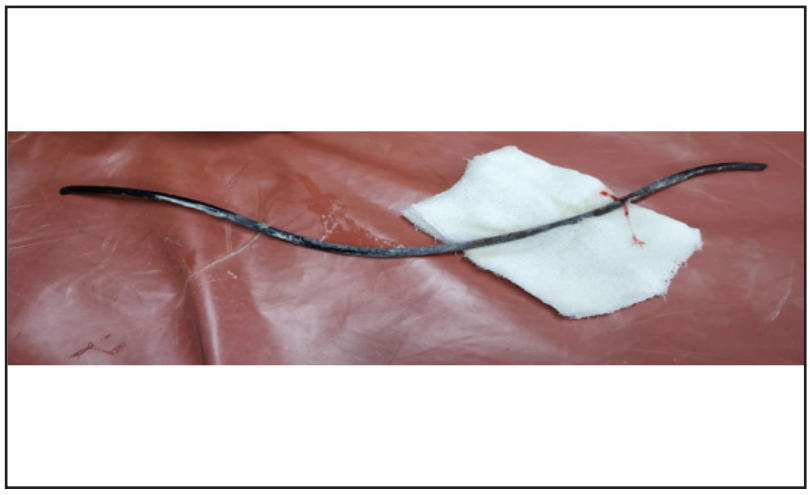

Fig. 4. Retained part of the NGT after removal.

severed NGT was seen just distal to cricoids and it was carefully removed in toto using a rat toothed forceps (Fig 4). Gastro-esophageal junction was identified at 38 cm from upper incisor. Little areas of ulceration were seen at fundus, body, antrum and pylorus of the stomach most probably due to prolonged NG tube contact; 1st part of duodenum appeared healthy. Post-op period was uneventful. The patient was discharged on the following day.

Discussion

There are multiple indications for insertion of NGT in modern medicine, and commonly performed in the patients who need nutritional support as enteral feeding. It is generally a well tolerated process though it can produce unexpected complications occurring in 0.3-8% of patients.[3] Long term tube placement can eventually lead to esophageal ulceration which may in turn result in stricture formation or perforation. Percutaneous gastrostomy is now preferred where long term NGT placement is anticipated.

There are very few studies to report the long term effects of NGT placement as nasogastric feeding is generally a short term intervention and only a few studies report use of it beyond 28 days.[4] Another case reports spontaneous transection of NG tube after successful placement and 8 days of enteral feeding,[5] but our case reports presence of the Ryle's tube in situ for 16 years following which the tube was spontaneously transected. Placement of NGT for longer durations is likely to increase the risks of irritation and erosion to the upper gastrointestinal tract as the tubes would eventually become rigid in due course time owing to regular exposure to low pH in the stomach. Stricture and hemorrhage may result from the inflammatory changes in upper gastrointestinal tract, and if severe may produce penetrating ulceration and esophageal perforation.[6] Very long-term presence of NGT in situ can cause spontaneous transection of tube as was found in our case though it seems to be an extremely rare occurrence. So, it's prudent to adhere to the current recommendation to use the NGT in situ for a maximum period of seven days in case of small-bore tubes, and for wide bore tubes for a maximum period of two months.

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Case Report

A Rare Case of Childhood Lipoblastoma presenting as Tongue Mass

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ABSTRACT

Introduction

Lipoblastoma is a rare benign tumour arising from embryonic white fat been commonly noted in limbs and trunk, but tongue involvement is rare and has not yet been reported.

Case Report

A child with tongue lipoblastoma is reported, whose imaging reported an encapsulated, well-delineated, fat-containing tumour. Surgical excision was performed with no post-operative morbidities.

Discussion

Lipoblastoma is an uncommon childhood tumour, which rarely affects the tongue. It presents as a progressive painless swelling, rarely causing any symptom. MRI is helpful to assess the precise location and extent of the lesion. Although the ratio of fat to myxocollagenous tissue in the tumour is variable, the diagnosis can be suggested in most cases based on the imaging characteristics. Recommended treatment is complete surgical excision and confirmation of diagnosis by histopathological examination.

Keywords

Lipoblastoma; Child; Tongue

The most commonly encountereded paediatric soft tissue tumour in the head and neck region is haemangioma. Lipoblastomas, though rare, should be kept in mind in cases of such presentation. Of these, a clinical diagnosis of lipoblastoma can be made taking into consideration the age of patient and clinical examination first, followed by a probable confirmation with MRI ± CT scan.

Case Report

A 4 year old boy, reported to the otorhinolaryngology outpatient department, with the complaints of painless swelling in the tongue for 45 days. The swelling gradually increased in the size to attain the present size. Lesion did not cause any other symptoms.

On examination of tongue, a smooth, firm, non-tender swelling of 3x2.5x2.5cm, non-compressible swelling noted in the posterior 1/3rd of dorsum of tongue (involving midline and right side of tongue). The function of hypoglossal and lingual nerve was spared (Fig. 1).

Pre-operative haematological investigations were normal. USG Neck was normal and showed a normal thyroid gland. T2 - weighted images of MRI showed a 2.7x2.3x2.9cm hyper intense, well encapsulated, soft tissue lesion involving midline and right side of tongue. (Fig. 2) The T1 images showed a hyper intense peripheral rim which is compatible with fat and a hypointense centre. (Fig. 3)

Surgical resection was planned. Informed and written consent was obtained. Under general anaesthesia, in-toto surgical resection of encapsulated lesion was done using a midline Glossotomy approach (Fig. 4), without any

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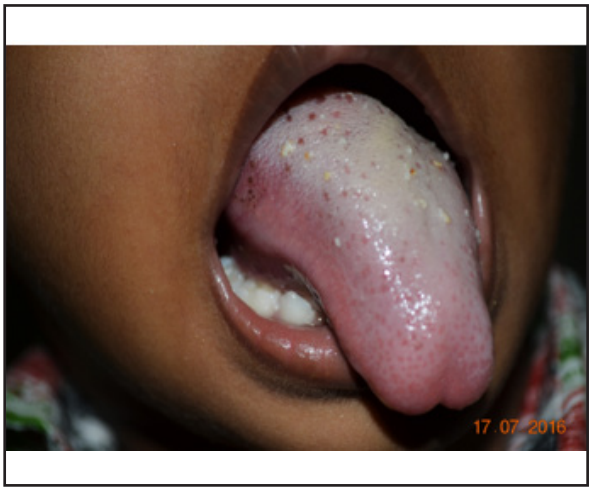

Fig. 1. Pre-op picture showing swelling in posterior aspect of tongue

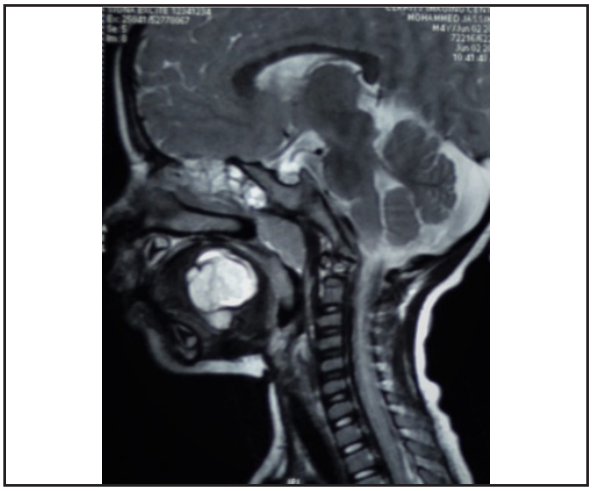

Fig. 2. MRI T2 coronal section: Encapsulated lesion within tongue, with rich vascularity

post-operative morbidity (Fig. 5).

Histopathological examination showed mature adipocytes which were organized in lobules separated by fibrous septae, few immature lipoblasts, myxoid/ myxocollagenous stroma, plexiform capillary network and an intact capsule. (Fig 6)

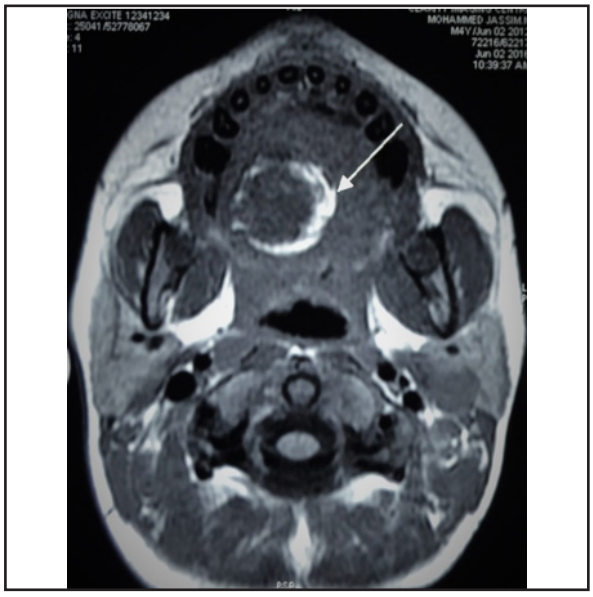

Fig. 3. MRI T1 axial section: Well encapsulated lesion within tongue with rich surrounding capillary network

Discussion

Lipoblastomas and their multicentric/infiltrative forms, lipoblastomatoses, are rare benign soft-tissue tumours of embryonic lipoid cells. Adipose tumours comprise about 6% of soft tissue neoplasms of which 94% are lipomas, 4.7% are lipoblastomas, and 1.3% are liposarcomas.[1] These are known to develop in the first two decades of life.

Lipoblastoma mainly occurs before the age of three

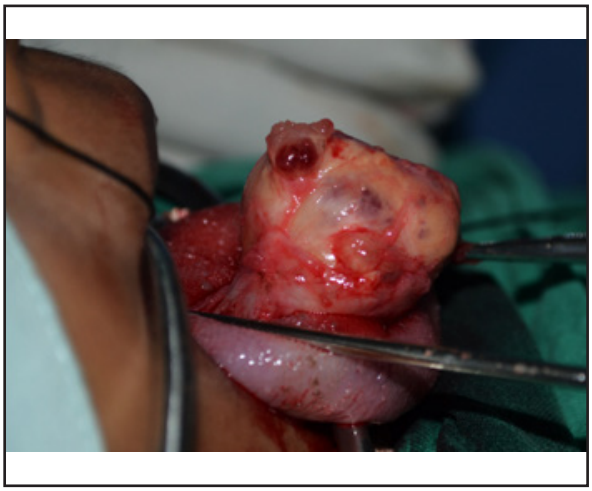

Fig 4. Intra-op. photograph: Excision of encapsulated mass in-toto

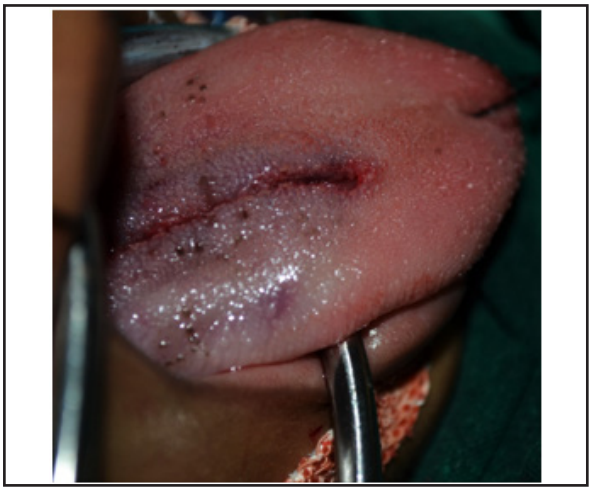

Fig. 5. Appearance post-excision and closure

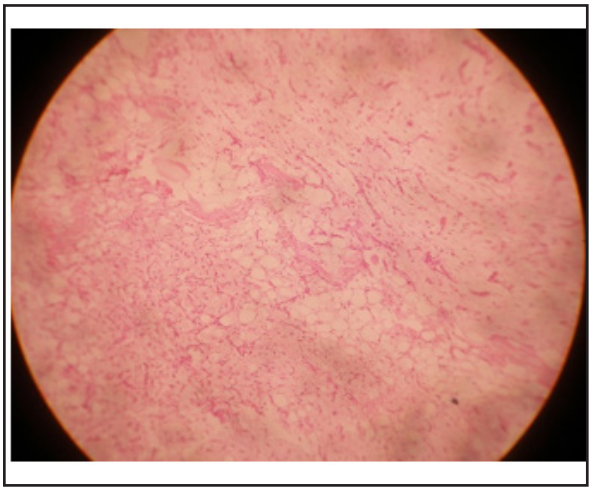

Fig 6. Lipoblastoma: Infiltrating islands of tumour tissue (H&E, 100X)

years and has a male predominance. This tumour is mostly present in the limbs and trunk, with its rare occurrence in the head and neck.[2] Lipoblastoma is categorized into two types: the circumscribed lipoblastoma (approximately 70% of cases) - a superficial and encapsulated lesion and diffuse lipoblastomatosis (about 30% of cases) - a deeply located, poorly circumscribed lesion with infiltrative growth pattern that may affect surrounding muscle structures.[3]

The terms lipoblastoma and lipoblastomatosis were first used by Jaffè4 and Vellious5, respectively. Less than 200 cases of lipoblastoma and lipoblastomatosis at various locations have been reported in the literature.[6]

The most common presenting symptom is a painless, progressively growing mass which is localized superficially. Other symptoms are related to the location and size or mass effect of the lesion. Airway obstruction and respiratory symptoms have been described in patients with pleural, mediastinal, pulmonary, and lower neck lipoblastomas. Gastrointestinal symptoms, such as emesis, diarrhoea, anorexia and abdominal pain occur in patients with mesenteric or retroperitoneal lipoblastomas. Depending on the location, nerve compression and related symptoms can be present.[7,8]

Head and neck lipoblastoma cases have rarely been reported in literature owing to their low incidence. Calhoun et al. reported the first case of lipoblastoma in salivary gland which occurred in the parotid gland.[9] Rasmussen et al. mentioned a case of cervical lipoblastoma causing intermittent airway obstruction.[10] Farrugia et al. reported another case of lipoblastoma in the neck which had presented with rapidly enlarging mass, mimicking cystic hygroma.[11] A case of lipoblastoma in parapharyngeal space was reported by DePasquale et al.[12]

On imaging, lipoblastoma appears as a well-defined soft tissue mass, often with lobular appearance and having internal septations. The imaging appearance of lipoblastoma depends on the proportion of fat relative to the amount of myxocollagenous stroma. Fat in lipoblastoma appears as hyperechogenic areas on ultrasonographs, areas of low attenuation on CT images and signal intensity identical to that of subcutaneous adipose tissue. The myxoid components are hypoechoic on ultrasonographs, have low attenuation on CT images (but less hypodense than fat) and on MRI have low signal intensities on T1-weighted images and high signal intensities on T2-weighted images; contrast enhancement of these areas reflects the rich capillary network.[8,13,14]

Lipoblastoma exhibits a tendency to invade locally. If not excised early, it may enlarge, and infiltrate the various surrounding spaces, present pressure symptoms and may lead to various complications as well.

Fine needle aspiration cytology is the basic investigation for diagnosis. It can be confirmed by excision biopsy and histopathological examination of the specimen. Histologically, the lesions are composed of immature fat cells (lipoblasts) in varying stages of maturity, mesenchymal cells, a plexiform capillary network, myxoid stroma and mature adipocytes organized in lobules by fibrous septa. There is no nuclear atypia.

If the pathologist is unable to differentiate lipoblastoma from myxoid liposarcoma, a cytogenetic analysis should be done. The typical chromosomal abnormality associated with lipoblastomas is breakpoints in the long arm of chromosome 8 (area 8q11-13), whereas myxoid liposarcomas typically show translocation t(12,16) (q13;p11) and atypical lipomatous tumour shows amplification of the MDM2/CDK4 genes on 12q[7–10].[15-19] The age of our patient, the tumour lobulation, its well-circumscribed nature, and the typical histological findings in our case made cytogenic investigations unnecessary.[20]

CT scan or MRI is a must to assess the tumour extent and also to plan surgical approach. Reiseter et al reported that MRI is the most reliable method, with USG and CT having complementary roles.[21] It is difficult to distinguish lipoblastomas from liposarcomas by imaging studies because of their similar feature of vascularity. However, lipoblastomas usually occur within the first 3 years of life, and diagnosis after the age of 5 years is unusual. In contrary, liposarcomas are extremely rare prior to 5 years of age.

The natural history of lipoblastoma is to evolve into mature lipomas.[8,22] The treatment used for lipoblastoma and lipoblastomatosis is wide surgical resection.[17] Recurrence develops in 9 to 25% of cases and is mostly seen in cases of with infiltrative lipoblastomatosis and incomplete resection.[8] Metastasis has not been reported to date and the prognosis is good.

Conclusion

Though lipoblastoma is an uncommon childhood tumour, it should be taken into consideration as a differential diagnosis of head and neck masses. It usually presents as a progressive painless swelling, rarely causing any symptom. Imaging is helpful showing the precise location and extent of the lesion. Although the ratio of fat to myxocollagenous tissue in the tumour is variable, the diagnosis can be suggested in most cases based on the imaging characteristics. Recommended treatment is complete surgical excision and confirmation of diagnosis by histopathological examination.

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