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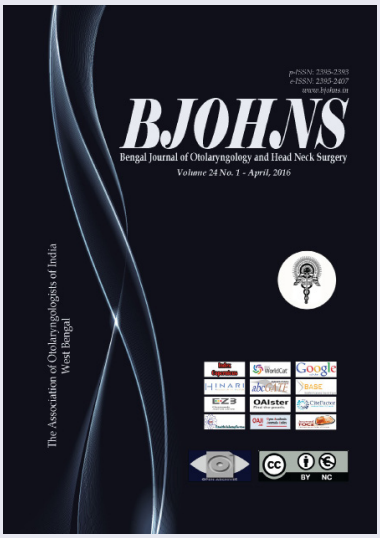

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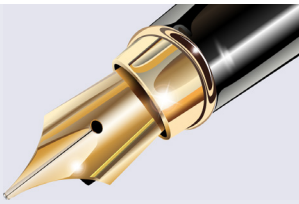
From the Desk of the Editor



The medical student community has traditionally involved themselves by assisting/supplementing the workforce in managing natural calamities, accidents, fires and even wars, while continuing with their education. However, the unprecedented global emergence of the highly contagious pandemic of the coronavirus disease 2019 (COVID-19) has not only restricted the scope of participation of the students in combating the situation but also threatened the basic method of medical education that shapes the quality and confidence of the budding physicians in treating the ailing patients.

As COVID-19 infection rates increased during March, 2020, and it became clear that asymptomatic persons (including the students and doctors) may carry the virus and infect others, the medical students were withdrawn from the traditional hospital-based instructional classes. Cancellation of surgeries and suspension of traditional learning sessions denied students the opportunity to learn from face-to-face contact with patients or hands-on experience using equipment/gadgets in authentic patient care environments under the mentorship of their teachers. Uncertainties fed the feeling of insecurity and anxiety amongst the students. Medical educationists all over the world experimented and implemented different educational adaptations to convert panic into resolve to fight the problem, while keeping the students engaged and on track with the curriculum-driven coursework. Innovations in medical education technology aimed at maintaining standards of quality and performance.

The perspective of medical education has changed during the COVID-19 pandemic. Virtual medical education utilized the resources of digital learning management systems to reach out to the students on video communication platforms like Google Classroom, Skype, Zoom, etc. and tried to generate a classroom like experience in participation and interaction while maintaining physical distancing to keep the students safe. One Chinese medical school devised online problem-based learning techniques to complete the curricula in one session. These methods became so popular that the medical school continued with these methods in subsequent sessions too.

The clinical experience the students gather during the in-patient and out-patient rotations are considered to be invaluable. Different methods have been proposed that ranged from moving the didactic lectures forward while deferring the clinical rotations, to digital simulations of clinical situations/procedures where participants can discuss or assist in virtual team settings to develop their clinical skills.

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The pandemic catalysed greater cooperation between institutions in providing access to and sharing their teaching resources. While most of the institutions have created their platform to provide virtual education, many such institutions and professional bodies joined hands to create a repository to provide resources and educational content to the medical community, e.g., the Virtual University of Medical Sciences (VUMS) in Iran, e-learning for healthcare in the UK (e-lfh) hub of the NHS, etc. The professional bodies/associations in India (e.g., AOI, NES, IAOHNS) have conducted different instructional/lecture series and uploaded those on their websites for ready access. A number of dependable YouTube medical education channels are available with very good content. So now the students have more options to learn from the virtual platforms rather than the traditional didactic lectures. Development of resource bases have now enabled the students to choose the topics of their interest and learn it from the best teachers around the world.

The rapid spread of COVID-19 and persistence of the pandemic for a prolonged period have had serious implications for medical education. The medical educators lived up to the challenge and came out with innovative methods to make up for the scarcity of traditional teaching environment and reduced clinical exposure. Virtual medical education came into being utilising digital technologies and online platforms to give more clarity to teaching. Wider use of simulations, adaptive teaching-learning activities, greater flexibility in curriculum as also in the assessment methods appear to have transformed the medical education forever.

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

Different Faces of Sinonasal Mass Lesions

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Devika T,[1] Shubha P Bhat,[2] Vadisha Srinivas Bhat,[1] Rajeshwary Aroor,[1] Satheesh Kumar Bhandary B,[1] Gautham MK,[1] Samatha KJ[1]

ABSTRACT

Introduction

Mass in the nasal cavity presents with a wide range of symptoms, when a presumptive diagnosis is often made with the help of imaging and endoscopy. This study focussed on correlating clinical diagnosis with the histopathological diagnosis so that appropriate treatment can be offered to improve the quality of life of the patient.

Materials and Methods

The study included 120 cases who presented with symptoms and signs of mass in the nasal cavity, undergoing surgery or diagnostic biopsy. They were evaluated with a detailed history and clinical examination, diagnostic nasal endoscopy, and relevant radiological investigations. Histopathological examination of the biopsy of the excised specimen was performed by Haematoxylin and Eosin stain. Special stains and Immunohistochemistry (IHC) were performed whenever indicated. The clinical diagnosis was correlated with histopathological diagnosis.

Results

Nasal obstruction was the most frequent symptom followed by nasal discharge. Non-neoplastic lesions made up 85% of cases, while16% of cases were proved as neoplastic lesions. Among neoplastic lesions, 7% were benign, and 9% were malignant. The inflammatory polyp was the most common non-neoplastic lesion. Fischer's exact test showed a correlation between clinical diagnosis and histopathological diagnosis. Non-neoplastic lesions were common in the 4th decade of life; benign lesions were common in the 3rd decade of life, while malignant lesions were common in the 5th decade of life.

Conclusion

Sinonasal masses present with overlapping clinical features, and sometimes the definite diagnosis is possible only by histopathological examination of the specimen. However, in the presence of characteristic clinical features, accurate clinical diagnosis is possible in most cases, and appropriate treatment can be performed without delay, pending histopathological examination..

Keywords

Mass,Sinonasal; Presentation; Histopathology

The nasal cavity hosts many diseases that present with common symptoms like nasal obstruction, nasal discharge, epistaxis, or anosmia.[1] Sinonasal mass lesions may be congenital, inflammatory, or benign or malignant neoplasm. Congenital mass can be intranasal or extra nasal dermoid, glioma or encephalocele. The Inflammatory polyp develops from the lining mucosa of the nose, ethmoid, and maxillary sinuses. It shows connective tissue edema, with infiltration of plasma, neutrophils, and eosinophils. Benign tumors may arise from the osteocartilaginous skeleton, respiratory mucosa or glandular, vascular, and neural structures within the sinuses. Malignant tumors of the nasal cavity are relatively uncommon, representing 3% of head and neck malignancy and less than 1% of all malignancies.[2] Sinonasal malignancies with coexisting infection lead to delay in diagnosis as early tumors can mimic sinusitis.

Sinonasal tumors may be large on presentation and

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invade structures of orbit and skull base or extend into nearby foramina or pathways of least resistance. Due to the complexity of these tumors, imaging may require a combination of a Computed Tomography (CT) and Magnetic Resonance Imaging (MRI). The primary goal of imaging is to identify the nature of the primary disease, determine its degree of aggression, delineate the local extent of the tumor, characterize perineural spread and orbital invasion, and evaluate skull base and lymph node involvement. CT scan is essential for assessing bone involvement or destruction. MRI characterizes soft tissue involvement.

This study aims to analyze and correlate the clinical and histopathological characteristics of sinonasal masses and to identify the occurrence of various neoplastic and non-neoplastic lesions in different age groups.

Materials and Methods

This observational study was conducted in the department of ENT, in a tertiary care hospital of Mangaluru between January 2017 and January 2019. Approval for the study was obtained from the Institutional Ethics Committee. The study included 120 cases who presented with symptoms and signs of mass in the nasal cavity. They were evaluated with a detailed history and clinical examination, including diagnostic nasal endoscopy after written informed consent. Radiological investigations like CT scan or MRI were performed wherever indicated. Patients undergoing diagnostic biopsy or surgical excision were included in the study. Histopathological examination of the specimen was performed by Haematoxylin and Eosin stain. Special stains like Gomori's methenamine silver (GMS) and Periodic Acid Schiff (PAS) were performed as and when required. Immunohistochemistry (IHC) was performed whenever indicated. The correlation between clinical diagnosis and histopathological diagnosis was carried out using Fischer's exact test. The occurrence of benign and malignant lesions and their age and gender distribution were carried out by the Chi-square test.

Results

The study population included one hundred and twenty patients with a mass in the nasal cavity and paranasal sinuses. Out of them, 80 (67%) were males, and 40 (33%) were females, with a ratio of 2:1 showing a male predominance. Most of the patients belonged to the age group of 51-60 years, 27 (23%) patients being in this group, followed by 24 patients (20%) in 31-40 years. The oldest patient was 79 years year old, the youngest being seven years. Nasal obstruction was the most frequent symptom in our study (71.7%), followed by nasal discharge (20.8%), epistaxis (14%), and headache (14%). Eight patients (7%) had eye symptoms, and 6 (5%) had disturbed smell sensation.

Out of 120 patients,79(66%) were clinically diagnosed as sinonasal polyp. The following common clinical diagnosis was fungal sinusitis in 11(9.2%) patients. Six patients (5%) were diagnosed as nasopharyngeal carcinoma and an equal number as inverted papilloma. Four cases (3.3%) each of angiomatous polyp and granulomatous disease, 3 (2.5%) of maxillary sinus malignancy, 2 (1.6%) each of rhinosporidiosis, olfactory neuroblastoma and Angiofibroma and 1 (0.83%) frontoethmoidal mucocele were the other clinical diagnoses, based on the clinical examination, nasal endoscopy, and imaging studies.

On histopathological examination, 101 (84 %) were non-neoplastic lesions, while 19(16%) of cases were neoplastic lesions (7% benign and 9% malignant). Among the non- neoplastic lesions, 74 (61.7%) were inflammatory polyp. (Table I)

Benign neoplasm consisted of 5 (4.2%) Inverted papilloma, 2 (1.6%) Angiofibroma, and 1(0.83%) Schwannoma. Out of the eleven malignant neoplasms, 5 were nasopharyngeal carcinoma, 2 Olfactoryneuroblastoma, and one each of pleomorphic sarcoma, squamous cell carcinoma, malignant round cell tumor of the maxillary sinus. One case of adenocarcinoma of the nasal septum was a surprise for the clinicians. (Table II)

We correlated the clinical diagnosis with the histopathological diagnosis. Out of the 79 cases clinically diagnosed with sinonasal polyp, 69 (87.3%) were histopathologically confirmed as Inflammatory polyp, 3 (3.7%) as allergic nasal polyp, 2 (2.5%) each as angiomatous polyp, fungal sinusitis, and inverted

Table I: Non-neoplastic lesions

HISTOPATHOLOGY	NUMBER (N=120)	PERCENTAGE (%)
Inflammatory polyp	74	61.7
Fungal sinusitis	12	10
Angiomatous polyp	4	3.3
Allergic nasal polyp	3	2.5
Rhinosporidiosis	2	1.6
Pyogenic granuloma	2	1.6
Tuberculosis	1	0.83
Rhinoscleroma	1	0.83
Rosai Dorfman's disease	1	0.83
Frontoethmoidal mucocele	1	0.83

papilloma and 1(1.2%) as adenocarcinoma. Even though the diagnosis of 78 out of 79 patients remains within the inflammatory pathology, one of the cases turned out to be a malignant condition, which required appropriate treatment. Eleven cases were clinically and radiologically diagnosed as fungal sinusitis, of which 8 (72.8%) were histopathologically confirmed as invasive fungal sinusitis (Mucormycosis), and 2 (18.2%) as non-invasive (aspergillosis) fungal sinusitis.

Six cases were clinically diagnosed as Nasopharyngeal carcinoma, of which 5 (83.3%) were histopathologically confirmed as nasopharyngeal carcinoma and 1(16.7%) as schwannoma, which is a benign lesion. Three cases were clinically diagnosed as malignancy of maxillary sinus, of which one each 1(33.3 %) were histopathologically diagnosed as squamous cell carcinoma, pleomorphic sarcoma, and malignant round cell tumor of the maxillary sinus. All three were confirmed to be malignant conditions. Clinical diagnosis of Angiofibroma and olfactory neuroblastoma were confirmed as histopathologically confirmed.

Six cases were clinically diagnosed as Inverted papilloma based on the clinical examination and imaging, of which 3 (50%) were histopathologically diagnosed as inverted papilloma, 2(33.3%) as an inflammatory polyp, and 1 (16.7%) as Angiofibroma of the nasal septum. In two cases, large and long-standing polyp leading to changes on the surface mimicked inverted papilloma.

Table II: Malignant neoplasm

HISTOPATHOLOGY	NUMBER (N=120)	PERCENTAGE (%)
Nasopharyngeal carcinoma	5	4.2
Olfactory Neuroblastoma	2	1.6
Adenocarcinoma of Septum	1	0.83
Pleomorphic sarcoma	1	0.83
Squamous cell carcinoma	1	0.83
Malignant Round cell tumour	1	0.83

Four cases were clinically diagnosed as angiomatous polyp, of which 2 (50%) were histopathologically diagnosed as pyogenic granuloma, one (25%) each as angiomatous polyp and inflammatory polyp. The four cases clinically diagnosed as granulomatous diseases were histopathologically diagnosed as Rosai Dorfman's disease, tuberculosis, Rhinoscleroma, and inflammatory polyp.

The clinico-histopathological correlation in our study was 92%. Fischer's exact test was significant across all age groups (p=0.01). Inflammatory lesions were common in the second decade of life. Benign lesions were common in the fifth decade, and malignant lesions were common in the elderly. However, there was no statistically significant difference in the occurrence of benign and malignant lesions in males and females (p=0.061).

Discussion

The mass lesions in the nasal cavity and paranasal sinuses have different histological features. It is essential to differentiate non-neoplastic from malignant neoplastic lesions to decide the modality of treatment and for timely intervention. The neoplastic and non- neoplastic lesions may present with overlapping clinical features, which makes it difficult to differentiate them clinically.[1] Histopathological examination of the biopsy of the nasal mass is performed before complete excision when the clinical diagnosis mandates histological diagnosis for further treatment. In some cases, Histopathological examination is performed after complete surgical excision of the mass for confirmation of the diagnosis and to decide about the additional course of treatment. Due to the common clinical presentation of inflammatory lesions, the histopathological examination is essential for proper management.[3] There are instances where malignant tumors of nose and sinuses show polypoidal features and can present like simple nasal polyps.[4]

Our study involved 120 cases of nasal mass, with a male predominance, with a male to female ratio of 2:1. Clinical studies on nasal mass lesions have shown that nasal mass lesions have a male preponderance.[5] Bakari et al. in a study from Nigeria found a predominance of females showing male to female ratio at 1: 1.2 and observed a higher incidence in the third decade of life. [6]

Nasal obstruction was the most common presentation (71.6%) in our study, followed by nasal discharge (20.8%), epistaxis and headache (11.6% each). Other symptoms were eye-related symptoms, neck nodes, and anosmia. In general, bilateral or unilateral nasal obstruction has been reported as a main presenting symptom, which is seen in more than 80% of the cases.[4,7] Clinically, most of our cases had a diagnosis of inflammatory, non-neoplastic lesions (78%), out of which 66% were inflammatory polyp. Benign lesions consisted of % of the study population, and 11% were diagnosed as malignant lesions.

On histopathological examination, neoplastic lesions made up 85% of cases, while 16% of cases were neoplastic lesions in our study, which is similar to most of the reports worldwide. The inflammatory polyp was the most common non-neoplastic lesion in our study. Among neoplastic lesions, 7% were benign, and 9% were malignant lesions. Gupta et al. studied 92 patients of sinonasal mass lesions and found that 74 cases were non-neoplastic, and 18 were neoplastic, comprising 12 benign and six malignant lesions.8 The inflammatory polyp was the most common histopathological diagnosis in our study; this was the commonest in most of the studies, with a share of 60-85% of the total cases.[4,9]

The clinico-histopathological correlation in our study was 92%. Interestingly, most of the studies done on the clinicopathological relationship of nasal mass lesions correlated by more than 95%.[10,11] Imaging modalities like CT scan points out the severity of the disease, involvement of adjacent structures and guides in diagnosis, planning the management. But we believe histopathology is the gold standard for diagnosis as one percent change in the clinical diagnosis, which makes a benign lesion into a malignant lesion, will change the plan of treatment. Sarkar et al. reported a series of six cases of nasal polyposis where the histopathological diagnosis was olfactory neuroblastoma, adenoid cystic carcinoma, basal cell adenocarcinoma, mucosal melanoma, primitive neuroectodermal tumor, and aspergilloma.[12] In our study, one of the 79 cases clinically diagnosed as nasal polyp had an underlying adenocarcinoma, which could have been missed if the histopathological examination was not performed. However, in the presence of characteristic clinical

features, a clinical diagnosis may be accurate, and necessary treatment may be initiated with pending histopathological confirmation, to avoid delay in initiation of treatment. Also, in some unique cases like Angiofibroma, a biopsy is contraindicated, and the diagnosis is purely based on clinical and radiological findings. Histopathological examination is possible only on completion of the surgical treatment.

The present study showed that inflammatory lesions were common in the second decade of life. Benign lesions were common in the fifth decade, and malignant lesions were common in the elderly. The inflammatory polyp is a common disease of the second and third decades of life.[3] Angiofibromais mostly seen in adolescent males. Only one case of Angiofibroma in our study was in the second decade. Olfactory neuroblastoma has a mean age of presentation of 30 years.[7] In our research, olfactory neuroblastoma was seen in elderly males.[7] In our study, one case of squamous cell carcinoma was observed in the sixth decade. We did not find any statistically significant difference in the occurrence of benign and malignant lesions in males and females.

Conclusion

The mass lesions in nasal and paranasal sinuses have diverse etiology. They present with overlapping clinical features, and sometimes it is challenging to differentiate neoplastic and non-neoplastic lesions. Due to the similarities in the initial presentation of non-neoplastic and neoplastic lesions, the diagnosis of a malignant lesion may be missed or delayed, which otherwise requires early intervention. In the presence of characteristic clinical features, accurate clinical diagnosis is possible in most cases, and appropriate surgical treatment can be performed without delay. However, histopathology of the resected specimen is essential to confirm the diagnosis.

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Main Article

Complications of Thyroidectomy in Hashimoto Thyroiditis vis-à-vis Benign Goitres

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ABSTRACT

Introduction

Surgery for Hashimoto thyroiditis (HT) can be difficult due to dense inflammatory process surrounding the gland and postoperatively patient can develop hypocalcaemia, recurrent laryngeal nerve injury, haematoma and infection. Purpose of this study was to compare the rate of post-operative complications in HT with that in benign goitres.

Materials and Methods

Data of the patients, who underwent thyroidectomy for benign goitres between January 2013 and December 2017, were reviewed retrospectively. Patients were divided in to two groups. Group A included patients confirmed to have Hashimoto thyroiditis (n=148) and Group B included patients who underwent thyroidectomy for other benign thyroid disorders (n=430).

Results

A total of 578 patients who underwent thyroidectomy for benign thyroid diseases were included in the present retrospective study. Group A consisted of 148 patients who had HT. Group B consisted of 430 patients who had other benign thyroid diseases. The data was analysed using SPSS 23 and p-value < 0.05 was considered as statistically significant. Patients undergoing thyroidectomy in HT had significantly higher post-operative complication rate (p<0.005). Of the 148 patients with HT, 31.6% (77) had hypocalcaemia while 68.4% (167) with benign goitres had hypocalcaemia. In addition, 51.8% of the patients in the HT group were later diagnosed with malignancy; there were no malignancies present in the group B.

Conclusion

Though patients with HT suffer higher rate of complications after thyroidectomy when compared to benign goitres, careful pre-operative planning and risk counselling of patients with improved surgical techniques helps to minimize postoperative morbidity.

Keywords

Hashimoto Thyroiditis; Goitre, Benign; Hemithyroidectomy; Hypocalcaemia

Thyroid disease is a frequently encountered endocrine disease in India.[1] Its incidence is very high. Thyroid diseases can be divided into benign and malignant types. Hashimoto's thyroiditis (HT) is one of the most common autoimmune diseases characterised by the production of antithyroid antibodies such as anti-thyroperoxidase (TPO) and anti-thyroglobulin antibodies (TG-Ab), that destroys the thyroid tissue leading to a decrease in the normal thyroid function.[2] Patients with HT who develop hypothyroidism are treated with thyroid replacement and surgery is rarely necessary.[3] Thyroidectomy in HT is not generally recommended because the inflammation that surrounds the gland can make the resection difficult , with excessive traction on the recurrent laryngeal nerve and injury to the parathyroid glands. Indications for surgery in HT include significant compressive symptoms, suspicion of malignancy and persistent symptoms associated with the disease.[2,3] Following thyroidectomy early, intermediate and late complications can occur and among them

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injury to recurrent laryngeal nerve, parathyroid gland damage, and post-operative haematoma are considered complications of technique.[4,5] Some thyroidectomies in conditions like hyperthyroidism, goitre and thyroiditis are more difficult to tackle and the degree of difficulty varies widely, and it is not easy to predict the level of difficulty preoperatively.[6] In HT patients the incidence of complications could be high due to adherence of the thyroid gland to its anatomical surroundings. The present study was undertaken to compare the postoperative complication rates after thyroidectomy in HT patients versus benign goitres.

Materials and Methods

In this study we retrospectively reviewed the data from patients who underwent thyroidectomy for benign goitres between January 2013 and December 2017 in a tertiary care Hospital. The Hospital is a teaching hospital affiliated with a Medical College. Institutional Ethics Committee clearance (IEC/CCM/447/2018) was obtained for waiver of consent as there was no contact between the researchers and patients, this being a retrospective study.

Patients who underwent total thyroidectomy were divided into two groups. Group A included patients confirmed to have Hashimoto thyroiditis (HT) on fine needle aspiration cytology and ultrasonography. Group B included patients who underwent thyroidectomy for other benign thyroid disorders. Patient data was searched for symptoms like compression in the neck, voice changes, and hormone imbalance. Other parameters assessed were pre-operative investigations, indications for surgery, type of surgery, complications and prevalence of malignancy. From the total of 578 patients included in the study, 148 patients confirmed to have HT on fine needle aspiration cytology and ultrasonography formed Group A. We compared this group with the remaining 430 patients who underwent thyroidectomy for other benign thyroid disorders (Group B). Only the patients who underwent total thyroidectomy were included in the study. Patients undergoing concomitant neck dissection, parathyroidectomy, and revision thyroidectomies were excluded. Patients having a preoperative diagnosis of thyroid cancer were also excluded. Vocal cord function was checked by laryngoscopy by an Otorhinolayngologist before surgery in all patients. A diagnosis of HT was done based on the presence of lymphocytic infiltration of stroma, Hurthle cell change of follicular epithelium on fine needle aspiration cytology in addition to serum thyroid hormone levels and ultrasonographic findings. A final histopathological evaluation was also considered in these patients. Thyroperoxidase (TPO) antibodies and antithyroglobulin antibodies were not measured in all patients; hence they were not taken into consideration. Post-operatively patients were evaluated for complications like hoarseness of voice due to recurrent laryngeal nerve palsy, hypocalcaemia, re-exploration, and infection. The results were expressed in percentages, proportions. The continuous data was presented as means and standard deviation. The student t test was applied to find out whether significant mean differences existed in ages of the patients who underwent thyroidectomy for Benign Thyroid disease and Hashimoto thyroiditis. The Appropriate tests of association like Chi square test were used to find out association of post-operative complications with the indications for thyroidectomy. The data was analysed using SPSS 23 and p-value < 0.05 was considered as statistically significant.

Results

There was no statistical significant difference in the age of patients between the two groups. The patients in our series ranged from 13-70 years with mean age of 45+10.5 years for group A and 46+11.7 years for group B. In both groups females were commonly affected. (Table I) While looking at postoperative complications we focussed mainly on hypoparathyroidism and hoarseness of voice due to recurrent laryngeal nerve injury. Of the 148 patients with HT, 31.6% (77) had hypocalcaemia; and 68.4% (167) with benign goitres had hypocalcaemia. (Table II) A range of 8.2-10 mg/dl of serum calcium was considered normal and less than 8.2 was considered as hypocalcaemia. The lowest recorded value was 5.4mg/dl in benign goitres and 6.8mg/dl in HT. Furthermore, one patient had vocal cord palsy in HT, whereas 3 patients had vocal cord palsy in

Table I: Demographics of HT patients compared to Benign Goitre patients

		BENIGN		HASHIMOTO'S	
		COUNT	N %	COUNT	N %
AgeGr	<=45	208	48.40%	67	45.30%
	>45	222	51.60%	81	54.70%
Sex	Male	59	13.70%	7	4.70%
	Female	371	86.30%	141	95.30%

benign goitres. One patient in Group B had developed haemorrhage and needed neck exploration. Hence when the complication rate was compared between the groups the p-value was found to be 0.005 which was statistically significant stating patients with HT had higher rate of complications. In addition, 48.1% (51) HT patients were diagnosed to have papillary carcinoma, 0.9% (1) patient had medullary carcinoma, and 2.8% (3) patients had follicular carcinoma on final histopathological evaluation. (Table III)

Discussion

Total thyroidectomy is an effective treatment for benign as well as malignant disease.

Articles by Kocher, Halsted, Lahey, Crile and Riddle have provided surgeons with principles that have significantly reduced the morbidity associated with thyroidectomy.[5,7] Patients with HT are managed either conservatively by medical management or surgically. Treatment generally depends on the presenting symptoms and thyroidectomy is considered for patients with symptoms like dysphagia, dyspnoea resulting from compression of oesophagus and trachea.[8] In addition, thyroidectomy can be considered when there are symptoms like pressure or pain in the neck with discomfort, hoarseness of voice and fluctuation between symptoms of hypothyroidism and hyperthyroidism and suspicion of malignancy.[9] However, thyroidectomy in HT is not usually recommended because the surgical resection is more difficult due to the dense inflammatory process that surrounds the gland, making complications like hypoparathyroidism due to trauma or disruption of blood supply to parathyroid glands and recurrent laryngeal nerve injury due to adherence of the gland, commoner.[2,10,11]

In a study by Catherine et al.[2] patients with HT were compared with those patients without HT with regard to outcomes. They reported that patients with HT had a higher rate of complications like transient (9.6%)

Table II: Hypocalcemia in HT patients compared to Benign Goitre patients

	CALCIUM		TOTAL
	NORMAL	HYPOCALCEMIA	
AgeGr	208	48.40%	67
	222	51.60%	81
Sex	59	13.70%	7
	371	86.30%	141
Total	334	244	578
	100.00%	100.00%	100.00%

Table III: Incidence of malignancy in the histopathology report in HT patients compared to Benign Goitre patients

	BENIGN THYROID DISEASE	PAPILLARY CARCINOMA	MEDULLARY CARCINOMA	FOLLICULAR CARCINOMA	TOTAL
Benign	430	0	0	0	430
	100%	0%	0%	0%	100%
Hashimotos's	51	51	1	3	106
	48.10%	48.10%	0.90%	2.80%	100%

and permanent (2.6%) hypoparathyroidism, permanent hoarseness(1.3%).There was no significant difference between two groups in the rate of malignancy. Of the 133 patients, 28 (21%) patients experienced postoperative complications; including three patients who had multiple complications and 2% of patients did not experience relief of preoperative symptoms after surgery. They also concluded that the presence of malignancy was not responsible for the difference in postoperative complication rates between HT and non-HT patients.

Mok et al.[6] used thyroidectomy difficulty scale to score the difficulty of thyroid operations. They compared difficult versus non-difficult thyroids. Their study showed that hyperthyroidism, elevated pre-operative thyroglobulin, antithyroglobulin antibodies and Grave's ophthalmopathy were associated with a more difficult thyroid surgery and more complications. Of the 189 patients, 40 (21.2%) experienced postoperative complications like hoarseness of voice (6.9%), hypoparathyroidism (23.3%). However, these measures of difficulty may not apply to all surgeons, especially those with lower thyroidectomy volumes. Manus et al.[9] performed a study in which they identified patients diagnosed with HT with significant preoperative symptoms who were evaluated for improvement or relief of symptoms postoperatively. The study showed compression as the most common symptom at a frequency of 63%; and 93% of the patients experienced post-operative relief. Though there were some patients with transient complications, which resolved within 6 months, overwhelming majority of symptomatic patients experienced benefit from thyroidectomy.

Shih et al.[12] retrospectively evaluated HT patients who underwent thyroidectomy for indications like thyroid cancers, benign thyroid nodules and relief of local symptoms. Of the 474 patients, 53% had thyroid cancer at final histopathological examination. 32.1% had transient postoperative hypocalcaemia, 0.4% had transient recurrent laryngeal nerve palsy, and 0.8% had a postoperative neck haematoma. No death or permanent surgical complications were seen. Hence, they concluded that thyroidectomy can be performed in patients with HT with a low risk of permanent surgical complications. In addition, they also found that cancer was also common in patients with HT even when not suspected preoperatively.

The purpose of the present study was to compare the postoperative complications among HT and benign goitres after thyroidectomy. Majority of the patients were females in both the groups. As studies[2,6,12] show that complication rate among HT is higher, our study too showed a statistically significant difference (p value 0.005) in HT patients having higher rate of complications especially hypocalcaemia.

The findings of the present study suggest that thyroidectomy in HT is warranted in view of the hidden malignancy which may not be picked by fine needle aspiration cytology. Shih et al[12] reported that 7 (28%) of 25 patients who underwent surgery for thyroiditis alone had an incidentally discovered cancer, suggesting that cancer is common in patients with HT even when not suspected preoperatively. Our study too had a higher positivity for malignancy in the final histopathology which was not suspected preoperatively. 48.1% (51) patients had an association with papillary carcinoma. The present study had some limitations. This being a chart-based study, we were unable to know whether

the complications were transient or permanent. Not all patients had details of anti-TPO and anti-thyroglobulin antibodies as some were evaluated on outpatient basis and hence details were missing in the charts. Risk of complications depends upon extent of thyroid gland resection, which can be minimized with experience and appropriate technique. Time taken for these surgeries may be a little longer and needs planning. Though thyroidectomy is not mandatory in HT, it must be considered in specific cases.

Conclusion

In the present study, patients with HT undergoing thyroidectomy had a significant higher rate of postoperative complications compared to benign goitres. However, though thyroidectomy is technically more demanding in HT a careful preoperative planning with patient counselling regarding risks of surgery needs to be considered. Another advantage of surgery would also be reducing long-term risk of malignancy. Hence it is evident that thyroidectomy in HT requires an experienced and skilled surgeon with improved surgical techniques to minimize postoperative mortality and morbidity.

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Study on Satisfaction Levels among Hearing Aid Users in Gangetic Plains

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ABSTRACT

Introduction

Outcome assessments have emerged as an effective method for determining whether or not hearing aids are working to achieve positive results in rehabilitating the hearing impaired. Present study aims to assess the satisfaction level of clientele using hearing aids.

Material and Methods

One hundred and fourteen (114) hearing handicapped patients, fitted with government-provided hearing aids at various clinics spread over Gangetic plains were included in this prospective observational study for outcome analysis. Follow up was done at 2 weeks and 45 days when they were further motivated to continue using the aid, comfortable fitting of mould was ensured along with minor trouble shooting. Four and half months later, their satisfaction level was assessed by analysing their response to Clientele Satisfaction Questionnaire.

Results

Fifty percent of the patients were motivated by their family members to try the aid whereas 50% were self motivated. Better communication with family members and immediate social circle was the common motive. Majority (85%) reported high level of satisfaction in terms of hearing benefit. Patients with severe degree of hearing loss were more satisfied and used the aid for longer duration in a day. Handling the aid was not as much of a problem as tolerating the noise produced by aid itself. Cost of battery was a concern for 80% of our clientele.

Conclusion

Proper fitting of hearing aid improved the quality of life of majority of our hearing handicapped clientele by overcoming their psychosocial problems.

Keywords

Outcome Assessment; Hearing Aids; Personal Satisfaction; Surveys and Questionnaires; Quality of Life; Hearing Loss, Sensorineural

In the current consumer-driven era of health care, health professionals need to be able to demonstrate, to both the community and resource providers, that the services they provide have a positive impact on their clients' functional status and quality of life.[1]

In audiological rehabilitation settings, outcome measures have emerged as effective method for determining whether or not specific interventions such as hearing aids (HA) are working to achieve positive results for clients.[2]

A study was hence undertaken to evaluate the outcome of fitting of hearing handicapped patients from Gangetic plains with HA by assessing their satisfaction level regarding hearing benefit and betterment of quality of life.

The aim of the study was to assess the satisfaction level of consumers using HA. The objectives were (a) to assess the benefit of HA use (b) to assess the constraints in using the HA and (c) to assess the difficulties in using HA.

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Materials and Methods

The study design was a prospective observational study for outcome analysis. It was conducted in a tertiary care ENT centre of Armed Forces Medical Services of India over 2 years (Sep 2016 to Sep 2018). Participants of the study were selected from the population of hearing handicapped patients who had been fitted with a government-provided HA at various clinics spread over Gangetic plains of India. They included serving soldiers and their dependents as well as veterans and their dependents. All participants were fitted with HA according to Govt. of India guidelines for issue of hearing aids.

The patients with hearing loss of more than 40 dB at frequencies 500Hz to 4000Hz or with sensorineural hearing loss (SNHL) equal to or worse than 30 dB in their better ear (averaged over 500, 1000, 2000 and 4000 Hz), willing to use HA and be a part of the study and also capable of responding to written questionnaire by themselves or by assistance were included in the study. The patients with middle ear disease, fluctuating or rapidly progressing hearing loss and with the history of previous HA use were excluded from the study.

HA type or their technological features were not considered as confounding factors in this study because they were similar for majority of the subjects. HA fitting and follow up process typically involved at least 4 sittings:

1. While prescribing the type of HA, the initial assessment steps included ascertaining the severity of hearing loss, diagnosing the type of hearing loss, determining the patient's listening needs, discussing the patient's job requirement, examining the special needs of the patient and gauging the patient's dexterity to handle the hearing aid.

2. HA was selected based on the above five factors. The patient was then made to wear the selected types of HA of different make and model which satisfy his/her listening needs. Selected types included Behind the ear, (BTE), In the canal (ITC) or Completely in canal (CIC). The patient was subjected to one to one conversation, group listening, crowd exposure and watching television. The one which gave maximum hearing benefit and minimum discomfort under the given circumstances was finally chosen. The impression of the contour of patient's external auditory canal was taken for making the ear mould for the chosen aid.

3. HA fitting involved a well designed process including fitting the HA with its ear mould, achieving appropriate amplification through the use of coupler measurement, real ear insertion gain and by measuring the aided response, educating the client in how to manage and care for their HA and providing the patient with an appropriate listening program to meet goals established in the prior appointment.

4. Follow up: First follow up at two weeks was done for motivating the patients to continue using HA and ensuring comfortable fitting of the mould. Second follow up, was done one month after the first one, i.e. 45 days after the HA fitting. It was done to further motivate them to continue using the HA and any other minor trouble shooting if necessary. During the third follow up, four and half months after HA fitting, their satisfaction levels were assessed by asking them to complete the Clientele Satisfaction Questionnaire. Literate individuals completed the questionnaire themselves. Illiterate individuals were assisted by one of the close family members.

Table I: Age and gender distribution

AGE GROUP (YEARS)	01-05	06-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	TOTAL
Male	6	0	0	1	2	0	16	33	8	66
Female	2	1	0	1	0	2	13	29	0	48
Number	8	1	0	2	2	2	29	62	8	114

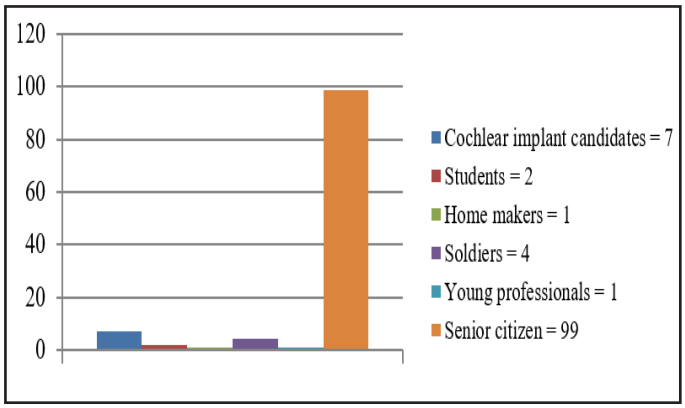

Fig. 1. Distribution of individual status

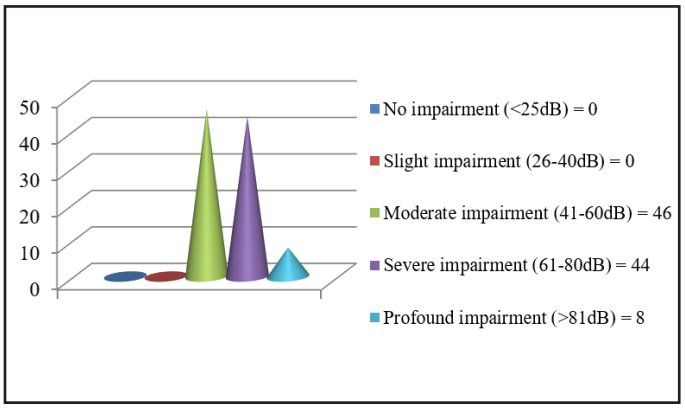

Fig. 2. Distribution as per degree of hearing impairment

Results

Total of 114 patients were fitted with HAs. Majority were in the age group of 61 to 70 years and were suffering from Presbyacusis. There were 66 males (58%) and 48 females (42%). (Table I)

Cochlear implantation candidates were 7 in number and were excluded from the study because questionnaire was not suitable for them. Nine patients were lost to follow up; one soldier was transferred out to a North Eastern state, 3 patients died of old age and another 5 were not traceable after fitting the aid, thus making the final count of participants 98 (n=98). (Fig. 1)

Grade of hearing impairment based on corresponding audiometric ISO values in decibel on four frequency average of PTA. (Fig. 2)

To the question as to why they needed HA, majority wanted ease in talking to family members and on telephones, watching television and socializing in their limited social group. (Fig. 3)

Fifty percent individuals were self motivated whereas equal percentage were motivated and nudged by others to try the aid. All of them were satisfied with the standard of trial done before fitting the HA. Almost all of them admitted that the price of battery is high though majority were prepared to bear the cost. Majority (71%) were using the HA for less than 6 hrs. Younger individuals, because of their need, were using the hearing aid for more than 12 hours. Twenty patients with severe hearing impairment used the aid for 6 to 12 hours. (Fig. 4)

All the patients wanted their hearing aid to be checked for its noise and 18 of them wanted reduction of the

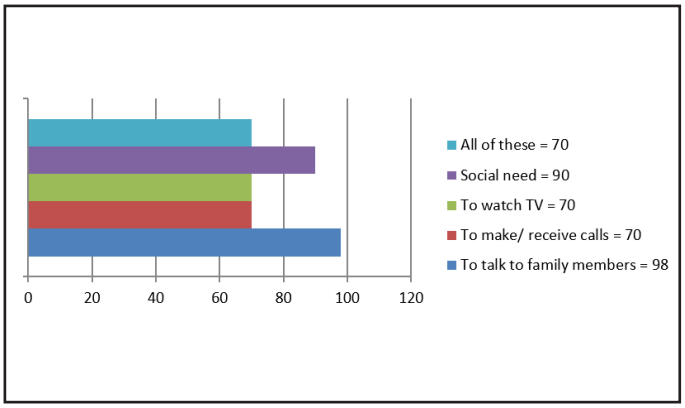

Fig. 3. Perceived need for HA use

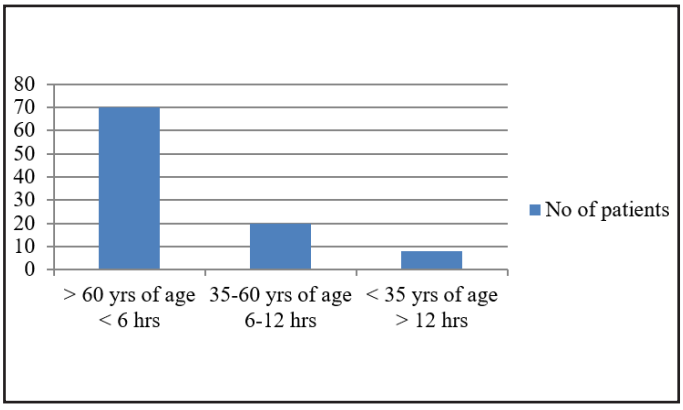

Fig. 4. Duration of use of HA by different age groups

Table II: Perceived benefits of HA use

BENEFIT OF USING HA	DEGREE OF BENEFIT			
Talking to family members	Excellent	Good	Satisfactory	No benefit
making/receiving telephone calls	Excellent	Good	Satisfactory	No benefit
Watching TV	Excellent	Good	Satisfactory	No benefit
Conversation in small groups	Excellent	Good	Satisfactory	No benefit
Hearing in crowd	Excellent	Good	Satisfactory	No benefit
Hearing in place of worship	Excellent	Good	Satisfactory	No benefit
n	9	17	59	13

ambient noise. Apart from 13 patients who reported no benefit from using the aid, others did not complain of any deterioration in the functioning of the aid over 4 months and they were ready to motivate other hearing impaired individuals to use the HA.

Hearing benefit for various important common activities was compared between individuals in the scale of their response as excellent, good, satisfactory and no benefit. (Table II) Most of them were only 'just' satisfied with their accrued benefit.

The difficulties faced by the patients in handling the aid, problems with mould, its noise and echo were also assessed. (Table III) Biggest irritating factor was found to be the whistling noise produced by the hearing aid.

Many of them were not conversant with the features of the HAs they were fitted with. The first follow up after 2 weeks of fitting the aid was most helpful in making them more aware about features. Many of them were not satisfied with noise cut which needed fine tuning but majority of them expressed dissatisfaction with the battery life. (Table IV)

At the end of survey, when asked whether use of HA has improved their quality of life (QOL) or not, 83 of them (85%) replied in affirmative, though only 64 (65%) found the change appreciably good. 15 reported no change in QOL, 19 reported change less than expected, 55 reported change as per their expectation and 9 had change in QOL beyond expectation.

Discussion

HA benefit is broadly defined as the reduction in disability or handicap caused by a hearing loss (e.g., improved communication ability, increased participation in social activities) following amplification and/or aural rehabilitation.[2]

HA benefit assessment may be subjective or objective. Objective way to assess is by comparing the aided and unaided speech reception thresholds and

Table III: Perceived difficulties of HA use

PROBLEMS FACED WITH HA	FREQUENCY OF PROBLEMS		
Wearing and removing it	Always	Sometimes	Never
Handling the controls	Always	Sometimes	Never
Problems with mould	Always	Sometimes	Never
Noise of the aid itself	Always	Sometimes	Never
Echo of own voice or swallowing	Always	Sometimes	Never
n	17	72	9

Table IV: Satisfaction level with the technical features of HA

FEATURES OF HA	SATISFACTION LEVEL		
Amplification	Amply satisfied	Satisfied	Not satisfied
Noise cut	Amply satisfied	Satisfied	Not satisfied
Clarity	Amply satisfied	Satisfied	Not satisfied
Direction sense	Amply satisfied	Satisfied	Not satisfied
Warranty	Amply satisfied	Satisfied	Not satisfied
Battery life	Amply satisfied	Satisfied	Not satisfied
n	19	66	13

speech recognition ability. Subjective way to assess is by analysing the response of the users as individual self reports. The degree to which a given hearing loss affects an individual's life is related to his lifestyle, occupation, academic concerns, psychological factors, etc. Hence, the hearing loss on audiogram may not always correspond to the degree of handicap experienced by the patient. Objective tests are done with a predefined external standard and are almost exclusively done in a laboratory which often fails to simulate realworld listening situations.

On the other hand, each individual harbours different expectations from the HA fitting. Hence, self report measures address the unique needs of all individuals and have become the new "gold standard" for measuring and reporting success.[3] In the present study, outcomes were measured based on subjective levels of hearing satisfaction with respect to the clientele expectation, hours of daily use, benefit reaped, problems encountered, familiarity with the technological features and the change in the quality of life. Participants were predominantly fitted with digitally programmable HAs; monoaural BTE in cases of presbyacusis, binaural BTE in cases of soldiers and students, binaural ITC/CIC in young professionals and home makers.They were surveyed four and half months after fitting of HA.

Daily HA usage duration is important for adaptation to the device and hence success of its Application.[4] The use of the HA for more than 4 hours a day is associated with significantly higher International outcome inventory for hearing aids (IOI-HA) scores, and individuals who use the HA more report greater benefits.[5] In the present study, younger participants, primarily because of their needs, used the HA for more duration but at the same time they also reported excellent benefit. This was in contrast to the reports of study by Cox & Alexander[2] and Jerram & Purdy.[6]

Individuals pursuing academics, managing domestic responsibilities, soldiers in active service and upwardly mobile professionals spelled out their obvious needs to overcome hearing disability. In elderly clientele, talking to family, interacting in close social circle, having telephonic conversation and watching television were the primary needs in order of priority to opt for HA.

The clientele's perceived benefit in their common domestic and social needs was assessed by an open-ended problems questionnaire, to which 85 (87%) reported satisfactory benefit whereas 26 (27%) reported good to excellent benefit. Most studies have found HAs to be beneficial. Bhat et al[7] have reported 74% satisfaction level in a smaller sample size of 68 subjects whereas Kochkin[8] and Bertoliet al[9] have reported up to 80% in studies involving large samples consisting of 3174 and 8707 participants respectively.

This study revealed that only 9% individuals denied facing any difficulty with the device. Majority, 72% sometimes and 17% always, did complain about some problems with the device; the background noise and mould discomfort being the most common ones. Bhat et al[7] reported that background noise (14%) and difficulty in use with telephone (13%) were the most common confounding factors in the use of HAs. Köjbleret al,[10] have also reported that 16% of their subjects reported background noise as troublesome and 14% reported

ear mould discomfort. Disturbing background noise and wearing discomfort have been reported as the most common cause of non-use by Bertoliet al.[9]

It is important to make every beneficiary aware about the technological features of the HA prescribed to him/her. The clientele uses the device more often and for longer duration and also takes more care of the device if he is conversant with the features. The knowledge makes him seek consultation as and when he encounters dissatisfaction with amplification, clarity, noise cut, directionality, battery life or warranty. In this study 13% were not at all satisfied with the features, they always faced difficulty in handling the aid, reported no benefit with its use and hence seldom used it.

Majority of hearing aid users in this study reported significant satisfaction level after fitting a hearing aid. An improvement in the listening power due to enhanced amplification, by itself, was not sufficient to make a client completely happy. Improved hearing ability, suitable sound quality, device reliability, usefulness in multiple listening environments, post-purchase service, and mould comfort were found to be more important factors influencing clientele satisfaction.

Conclusion

Majority of users reported significant satisfaction level with hearing aid. An improvement in the listening power due to enhanced amplification, by itself, was not sufficient to make a client completely happy. Improved hearing ability, suitable sound quality, device reliability, usefulness in multiple listening environments, post-purchase service, and mould comfort were reported to be more important factors influencing clientele satisfaction.

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In Saving the Canal Wall, can MERI and Otoendoscopes Help Take a Call?

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ABSTRACT

Introduction

The study was aimed to find out whether any correlation exists between Middle Ear Risk Index (MERI) and the diagnostic ability of otoendoscopes to help in the decision making to preserve the posterior canal wall in management of cases of chronic otitis media(COM) squamous type.

Materials and Methods

Patients of chronic otitis media squamous active type were subjected to tympanomastoid surgery under the microscope and adjunctive use of otoendoscope. After proper disease clearance under microscope, otoendoscopes were taken as an adjunct to find out whether any residual disease was being left behind and to confirm whether the posterior canal wall could be preserved. Dubious cases in which the canal wall could be saved due to conclusive evidence of disease removal through the endoscope were taken as the ones being influenced by otoendoscopic decision-making.

Results

Patients having moderate MERI score were likely to have their canal walls spared by endoscopic evaluation.

Discussion

The percentage of residual disease detected with otoendoscopes were concurrent with other studies reporting similar figures.

Conclusion

The otoendoscope is decidedly more helpful in conclusive decision making in preserving the posterior canal wall in a case of chronic otitis media.

Keywords

Endoscopy; Mastoidectomy; Cholesteatoma, Middle Ear; Decision Making

A huge number of tympanomastoid surgeries are performed every year all over the world, for the treatment of chronic otitis media. The operating microscope is the accepted standard for these surgeries. It has conventionally been the binocular vision microscope that helps in delineating the middle ear structures, presence of disease in the middle ear, and to decide pre and intra operatively, the extent to which a surgeon will make his manoeuvres within the restricted space of the middle ear cleft to make it disease free. But due to the intricate anatomy, along with numerous anatomical variations within this minute space, many structures cannot be seen at all, or, necessitates another instrument that can help to 'look around corners'. The availability of otoendoscope has broadened the surgeon's repertoire, helping him take a closer look at the middle ear, by various degrees of vision. But it is not routinely used by otosurgeons despite coming into existence in 1967.[1] Otoendoscope is used in 25% of ear surgery cases in Japan (2016).[2] A Canadian survey (2016) had shown 42% of surgeons use otoendoscope as an adjunct in cholesteatoma surgery.[3]

Chronic otitis media active squamous type can

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present with or without frank cholesteatoma and tympanomastoidectomy remains the treatment of choice. The surgery can be broadly classified as canal wall up and canal wall down surgery. The problems of a canal wall down surgery are well known and they include perpetually discharging ear, cosmetically unacceptable, doctor dependency, water sports prohibition and difficulty in fitting hearing aids. Although several techniques have been described in literature to reconstruct the posterior canal wall, physiologically the best possible result is obtained when the posterior canal wall is kept intact. In the present study, we tried to analyse the utility of otoendoscopes in saving the posterior canal wall in patients of chronic otitis media squamous active type and to gauge the disease severity at which otoendoscope usage was likely to be the most beneficial in taking the decision to save the wall.

The aims of this study were to find out whether otoendoscopes can be used for decision making to preserve the posterior canal wall and also to find out the disease severity (using the MERI score) in cases where otoendoscopes are likely to be the most decisive to save the posterior canal wall. Middle Ear Risk Index[4] (MERI) was devised by Kartush in 1994 to prognosticate the severity of disease affecting the middle ear and was later modified by adding smoking as a risk factor by Becvarovski & Kartush[5] (2001). (Fig.1) The highest possible score is 16. MERI can be categorised into mild MERI (0-3), moderate MERI (4-6), severe MERI (≥7). [6]

Risk factor	Risk value
Otorhhea (Belucci)	
I- Dry	0
II- Occasionally wet	1
III- Persistently wet	2
IV- Wet, cleft palate	3
Perforation	
None	0
Present	1
Cholesteatoma	
None	0
Present	2
Ossicular status (Austin/Kartush)	
M+I+S+	0
M+S+	1
M+S-	2
M-S+	3
M-S-	4
Ossicular head fixation	2
Stapes fixation	3
Middle ear granulations or effusion	
No	0
Yes	2
Previous surgery	
None	0
Staged	1
Revision	2
Smoker	
No	0
Yes	2

Fig. 1. MERI score

Materials and Methods

A prospective analytical study was conducted at a tertiary care centre for 18 months with a study population of 42 patients. Minimum age of the patients was 10 years while the maximum was 60 years. (Mean - 33.9 ± 14.04 years)

All patients diagnosed having chronic otitis media squamous active type undergoing tympanomastoid surgery were included in the study, while patients with known complications of COM, and those undergoing revision surgeries were excluded.

After a thorough history taking and clinical examination, patients were subjected to tympanomastoid surgery. All the surgeries were conducted by the same team of surgeons. MERI score of all patients were recorded. All cases were proceeded with a postauricular incision and a cortical mastoidectomy (posterior-to-anterior bony approach). The patients were operated primarily under the microscope. Adjunctive otoendoscopic evaluation was done when disease removal/surgical dissection was deemed complete under the microscope (0 & 30 degree endoscopes used as per need). Main areas where

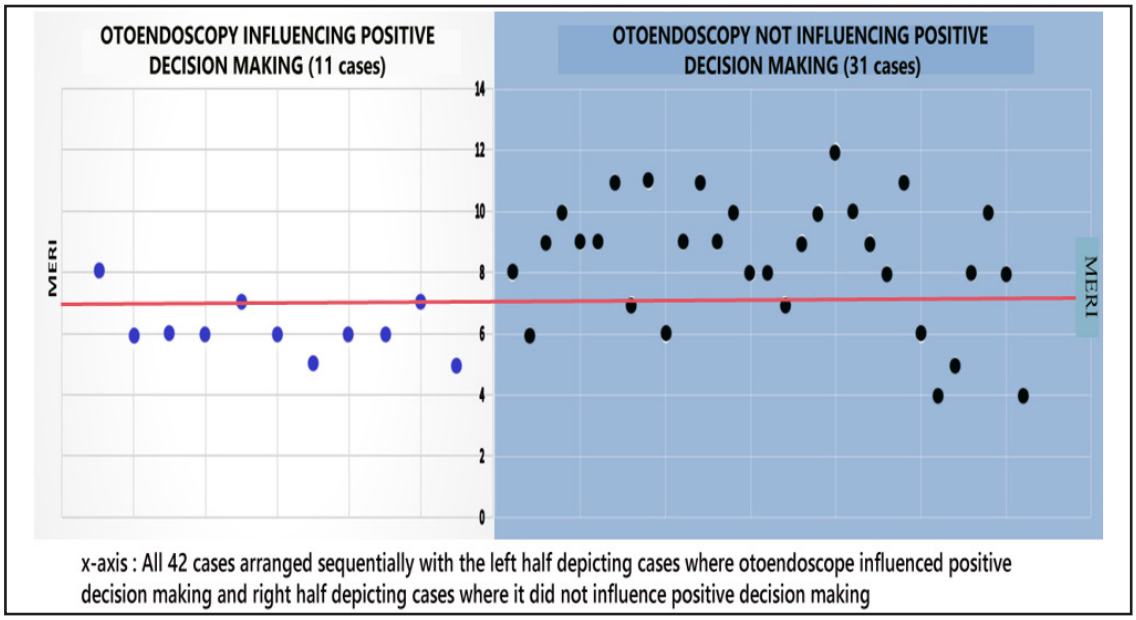

Fig. 2. All 42 cases plotted against their MERI scores. x-axis represents the 42 cases arranged serially, y-axis represents the MERI score. Left side of the chart has the cases where otoendoscopy helped in positive decision making. Right side of chart shows cases where otoendoscopy did not help positive decision making. Red line through MERI score 7 demonstrates that most cases where otoendoscopy had a positive influence in decision making had MERI<7.

otoendoscopes were utilized were aditus ad antrum, anterior epitympanum, sinus tympani, facial recess, eustachian tube opening and supratubal recess. (Fig. 3 & 4) Otoendoscopy influencing the definitive decision making positively were the cases where the posterior canal wall could be spared after visualization through the otoendoscope, which would not have been done/or would have been done differently, if the evaluation was made under the microscope only. This was decided by looking at the extent of canal wall erosion, presence of

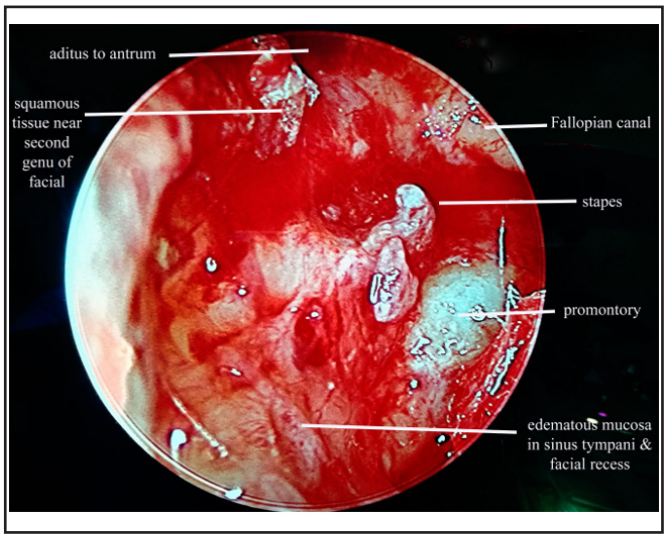

Fig. 3. Retrotympanum with an angled scope

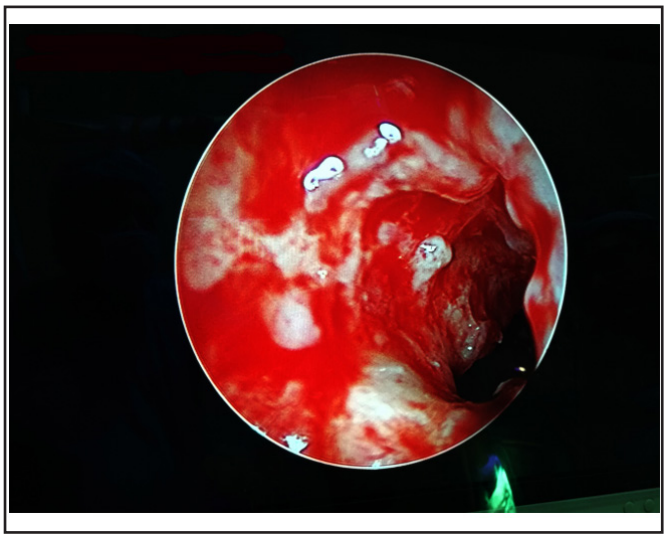

Fig. 4. View of the aditus from the mastoid cavity side

Table I : MERI scores and the number of canal wall up and canal wall down surgeries (CWU= Canal wall up, CWD= Canal wall down)

MERI SCORE	CWU MASTOIDECTOMY (N1 = 16)	CWD MASTOIDECTOMY (N2 = 26)	TOTAL (N = 42)
04-Jun	12	1	13
≥7	4	25	29
Total	16 (38%)	26 (62%)	42(100%)

squamous epithelium in hidden areas which could be removed after being detected with the endoscopes but were not seen by the microscope.

Despite the use of otoendoscopes, in many of the cases, the canal wall was already eroded to a large extent which precluded any canal wall preservation surgery. Hence, these cases were considered in the group where otoendoscopy did not help save the canal wall. In some cases, the extent of disease was such that despite otoendoscopic evaluation, complete disease exenteration could not be guaranteed with a canal wall in place as instrumentation was too difficult in those narrow confines. In these cases, otoendoscopy made us decide to remove the canal wall, but those cases were not considered as positive decision making in terms of canal preservation in this study.

Results

Out of total 42 patients, 13 patients had a moderate MERI score (MERI 4-6), while 29 patients had a severe MERI score (MERI (≥7). (Table I) Among all the patients, 16 patients had a canal wall up mastoidectomy while 26 patients had a canal wall down mastoidectomy, which was determined by the extent of complete disease removal under the microscope and confirmed by the otoendoscope.

In our study, all the 26 patients of canal wall down mastoidectomy were considered to be the ones where otoendoscope did not have a positive decision making role to spare the canal wall. Out of the remaining 16 cases of canal wall up surgery, in 5 cases, the canal wall would have been spared even without the use of otoendoscopes. In the remaining 11 cases, there were doubts regarding the feasibility of keeping the posterior canal wall intact as adequate disease removal could not be ensured under the microscope. This is because, squamous epithelium remained in the sinus tympani or facial recess or on the medial aspect of the aditus despite adequate bone removal and rectilinear vision under microscope could not afford adequate visibility even after rotating the microscope or the patients' head in various angulations.

These are the cases where the otoendoscope played the positive decision making role, as the canal wall could be spared conclusively after endoscopic evaluation. Thus, in 11(26%) of 42 patients, otoendoscopy helped in positive decision making to save the canal wall, while in the remaining 31 cases, it did not help. Plotting the cases on a chart showed that in 8 of the 11 cases where the otoendoscope had a positive decision making role to save the canal wall, the MERI score was between 4 and 6 (moderate MERI). (Fig. 2)

Applying Fisher's exact test, p-value was calculated as 0.0012, which was a statistically significant figure. (Table II) So, it was observed that patients with moderate MERI score are the ones in which otoendoscope helps in decision making to preserve the posterior canal wall.

Amongst the areas where residual cholesteatoma was found after extensive dissection and disease clearance under the operating microscope, sinus tympani harboured the most (12 cases-29%), followed by facial recess (6 cases- 14%) and anterior epitympanum (4 cases- 10%).

The patients were followed up for an average of 6 months. Out of the 16 cases of canal wall up mastoidectomy, 1 case each had graft medialisation and prosthesis extrusion. Out of 26 patients of canal wall down mastoidectomy, disease recurrence occurred in 1 case, which could be confirmed by examination under microscope and otoendoscopy.

Table II : MERI scores and the number of cases where otoendoscope helped to preserve the canal wall. In 11 cases, otoendoscope helped to preserve the canal wall. The 31 cases where otoendoscopy did not help in positive decision making included the 26 cases of canal wall down surgery as well as 5 cases of canal wall up surgery which could have been decided with microscope only.

MERI SCORE	OTOENDOSCOPY INFLUENCING DECISION MAKING TO PRESERVE THE CANAL WALL		P- VALUE
	YES	NO	
04-06	8	6	0.0012
≥7	3	25	
Total	11	31	

Discussion

Otoendoscope is a tool which is sparingly used globally despite its advantages being well known globally. It can be helpful in taking the decision to spare the posterior canal wall in case of chronic otitis media squamous active type, as was evident in our study where in 11 (26%) cases, the canal wall could be spared after endoscopic assessment of the surgical field after disease clearance under the microscope. Residual disease clearance can be done with the help of otoendoscopes. The figures of residual disease detected in our study concur with those by figures reported by other workers, namely El Meselaty,[7] Presutti,[8] Ayubi,[9] Ayache,[10] Elfeky,[11] le Nobel.[13]

Our study had a few limitations. Firstly, it was a relatively small study sample of 42 patients. We proceeded with a canal wall up mastoidectomy in all patients, thus keeping the bony approach from posterior to anterior. The anterior to posterior bony approach, i.e. inside out mastoidectomy technique was not explored in this study. No mild MERI score patients were there in our study. Hearing mechanism reconstruction was not assessed, as keeping the posterior canal wall intact and complete disease removal was the prerogative of this study. Minimally invasive second look surgery not performed. However, a study by Shelton et al.[12] showed that due to better quality excision of disease under the endoscope in the initial surgery, residual lesions appeared as small pearls in the second look surgery which were easy to manage and need not be removed. Additionally, Ayache et al. had stated that better endoscopic clearance at the first surgery can reduce the requirement of a second look surgery.[11]

Conclusion

Adjunctive use of otoendoscopes in mastoid surgery should be considered. Otoendoscopes can be decisive in preserving the posterior canal wall in a case of chronic otitis media. Cases with moderate MERI score are the ones most likely to benefit from otoendoscopic decision making to preserve the canal wall (more specifically, patients with MERI score 6-7 were found to be the ones where otoendoscopy was most decisive). Finally, where they are not helping in the decision making, otoendoscopes still allow residual disease removal from hidden recesses of middle ear and enable the surgeon have more confidence in complete disease clearance.

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The Use of Serial Non EPI DWI MRI Scans to Determine the Growth of Cholesteatoma

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ABSTRACT

Introduction

It is an established practice to use non-EPI DWI MRI scans to detect the presence of cholesteatoma post operatively. In the present era of Covid-19 where routine surgery to remove cholesteatoma has been suspended resulting in potentially unprecedented demands on the service, a review of serial MRI scans performed over a 7 year period was undertaken to determine the rate of growth of cholesteatoma.

Materials and Methods

A retrospective longitudinal study identified 24 middle ear cholesteatomas in 17 patients with serial non-EPI DWI MRI scans (having excluded those having surgical intervention between scans) for a median period of 33 months (range of 6-91 months). Cholesteatomas were measured by the first author and by the consultant radiologist.

Results

Of 24 cholesteatomas, 1 resolved completely, 5 reduced, 6 stayed the same size, 4 grew slowly and 8 grew significantly.

Conclusion

Non-EPI DWI MRI scans to determine cholesteatoma growth in asymptomatic ears is useful in triaging patients in the Covid-19 era.

Keywords

Cholesteatoma; Diffusion Magnetic Resonance Imaging; Echo-Planar Imaging; COVID-19

Middle ear cholesteatoma is mainly diagnosed clinically and the gold standard treatment is surgical removal of the disease. High-resolution computed tomography (HRCT) scan of the temporal bone provides useful information on the anatomy and location of potential disease but it is unable to differentiate cholesteatoma from cholesterol granuloma, fluid or other non-cholesteatoma soft tissue.[1] The use of the canal wall-up approach to the surgical management of cholesteatoma or cartilage and hydroxyapatite granules to obliterate cavities prevents the detection of residual cholesteatoma clinically following surgery. It is now an established practice to use non-EPI DWI MRI scans to detect the presence of cholesteatoma post operatively with studies even reporting sensitivity and specificity of up to 100%.[2-6]

In the present era of covid-19 where routine surgery to remove cholesteatoma has been suspended resulting in potentially unprecedented demands on the service, a review of serial MRI scans performed over a 7 year period was conducted to identify the behaviour with specific reference to the rate of growth rate of middle ear cholesteatoma. This was to determine whether all cholesteatoma requires surgical removal and secondly a means to prioritise cases for surgery particularly during a pandemic crisis.

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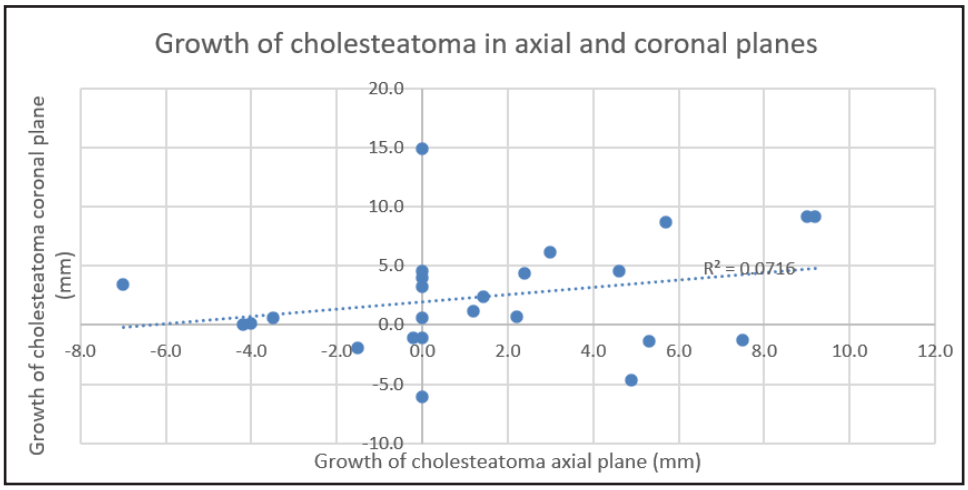

Fig. 1. This demonstrates a poor relationship of the growth of cholesteatoma when comparing the change in the maximum dimension in axial and coronal planes in serial MRI scans

Materials and Methods

A retrospective longitudinal study of patients under the care of the first author who had had serial non-EPI DWI MRI scans between 2015 and 2019 were identified. The cholesteatomas in patients who had had surgical intervention on the ear between the serial scans were excluded. 20 cholesteatomas were detected on post-operative scans; 4 cases occurred in non-operated ears. Some patients who had cholesteatoma detected in otherwise asymptomatic ears elected to be managed conservatively with serial MRI scanning. They declined surgery due to the potential risks of surgery or personal circumstances whilst 2 were deemed medically unfit for surgery.

There was a total of 24 cholesteatomas in 23 ears in 17 patients. There were 10 males, 7 females. The age range was 10-72 years (3 were children) with median age of 32 years. All ears were examined under the microscope and an attic pocket was found in 6; 4 representing recurrent disease but in 2 this was new disease in a non-operated ear. The remaining 18 cholesteatomas were found in asymptomatic ears with no obvious cholesteatoma. The median period for monitoring was 33 months with a range of 6-91 months. All had at least 2 serial non-EPI DWI MRI scans.

The MRI scans were evaluated independently by an experienced head and neck consultant radiologist and the consultant otologist. Cholesteatoma was diagnosed in the presence of restricted diffusion on non-EPI DWI sequence and a low signal intensity on ADC mapping. The size of the cholesteatomas was independently measured as per the usual practice by the otologist (maximal dimension in mm, using images taken in the coronal plane) and by the radiologist (largest axial dimension in mm) to predict the growth behaviour of the cholesteatomas.

Results

Table I shows the serial measurements (in mm) of the largest diameter of the cholesteatomas in the coronal and axial planes with the interval between the scans in months.

Fig. 1 demonstrates that there appears to be very little correlation (R2= 0.0716) between the growth behaviour of cholesteatomas based on the maximum dimensions obtained for each cholesteatoma when measured in the axial and coronal planes which is also seen in Fig. 2. Despite this, 7 of 24 cholesteatomas were assessed as behaving in the same manner by the radiologist and otologist and in 9 of 24 cholesteatomas to within 1 group (defined by an increase >4mm, a small increase of >1mm but<4mm, the same -1mm to+1mm, a small decrease >-1mm to <-4mm, a decrease >4mm, resolved) of each other. The overall growth in the

Table I: Maximum diameter of cholesteatoma in coronal and axial planes

OP TO INITIAL SCAN (MO)	MAX COR INITIAL SCAN	MAX AXIAL INITIAL SCAN	INTERVAL INITIAL TO 1ST FU SCAN (MO)	MAX COR 1ST FU	MAX AXIAL 1ST FU	INTERVAL 1ST TO 2ND FU SCAN (MO)	MAX COR TO 2ND FU SCAN	MAX AXIAL TO 2ND FU SCAN	INTERVAL 2ND TO 3RD FU SCANS	MAX
25	7.2	2	6	11.2	2					
No op	5.8	3.7	6	3.9	2.2					
12	10	2.3	11	7.7	4.2	15	8.6	7.6		
12	4.7	4.2	8	3.6	4					
4	0	2	21	4.7	8.2	7	4.4	4.4		
24	3.3	2.8	18	4	5					
11	4.1	2	18	3	2					
17	5.6	3.5	7	6.2	4.9					
12	9.7	0	25	8.4	7.5					
11	7.9	4.2	7	7.9	0					
9	0	0	7	4.6	4.6					
27	4.7	3.2	13	12.2	8.1					
3	0	0	21	9.6		10	4.6			
No op	0	0	25	0	0		14.9			
13	4.1	4	10	4.2						
16	6.7	4.6	22	15.4	10.3					
10	6.1	0	27	0	0					
27	5.4	3.5	14	4.6	3.9	19	6.6	4.7	31	4.2
17	0	0	8	5.6	3	41	9.2	9.2		
No op	0	0	8	0	0	41	3.2			
No op	5.7	5	12	14.9	14					
24	6.8	7	12	10.2	11					
4	0	0	12	5.7	3	11	6.2			
12	4.4	3	10	4.6	3	1	5			

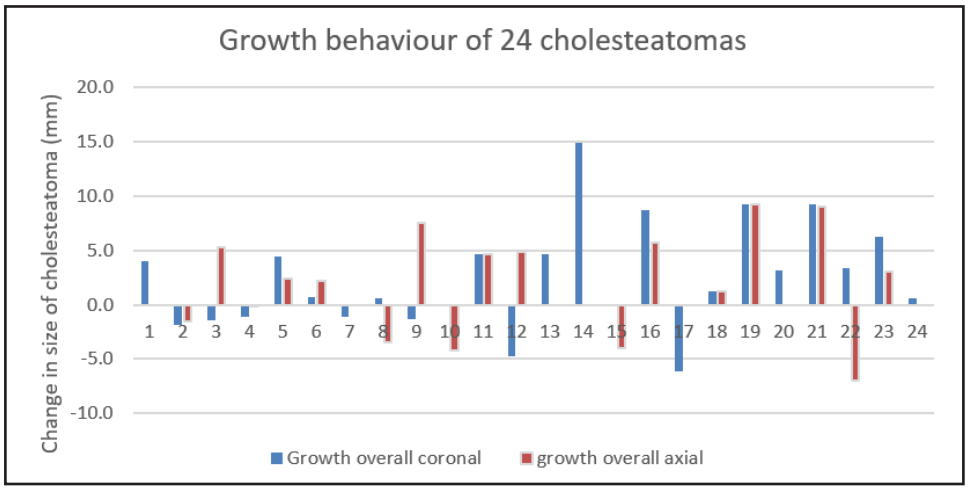

Fig. 2. Growth behaviour of the 24 cholesteatomas

coronal plane was greater than in the axial in two-thirds of the cholesteatomas but the average difference in the two measurements was 0.9mm with measurements in the coronal plane tending to be larger.

Of the 24 cholesteatomas 1 resolved completely, 5 reduced, 6 stayed the same size whilst 4 grew slowly and 8 grew significantly.

Discussion

It has been advocated that cholesteatoma should be managed by surgical removal in a timely fashion to prevent the complications of the disease which include hearing loss (both conductive and sensorineural), facial nerve palsy, erosion of vestibular apparatus as well as infection that may spread intracranially.

This is the first study, to our knowledge, that has monitored the growth behaviour of both operated and non-operated middle ear cholesteatomas using non-EPI DWI MRI scans. The study demonstrated some consistency between the consultant head and neck radiologist and otologist in predicting the behaviour

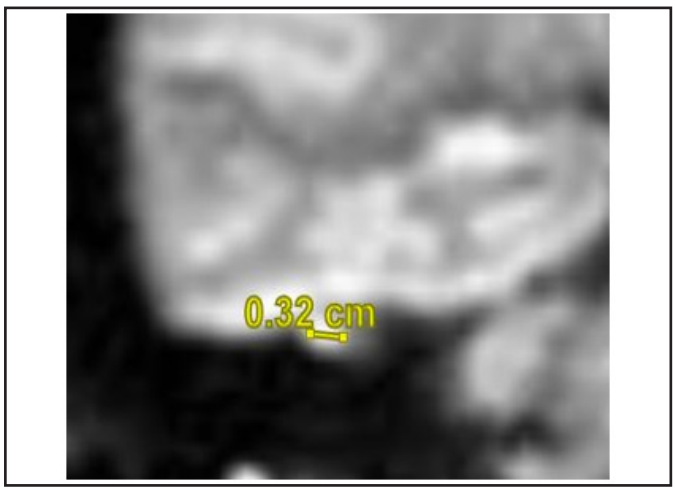

Fig. 3a. Non-EPI DWI MRI SCAN in a patient with an area suspicious of cholesteatoma

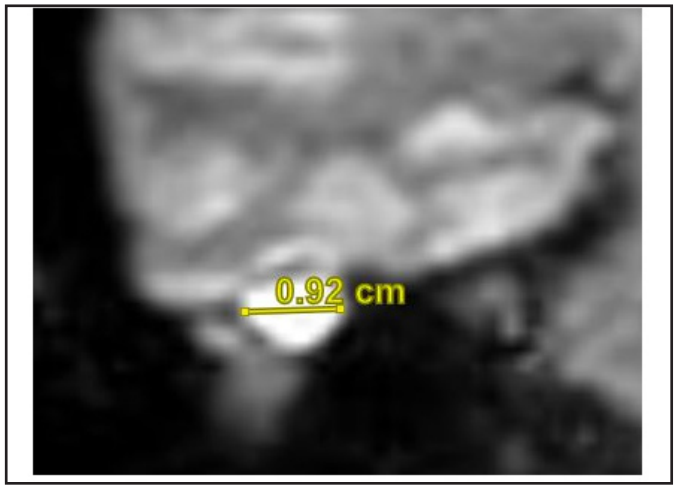

Fig. 3b. Non-EPI DWI MRI SCAN in same patient demonstrating significant growth of cholesteatoma 41 months later

of cholesteatoma growth although there were some inconsistencies. Review of any previous MRI scans can be useful to confirm whether an area suspicious of restricted diffusion of the non-EPI DWI sequence has developed a more obvious restricted diffusion and has increased in size as seen in Figures 3a and 3b.

In addition to the degree of inter-variability between the otologist and radiologist, the otologist measured the largest diameter in the coronal plane whereas the radiologist measured in the axial plane. Wong et al in 2016 found that cholesteatoma expands most rapidly in the craniocaudal plane.[7] Measuring the greatest dimension of the cholesteatoma in the coronal plane it is therefore more likely to detect any change in the size of the disease.

20 cholesteatomas were found in operated ears. 4 were in ears that had an attic pocket and represented recurrent disease however 16 were in asymptomatic ears with no obvious cholesteatoma present clinically behind an intact tympanic membrane. Our study has found that 8 had grown in one measurement by >4mm and 4 between 1-4mm. 10 proceeded to have surgery however 2 were in patients deemed unfit for surgery and continue to be managed conservatively with further MRI scans. 6 cholesteatomas have remained unchanged in size, 5 have decreased by 1-4mm and one cholesteatoma had resolved. Even prior to the introduction of non-EPI DWI MRI scans, Gristwood and Venables in 1976 estimated the growth rate of cholesteatoma by measuring the volume of cholesteatoma found at second look surgery and dividing it by the days between initial and second look surgery.[8] They found an exponential growth pattern, not found by Hellingmann et al in 2019.[9] The latter followed patients up to 4.5 years and found variation in the growth rate of different cholesteatomas even in the same patient. Hellingman et al found a large individual variation in the growth rate of residual cholesteatoma in 10 patients after subtotal petrosectomy with a rho value of 0.32 for the correlation between growth rate and volume of cholesteatoma at detection9. They concluded that where the volume of cholesteatoma is small with room to grow before destroying any remaining structures, a wait and scan policy could be considered. This suggests that serial MRI scans may be a useful adjunct to determine when and what priority should be given to patients listed for surgery to remove cholesteatoma

The rate of growth of these 24 cholesteatomas per year was then calculated and found to vary from -0.2mm to 19.9mm/ year with a median growth of 0.6mm/ year. This is important to consider when advocating the timing and frequency of follow-up scans. It has been our practice to arrange non-EPI DWI MRI scans in patients around 12 months and 5 years post-surgery with additional scans at 3 years in children, where there was a suspected or a small cholesteatoma detected on a scan or if clinically indicated. Our study first detected cholesteatoma in this cohort of patients at 10 to 27 months (median of 14.5 months) post-surgery. Wong et al suggested that in patients where routine second look surgery is not performed following canal wall up surgery, a follow-up scan at 1-2 years is likely to detect most residual disease.[7] Pai et al in 2019 also found the growth rate of residual cholesteatoma to be highly variable, ranging from static over three years to an estimated value of 29mm/year.[10] They therefore recommended interval imaging for a minimum of 5 years in stable ears following definitive cholesteatoma surgery with additional interval scan between 2 and 3 years postoperatively if indicated.[10]

4 of the cholesteatomas in this study occurred in non-operated ears and in only 2 of these was (an attic) cholesteatoma clinically present. The other patients were asymptomatic and were incidental findings on MRI scans performed to follow-up previous disease in the other ear. Of these primary cholesteatomas 2 showed significant growth, one minimal growth and one actually regressed. Wong et al in 2016 reported the progress of 12 cases of non-operated middle ear cholesteatoma using non EPI DWI MRI imaging describing only one case of rapid progression, a third had a mean growth of 11.9%/ year; 7 showed evidence of a mean regression of 53%/ year with 3 having resolved completely over a 17 month period7. Although the study had some limitations since it reported on a small cohort of patients who did not have surgery to confirm the "true" extent of disease, it does raise the issue as to if and when cholesteatomas even in non-operated ears require to be removed surgically.

Review of these 24 cases suggests that significant growth (>4mm) is mostly likely in cholesteatoma

found in children or in adults with bilateral disease. In fact, in all 8 patients with >4mm increase in the size of their cholesteatoma, all had bilateral disease, two of whom were diagnosed in childhood. A number of theories have been suggested as to the variation in the growth rates seen including the effect of the host innate immune response and genomic alterations found in cholesteatoma.[9-11]

In addition to confirming the presence of residual cholesteatoma in asymptomatic post-operative ears, this study has demonstrated the value of serial non-EPI DWI MRI scans in providing information on the growth behaviour of cholesteatoma. Interestingly only half of the 24 cholesteatomas actually increased in size with 6 remaining static, the rest reducing in size with one resolving completely. This may suggest that we may in fact be over-treating some cholesteatomas and serial scanning may offer an appropriate alternative to surgical removal especially in patients with co-morbidities or where surgery is limited due to the impact of Covid-19 or any future pandemics.

Conclusion

Non-EPI DWI MRI scans are useful to monitor the growth behaviour of cholesteatoma in asymptomatic ears. Only half of the 24 cholesteatomas in this study demonstrated any increase in size over 6 to 91 months (median 33months) suggesting that this investigation could be invaluable in managing patients conservatively after initial surgery for cholesteatoma. This should be considered in patients where surgery is to be avoided either in patients with co-morbidities or in managing patients in the Covid-19 era.

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Evaluation and Comparison of the Outcomes of Endoscopic Dacryocystorhinostomy with and without Silicone Stent

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ABSTRACT

Introduction

Endoscopic dacryocystorhinostomy aims to establish a patent nasolacrimal fistula. Use of silicone stent is a preferred modification to achieve long term patency of neo-ostium, though it has been blamed for granulations, synechia and punctal erosion. Present study was done to evaluate and compare the outcomes of Endoscopic dacryocystorhinostomy with and without stent.

Materials and Methods

40 patients of with chronic dacryocystitis and nasolacrimal duct blockage were selected for the study. Nasal endoscopy was done for suitability of surgical access and to detect any nasal pathology. Sac syringing was done to assess the site of blockage and Dacryoscintigraphy to confirm it. 20 patients in Group A underwent Endoscopic dacryocystorhinostomy without stent and remaining 20 in Group B with silicone stent. Success rates were determined by subjective relief from epiphora and by endoscopic visualization of rhinostomy opening, granulation tissues/ synechiae at rhinostomy site and by result of sac syringing.

Results

In Group A, complete relief was obtained in 75% patients, significant relief in 10% and no relief in 15% patients thus recording overall success rate of 85%; whereas in Group B complete relief of symptom was obtained in 70% patients, significant relief in 10% and no symptom relief in 20% patients thus recording the overall success rate of 80%. Cases in Group B were also found to have persistent epiphora (17.5%), stenosis of ostium (25%), granulation (35%) and synechia (37.5%).

Conclusion

Stenting does not significantly improve the success of Endoscopic dacryocystorhinostomy but is associated with more complications.

Keywords

Endoscopic; Dacryocystorhinostomy; Stenosis; Synechia; Granulation; Epiphora; Chronic dacryocystitis; Silicon stent; Nasolacrimal duct

Dacryocystorhinostomy (DCR) is the surgery performed to direct the lacrimal flow into nasal cavity through an artificial opening made at the level of lacrimal sac. It is indicated in cases of symptomatic distal obstruction of nasolacrimal duct (NLD) which is not relieved by simple probing and syringing. Endoscopic DCR (Endo DCR) is the preferred approach over external DCR due to its two major advantages, namely (a) preservation of pumping action of orbicularis oculi muscle and (b) correction of associated nasal pathology.

The aim of DCR surgery is not only to establish a nasolacrimal fistula but also to keep it patent. Use of local topical application of Mitomycin C and insertion of

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silicone stent are two commonly preferred modifications in this surgery aiming at long term patency of neo-ostium. Though silicone stent has been reported to improve the surgical outcome of Endo DCR, some studies indicate that the stent itself is a reason of surgical failure due to granulation tissue formation, punctal erosion and slitting of canaliculi. A study was hence conducted to evaluate and compare the outcomes of Endo DCR with and without silicone stent.

Materials and Methods

This Randomized Controlled Clinical Trial was conducted in a tertiary care Armed Forces hospital over a period of two years in a sample size of 40 subjects without any age or sex bias. Patients attending Eye and ENT OPDs with chronic dacryocystitis and NLD blockage were included in the study. Patients of canalicular blockage, fibrosed punctum and revision cases were excluded from the study. Institutional Ethical Clearance was obtained. Consent from the patients was obtained to participate in the study.

The lids, puncta and medial canthal region were examined for any abnormality. Nasal endoscopy was done for suitability of surgical access and to detect any nasal pathology. Sac syringing was done using saline to assess the site of blockage in lacrimal flow. Dacryoscintigraphy (DCT) was done with Technetium (T99M) to confirm the blockade site. The radioactive tracer was prepared by mixing a diluted mixture of T99M and saline with tin sulphar colloid. Proper dosimetry was done with a specific dosimeter to make it ready for use. 2 drops of the mixture were instilled in both eyes, image was captured in gamma camera and Scintigraph was obtained.

20 patients, randomized by odd-even method of serial numbers, were placed in Group A to undergo Endo DCR without silicone stent and equal number of patients were placed in Group B to undergo Endo DCR with silicone stent which was passed through the lower and upper punctum to come out of the window created in the lacrimal sac wall. Endo DCRs were done under general anesthesia. After endoscopic confirmation of the sac, itsmedial wall was incised vertically by sickle knife and removed by quick bites using Kerrison's punch forceps. Nasal cavity was cleared of all secretions and blood. Lacrimal syringing was done with dilute methylene blue and free flow of fluid was observed endoscopically. 20 patients (Group A) did not undergo stenting; whereas another 20 patients (Group B) underwent stenting.Oral antibiotic (Amoxyclav), analgesics, antibiotic eye drops (ciprofloxacin), and normal saline nasal drop were given to every patient post-operatively for 7 days. Saline nasal douching was started after 7 days and continued for 4 weeks at a dosage of 20 ml 4 times a day. Gentle digital massaging of sac region was advised for one month. Silicone stent was removed after 3 months.

The cases were followed up at the end of 1st week, 2nd week, 1 month and then monthly for 6 months. Follow up examination was done under endoscope by the same surgeon and included syringing. Success rate was determined by subjective as well as objective assessment. Patients were asked to grade the degree of relief from epiphora subjectively using a 3 point scale comprising of (i) completely symptom free (ii) significantly improved (iii) not improved. First two responses were considered as success.

Objective assessment was done using endoscope to visualize the rhinostomy opening, to check for granulation tissues or synechiae and to confirm the appearance or absence of Methylene blue dye in the nasal cavity on syringing. The patients of the two groups were compared for the success rates using the above subjective and objective assessment criteria. Complications of silicone stent were studied, especially with regard to ecchymosis of medial canthal region, granulation tissues at or adjacent to rhinostomy site and synechia formation between nasal septum, middle turbinate and lateral nasal wall.

The results were studied and compared with existing data. The variations were analyzed as a percentage of the two groups. Student's t test was used to compare mean of the groups. The comparison of outcomes (subjective and objective) between two groups were performed by Chi-square test. The p values smaller than 0.05 were regarded as significant.

Table I: Demographic and preoperative statistics of patients

VARIABLE	ALL PATIENTS	GROUP A	GROUP B	P VALUE
Age (years)				
Range	37-65	37-62	44-65	0.092
Mean	52	50	54	
Gender				
Male	18	10	8	0.525
Female	22	10	12	
Laterality of eye				
Bilateral	5	3	2	0.563
Right	21	10	11	
Left	14	7	7	
Additional pathology				
Mucocele	11	7	4	0.288
DNS	17	6	11	0.11
Yield from sac syringing				
Regurgitation from upper punctum	32	14	18	0.114
Regurgitation from both punctum	8	6	2	
Dacryocintigraphy				
NLD (bilateral)	16	10	6	0.254
NLD (right)	15	7	8	
NLD (left)	9	3	6	

Results

40 patients of Chronic Dacryocystitis underwent Endo DCR, 20 without stent (Group A) and 20 (Group B) with silastic stent. Majority of the patients were in the age group of 51-60 years. The comparison of the two groups are statistically not significant (p = 0.092). There were 10 male and 10 female in Group A whereas there were 8 male and 12 female in Group B with an overall sex distribution showing female preponderance of 55%. Majority (87.5%) presented with unilateral epiphora. 27.5% were also found to have mucocele. However, the comparison between two groups for both the clinical features epiphora (p = 0.563) and mucocele (p = 0.288) was insignificant. There were 11 patients (55%) with deviated nasal septum (DNS) in Group A and 6 patients (30%) in Group B but only one case in Group B with significant DNS was required to undergo endoscopic septoplasty in the same sitting. (Table I)

Sac syringing was done in all cases as preoperative evaluation. Regurgitation of mucopurulent discharge from upper punctum was seen in 14 patients (70%) and in 18 patients (90%) in Group A and B respectively. Regurgitation of mucopurulent discharge from both puncta was seen in 6 patients (30%) and in 2 patients (10%) in Group A and B respectively. However,

Table II: Intraoperative findings

VARIABLE	ALL PATIENTS	GROUP A	GROUP B	P VALUE
Condition of the sac				
Thin	**30**	**14**	**16**	**0.465**
Thick & fibrosed	**10**	**6**	**4**	
Yield on incising lacrimal sac				
No yield	**18**	**8**	**10**	**0.525**
Mucopurulent yield	**22**	**12**	**10**	

difference between the two group was statistically insignificant (p = 0.114). (Table I) Dacryscintigraphy was done in all cases. In Group A, 10 cases (50%) showed NLD obstruction on both sides, 3 cases (15%) on the left side and 7 cases (35%) on the right. In Group B, 6 cases (30%) showed NLD obstruction on both sides, 6 cases (30%) on the left side, 8 cases (40%) on the right. The difference of two group was statistically insignificant (p = 0.254). (Table I)

During the surgery it was observed that 14 (70%) patients of Group A had a thin lachrymal sac and 6 (30%) patient had thick fibrosed sac. In this group on incising the sac, there was no discharge yield in 8 (40%) patients but 12 (60%) had mucopurulent discharge. Intra-operatively, 16 (80%) patients of Group B were found to have thin lacrimal sac and 4 (20%) had thick fibrosed sac. In this group on incising the sac, there was no discharge yield in 10 (50%) patients but 10 (50%) had mucopurulent discharge. The comparison of the two groups is statistically not significant. (Table II)

The important complications were persistent epiphora (17.5%) and stenosis of the ostium (25%) suggesting failure of surgery, granulation (35%) at the bone work site and synechia (37.5%) between middle turbinate and lateral wall of nasal cavity. The complications such as Orbital ecchymosis, foreign body (FB) sensation, local pain and extrusion of silicone stent were seen in patients in Group B. (Table III)

The patients were assessed on the parameter of degree of relief from symptoms after DCR, namely complete relief, significant relief and no relief. In Group A complete relief was obtained in 15 patients (75%), significant relief in 2 patients (10%) and no relief in 2 patients (10%) thus recording the overall success rate of 85%; whereas in Group B complete relief of symptom was obtained in 14 patients (70%), significant relief in 2 patients (10%) and no symptom relief in 2 patients (10%) thus recording the overall success rate of 80%. (Table IV)

Discussion

Age and sex of the patients, laterality of symptom, presence or absence of mucocele or DNS are not the factors known to affect the outcome of Endo DCR. Dacryoscintigraphy serves as an important investigation for documentation but it is not mandatory. It does not improve the successful outcome of procedure. Patency of lacrimal system can be determined by sac syringing which by itself is a reliable method and correlates well with successful outcome of endoscopic procedure.

Condition of lacrimal sac is known to affect the result of DCR. In our study, out of 10 (25%) cases of thick fibrosed sacs, 2 amongst 6 in Group A and 1 amongst 4 in Group B, were relieved completely from epiphora recording a success rate of 30% only. The finding is similar to the study of Krishnan et al. which reported the success rate of only 29% with fibrosed sacs.[1]

The complications of Endo DCR are similar to any other nasal endoscopic surgery and include bleeding, wound infection, granulation, synechiae, damage to the orbital contents and surgical failures. Synechia is a significant complication in our study, which has also been reported by Metson, to strongly influence the

Table III: Postoperative complications

VARIABLE	GROUP A	GROUP B	ALL PATIENTS	P VALUE
Complications				
Epiphora	**3 (15%)**	**4 (20%)**	**7 (17.5%)**	**0.677**
Regurgitation on post-op syringing	**4 (20%)**	**3 (15%)**	**7 (17.5%)**	**0.677**
Granulation	**4 (20%)**	**10 (50%)**	**14 (35%)**	**0.047 (significant)**
Synechia	**4 (20%)**	**11 (55%)**	**15 (37.5%)**	**0.022 (significant)**
Punctal injury	**1 (5%)**	**0**	**1 (2.5%)**	**0.311**
Non-visualization of ostium	**2 (10%)**	**8 (40%)**	**10 (25%)**	**0.028 (significant)**
Orbital ecchymosis	**0**	**2 (10%)**	**2 (5%)**	
FB sensation	**0**	**8 (40%)**	**8 (20%)**	
Pain in operated site	**0**	**16 (80%)**	**16 (40%)**	
Extrusion of stent	**0**	**1 (5%)**	**1 (2.5%)**	
Epistaxis	**0**	**1 (5%)**	**1 (2.5%)**	

surgical outcome if it occurs between rhinostomy site and intranasal structures.[2]

Though Endo DCR with stent was thought to be effective in the prevention of granulations at or/and adjacent to rhinostomy site, which was found in 50% cases in Group B in our study, was also reported by Unlu et al to be at 42.9% in Endo DCR with silicone stents and it adversely affected the outcome.[3]

Surgical success or failure can be judged by (a) endoscopic visualization of the rhinostomy opening and (b) regurgitation in sac syringing. The aim of surgery is to provide relief to the patient from epiphora. Patients can be categorized as (i) completely relieved from epiphora, (ii) significantly improved and (iii) no improvement; as done in the present study or as (i) complete cure, (ii) partial cure and (iii) no improvement depending upon symptomatic relief.[4]

Bony window of adequate size is a key factor in achieving good results in Endo DCR which can be achieved by using 2mm Kerrison's punch alone[5] or supplemented with burr or septal chisel.[6] The surgeon has to make his own judgment about the adequacy of the size of bone window. Increasing the size not only increases the duration of the operation but also patient's

Table IV: Surgical success

RELIEF OF SYMPTOM	GROUP A	GROUP B	ALL PATIENTS	P VALUE
No relief from symptom	**3**	**4**	**7**	**0.915**
Significant relief	**2**	**2**	**4**	
Complete relief	**15**	**14**	**29**	
Success rate	**17 (85%)**	**16 (80%)**	**33 (82.5%)**	**0.677**

discomfort.

On the other hand, smaller size of rhinostomy despite silicone stenting lowers the success rate. A study by Kong et al reported that the average onset of ostium closer after the primary operation was 6 to 26 weeks (mean 12.7 weeks).[7] A total of 7 patients (17.5%), 3 without stent and 4 with stent, continued to have epiphora post-operatively in our study. It was comparable to the finding of persistent epiphora in post operative period in 16% cases by Shoaib et al. out of 31 patient studied in 2012.[8] Narrowing of the bony neo-ostium along with formation of granulations were the possible causes of the recurrence of the epiphora. Inadequacy to create a sufficiently large stoma leading to post operative contracture of the size can be an important factor.

During sac syringing, we observed and checked for free flow on the 7th and 14th day post operatively and then on monthly basis for 6 month. Regurgitation of fluid or partial regurgitation from same or upper punctum was observed in failure cases during 4th or 5th follow up (between 3 to 4 month post operatively) in our study. Similar analysis of case series by Boush et al showed that the majority of surgical failures occurred within 4 months of Endo DCR.[9]

Other complications seen in our study were orbital echymosis, foreign body sensation in operated site, pain and extrusion of stent. Orbital echymosis was also found in 4 cases by a similar study upon 46 patients by Saratziotis et al (2009).[10] Extrusion of stent and difficulties of removing stent because of its submucosal submersion in one case each was also observed by Kakkar et al.(2009) among 20 patients.[11] Other causes of failed dacryocystorhinostomy, such as obliterated sac and impaired canalicular function were not seen in our study.[12]

Silicone stents are used to keep the canalicular walls and or lacrimal sac nasal mucosal flap separated so as to maintain the patency of the neo-ostium. Though it is a debatable issue, it is popular among ENT surgeons all around the world. Singh reported success rate of 92.6% ofEndo DCR without stent with no major complication.5 On the other hand, Welhalm and Huges (1984) have implicated stents for increased incidence of complications and post-operative Failure.[13] There are others like Massaro and Gonnering (1990), who believe that stenting offers benefits that outweigh any possible adverse effects.[14] The use or silicone stents in complicated DCR surgery is a well established means of maintaining fistula patency where an otherwise narrow or traumatized passage will narrow further during healing as opined by Patrinely and Anderson (1986).[15]

We achieved 80% success rate with intra operative placement of stent and 85% without stenting thus recording an overall success rate at 82.5% in our study. This result is comparable to many other workers. Kakkar and Chugh reported a success of 85% patients with stent and 90% patients without stent.[10] Sprekelson reported success with Endo DCR with stent in 85% patients.[16] Jin reported primary success rate of 83% with Endo DCR with stent but also the obstruction of neo-ostium by granulation tissue in 17.4% cases.[17]

Conclusion

The present study shows that there is no statistically significant difference in the rates of patency following Endo DCR with or without use of Silicone stents. Patient's compliance and comfort is much better without placement of stent. The use of stents is associated with complications like formation of granulation, synechia, loss or submucosal submersion of stents, extrusion of stent, foreign body sensation and pain in operated site.

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Main Article

Local Bupivacaine Infiltration to Reduce Pain after Tonsillectomy: A Low Cost Approach

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ABSTRACT

Introduction

Congenital deafness in a child is often missed. Several distraction tests have evolved over time to diagnose congenital deafness. Tonsillectomy is one of the most commonly performed surgical procedures worldwide, with the major drawback of significant post operative pain.There is no consensus regarding topical application or local infiltration of anesthetics post operatively to reduce pain. The present study was performed to evaluate the effect of bupivacaine infiltration in the tonsillar fossae after tonsillectomy.

Materials and Methods

A double-blinded clinical trial was performed on 75 patients undergoing tonsillectomy between January 2019 and January 2020. All patients underwent tonsillectomy under general anesthesia and were then randomly divided into 3 groups of 25 patients each. For Group I, a swab soaked in normal saline was applied to the tonsillar fossae for 5 minutes just before extubation. In Group II, a swab soaked in 5 ml of 0.5% bupivacaine was placed for 5 minutes, while in Group III, 5ml of 0.5% bupivacaine was infiltrated in the tonsillar fossae. The intensity of pain for each group was measured in the immediate post op period, at6 hours, 24 hours and 1 week by Wong Baker Faces Pain Rating Scale.

Results

There was a significant difference in the mean level of pain between groups I and III in the immediate post op period, at 6 hours and 24 hours. Although the average pain scores of group III were better than those of group II, the results were significant only in the 6 hour post op period.

Conclusion

To reduce post-tonsillectomy pain,0.5% bupivacaine can be infiltrated into the tonsillar fossa.

Keywords

Tonsillectomy;Pain;Bupivacaine;Anesthesia,Local

Tonsillectomy is one of the most commonly performed procedures worldwide, with the major drawback of significant amount of post operative pain. Decreasing the pain postoperatively has multiple benefits such as shorter recovery period, faster return to regular diet, and activity, improving overall condition of the patients and bringing relief to the caregivers.[1]

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Although analgesic drugs are used orally or parenterally post tonsillectomy, pain remains one of the main complaints after this surgery, especially in adults, who may not have significant reduction in pain, till day 9 postoperatively in some cases.[2]

Decreasing post tonsillectomy pain has been the subject of intense research, with various novel methods being applied for the same. Interventions have included administration of corticosteroids, Coblator assisted tonsillectomy, systemic analgesics, local infiltration with anaesthetic agents or even low dose tramadol given at the beginning of the procedure.[3, 4, 5, 6, 7]

The present study was performed to evaluate the effect

Fig. 1. Wong Baker FACES® Pain Rating Scale.

of 0.5% bupivacaine infiltration in the tonsillar fossae after tonsillectomy, just before extubation, in patients older than 9 years of age.

Materials and Methods

A double-blinded clinical trial was performed on 75 patients aged 9-25 years who had undergone tonsillectomy between January 2019 and January 2020. Patients included in the study were those who fulfilled the Paradise Criteria (at least 7 episodes of tonsilitis in the past year, at least 5 episodes in each of the previous 2 years, or at least 3 episodes in each of the previous 3 years). Any patients with signs and symptoms of active infection were excluded. Informed written consent was obtained from each patient and his/her caregivers, and routine blood investigations were done.

All patients underwent tonsillectomy by dissection and snare method by the same surgeon (author 1),under general anesthesia. Hemostasis was achieved by ligating the bleeding vesels in the tonsillar fossae. Following this, the patients were randomly divided into 3 groups.

For each person in Group I, a swabsoaked in 5ml of normal saline was placed in the tonsillar fossae for 5 minutes; in Group II, a swab soaked in 5 ml of 0.5% bupivacaine was placed ineach tonsillar fossa for 5minutes, and in Group III, 5 ml of 0.5% bupivacaine solution was infiltrated into each tonsillar fossa post operatively. Group allocation was randomly done for each patient. All patients were given oral ibuprofen in weight-adjusted doses (10 mg/kg/dose every 8 hours) post operatively.

The intensity of post-tonsillectomy pain was recorded in the immediate post operative period, at 6 hours, one day and one week after surgery by Wong Baker Faces Pain Rating Scale. This scale (Fig. 1) is a self-assessment tool that must be understood by the patient so that they are able to choose the rating that best illustrates the physical pain they are experiencing. It consists of a face chart with a pain rating below each face and the patient has to record his or her pain score from zero (no pain) to ten (severe pain).

Data was analyzed by one-way ANOVA with 95% confidence interval.

Results

In the immediate post op period, the mean intensity of pain in Group I was 5.52, with maximum patients recording a pain reading of 6. The mean intensity of pain in Group II was 3.76 with most patients recording a pain score of 4, while the mean in Group III was 2.96, with most patients recording a score of 2. Difference in pain scores among groups I and III was statistically significant ($p<0.05$). Though group III showed overall lesser pain scores than group II, the difference was not statistically significant (Fig. 2).

When the pain scores were recorded 6 hours post op, Group I again had an overall higher mean pain score of 4.24, with most patients recording 6 again. In Group II, the patients had a mean of 3.2 with maximum patients having a score of 2 and Group III had a mean of 1.76, with the majority of patients showing a score of 2. The differences were statistically significant ($p <0.05$). The difference between Groups II and III at 6 hours post-op was alsostatistically significant, with Group III showing

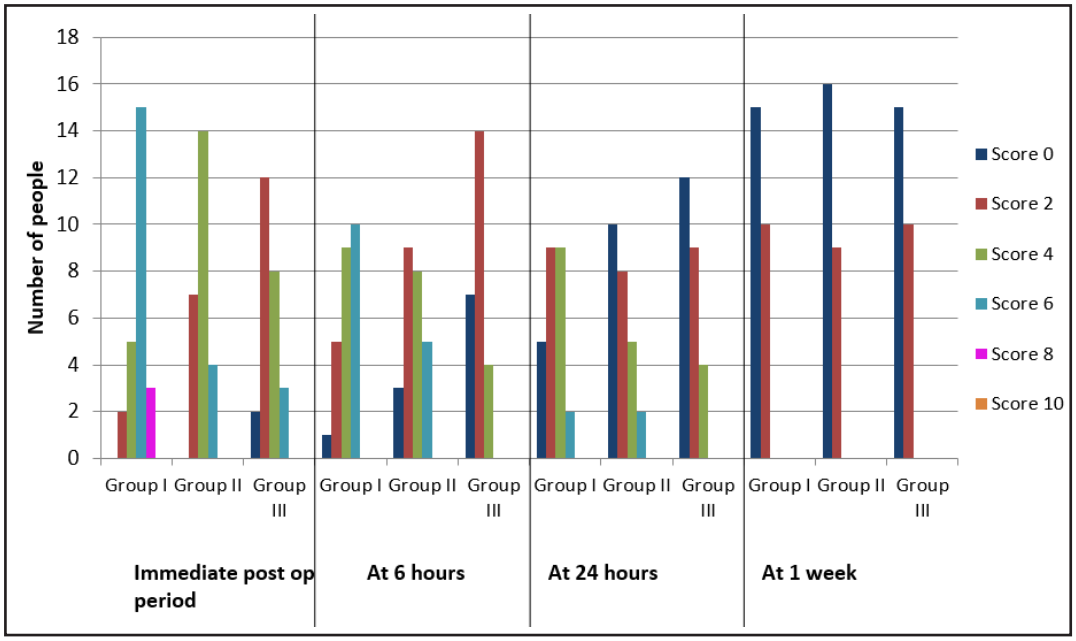

Fig. 2. The pain scores for patients in Group I, II and III in the immediate post op period, at 6 hours, at 24 hours and at 1 week post operatively

a drastic improvement in pain (Fig. 2).

24 hours after surgery, the pain scores of Group I dropped to a mean of 2.64, while the average scores of Groups II and III were 1.92 and 1.36 respectively. When compared the results of groups I and III showed a statistically significant difference, while the difference between Groups II and III was not statistically significant. The overall pain scores in Group III were nevertheless lesser than Group II (Fig. 2).

1 week after surgery Group I showed an average pain score of 0.8, Group II showed 0.72 and Group III showed 0.8. There was no statistically significant difference between the groups (Fig. 2).

The results are represented graphically below, with Figure 2 showing pain scores for Groups I, II and III in the immediate post op period, 6 hours after surgery, 24 hours after surgery, and 1 week after surgery.

Discussion

Tonsillectomy is one of the most commonly performed procedures worldwide, with the major drawback being significant post-operative pain. Alleviation of post-operative pain has multiple benefits such as shorter recovery period, faster return to regular diet and activity, improvement of overall condition of the patients and relief for the caregivers.[1]

Bupivacaine is an amide linked local anaesthetic that blocks nerve conduction by decreasing the entry of sodium (Na+) ions during upstroke of action potential. It interacts with a receptor situated within the voltage sensitive Na+ channel and raises the threshold of channel opening. Na+ permeability fails to increase in response to a stimulus and the impulse conduction is interrupted when the Na+ channels are blocked.[8]

The dose of bupivacaine for peripheral block is 5-20 ml of 0.25% solution; the effect lasts 4-24 hours (mean: 8 h), but it may last up to 1 week after surgery because of pre-emptive analgesia mechanism.[9]

Hung et al. demonstrated in a study on 99 patients aged between 3 and 16 years that bupivacaine-soaked swabs tightly packed in the tonsillar fossae after tonsillectomy resulted in patients starting to drink and eat earlier than the control group. The pain scores at 1 ($p<0.001$), 3 ($p<0.001$) and 6 ($p<0.001$) hours post-operation were also found to be lower in the bupivacaine group than the control group.[10]

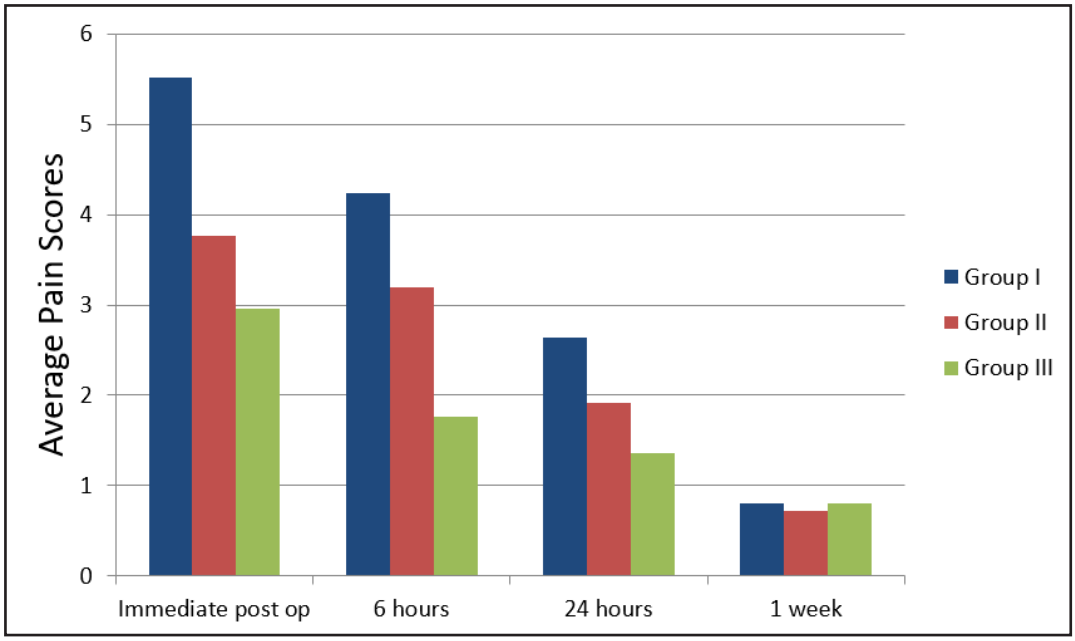

Fig. 3. A comparison of average pain scores of all 3 groups in the immediate post op period, at 6 hours, at 24 hours and at 1 week

Studies by Johansen et al.,[11] Jebeles et al.[12] and Alvarez et al.[13] have demonstrated that pre incision infiltration of bupivacaine into the tonsillar fossae have a significant impact on pain in the post operative period, especially in the first 2-3 days.

Other studies by Wong et al.,[14] Kountakis et al.[15] have also demonstrated that infiltration of bupivacaine in the tonsillar fossa after tonsillectomy also decreases post-operative pain.

Molliex et al. in their study of 68 patients found that infiltration of tonsilswith bupivacaine produces mild decrease in pain after tonsillectomy; however, effect of bupivacaine infiltration is the same whether it is performed before or after surgery.[6]

Other studies have demonstrated that infiltration of bupivacaine provides little or no post operative relief of pain in patients.[16, 17, 18, 19]

Although analgesics such as tramadol decrease post operative pain, data from short term studies show tramadol causes nausea, tiredness, vomiting, sweating, drowsiness and postural hypotension. Although predominantly mild in nature, the most commonly reported side-effects were headache, nausea, vomiting, dizziness and somnolence. These were significantly higher after dental surgery, possibly as a result of acute dosing of awake patients and rapid patient mobilization. Hence its use is not advocated after this surgery.[20]

All of our patients were also given oral ibuprofen in weight-adjusted doses (10 mg/kg/dose every 8 hours) postoperatively as this is the only other intervention for pain recommended by American Academy of Otolaryngology–Head and Neck Surgery in their 2019 clinical practice guideline update for tonsillectomy.[21]

Electrocautery was avoided in our study since it has been generally accepted via multiple studies that cold steel results in lesser post operative pain and decreased recovery period when compared to electrocautery.[22, 23]

Coblation assisted tonsillectomy, although a superior method with lesser post operative pain and hemorrhage,[24] is not a viable option for all centres in India, due to the lack of availability of this technology, and because it is significantly more expensive when compared to dissection and snare method. It is also associated with a longer learning curve.[25] JP Windfuhr[26] in a review of literature concluded that calculation of cost-effectiveness of Coblation tonsillectomy is currently not possible. Similarly, harmonic scalpel assisted tonsillectomy also shares the same problems of being non-cost effective,[27]

and with most studies concluding that it may ultimately have little to no effect on post operative pain scores of patients when compared to other methods such as cold steel or electrocautery.[28, 29] Bupivacaine, on the other hand, is readily available in the operating theatre, at minimal cost.

Although local infiltration of Bupivacaine is generally considered safe, Bean-Lijewski in a retrospective study reported two cases of upper airway obstruction following pre-tonsillar injection of bupivacaine. But the author concedes that retrospective analyses are flawed due to their inability to control clinical variables. Wide variations in anesthetic techniques, concentration, and amount of local anesthetic and patients' age may occur. In addition, selection bias can result in disparity between groups, which can lead to erroneous conclusions.[30]

This study showed that there was a significant difference in the mean level of post-tonsillectomy pain between groups I and III in the immediate post op period, at 6 hours and at 24 hours. Although the average pain scores of group III were better than even group II, the results were significant only in the 6 hour post op period.(Fig. 3)

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Main Article

Usefulness of The Reflux Symptom Index in the Management of Laryngopharyngeal Reflux

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ABSTRACT

Introduction

Laryngopharyngeal Reflux (LPR) is highly prevalent in the general population and its impact on health systems is growing dramatically by the day. The contents of the stomach flowing back into the oesophagus, pharynx and larynx because of a transient relaxation of the lower oesophageal sphincter leads to a spectrum of symptoms diagnosed as LPR and Gastroesophageal Reflux Disease (GERD). The aim was to study in detail the symptoms of LPR and to ascertain if and how they hamper the routine of an individual by using the Reflux Symptom Index (RSI).

Materials and Methods

The Reflux Symptom Index (RSI) is a self-administered nine-item outcomes instrument for LPR. Ninety-one patients with clinically diagnosed LPR were taken up for this study and were issued the RSI (translated into the local language for better results) before and after treatment. Data was assessed at the end of 3 months and 6 months.

Results

The tabulated data showed significant improvement in the symptomatic index after treatment.

Conclusion

It can thus be concluded that RSI is still highly valid in the follow-up for patients with LPR because it can be easily administered and gives accurate results with excellent validation.

Keywords

Laryngopharyngeal Reflux

Reflux of gastroduodenal contents into the larynx because of transient relaxation of the upper and lower oesophageal sphincter may cause inflammation and symptoms resulting in chronic laryngeal signs often referred to as Laryngopharyngeal Reflux (LPR).[1] It is often associated with chronic cough, hoarseness, dysphonia, recurrent throat clearing and globus pharyngeus (sensation of a lump in the throat).

Due to nonspecific symptoms, laryngoscopy is often performed to rule out malignancy and the diagnosis of LPR is considered in the presence of any signs of laryngeal inflammation.[2] The two predominant pathophysiological mechanisms for LPR are direct and indirect exposure of the larynx to injurious gastric contents. The direct exposure is due to exposure of laryngopharyngeal mucosa to acid, pepsin and bile acid. The indirect mechanism is thought to be a result of refluxate interactions with structures distal to the larynx, evoking a vagus nerve mediated bronchoconstriction.[3] LPR is estimated to account for 10% of all ear, nose and throat clinic patients and 50% of all patients with voice complaints.[4] However, due to the lack of a gold-standard in testing, the prevalence of LPR can be overstated, with

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one meta-analysis that reviewed data from pH probe readings reporting that 10% to 60% of normal subjects demonstrated reflux.[5]

LPR differs from classic Gastroesophageal Reflux Disease (GERD) in many ways. While heartburn and regurgitation are common symptoms of GERD, such symptoms are not present in most LPR patients.[4] LPR, on the other hand presents with laryngeal inflammation and reflux in upright position. LPR is the preferred term for use in Otorhinolaryngology. It is also ubiquitous and pernicious in paediatric patients. The diagnosis may be particularly difficult to make because infants and children almost never complain of heartburn or other symptoms related to reflux. Physiologic barriers against the development of reflux include the lower oesophageal sphincter, oesophageal peristalsis, saliva that buffers the refluxed contents and mucus covering of the stomach-oesophagus-larynx-pharynx along with the upper oesophageal sphincter.

Shaw et al presented a 12-item symptom questionnaire to assess GERD, but again it concentrates on symptoms such as acid taste, burning and chest pain.[6] The questionnaire from a GERD perspective and from a LPR perspective has to be different since the symptoms vary ever so slightly. The LPR questionnaire must focus more on the symptoms relating to throat and voice as compared to the GERD questionnaire which needs to assess the condition of the oesophagus with relation to the damage done by the anti-peristaltic movement.

Till 2002, there was no validated and approved questionnaire for the diagnosis and follow-up of patients with LPR. The Reflux Symptom Index (RSI) is a self-administered nine-item score sheet for the symptomatic assessment of patients with Laryngopharyngeal Reflux. It was developed by Belafsky et al and it has been in use ever since.[7] The RSI has its advantages in the fact that it is easy to use, inexpensive and is easily available in print. A copy can be simply administered to the patient. Thus, this criterion-based score has become an important tool in diagnosis.

This study deals with the relevance of the RSI in local population whilst treating properly diagnosed patients with LPR. Diagnosis was made on the basis of RSI and Laryngeal Endoscopy findings. Data was accumulated and analysed at the start of treatment and 3 & 6 months thereafter.

Materials and Methods

This prospective study was conducted between January 2018 and December 2019 over a period of 24 months.

The patients included in the study were diagnosed with Laryngopharyngeal Reflux, had RSI greater than or equal to 13, showed laryngeal endoscopy findings secondary to reflux, were 18 years and above, gave consent to treatment and procedure and agreed to be part of the study.

Patients with co-morbidities, Gastroesophageal Reflux Disease, extremes of age, severe disease requiring surgical intervention and those found unfit to take treatment for a 6-month period, were excluded from the study.

All statistical analyses were performed using SPSS Statistics 19 for Windows (IBM Corp., Armonk, NY, USA). Samples were compared and evaluated by means of a paired t-test. A p-value of <0.05 was considered statistically significant. The confidence interval was set at 95%.

All the 91 patients presented to the Out Patient Department of Otorhinolaryngology with complaints related to difficulty in swallowing, difficulty in speech, sensation of foreign body in the throat, voice changes and a feeling of acid in the mouth. Such patients were assessed with a Laryngoscopy and the Reflux Symptom Index instrument. RSI >/=13 was taken as significant.[7]

According to the Reflux Finding Score (RFS), the various laryngeal changes which can be seen in these patients on a laryngeal endoscopy include Oedema (Vocal cords/Subglottis), Ventricular obliteration, Erythema/hyperaemia, Mucus, Granuloma/granulation.[8]

After thorough counselling and acquiring proper consent, each patient was given the RSI instrument before the beginning of the treatment. If the patient was unable to understand English, the same was explained in the local language (Tamil) and a translated version of the same was given (Tables I and II). The risks of treatment and the necessity to continue for a particular amount of time were mentioned.

Table I: Reflux Symptom Index in English.[7]

WITHIN THE LAST MONTH, HOW DID THE FOLLOWING PROBLEMS AFFECT YOU?	0 = NO PROBLEM 5 = SEVERE PROBLEM					
1. Hoarseness or a problem with your voice	0	1	2	3	4	5
2. Clearing your throat	0	1	2	3	4	5
3. Excess throat mucus or post nasal drip	0	1	2	3	4	5
4. Difficulty in swallowing food, liquids or pills	0	1	2	3	4	5
5. Coughing after you ate or after lying down	0	1	2	3	4	5
6. Breathing difficulties or choking episodes	0	1	2	3	4	5
7. Troublesome or annoying cough	0	1	2	3	4	5
8. Sensation of something sticking in your throat or a lump in your throat	0	1	2	3	4	5
9. Heart burn, chest pain, indigestion or stomach acid coming up	0	1	2	3	4	5

கடந்த ஒரு மாதத்தில் , கீழ் கண்ட கஷ்டங்கள் உங்களை எப்படி பாதித்தது?	0 = எந்த பிரச்சினையும் இல்லை 5 = கடுமையான சிக்கல்					
1. கூச்சல் அல்லது உங்கள் குரலில் சிக்கல்	0	1	2	3	4	5
2. உங்கள் தொண்டையை சரி செய்து கொள்வது	0	1	2	3	4	5
3. அதிகப்படியான தொண்டை சளி அல்லது பிந்தைய நாச சொட்டு	0	1	2	3	4	5
4. உணவுகள், திரவங்கள் அல்லது மாத்திரைகளை விழுங்குவதில் சிரமம்	0	1	2	3	4	5
5. நீங்கள் சாப்பிட்ட பிறகு அல்லது படுத்த பிறகு இருமல்	0	1	2	3	4	5
6. சுவாசிப்பதில் சிரமங்கள் அல்லது மூச்சுத் திணறல்கள்	0	1	2	3	4	5
7. தொந்தரவான அல்லது எரிச்சலூட்டும் இருமல்	0	1	2	3	4	5
8. உங்கள் தொண்டையில் ஏதோ ஒட்டிக்கொண்டிருக்கும் உணர்வு அல்லது உங்கள் தொண்டையில் ஒரு கட்டி	0	1	2	3	4	5
9. நெஞ்செரிச்சல், மார்பு வலி, அஜீரணம் அல்லது வயிற்று அமிலம் வரும் உணர்வு	0	1	2	3	4	5

Table II: Reflux Symptom Index in Tamil

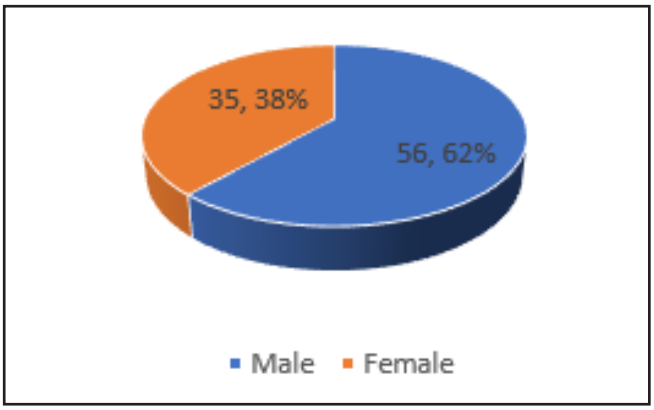

Fig. 1. Gender Distribution

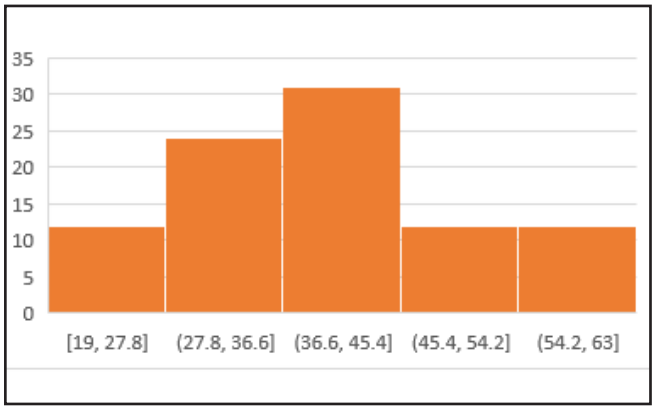

Fig.2. Age Distribution

The RSI instrument contains 9 questions. Each question carries 5 points on a 0-5 severity scale wherein 0 indicates no problem and 5 indicates severe problem. Each patient was asked to fill this up without any prompting. Thus, the maximum score a patient could get was 45. Any value of >/=13 was considered significant and part of study.[7]

The treatment modality was multi-fold and each patient was asked to follow the same pattern.

The dietary modifications included no eating or drinking within 3 hours of bedtime, avoiding over eating or reclining right after meals, fried food, coffee, tea, chocolate, mints, soda, alcohol, sticking to low fat diet and a particular increase in the intake of water.

The lifestyle modifications included elevation of the head end of the bed, avoiding wearing tight fitting clothes or belts and quitting tobacco.

The Medical management included Liquid Antacid – Magnesium Hydroxide and Aluminium Hydroxide (1 tablespoon after each meal and at bedtime) and Proton Pump Inhibitor (PPI) – Pantoprazole, 20 mg half an hour before the first and last meals of the day.

After the aforementioned therapy, patients were asked to follow-up once a month for the next 6 months. The RSI instrument was again given to the patient at the end of 3 months and 6 months. The results were tabulated. After the end of the 6-month period, patients were asked to slowly wean off the medications and strictly follow the lifestyle changes to keep the symptoms under control.

Results

Among the 91 people included in the study, 56 were male and 35 were female. (Fig. 1)

The average age of the study group was found to be 39.62 years. The maximum number of patients were found to be in the age bracket of 36-45 years. The youngest case reported in our study was 19 years with the oldest being 62 years. (Figure 2)

The average RSI score before treatment was 23.78. Before treatment, the symptom causing the most trouble was “Heart burn, chest pain, indigestion or stomach acid coming up” which docked at 4.109/5 and the symptom causing the least trouble was “Breathing difficulties or choking episodes” which docked at 1.637/5.

At the end of 3 months, the sensation of heart burn/ acid in throat improved by about 56% and by the end of 6 months it reached to about 65%.During the treatment i.e. at the 3-month and 6-month intervals, the relative improvement was found to be the most in “Difficulty in swallowing food, liquids or pills” at a significant 11%.

The total score improved by about 49% after 3 months and 58% after 6 months (Table III) and the p-value was found to be significant (Tables IV & V).

Discussion

There is a difference in the symptomatology of GERD and LPR. The patterns, mechanisms, manifestations and treatment of LPR and GERD differ and the

Table III: Average RSI Score at 0, 3 and 6 month timeline

WITHIN THE LAST MONTH, HOW DID THE FOLLOWING PROBLEMS AFFECT YOU?	BEFORE	AFTER 3 MONTHS	AFTER 6 MONTHS
Hoarseness or a problem with your voice	2.538	1.318	1.055
Clearing your throat	2.142	1.142	0.912
Excess throat mucus or post nasal drip	2.406	1.241	1.165
Difficulty in swallowing food, liquids or pills	3.032	1.571	1.253
Coughing after you ate or after lying down	1.912	1.021	0.868
Breathing difficulties or choking episodes	1.637	0.978	0.868
Troublesome or annoying cough	2.56	1.274	1.066
Sensation of something sticking in your throat or a lump in your throat	3.439	1.67	1.429
Heart burn, chest pain, indigestion or stomach acid coming up	4.109	1.824	1.418
TOTAL	23.775	12.044	10.034

gastroenterology model of reflux disease does not apply to LPR. LPR patients have head and neck symptoms, but heartburn is uncommon. Consequently, LPR is often called silent reflux. LPR patients have predominantly upright (day-time) reflux and normal oesophageal motility; most do not have oesophagitis, which is the diagnostic entity of GERD. Laryngopharyngeal epithelium is far more susceptible to reflux-related tissue injury than is the oesophageal epithelium. Because of these differences, treatment algorithms for LPR and GERD vary.[9]

The RSI is a nine-item self-administered outcome instrument that accurately documents symptom improvement of patients with LPR, thus displaying excellent criterion-based validity.[7]

The questionnaire from a GERD perspective and from an LPR perspective has to be different since the symptomatology vary ever so slightly. The LPR questionnaire must focus more on the symptoms in the throat and voice as compared to the GERD questionnaire which needs to assess the condition of the oesophagus with relation to the damage done by the anti-peristaltic

Table IV: Paired Sample Correlations after 3 months.

	PAIRED DIFFERENCES					T	SIG.	CORRELATION
	MEAN	STANDARD DEVIATION	STANDARD ERROR MEAN	95% CONFIDENCE INTERVAL OF THE DIFFERENCE				
				LOWER	UPPER			
RSI before to RSI after 3 months	11.74	3.32	0.35	11.05	12.42	33.9	0.001	0.69

SD: Standard deviation, CI: Confidence interval, SE: Standard error

Table V: Paired Sample Correlations after 6 months.

	PAIRED DIFFERENCES					T	SIG.	CORRELATION
	MEAN	STANDARD DEVIATION	STANDARD ERROR MEAN	95% CONFIDENCE INTERVAL OF THE DIFFERENCE				
				LOWER	UPPER			
RSI before to RSI after 6 months	**13.75**	**3.4**	**0.35**	**13.04**	**14.45**		**0.001**	**0.66**

SD: Standard deviation, CI: Confidence interval, SE: Standard error

movement.

Symptoms of LPR improve over 2 months of therapy. The physical findings of LPR resolve more slowly than the symptoms and this continues throughout at least 6 months of treatment. The physical findings of LPR are not always associated with patient symptoms and treatment should continue for a minimum of 6 months or until complete resolution of the physical findings.[10]

The diagnosis of LPR is usually made on the basis of presenting symptoms and associated laryngeal signs. Current recommendation for management of this group of patients is empiric therapy with twice daily proton-pump inhibitors for 2–4 months.[11] In majority of those who are unresponsive to such therapy, other causes of laryngeal irritation is considered.

Although acid can be controlled by proton pump inhibitor (PPI) therapy, all of the other damaging factors (i.e. pepsin, bile salts, bacteria and pancreatic proteolytic enzymes) remain unchanged on PPI therapy and may have their damaging ability enhanced.[12]

Changing food, lifestyle and habits will go a long way in reducing the drug intake and maintaining long term cure. Laryngopharyngeal reflux still has many aspects in its etio-pathogenesis as well as treatment which need to be understood before we can achieve complete cure rates.[13] Awareness regarding LPR in general population will also help reduce the severity with which the patients present to the primary care physician.

PPIs remain the cornerstone of treatment of LPR. The current management recommendation for this group of patients is empiric therapy with twice-daily PPIs for 1 to 2 months.[14]

Various studies have found that the RFS as a clinical tool for diagnosis of LPR should be viewed with limited utility as it exhibits low inter-rater reliability.[15] Thus, it becomes all the more necessary that the RSI be assessed extensively for symptomatic betterment of the patient.

Every fifth patient who reports to their family medicine physician shows symptoms of LPR. At primary health care levels, it is possible to establish some form of prevention, diagnostics and therapy for LPR in accordance with suggested algorithms. Only a small number of patients require surgical procedures and do not show improvement with medical management.[16]

Research has proved that the RSI is a quality tool in the assessment of LPR. It can be used in regular ENT practice to analyse the improvement in patients after the commencement of therapy.[17,18]

Conclusion

The diagnosis and management of Laryngopharyngeal Reflux is tough in clinical practice since the symptoms are loosely related to Gastroesophageal Reflux Disease. Specific tools are thus needed which can aid in the assessment of improvement or deterioration of the patient after the treatment modality is administered. One of those tools include the Reflux Symptom Index which is by far the easiest to use because of its non-invasive and time-saving nature and cost effectiveness. In our study, we found that the RSI improved by about 49% after 3 months and 58% after 6 months. It can thus

be concluded that the RSI is a relevant tool to assess patients with LPR in our population.

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Alteration in Status of Olfaction amongst COVID 19 Patients: A Descriptive Study in a Dedicated COVID Hospital of Eastern India

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ABSTRACT

Introduction

COVID 19 patients present with symptoms of respiratory tract infection as it is caused by SARS Cov-2 which is a β corona virus. A significant number of patients may complain of changes in olfaction either at the onset or later. The incidence, severity and recovery from anosmia/hyposmia varies in different patients. This study was done to investigate the effect of COVID 19 on olfactory dysfunction in the Indian population.

Materials & Methods

100 patients admitted with RT-PCR positive reports for SARS Cov-2, in a dedicated COVID hospital in eastern India, were included in this study. Their olfactory function was estimated by pocket smell test (4 items) during ENT examination at bed side. Recovery from anosmia/hyposmia were noted during follow up visits.

Results

In our study 36% of patients had some alteration in smell. Out of the 36%, 12% had anosmia and 24% had hyposmia. Chances of complete recovery is more in patients suffering from anosmia than hyposmia.

Conclusion

Changes in smell sensation is a significant marker for screening and diagnosis of cases of COVID 19. Most of the patients recover completely.

Keywords

COVID 19; SARS CoV 2; Anosmia; Hyposmia

The highly transmittable Corona Virus Disease 19 (COVID-19) is caused by a β corona virus known as Severe Acute Respiratory Syndrome corona virus-2 or SARS Cov-2. It was first reported in Wuhan, China, on 31st December, 2019 (WHO) and spread throughout the world, creating a pandemic and continues to take numerous lives daily. Human-to-human transmission is increasing at a troublesome exponential rate, which has led to steep curves of infection in many areas .[1]

Most of the infected people develop mild to moderate symptoms, some of them being fever, malaise and non-productive cough.[2] Some people may present with changes in smell and taste sensations (e.g. anosmia and dysgeusia), sore throat, myalgia, etc. Anosmia and dysgeusia may be the presenting symptoms in a significant number of patients infected with COVID 19.

Immediate self-recognition of olfactory dysfunction is thought to be present in the most severe cases, or it is only self-identified after a prolonged latency period.[3,4]

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Temporary loss of smell and some disturbances in taste are commonly seen in patients with Viral Upper Respiratory Tract Infection through an inflammatory reaction of the nasal mucosa and the development of rhinorrhea. The most familiar agents associated being rhinovirus, parainfluenza, Epstein-Barr virus and some coronavirus 5,6. However, olfactory dysfunction linked to COVID-19 infection seems peculiar, as it is not associated with rhinorrhea.

Lechien et al. found in their study within European population that olfactory disorder may appear before the rest of the complaints in 11.8% of cases, making them very important for early detection of the disease7.A study done by Luers et al.8 in Germany, shows that 70% of the patients suffering from COVID 19 had olfactory dysfunction. But there is scarcity of studies in the Indian population.

The objectives were to study the magnitude of changes in smell among all COVID 19 patients admitted in ID and BG Hospital, Kolkata, elicit the factors associated with the changes and estimate the median recovery time of changes in smell among the study subjects.

Materials and Methods

A descriptive type of cross sectional study was conducted in a dedicated centre for COVID-19 infected cases in Kolkata over a period of 2 months, with 100 study subjects. All of them were laboratory tested COVID positive patients, without any debilitating symptoms, who consented to participate in the study . Clearance was obtained from the institutional ethics committee.

A Pocket smell test {(4 items- soap, grap, onion, gas) on basis of olfaction test of the 2013-14 US, National Health and Nutrition Examination Survey (NHANES)},[9] was used as the study tool and clinical data was prospectively collected during the ear, nose, and throat (ENT) consultation.

Small dark colour bottles of same shape and size, containing the essence were kept in front of the patient. The patient was asked to compress each nostril in turn and sniff through the other, to confirm airway patency. The test odour was then placed under one nostril while the other is compressed, and the patient was asked to take two good, but not overexuberant sniffs. He was then asked:

1. If he could smell anything
2. If he could identify the odour

If he could identify the odour, then the test was repeated in the other nostril.

After an interval to allow the odour to disperse, the test was then repeated with three other odours, and in addition he was asked

3. If he could distinguish the different odours.

After the examination, the patients were grouped into following :

Anosmia: Those who did not perceive any smell

Hyposmia: Those who perceived odour of less than four items

Normosmia: Those who could identify all the 4 items

For a good clinical history, each patient was given a proforma to fill which was later evaluated.

Patients were followed up over phone after discharge, for two months regarding full recovery of the symptoms.

Statistical analysis was done using Microsoft Excel.

Results

Data was collected from 100 patients admitted in the COVID ward of Infectious Disease and Beliaghata General Hospital, Kolkata and they were categorised. Our study included 68 males and 32 females. (Fig.1)

The patients were divided into 5 groups based on their age distribution. Out of the 100 participants, 36% (maximum number) were in 20-30 years of age, followed by 16% in 31- 40 years, 24% in 41- 50 years, 16% in 51-60 years and 8% in more than 60 years. (Fig. 2)

Assessment of proforma filled by patients revealed that out of the 100 participants, 64% were normosmic, 24 % had hyposmia and 12% had anosmia. (Fig. 3) Most of the (10) patients of hyposmia were in the age group of 51- 60 years, and maximum number of patients with anosmia (8) were in the age group of 20- 30 years. So anosmia was more common in younger age group whereas, hyposmia was more in older age group. (Fig. 4)

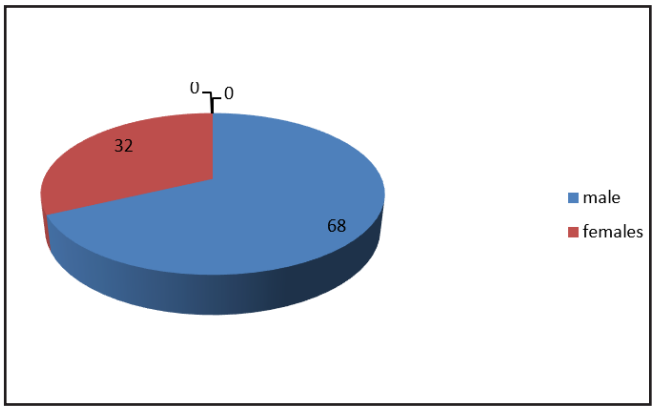

Fig. 1. Distribution of sex

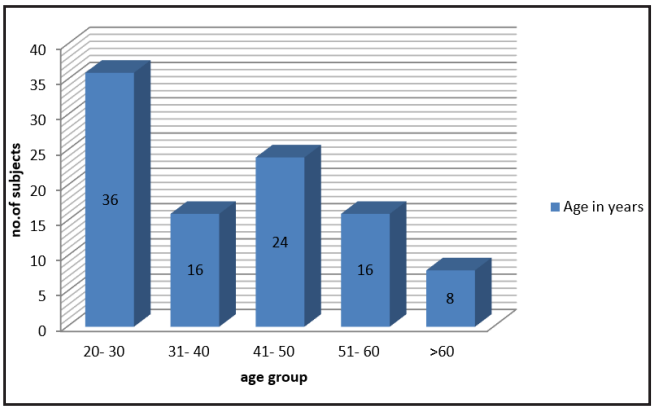

Fig. 2. Age group Distribution

Among patients with anosmia and hyposmia, maximum had onset of the alteration of smell within 1week of other symptoms, whereas the alteration of smell was the presenting feature in 33.33% of anosmic patients and 12.5% of hyposmic patients. (Table I, Fig. 5). The patients were followed up till discharge and after discharge from the hospital, over phone regarding persistence of symptoms. Maximum patients with alteration of smell improved within the 1st month(i.e. 58.33% of patients with anosmia and 70.83% patients with hyposmia). 16.67% of the anosmia patients and 20.83% hyposmia patients had persisting dysfunction even after 2 months (Table II).

Discussion

100 patients who were tested positive for SARS-COV 2 by Reverse Transcriptase- Polymerase Chain Reaction test, and volunteered for the study were included in the study. Out of the 100 subjects, 68% were male and 32% females. Maximum number of patients (36%) were in 20-30 years of age, followed by 16% in 31- 40 years, 24% in 41- 50 years, 16% in 51- 60 years and 8% in more than 60 years. History and examination showed that 64% of them were normosmic, 24 % had hyposmia and 12% had anosmia. 45% of the patients had known contact with a patient tested positive for COVID 19.

In our study 36% of patients had some alteration in smell and 13% had alteration in taste. Out of the 36%, 12% had anosmia and 24% had hyposmia ,which was confirmed by clinical history and pocket smell test.

A study by Jan C. Luers8 in Germany, which showed that 70% of the patients had olfactory dysfunction, is in contrast to our study.

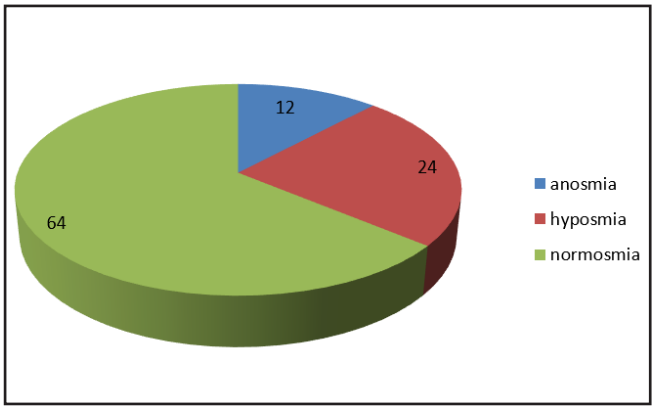

Fig. 3. Alteration of smell

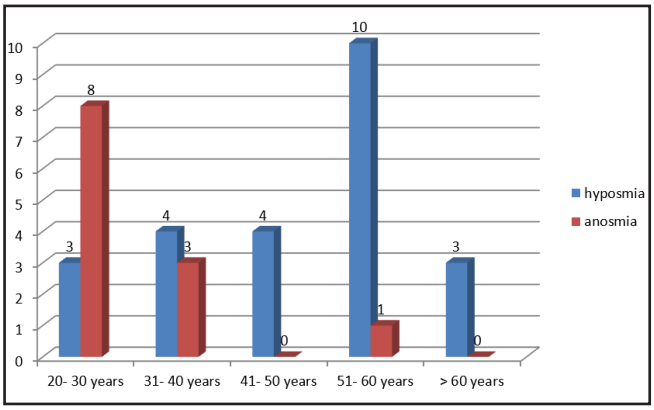

Fig. 4. Age wise distribution of patients having anosmia and hyposmia

Table I: Onset of alteration of smell with respect to other symptoms

ONSET OF THE ALTERATION OF SMELL	ANOSMIA (12)	HYPOSMIA(24)
Simultaneously with other symptoms	4 (33.33%)	3 (12.5%)
Within a week of other symptoms	8 (66.67%)	21 (87.5%)

Table II: Time taken for recovery of symptoms

RECOVERY OF SYMPTOMS	ANOSMIA (12)	HYPOSMIA(24)
Full recovery within a month	7 (58.33%)	17 (70.83%)
Recovery between 1- 2 months	3 (25%)	2 (8.33%)
Persisting dysfunction after 2 months	2 (16.67%)	5 (20.83%)

One of the most commonly identified causes of olfactory loss is Upper Respiratory Tract Infection, accounting for 22% to 36% of cases,[10] which is consistent with our study. In a study by Lechien et al,[7] a total of 357 patients (85.6%) had olfactory dysfunction related to the COVID 19 infection, among which 284 (79.6%) patients were anosmic and 73 (20.4%) were hyposmic . Lovato and de Filippis reviewed five articles about the clinical presentation of COVID-19 patients from China, comprising 1556 cases, with no reports of olfactory dysfunction.[11] Mao et al.[12] analysed the neurologic symptoms of 214 patients retrospectively in Wuhan, China, and found that 5.1% (n = 11) of the patients exhibited smell impairment. The above two studies show that smell impairment is lesser in Chinese population as compared to European and American population. In a study by Khare et al,[13] the percentage of COVID-19 positive individuals who were unable to either smell or identify the odorants correctly, or both, went as high as 48.9 % for single odorant and 22.5% for two odorants. The difference in identification of smell and complete inability to sense the smell was

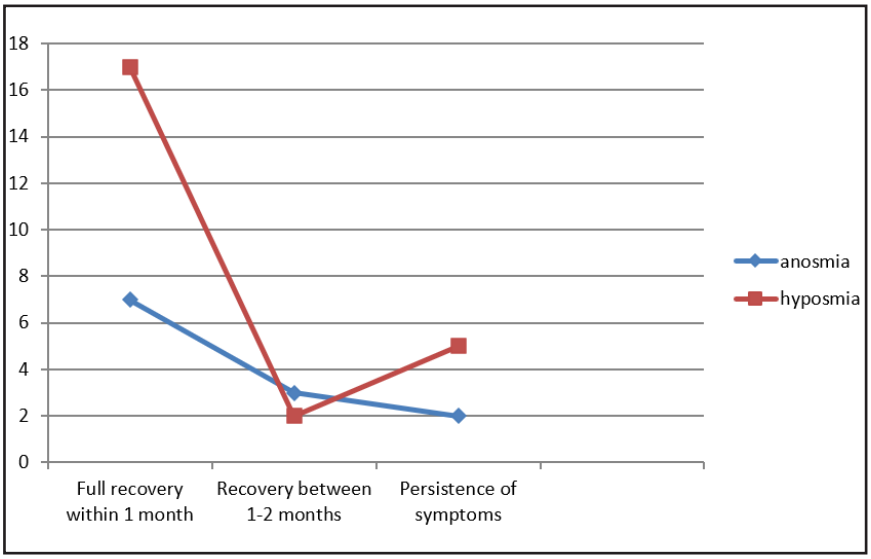

Fig. 5. maximum improvement in patients within 1 month period

different among COVID-19 positive individuals as 38.8% were completely unable to smell a single thing and 16% individuals could not smell two odorants. In the study by Mishra et al where 74 COVID-19 patients were evaluated for presence of anosmia, it was found that 11 patients (14.8%) had symptoms of anosmia while in controls that were COVID-19 negative, none had anosmia and only one subject had hyposmia.[14] Our study is consistent with other Indian studies with respect to the prevalence of anosmia and hyposmia.

Among patients with anosmia and hyposmia, maximum had onset of the alteration of smell within 1week after appearance of other symptoms. Alteration of smell was the presenting feature in 33.33% of anosmic patients and 12.5% of hyposmic patients.

Maximum patients with alteration of smell improved within the 1st month, i.e. 58.33% of patients with anosmia and 70.83% patients with hyposmia showed complete improvement in the first month. 25% of anosmic patients and 8.33% of hyposmic patients had complete improvement after 1st month of treatment, whereas 16.67% of the anosmia patients and 20.83% of hyposmia patients had persisting dysfunction even after 2 months of follow up.

In a study by Lechien et al, 72.6% of these patients recovered from the olfactory dysfunction within the first 8 days following the resolution of the disease and 25.5% of patients recovered both olfactory and gustatory functions throughout the 2 weeks after the resolution of the general symptoms.[7] In the study by Mishra et al. 7 out of 11 patients had regained the sense of smell 14 days following discharge and all the patients had regained their olfaction at the end of 21 days.[14]

Upper respiratory tract infection is one of the most commonly identified causes of olfactory loss, accounting for 22% to 36% of cases.[10] Many viruses which cause olfactory dysfunction is through an inflammatory reaction of the nasal mucosa and thus also present with rhinorrhea; like rhinovirus, parainfluenza, and some coronavirus. [5,6] However, olfactory dysfunction linked to COVID-19 infection is different in a sense that it is not associated with rhinorrhea.

The mechanism of action of the Novel Corona virus (SARS- CoV-2), might be similar to the family of corona virus, because of the similarity in their structure.[15] Coronaviruses could invade the brain via the cribriform plate close to the olfactory bulb and the olfactory epithelium. Yao et al[16] have reported that the volume of the olfactory bulb is decreased in patients with postinfectious olfactory loss and is inversely related to the duration of olfactory loss. Recently Ligget et al[17] described expression of the olfactory receptor family on central cortical neurons, vascular smooth muscle, and upper and lower airway epithelium. Fodoulian et al, identified ACE 2 and TMPRSS2 receptors in the olfactory sustentacular cells, horizontal, basal and microvascular cells.[18] The spike protein (S) on the surface of SARS-CoV-2 virus plays an essential role of attachment of the virus particle on ACE 2 receptor and its transneuronal spread.

A scarcity of acute phase advanced neuroimaging studies, difficulties in obtaining histopathological tissue specimens, and an absence of viral cultures of infected olfactory neuroepithelium compound the difficulties in studying this phenomenon.

Conclusion

Our study shows that alteration of smell can be the sole presenting symptom in patients with COVID 19, which can be included as a criteria for isolation of the subjects to prevent spread of the infection.

There is also a significant variance in the occurrence of olfactory dysfunction among COVID 19 patients, rates being lesser in the Indian population compared to the American and European populations.

Young patients do suffer from anosmia more than the aged patients. There is more probability of complete recovery from anosmia than hyposmia.

Another important finding is that some patients can have a persistent loss of smell following infection with COVID 19, which has to be explained to the patients on appearance of the symptoms.

The possibility of COVID 19 infection should be considered clinically in any patient presenting with change in smell or taste disorder with new onset of pyrexia with a positive history of contact with COVID 19 patients and / or travel prior to 14 days to a location

where there is community transmission of SARS-COV-2 (COVID 19).

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PROFORMA

1. Age:
2. Sex:
3. Address:
4. Chief complaints:
5. History of present illness:

a. When did the symptom of reduced sensation of smell start (with reference to contact history/ first symptom/ test positive)

b. If there was a complete or partial loss of smell

c. Did the symptoms recover with time?

d. If so, how much time did it take to recover?

6. History of past illness:

a. Travel History: (International / Other state)

b. History of contact with COVID positive patients: Yes/ No

c. Comorbidities: Diabetes Mellitus/ Hypertension/ COPD/ SARI

d. Previous history of Chronic rhinosinusitis / Nasal polyposis/ Allergic rhinosinusitis, nasal surgery.

e. Past history of trauma to the nose/ head injury

f. History of any Neurodegenerative disease (eg Parkinson's disease, Multiple myeloma)

7. Examination of the nose:

a. External nose

b. Vestibule

c. Anterior rhinoscopy (without a speculum): to see if there is any gross obstruction.

8. Olfactory examination: (with Pocket smell test (4 items- soap, grape, onion , natural gas):

a. If he can smell anything : (yes/ no)

b. If he can identify the odour: (yes/ no)

c. If he can distinguish the different odours: (yes/ no)

Main Article

The Effect of Stimulus Rates in Chirp and Click Evoked Auditory Brainstem Response in Adults with Normal Hearing Sensitivity

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ABSTRACT

Introduction

The effects of increasing stimulus repetition rate on the ABR using click stimuli have been investigated in normal and hearing impaired subjects with neurologic abnormality but there is limited study on the effect of stimulus repetition rate on ABR using chirp stimuli. The present study aims to compare the chirp evoked auditory brainstem responses with reference to changes in latency of peaks, interaural latency differences and interwave latency intervals as a function of rate and compare those responses with the click evoked auditory brainstem responses, in normal hearing subjects.

Materials and Methods

Total 30 normally hearing adults were considered for this study. All participants were screened for normal hearing sensitivity upto 8 kHz in pure tone audiometry for middle ear pathology and central auditory processing disorder. Four parameters of ABR were considered to assess in this study including absolute latency, interwave latency intervals, latency-rate function and interaural latency. ABR was done based on the protocol of this study.

Results

Results revealed that there was a significant difference in the absolute latency and interwave intervals when the stimulus repetition rate was increased.

Conclusion

The latencies of wave III and V increases and waveform morphology changed as the stimulus repetition rate increased above 20/sec. The absolute latency of wave III and V was found to be shorter than clicks and can be used especially in newborn hearing evaluation assuming in shorter time window.

Keywords

Evoked Potentials, Auditory, Brain Stem; Chirp; Click; Latency; Stimulus Rate

The auditory evoked potentials are the electrical responses of the nervous system to auditory stimuli.[1] The ABR is a complex response to particular type of external stimuli that characterizes neural activity generated from the eighth cranial nerve i.e. vestibulocochlear nerve and neural centers and tracts within the brainstem which are responsive to auditory stimulation. Auditory brainstem response (ABR) audiometry was first described Jewett and Williston in 1971.[2]

The ABR waveform revealed by summation usually has wave components (peaks and troughs) which are described by their amplitude and latency characteristics. By correlating the location of the lesion with the changes in the ABR, information about the origin of the different components of the ABR was obtained.[3,4,5,6] The time interval between the stimulus onset and the peak of a

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waveform is referred as the absolute latency , more precisely, the absolute latency of a peak because it is related to the onset of the stimulus respect to the particular peak. The unit measurement of latency is millisecond (ms). Latency of ABR waveforms is the most consistent and robust characteristics and provides the nucleus of ABR interpretation and peak latencies should replicate within 0.1 ms. In normal individuals, the absolute latency of wave I should occur approximately at 1.6 ms after stimulus onset, wave III at about 3.7 ms and wave V at about 5.6 ms for click presented at an intensity level of approximately 75 dB above normal threshold.

The limits of the normal latency range encompass either two or three standard deviations from the mean value.[7] Latency is affected by various factors; most commonly observed change is increase or decrease of stimulus intensity and repetition rate. Substantial maturational changes occur in the ABR during early life, both in terms of waveform morphology and latencies. Hecox and Galambos (1974) concluded that ABR waves in infants are incomplete, only wave I, III, V are observed, and interwave intervals are initially prolonged.[8] At around 18 months of age other wave components emerge and wave III and V progressively shorten in latency. In infants wave I is more prominent than later waves because peripheral system matures before central auditory nervous system.[9] The length of time window will vary with the age of the patients, the intensity and the type of the stimulus used. In adults a time window of 10-12 ms is sufficient, but testing below 18 months ABR components are delayed, therefore a time window of at least 15 ms is recommended.[7] For eliciting a detectable ABR, the acoustic click is often thought to be an ideal stimulus because of its abrupt onset, a wide spectral spread, are inherent in transient signals; which elicit synchronous discharge from a large portion of cochlear fibers.[10,11] For estimation of low frequency hearing status, frequency specific ABR using tone burst, which have a rapid rise time while still maintaining some frequency specificity, can be used.[12]

In creating a chirp stimulus, higher frequency components contributing to the stimulus are delayed in time relative to the lower frequency components.[13] Through this stimulus generation, chirps are designed to offset cochlear delays and increase synchronous neural firing, resulting in increased response amplitude.[14]

Materials and Methods

Quasi Experimental design was used. There were 30 normal hearing participants, included 15 males and 15 females (mean age: 22.30 years, standard deviation: 2.10 years) within the age range 18- 25 years, with a thorough case history with normal medical and otologic history. All the subjects passed an otoscopic examination to ensure a normal external ear canal, had hearing sensitivity within normal limits (< 25dBHL) at standard audiometric frequencies (250 Hz to 8000Hz; ANSI 1996), having normal speech discrimination score was within the range of 80%-100% and normal middle ear function and tympanic membrane movement, as measured by tympanometry, no central auditory processing disorder and Auditory Neuropathy Spectrum Disorder.

Double sound treated room with permissible noise level no more than 25 dB as per ANSI S3.6- 2003was used. ABR instrument was calibrated as per manufacture specification. Subjects were asked to stay quiet and relaxed in order to avoid artifacts related to the muscles responses. After cleaning the surface of skin, electrodes were placed by the conductive electrode paste, attached to the skin with the tape. The electrode was placed at vertex or positive electrode (Cz), two negative electrodes were placed on mastoid (A1 and A2) and the ground electrode was placed on forehead. The impedance was checked at beginning of the test and end of the test maintained at less than or equal to 5000 ohm, and the 2000 ohm was the electrode impedance difference of each other. A total 2000 alternative stimulus was presented through insert earphones at the fixed level of 80 dBnHL. Filter setting was 100 Hz to 3000 Hz and the repetition rates were 11.4/sec, 20/sec, 27.1/sec, 27.7/sec,33.1/sec 44.1/sec.

Only the ipsilateral recording was done. The latencies of each wave were plotted after acquisition of the data and absolute latency, interwave latency and interaural differences were measured.

Data was recorded for all the participants. The latency

of peak I, III and V, interaural latency differences, interwave latency intervals was obtained at different stimulus rate at the fixed intensity level for comparing of two stimuli (chirp and click) in normal hearing adults. Data was processed in excel spread sheet, and analyzed using statistical package for the social Science software (Version 16.0). Descriptive analysis was used to calculate the normative. Independent-sample t test, one-way Analysis of Variance, posthoc (Tukey) tests were performed to measure any significant differences in the latency value as a result of increasing stimulus rate.

Results

The objective of the present study was to develop normative data for chirp stimulus at six different stimulus repetition rates at a fixed intensity level (80dBnHL) for adult normal hearing population and to study the effect of stimulus rate on the ABR latencies and compare the auditory brainstem responses elicited by chirp stimulus and click stimulus in participants. Results were analyzed in terms of absolute latencies of waves I, III, V and interwave intervals of wave I-III, III-V and I-V, latency rate functions and interaural latency differences. (Table I)

Post hoc (Tukey) analysis for multiple comparison (Table II) showed significant mean difference in the absolute latency values of wave I between the stimulus repetition rates of 11.4/sec and 44.1/sec [p=0.006] at 95% level of confidence. No significant mean differences have been found in corresponds to other mentioned rates i.e. 20/sec, 27.1/sec, 27.7/sec and 33.1/sec. There was significance mean difference in the absolute latency of wave III between the stimulus repetition rates of 33.1/sec and 11.4/sec [p= 0.019], 44.1/sec and 20/sec [p=0.001], 44.1/sec and 27.1/sec [p=0.001] and 44.1/sec and 27.7/sec [p=0.027] and 44.1 and 11.4/sec [p=0.000] at 95% level of confidence. No significant mean differences were found in corresponds to other mentioned rates; It was found that there was significant mean difference in the absolute latency of wave V between the stimulus repetition rates of 44.1/sec and 33.1/sec [p=0.044], 44.1/sec and 27.7/sec [p=0.000], 44.1/sec and 27.1/sec [p=0.000], 44.1/sec and 20/sec [p=0.000], 44.1/sec and 11.4/sec [p=0.000],

Table I: Determine the normative values of absolute latency of wave I, III, V and interwave intervals of wave I-III, III-V and I-V at six different stimulation rates in chirp evoked ABR.

WAVE	REPETITION RATES (/SEC)											
	11.4/SEC		20/SEC		27.1/SEC		27.7/SEC		33.1/SEC		44.1/SEC	
	MEAN	S.D	MEAN	S.D	MEAN	S.D	MEAN	S.D	MEAN	S.D	MEAN	S.D
Wave I	1.38	0.27	1.45	0.28	1.44	0.31	1.49	0.31	1.5	0.29	1.57	0.25
Wave III	2.99	0.4	3.06	0.42	3.05	0.44	3.12	0.36	3.22	0.34	3.34	0.35
Wave V	4.3	0.42	4.39	0.46	4.51	0.54	4.54	0.47	4.69	0.48	4.95	0.48
Interwave interval of Wave I-III	1.6	0.33	1.59	0.37	1.61	0.37	1.62	0.31	1.74	0.31	1.76	0.34
Interwave interval of Wave III-V	1.3	0.35	1.33	0.35	1.46	0.36	1.43	0.39	1.46	0.33	1.62	0.32
Interwave interval of Wave I-V	2.91	0.41	2.94	0.43	3.07	0.54	3.06	0.42	3.19	0.39	3.38	0.46

Table II: One-Way ANOVA showing the effect of stimulus repetition rates on absolute latency values of waves in normal hearing adults.

WAVE	LATENCY VALUES									
	BETWEEN GROUPS					WITHIN GROUPS			TOTAL	
	SUM OF SQUARE	DF	MEAN	F	SIG.	SUM OF SQUARE	DF	MEAN	SUM OF SQUARES	DF
Wave I	1.217	5	0.243	2.856	0.015	30.158	35 4	0.085	31.375	359
Wave III	4.875	5	0.975	6.351	0	54.346	354	0.154	59.222	359
Wave V	15.801	5	3.16	13.69	0	81.72	354	0.231	97.521	359
Interwave intervals of Wave I-III	1.669	5	0.334	2.811	0.017	42.035	354	0.119	43.704	359
Interwave intervals of Wave III- V	378.829	5	75.766	1.188	0.315	22576.678	354	63.776	22955.506	359
Interwave intervals of Wave I-V	9.047	5	1.809	9.322	0	68.707	354	0.194	77.753	359

33.1/sec and 20/sec [p=0.010], and 33.1/sec and 11.4/sec [p=0.000] at 95% level of confidence. No significant mean differences were found in corresponds to other mentioned rates; in case of interwave intervals, there is no significant mean difference in the interwave intervals of wave I-III and III-V between the all selected stimulus repetition rates. But there is positively significance mean difference in the interwave interval of wave I-V between the stimulus repetition rates of 44.1/sec and 11.4/sec [p=0.000], 44.1/sec and 20/sec [p=0.000], 44.1/sec and 27.1/sec [p=0.002], 44.1/sec and 27.1/sec [p=0.001], 33.1/sec and 20/sec [p=0.21], and 33.1/sec and 11.4/sec [p=0.009] at 95% level of confidence. No significant mean differences were found in corresponds to other mentioned rates. The mean difference is significant at the 0.05 level.

Regarding interaural latency differences, through t test statistics (p>0.05) indicated that there was no significant difference in absolute latency of wave I, III, V, interwave interval of wave I-III, III-V and I-V latencies at six selected repetition rates.

By calculating t test statistics (p>0.05) There was no significant difference in absolute latency of wave I between chirp and click evoked responses for six stimulus repetition rates but there was significant difference in absolute latency of wave III, V, interwave interval of wave I-III, interwave intervals of wave III-V, and interwave intervals of wave I-V between chirp and click ABR at six selected repetition rates.

Discussion

Present study aims to find out the normative value of absolute latency of ABR waves and the interwave intervals for chirp evoked ABR at different stimulus repetition rates and to find out the effect of repetition rates on the ABR waves when it is evoked by chirp stimulus and to compare the responses elicited by chirp stimulus and click stimulus in normal hearing participants.

Interwave interval of I-III, III-V, I-V. (Fig. 1) There was a significant difference in the absolute latency value of wave I, III, V as the effect of stimulus repetition rate for chirp evoked ABR i.e. absolute latency was prolonged as the repetition rate was increased. No significant differences were observed for interwave intervals of wave III-V as an effect of increasing stimulus repetition rate and for interwave intervals of wave I-III, I-V was observed for chirp evoked ABR.

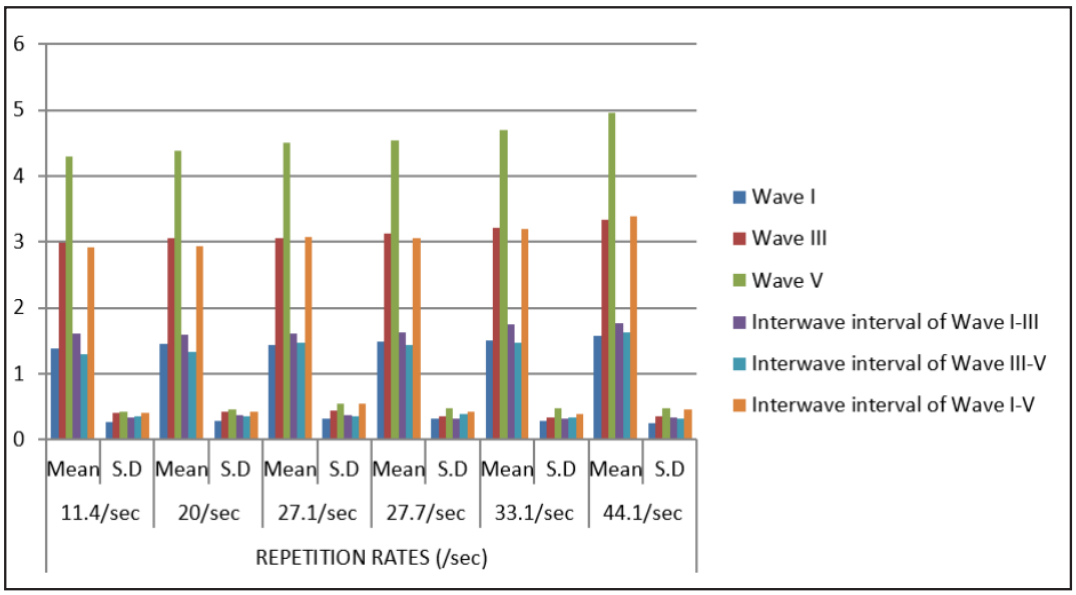

Fig. 1. Determine the normative values of absolute latency of wave I, III, V and interwave intervals of wave I-III, III-V and I-V at six different stimulation rates in chirp evoked ABR.

The present study showed that there was no significant inter-aural difference in absolute latency of wave I, wave III, wave V and interwave intervals of wave I-III, III-V and I-V in normal hearing adults at different stimulus repetition rates in chirp evoked ABR.

There was no significant difference in absolute latency of wave I between two stimuli i.e. clicks and CE-Chirp, but the difference in the absolute latency

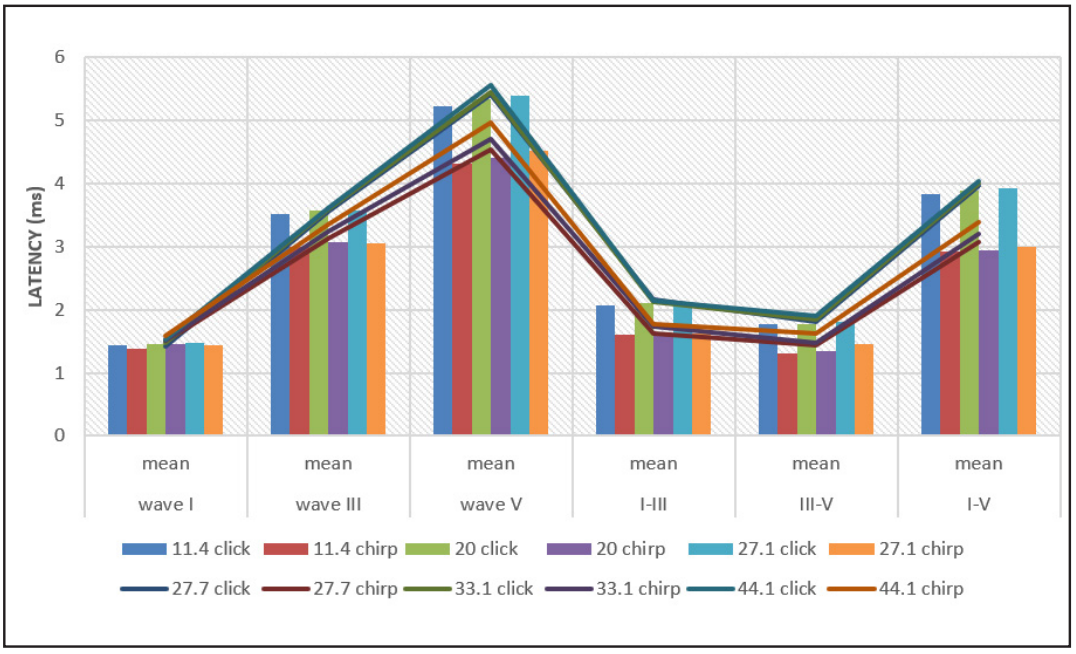

Fig. 2. Chart showing the mean difference of the absolute latency of wave I, III, V and inter-wave intervals of I-III, III-V, I-Vin six different stimulus rates between chirp-evoked ABR and click-evoked ABR in normal hearing adults.

of wave III and wave V was significant between two stimuli i.e. the absolute latency value of wave III and Vis more for click stimulus than chirp stimulusat all stimulus repetition rates. (Fig. 2) Present study showed that the difference in the interwave intervals of wave I-III, III-V,I-V was significant between two stimuli i.e. clicks and CE-Chirp.

The findings of the present study were supported by the findings of Cebulla et al that Chirp-evoked responses showed clearly larger wave amplitudes and shorter wave's latencies compared to those evoked by click.[15]

The present study also supported by the findings of Hamada et al that statistically significant difference of wave V latency when comparing between click, low frequency and high frequency chirp in all test conditions in normal hearing subjects.[16]

This study supports the finding of Hall (2016) that the amplitude for the ABR is usually up to two times larger for chirp stimuli than for traditional stimuli.[17] That means one can identify wave V with more confidence, which leads to reduce test time than clicked evoked ABR.

The possible explanation for shift in latency of ABR waves as a function of rate in chirp stimuli is due to cumulative neural fatigue and adaptation and incomplete recovery involving hair-cell-cochlear nerve junction and also subsequent synaptic transmission.[18] The difference in the latency value of ABR component for chirp and clicks can be explained by the simultaneous depolarization of all frequency regions of the basilar membrane. Chirps are designed to offset cochlear delays and increase synchronous neural firing.[14]

Conclusion

As stimulus repetition rate increases above 20/sec, the latencies of wave III and V increases and waveform morphology changes. The absolute latency of wave III and V was found to be shorter than clicks and can be used especially in newborn hearing evaluation assuming in shorter time window, but further study may need for establishment of normative in newborn, and comparison of stimulus rate in disorder population at various age groups, so that chirp evoked ABR can be used in diagnostic purpose. The chirp ABR helps in assessing hearing thresholds.

Limitations of the Study

I. As compared to the click evoked ABR the recommended stimulus rate in chirp evoked ABR was not computed.

II. Stimulus repetition rate beyond 44.1/sec could not be analyzed due to instrumental limitation.

Future Directions

I. Comparison of stimulus repetition rates in chirp ABR in newborn population.

II. Comparison of stimulus repetition rates in tone burst and chirp stimuli.

III. To compare the chirp stimulus in diseased population.

IV. To compare the chirp stimulus in male and female.

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Nasal Septal Perforation: Experience of Management

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ABSTRACT

Introduction

Nasal septal perforation is the loss of composite tissue comprising the mucosa, bone or cartilage structures that form the nasal septum. Nasal septum perforation has many causes. Though it may be idiopathic, the most common causes are iatrogenic like nasal surgeries. Among other reasons are septal hematoma, nasal picking habit, nasal cauterization due to nosebleeds, nasotracheal intubation, cocaine use, vasculitis, inflammatory diseases such as sarcoidosis, This study aims to review the approach to management of patients with nasal septal perforation who underwent repair of the perforation in a tertiary clinic, in the light of current literature.

Materials and Methods

In this study, the records of 27 patients who were diagnosed with nasal septal perforation and treated surgically in a tertiary clinic, between January 2015 and June 2019 were reviewed retrospectively.

Results

The successful closure rate of perforations was 74%. In 4 of 7 patients whose perforations were not completely closed, the perforation size was larger than 2 cm in diameter.

Conclusion

Successful repair of nasal septal perforation depends largely on the cause, location, size of the perforation, cartilage bone tissue on the perforation edges, surgical technique and the surgeon's experience.

Keywords

Nasal Septum; Nasal Septal Perforation; Surgical Flaps

Nasal septal perforation (NSP) is not common and its treatment is difficult. Trauma (nasal surgery, septal fracture, septal hematoma, nasal foreign bodies and nasal piercing, nasal picking, septal cauterization, nasotracheal intubation, etc.), long-term use of nasal spray, smoking habit, cocaine use, inflammation (vasculitis, collagen vascular diseases, sarcoidosis, Wegener granulomatous), infection (tuberculosis, syphilis, lepromatous leprosy, diphtheria, etc.), chemical irritants and neoplasm are among the causes of septal perforation.[1-4]

In recent years, nasal steroid and decongestant sprays are increasingly important causes. Unfortunately, the most common cause of septal perforation are septal surgeries such as submucous resection and septoplasty.[5] In this study, 27 patients who underwent nasal septal perforation repair in a tertiary clinic were reviewed retrospectively and the approach to nasal septal perforation is presented in the light of current literature.

Materials and Methods

In this study, the records of 27 patients who were diagnosed with nasal septal perforation and treated surgically in a tertiary clinic, between January 2015 and June 2019 were reviewed retrospectively. Age, gender, size of nasal septal perforation, etiology of the perforation, surgical technique applied, surgical treatment results and period of follow-up were evaluated. According to size

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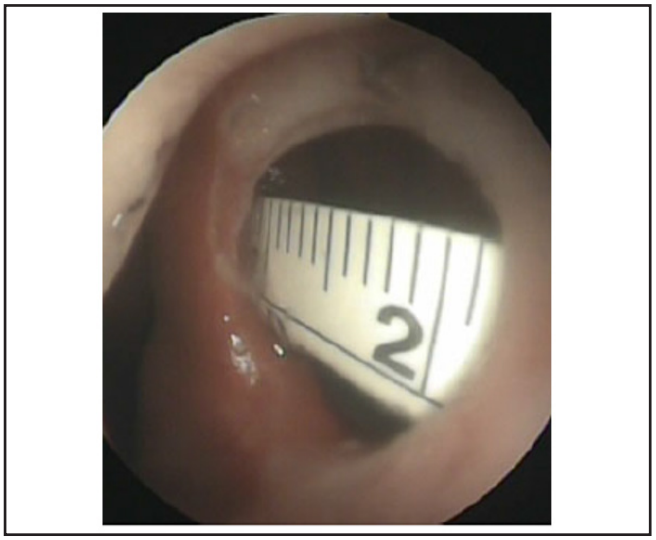

Fig.1. Measurement of an anteriorly placed perforation

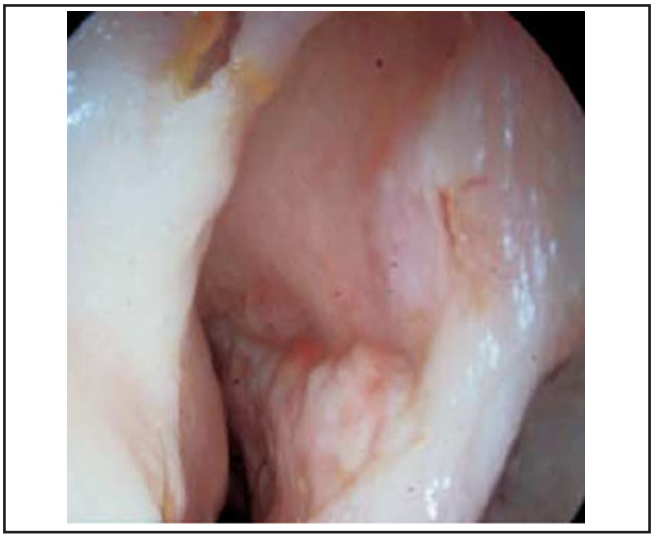

Fig.2. Total closure of perforation,postoperative 5th

of nasal septal perforation; perforations < 0.5 cm were grouped as small, 0.5-2 cm as medium and > 2 cm as large. Perforation repair was performed in all patients with open rhinoplasty under general anesthesia with the help of mucosal flaps and interposition grafts.

Surgical Technique: All cases were operated under general anesthesia. Open rhinoplasty was started with a trans columellar incision. This incision was combined with alar rim incisions on both sides and the back of the nose was elevated. Then, by entering between the medial crura of the alar cartilages, the septum was reached and the upper tunnel was carefully created superior to the perforation. An inferior tunnel was created at the lower edge of the perforation. The mucoperichondrium and then the mucoperiosteum opposite the inferior meatus were elevated on both sides.

After completion of the elevation on both sides, excess septal cartilage or perpendicular laminae of the ethmoid and in some cases, tragal cartilage was harvested for the reconstruction of the perforation. After the edges of the perforation were deepithelialized, four tunnels were created on both sides by the advancement flap technique, and extended up to the top of the nose, the bottom of the nose and the inferior turbinate. Then, longitudinal incisions were made on both sides of the nasal ceiling and mucosa at the base, and the septal flaps were shifted to close the perforation and an interposition graft was inserted. The mucosal flaps were then sutured to the residual mucosa with 5/0 Vicryl® (Ethicon, Inc., Somerville, NJ) in a primer fashion, without being stretched. The dehiscences in the flap donor site at the top and bottom were left for secondary healing. After the operation, internal splints were placed on both sides of the nasal septum after the columellar incision was sutured with a 5/0 prolene suture. Oral broad-spectrum antibiotics and daily saline irrigation were used for 14 days postoperatively. In the postoperative period, patients were warned against smoking, vasoconstrictor sprays, nasal scratching, and straining.

Results

A total of 27 patients (15 (56%) males and 12 (44%) females) were included in the study. The average age of the patient was 32 (24- 55 years old). There was a history of septal surgery in 12 patients (44%), trauma in 5 patients (19%) and chronic nasal spray usage in 2 (7%) patients (Table I).

Etiology could not be determined in 8 (30%) patients. Complaints were nasal obstruction in 10 patients, crusting and bleeding in the nose in 7 patients, only bleeding in 5 patients, and noise in the nose while breathing in 5 patients (Table II).

Table I: Distribution of patients according to aetiology

AETIOLOGICAL CAUSE	NUMBER OF PATIENTS (%)
Previous septal surgery	12 (44%)
Idiopathic	8 (30%)
Trauma	5 (19%)
Nasal Sprey Usage	2 (7%)

Table II: Symptoms in patients with nasal septal perforation distribution

SYMPTOM	NUMBER OF PATIENTS
Nasal Obstruction	10
Crusting and bleeding	7
Bleeding	5
Whistling sound from the nose	5

Perforation sizes ranged from 0.5 cm to 3 cm. The size of the nasal septal perforation was small (<0.5 cm) in 10 (37%) patients, medium (0.5-2 cm) in 10 (37%) patients, and large (> 2 cm) in 7 (26%) patients. The successful closure rate of perforations was 74%. (Fig. 1,2). In 4 of 7 patients whose perforations were not completely closed, the perforation was larger than 2 cm in diameter (Table III).

The mean postoperative follow-up period of the patients was 4.3 years (10 months-8 years).

Discussion

Nasal septal perforation is the loss of composite tissue comprising the mucosa, bone or cartilage that form the nasal septum.6 Nasal septum perforation has many causes. Though it may be idiopathic, the most common causes are nasal surgeries such as submucosal resection, septoplasty, functional endoscopic sinus surgery.[7] Among other reasons, septal hematoma, nasal picking habit, nasal cauterization for nosebleeds, nasotracheal intubation, cocaine use, vasculitis, inflammatory diseases such as sarcoidosis, Wegener granulomatosis and infections such as tuberculosis, leprosy, syphilis, diphtheria can be listed.[8,9]

The majority of nasal septal perforations are asymptomatic and are diagnosed during examinations done for other reasons. Symptomatic patients have epistaxis, nasal obstruction, discharge, pain and whistling.[10] Most of the symptoms occur due to turbulence of nasal airflow, which is caused by the perforation.[11] Posterior perforations cause fewer symptoms than the anterior perforations because the nasal mucosa moistens the respiratory air rapidly.[12] Symptoms may vary according to location, size, and cause of perforation. A small perforation in the posterior septum can be asymptomatic, but it can cause a distinctly whistling voice when the perforation is anterior. As the size of the perforation increases, laminar air flow deteriorates and turbulence increases. This causes drying, crusting, and nasal congestion. Also, a large anterior perforation may cause saddle nose deformity with loss of structural support. In cocaine users, mid- to low-grade chondritis may cause pain as in infectious perforations.[1,2,13] In our study, there were complaints of nasal obstruction in 10 patients, crusting and bleeding in the nose in 7 patients, bleeding in the nose in 5 patients, and noise in the nose in 5 patients.

Table III: Closing rates according to the size of the perforation

PERFORATION SIZE	FULL CLOSURE	NOT CLOSED
Small (<0.5 cm)	10	0
Medium (0.5-2 cm)	7	3
Large (> 2 cm)	3	4
Total (27)	20	7

Depending on the location and size of the nasal septal perforation, depending on the change in the nasal airflow, patients may have nasal congestion, discharge, crusting, whistling during breathing, nosebleeds, headache, and foreign body sensation in the nose.[8]

Conservative approaches, prosthesis application, and surgery are included in the treatment of nasal septal perforation. Moisturizing and softening ointment applications to the nasal cavity are conservative approaches. The use of septal buttons as a prosthesis is an option. However, ointment application and prosthesis placement approaches are not sufficient to treat symptoms in all patients. The most effective method of restoring normal physiology of the nose is surgical repair.[14]

Many methods of surgical treatment of nasal septal perforation are described in the literature. However, the most important factors affecting the success of septal perforation repair, in addition to the surgeon's ability and experience, are the amount of tissue in the rest of the septum, the size, and location of the septal perforation.[7,15]

The approach is as important as the technique to be preferred in surgery. Closed or open technique can be used for surgical repair of septal perforations. The advantages of the closed technique can be the absence of an external scar, causing minimal tissue damage and minimal damage to anatomical integrity. In contrast to these advantages, an insufficient surgical field of view can be counted as a disadvantage during the suturing of the mucoperichondrial and mucoperiosteal flaps created along with difficulty in placing grafts. The advantages of open technique are a better field of view, easier access to the area of perforation, and the surgeon's ability to use both hands.[8] The biggest disadvantage of the open technique is that it disrupts the supporting structures and creates an external scar.[6] In our study, an open approach was applied to all patients.

Techniques commonly described include repair with bilateral septal mucosal flaps with interposition connective tissue grafts, repair with unilateral septal mucosal flaps with or without interposition graft, repair with bilateral septal mucosa flap without nasal graft, nasolabial flap and buccal mucosa flap, composite grafts or flaps.[16] In our study, perforation repair was performed in patients with the help of advancement mucosal flaps and interposition grafts.

Conclusion

Successful repair of nasal septal perforation depends primarily on the cause, location, size of the perforation, cartilage and bone tissue at the perforation edges, surgical technique and the surgeon's experience. Since nasal septal perforation is mostly caused by mucoperichondrial and mucoperiosteal tears in nasal surgeries, bilateral mucosal tears should be repaired immediately after detection.

In the light of available literature, it is not possible to pick a single technique that provides guaranteed success in nasal septal perforation repair. The surgical method to be preferred should be determined according to the size, location of the perforation and the amount of tissue left in the remaining septum. To increase the success of surgical results attention should be paid towards creating a contralateral flap prepared from different regions, not stretching the flaps in the repaired area, suture lines not crossing each other and providing a comfortable surgical view. Whichever surgical method is applied, repair of chronic perforation is difficult. For this reason, it would be a more appropriate approach to prevent a septal perforation in the first place.

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Tympanoplasty for Wet and Dry Perforation: A Prospective Comparative Study

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ABSTRACT

Introduction

Two types of surgical procedures are performed for the treatment of Chronic otitis media (COM) mucosal disease, namely myringoplasty and tympanoplasty. In the present study, an objective, comparative evaluation between the outcomes of tympanoplasty, performed in the 'wet ear' and the 'dry (non- discharging) ear' has been undertaken.

Materials and Methods

A prospective study was conducted in a peripheral referral institute over a period of 37 months wherein a total of 105 patients with tympanic membrane perforation were selected, amongst which 56 patients had moist ear and 49 patients had dry ear. All of the patients underwent tympanoplasty by underlay technique. Final results were analyzed 12 months post operatively.

Results

In the wet ear group amongst 56 patients, 51 patients had successful graft uptake (91.07%). In dry ear group, among 49 patients, successful graft uptake was seen in 44 cases (89.79%). In the wet ear group 50 out of 56 patients had hearing improvement (89.28%). In dry ear group 44 out of 49 patients had hearing improvement (89.79%). Statistically significant results were obtained postoperatively in each group; however, inter group analyses showed no statistical significance.

Conclusion

Success rate of tympanoplasty does not depend upon the wet or dry state of middle ear at the time of surgery.

Keywords

Tympanoplasty; Myringoplasty; Otitis Media

Chronic otitis media (COM) is a long-standing inflammation of the middle ear cleft characterized by permanent abnormality of tympanic membrane. The prevalence of COM in urban school children is 2.32% and in rural children it is about 5.11%.[1] The prevalence of COM in adults varies according to the geographical location though its exact prevalence in India is not known. Apart from permanent abnormality of tympanic membrane, COM is associated with aural polyp and resorptive osteitis of ossicular chain.[2] Clinically COM is divided into mucosal and squamous varieties. In cases of mucosal disease tympanoplasty plays an important role in preventing discharge from ear, hearing improvement and eradication of disease from middle ear cleft.[3]

Two types of surgical procedures are performed for the treatment of mucosal disease, namely myringoplasty and tympanoplasty. Myringoplasty is limited to simple grafting of tympanic membrane perforation. In tympanoplasty ossicular chain inspection/reconstruction is performed along with grafting of tympanic membrane. Success rate of tympanoplasty depends on various factors like position of perforation, type of perforation (small central, subtotal, total perforation), eustachian

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tube function, pre-operative dry or wet status of middle ear, surgical techniques etc. Other factors which also influence the outcome of tympanoplasty include chronic sinusitis, deviated nasal septum, adenoid enlargement and discharge from other ear. From the clinical experience of the authors it has been seen that a significantly large number of patients who have been advised tympanoplasty do not have a dry ear on the day of surgery. The dilemma continues whether to operate now or to defer the surgery till the ear becomes completely dry. On an average, adults catch a cold 4 to 6 times a year, while children get them 6 to 8 times.[4] With each episode of common cold chances of conversion from inactive to active stage of mucosal COM increase.

The average waiting times for various elective surgeries in OECD (Organisation for Economic Co-operation and Development) countries varies from 30 days to more than 7 months whereas for National Health Service in the United Kingdom it is more than 18 weeks for elective cases.[5,6] Though no such official data is available for our country, significantly high waiting times in government hospitals results in increased stress, prolonged functional impairment along with increased chances of conversion to active disease resulting in further delay in treatment. In the present study, an objective, comparative evaluation between the outcomes of tympanoplasty, performed in the 'wet ear' and the 'dry (non- discharging) ear' to compare the results of tympanoplasty in dry and wet perforation in terms of graft intake and hearing improvement.

Materials and Methods

This study was conducted in the Department of Otorhinolaryngology and Head – Neck Surgery, of a peripheral referral institute in West Bengal, India over a period of 37 months (April 2015 to April 2018). Patients of COM aged between 10-60 years of age with central perforation and purely conductive hearing loss were selected for this study. Patients with squamous disease or sensorineural hearing loss and those unwilling to participate in the study were excluded. Individuals with pus or smelly discharge were initially treated with a course of antibiotics based on culture sensitivity reports along with topical ear drops and antihistamines. Patients with active purulent discharge had their surgeries deferred till it became completely dry or the discharge was mucoid and devoid of any smell.

Criteria for dry ear: The ear should be free from discharge for the last 6 months; middle ear mucosa and remnant of tympanic membrane will be of normal colour, not congested.

Criteria for wet ear: Congestion in remnant of tympanic membrane; congested middle ear mucosa; presence of mucoid discharge but no frank pus in the middle ear and/or polypoidal change in middle ear mucosa.

Institutional ethics clearance was obtained before conducting this study. Written informed consent was taken either from the study subjects or their next of kin. Study proforma consisting of name, age, sex, type of perforation, wet or dry middle ear status, pre and post-operative hearing status (measured in decibel), graft uptake and re-perforation was constructed. All cases underwent thorough clinical evaluation and those individuals found to be having known factors (deviated nasal septum, chronic sinusitis etc) which influence the outcome of tympanoplasty were initially treated for the same before definitive surgery was undertaken. Examination under microscope was done in all cases to evaluate the status of the ear pre- operatively including the colour of the middle ear mucosa. Each individual was advised a skiagram of the mastoids (lateral oblique view). Pure tone audiometry (using Bracketing method) and impedance audiometry (to assess Eustachian tube function) was performed (by the same audiologist) in a sound proof audiometry booth using the same audiometer both pre and post operatively. Routine pre-operative investigations were performed.

The surgical procedure was performed by the first author in all of the cases in a single institution. The surgery was carried out under local anesthesia in most of the cases; general anaesthesia being used for those who could not co-operate under local anaesthesia. Endaural or post aural incision was made; margins of perforation were made raw; undersurface of tympanic membrane remnant was scraped to remove any epithelium; tympanosclerotic patch over the remnant of tympanic membrane, if any, was removed; tympanomeatal flap

Table I: Distribution of study population based on sex

TYPE OF PERFORATION	FEMALE	MALE	GRAND TOTAL
Dry	26 (46%)	23 (47%)	49 (47%)
Wet	30 (54%)	26 (53%)	56 (53%)
Grand Total	56	49	105

was elevated; any polypoidal or granulation tissue found was removed from the middle ear; type 1 tympanoplasty was performed using temporalis fascia graft by underlay technique. Details of intra operative findings including status of ossicular chain, chorda tympani nerve and any facial nerve injury were recorded. Follow up was done at the end of 1st, 3rd, 6th and 12th month. Graft uptake or rejection at the end of 12 post-operative months along with post operative audiogram were taken for calculating the results. The data was analyzed using Microsoft-Excel software; statistical tests like paired and unpaired T tests were performed using the same software.

Results

This study was conducted on a total 105 patients, with 49 males (47%) and 56 females (53%). These patients were divided into two groups: dry ear and wet ear. Total number of patients in the dry ear group was 49 (47%) and in wet ear group was 56 (53%). (Table I) Maximum number of individuals belonged to 21-30 years age group followed by 31-40 years age group. Least number of patients belonged to the age group of 51-60 years.

Pre operative air conduction hearing thresholds are shown in Table II. The majority of patients both in dry and wet perforation group had hearing loss in the 41 -50 db HL range followed by 31 – 40 db HL range.

In the wet ear group, out of 56 patients, successful graft uptake was seen in 51 cases (91.07%). In the dry ear group, out of 49 patients successful graft uptake was seen in 44 cases (89.79%). But this result is not statistically significant (p value = 0.9999. Fischer exact test).

The mean hearing gain in the wet ear group was 15.9175 db which is statistically significant ($p<0.001$) and that in the dry ear group was 16.9057 db which is also statistically significant ($p<0.001$). However on comparing the hearing gain between the wet and dry

Table II: Pre operative hearing status

PRE-OPERATIVE A-C THRESHOLD	DRY EAR		WET – EAR	
	CASES	PERCENTAGE	CASES	PERCENTAGE
0 – 10 db HL	0	0	0	0
11 -20 db HL	0	0	0	0
21 – 30 db HL	1	2.04%	2	3.57%
31- 40 db HL	21	42.85%	24	42.85%
41 -50 db HL	25	51.02%	25	44.64%
51 -60 db HL	2	4.08%	5	8.93%

Table III: Comparison of pre and post operative hearing status (according to AC threshold)

		AGE (YEARS)	PRE-OP HEARING (DB HL)	POST-OP HEARING (DB HL)
Dry Ear	Mean	27.47	41.73	24.83
	Minimum	11	30	18.33
	Maximum	55	51.66	51.66
	Median	26	43.33	21.66
Wet Ear	Mean	28.2	41.09	25.17
	Minimum	15	30	18.33
	Maximum	56	51.66	51.66
	Median	28	41.66	21.66

ear groups using unpaired 't' test statistically significant difference was not seen (p=0.249741).

In the wet ear group 6 patients had no hearing improvement. Among them, 1 patient had ossicular fixation detected at the time of operation, 2 patients had dehiscence of graft in protympanic area at 1 month follow up, 2 patients had perforation in newly formed tympanic membrane at 3 month visit following an upper respiratory tract infection, 1 patient had re-perforation of newly formed tympanic membrane without any definite etiology. In dry ear group, 5 patients had no hearing improvement, 1 patient had ossicular fixation detected at the time of surgery, 2 patients had medialization of graft at the end of 3 month follow up and 2 patients had perforation in newly formed tympanic membrane following upper respiratory tract infection at 6 months follow up.

Discussion

Chronic otitis media is divided into two types, mucosal variety and squamous variety. Mucosal variety is more common and is characterized by perforation in pars tensa of tympanic membrane. This perforation results from middle ear infection, trauma or iatrogenic causes. Spontaneous healing rate of traumatic perforation after 3 months follow up is 82.3%.[7] Spontaneous closure of tympanic membrane is uncommon in case of COM and surgical treatment is necessary to close the perforation. The aim of surgery is closure of tympanic membrane perforation to prevent recurrent discharge from ear and improvement of hearing.

Different graft materials are used for closure of tympanic membrane perforation. At the beginning of tympanoplasty surgery, Wullstein and Zollner used split thickness skin as graft material but subsequently it was rejected owing to its numerous disadvantages.[8] From 1980 onwards most surgeons started using mesoderm-originated graft material such as temporalis fascia, perichondrium, vein graft, loose areolar tissue which exclude chances of iatrogenic cholesteatoma.[9] Many factors may affect the outcome of surgery like type of perforation, dry or wet perforation, condition of contralateral ear, type of graft materials, expertise of surgeon etc. In our study we are more concerned with effect of wet and dry perforation on final outcome of tympanoplasty. We selected a total of 105 patients over a period of 37 months. Our study had a male: female ratio of 1:1.12 which is comparable with the study of Yi – Chaio Lin et al. where male: female is 1:1.21.[10] In our study 89.5% of patients were in the age group of 11-40 years with a mean age of 27.86 years, median age 27.00 years with standard deviation (SD) of 9.131. Our study is comparable with the study of Prakash Mishra et al.,

Table IV: Comparative results of graft uptake in the various studies

STUDY	WET EAR GROUP	DRY EAR GROUP
Our study	91.07%	89.79%
Nagle SK et al., 2009	74%	88%
Hosny S et al, 2014	87%	90.40%
Gamra OB et al., 2016	88%	87.50%
Chandrasekhar Y et al., 2017	86.70%	90%
Pothala et al., 2018	98.50%	98.50%

where 89% of cases were in the age group of 11 – 40 years.[11]

In our study graft uptake rate in dry ear was 89.79% and that in wet ear was 91.07%. In their study, Nagle et al. found a graft uptake rate of 88% in the dry ear group and 74% in the wet ear group.[12] Chandrasekhar et al. demonstrated graft uptake rates of 90% and 86.7% for dry ear and wet ear respectively.[13] No statistical difference was found (p value 0.688). In their study, Gamra et al. showed that graft integration rate was 87.5% in dry ear group and 88% in wet ear group, without any statistically significant difference (p=0.9).[14] Sivasankari showed graft uptake rate was 86.6%.[15] Pothala et al. exhibited a higher percentage of graft uptake for both dry and wet ear, 98.5% in each case.[16] Hosny showed graft uptake rates of 90.4% in dry ear and 87% for wet ear.[17] Sheehy found that successful closure of tympanic membrane is over 97%.[18] Andersen in his study showed graft uptake rate of 93% at 2 to 6 months and 86.6% at more than 12 months.[19] In our study graft uptake is slightly better in wet ear group compared to dry ear group. (Table IV) This can be explained by density of inflammatory cells and blood vessels in the remnant of tympanic membrane of wet ears in contrast to the marginalized blood vessels in dry and atrophic membrane of dry perforation.

There are many methods for assessing hearing gain after COM surgery like social hearing method, air conduction threshold estimation, hearing gain method, mean A–B gap method, but none are universally accepted.[20] In our study we used the air conduction threshold for comparing hearing results.

In our study, in the wet ear group, out of 56 patients, 50 patients (89.28%) had hearing improvement. In the dry ear group 44 out of 49 patients had hearing gain (89.79%). This result is not statistically significant (p value 0.9999, Fisher exact test). Out study corroborates with the study of Kumar et al. where successful hearing improvement was seen in 93.3% of cases with mean post-operative air-bone gap in final follow up being 13.67+5.56db.[21] Pothala et al. demonstrated hearing improvement in 87.14% of dry ear cases and 77.14% cases of wet ear.[16] Study by Hosny et al. in 2014 showed

Table V: Comparative results of hearing improvement in the various studies

STUDY	WET EAR GROUP	DRY EAR GROUP
Our study	89.28%	89.79%
Pothala et al., 2018	77.14%	87.14%
Hosny et al., 2014	91.30%	92.30%

hearing improvement was 91.3% in wet ear and 92.3% in dry ear.[17] Factors like age, sex, type of perforation were included in our study. Perhaps these factors do not have much influence on the outcome of graft uptake and post-operative hearing results. Thakur et al, in 2016, mentioned that there is no significant influence of age or gender on hearing outcome.[22] (Table V)

Conclusion

The present study shows statistically significant improvement in terms of graft uptake and hearing status post-operatively irrespective of the status of middle ear, whether dry or wet at the time of surgery. There is statistically no significant difference in terms of graft incorporation and hearing gain amongst these two groups. So we find no valid ground to postpone or cancel the tympanoplasty surgery in cases of central perforation when middle ear is wet and unnecessarily prolong the stress, anxiety and functional impairment of the individuals and further delay the waiting times for elective surgery. However a study with a larger sample size is needed to draw a firm conclusion.

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Parapharyngeal Tumours : Our Experience in a Tertiary Care Hospital

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ABSTRACT

Introduction

Tumours of parapharyngeal space are rare. Surgical excision is the mainstay of its management. However, approach to the space is rather difficult. The transcervical approach is most commonly practiced as opposed to the transoral approach, due to fear of complications. The present study aims to study the two approaches with respect to treatment outcomes and complications.

Materials and Methods

A prospective study was conducted from July 2018 to December 2019 (1.5 years) at the Department of ENT in a tertiary care Hospital. A total of 10 cases of parapharyngeal tumours were selected; 5 of involving the prestyloid compartment underwent transoral surgery and the other 5 involving the post styloid compartment underwent transcervical surgery. The results of surgery and complications were studied.

Results

The mean age of presentation was 36.5 yrs. Male: Female ratio was 3:2. There were 9 benign and 1 malignant case in the study. The most common presentation was an asymptomatic oropharyngeal mass (80%). The most common pathological type was pleomorphic adenoma of the salivary gland (50%).

Conclusion

We found that the transoral approach is as effective as transcervical approach in surgical cureand contrary to the popular belief, it is associated with fewer complications.Hence, carefully selected cases can be safely managed by this approach.

Keywords

Parapharyngeal Tumors; Surgical Approaches; Treatment Outcome

Parapharyngeal space (PPS) is one of potential fascial planes of head and neck and resembles an inverted triangular pyramid with the base at the skull base and apex at the greater cornu of hyoid bone. The prevertebral fascia joining the styloid process to the tensor veli palatini divides it into the pre-styloid (containing adipose tissue, lymphatics and ectopic salivary gland tissue) and post-styloid (containing the internal carotid artery, internal jugular vein, cranial nerves IX to XI, the cervical sympathetic chain, lymph nodes and glomus bodies) compartments.

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Tumours of the parapharyngeal space are uncommon, comprising 0.5 - 1% of all head and neck neoplasms.[1] According to one study, about 80% are benign and 20% malignant.[2] Due to its deep location in the neck, clinical examination is limited and hence diagnosis of PPS lesions is completely dependent on imaging. Fine needle aspiration cytology (FNAC) reveals inconsistent results. On cross sectional imaging (CT/MRI), PPS appears as a small triangular space with density/signal consistent with fat.[3] Prestyloid mass causes displacement of the PPS fat medially and displacement of internal carotid artery (ICA) posteriorly. Poststyloid mass causes displacement of PPS fat anterolaterally, displacement of ICA anteriorly or medially.

The choice of surgical approach is dictated by the size of the tumour, its location, its relationship to the great vessels, and suspicion of malignancy. Because most of

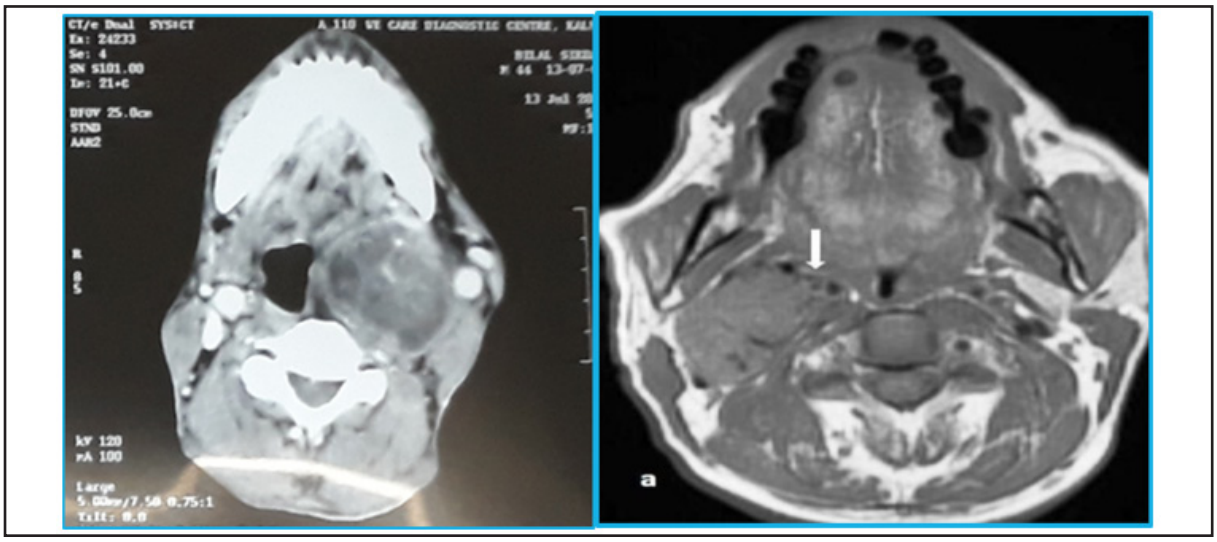

Fig.1. Axial CT of left prestyloid mass and TW1 axial MRI of right poststyloid mass

these tumours are benign, the approach chosen should minimize surgical morbidity, as well as the risk of surgical recurrence. These tumours can be approached intra orally or through an external incision which can be transcervical (below mandible), transparotid (behind mandible) or transmandibular (through a mandibulotomy). A combination of these approaches may be required at times. Most surgeons discourage intraoral approach due to its limited exposure, fearing greater chances of major vessels and nerve injury. However, this approach can be undertaken in carefully selected cases of prestyloid compartment lesions with similar efficacy and lower morbidity than external approach. The present study aims to redefine the advantages of using the approach and alleviate the misconceptions around it.

Materials and methods

All cases of head and neck tumours attending the OPD of the Department of ENT were evaluated and a total of 10 cases of parapharyngeal tumours were selected. After obtaining written consents, a prospective study was conducted from July 2018 to December 2019 (1.5 years). After meticulous history taking and a thorough clinical examination of head and neck, these patients were subjected to routine investigations, FNAC and CT scans. (Fig.1) Surgical approach was decided based on the following criterion:

Transoral approach - Benign, relatively avascular, well encapsulated tumours of prestyloid compartment (Size <= 3 cm) with no neck/ parotid component and no involvement with vital structures.

Transcervical approach- Malignant or vascular tumour of poststyloid compartment (Size > 3 cm) with close relation to vital structures.

Thus, 5 cases involving the prestyloid compartment underwent transoral surgery and the other 5 involving the post styloid compartment underwent transcervical surgery. (Fig. 2)

Postoperatively, the histopathological report confirmed the diagnosis and the patients were observed for development of complications for a period of 6 months.

Results

Out of all the patients of head and neck tumours attending the ENT OPD for the given period of the study, 0.46% were found to suffering from parapharyngeal tumours. 60% patients were male and 40% were female,with a male: female ratio of 3:2. The most common presenting age group was 21-40 years (40%) and the most common

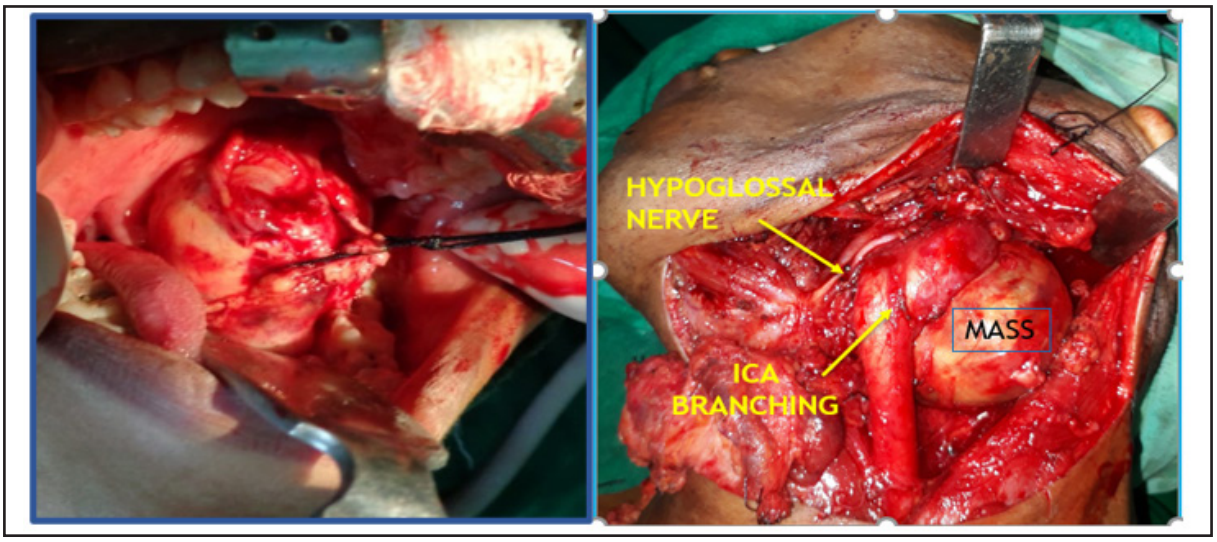

Fig. 2. Tumour delivery by transoral route (left) and by transcervical approach (right).

presenting feature was oropharyngeal mass (80%) followed by neck mass (50%), (Fig. 3) dysphagia, hoarseness of voice and tongue deviation (Fig.4).

Histopathologically, 90% cases were benign and there was only one case of malignant vagal paraganglioma. Out of the total, 50% tumours were of salivary gland origin, 30% were schwannomas and 20% were paragangliomas. (Table I)

In the transoral approach group, there were no incidence of nerve or vascular injury but in one patient, there was wound dehiscence (Fig. 5) that was managed conservatively (Ryle's tube feeding followed by healing by secondary intention). There was 1 case of recurrence as it was misdiagnosed preoperatively as benign tumour of prestyloid compartment (postoperatively turned out to be malignant paraganglioma) that was referred for radiotherapy.

In the transcervical group, one patient suffered from

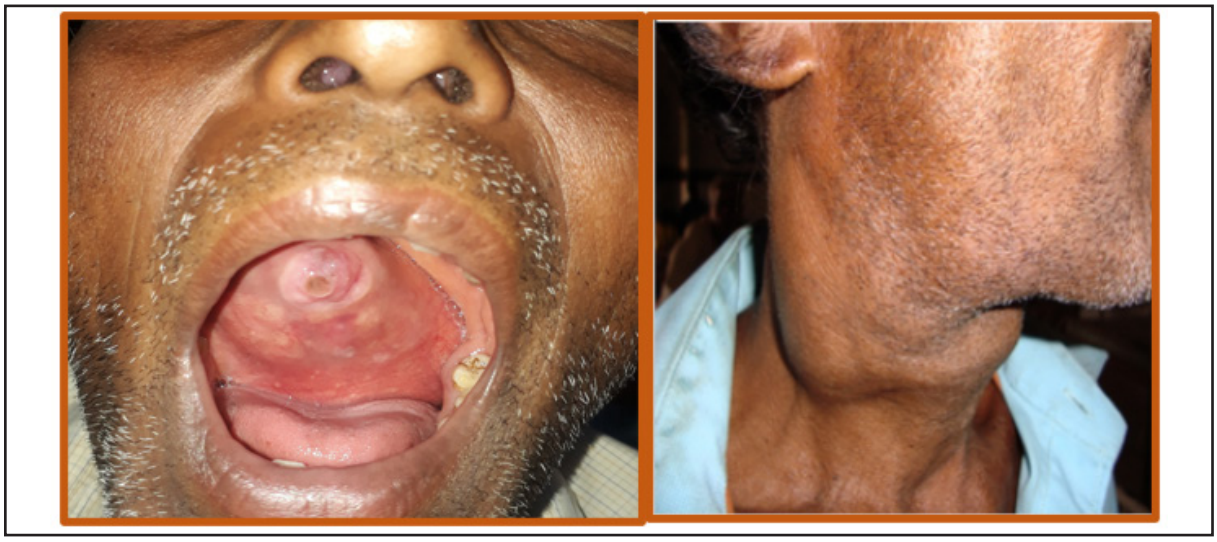

Fig. 3. Presentation as an intraoral mass and as a neck mass

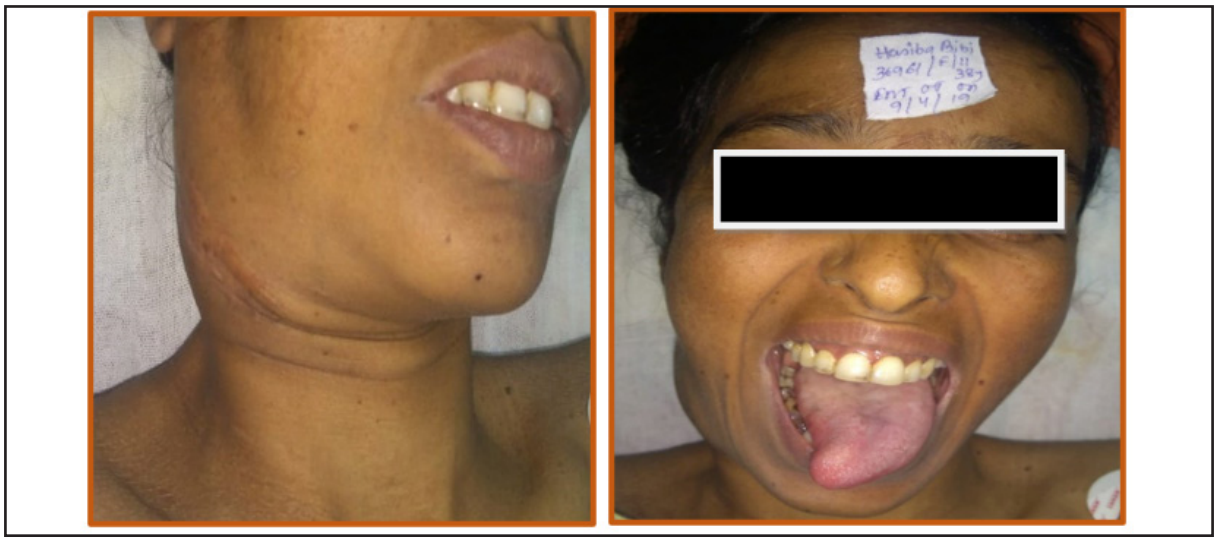

Fig. 4. Neck mass with hypoglossal nerve involvement

transient vagal nerve paresis and another from transient marginal mandibular branch of facial nerve paresis (Fig.5) which resolved spontaneously to conservative management. Intra-op. ligation of internal jugular vein in one patient for better exposure and tumour delivery. One of the patients suffered from a CVA on 3rd postop day. There was one case of hypertrophied scar formation. No recurrences were seen.

Table I: Case profile (n=10)

CASE NO	AGE/ SEX	PREOP FNAC REPORT	SURGICAL APPROCH	POSTOP HPE REPORT
1	16/F	Benign salivary gland tumour	Transoral	Pleomorphic Salivary Adenoma (PSA)
2	20/F	Benign salivary gland tumour	Transoral	Pleomorphic Salivary Adenoma (PSA)
3	25/F	Benign salivary gland tumour	Transoral	monomorphic Salivary Adenoma
4	32/M	Paraganglioma	Transcervical	Carotid body tumour
5	36/M	Schwannoma	Transcervical	Vagal Schwannoma
6	37/M	Benign salivary gland tumour	Transoral	PSA deep lobe
7	42/M	Benign salivary gland tumour	Transcervical	Pleomorphic Salivary Adenoma (PSA)
8	45/M	Paraganglioma	Transoral	Vagal paraganglioma (Malignant)
9	50/F	Schwannoma	Transcervical	Hypoglossal Schwannoma
10	62/M	Schwannoma	Transcervical	Vagal Schwannoma

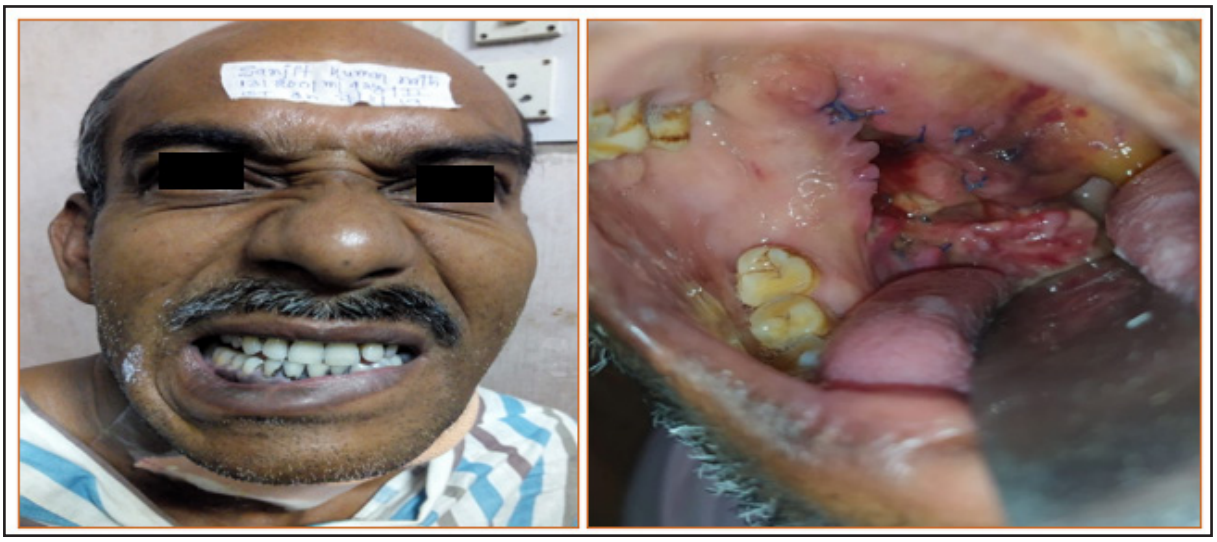

Fig. 5. Case of nerve injury (marginal mandibular nerve) and wound dehiscence.

Discussion

In the present study, majority of the patients affected by parapharyngeal tumours were male in the age group of 21-40 years. These tumours are rare in extremes of ages. Most tumours were benign salivary gland adenomas limited to the prestyloid compartment of the parapharyngeal space, a finding that is consistent with other studies as well.(Table II) The usual presentation is an asymptomatic oropharyngeal mass with or without neck extension. It has been reported by other studies that the tumour must be at least 3cm in size to have a neck component.

A high clinical suspicion is needed for timely diagnosis and appropriate management. Imaging studies are instrumental in reaching to a diagnosis. Many of these patients may be subjected to repeated inconclusive intraoral FNAC before they undergo a CT scan, thereby allowing progression of disease to the neck, precluding the use of a relatively less morbid transoral surgery. The

Table II : Comparison with other recent studies

FINDINGS	PRESENT STUDY	F BOZZA ET AL 2009[4]	KEI IGICHI ET AL 2017[5]
Number of cases	10	10	29
Mean Age	36.5 yrs	49 yrs	43.5 yrs
M : F	03:02	02:01	15:14
MC Presentation	Oropharyngeal mass (80%)	Neck mass	Neck mass (37.5%)
Benign : Malignant	09:01	02:01	23:02
MC Pathological type	Salivary gland tumour (50%)	Salivary gland tumour (80%)	Salivary gland tumour (44.8%)
Most Frequent complication	"Hoarseness (Vagal nerve paresis)"	"Horner's syndrome (Sympathetic nerve plexus)"	"Horner's syndrome (Sympathetic nerve plexus)"

Table III: Comparison between the two approaches to surgery.

COMPLICATION	TRANSORAL (N=5)	TRANSCERVICAL (N=5)
External scar	No	Yes
Nerve injury (Temporary)	Nil	2
Vascular injury	Nil	2
Wound complication	1	1
Recurrence	1	Nil

surgeon is forced to go for a more extensive surgery due to late presentation and diagnostic delay.

In the present study, the cases selected for transoral approach were diagnosed early and managed successfully with little complications. (Table III) In spite of limited exposure in this method, neurovascular injury could be avoided because of adequate knowledge of tumour location and its relationship with the structures in the neck. Using the technique of blunt finger dissection aids in avoiding any such injury. Taking care so as to not rupture the capsule of the tumour prevents seeding of the tumour and recurrences. The recurrent case encountered in the present study was not a consequence of the surgery per se but more due to the malignant nature of the tumour. This approach also has the benefit of no external scar which maybe an issue with young individuals.

It is noteworthy that despite adequate exposure in the transcervical surgical approach, neurovascular injury could not have been prevented in an advanced tumour that has already involved the structures in the neck. However, whenever there is any doubt with respect to completeness of tumour removal, full and extensive exposure must be ensued that may require conversion of a transoral approach to a transcervical one with or without mandibulotomy or mandibulectomy wherever needed.

Conclusion

As it is evident from this study that there was no case of nerve or vascular injury in patients who underwent transoral resection, this approach must be considered for carefully selected patients because it produces less morbidity than the transcervical approach.

Complications are not associated only with a particular surgical approach but it is largely determined by the tumour characteristics like location, malignancy and relationship with important structures in the neck. A surgeon must not shy away from the transoral approach fearing higher complication rate.

However, all patients must be counselled regarding the conversion of a transoral approach to transcervical and that a mandibulotomy or even a tracheostomy may be necessary.

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Case Report

Hydatid Cyst of Submandibular Region

https://doi.org/10.47210/bjohns.2020.v28i3.279

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ABSTRACT

Introduction

Hydatid cysts in the neck are relatively exceptional. We report a rare case of a hydatid cyst localized in the right submandibular region of the neck with a second cyst in lung discussing diagnostic and management algorithm with brief review of literature.

Case Report

A 6 years old boy presented to us in Gauhati Medical College & Hospital with a gradually enlarging painless swelling in right submandibular region since last 4 months. The patient was thoroughly evaluated. Imaging and FNAC was performed. Suspected common locations were also screened prior to surgery. He was treated with total pericystectomy and followed up regularly.

Discussion

Hydatid disease is a widespread public health problem in developing countries. The possibility of hydatid disease, especially in endemic regions, may always be considered in the differential diagnosis of mesenchymal neoplasms or soft tissue cystic masses in the neck. Radiologic imaging modalities in such cases are mandatory for the diagnosis. The prognosis is excellent in hydatid cyst cases treated with total removal of the cyst without rupture.

Keywords

Hydatid Cyst; Submandibular

Hydatid cyst is an infectious disease which is most commonly caused by Echinococcus granulosus and less commonly by Echinococcus multilocularis. Humans are accidental intermediate hosts in echinococcus lifecycle, as infection of human beings represents a terminal event. Dogs are the main host, and animals like cattle, sheep, horse and pig are intermediate hosts in the disease. Parasite eggs that penetrate the organism hatch in small intestine of the main host, pass into portal venous system or lymphatic system and reach liver and lungs, and finally form hydatid cyst lesions. Moreover, they can cross hepatic sinusoid or pulmonary capillary barriers, and embryos get into systemic circulation and can settle in all the organs and structures in the body.[1,4] Typically, a man is exposed to the organism by ingestion of contaminated vegetable or meat.

Infection may also occur when playing with dogs harbouring tapeworm, as eggs cling to their fur. The larval form may invade any organ system, and distribution of infection is limited only by blood flow and filtration. Hydatid cyst is most frequently involved in liver and lungs, and rarely in the bone, brain, eye, heart, kidney, spleen and parotid gland.[3,5] Atypical localization of hydatid cyst may be challenged the diagnosis of hydatid disease.[2] The neck is one of the atypical sites of hydatid disease, accounting for no more than 1% of all hydatid sites.[1,6]

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Case report

A 6 years old boy presented at Gauhati Medical College with a painless swelling in right submandibular region which he noticed 4 months back. The swelling had gradually increased in size however there was no history

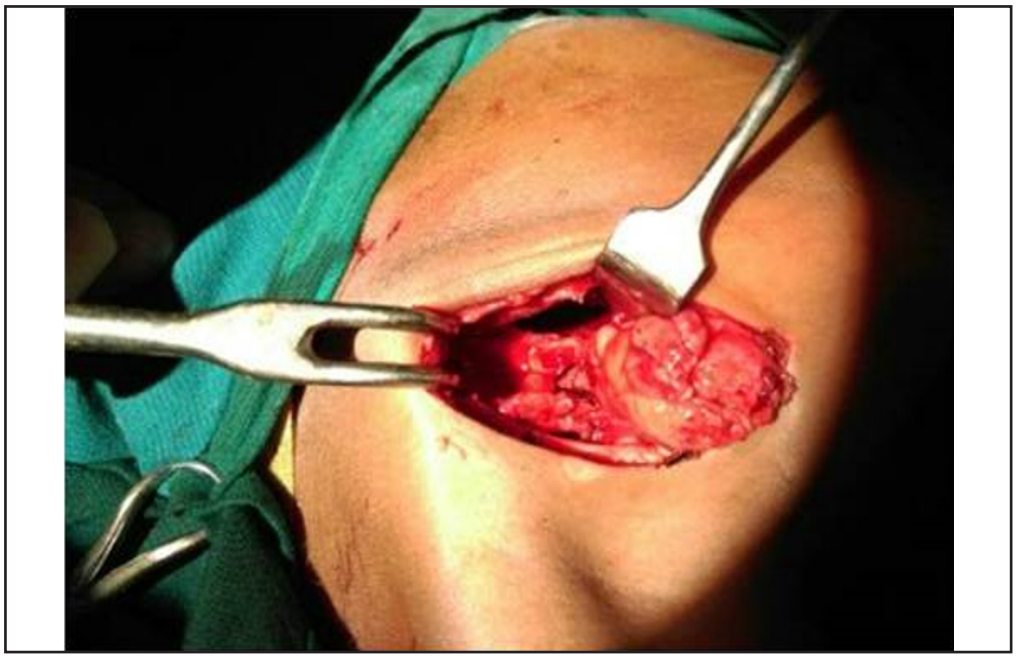

Fig. 1. Post-operative surgical site showing the submandibular region with intact submandibular gland. (Approach through horizontal incision 1cm below and along lower border of mandible, surgical step similar till exposure of submandibular triangle and gland, Cyst found separate from Submandibular gland, Submandibular gland transposed anteriorly, Peri cystectomy done preserving the Submandibular gland)

of increase in size while consuming food, fever difficulty in swallowing or any other systemic complains. On physical examination, there was a smooth, soft, cystic, non-tender, immobile mass of 4x3cm in right submandibular region. CECT of neck revealed a cystic lesion in pre-styloid compartment of right parapharyngeal space, superiorly extending to base of skull, displacing submandibular gland inferiorly, medially protruding into nasopharyngeal and oropharyngeal air column, laterally compressing masticator space and displacing carotid sheath posteriorly. Suspecting a possible hydatid cyst, we also conducted a thorough imaging studies of more common locations for hydatid cyst which included USG whole abdomen, CECT of brain and HRCT of lungs. HRCT thorax revealed a well-defined cystic lesion of 68x53mm was noted in left lung predominantly involving upper lobe abutting mediastinal pleura around hilum and lateral costal pleura.

FNAC was only suggestive of a cystic lesion. In collaboration with CTVS department excision of neck & lung cyst was done. Neck cyst was approached through an approximately 3 cm long horizontal incision 1cm below & along lower border of mandible, and identified lying in right digastric triangle free from any significant attachment to nearby structures including the submandibular gland. The Submandibular gland was transposed anteriorly and total pericystectomy was

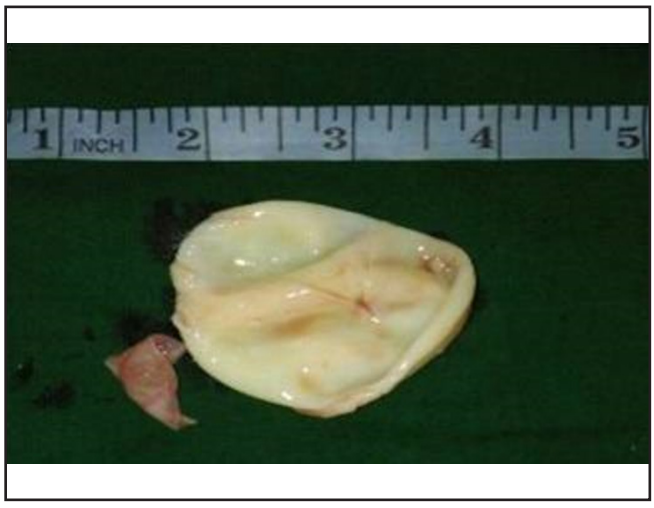

Fig 2. Post-operative specimen of the resected cyst and its germinative membrane.

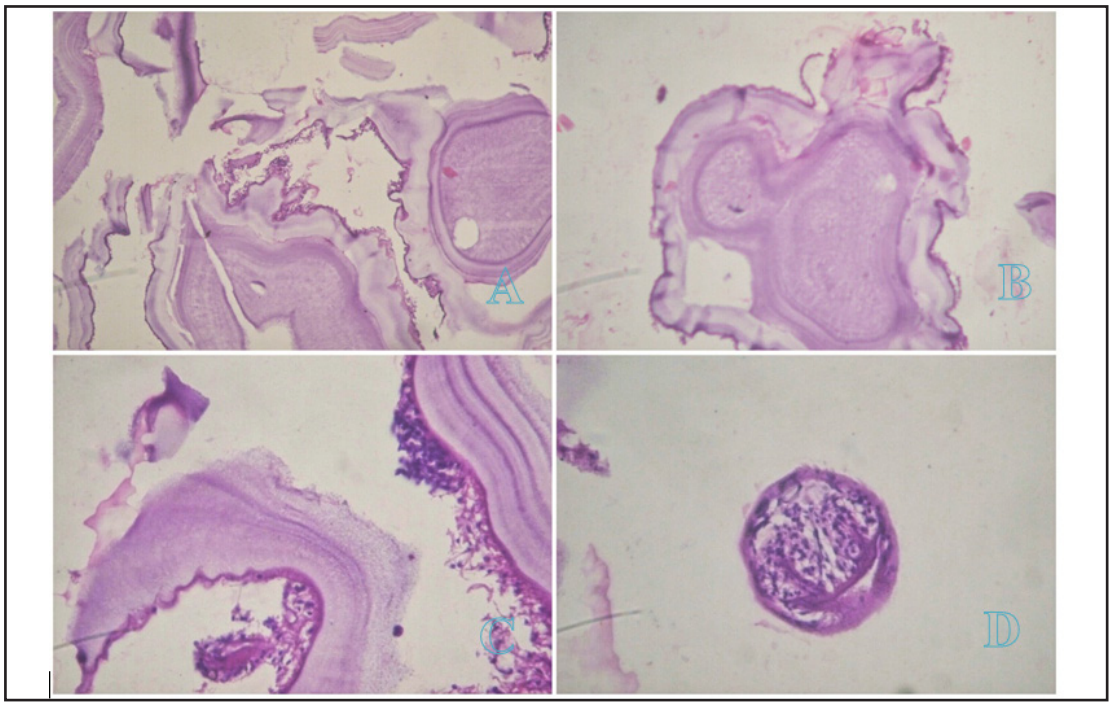

Fig. 3. Microscopic examination using Haematoxylin & Eosin staining (A= 200X, B=200X, C=400X, D= 600X). (A, B, C) Microscopic examination of the specimen demonstrating a thick collagenous fibrotic cyst wall (D) free scolex in the cyst lumen.

performed preserving the submandibular gland. (Fig. 1) Grossly, it was a cystic mass with an outer smooth greyish white glistening surface measuring about 6x4x3cm. (Fig. 2) HPE showed cyst wall being lined by a germinative layer and composed of pale eosinophilic, acellular, laminated chitinous material suggestive of hydatid cyst. (Fig. 3) The lung cyst was excised sub-totally due to significant air leakage form left upper lobe and closed with a chest drain. Rest of the hospital stay was uneventful. The patient is under yearly follow-up for the last 5 years without any local recurrence.

Discussion

Hydatid cysts at unusual sites have been reported all around the world. Hydatid disease in the neck is quite rare and the diagnosis is remarkably difficult because of presence of simulating and more common cystic pathological conditions in the neck.

Hydatid cyst is a diagnosis rarely considered, even in endemic zones, in the presence of a neck cyst. As such isolated cysts are more suggestive of congenital cyst or benign tumour. It displays the characteristic symptoms of benign tumour that grows slowly. It may also imitate cysts, abscess, hematoma or pseudocysts. Although the disease is generally asymptomatic, it may exhibit clinical symptoms depending on the size and location of the cyst and the pressure of the growing cyst. Physical examination may also reveal signs of laryngotracheal compression or even local infection following puncture or rupture of the cyst.

Medical imaging provides a considerable contribution, not only to confirm the diagnosis, but also to eliminate any other coexisting hydatid cysts, particularly in the liver, lungs and spleen. Ultrasound constitutes the first-line examination as it can visualise features highly suggestive of hydatid cyst (detachment of the membrane, multilocular appearance and peripheral calcifications), similar to those observed in other visceral sites, particularly the liver, corresponding to Gharbi's classification.[7] In the absence of these signs, differential diagnosis can include cystic lymphangioma,

cold abscess, chronic haematoma, and epidermal cyst. The sensitivity and specificity of ultrasound have been estimated to be 90—95%.[8]

Positive hydatid serology confirms definitive diagnosis, while eosinophilia is nonspecific, as it is observed in any form of parasitic infestation.[8] Serological tests are broadly used to substantiate the diagnosis. However, because of chances of false positives and negatives, imaging modalities remain more sensitive than serodiagnosis, especially with unusual sites. However, in our patient, ultrasound report did not diagnose hydatid cyst, probably the unusual site being the reason behind the miss. Abdomino-pelvic ultrasound and chest X-ray, should be performed in context to detect other hydatid sites in such cases. CT can be used to confirm suspected lesions.

Fine needle aspiration cytology can suggest the diagnosis by showing clear fluid characteristic of hydatid disease.[8] However, this examination is considered to be dangerous due to risks of fissure, dissemination, anaphylactic reactions & infectious inoculation.[8]

The definitive diagnosis is based on histology with direct microscopic examination demonstrating debris of lamellar membrane, hooklets or whole protoscolex during percutaneous aspiration, biopsy or examination of the resection specimen. This direct examination can determine the viability of the protoscolices.

Treatment of hydatid cyst of the neck is exclusively surgical.[8] Total pericystectomy, removing the entire cyst, is the method of choice.[8] Subtotal pericystectomy or resection of roof of the cyst are reserved to cases in which cyst arises in contact with nerves and vessels.[8]

Prior to incision, the surgical field must be protected by scolicidal solution to avoid any dissemination of scolices in event of accidental opening of the cyst.8 Care must be taken while dissection for intact cyst delivery as the cyst fluid is highly anaphylactogenic and required medications for anaphylaxis management must be checked prior surgery. Accidental spillage is to be cleared immediately and surgical field may be guarded by sponges.

Injecting a scolicidal agent into the unopened cyst and walling off the operative field with sponges soaked in a scolicidal agent are the two most commonly employed scolicidal measures.[9] 0.4% chlorhexidine gluconate,1.5% cetrimide - 0.15% chlorhexidine (10% Savlon®), Povidone-iodine (Betadine®) and 3% hydrogen peroxide are fastest acting effective scolicidal agents in their undiluted to half diluted forms in 5- and 10-minute exposure time on field and in 15 minutes on surgical sponges.[9,10] 0.24% sodium hypochlorite, 95% ethyl alcohol and 20% saline are only effective scolicidal agents in undiluted form reaching maximum efficacy after 20 minutes.[9,10] All agents are to used cautiously as every one agent is locally and systemically toxic. Savlon appears to most widely available fastest acting least toxic scolicidal agent. There is no maximum volume guide. As these agents acts on the surface applied, effects & toxicities are time, volume and area of application dependent.

Regular postoperative and long-term surveillance is required, essentially based on ultrasound, primarily to monitor appearance of residual cavity. Hydatid serology is performed six months and one year after surgery. Computed tomography is reserved for cases of suspected recurrence and surveillance of large residual cavities.

Medical treatment with imidazole derivatives (mebendazole and albendazole) has a limited place in treatment of hydatid disease of neck, as, when used alone, it only decreases size of the cysts and cyst sterilization is much longer to achieve.[8] It is prescribed as an adjuvant to surgery, especially following intra-operative cyst rupture, postoperative recurrence or in cases of multiple hydatid cysts.[8]

Radiology in form of ultrasound appears to be the most reliable modality for surveillance after exclusive medical treatment by demonstrating reduction of size of cysts and/or increased intracystic density or echogenicity. Physical examination and serology contribute poorly, as hydatid cyst, even when dead, can remain antigenically active and can continue to stimulate host's immune system.

Hydatid disease is a widespread public health problem in developing countries. The possibility of hydatid disease, especially in endemic regions, may always be considered in the differential diagnosis of mesenchymal neoplasms or soft tissue cystic masses in

the neck. Possibility of multiple lesion should always be kept in mind and if suspected, commoner locations must always be screened prior to surgery. Radiologic imaging modalities in such cases are mandatory for the diagnosis and post-operative follow-ups. The prognosis is excellent in hydatid cyst cases treated with total removal of the cyst without rupture. In case of intraoperative rupture or planned partial cystectomy is performed, the surgical field must be washed thoroughly by scolicidal solution to prevent recurrence and followed up regularly for early identification of possible recurrence.

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Efficacy of Auditory Verbal Therapy on Listening and Linguistic Skills of a Child with Bimodal Hearing

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ABSTRACT

Introduction

This study aimed to document the effect of Auditory Verbal Therapy (AVT) with proper assessment and management in early intervention of a child with bimodal hearing. Bimodal Hearing is the use of a cochlear implant in one ear and a hearing aid in the opposite ear. Auditory Verbal Therapy is a highly specialist early intervention programme which equips parents with the skills to maximise their deaf child's speech and language development.

Case Report

A male child aged 5 years 1 month had bilateral severe to profound hearing loss and speech-language problem. He was using cochlear implant in the right ear and BTE hearing aid in left ear (Bimodal hearing). Speech and language assessment revealed delayed semantic, syntax and pragmatic skills. Assessment of language development test showed poor receptive and expressive language score. The functional auditory performance indicator score indicated poor auditory function. Auditory verbal therapy hierarchy plan was used for treatment. Post 15 sessions after applying AVT the child's listening and linguistic skills showed a great improvement.

Discussion

The scales used to measure the efficacy of AVT are found to be useful for the assessment and goal setting for intervention. Thus, appropriate quantification of various aspects of communication skills may describe its potential impact in this case under ADIP scheme.

Keywords

Hearing Loss; Cochlear Implantation; Bimodal Hearing; Auditory Verbal Therapy

Cochlear Implant is surgically implanted device coupled to external components that provide useful hearing and improved communication to adults and youngsters with severe to profound hearing losses.[1] In a bimodal fitting, one ear is stimulated acoustically with a hearing aid and the other is stimulated electrically with a cochlear implant. Appropriate medical and audiological management to ensure that amplification or a cochlear implant leave maximum access to speech. Auditory-Verbal Therapy (AVT) facilitates optimal acquisition of speech through listening by newborns, infants, toddlers, and young children who are deaf or hard of hearing. It promotes early diagnosis, one-on-one therapy, and state-of-the-art audiological management and technology.[2] Auditory-Verbal Therapy is specialized type of therapy designed to teach a child to use the hearing provided by a hearing aid or a cochlear implant for understanding speech and learning to speak. The child is taught to develop hearing as a lively sense in order that listening becomes automatic and therefore the child seeks out sounds in life. Hearing and active listening becomes an integral a part of communication, recreation, socialization, education, and work. Under the ADIP scheme cochlear implant was done since there was little benefit from the BTE hearing aid. The parents

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Table I: Audiological test reports.

	TESTS	RIGHT EAR	LEFT EAR	IMPRESSION
Pre-Implant	PTA	111.6 dBHL	115 dBHL	Bilateral profound sensorineural hearing loss.
	SAT	105dBHL (NR)	105dBHL (NR)	
	Immittance Test	'A'-type	'A'-type	
	Acoustic Reflexes	Absent	Absent	
	ASSR	95 dBHL	98 dBHL	Bilateral profound hearing loss.
	ABR	95dBnHL(NR)	95dBnHL(NR)	Bilateral severe to profound hearing loss.
Post-Implant	PTA	120 dBHL(NR)	113.3 dBHL	Bilateral profound sensorineural hearing loss.
	Immittance Test	'A'-type	'A'-type	
	Acoustic Reflexes	Absent	Absents	

were concerned about the child's speech- language and listening skills as they were now entering into a different domain of therapeutics. This study aimed to document the effect of AVT with proper assessment and management in a child with bimodal hearing (cochlear implant with hearing aid).

Case Report

A male child aged 5 years 1 month with cochlear implant (Cochlear-CI24RE-CP802 under ADIP scheme) in the right ear and BTE hearing aid (Siemens Intuis DIR) in left ear was brought to the speech and language diagnostic department with the complaint of speech-language and hearing problem. He was from native Bengali speaking family and using few words along with gestures for his needs and came for rehabilitation purpose. His hearing age was 2 years with hearing aids. No history of developmental delay or any other medical conditions.

All audiological evaluation reports are shown in the Table I and aided free field responses are shown in Table II.

Speech and language assessment revealed semantic age-12-18months, syntax age-yet to enter Browns stage and pragmatic age-18-24 months. Assessment of language development (ALD) test showed receptive language score-8 (6-11months) and expressive language score-11 (12-17months). The functional auditory performance indicator (FAPI) score are tabulated in Table III. Overall parental satisfaction from implantation rating was 07 (considerable).

AVT Hierarchy Plan was used for treatment (Fig.1).[3] Management included the main goal to facilitate age appropriate speech and language skills within the child's limit of participation. To accomplish that long term goal, three short term goals were taken, which included the target to improve auditory skills (Auditory awareness, Attention, Localization, Discrimination, Auditory feedback, Auditory memory and Auditory closure); second to facilitate the improvement of speech production and lastly to facilitate improvement of language skills. Therapy session was for 45 minutes, twice a week.

To achieve first goal means to improve listening and speech perception skills, the clinician was used different noise makers (drum, jhankara, whistle), rings/blocks, flash cards of 6 ling sounds (/ah/, /oo/, /ee/, /m/, /s/, /

Table II: Free field aided responses

	500HZ	1KHZ	2KHZ	4KHZ
Unaided	**85 dBHL (NR)**	**90 dBHL (NR)**	**95 dBHL (NR)**	**95 dBHL (NR)**
Only CI	**30 dBHL**	**40 dBHL**	**40 dBHL**	**45 dBHL**
CI with Hearing aid	**25 dBHL**	**30 dBHL**	**25 dBHL**	**30 dBHL**

sh/- showed in Fig.2), daily objects and activity cards.

The clinician showed pictures of Six ling sounds(/a/, /u/,/ i/, /m/, /s/, /ʃ/) and produced each sound again and again till the child indicate them consistently by pointing to their pictures. Also to discriminate intensity/ pitch (Loud vs. Soft; High vs. Low), consonant and vowel difference in 1, 2, and 3 syllable words (/a:m/, /kola/, /a:narosh/) and discrimination between increasingly similar word also between consonant same but different vowel (/pet/, /pith/, /pa/; /bot/, /bæt, /bas/; /kæt/, /kot/, /kar/) and consonant that only differ by manner: (/bæt/, /mæt/). To improve auditory memory and auditory closure, clinician used identification of key word in context with and without suprasegmentals tasks like: two key words in context of one sentence, three key words in context of one sentence, 4+ words in one sentence (e.g. show me book, watch, plate and tree, Increase word play association through listening, answer simple questions (where, what, who) understand increasingly complex sentences.

Second goal was to facilitate improvement of speech production that was trained by making the child imitate single words which were spontaneously produced using with phonological cues and after sometime without cues. When the child spontaneously produced single words without using phonological processes the clinician moved towards the imitation of 10 different phases using 2-3 different words. Goal was to make the child spontaneously produce 10 different phrases with 80% intelligibility.

Thirdly the target was set to improve language skills which constituted the imitation of single words spontaneously with the help of common daily used objects -> initiation of two word phrases -> spontaneous production of 2-3 word sentences which was done by the clinician -> production and use of single words as well as 2 word utterances. Also the child was encouraged to use them in real life situations.

After 15 sessions of AVT the child listening and linguistic skills showed a great improvement. FAPI score

Table III: FAPI score

CATEGORY	SCORE & INTERPRETATION
Sound awareness	**77.77%**
Sound meaningful	**59.52%**
Auditory feedback	**0%**
Localizing sound source	**0%**
Auditory discrimination	**0%**
Short term auditory memory	**0%**
Linguistic auditory	**0%**

PLANNING AUDITORY-VERBAL THERAPY FOR CHILDREN

Auditory Potential + Cognitive-Linguistic Processes + Motor Processes → Auditory-Verbal Communication

(e.g., auditory access and processing) (e.g., ideas, intent and language) (e.g., planning and execution)

Variables to Consider

etiology of hearing loss, age of diagnosis, degree of hearing loss, effectiveness of hearing technology, effectiveness of audiological management, hearing potential, general health, learning style, intelligence, emotional health, participation and involvement of the family, expertise and skills of the therapist

Hierarchies*

Expressive Language	Listening Skills	Awareness of Sounds				Auditory Memory								Auditory Closure	Figure Ground		
		Distance	Rate	Loudness	Pitch	Aspect	Set Type	Set Size	Number of Items	Target position	Sequence	Critical Elements	Directions	Stereotypic/ common phrases	Noise Type	Distance	State of Noise
• Crying • Cooing • Smiling • Laughing • Vocalizing • Babbling • Imitating • Blowing and whispering • Jargon • First words • Word combinations • Sentences • Conversation • Near age-appropriate grammar • Age-appropriate grammar	• Auditory awareness • Attention • Localization • Discrimination • Auditory feedback • Monitoring of voices • Auditory memory • Sequencing • Comprehension	6 inches ↓ 3-6 feet ↓ 12+ feet ↓ Outside door ↓ Outside building	Slow ↓ Regular ↓ Rapid	Loud ↓ Regular ↓ Soft ↓ Whisper	Low ↓ Mid ↓ High	Supra-segmetal features ↓ Learning to Listen sounds ↓ Word ↓ Phrase ↓ Sentence	Closed ↓ Open	2-3 items ↓ 4-8 items ↓ 9-16 items ↓ 17+ items	1 item ↓ 2 items ↓ 3 items ↓ 4+ items	Isolated word ↓ End of phrase ↓ Middle of phrase ↓ Beginning of phrase	Out of order ↓ In order	1 element ↓ 2 elements ↓ 3 elements ↓ 4+ elements	1 step ↓ 2 related steps ↓ 2 unrelated steps ↓ 3 steps ↓ 4+ steps	Songs and nursery rhymes ↓ Concepts and analogies ↓ Sentences	Fan ↓ 4-speaker babble ↓ Cafeteria	Next to sound source ↓ 5-6 feet from source ↓ across the room	Continuous ↓ Intermittent with a pattern ↓ Continuous with no pattern

Fig.1. AVT Hierarchy Plan by Estabrooks (Image copied from "Auditory Verbal Practice")[4]

showed sound awareness, sound meaningful, localizing sound source 100% (acquired), auditory feedback and auditory discrimination 91.66% and 95.5% (acquired) respectively, short term auditory memory 88.88% (acquired) and linguistic auditory was 15% (emerging).

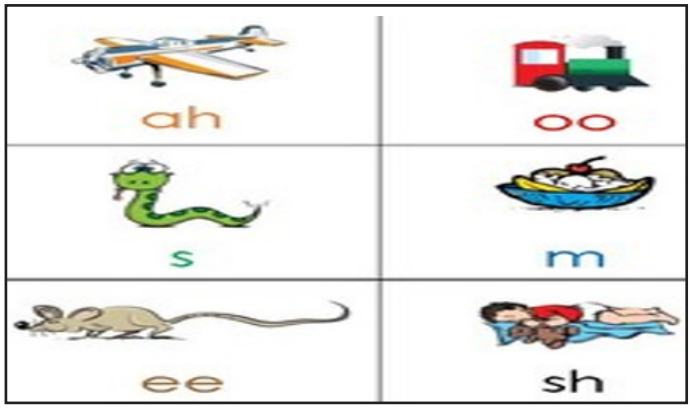

Fig. 2. Six Ling Sounds cards (Image copied from "www. teacherspayteachers.com")[5]

Assessment of language development (ALD)-Receptive language assessment-Score 13 (18-23 months) {criteria met} and Expressive language assessment-Score 19 (24-29 months) {criteria met}, Speech production showed-Brown's stages for MLU assessment-Brown stage 1 (emerging) and Speech intelligibility rating scale-2 (can understand with little effort, occasionally need to ask for repetition), and Overall parental satisfaction from implantation-rating- 09 (tremendous). The child is now attending regular school and studies in upper kindergarten.

Discussion

AVT includes education, advocacy, guidance and family support as it states a major role of the parents. The assessment procedure was based on assessing the four domains that is listening and speech perception skills, language skills, speech production, as well as overall

parental satisfaction from the implant. Management also included periodical mapping of the cochlear implant based on the child's responses. The primary goal of AVT is to guide parents in helping their children develop intelligible spoken language through listening and to coach parents in advocating their children's inclusion in mainstream schools.

Ongoing assessment of the child's development; auditory verbal therapy is diagnostic in nature and supports ongoing analysis of the child's progress. Integration into regular education the maximum amount as possible to permit for typical speech, language, and auditory models, as well as typical curriculum that supports age-appropriate academic and social learning. Integrating audition into the personality of the kid in order that listening is viewed as meaningful and first for learning and functioning within the mainstream of society. Parents and caregivers are viewed because the primary models for speech development, and remain as active participants throughout the child's intervention and education. Study also suggested that AVT can have a positive impact on developing speech and language skills in children with HI.[6] It focuses on certain factors like- speech detection, auditory learning instead of visual learning, effective language learning, reading skills development, team approach to therapy that allows for a more complete education environment, stresses listening rather than watching and finally parents do not need to learn sign language.[7]

Improvements in cochlear implant technology and outcomes have resulted in expanded candidacy criteria. As a result, more implant recipients present with significant residual hearing and bimodal stimulation should be considered in order to provide access to bilateral, binaural & complementary acoustic cues. The scales used to measure the efficacy of AVT are found to be useful for the assessment and goal setting for intervention. Thus, appropriate quantification of various aspects of communication skills may describe its potential impact in this case under ADIP scheme. Due to the inherent variability in the cochlear implant population, the approach that provides the most benefit will vary from patient to patient. Outcomes assessment is important in individualizing the AVT approach.

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Case Report

Foreign Body Nose: An Unusual Presentation

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ABSTRACT

Introduction

This is a very interesting case of retained homicidal foreign body in the nose in contrast to most of the foreign bodies which are accidental.

Case Report

A 27 year old male presented to ENT emergency with alleged history of assault over face with sharp object following which patient developed nasal bleed. On examination vertical laceration of approximately 8 cm in length was present along left naso-orbital groove extending superiorly from medial canthus of left eye and inferiorly to nasal alar cartilage. On anterior rhinoscopy a metallic foreign body was seen in both nasal cavities, which appeared to be crossing from left to right side piercing the nasal septum. Foreign body was removed via open approach.

Discussion

Penetrating maxillofacial injury with foreign body impaction are less common. High index of suspicion is required in diagnosing these cases. Radiological intervention should be done to get idea of exact location and extent of foreign body. Lateral rhinotomy is a useful approach in removing these foreign bodies.

Keywords

Foreign Body; Nose; Homicidal; Lateral Rhinotomy

Nasal foreign bodies are most commonly seen in children and are unusual in adults. Whenever an adult patient presents with nasal foreign body, underlying accident, assault or psychiatric disorder should be ruled out. An eastern European retrospective study (over 10 years with 849 patients) identified the following relative proportions of foreign bodies: tracheobronchial 11%, pharyngo-oesophageal 17%, and ear, nose and post-nasal space 72%.[1] Our case is different as it is a case of homicidal foreign body in an adult which got impacted after an assault.

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Case Report

A 27 year old male presented to ENT emergency with alleged history of assault over face with sharp object following which patient developed nasal bleeding which was sudden in onset, gradually progressive, relieved on its own after sometime. There was no history of any retained foreign body, oral bleed, vomiting, seizures, diplopia, blurring of vision or any other ENT complaint. On examination a vertical incised like wound of approximately 8 cm in length was present along left naso orbital groove extending superiorly from medial canthus of left eye and inferiorly till nasal alar cartilage. The wound around the eye was primarily sutured with silk sutures by eye department. On anterior rhinoscopy metallic foreign body was seen in B/L nasal cavity appearing to be crossing from left side of the nasal cavity to the right side after piercing the nasal septum. On oral cavity examination, mouth opening was adequate and posterior pharyngeal wall was clear. Examination

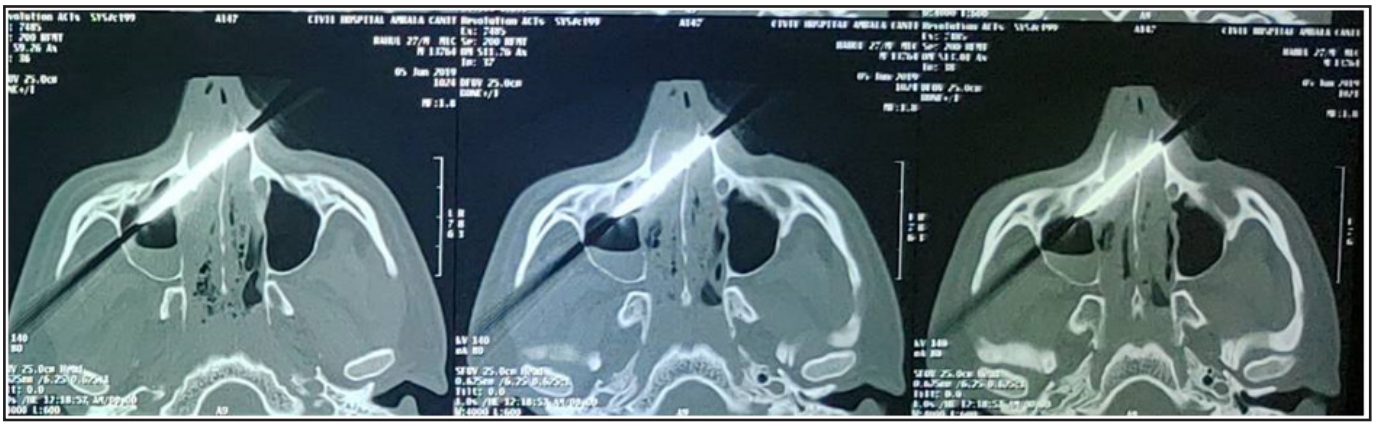

Fig. 1. Non contrast Computed tomogram depicting the radiopaque foreign body reaching up to posterior wall of right maxilary sinus.

of eye - B/L vision- normal, extraocular movements- normal in all directions, pupils- B/L normal reacting, no RAPD. Rest of the ENT examination was within normal limits. NCCT Nose and PNS was done for Medicolegal purpose and to see the exact location of foreign body. It showed metallic foreign body going from left naso-orbital groove entering left nasal cavity, going through nasal septum into right nasal cavity and entering till posterior wall of right maxillary sinus. No invasion into the orbit was seen. (Fig. 1) The patient was taken to ENT OT for foreign body removal under general anesthesia after taking written and informed consent for both endoscopic and external approach. Under GA, B/L nasal cavities were decongested and nasal endoscopy was done.

A metallic foreign body was seen in left nasal cavity going through the septum in right nasal cavity and into the maxillary sinus. Endoscopic manipulation was done to remove the foreign body but it was impacted and hence decision for external approach was made. Right lateral rhinotomy incision was made, soft tissue dissection done and part of anterior wall of right maxillary sinus removed. Foreign body visualized in maxillary sinus reaching upto posterior wall and roof, however, no breach was seen. Taking endoscopic control through right maxillary sinus, foreign body removed from left side entry wound. (Figs. 2 and 3) No immediate post op bleeding observed. Incisions closed in layers by inner Vicryl®, outer silk respectively and B/L anterior nasal packing was done with one full Merocel® in each nasal cavity. Pack removal was done on post-operative day 2 and patient was discharged on antibiotics and nasal decongestants. Patient underwent complete suture removal on post op day 7 and is continuously on regular follow up. Septal perforation was healed and no post-op. septal hematoma or abscess was seen. Patient is on regular follow up and a well healed scar is present.

Discussion

Foreign bodies in the nose can be situated in any portion of the nasal cavity. Foreign bodies in PNS are rare, if present they are usually traumatic or iatrogenic. Traumatic ones include pellets or bullets from gunshot injuries, wood, pieces of glass, and stones, while iatrogenic ones includes teeth, dental cement, and pieces of broken forceps.2-4 The approach in these patients include thorough clinical examination and radiological investigation to see exact location and extent of foreign body. The treatment protocol for a penetrating maxillofacial injury is to decompress, debride and avoid neurovascular injury and subsequent complications.

A multidisciplinary surgical intervention is always required in these cases. The surgical approach is chosen on basis of size, shape, material and location of foreign body. External approach could also be used if the foreign body is not retrievable by endoscopic approach. In a case in Turkey, septorhinoplasty was performed as a part of removal of asymptomatic foreign body in nose in a 17 year old patient.5 In our

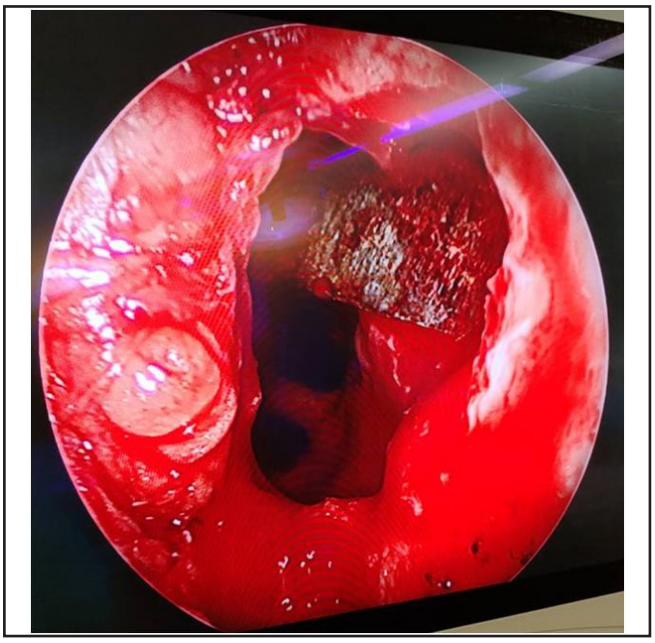

Fig. 2. Intra-operative picture showing foreign body in the right maxillary sinus after right maxillotomy.

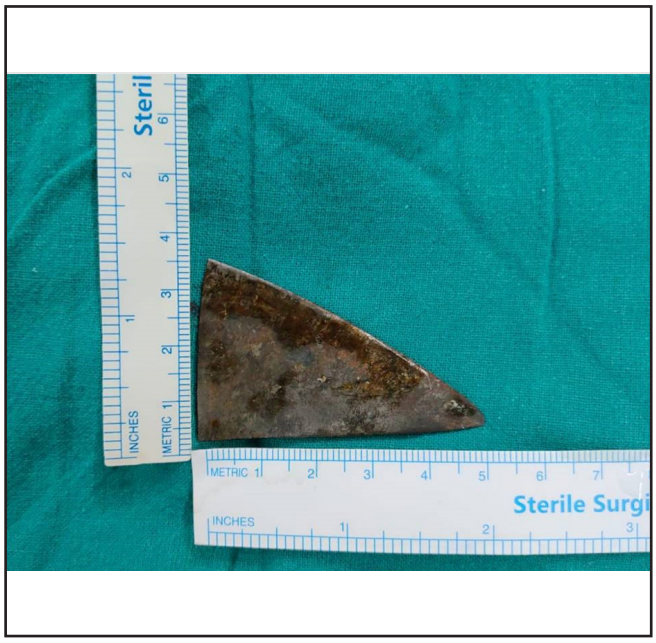

Fig. 3. Metallic foreign body after removal

case we performed anterior maxillectomy as a part of removal of foreign body because it was entering into the maxillary sinus and to look for possible injury to internal maxillary artery as the foreign body was sharp and in close contact to posterior maxillary wall. Our case also emphasizes importance of thorough clinical examination in identifying such retained foreign bodies and further helping in the management of the patient. Penetrating maxillofacial injury with foreign body impaction are less common. High index of suspicion is required in diagnosing these cases. Clinical examination helps in identification of foreign body as it did in our case. Radiological intervention (CT) should be done to get idea of exact location and extent of foreign body. Lateral rhinotomy is a useful approach in removing these foreign bodies.

Abbreviations

ENT - Ear, Nose and Throat

RAPD- Relative Afferent Pupillary Defect

NCCT- Non Contrast Computed Tomography

OT- Operation Theatre

GA- General Anaesthesia

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Impaled Nasopharyngeal Foreign Body

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ABSTRACT

Introduction

Foreign body cases are common in otolaryngologic practice, usually occurring in children. An impacted penetrating impaling foreign body can be one of the most challenging emergencies Management revolves around safe extraction of impaling object and prevention of complications. Here we share our experience with one such case of unusual foreign body impacted at an unusual site, with an extensive review of literature discussing management & prevention of complications in similar cases.

Case Report

A 3 year old boy presented to us in ENT emergency with a long metallic hook impaled in nasopharynx for the past 8 hours. We were able to dislodge the impacted foreign body under direct endoscopic visualisation under general anaesthesia.

Discussion

Any such injury might be similar but no two injuries are the same. It needs combined expertise of multidisciplinary team usually consisting of ENT surgeon, anaesthesiologist, radiologist and may also need vascular surgeon and interventional radiologist at times. Several complications are reported in literature, knowledge of which would help preparedness and thus a better outcome..

Keywords

Impalement; Foreign Bodies; Nasopharynx; Oropharynx

Foreign body cases are common in otolaryngologic practice, usually occurring in children. An impacted penetrating impaling foreign body can be one of the most challenging emergencies. Here we share our experience with one such case of unusual foreign body impacted at an unusual site.

Case report

A 3 years old boy presentedin ENT emergency with a long metallic hook struck somewhere in oral cavity for past 8 hours.The child was irritable with no signs of respiratory distress or any active bleed. X ray of soft tissue of neck (Figure 1) showed foreign body has probably not pierced any prevertebral or spinal structure but it has a hook at the impaling end which is lodged atnasopharynx.Flexible fibreoptic intubation was done. After elevating the soft palate using infant feeding tube, 2.7mm 11cm 0-degree and 4mm 17cm 70-degree endoscopes were used through nose and oral cavity to inspect actual site and mode of impaction. To rather surprise, there was no major injury. The hook passed from left side of oral cavity below right half of soft palate into the nasopharynx, entered through right choana, perforated lower part of posterior bony septum and appeared in the left nasal cavity.

Pulling the stick was definitely not working as it was lodged at the posterior border of palate& perforated bony septum at an angulation. Pushing the hook back was also not working as it seemed the hook's diameter was larger than nasopharynx.With a better understanding of mode of impaction under direct visualisation, we were able to dislodge it by an upward rotational manoeuvre. Except for a small septal perforation and multiple minor lacerations on soft palate & posterior pharyngeal wall, no other injuries were noted.Rest of the stay in hospital and follow-up was uneventful.

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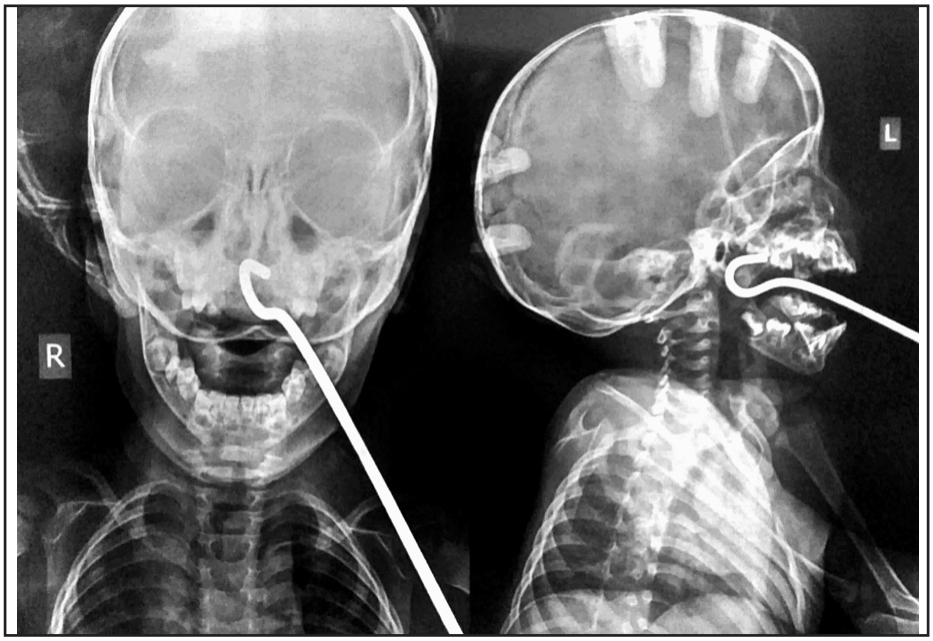

Fig. 1. X ray of soft tissue of neck showed the foreign body has probably not pierced or significantly injured any prevertebral or spinal structure but it has a hook which is lodged at the nasopharynx.

Discussion

Impalement injury to pharynx usually occur in children who fall prone while walking with foreign body in their mouths.[1,2] The most frequently observed foreign bodies are toothbrushes and pencils.1,2Soft palate and tonsils are usually injured followed by hard palate, tongue, and posterior oropharynx.[1,2] Nasopharynx is particularly rare area to be injured this way.[3]

The pharynx of a child is soft and stiff pointy foreign bodies can pass through posterior wall, injuring carotid artery or cervical spine. Management of these cases varies, which revolves around safe extraction of impaling object and prevention of complications. Impaling pharyngeal foreign body is a medical emergency. Delay of intervention can cause respiratory distress, due to edema or aspiration, impending vascular or spinal trauma& infectious complications.[3,4]

At peripheral centres, where general physician or even if an ENT surgeon is available, but a proper diagnostic facility or a complete OT setup might not be available,it is always prudent to arrange for urgent referral to nearest tertiary care centre without any unnecessary delay. A detailed history ofinjury and object impacted is obtained, if possible, from an eye witness.

The initial assessment should focus on stabilizing potential life-threatening injuriesusing structured approach of advanced trauma life support (ATLS)1withsomecalculated risks which might fetch adequate time to reach higher centre.Immobilisation of patient &impaling object is usually first essential step so that no further damage is caused.

Digital X-rays can be done for having general idea of shape & size of impacted object, depth of penetration and site of impaction. It is always better to get, contrast enhanced CT and CT angiogram to rule out vascular injury or possible impaction on to major vascular channels. 1,33D reconstructed CT imaging are quite helpful for better understanding of orientation of foreign body with respect to surroundings and site of impaction. CT is also must for wooden or plastic foreignwith are not as radiopaque as metals.

If impending major vascular trauma is suspected, preoperative embolization can be done by interventional radiologist which can ensure safer extraction process. Bleeding can be severe, possibly from great vessel injury, requiring urgent repair by cardiovascular surgery

team. If repair could not be performed, carotid artery ligation must be considered as a last resort.[4]

The potential of airway compromise may be apparent or predictable. In case of upper airway obstruction and severe intractable active bleed, one must plan to secure airway at the earliest. Anaesthesiologist can intubate, secure the airway and anaesthetise the patient for ENT surgeon to intervene. Other way round, in case of failed intubation, emergency tracheostomy can be can be performed by ENT surgeon to secure airway access and prevent aspiration.

Planning steps of extraction always needs individualised approach. It needs combined expertise of multidisciplinary team usually consistingof ENT surgeon, anaesthesiologist, radiologist and may also need vascular surgeon & interventional radiologist. One of the important points toconsider is proper choice of instruments and operation room setup. Thisisparticularly important in case of sharp impacted pointedobjects like protruding hooks, blades, and open safety pins, which increase thedanger of perforation and vascular injury.

Anaesthesia was challenging in our case. Mouth opening was small and restricted. Preoxygenation was difficult as face mask couldn't be placed sufficiently in contact to face covering nose and mouth. All kinds of neck, head or chin manoeuvres needed for intubation were not done in fear of advancement of the foreign body and possible spinal trauma. Fibreoptic intubation was done considering all possibilities, keeping tracheostomy in hand.

Exact visualisation of site of impactionand damage is vital, but at times difficult due to shadowed anatomical location. It is difficult to immobiliseimpaling object in mouth. Luckily for our patient, with imaging,it was quite evident that it has not done any major damages and there were no major vessels at risk but surprisingly it has structed in such a way that it couldn't be taken out with ease. Never the less, in case an impending major vascular injury is suspected, before going in for actual extraction process, the vessel at risk should be secured for safer extraction process.

Wherever possible an endoscope can always be passed through nose and oral cavity to visualise oropharynx and nasopharynx. Controlled movement of the impacted object should be done under visualisation which eases extraction process just by mare better understanding of the situation. Direct exposure of the nasopharynx by retraction of soft palate with catheters could be helpful.[5] C-arm can also be used for a real time imaging to guide extraction.

After removal check endoscopy is to be done to identify any bleed and injury or residual broken piece of foreign body.For nasopharyngeal foreign bodies, nasal endoscopy provides the only method of proper visualization especially for sharp foreign bodies whose retrieval can also damage the surroundings.[5]

Immediate injury can range from minor laceration to major tear in posterior pharyngeal wall, soft palate, passervent ridge, pillars, injury to adenoid & eustachian tube.[6] Bleed may occur from minor mucosal lacerations and major arterial supplies in the area like sphenopalatine artery and tonsils,all kinds of which should be controlled by bipolar electrocauterization, sutures or packs as needed.

Any major laceration specially at palate level should be repaired with absorbable sutures to prevent late complications.6After removing foreign body, pharyngeal wound can be sutured or left open. It is better to leave wound open if it is infected, has slough or necrotic tissue. A clean wound should better be sutured. Leaving it open will unnecessarily subject it to very high bacterial load of oral secretions. Closing of an infected wound can lead to development of retropharyngeal abscess,[6,7] sepsis[8] and even life-threatening mediastinitis, and for such wounds debridement and drainage is to be done.[8]

CT can be repeated for detection of residual foreign bodies suspected & recurrent abscess patients. Magnetic resonance imaging has role in detection of neurological sequels, grisel syndrome and carotid artery pseudoaneurysm. [9]

Late complications may include velopharyngeal insufficiency or even stenosis.[9,10] Smaller septal perforation usually heals spontaneously which happened for our case but there might be persistent bigger perforationscausing symptoms. Literature has also mentioned rare possibility of Grisel syndrome, carotico-jugular fistulaandcarotid artery pseudoaneurysm.[9]

Neurological sequels due to thrombosis[6,7] and stroke[9]

are potential severe complications.These isa high risk of air entering deep neck spaces causing widespread dissecting cervical emphysema,[11] pneumothorax,[11] pneumomediastinum,[11] mediastinal emphysema[8] or even pneumoencephalocoele.[8] Edema of soft palate, tongue, retropharyngeal abscess & dissecting emphysemas can present with stridor & respiratory distress in post-operative period. Life threatening accident of carotid artery damage,[11] shock and death have rarely been documented.

Innocuous injuries with minor soft-tissue trauma have also been associated with severe neurologic sequelae.[12] Neurological examination may not correlate with development of symptoms, degree or mechanism of injury.[12] The patient must be followed for at least 72 hours for early identification of possible life-threatening complications.[12] Appropriate antibiotics, anti-inflammatory and steroid have been found adequate in prevention and control of most of the complications. Oral feeding may be stopped for around 48 hours in suspected cases, for possibility of reoperation for tracheostomy or control of reactionary bleeds.

Neurovascular complications, despite their rarity have earned maximal discussion in literature. Traumatic lacerations and infectious complications have far more clinical relevance due to their frequency of occurrenceand should thus occupy a more prominent position in management flow chart.[13]

Any such injury might be similar but no two injuries are the same. From referral to extraction, each step should be considered with patience. One should always seek insights of experience, specialists from all required branches and well-equipped set up for a predictable positive outcome.

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Communication Profile of de Lange Syndrome

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ABSTRACT

Introduction

de Lange Syndrome is an autosomal dominant disorder which was initially described by Vrolik (1849) in a child with severe oligodactayly.

Case Report

A case of 2y2m/Female child came for speech and hearing evaluation. Audiological examination (BOA, DPOAE, ABR /BAER) and Speech-Language Evaluation, Psychological Examination were done by expertise clinicians. Previously, the child was diagnosed with de Lange Syndrome. Audiological evaluation diagnosed the child to have moderately severe hearing loss. After speech and language evaluation the child was detected with speech language disorder. After psychological evaluation the child was diagnosed with severe developmental delay and having low IQ range.

Discussion

de Lange syndrome is an autosomal dominant developmental disorder characterized by the sample number of characteristics which requires more rehabilitation options have to be planned. Unfortunately, there is dearth of literature that addresses the characteristics, assessment and intervention of individuals with de Lange syndrome.

Keywords

De Lange Syndrome; Communication Disorders

In the 1930s Cornelia de Lange, a Dutch pediatrician reported two unrelated girls with similar features and named the condition "degeneration typus amstelodamnesis".[1,2] In honor of her formal characterization the term de Lange syndrome is widely used.

de Lange syndrome is a syndrome of congenital anomalies mainly characterized by a prenatal and postnatal growth deficiency; Intellectual disability that usually ranges from moderate to severe; Hearing loss; distinctive facial appearance including arched eyebrows that is often meet in the midline (synophrys), low set ears, small and widely spaced teeth and a small upturned nose; a psychomotor delay; Hirsutism; feeding difficulties; behavioral problems and upper limb defects were also evident. Jackson et.al (1989)[3] clinically review 310 patients and reported that 33% of these children were delivered prematurely and intrauterine growth retardation was also evident in many children.

de Lange syndrome is a very rare disorder that is apparent at birth (congenital). Males and females appear to be affected in equal numbers. It has been estimated that de Lange syndrome occurs in approximately one in every 30,000 to one in every 50,000 live births.[4]

Case Report

A retrospective case study design is adopted for the present study. A 2 year 2 months old male child reported with a complaint of speech& language problem and reduced hearing sensitivity from both the ears. A detailed case history was taken which reveals that baby was born as premature b and suffered with jaundice at birth and all the developmental milestones were also delayed.

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Table I: Report of Behavioural Observation Audiometry

SOUND STIMULATION	INTENSITY	RESPONSE
Clapping	80dBHL	Searching
Name Calling	75dBHL	Searching
Bell	85dBHL	Startle
Drum	75dBHL	Eyeblink
Daphli	80dBHL	No Response
500 Hz	75dBHL	Startle
1KHz	80dBHL	Ceasation of activity
2KHz	85dBHL	No response
4KHz	85dBHL	No response

A detailed Audiological and Speech and language Evaluation has been done.

Audiological evaluation:

As the age of the child was 2years 2months, so as per as the protocol for the assessment initially Behavioral Observation Audiometry (BOA)5 was performed. (Table 1)

This report (Table I) indicates that child responds to all verbal stimulus (such as speech cues, name calling) and nonverbal sound stimulus (such as Drum, Bell, Daphli, frequency specific warble tones) between the intensity of 75- 85 dBHL and the responses were eye widening, searching, cessation of activity and startle responses. BOA responses were indicative of bilateral moderate to moderately severe hearing Loss.

Further the child was recommended for DP-OAE. DP-OAE screening indicated "REFER" for both the ears indicative of abnormal outer hair cell functioning in the cochlea in both ears.

After doing DP-OAE screening, Auditory Brainstem Response (ABR) test was recommended for the child.

ABR test was done by using an instrument with ANSI S3.1-1999 specifications for the background noise. This test was done by using the protocol.6 (Table II)

This ABR finding (Fig.1) reveals, identifiable peak V was obtained till 65 dBnHL in right ear which was indicative of moderate hearing loss and identifiable

Table II: ABR Test Protocol

PARAMETER	SELECTION
TRANSDUCER	·ER-3A inserts
TYPE	·Click
POLARITY	Rarefaction
RAMPING (Window)	Blackman
RATE	·Click:21.1/sec

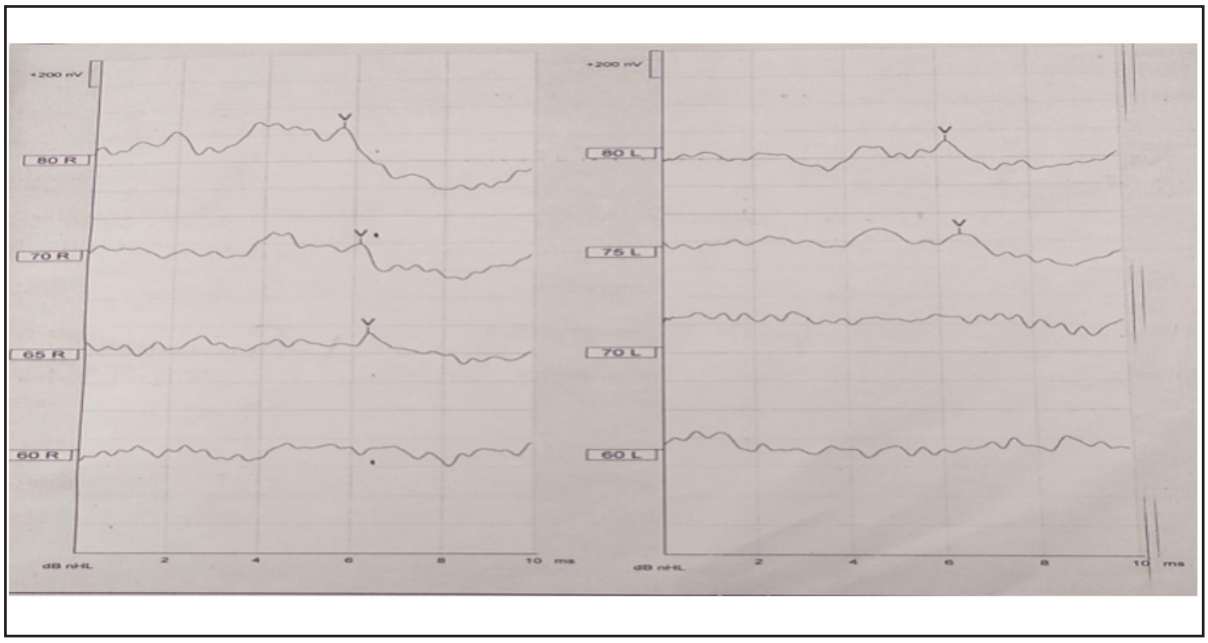

Fig. 1. ABR Report Findings of the Case of de Lange syndrome

peak V was obtained till 75 dBnHL in left ear which was indicative of moderately severe hearing loss.

Speech language evaluation:

The primary mode of communication was predominantly nonverbal through crying no true word or vocalizations were present.

On OPME examination, all articulators are normal in appearance and functions except the tongue elevations and lateral movements are affected. All the vegetative skills such as blowing, chewing are also affected except sucking.

For assessing receptive expressive language skills REELS was administered on the patient which reveals receptive and expressive language age of the patient is 0-3 months. Level of expression was also which reveals intentional communication behavior for both vocal and motor gestural.

Cognitive prerequisites for language development showed poor skills for all aspects of language development.

COMM DEALL shows delay in all aspects of language development(i.e. Gross motor, Fine motor, Activity of Daily Living, Receptive, Expressive, Social, Cognitive and Emotional skills all are delayed).

Psychological evaluation:

Mild Developmental Delay was reported secondary to de Lange syndrome (DQ=52).

EEG reports revealed normal sleep record.

MRI of brain reports revealed no detectable significant

Fig.2. The child with de Lange Syndrome

Table III: Comparison of ranges between unaided and aided responses

SOUND	INTENSITY (UNAIDED)	RESPONSE (UNAIDED)	INTENSITY (AIDED)	RESPONSE (AIDED)
Clapping	80dBHL	Searching	50dBHL	Searching
Name Calling	75dBHL	Searching	50 dBHL	Eye Blink
Bell	85dBHL	Startle	45 dBHL	Eye widening
Drum	75dBHL	Eyeblink	45dBHL	Startle
Jhankara	80dBHL	No Response	50dBHL	Searching
500 Hz	75dBHL	Startle	45 dBHL	Ceasation of activity
1KHz	80dBHL	Ceasation of activity	50dBHL	Startle
2KHz	85dBHL	No response	50 dBHL	Eye Blink
4KHz	85dBHL	No response	50 dBHL	Head movement

abnormality with both the hemispheres were normal in appearance and show abnormal signal intensity, centrum semi ovale and white matter tracts are normal, corpus callosum is normal in size and shape with normal signal pattern, sulci and gyri are normal, cisterns ventricle are normal with septum in the midline, no evidence of hippocampal sclerosis is seen.

Gene karyotyping was done, reports revealed translocation between chromosomes 1 and 4. Breakage and reunion have occurred at the bands 1q21 and 4q31.3. The segments distal to them have been exchanged i.e. 46, XY, t (1; 4) (q21; q31.3).

Clinical features: clinical examination of the patient reveals following features: Developmental delay; Synophrys: thin eyebrows often meet in the midline; Long eyelashes; Thin downturned lips; Oligodactyly; Low set ears; Hearing loss; Communication delay; Hirsutism: excessive hairs on head and back; small widely spaced teeth, small upturned nose. (Fig.2)

ABR responses of the child revealed moderate hearing loss in the Right ear and moderately severe hearing loss in the left ear. For management, regular use of the hearing aid is recommended to the child which is followed by the Hearing Aid Trial. Patient was recommended for Hearing Aid Trial. (Table III)

BTE hearing aid was tried which was given under the ADIP Scheme or Assistance to Disabled Persons for purchasing/ fitting of aids/ appliances. Where, the patient (Aided) responds to the entire verbal and non- verbal sound stimulus between the intensity of 40- 50dBHL. Responses were eye widening, searching, cessation of activity and startle. (Table III)

For management, firstly hearing aids were given to the child with proper programming. Unaided and aided responses were recorded (Table III) to check functional gain of hearing aid and ling six sounds test were to check the child's hearing skills. (Table IV)

Discussion

The aim of the study is to know the Audiological, Speech Language characteristics and clinical features for the individuals with de Lange syndrome. Due to this rarity speech and language features of de Lange syndrome lack literature. This study may help to investigate the specific clinical features, assessment, and management protocol best suited for patients with de Lange syndrome.

de Lange syndrome is a dominantly inherited developmental disorder characterized by the sample number of characteristics which requires more rehabilitation options have to be planned. Unfortunately, there is dearth of literature that addresses

Table IV: Comparison of ranges between unaided and aided responses in six ling sound test

	WITHOUT LIP READING				WITH LIP READING: AIDED			
	UNAIDED RESPONSE		AIDED RESPONSE		UNAIDED RESPONSE		AIDED RESPONSE	
SOUNDS	3ft	5ft	3ft	5ft	3ft	5ft	3ft	5ft
/a/	×	×	√	√	√	×	√	√
/e/	×	×	√	√	√	×	√	√
/u/	×	×	√	√	√	√	√	√
/s/	×	×	×	×	×	×	×	×
/sh/	×	×	×	×	×	×	×	×
/m/	×	×	×	×	×	×	√	√

the characteristics, assessment and intervention of individuals with de Lange syndrome. Therefore more clinical empirical studies are needed to confirm and understand speech & language characteristics in individuals with de Lange syndrome.

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Case Report

Acrylic Foreign Body in the Orbit : A Multidisciplinary Approach

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ABSTRACT

Introduction

Foreign body in the eye is one of the leading causes of temporary as well as permanent visual problems in developing world.

Case Report

We are presenting a case of 17 year old male with alleged history of traumatic insertion of foreign body acrylic glass in right orbit due to bursting of cracker in acrylic bottle and its subsequent management.

Discussion

It was removed with endoscopic guidance and floor of orbit was reconstructed to provide stability to eyeball and also to prevent secondary complications. We present this case to highlight importance of multidisciplinary approach in tertiary health care centre.

Keywords

Multidisciplinary; Endoscopy; Trauma; Fracture; Orbit; Foreign body

Foreign body in the eye is one of the leading causes of temporary as well as permanent visual problems in developing world. According to reports, maximum numbers of patients are seen in 21 to 40 years of age group with bimodal peak between March and November, with male predominance. Sharp pointed object related injuries are most common in work related conditions.[1] We are presenting a case of 17 year old male with history of traumatic insertion of foreign body acrylic glass in right orbit due to bursting of cracker in acrylic bottle and its subsequent management.

Case Report

17 year old male patient came in casualty with a piece of acrylic in right orbit as a result of accidental trauma due to bursting of cracker in an acrylic bottle.

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On examination, the patient was conscious and well oriented to surroundings with right eyeball pressed downwards due to foreign body with no apparent rupture of the globe. (Fig. 1) There was enophthalmos of right eye due to downward pushing of eyeball with resultant floor of orbit fracture as a result of presence of foreign body in right orbit, with no apparent phthisis bulbi. The right upper eyelid was injured, the right lower eyelid was rolled inwards along with the foreign body, and the medial canthus on right was injured along with some injury near dorsum of nose while the right lateral canthus and right upper eyebrow was intact. Left eye was normal.

Ophthalmological consultation was taken, visual assessment and extraocular movements was not possible on right side as the eyeball was pushed below into maxillary cavity by rupturing the floor of orbit. The exact cause of loss of extraocular movements on right side. was it because of entrapment and/or injury to fourth (IV) and sixth (VI) cranial nerve were not possible to assess due to presence of foreign body in right orbit pushing the eyeball downwards. A computed tomography (CT) scan of orbit, paranasal sinuses (PNS) and brain was done to assess the three dimensional anatomical orientation

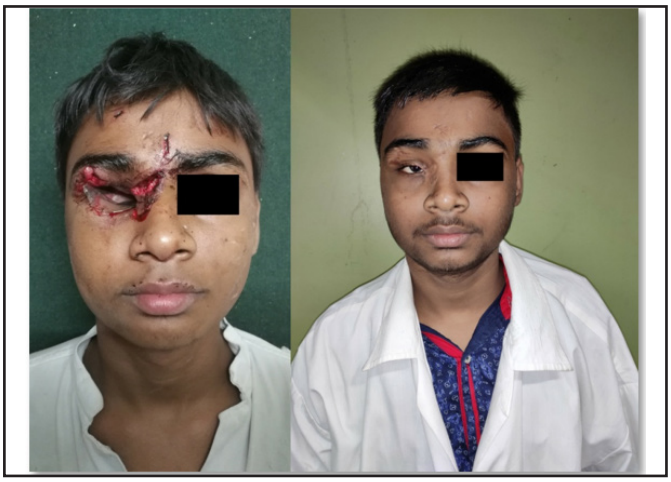

Fig. 1. On left, preoperative photograph of patient with foreign body in situ in right orbit. On right, postoperative photograph of patient at time of discharge.

of foreign body, extent of damage to surrounding structures and to help in planning the removal of body. CT scan was suggestive of downward displacement of right eyeball into maxillary sinus with fracture of floor of orbit, without rupture of eyeball with no optic nerve damage. (Fig. 2) Plastic surgery consultation was taken for right upper eyelid and floor of orbit reconstruction. Pneumocephalus was also noted on right side which was managed conservatively after taking neurosurgical consultation.

As it was a case of acute accidental trauma, the patient was taken for removal of foreign body immediately after arrival in hospital under general anaesthesia, with neurosurgeons on standby. Firstly, the foreign body was removed from orbit (Fig. 3), followed by reconstruction of right upper eyelid.

Right upper eyelid reconstruction was done by primarily closing the defect. Peritomy was performed, in which an incision was made at the limbus in order to reflect the conjunctiva and Tenon's capsule of eye to expose the sclera and extraocular muscles to carry out forced duction tests on superior, inferior, medial and lateral rectus muscles. The forced duction tests on all four rectii were normal. A small iris sphincter tear was also noted medially. Pupillary reaction could not be checked due to patient being under anaesthesia. As the visual prognosis of the patient was guarded, decision was taken to temporarily reconstruct the floor of orbit. Endoscopically right sided uncinectomy and middle meatal antrostomy was done, maxillary sinus ostium opened. A 16 FG Foleys balloon catheter was introduced into maxillary sinus and was inflated with around 8cc of saline. There was immediate elevation of the earlier depressed right eyeball after inflation of balloon. Immediate postoperative CT scan of the patient

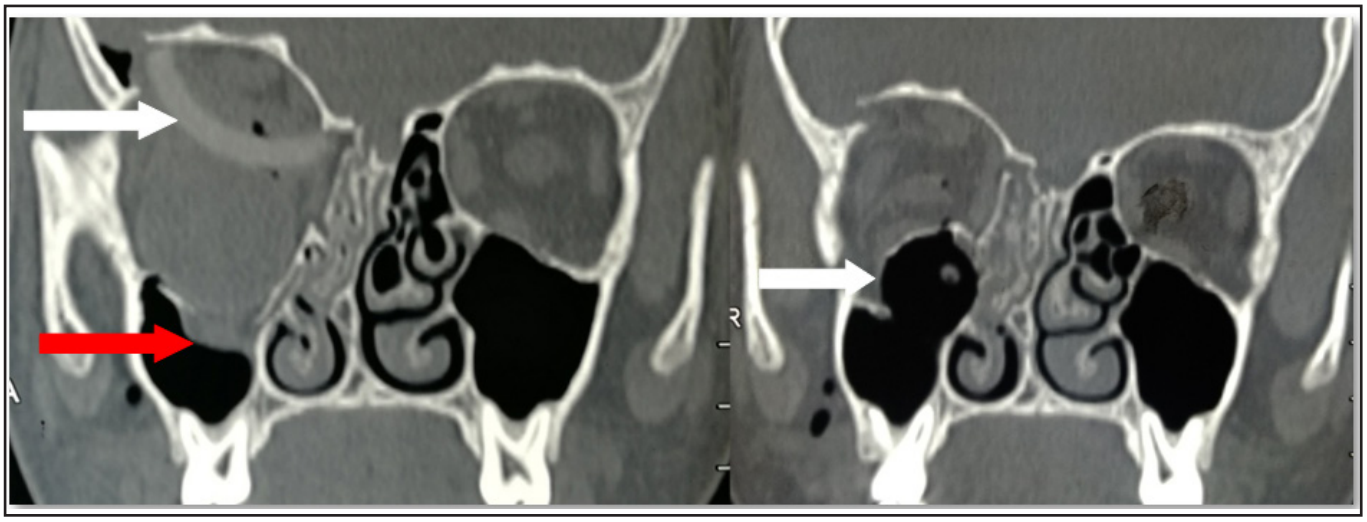

Fig 2: On left, preoperative CT scan of patient showing foreign body in right orbit (white arrow), fracture of right orbital floor, pushing the eyeball downwards (red arrow). On right, immediate postoperative CT scan of patient showing inflated Foley's balloon catheter in right maxillary sinus providing support to right orbital floor (white arrow).

was done, showing elevation of floor of orbit to near normal level as compared to left side. (Fig. 2)

Postoperative visual assessment of patient was showing presence of pupillary reflex with perception of light and projection of rays present. There was partial movement of eyeball towards medial and inferior aspect during extraocular muscle testing. Movements of lateral and superior rectus muscles were not present. Foleys catheter was removed on postoperative day 7, eyelid sutures were removed on postoperative day 10 and patient was discharged. The visual acuity was improved to finger counting from 6 feet distance at the time of discharge. (Fig. 1) Lateral and superior movements of eyeball were present 3 weeks after discharge. Currently the patient is under follow up since last 15 months with steady improvement in vision and eyeball movements present in all directions.

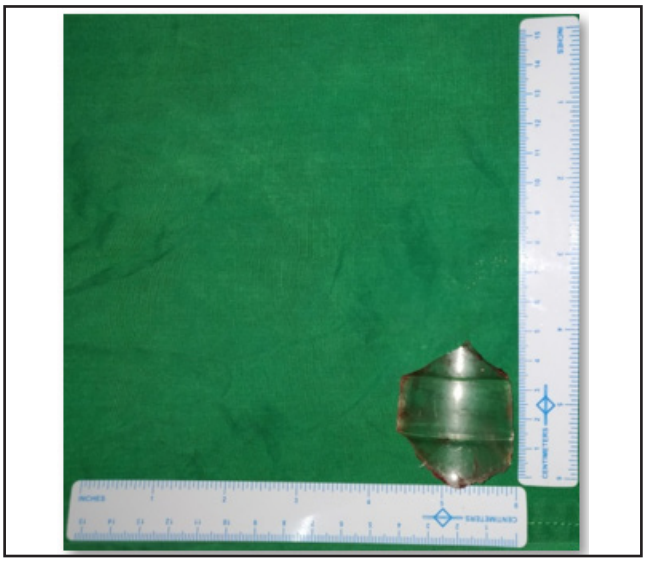

Fig 3: Foreign body specimen

Discussion

Ocular injury is a major cause of treatable visual impairment and blindness. Incidentally, the monthly distribution of ocular trauma often corresponds to the festivals of Holi and Diwali in India. Holi is usually celebrated in March and Diwali in October/ November.1 5% of all blindness occurs due to direct result of trauma. According to an estimate under the WHO program for the prevention of blindness, the incidence of open globe injuries in the world is about 2 lakh cases per year which were largely preventable.[2] Males are more frequently injured than females.[3,4] Children are more commonly injured than adults due to their curiosity and under developed motor skills. Nearly 90% eye injuries can be prevented by relatively simple measures.[5] Though extensive literature is available on ocular trauma and its management, multispecialty management has not been recorded frequently because of rare occurrence of such an extensive trauma and lack of public access to tertiary referral centers. Conservative management of isolated orbital floor fracture is a recognized entity.[6]

Use of multiple specialties of expertise in tertiary referral center is required to deal with such rare case along with a customized approach, as each case is different in presentation. Prompt and effective management with removal of foreign body at the earliest is required to prevent development of complications such as blindness, intraorbital and intracranial infections. Public education about health safety during festival times is a must.

To conclude, the above case has been presented to highlight the effectiveness of a multidisciplinary approach in a tertiary referral center in management of such a rare and complicated case.

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Nasal Schwannoma

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ABSTRACT

Introduction

Congenital deafness in a child is often missed. Several distraction tests have evolved over time to diagnose congenital deafness. A schwannoma is a benign nerve sheath tumuor of myelinated nerves arising from Schwann cells. In the head and neck region, the most common site is the eighth cranial nerve (vestibulocochlear). Only 4% of schwannomas seen in the head and neck region arise from the nose and paranasal sinuses involving branches of the trigeminal nerve (ophthalmic or maxillary) or from the autonomic nervous system.

Case Report

A 29 year old female patient presented to the Ear, Nose and Throat Out Patient Department with the complaints of left sided nasal obstruction and left sided nasal bleed. On anterior rhinoscopy, a single, smooth, greyish, non-pulsatile polypoidal mass was seen in the left nasal cavity seeming to be arising medial to middle turbinate. A provisional diagnosis of benign nasal mass was made and the patient underwent excision under general anaesthesia. On histopathology, an impression of Schwannoma was made.

Discussion

Sino-nasal schwannomas are a very rare entity with non specific imaging studies. A confirmatory diagnosis can be made only after histopathology. The treatment modality of choice is surgical excision of the mass, taking care to leave no residual, so as to prevent a recurrence.

Keywords

Schwannoma; Neurilemoma; Nose

A schwannoma is a benign nerve sheath tumour of myelinated nerves arising from Schwann cells. In the head and neck region, the most common site is the eighth cranial nerve (vestibulocochlear); other sites include the scalp, face, parotid gland, oral cavity, pharynx, larynx, and trachea. Only 4% of schwannomas seen in the head and neck region arise from the nose and paranasal sinuses involving branches of the trigeminal nerve (ophthalmic or maxillary) or from the autonomic nerv-ous system.[1] Confirmatory diagnosis can only be made with the help of histopathology.

We are reporting a rare case of Nasal Schwannoma encountered and dealt with at our institution.

Case Report

A 29 year old female presented to the Ear, Nose and Throat (ENT) Department with the complaint of left sided nasal obstruction for the last 18 months which was insidious in onset, progressive, persistent, not relieved with medications and associated with left sided ear fullness. No diurnal variation was associated with the complaint. It was associated with left sided nasal discharge which was mucopurulent, yellowish in colour, thick in consistency and non foul smelling. There was a history of left sided nasal bleed twice in the past six months, both episodes were sudden in onset, approximately 30ml in amount and relieved spontaneously. There was no history of excessive sneezing, facial pain or pressure or any disturbance in olfaction or vision. There was no history of fever or trauma and there were no other otorhinolaryngological complaints. The past, personal and family histories were insignificant. External examination of the nose revealed no abnormalities.

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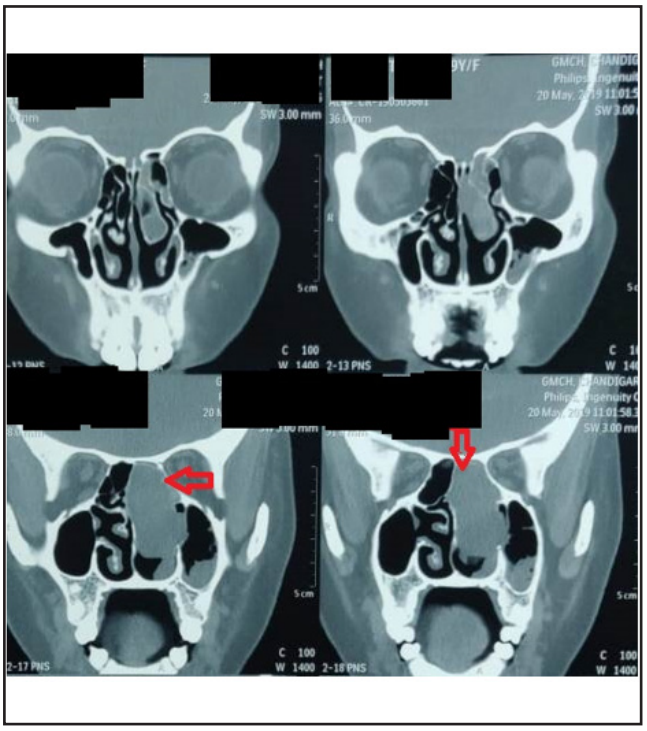

Fig. 1. coronal cut showing soft tissue density in the left nasal cavity, ethmoids and sphenoid (red arrow)

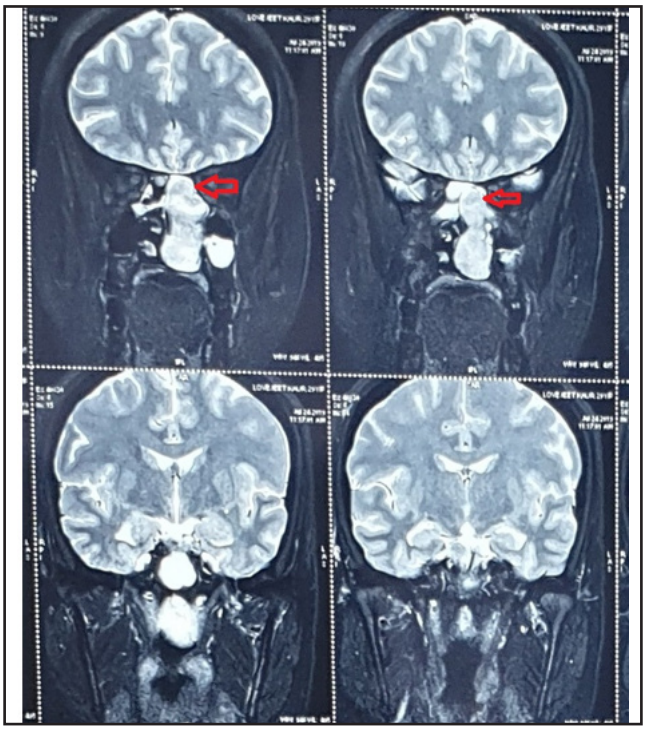

Fig. 2. MRI depicting the lesion in the left nasal cavity (red arrow)

On anterior rhinoscopy; mucoid discharge was seen on the floor on left side and was suctioned. A single, smooth, greyish, non pulsatile polypoidal mass was seen in the left nasal cavity seem to be arising medial to middle turbinate. On probing, it was firm, non tender, bled slightly on touch. Posterior rhinoscopy revealed a single greyish mass in the left side of nasopharynx. Cold spatula test showed decreased misting on the left side and cotton wool test showed decreased movement of the wisp on the left. Paranasal sinus examination was within normal limits. Bilateral tympanic membranes were intact and normal.

The rest of the otorhinolaryngological and head and neck examination was unremarkable. The patient underwent non contrast computed tomography scan of the nose and paranasal sinuses which showed homogenous soft tissue density filling the left nasal cavity reaching upto the posterior choana, left anterior and posterior ethmoids, bilateral sphenoid sinuses. Minimal soft tissue density was also seen in the left maxillary sinus (Fig. 1). The patient then underwent contrast enhanced magnetic resonance imaging of the paranasal sinuses which revealed a large, approximately 57.4(AP) x 21.7(TR) x 46.9(CC) mm, heterogenous T2 hyper intense soft tissue lesion in the left ethmoidal air cells, left nasal cavity and nasopharynx. It was seen to block the sphenoethmoidal recess superiorly and the left maxillary ostium laterally (Fig. 2).

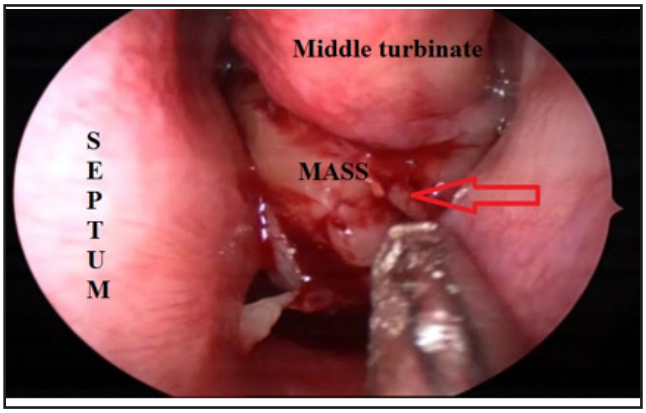

Fig. 3. Intra-operative picture of the mass (red arrow)

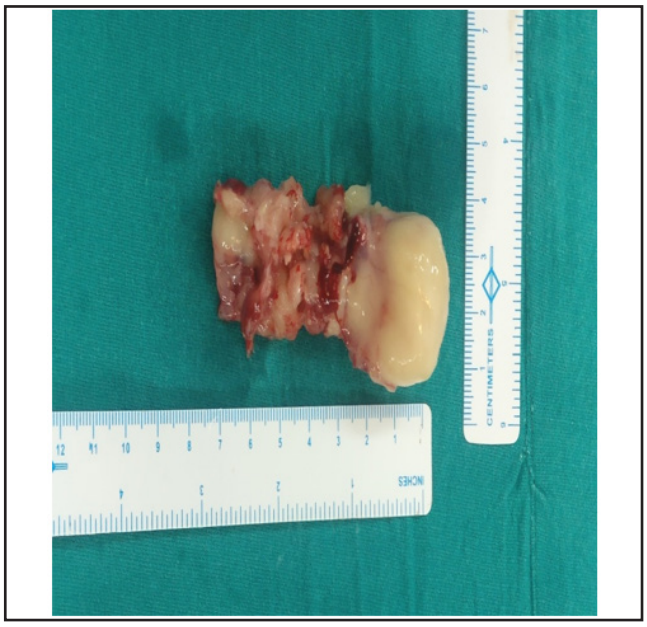

Fig. 4a. Gross specimen

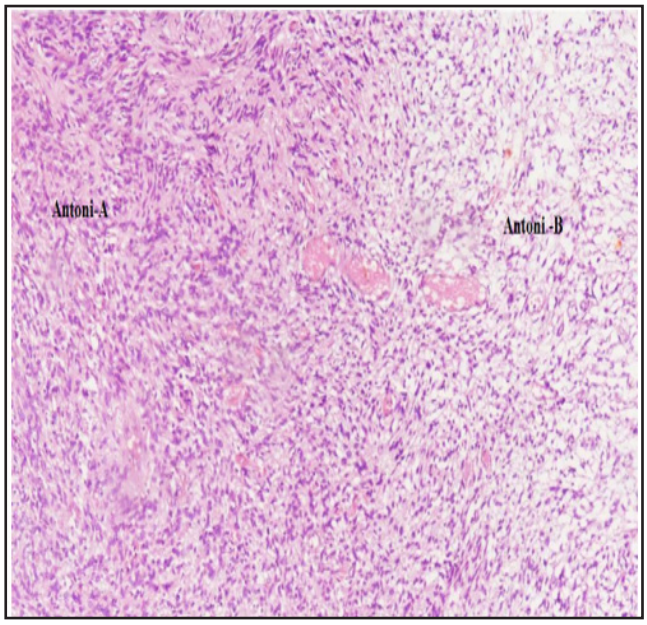

Fig. 4b. Microscopic picture (H&E, 100X)

A differential diagnosis was made of benign nasal mass, sphenochoanal polyp and inverted papilloma, on the basis of unilateral disease and the clinical features. The patient was planned for endoscopic excision under general anaesthesia (GA). Informed written consent was taken. Under GA, nasal decongestion was done. Diagnostic nasal endoscopy was done which revealed left concha bullosa. A polypoidal mass of approximate size 7x3cm was seen arising from left sphenoethmoidal recess and occupying the whole of choana (Fig. 3). An additional Ostia was seen in the anterior wall of sphenoid sinus. Concha bullosa reduction was done. The polypoidal mass was traced to its origin till the sphenoethmoidal recess and removed with the help of coblator. Wide sphenoidotomy was done and polypoidal tissue was removed from the posterior ethmoids (Fig. 4a). Haemostastis was achieved and no postoperative nasal packing was required. The postoperative period was uneventful and the patient was discharged on postoperative day 2 and was followed up with the biopsy report. Final histopathological examination revealed biphasic tumour with hypercellular (Antoni A) and hypocellular (Antoni B) areas. (Fig. 4b). An impression of schwannoma was made.

In the one month follow up of the patient, the nasal cavity had re-epithelised and was healthy. The patient was asymptomatic and computed tomography scan showed complete clearance of disease with no recurrence (Fig. 5).

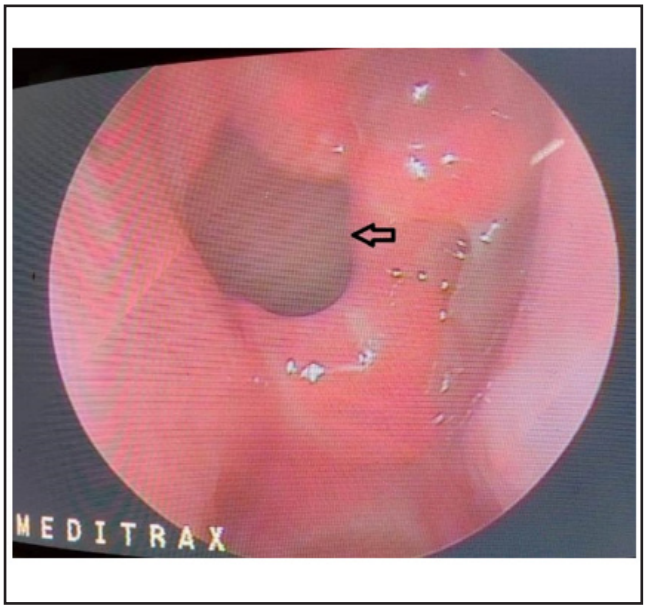

Fig. 5- Post operative endoscopy of the patient showing healthy cavity (Black ar-row)

Discussion

Schwannomas, also known as neurilemomas, are benign, slow growing, encapsulated tumours of the peripheral nervous system, arising from Schwann cells. They were first described by Verocay in 1908. The literature mentions very few cases of nose and paranasal sinus schwannomas that are mostly seen in adults aged 40-60 years and without gender or racial predilection.[2] It commonly involves the ethmoid sinus, maxillary sinus, the nasal cavity, sphenoid sinus and nasal septum in that order of decreasing prevalence.[3] They usually present with nasal obstruction, pain, headache, nasal bleed. They may also present with ptosis, proptosis or diplopia, pain or paraesthesias. Rare cases of intracranial and intraorbital extension have been studied, which showed symptoms of rhi-norrhea, decreased level of consciousness, and strabismus.[4] Association with neurofibromatosis type-2 (NF-2) is seen in cases where multiple schwannomas occur. Imaging features are generally nonspecific but mild enhancement may be evident on contrast CT. Bone remodeling may also be appreciated. MR imaging shows intermediate T1 and variable T2 signal intensity.[5] Histopathology is considered as the gold standard for diagnosis. Macroscopically, schwannomas appear as cystic or gelatinous, well encapsulated masses. Microscopically, they can be classified into:

1. ANTONI A - which comprises of organized compact stroma with spindle cells and parallel rows of palisading nuclei
2. ANTONI B - which has a disorganized loose myxoid stroma with few spindle cells

Nasal schwannomas can be differentiated from those arising elsewhere, by their histopathology as they are hyper-cellular and do not have fibrous encapsulation.

Schwannomas can be graded by the Enneking system based on their severity. This system classi-fied the tumour into three grades. Grade 1 includes lesions that are inactive, Grade 2 are the le-sions that deform surrounding tissue but are not locally destructive while grade 3 encompasses those lesions that are locally aggressive but do not have metastatic potential.[6]

The differential diagnosis for the nasal mass may include: concha bullosa, antrochoanal polyp, inverted papilloma, lymphoma, capillary hemangioma, mucocoele, fibrous dysplasia,meningioma, neurofibroma, enchondroma,dermoid cyst, idiopathic midline granuloma, melanoma, myxoma, fibromyxoma, squamous cell carcinoma, esthesioneuroblastoma, chondrosarcoma, and intranasal extension of the nasopharyngeal angiofibroma.[7,8]

In this patient, a provisional diagnosis of benign nasal mass was made due to the unilateral presen-tation of disease as well as presence of symptoms like nasal obstruction and unilateral nasal bleed. Intra-operatively, a polypoidal mass was seen in the left nasal cavity, pointing more towards a spheno-choanal polyp. The mass was revealed to be a schwannoma, kept low on the list of differ-entials due to its rare occurrence, on histopathological examination. Definite treatment for schwannomas is surgery, which can be either endoscopic or open. This is decided by the operating surgeon after careful consideration of the site and extent of the disease. Recurrence of the disease post operatively is rare.[9] However malignant changes may occur in long standing lesions.[10]

Although a rare entity, schwannomas should be considered as a differential in cases of unilateral nasal obstruction and nasal bleed in patients. Confirmatory diagnosis can only be made on the ba-sis of histopathology with complete surgical excision being the treatment of choice.

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Case Report

Midline Nasal Tip Sinus

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ABSTRACT

Introduction

Congenital midline sinus over tip of nose is a rare clinical presentation. Accurate diagnosis should be done to rule out intracranial extension and to prevent recurrence. Appropriate surgical approach depends upon location, extent and degree of intracranial extension. Management entails complete surgical excision of sinus tract. We discuss a rare case, where external rhinoplasty approach was used for excising recurrent sinus and patient was disease free.

Case Report

A 29 year old male patient with midline nasal tip sinus presented in our institute with history of opening over tip of nose since childhood associated with recurrent episodes of discharge from opening. Our objective is to present clinic-radiological-pathological profile of congenital nasal sinus along with review of literature.

Discussion

Nasal dermoid is rare embryological anomaly of ectodermal and mesodermal origin. Radiological imaging should be considered to rule out any intracranial extension. Goal of management is complete surgical excision with meticulous pre-operative and surgical planning to avoid complications and recurrence. External rhinoplasty provides best surgical exposure and allows excision of sinus tract.

Keywords

Midline Nasal Tip Sinus; Nasal Dermoid Sinus Cyst; Rhinoplasty, External

Congenital midline embryological anomalies of nose are rare clinical presentation. These congenital midline lesions are rare estimated at 1:20,000 to 1:40,000 live births[1,2] with male predominance.[3] It constitutes 1%-3% of all dermoids and 4%-12% of head and neck dermoids.[4] This includes dorsal nasal sinus, columellar sinus of nose, nasal dermoid cysts, others include gliomas and encephalocoele which may have intracranial extension.

Case Report

A 29 year old male presented to ENT outpatient department with history of opening over tip of nose since childhood which was asymptomatic till age of 3 years when the patient started having recurrent episodes of discharge from the opening. It was associated with intermittent, mucoid, 5-6 episodes/year, non-blood stained, non-foul smelling, white colour discharge from opening and occasional nasal obstruction.

He was operated for the similar complaints in 2003 in private hospital under LA. Patient was asymptomatic for 3-4 months and symptoms recurred again. There was no history of trauma, swelling over nose. There was no history of any other ENT complaints.

Local examination revealed an irregular vertical scar mark surgery (~1 cm) of previous surgery on undersurface of tip of nose. A single opening (~0.3cm) was present on undersurface of tip of nose at mid- point of scar mark. (Fig. 1) No discharge could be expressed from sinus opening on pressing. Skin surrounding nose was normal in color.

Anterior rhinoscopy was suggested of a left high DNS with right spur touching right inferior turbinate. On probing, 2cm long sinus tract found was found. Rest of

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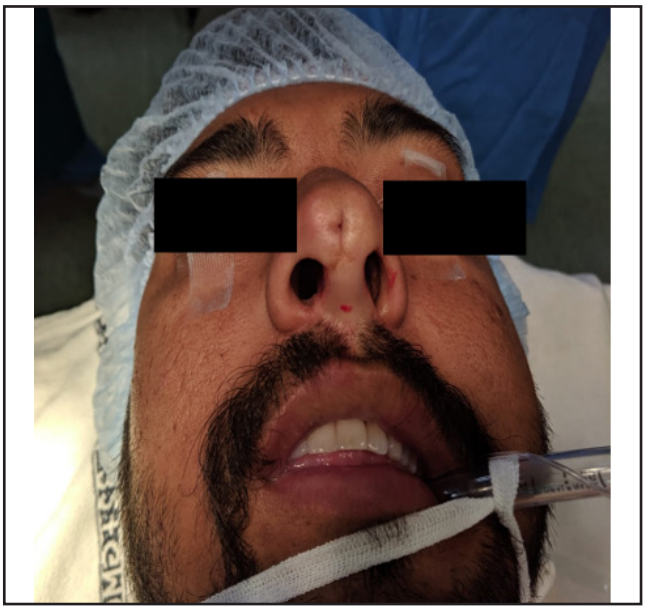

Fig. 1. Sinus opening on tip of nose at mid-point of scar mark

ENT examination was within normal limits.

Patient underwent NCCT Nose and PNS which was suggestive of bilateral maxillary sinusitis and mild left DNS.

MRI face and nose showed a linear T2 STIR hyperintense tract around 4cm seen extending from subcutaneous tissue of tip of nose into underneath anterior part of nasal septum. A ramification was seen extending superiorly into subcutaneous tissue of nose in midline for length of 2cm. (Fig. 2) No intracranial extension of the tract was seen.

Surgical excision of sinus tract was planned under general anaesthesia after taking written and informed consent for the same. Under GA, Gull wing incision (External Rhinoplasty) was marked on columella. (Fig. 3)

Part was cleaned, draped and positioned. Methylene blue dye was injected in the sinus tract. Metallic probe was passed to guide complete excision of sinus tract. Elliptical incision was made and skin with soft tissue was removed. Inverted-V shape incision was made in mid-columellar region. Incision was extended to caudal margins of medial crura of alar cartilage upto dome. Columellar flap was elevated off the alar cartilage. Lower lateral, upper lateral cartilages and nasal bone was exposed (Fig. 4). Sinus tract was found to be going upto lower part of nasal bones in midline at junction of upper lateral cartilage and nasal bone in subcutaneous

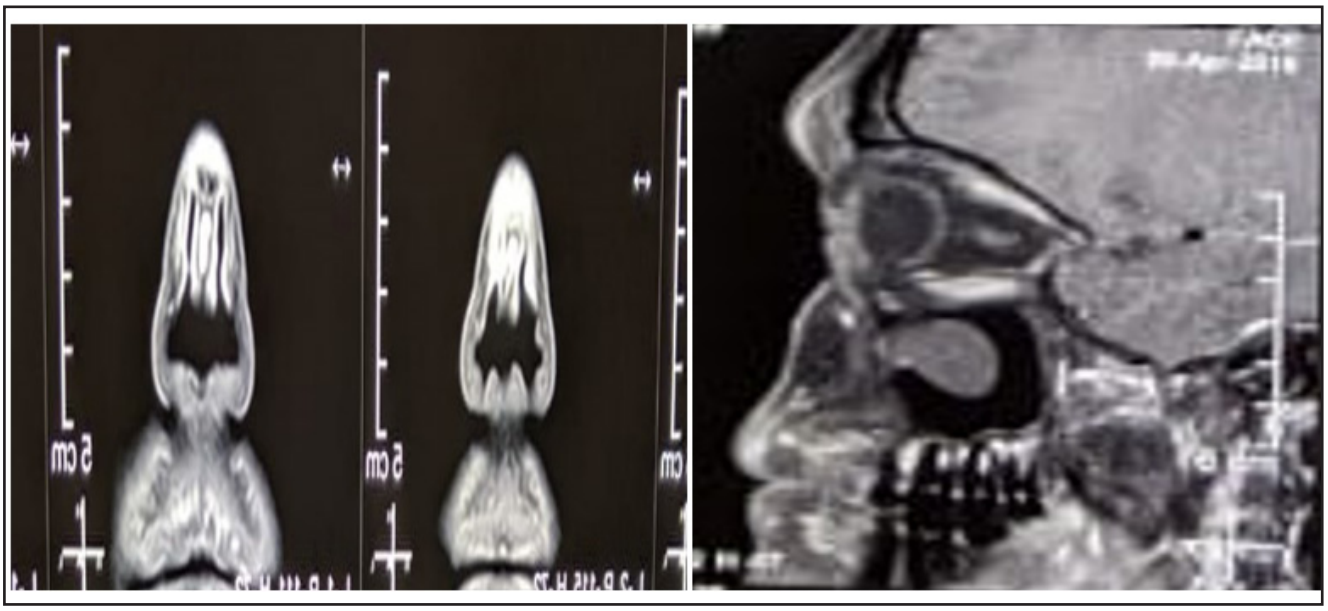

Fig. 2. MRI showing Ramification extending from subcutaneous tissue of tip of nose upto anterior part of nasal septum.

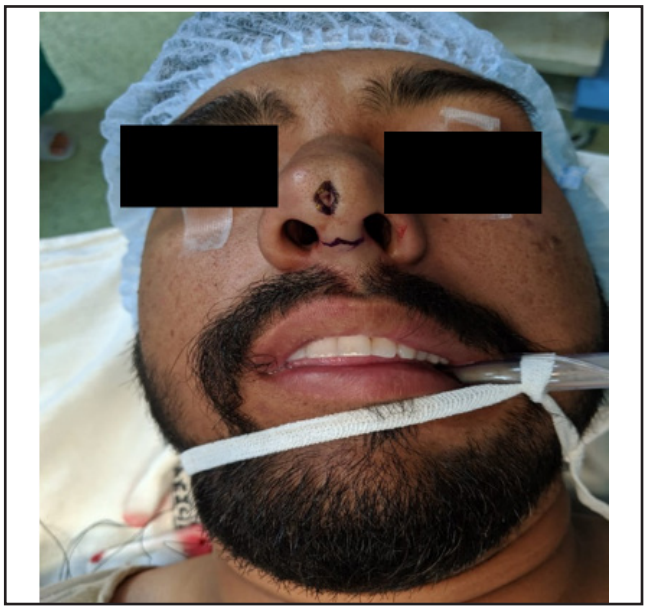

Fig. 3. Gull wing incision marked on columella.

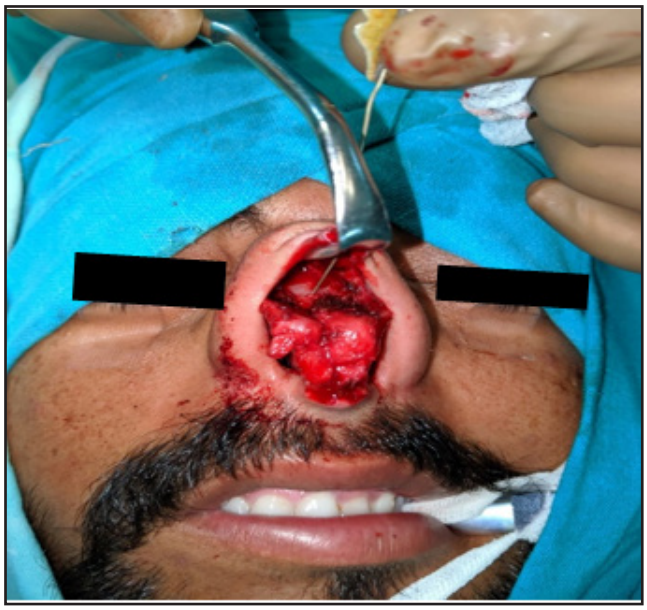

Fig. 4. Columellar flap elevated off the alar cartilage exposing lateral cartilages and nasal bone.

plane.

Soft tissue tract was removed. Nasal bone was drilled at tract site. Surgicel® was kept and flap reposited. Wound was closed with Vicryl® 4-0 (internal) and Ethilon® 5-0 (skin). Steri Strips® were applied. Bilateral nasal cavities packed with one full merocel each. Patient was discharged on postoperative day 2 after pack removal and followed up on postoperative day 7 for suture removal. Post-operative period was uneventful and there was no recurrence in a 2 year follow-up.

Discussion

Nasal dermoid is rare embryological developmental anomaly of ectodermal and mesodermal origin.[5] Most theories for pathogenesis are "Prenasal theory" i.e During development of frontal skull base, dura mater retreating from prenasal space adheres to prenasal skin.1 and "Superficial theory" i.e abnormal congenital fusion at nasal root with submucosal trapping of ectoderm between two medial fusing nasal processes. Many authors reported intracranial extension in 6%[5]-45%[6] of midline nasal dermoid cysts. There is association of other congenital anomalies in 5-41% cases.[7] like aural atresia, mental retardation, spinal column abnormalities, hypertelorism, albinism, cleft lip and palate, tracheoesophageal fistula, cardiac, genital and cerebral anomalies.[7]

Radiological imaging such as CT scan and MRI should be considered in order to know the size, extent of the lesion and to rule out intracranial extension.[8] Open approaches include transverse, vertical, lateral rhinotomy, external rhinoplasty.[9,10] External rhinoplasty provides good surgical exposure, scar tissue and redundant subcutaneous tissue are more easily excised and valve region is well protected. Goal of management is complete surgical excision with meticulous pre-operative and surgical planning to avoid complications and to prevent local recurrence.

Any intracranial extension should be ruled out in pre-operative evaluation of any sinus over tip of nose. Biopsy is contra-indicated in cases with intra-cranial connections due to risk of CSF leakage. Complete surgical excision of sinus tract should be done to prevent recurrence after thorough investigations. External rhinoplasty provides best surgical exposure and allows complete surgical excision of sinus tract.

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