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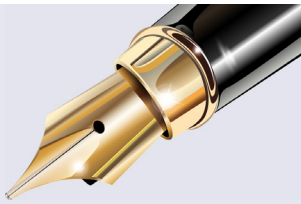

Surgery became the management of choice for head and neck cancers since the mid-20th century with the advent of safe and effective modern head-neck surgeries through the pioneering works of Hayes Martin, John Conley etc. New reconstructive techniques improved the scope of wider resections without unacceptable functional burden, ensuring better local control compared to radiotherapy with good functional rehabilitation.

'Organ preservation' efforts in 1990s indicated that primary chemoradiation might have similar oncologic results as achieved by primary surgery with post-operative radiation. Many series in the first decade of the 21st century reported very high control rates for primary concurrent chemoradiation in oropharyngeal cancer. Despite awareness about long term toxicities (e.g., xerostomia, dysphagia, strictures, chronic pain and osteoradionecrosis), chemoradiation started getting increasing favour as the primary treatment modality in oropharyngeal cancer. If surgery cannot provide comparable local control with rapid recovery and a better quality of life, chemoradiation would emerge as the choice of primary management.

Transoral Robotic Surgery (TORS), developed at University of Pennsylvania, led by Hockstein, Weinstein, O'Malley, Snyder with its encouraging preliminary results, might open up a new vista for surgical management of oropharyngeal cancers. This computer assisted remote controlled transoral surgery precludes the necessity of external incisions and tracheostomy. Improved high definition 3D visualisation and up to 540 degrees of wristed instrumentation allow precision cutting with cautery or flexible CO2 laser.

TORS got USFDA approval in December, 2009 for surgery of malignant T1 and T2 oral, oropharyngeal, hypopharyngeal and laryngeal lesions as well as surgery for obstructive sleep apnoea(TORSA). da Vinci surgical system is the only available equipment for TORS till now and the cost is very high (approx. $ 2.5million to buy and annual maintenance cost of around $1,50,000).

With more than 2500 da Vinci surgical systems in use worldwide, more reports are likely to emerge in near future, which may prove TORS to be a game changer in the management of oropharyngeal cancer.

Dr Saumendra Nath Bandyopadhyay
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Endoscopic Management of Inverted Papilloma Using CT Scan as the Predictor of Tumour Origin

Ravi Roy,[1] Vijay Bhalla,[1] Ankit Mathur,[2] N Ramakrishnan[1]

ABSTRACT

Introduction

Inverted papillomas are notorious for recurrence. The surgical cause attributed to recurrence is failure to achieve good surgical exposure and inadequate clearance of disease. Pre-operative prediction about the site of origin by CT Scan may contribute to a better surgical outcome. This study was undertaken to assess if focal hyperostosis on pre-operative CT scan can be considered to be a predictor of the site of tumour origin and correlate with endoscopic finding of the site of origin.

Materials and Methods

A prospective descriptive study was carried out between Jan 2014 and May 2016. Fifteen patients of histopathologically proven inverted papilloma that reported during this time period were evaluated using contrast enhanced CT Scan and subsequently underwent endoscopic excision of tumour identifying the tumour origin. Assessment of age, gender, symptoms, pre-operative staging, location of the tumour origin on CT Scan and surgical correlation of origin was done. Post-operative follow-up was done at 1 month, 3 months and 6 monthly thereafter.

Results

Six (40%) were classified as Krouse II and nine (60%) were classified as Krouse III. 12 (80%) arising from maxillary sinus, 02 (13.3%) arising from maxillary sinus and anterior ethmoids and 01 (6.7%) from sphenoid. Thirteen (86.7%) cases CT scan could predict the tumour origin which was confirmed during surgery. All cases managed by endoscopic technique with no recurrence or co-existence of malignancy.

Discussion

Focal hyperostosis in the walls of paranasal sinus is seen to be associated with IP tumour origin, the cause of which is not fully understood. It is hypothesized that tumour induced inflammation at the site of origin leads to bone remodeling and increased bone deposition with vascularity at the site of attachment.

Conclusion

CT scan is a good predictor of tumour origin and a conservative endoscopic approach can be planned accordingly for complete clearance of disease.

Keywords

Papilloma, Inverted; Tomography, X-Ray Computed; Hyperostosis

Sinonasal papilloma is a benign and locally aggressive neoplasm of sinonasal epithelium. It arises from the Schneiderian membrane of the sinonasal tract. In 1854 Ward was the first to describe the Schneiderian papilloma in the nasal cavity[1] and subsequently Kramer and Som classified the Papilloma as a true neoplasm and distinguished it from inflammatory polyp[2]. Reingertz in 1935 first described the histopathological features of inverted papilloma (IP).[3] In 1991 the World health organization classified the Schneiderian Papilloma into three histopathological type: endophytic (Inverted), exophytic (Fungiform) and oncocytic (Cylindrical) type.[4]

Sinonasal papillomas are relatively uncommon neoplasm comprising of 0.5- 4% neoplasm of all primary nasal tumours and 70% of all sinonasal papillomas are inverted papillomas. The incidence of Inverted Papilloma ranges from 0.74- 1.5 cases per 1,00,000 per year.

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IPs are notorious for recurrence and the rate of recurrences ranges from 6-75% according to various literatures. The surgical cause attributed to recurrence is failure to achieve good surgical exposure and inadequate clearance of disease.[5] The gold standard of treatment of IP is lateral rhinotomy and medial maxillectomy however in recent times a more conservative endoscopic approach is becoming the standard of care without compromising the sub-periosteal clearance of disease. This creates the need for imaging to predict the origin of tumour pre-operatively to have better surgical outcome. On CT Scan the changes in IP are associated calcification, sclerosis, erosion or thinning of bony confines of nasal cavity and paranasal sinus.[6] So, a prospective study was designed to show if focal hyperostosis on preoperative CT scan predicts the tumour origin of inverted papilloma and correlates with endoscopic finding of the tumour origin.

Materials and Methods

A prospective descriptive study was carried out at an ENT Centre between January 2014 and May 2016. All patients of unilateral nasal mass/ polyps underwent a diagnostic nasal endoscopy (DNE) after proper decongestion of nose. Careful representative tissue biopsies were taken and sent for histopathological diagnosis. Fifteen (N=15) cases of histopathological proven Inverted papilloma underwent surgical treatment at this centre in the given period and informed written consent was taken from all of them for inclusion in the study. The patients were evaluated by contrast enhanced computed tomography (CECT) Scan of paranasal sinus and nose preoperatively (using 16 slice CT Scanner). The CT protocol used were 1mm cuts in axial imaging and subsequently the reformatted coronal and sagittal cuts in bone window were studied to look for areas of erosion, thinning of the bony walls and focal areas of bony thickening (Focal Hyperostosis). In evaluating the CT Scan paranasal sinus and nose we assumed that the site of focal hyperostosis is the predictor of tumour origin. The CT Scan was studied by a radiologist and ENT surgeon separately to identify the areas of focal hyperostosis. All patients were staged using Krouse staging system on CT scan.[7] Patients with diabetes mellitus, bleeding disorders, unwilling for surgery or unfit for surgery were excluded from the study.

Subsequently the patient underwent conservative endoscopic excision of inverted papilloma with the identification of tumour origin and sub-periosteal clearance.

We also assessed the age, gender, symptoms, surgical approach, and post-operative follow-up was done at 01 months, 03 months and 06 monthly thereafter.

Results

The study included 15 patients of inverted papilloma diagnosed and treated at our centre between January 2014 and May 2016. The Male: Female ratio was 14: 1 with a mean age of 57.26 years (age range, 38-72 years). The symptoms with which the patients presented are described in Table I. All patients were staged using the Krouse's staging system and six (40%) were staged as II and nine (60%) staged as III. The primary sites of tumour involvement were 12 (80%) from maxillary sinus, 02 (13.3%) from the maxillary sinus and anterior ethmoids, 01 (0.7%) from the sphenoid sinus.

Table I :Symptom presentation (N= 15)

SYMPTOMS	N	PERCENTAGE (%)
Nasal Obstruction	15	100
Rhinorrhea	11	73.3
Epistaxis	7	46.6
Headache	3	20
Facial Pain	5	33.3
Postnasal drip	2	13.3
Hyposmia/ anosmia	8	53.3

All patients underwent CECT scan preoperatively in earch of focal hyperostosis and was identified in 13 of the 15 patients (86.7%). The types of focal hyperostosis identified were cone type and plaque type (Fig. 1).

The various types of focal hyperostosis with the predicted site of tumour origin on CT Scan is shown in Table II. All the patients underwent endoscopic excision

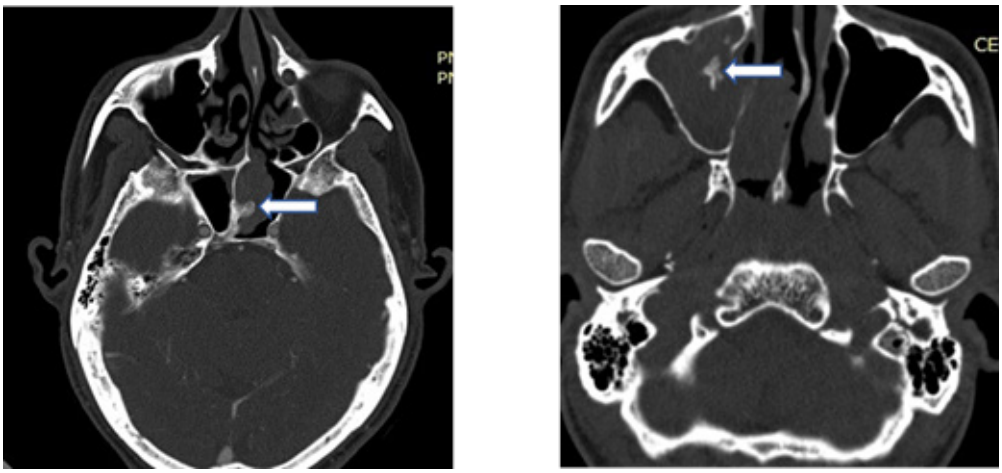

Fig.1. An axial cut CECT scan showing the cone type [A] (indicated by white arrow) and plaque type [B] (indicated by white arrow) of focal hyperostosis

of the tumour with careful identification of the tumour origin and attachment.

Table II: Focal hyperostosis predicting the site of tumour origin (N=13)

SITE OF ORIGIN	CONE TYPE	PLAQUE TYPE
Lateral wall nose	1	3
Anterior wall maxillary sinus	2	1
Postero-lateral wall maxillary sinus	4	-
Anterior ethmoids	-	1
Sphenoid sinus	1	-

The site of tumour origin identified intra-operatively coincided 100% with focal areas of hyperostosis in all 13 cases (Figs. 2, 3). One of the cases had multiple focal hyperostosis on the postero-lateral wall of maxillary sinus and intra-operatively showed broadbase attachment of tumour on the specific site (Fig. 4). Two cases in which no hyperostosis was identified on CECT Scan originated from the lateral wall of nose. The various endoscopic approaches to the various sites of origin of IP are described in Table III. Post-operatively the patients were followed up with a mean duration of follow-up of 1.8 years (minimum of 6 month and maximum of 3 years) with no evidence of recurrence. No evidence of synchronous co-existent malignancy has been found in any of the IP under study.

Table III: Various Endoscopic Approaches to Nasal IP

SITE OF ORIGIN/ ATTACHMENT OF TUMOUR	ENDOSCOPIC APPROACHES
Lateral wall of nose	Infero-medial Maxillectomy+ ethmoidectomy ± Excision of part of lamina papyracia
Other sites of Maxillary sinus	Infero-medial maxillectomy ± Modified Denker's approach
Maxillary sinus and ground lamella involvement	Infero-medial maxillectomy+ Ethmoidectomy+ Middle turbinectomy
Sphenoid Sinus	Sphenoidotomy

Discussion

Sinonasal Inverted papillomas are benign locally aggressive epithelial neoplasm; they are notorious for recurrence and known to harbor malignancy. These benign tumours are known to occur at any age but commonest age of incidence is the fifth and sixth decade

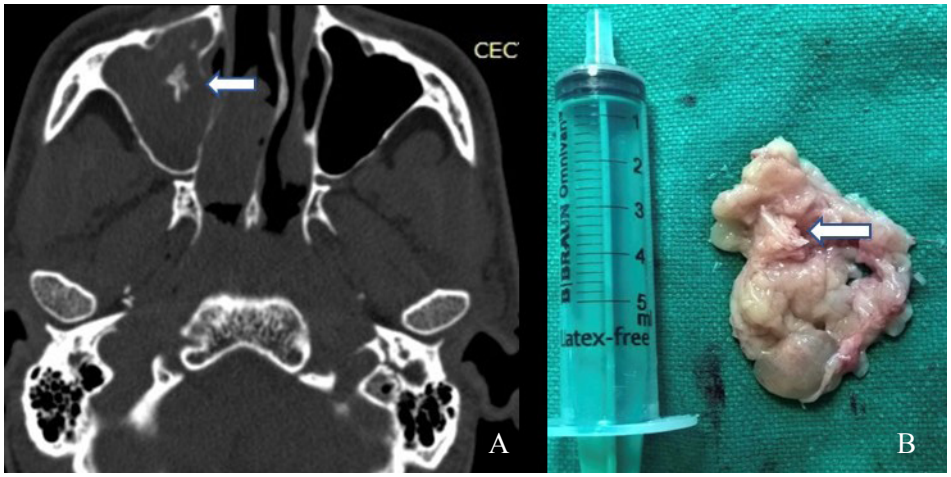

Fig. 2. Plaque type Hyperostosis lateral wall nose (A) and tumour with focal hyperostosis (B) shown by white arrows

of life.[5,8,9] These tumours are also known to occur more in males than female and male to female incidence varies from 3:1 to 8:1 according to various literatures.[5,10] This is in agreement with our study, where the mean age of occurrence is 57.26 years and has occurred in male population predominantly.

The patients of nasal IP present with varied symptoms but commonest are the progressive unilateral nasal obstruction, rhinorrhea, epistaxis, facial pain and headache in varied proportions. However, these are nonspecific features of nasal pathologies except unilateral nasal obstruction with epistaxis in elderly age group above 40 years warrants careful evaluation for malignancy.[5,8]

The best modality of evaluation is diagnostic nasal endoscopy after nasal decongestion. The macroscopic appearance of the nasal IP described in literature is a mulberry-like uneven surface which is reddish grey in colour and bleeds on touch.[5] In the experience of the author the tumour may be inconspicuously hidden behind pale looking polyps which require a careful evaluation and good representative biopsy to have the right diagnosis. On many occasions, the patient has to undergo repetitive surgery due to improper evaluation or inadequate surgery. Four out of the fifteen cases in the present study had to undergo multiple inadequate surgeries in the past due to improper diagnosis.

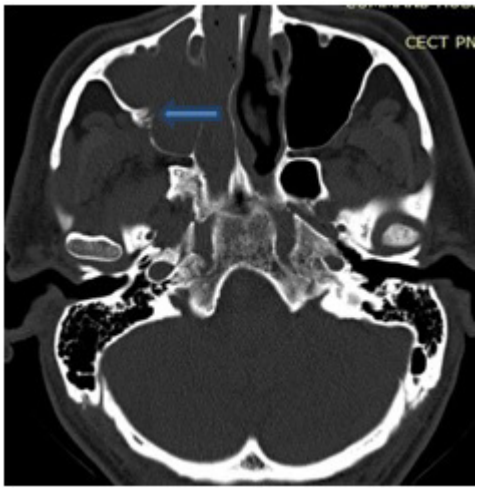

Fig. 3. Cone type of Hyperostosis on postero-lateral wall of right maxillary sinus

With the changing time the more aggressive external approach has been replaced by the conservative endoscopic approach for excision of sinonasal Inverted papillomas. This creates the need of accurate preoperative assessment of tumour origin and mapping of the extent of the lesion. MRI holds superior grounds in better delineation of soft tissue from inflammation, retained secretion but CT imaging is better for evaluation of bony changes such as sclerosis, erosion and thinning of bony walls.[11] CT scan changes such as thinning, bowing

and erosion of bones are due to pressure changes of growing tumour and unlikely to be the site of tumour origin. However localized and eccentric thickening of bone in the walls of paranasal sinus classically defined as focal hyperostosis is seen to be associated with IP tumour origin. The cause of focal hyperostosis is not fully understood but it is hypothesized that tumour induced inflammation at the site of origin leads to bone remodeling and increased bone deposition with vascularity at the site of attachment.[6,12,13,14] This is different from the diffuse, concentric sclerosis of the bony walls of paranasal sinuses seen in chronic rhinosinusitis and is concurred by Lund and Lloyd et al.[15]

In the present study, we identified focal hyperostosis in 13 out of 15 cases of IP (86.7%) and all corresponded with tumour origin identified endoscopically and is in agreement with Lee et al.[12]

Fig. 4. Postero-lateral wall of right maxillary sinus shows multiple cone/ plaque shaped hyperostosis (shown in Blue arrow), tumour origin was broad base

The controversy exists in literature regarding the approach to management of sinonasal inverted papilloma. Open approach is considered to be the standard of care but endoscopic approach in recent time has taken precedence over the traditional open approach. A systemic review comparing the endoscopic approach vs the open approach found recurrence rate of 12% and 17% respectively with a mean follow up of 46 months and showed no statistical advantage of one over the other.[16] However endoscopic approach is less morbid, reduces hospital stay and has better outcome. The factors such as identification of tumour origin and sub-periosteal clearance reduce chances of recurrence. Laterality of disease extent i.e. involvement of infratempral fossa, massive skull base erosion, extensive intraorbital extension poses challenge for a purely endoscopic approach. Thus Krouse Stage I, II, III can be approached purely by endoscopic, but Krouse IV requires open or combined approach.[5] All the patients of IP in the study were of Krouse stage II and III hence approached endoscopically with sub-periosteal clearance and are on follow-up with the mean duration of follow-up of 1.8 years with no recurrence. These patients are reviewed 6 monthly by diagnostic nasal endoscopy. According to Dong-Young Kim et al a follow-up of more than 3 years have shown higher chances of recurrence. Thus, operated patients of IP need longer duration of follow-up to assure disease clearance.[9]

Conclusion

All unilateral nasal masses need evaluation with proper nasal endoscopy and careful representative tissue biopsy to yield a correct diagnosis. In a case of biopsy proven sinonasal inverted papilloma CT Scan identification of focal hyperostosis assists in localization of tumour origin and can be used in planning the surgical approach to inverted papilloma without compromising the disease clearance. The two types of hyperostosis namely the cone type and plaque type correlated equally well with the site of tumour origin.

References

1. Ward N. A mirror of the practice of medicine and surgery in the hospitals of London. London Hosp Lancet. 1854; 2:480-2
2. Kramer R, Som ML. True papilloma of the nasal cavity. Arch Otolaryngol. 1935; 22-43
3. Ringertz N. Pathology of malignant tumors arising in the nasal and paranasal cavities and maxilla. Acta Otolaryngol (Stockh). 1938; 27 (Suppl): 31-42
4. Shanmugaratnam K, and Sobin LH. The World Health Organization histological classification of tumors of the upper respiratory tract and ear. A commentary on the second edition. Cancer 1993; 71:2689-97
5. Shafik N. Wassef, Pete S. Batra, Samuel Barnett. Skull Base Inverted Papilloma: A Comprehensive Review. International Scholarly Research Network. 2012, Article ID 175903, 34 pages
6. Woodruff WW, Vrabec D P. Inverted papilloma of the nasal vault and paranasal sinuses: spectrum of CT findings. AJR Am J Roentgenol. 1994; 162:419-23
7. Krouse JH. Development of a staging system for inverted papilloma. Laryngoscope 2000; 110(6):965-8
8. Fábio de Azevedo Caparroz, Luciano Lobato Gregório, Eduardo Macoto Kosugi. Evolution of endoscopic surgery in the treatment of inverted papilloma. Braz J Otorhinolaryngol. 2013;79(1):13-7
9. Dong-Young Kim, MD; Sung-Lyong Hong, MD; Chul Hee Lee, MD et al. Inverted Papilloma of the Nasal Cavity and Paranasal Sinuses: A Korean Multicenter Study. Laryngoscope 2012; 122:487-94
10. Cheng TY, Ueng SH, Chen YL, et al. Oncocytic Schneiderian papilloma found in a recurrent chronic paranasal sinusitis. Chang Gung Med J. 2006; 29:336-41
11. Savy L, Lloyd G, Lund VJ, et al. Optimum imaging for inverted papilloma. J Laryngol Otol. 2000; 114:891-3
12. Lee DK, Chung SK, Dhong HJ, Kim HY, Kim HJ, Bok KH. Focal hyperostosis on CT of sinonasal inverted papilloma as a predictor of tumour origin. AJNR Am J Neuroradiol. 2007; 28(4):618-21
13. Bhalla RK, Wright ED. Predicting the site of attachment of sinonasal inverted papilloma. Rhinology 2009; 47(4):345-8
14. Chiu AG, Jackman AH, Antunes MB, Feldman MD, Palmer JN. Radiographic and histologic analysis of the bones underlying inverted papilloma. Laryngoscope 2006;116(9):1617-20
15. Lund VJ, Lloyd GA. Radiological changes associated with inverted papilloma of the nose and paranasal sinuses. Br J Radiol. 1984; 57:455-61
16. PD Karkos, G Fyrmpas, SC Carrie, AC Swift. Endoscopic versus open surgical interventions for inverted nasal papilloma: a systematic review. Clinical Otolaryngology 2006; 31:499-503.

Intratympanic Methylprednisolone Injection as First Line Therapy for Idiopathic Sudden Sensorineural Hearing Loss

Mukul Patar,[1] Rupanjita Sangma[1]

ABSTRACT

Introduction

Steroid therapy is considered to be the gold standard for sudden sensorineural hearing loss (SSNHL). Delivering steroids by intratympanic injection is more efficient than systemic injections with minimum or no side effects. The present study was aimed to evaluate the efficacy and safety of intratympanic methylprednisolone injections as initial first line therapy for unilateral idiopathic SSNHL and the ease of giving it by otoendoscopy.

Materials and Methods

A prospective analysis was performed for the patients diagnosed as unilateral idiopathic SSNHL from April 2014 to April 2016 and receiving intratympanic steroids injections as first line therapy. Patients with unilateral sensorineural hearing loss of at least 30 dB at 3 contiguous frequencies occurring within a period of not more than 3 days are only included. All of the intratympanic steroid (ITS) injections were administered as OPD procedures. Each patient was treated by 3 injections given at 3 days interval.

Results

A total of 22 patients who underwent primary intratympanic steroid (ITS) injection for unilateral SSNHL during the study period were included in the study. The mean age was 42.22 years (±9.79) and age ranged from 27 to 68 years. Patients included in our study came within 2nd to 27th day of occurrence of deafness and the mean duration (days) from onset of disease to start of ITS was 7.86 days. The average hearing gain in our study was 44.22 dB. In the present study 11 patients (50%) showed complete hearing improvement and 10 cases (45.45%) had partial and one (4.54%) showed no hearing recovery at 3 weeks follow up period.

Conclusion

Minimal systemic absorption with minimum or no systemic effects and high percentage of success rate encouraged the surgeons to prefer ITS as primary therapy for idiopathic unilateral SSNHL. It is effective, cheap, well-tolerated and can be performed as OPD procedure.

Keywords

Hearing Loss, Sensorineural; Injection, Intratympanic; Methylprednisolone

Sudden sensorineural hearing loss (SSNHL) was first described by De Kleyn in 1944 and defined by Wilson et al[1] as sudden decline in hearing over < 3 days affecting ≥ 3 frequencies by > 30 dB with no identifiable etiology. There is always high degree of patient frustration and little evidence to suggest the viral infection, bacterial infection, vascular occlusion or vasculitis as the sole etiological factor. In the past patients were given all available treatments at once due to multiple possible etiologies and limited time to treat. Old treatment regimens for SSNHL included steroids, carbogen inhalation, oral papaverine, aspirin & hydrochlorothiazide. Steroid therapy is considered to be the gold standard for SSNHL and this treatment method

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has been accepted and efficacy has been proven with randomized clinical studies. Intratympanic steroid (ITS) injection is usually used as a rescue therapy for patients with SSNHL who do not benefit from systemic steroid therapy. It is said that physician who does not give steroids may have violated standard of case but physician is also at risk if steroid is given and complications occur. Delivering steroids by intratympanic injection is more efficient than systemic injections and decreases chances of side effects related to systemic steroid injections.[2] The rationale for intratympanic corticosteroids treatment is that by intratympanic injections steroid reach in high concentration in the inner ear compared to oral or IV injection.[3]

Erichsen et al[4] has demonstrated corticosteroid receptors in the inner ear of mice. In intratympanic injections, steroids target these receptors in inner ear, decrease inflammation, improve blood flow, protect against ischaemia, increase stria vascularis function and morphology, prevent loss of spiral ganglion neurons, modulate sodium/potassium in endolymph and regulate RNA transcriptional factors. Till date, majority of studies were conducted concerning the use of ITS as rescue therapy in SSNHL after failure of systemic steroids.[5,6] Only few studies have evaluated the efficacy of ITS as initial and only treatment for SSNHL. Silverstein et al[2] in 1996 first reported on intratympanic steroids for SSNHL.

The present study aimed to evaluate the efficacy and safety of intratympanic methylprednisolone injections as initial first line therapy for unilateral idiopathic SSNHL and the ease of giving ITS injections by otoendoscopy.

Materials and Methods

A prospective analysis was performed for the patients diagnosed as unilateral idiopathic SSNHL from April 2014 to April 2016 and receiving ITS injections as first line therapy. Patients with unilateral sensorineural hearing loss of at least 30 dB at 3 contiguous frequencies occurring within a period of < 3 days are only included.

Patients with identified causes were excluded from this study and only idiopathic cases were investigated. Bilateral cases were also not included in this study. Patients with lesions found on imaging like vestibular schwannoma or inner ear malformation with associated SSNHL or recent use of ototoxic medications were excluded from the study.

The age, gender, affected side, routine blood tests including CBC, basic biochemical parameters, time period from onset of hearing loss and start of treatment, sociated tinnitus and vestibular symptoms and co-morbidities like diabetes, hypertension were recorded. Patients were grouped according to their ages – age less than 20 years, between 20 and 40 years, between 40 and 60 years and those more than 60 years. Audiometric evaluation of all the patients were done by pure tone audiometry and hearing thresholds at 250, 500, 1000, 2000, 4000 and 8000 Hz frequencies were obtained. Pure tone average was determined by calculating the arithmetic mean of 500, 1000, 2000 and 4000 Hz frequencies. The patients were informed about the treatment procedure and the possible benefits and risks. Informed consents were obtained from all the patients, who agreed with the treatment procedure. Audiometric findings were recorded in all the cases before treatment and three weeks and three months after treatment. Hearing gain after ITS treatment was calculated from pre-treatment and post treatment hearing thresholds in different frequencies.

Intervention:

All of the ITS injections were administered as OPD procedure assisted by otoendoscopy with 0° otoendoscope. The advantages that we got using an endoscope was that the procedure of ITS can be performed as OPD procedure in the clinic and can be performed more precisely with a clear endoscopic visualisation of tympanic membrane (TM) without an operating microscope. Patient was placed in the supine position with the affected ear directed upwards and head tilted at 45 degree. The external ear and tympanic membrane visualised with the 0° otoendoscope and any debris present in external canal were cleaned.

A small cotton ball soaked in 10% local anaesthetic solution placed carefully over the tympanic membrane for surface anaesthesia. A 23 gauge spinal needle was

angled for proper visualisation of puncture site and 40 mg/ml sterile aqueous suspension of methylprednisolone warmed to body temperature was injected into the postero-inferior quadrant of the tympanic membrane using a 2ml syringe. 0.3-0.5 ml of the solution was gradually injected, till the middle ear cavity was completely filled. Patient was instructed to avoid swallowing and speaking and kept in supine position with affected ear up for 30 minutes to provide maximal absorption of medications through round window and to prevent drug leakage through the Eustachian tube. Each patient was treated by 3 injections given at 3 days interval.

Hearing Evaluation:

Pure tone audiometric finding in unaffected ear was presumed as pre-morbid baseline hearing in the affected ear. Evaluation was done before each injection and 3 weeks and 3 months after completion of steroid injection. Mean value of pre-treatment and post treatment audiometric findings were calculated as the mean value from 6 frequencies (250, 500, 1000, 2000, 4000, 8000 Hz). Post treatment hearing recovery was defined as complete recovery when the final pure tone audiometry finding within 10 dB of baseline hearing.

Data Collection:

Review of medical records was undertaken for all patients who underwent ITS injection from April 2014 to April 2016. These data were composed of both pretreatment and post treatment audiometric findings and recorded in decebels (dB) of hearing loss.

Results

A total of 22 patients who underwent primary ITS for sudden unilateral SNHL during the study period were included in the study. Patients who received ITS as secondary treatment after failure of primary treatment with oral or systemic steroids, patients using ototoxic drugs were not included in this study. There were 14 males and 8 females.

The mean age was 42.22 years (± 9.79) and age ranged from 27 to 68 years. Patients included in our study came for treatment within 2nd to 27th day of occurrence of deafness. The mean duration (days) from onset of disease to start of ITS was 7.86 days. The left ear of 15 patients and the right ears of 7 patients were affected. Depending on medical history and medical records, all the patients were assumed to have normal hearing before SSNHL as none of them had an audiogram performed previously. The profiles of the patients are summarized in the table 1.

All the patients received 3 injections of ITS at the interval 3 days. Four patients with idiopathic unilateral SSNHL had diabetes mellitus (DM) and 7 patients had hypertension as co morbid conditions. 16 patients (72.72%) experienced pain at the time of injection that disappeared within minutes to hours, 6 patients (27.27%) described dizziness and 4 (18.18%) had tinnitus lasting for few hours only. No serious complications developed in any patient during and after treatment. Patients with DM receiving ITS were kept under coverage of oral antibiotics during the treatment period.

The improvements of hearing threshold at 250, 500, 1000, 2000, 4000 and 8000 Hz were calculated from post treatment pure tone audiometry findings. It was observed that significant improvement were there in all the frequencies with recovery in mean pure tone by 44.22 dB.

Discussion

The rationale for intratympanic corticosteroid treatment is that it delivers a high concentration of drug to the target tissue i.e. inner ear through diffusion from the round window membrane with minimal systemic exposure. Many researchers studied ITS treatment for SSNHL and reported positive results.[7]

It was also found that the highest corticosteroid concentrations with longest duration were obtained with hydrocortisone, dexamethasone and methylprednisolone.[8] But data to support the use of ITS as primary therapy are currently limited to case series, reporting success rates similar to those reported with oral therapies.[3] Dexamethasone was the

most common steroid used for ITS use[5,9,10] followed by methylprednisolone.[11] But methylprednisolone presented the best absorption profile in both perilymph and endolymph after transtympanic administration.[3]

Table II: Recovery of Hearing 3 weeks after completion of ITS injections

	RESULTS
Hearing gain 3 weeks after treatment (ITS)	Mean ± SEM: 44.22 dB ± 6.47 Range: 0 - 67dB
Complete hearing recovery	11 (50%) cases
Partial hearing recovery	10 (45.45%) cases
No hearing recovery	1 (4.54%) case

SEM = Standard Error of Mean

We used methylprednisolone (40mg/ml) for intratympanic therapy and 0.3 - 0.5 ml injected through the TM towards round window at the interval of 3 days. Literatures described different methods of drug delivery into the middle ear like transtympanic needle injection[5,9,11,12] delivery through a myringotomy10 and through a myringotomy tube.[11]

In our study, 11 cases (50%) showed complete hearing improvement and 10 cases (45.45%) had partial hearing improvement and one female patient (4.54%) showed no hearing recovery at 3 months follow up period (Table 2). Study conducted by Banerjee[8] and Parnes[3] reported successful hearing improvement in 50% (mean PTA improvement was 27 dB) when ITS methylprednisolone was used as a primary treatment. Ljiljana C et al[13] reported absolute hearing gain between the initial audiogram and final audiogram in IT MP group as 50.7dB, mean relative recovery was 78% following primary ITS therapy.

In the present study we injected ITS to four diabetic patients with ISSHL and blood sugar was within normal limits at the time of each injection and we achieved partial hearing improvement in all the cases (mean PTA improvement was 37.3 db). Ljiljana et al[13] compared a group of 10 diabetic patients who were treated with ITS dexamethasone and showed successful hearing improvement in 70%. Hypertension was detected in seven cases and BP was controlled before starting the ITS without any serious complications.

The average hearing gain between the initial audiogram and the final audiogram in our study was 44.22 dB + 6.47 (SEM) and it seems high compared to reports of spontaneous recovery rates. Main limitation of our study was no control group with any other treatment. It is also not clear whether the improvement was actually from ITS or due to natural course of disease. Wilson et al1 reported 29 of 52 non treated patients regained normal hearing ability (56%). Our study is based on small sample sizes but we need larger sample sizes to establish the valid conclusion of ITS as primary therapy of idiopathic SSNHL.

Complications during and after ITS have been rare and included pain, vertigo, otitis media, TM perforation, dysguesia, chronic otitis media and further hearing loss.[3,9,12] Pain at the time of injection can be reduced by surface anaesthesia with Lidocaine 10% solution (cotton ball soaked), similar procedure was also used by Onur Gundogan et al.[19] Kakehata et al,[12] in their case control study mentioned less toxicity with initial intratympanic steroids therapy than systemic steroids. Possible ototoxic effect of IT steroids has been ruled out by some clinical studies.[14,15,16] Dallan I et al[17] has reported one patient with worsening of hearing after repeated injections of methylprednisolone. Pain and a burning sensation around the ear were the frequently encountered side effects of ITS of methylprednisolone and resolved over a period of 10-20 minutes after the injection.[18] In the present study 6 (27.27%) patients complained of dizziness that resolved within minutes and 4 patients complained of tinnitus immediately after the injections but resolved within 24 hours. In our study we have used 23 gauge spinal needle curved to have a good visualization of TM and because of smaller size of needle the hole at TM heals up without any post treatment iatrogenic perforation. We have not found any unexpected major adverse event during treatment or follow up period.

Some issues relating to ITS injections that may need further study are – amount of loss by Eustachian tube, unknown whether absorbed systemically, unknown whether vehicle should be highly viscous or less viscous, would product with high viscosity maintain round window contact better, presence of air bubbles in round window niche and round window adhesions, concentration gradient needed to maintain the therapeutic effect.

Conclusion

Controversy still exists among the ENT practitioners regarding the treatment of idiopathic SSNHL by ITS injections. Many of ENT surgeons still prefer ITS as a rescue therapy instead of primary. Results from different studies showed encouraging results of primary ITS therapy.

Minimal systemic absorption with minimum or no systemic effects and high percentage of success rate encouraged the surgeons to prefer ITS as primary therapy instead of systemic steroids. Moreover it is effective, cheap, well-tolerated and can be performed as OPD procedure with no serious side effects.

Low complications, successful hearing improvement in diabetic and hypertensive patients were also encouraging. Limitation of our study is that it has no control group and study was conducted in a small number of patients. Controlled studies in a large group of patients will further confirm the benefits of ITS as a primary treatment of choice for idiopathic SSNHL.

References

1. Wilson WR, Byl FM, Laird N. The efficacy of steroids in the treatment of idiopathic sudden hearing loss. A double blind clinical study. Arch. Otolaryngol. 1980; 106; 772-776.
2. Silverstein H, Choo D, Rosenberg SI, Kuhn J, Seidman M. Intratympanic steroid treatment of inner ear disease and tinnitus (preliminary report). Ear Nose Throat J; 1996; 75(8):468-471.
3. Parnes LS, Sun AH, Freeman DJ. Corticosteroid pharmacokinetics in the inner ear fluids: an animal study followed by clinical application. Laryngoscope. 1999; 109; 1–7.
4. Erichsen S, Bagger-Sjoback D, Curtis L, Zuo Z, Rarey K, Hultcrantz M. Appearance of Glucocorticoid receptors in the inner ear of the Mouse during development. Acta Oto-Laryngol. 1996; 116(5); 721-725.
5. Haynes DS, O'Malley M, Cohen S, Watford K, Labadie RF. Intratympanic dexamethasone for sudden sensorineural hearing loss after failure of systemic therapy. Laryngoscope. 2007; 117:3-15
6. Slattery WH, Fischer LM, Iqbal Z, Friedman RA, Liu N. Intratympanic steroid for the treatment of sudden hearing loss. Otolaryngol Head Neck Surg. 2005; 133; 251-259.
7. Colin AE, Parnes LS. Treatment of sudden sensorineural hearing loss: A systematic review. Arch Otolaryngol Head Neck Surg. 2007; 133; 573-81.
8. Banerjee A, Parnes LS. Intratympanic corticosteroids for sudden idiopathic sensorineural hearing loss. Otol. Neurotol. 2005; 26; 878-81.
9. Ho GM, Lin HG, Shu MT. Effectiveness of intratympanic dexamethasone injection in sudden deafness patients as salvage treatment. Laryngoscope. 2004; 114:1184-1189.
10. Gouveris H, Selivanova O, Mann W. Intratympanic dexamethasone with hyaluronic acid in the treatment of idiopathic sudden sensorineural hearing loss after failure of intravenous steroid and vasoactive therapy. Eur Arch Otorhinolaryngol. 2005; 262:131-134.
11. Lauterman J, Sudhoff H, Junker R. Transtympanic corticoid therapy for acute profound loss. Eur Arch Otorhinolaryngol. 2005; 1-9.
12. Kakehata S, Sasaki A, Oji K, Futai K, Ota S, et al. Comparison of intratympanic and intravenous dexamethasone treatment on sudden sensorineural hearing loss with diabetes. Otol Neurotol. 2006; 27(5); 604-608.
13. Ljiljana C, Mile S, Milan B. J., Zoran M, Katarina S, Dragoslava D. Intratympanic steroid treatment as a Primary Therapy in Idiopathic Sudden Sensorineural Hearing Loss. Int. Adv. Otol. 2009; 5; (3); 334-339.
14. Shirwany NA, Seidman MD, Tang W. Effects of transtympanic injection of steroids on cochlear blood flow, auditory sensitivity and histology in the guinea pig. Am J Otol. 1998; 19(2); 230 – 235.
15. Chandrasekhar SS, Rubinstein RY, Kwartler JA, Gatz M, Connelly PE. Dexamethasone pharmacokinetics in the inner ear: Comparison of route of administration and use of facilitating agents. Otolaryngol Head Neck Surg. 2000; 122(4); 521-528.
16. Yilmaz I, Yilmazer C, Erkan AN, Aslan SG, Ozluoglu LN. Intratympanic dexamethasone injection effects on transient-evoked otoacoustic emission. Am J Otolaryngol. 2005; 26(2); 113-117.
17. Dallan I, Bruschini L, Nacci A, Bruschini P, Traino C. Transtympanic steroids as a salvage therapy in sudden hearing loss: preliminary results. ORL, 2006; 68(5); 185-190.
18. Topak M, Sahin-Yilmaz A, Ozdoganoglu T, Yilmaz HB, Ozbay M. Intratympanic methylprednisolone injection for subjective tinnitus. J Laryngol Otol. 2009; 123(11); 1221-1225.

19. Gundogan O, Pinar E, Imre A, Ozturkcan S, Cokmez O. Therapeutic efficacy of the combination of intratympanic methylprednisolone and oral steroid for idiopathic sudden deafness. Otol Neurotol. 2013; 149(5); 753-758.

Present Scenario of Childhood Deafness: A Tertiary Level Health Care Study

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ABSTRACT

Introduction

Hearing loss is the most common sensory deficit in humans today. Approximately 63 million people in India suffer from significant auditory impairment.

Materials and Methods

Fifty children of 0-7 years age group, presented to a tertiary level center in Kolkata were assessed by objective and behavioural audiological tests.

Result

Mean age of presentation was found to be 40.5 months. No risk factor could be identified in 72% of the cases. 47% fell into the profoundly deaf category.

Discussion

Numerous studies agree that half of the infants with sensorineural hearing loss have no risk factors at birth and thus would be missed by a targeted hearing screening.

Conclusion

India certainly faces a worse situation regarding childhood deafness. Implementation of universal neonatal hearing screening along with pre-school hearing assessment can certainly change the scenario.

Keywords

Deafness; Child, Preschool; Incidence; Audiometry; Evoked Potentials, Auditory, Brain Stem; India

Hearing loss is the most common sensory deficit in humans today. As per WHO estimates in India, there are approximately 63 million people, who are suffering from significant auditory impairment; this places the estimated prevalence at 6.3% in Indian population. As per NSSO survey, currently there are 291 persons per one lakh population who are suffering from severe to profound hearing loss (NSSO, 2001). Of these, a large percentage is children between the ages of 0 to 14 years. With such a large number of hearing impaired young Indians, it amounts to a severe loss of productivity, both physical and economic. An even larger percentage of our population suffers from milder degrees of hearing loss and unilateral (one sided) hearing loss.[1]

In countries like India, where "Universal Neonatal Hearing Screening" has not yet been established, only a small EHDI program under the 'Project Deaf India' started in 1998 in the city of Mysore by Dr. Rajendra Desai is in effect;[2] identification of children with PCHI is still dependent on parental or teacher suspicion, locally arranged behavioural screening programmes and preschool screening. In a questionnaire based study in Nigeria, only 12 percent of parents of a child with hearing loss suspected hearing difficulty by the age of 6 months. Parental suspicion occurred mostly at 12 – 24 months, compared with 8 – 14 months in developed countries. The most common mode of detection was a child's failure to respond to sound (49 percent).[3]

Review of literature

Permanent disabling hearing impairment (> 40 dBHL) significantly increases the global burden of disease on individuals, families, communities and countries at large,

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affecting about 250 million people worldwide as in the year 2005.[4] There were 120 million people suffering from disabling hearing impairment when the World Health Assembly (WHA) passed a resolution on the Prevention of Hearing Impairment which asked member states to "prepare national plans for the prevention and control of major causes of avoidable hearing loss, and for early detection in babies, toddlers and children, as well as in the elderly, within the framework of primary health care" in the year 1995.[5]

The incidence of moderate to severe bilateral sensorineural hearing loss ranges from 1-2/1000 among healthy newborn infants[6] to 4-5% in high risk newborns.[7] But according to available published data, in India this picture seemed a little more grim. In India, 4 out of every 1000 newborns suffered from severe to profound hearing loss.[8] Another community based disability survey supported by ICMR had detected the incidence of congenital hearing loss at 10/1000 in rural and 20/1000 in urban India.[9,10] Another study more recently in rural Karnataka had revealed the figure of congenital hearing loss to be a staggering 8 children per 1000 screened.[11]

Though the idea of early detection of deafness and subsequent early intervention was not new, it did not gain a strong foothold in India. Way back in 1971, Nikam and Dharamraj had attempted infant hearing screening.[10] Thereafter, Basvaraj et al (1984), had carried out screening for hearing impairment in Bangalore.[11] In the year 1985, in Mumbai, the Ali Yavar Jung National Institute for the Hearing Handicapped had conducted a 3 year project on screening pre-school children for early identification and intervention of hearing loss, using the high risk register (HRR) approach.[12] Hearing screening of neonates has already gained momentum in those admitted in Neonatal ICUs in Wadia Children's Hospital, Mumbai and AIIMS, New Delhi.[13] But the effectiveness of these techniques, to identify early hearing impairment was already being questioned. The reason for this being that the above studies or procedures only took into account the high risk babies. Thus, leaving aside a large population of apparently healthy 'non-risk' babies. In practice, due to the difficulty experienced by maternity services in reliably identifying a family history of permanent childhood hearing loss, the proportion of the target population identified by 'at risk' screening was rarely above 40 percent.[17] Numerous studies agree that around half of all affected infants have no risk factors at birth and thus would be missed by a targeted hearing screening.[18,19,20,21]

JCIH in its 2007 Position Statement suggested that "to maximize the outcome for infants who are deaf or hard of hearing, the hearing of all infants should be screened at no later than 1 month of age. Those who do not pass screening should have a comprehensive audiological evaluation at no later than 3 months of age. Infants with confirmed hearing loss should receive appropriate intervention at no later than 6 months of age from health care and education professionals with expertise in hearing loss and deafness in infants and young children.[22]

Materials and methods

Study area: Department of ENT at a tertiary level health care center in Kolkata (W.B.).

Study period: January, 2014 – June, 2015.

Study sample: Fifty children (age group 0 – 7 years) attending the out-patient department with deafness.

Study design: Prospective, non-randomized trial.

Ethical clearance: Institutional ethics committee clearance was taken prior to the commencement of the study.

Study technique: A complete case history was obtained from the child's parent or primary care giver which included developmental history, prenatal and perinatal history, risk factors for infant hearing loss and progressive / late onset hearing loss (JCIH, 2007), parent / caregiver's judgments regarding responsiveness to sound in real world environments, performance at school and any other general ENT related complaints (otorrhea etc). Routine ENT examinations with special emphasis on Ear examination, Otoscopic evaluation and Examination under Microscope (EUM). Subsequently, all children below 7 years of age underwent click-evoked auditory brainstem response (CABR) and transient-evoked optoacoustic emission (TEOAE), and children between 3 and 7 years of age additionally underwent behavioural conditioned play audiometry (CPA).

Result and analysis

Among fifty children, 26 (52%) were male. The age at which the children were presented to us ranged from 5 months to as late as 7 years, i.e. 84 months. The mean age of presentation, irrespective of sex, is 40.5 months, whereas median age of presentation is 43 months. In male population, the mean age of presentation is 41.7 months and median 48 months; whereas, in females, mean is 39.1 months and median 36 months. Thirty six children (72%) hailed from urban region, where rest were from rural area.

Thirty children (60%) were delivered through normal vaginal route (NVD) and twenty (40%) were by caesarean section (CS). Regarding place of delivery it was found 46 deliveries (92%) were institutional (ID). Thirty seven children (74%) were presented to us with parental concern of hearing impairment (HI), 10 (20%) with non-development of speech (NDS) and 3 (6%) with poor academic performance at school (PPS), where respective teachers raised the concern. Parents of only 2 children (4%) gave history of delayed onset hearing loss. In majority (72%) cases, no definite risk factor could be assessed; whereas prematurity was found to be the leading cause (10%), followed by neonatal hyperbilirubinemia (6%). Two children with delayed onset hearing loss suffered from meningitis and head trauma respectively.

When correlation between the mode of delivery and the risk factors were done, it was found that –

1. In cases of normal vaginal deliveries (NVD) performed in institutions (n = 26), history of MS was found in 1 child, NHB in 2, PM in 3, and NRF in 18 children (69.23%).

2. If NVD is taken into account, whether delivered at home or institution (n = 30), it came out that NRF could be identified in 22 children (73.33%).

3. In cases of CS (n = 20), FHD and NHB were identified in 1 child each, HIE and PM were identified in 2 children each, and NRF in 14 children (70%).

When children delivered institutionally either by NVD (NVID) or by CS were compared using Chi-square test, the result was found to be insignificant (chi-square statistic – 0.0032, P value – 9.55176; significance level – 0.05).

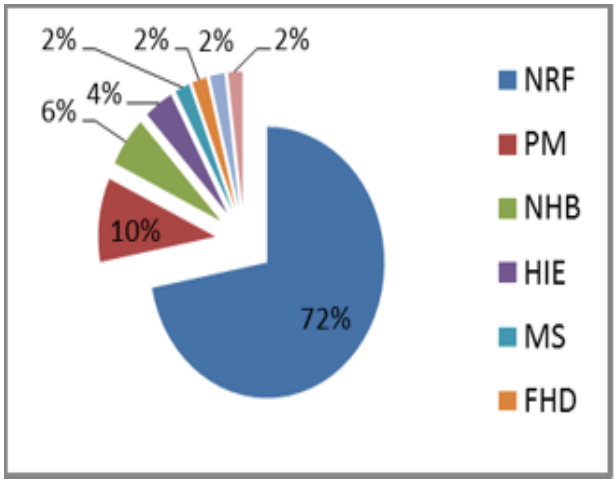

Fig. 1: Pie diagram showing possible etiologies; No risk factor (NRF) – 72%, prematurity (PM) – 10%, neonatal hyperbilirubinemia (NHB) – 6%, hypoxic ischemic encephalopathy (HIE) – 4%, and maternal syphilis (MS), family history of deafness (FHD), meningitis (ME) and head trauma (HT) – 2% each.

Table I: Chi-square test showing comparison between NVID and CS, and NRF and risk factors present (RF).

	NVID	CS	MARGINAL ROW TOTALS
NRF	18 (18.09) [0]	14 (13.91) [0]	32
RF	8 (7.91) [0]	6 (6.09) [0]	14
Marginal Column Totals	26	20	46 (Grand Total)

Next, total NVD children (HD + ID) were compared using Chi-square test again. The result came out to be insignificant again (chi-square statistic – 0.0661, P value – 0.797046; significance level – 0.05).

Table II: Chi-square test showing comparison between NVD and CS, and NRF and RF.

	NVID	CS	MARGINAL ROW TOTALS
NRF	22 (21.6) [0.01]	14 (14.4) [0.01]	36
RF	8 (8.4) [0.02]	6 (5.6) [0.03]	14
Marginal Column Totals	30	20	50 (Grand Total)

In 0-3 years age group (n=20), all children were found to have cochlear deafness ranging from moderately severe to profound category. Wave V could not be recorded till 100 dBnHL in 11 children, placing them in profoundly deaf category. Overall, 50 children i.e. 100 ears were evaluated by TEOAE, cABR and CPA (pure tone average of 0.5, 1 and 2 KHz). No deafness (NoD) was found in 3 ears (include both ears of a child with auditory processing disorder and another with unilateral hearing loss) (3%), mild deafness (MiD) in 2 ears (2%), moderate deafness (MoD) in 7 ears (7%), moderately severe deafness (MoSeD) in 20 ears (20%), severe deafness (SeD) in 21 ears (21%), and profound deafness (PrD) in 47 ears (47%) (Fig. 2).

Discussion

The critical review (1997) of new born hearing screening carried out as part of the UK's Health Technology Assessment program revealed that the median age in the UK for moderate or greater bilateral congenital permanent hearing loss based on current screening tests was around 22 months. In the present study, the mean age of identification is 40.5 months and median age is 43 months, irrespective of sex, which is worse when compared to the international figure. No sex preponderance was noted with male to female ratio being 1.08:1.

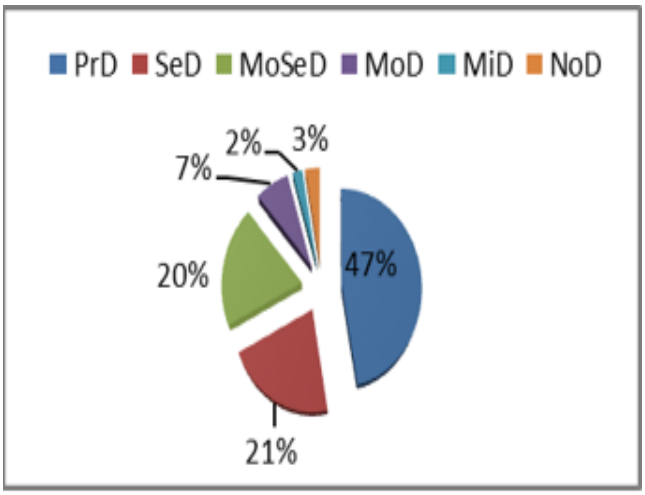

Fig. 2: Pie diagram showing severity of deafness in 100 ears (50 children); PrD – 47%, SeD – 21%, MoSeD – 20%, MoD – 7%, MiD – 2% and NoD – 3%.

A study conducted by the Department of Otolaryngology, PGIMER, Chandigarh[23] found the incidence of hearing loss is 6.31% in the urban group and 32.81% in the rural group. This is contradictory to the present study, where 72% hailed from urban area against the 28% from rural area. This difference may be because of two reasons. Firstly, the study conducted by IPGMER was a screening program. Secondly, may be due to increased literacy, increased awareness and better accessibility to healthcare facilities in the urban population.

A hearing impaired child usually raises parental concern about not reacting to loud noises, not responding to their voice and / or making simple sounds that taper off.[24] These children also present with none or poorly developed speech.[25] Compromised outcome also noted to be associated with literacy[26] and educational achievement.[27] In this study, majority (74%) of the children presented with parental concern of hearing impairment, followed by non-development of speech (20%) and poor academic performance at school (6%).

A study by Naarden KV et al. titled "Prevalence and Characteristics of Children With Serious Hearing Impairment in Metroplitan Atlanta, 1991 – 1993"[27] showed that a probable etiology could only be found for

22% of cases born in the study area. E. Marlow, L. Hunt and N. Marlow[28] showed that prematurity is another risk factor for childhood sensorineural deafness. The present study can be well corroborated with these as in majority of the cases (74%), no risk factor could be identified, distantly followed by prematurity (10%).

When number of cases where an established risk factor was identified and in cases where no risk factor could be identified were compared between two groups of institutional normal vaginal delivery and caesarean section using Chi-square test, the result came out to be statistically insignificant. The result was insignificant even when all children delivered vaginally, irrespective of home and institutional delivery were compared with children delivered by caesarean section. This concludes, whatever may be the mode of delivery, home or institutional, normal vaginal delivery or caesarean section; all children bears the same risk of hearing impairment. This very well supports the fact why in universal neonatal hearing screening (UNHS) all children are given equal importance and why UNHS is better than High-risk Screen alone.[17,18,19,20,21,29]

Lastly, when 100 ears were categorized, it was found that 47% had profound deafness, 21% had severe deafness and 20% had moderately severe deafness; whereas, moderate and mild deafness comprised only 7% and 2% respectively. This warns about the gloomy situation in India when compared to western part of the world.[6,7,8,30,31] This may be because mild to moderate deafness are still overlooked in this country as these two groups are least likely to raise parental concern about their child's hearing impairment apparently.

Conclusion

The present study strongly recommends implementation of universal neonatal hearing screening; parental awareness of childhood deafness – its symptoms, its influence over child's development and potential benefits of early intervention; pre-school hearing assessment; and lastly awareness program of school teachers regarding early childhood deafness.

Compliance with ethical standards

Funding: The study was conducted in a Government aided institution where every facility is provided free of cost to the bearers.

Ethical approval: All procedures performed in this study were in accordance to the institutional ethical standards.

Informed consent: Informed consent was obtained from the parents of all children included in the study.

healthcare facilities in the urban population.

References

1. Internet article: mohfw.nic.in/WriteReadData/l892s/8616338852nppcd.pdf
2. Olusanya BO, Luxon LM, Wirz SL. Childhood deafness poses problems in developing countries. British Medical Journal 2005; 330: 480c
3. World Health Organisation. Preventing chronic diseases – a vital investment. Geneva. 2005
4. World Health Organisation. Prevention of hearing impairment – Resolution of the 48th World Assembly, WHA 489. Geneva. 1995
5. Davis A, Wood S. The epidemiology of childhood hearing impairment: factors relevant to planning of services. Br J Audiol. 1992; 26:77-90
6. Hall JW. Handbook of auditory evoked responses. III. Needam Heights, MA: Allyn and Bacon; 1992
7. Rehabilitation Council of India. Status of Disability in India-2000. http://www.rehabcouncil.nic.in/writereaddata/Cover_Page.pdf
8. Report of the collaborative study on the prevalence and etiology of hearing impairment. New Delhi, ICMR and Department of Science, 1983: 16
9. Kacker SK. The scope of pediatric audiology in India. In Deka RC, Kacker SK, Vijayalakshmi B, eds. Pediatric audiology in India, 1st edition, New Delhi; Otorhinolaryngological Research Society of AIIMS. 1997: 20
10. Nikam S, Dharamraj. School of Screening Programme in Mysore city. Journal of All India Institute of Speech & Hearing 1971; 1:28-32
11. Basvaraj V, Kumudavalli S, Kamakshi V. et al. Newborn Hearing Screening in Nursing Homes of Bangalore City, Unpublished report of Institute of Speech and Hearing, Bangalore. 1984
12. Annual report of Ali Yavar Jung National Institute for the Hearing Handicapped (1991-92): AYJNIHH, Bandra Reclamation. Mumbai. 1992

13. Basvaraj V, Kacker SK, Deka RC (Eds): Pediatric Audiology in India; Proceeding of the International Seminar on Pediatric Audiology. Department of Otolaryngology, AIIMS, New Delhi. 1997
14. Baquer A, Sharma A. Disability: Challenges vs Response. CANS Publication, New Delhi. 1997: 87-90
15. Davis A, Bamford J, Wilson I, Ramkalawan T, Forsaw M, Wright S. A critical review of the role of neonatal hearing screening in the detection of congenital hearing impairment. Hearing Technology Assessment 1997; 1: 1-105
16. Fortnum H, Davis A. Epidemiology of permanent hearing impairment in Trent region, 1985-1993. British Journal of Audiology 1997; 31: 409-46
17. Mehl AL, Thomson V. The Colorado Newborn Hearing Screening Project, 1992-1999: On the threshold of effective population-based universal newborn hearing screening. Pediatrics 2002; 109: e7
18. Mehl AL, Thomson V. Newborn hearing screening: the great omission. Pediatrics 1998; 101: e4
19. Berg AL, Spivak LG. Universal newborn hearing screening: Should we leap before we look? Pediatrics. 1999; 104: 351-2.
20. Year 2007 position statement: Principles and Guidelines for Early hearing detection and intervention program. Jt Comm Infant Hearing Pediatr. 2007: 898.
21. Davis A, Bamford J, Wilson I, Ramkalawan T, Forsaw M, Wright S. A critical review of the role of neonatal hearing screening in the detection of congenital hearing impairment. Hearing Technology Assessment 1997; 1: 1–105.
22. Mann SBS, Sharma SC, Gupta AK, Nagarkar AN, Dharamvir. Incidence of hearing impairment among rural and urban school going children: A survey. The Indian Journal of Pediatrics 1998; 65 (1): 1415
23. Internet article: http://www.webmd.com/parenting/help-for-parents-hearing-impaired-children
24. Psarommatis IM, Goritsa E, Douniadakis D, Tsakanikos M, Kontrogianni AD, Apostolopoulos N. Hearing loss in speech-language delayed children. 2001; 58 (3): 205-10
25. Conrad R. The deaf school child. London: Harper Et: Row, 1979
26. Powers S. Deaf pupils' achievement in ordinary subjects. Journal of British Association of Teachers of the Deaf 1996; 20: 111-23
27. Naarden KV, Decouflé P, Caldwell K. Prevalence and Characteristics of Children with Serious Hearing Impairment in Metropolitan Atlanta, 1991-1993. Pediatrics 1999; 103 (3): 570-5
28. Marlow E, Hunt L, Marlow N. Sensorineural hearing loss and prematurity. Arch Dis Child Fetal Neonatal 2000; 82(2): F141-4
29. Samaddar S, Banerjee S, Ghosh S K, Bhattacharya S, Mukherjee D, Dutta S. Universal Neonatal Hearing Screening - a Necessity and not a Choice. Bengal Journal of Otolaryngology and Head Neck Surgery 2015; 23(1):1-6
30. Prevention Of Deafness, Posted on May 4, 2012; Internet article: projectdeafindia.org
31. Bess FH, DoddMurphy J, Parker RA. Children with Minimal Sensorineural Hearing Loss: Prevalence, Educational Performance, and Functional Status. Ear & Hearing 1998; 19 (5): 339-54.

Comparative Study to Assess Clinical Efficacy of Leukotriene Receptor Antagonists and Antihistamines in the Treatment of Allergic Rhinitis

Gurpreet Kaur,[1] Rachna Dhingra,[2] Manjinder Singh[3]

ABSTRACT

Introduction

Pharmacologic treatment options for allergic rhinitis include intranasal corticosteroids, oral and topical antihistamines, decongestants, intranasal cromolyn, intranasal anticholinergics and leukotriene receptor antagonists. The present study was undertaken to compare the efficacy of leukotriene receptor antagonist and antihistamines in relieving nasal congestion/ obstruction symptom and itching /irritation in eyes.

Material and Methods

The study was conducted among 125 patients clinically diagnosed to be suffering from allergic rhinitis Patients were divided into 5 groups and were given oral treatment with oral antihistamines (chlorpheniramine maleate, levocetrizine, fexofenadine, desloratadine) and leukotriene receptor antagonist (montelukast) for a period of 6 weeks. The results were tabulated and analyzed by Chi-square and Kruskal-Wallis test with p value <0.05 as significant value.

Result

For relieving nasal obstruction, levocetrizine group showed maximum improvement at 2 weeks. However, at the end of 6 weeks montelukast group showed maximum relief followed by levocetrizine and desloratidine. In relieving eye itching/irritation, montelukast and levocetirizine were equally effective. Fexofenadine and desloratadine were less effective in relieving nasal obstruction and eye itching/irritation followed by chlorpheniramine maleate, which was least effective.

Conclusion

Allergic rhinitis affects the social and professional life of patient. Allergen avoidance should be the initial step in the management of allergic rhinitis. Montelukast and levocetirizine are more effective in relieving nasal obstruction and eye itching/irritation compared to fexofenadine, desloratadine and chlorpheniramine maleate.

Keywords

Rhinitis, Allergic, Seasonal; Histamine Antagonists; Leukotriene Antagonists.

Allergic rhinitis is clinically defined as a symptomatic disorder of the nose induced, after allergen exposure, by an IgE-mediated inflammation of the membranes lining the nose. It represents a global health problem affecting at least 10% to 40% of the population. Although it is not usually a severe disease, it alters the social life of patients and affects school performance and work productivity.[1] Histamine appears to be a major mediator released by mast cells in seasonal and perennial allergen exposure, but other mediators such as leukotrienes, prostaglandins and kinins may also contribute to the symptomatology through their interaction with neural and vascular receptors.[2] Pharmacologic treatment options include intranasal corticosteroids, oral and topical antihistamines, decongestants, intranasal cromolyn (Nasalcrom), intranasal anticholinergics and leukotriene receptor antagonists.[3] The present study was undertaken to

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compare the efficacy of leukotriene receptor antagonist and antihistamines in relieving nasal congestion/ obstruction symptom and itching/irritation in eyes.

Material and methods

The present prospective study was conducted among 125 patients attending the ENT outpatient Department. Patients clinically diagnosed suffering from allergic rhinitis of either sex with age range 10-60 years were randomly selected for the study. Patients with nasal congestion/obstruction and itching/irritation in eyes were selected for the study.

Informed consent was taken from the patients and ethical approval was obtained from the institute. This was an open study where the patient, the observer and the supervisor and co-supervisor were having a clear knowledge of the drugs used.

It was chosen as it avoided any psychological trauma to the patient as to what therapeutic trial is made on his/ her by using the drug. Patients with previous treatment with leukotriene receptor antagonist and antihistamines over a period of one month were excluded from the study.

DAY TIME	RESULTS			
	0	1	2	3
Nasal Congestion/ Obstruction	No	Mild	Moderate	Severe
Itching/ Irritation in Eyes	No	Mild	Moderate	Severe

Patients were divided into 5 groups with 25 patients in each group and were given oral treatment with oral antihistamines (Chlorpheniramine maleate, Levocetrizine, Fexofenadine, Desloratadine) and leukotriene receptor antagonist (Montelukast) for a period of 6 weeks. The different 5 groups were compared for symptoms of nasal congestion/ obstruction and itching/irritation in eyes recorded on day 1, 2 weeks, 4 weeks and 6 weeks of treatment and analysed. The result were interpreted on the basis of symptoms relieved.

The subjective assessment for the degree of relief of symptoms were done according to total symptom score (TSS) from 0 to 3 as given below. Each patient was followed up after 2 week and then, after 4 and 6 weeks.

The results were tabulated and analyzed by Chi-square and Kruskal-Wallis test with p value <0.05 as significant value.

Results

The number of patients residing in rural area (63.2%) was higher than in urban area (36.8%) (Table I).

Table II shows that in maximum number of patients, dust was the single most important predisposing factor (36%) followed by seasonal change (32.8%). However in 12% patients, no predisposing factor could be identified. The predisposing factors were identified from detailed history.

Table III shows that at 2nd week follow up Levocetrizine in Group 2 was significantly effective with 20% patients having zero (0) symptom score in nasal congestion/obstruction symptom and with mean rank 35.92 as compared to other drugs.

At 4th week, follow up montelulast in group 1 and Levocetrizine was more effective with 40% patients having zero symptom score in nasal congestion/ obstruction symptom score and having mean rank 43.80 and 47.48 as compared to other drugs. At 6th week follow up montelulast in group 1 was significantly effective with 64% patients having zero symptom score in nasal congestion/obstruction symptom and having mean rank 42.62

Table IV shows that at 2nd & 4th week follow up Levocetrizine in Group 2 was significantly effective with 40% patients and 56% patients having zero (0) symptom score in itching /irritation in eyes symptom and with mean rank 46.08 and 51.40 as compared to other drugs. At 6th week follow up montelulast in group 1 and Levocetrizine in Group 2 were more effective with 56% patients having zero (0) symptom score in

Table I: Comparison of patients according to residential area

	GROUP					TOTAL
	1 Montelukast	2 Levocetrizine	3 Fexofenadine	4 Desloratadine	5 CPM	
RURAL	13 (52%)	16 (64%)	18 (72%)	15 (60%)	17 (68%)	79 (63.2%)
URBAN	12 (48%)	9 (36%)	7 (28%)	10 (40%)	8 (32%)	46 (36.8%)

SEM = Standard Error of Mean

itching / irritation in eyes symptom in group 1 and 2 with mean rank 58.62 in both groups as compared to other drugs.

Discussion

Allergic rhinitis is one of the diseases that affect health-related quality of life. Health-related quality of life is defined as the patient's perception of the effects of a specific disease or the use of a certain treatment on different aspects of his/her life, particularly the consequences for the patient's physical, emotional, and social well-being.[4] The rapid increase in air pollution and climate change are reasonable explanations as risk factors for the marked increases in the occurrence and exacerbation of allergic rhinitis.[5]

Present study shows a slightly higher incidence of allergic rhinitis in rural areas (63.2%). It may be because people in rural areas are more exposed to house dust because of katcha houses and field dust as well as increased pollen exposure in fields.

Animal dander (Buffalo, cats, dogs and sheep) is also important in disease causation. Similar findings were reported by Mygind N[6] and Krouse GH[7] who reported increased incidence of allergic rhinitis in rural area mainly due to pollens, grasses, house dust and animal danders.

In present series 36% percent of patients were allergic to house dust while 32.8% percent patients got their illness aggravated on exposure to various seasonal changes and some patients could identify other factors like smoke fumes, perfume, flowers, and cosmetics as the aggravating factors. 12% patients found no predisposing factor for causation of allergic symptoms.

Mygind N,[7] Pawankar R[8] identified house dust and house dust mite to be the most important allergen causing allergic rhinitis. Jones NS[9] implicated house dust, animal emanations, perfumes and cosmetics to be important as the causative factors leading to allergic rhinitis symptoms.

In the present study, regarding nasal obstruction, levocetrizine was significantly better at 2 weeks with mean rank 35.92, followed by montelukast with mean rank 57.90, desloratidine with mean rank 65.84 is better than fexofenadine with mean rank 77.04. Chlorpheniramine maleate with mean rank 78.30 was least effective.

Table II : Statistical Analysis

		GROUP					TOTAL
		1 Montelukast	2 Levocetirizine	3 Fexofenadine	4 Desloratadine	5 CPM	
PREDISPOSING FACTORS	Cosmetics	0	1 (4%)	1 (4%)	1 (4%)	1 (4%)	4 (3.2%)
	Dust	7 (28%)	12 (48%)	5 (20%)	9 (36%)	12 (48%)	45 (36%)
	Flowers	1 (4%)	0	1 (4%)	1 (4%)	1 (4%)	4 (3.2%)
	No history	4 (16%)	2 (8%)	5 (20%)	3 (12%)	1 (4%)	15 (12%)
	Perfumes	1 (4%)	0	2 (8%)	0	0	3 (2.4%)
	Seasonal Change	8 (32%)	7 (28%)	9 (36%)	8 (32%)	9 (36%)	41 (32.8%)
	Smoke	4 (16%)	2 (8%)	1 (4%)	2 (8%)	1 (4%)	10 (8%)
	Wheat flour	0	1 (4%)	1 (4%)	1 (4%)	0	3 (2.4%)

At the end of 4th weeks levocetrizine with mean rank of 43.80 was better than montelukast with mean rank 47.48 while fexofenadine, desloratidine and chlorpheniramine maleate were very less effective in relieving nasal obstruction with mean rank of 64.44, 68.20 and 84.90 respectively.

At 6 weeks, montelukast (mean rank 42.62) was slightly better than levocetrizine (mean rank 46.98). Desloratidine (mean rank 68.32) though less effective in relieving nasal obstruction but it was better than fexofenadine (mean rank 74.20) and chlorpheniramine maleate (mean rank 75.14). Fexofenadine and chlorpheniramine maleate were very less effective in relieving nasal obstruction.

George P et al[10] found that during the 4 weeks treatment with montelukast, patients showed improvement compared with patients treated with placebo for the primary end point day night symptom score and for individual nasal symptoms of rhinorrhoea, sneezing and nasal congestion. During the entire 6 weeks of treatment, treatment with montelukast showed a statistically significant improvement over treatment with placebo in rhinorrhoea, nasal congestion and sneezing, but no difference in itching.

In the present study, regarding relieving of itching/ irritation in eyes, at 2 weeks levocetrizine in group 2 was significantly effective with mean rank 46.08 followed by montelukast and desloratidine with same

Table III : Comparison of Nasal congestion/Obstruction symptom score from day 1 presentation to 6 weeks follow-up

		GROUP					TOTAL
	Symptom score	Montelu-kast	Levocetiri-zine	Fexofena-dine	Deslora-tadine	CPM	
Obstruction at day 1 presentation	1	3(12%)	2(8%)	3(12%)	3(12%)	3(12%)	14(11.2%)
	2	12(48%)	11(44%)	12(48%)	12(48%)	12(48%)	59(47.2%)
	3	10(40%)	12(48%)	10(40%)	10(40%)	10(40%)	52(41.6%)
	Total	25	25	25	25	25	125
	Mean Rank	61.82	67.72	61.82	61.82	61.82	
	Sig. #	Chi Square 0.646; p value 0.958; Non Significant					
Obstruction at 2 weeks follow-up	0	0(0%)	5(20%)	1(4%)	1(4%)	0(0%)	7(5.6%)
	1	15(60%)	17(68%)	6(24%)	11(44%)	7(28%)	56 (44.8%)
	2	10(40%)	3(12%)	16(64%)	11(44%)	16(64%)	56 (44.8%)
	3	0(0%)	0(0%)	2(8%)	2(8%)	2(8%)	6(4.8%)
	Total	25	25	25	25	25	125
	Mean Rank	57.9	35.92	77.04	65.84	78.3	
	Sig. #	Chi Square 25.722; p value 0.000; Significant					
Obstruction at 4 weeks follow-up	0	10(40%)	10(40%)	4(16%)	5(20%)	0(0%)	29(24%)
	1	13(52%)	15(60%)	14(56%)	14(56%)	11(52.4%)	67(55.4%)
	2	2(8%)	0(0%)	7(28%)	6(24%)	10(47.6%)	25(20.7%)
	Total	25	25	25	25	21	121
	Mean Rank	47.48	43.8	68.2	64.44	84.9	
	Sig. #	Chi Square 25.722; p value 0.000; Significant					
Obstruction at 6 weeks follow-up	0	16(64%)	14(56%)	5(20%)	7(28%)	3(14.3%)	45(37.2%)
	1	9(36%)	11(44%)	15(60%)	14(56%)	15(71.4%)	64(52.9%)
	2	0(0%)	0(0%)	5(20%)	4(16%)	3(14.3%)	12(9.9%)
	Total	25	25	25	25	21	121
	Mean Rank	42.62	46.98	74.2	68.32	75.14	
	Sig. #	Chi Square 23.640; p value 0.000; Significant					

Table IV : Comparison of Itching /Irritation in eyes symptom score from day 1 presentation to 6 weeks follow-up

		GROUP					TOTAL
	Symptom score	Montelukast	Levocetrizine	Fexofenadine	Desloratadine	CPM	
Itching in eyes at day 1 presentation	0	1(4%)	1(4%)	1(4%)	1(4%)	1(4%)	5(4%)
	1	5(20%)	5(20%)	5(20%)	5(20%	5(20%)	25(20%)
	2	16(64%)	16(64%)	16(64%)	16(64%)	16(64%)	80(64%)
	3	3(12%)	3(12%)	3(12%)	3(12%)	3(12%)	15(12%)
	Total	25	25	25	25	25	125
	Mean Rank	63	63	63	63	63	
	Sig. #	Chi Square 0.000; p value 1.000 Non Significant					
Itching at 2 weeks follow-up	0	5(20%)	10(40%)	4(16%)	4(16%)	3(12%)	26(20.8%)
	1	15(60%)	14(56%)	16(64%)	17(68%)	14(56%)	76 (60.8%)
	2	5(20%)	1(4%)	5(20%)	4(16%)	8(32%)	23 (18.4%)
	Total	25	25	25	25	25	125
	Mean Rank	64.2	46.08	66.24	64.26	74.22	
	Sig. #	Chi Square 10.668; p value 0.031; Significant					
Itching at 4 weeks follow-up	0	10(40%)	14(56%)	10(40%)	10(40%)	5(23.8%)	49(40.5%)
	1	15(60%)	11(44%)	15(60%)	15(60%)	15(71.4%)	71(58.7%)
	2	0(0%)	0(0%)	0(0%)	0(0%)	1(4.8%)	1(.8%)
	Total	25	25	25	25	21	121
	Mean Rank	61	51.4	61	61	72.43	
	Sig. #	Chi Square 5.608; p value 0.230; Non Significant					
Itching at 6 weeks follow-up	0	14(56%)	14(56%)	13(52%)	13(52%)	9(42.9%)	63(52.1%)
	1	11(44%)	11(44%)	12(48%)	12(48%)	12(57.1%)	58(47.9%)
	Total	25	25	25	25	21	121
	Mean Rank	58.62	58.62	61.04	61.04	66.57	
	Sig. #	Chi Square 1.015; p value 0.907; Non Significant					

mean rank 64.20, fexofenadine with mean rank 66.24 and chlorpheniramine maleate with mean rank 74.22.

In relieving eye itching/irritation at 4 weeks levocetrizine in group 2 was effective with mean rank 51.40 followed by montelukast, fexofenadine and desloratidine which were equally effective in relieving itching/irritation with same mean rank 61.00 which was least effective among the compared groups.

At 6 weeks, montelukast and levocetrizine were equally effective with mean rank of 58.62 in relieving itching/irritation in eyes followed by desloratidine and fexofenadine with same mean rank 61.04 and chlorpheniramine maleate with mean rank 66.57. Singh Franco D et al[11] found that in patients with moderate to severe perennial allergic rhinitis, levocetrizine 5 mg/d was associated with improvements in scores for rhinorrhoea, nasal and ocular pruritus, and sneezing at 4 to 6 weeks compared with placebo.

Nasal congestion scores improved within 1 week, an effect that was maintained over 4 to 6 weeks. Ralph M et al[12] revealed that effectiveness of modern antihistamines for treatment of allergic rhinitis (levocetrizine) improved the symptom score after 24 hours compared to Fexofenadine and Desloratidine, thus reported that levocetrizine is highly effective in reducing the total symptom score.

Allergen avoidance should be the initial step in the management of AR. Oral antihistamines are the first-line therapy for mild to moderate intermittent and mild persistent rhinitis and montelukast is as effective as antihistamines.[13]

Conclusion

Allergic rhinitis affects the social and professional life of patient. For relieving nasal obstruction, levocetrizine group showed maximum improvement at 2 weeks. However, at the end of 6 weeks montelukast group showed maximum relief followed by levocetrizine and desloratidine.

In relieving eye itching/irritation, montelukast and levocetirizine were equally effective. Fexofenadine and desloratadine were less effective in relieving nasal obstruction and eye itching/irritation followed by chlorpheniramine maleate which was least effective.

References

1. Bousquet J, van Cauwenberge P, Bond C, Bousquet H, Canonica GW, Howarth P et al. Management of Allergic rhinitis Symptoms in the Pharmacy. Allergic rhinitis and its Impact on asthma- A Pocket Guide for Pharmacists. Available at: http://www.whiar.org/docs/ARIA_Pharm_PG.pdf
2. Van Cauwenberge P, Bachert C, Passalacqua G, Bousquet J, Canonica GW, Durham SR, et al. Consensus statement on the treatment of allergic rhinitis. Allergy 2000; 55:116-34
3. Sur DK, Scandale S. Treatment of Allergic Rhinitis. Am Fam Physician 2010; 81(12):1440-6
4. Delgado J, Davila ID, Domínguez-Ortega J, Quirce S, Martí-Guadaño E, Valero A. Quality of life in patients with respiratory allergy is influenced by the causative allergen. Investig Allergol Clin Immunol. 2013; 23(5):309-14
5. Jun-Pyo M, Kim H, Lee K, Chang S. Time Trends of Allergic Rhinitis and Effects of Residence on Allergic Rhinitis in Korea From 1998 Through 2007–2009. Asian Nursing Research 2012; 6(3):102-6
6. Mygind N. Perennial rhinitis. In: Mygind N, editor. Nasal allergy. 1st ed. Oxford: Blackwell Scientific Publications; 1978. pg 52-84
7. Krouse JH. Allergy and chronic rhinosinusitis. Otolaryngol Clin North Am. 2005; 38:1257-66
8. Pawankar R. Allergic Rhinitis and Asthma from the link to Emerging Therapies. Indian J Chest Dis Allied Sci. 2003; 45:179-89
9. Jones NS. Prevalence of Allergic Rhinosinusitis. Journal Otol Laryngol. 1998; 2:1019-30
10. George P, Debora WH, Patel P, Steven F, Achilles Alon, Leen G, Carol A, Dass BS, Theodore F. Efficacy of montelukast for treating perennial allergic rhinitis, Allergy Asthma Proc. 2007; 28:296-304.
11. Singh-Franco D, Ghin HL, Robles GI, Borja-Hart N, Alexandra P. Levocetirizine for the treatment of allergic rhinitis and chronic idiopathic urticaria in adults and children. Clin Ther. 2009; 31(8):1664-87
12. Ralph M,Volker K, Juliane K. The Effectivness of modern Antihistamines for treatment of allergic Rhinitis-

An IPD Meta-Analysis of 140,853 Patients. Allergology International 2013; 62:215-22

13. Cingi C, Kayabasoglu G, Nacar A. Update on the Medical Treatment of Allergic Rhinitis. Inflammation & Allergy - Drug Targets 2009; 8:96-103.

Aerobic and Anaerobic Bacterial Isolates on the Surface and Core of Tonsils from Patients with Chronic Tonsillitis

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ABSTRACT

Introduction

Controversy regarding treatment of tonsillitis based on throat culture report still persists. If surface culture is a determinant of bacteriology of the core, then rational therapy could be aimed at organisms cultured by surface swab.

Materials and Methods

A Cross-sectional study was conducted on 100 patients of chronic tonsillitis who underwent tonsillectomy. Tonsil surface and core swabs were studied for aerobic and anaerobic growth.

Results

Seventy-three percent patients had aerobic growth on tonsil surface and 74.2% in tonsil core. Staphylococcus aureus was the commonest aerobic bacteria isolated. Anaerobic growth was present in 44.4% patients on tonsil surface, and 48.4% in core. Porphyromonas sp. was the commonest anaerobic bacterium isolated.

Discussion

There was no statistically significant difference between aerobic and anaerobic bacteria found in tonsil surface and core.

Conclusion

Throat swabs adequately represent core pathogen, and are dependable in detecting bacteriology of chronic tonsillitis.

Keywords

Tonsillitis; Bacteria, Aerobic; Bacteria, Anaerobic.

Tonsillitis remains a frequently occurring clinical problem, affecting children and adults. Although treated everyday, the controversy regarding treatment based on throat culture report still persists. Chronic tonsillitis is not only clinically suspected, but has to be supported by bacteriological and patho-anatomical considerations. Empirical treatment of chronic tonsillitis patients cannot be based on bacteriological profile of surface. The bacterial profile obtained by swabbing the surface, may be colonizers only. If surface culture is a determinant of bacteriology of the core, then rational therapy could be aimed at organisms cultured by surface swab. This study was planned to assess the relationship of aerobic and anaerobic bacterial isolates on the surface and in the core cultures from recurrently infected and inflamed tonsils.

Materials and Methods

A cross-sectional study was conducted on hundred patients of chronic tonsillitis, who attended the Out Patient Department of ENT, from January to December 2014, who underwent tonsillectomy, were taken for the study after obtaining written informed consent. Patients with history of more than 3 episodes of tonsillitis for a minimum of 6 months, with no relief of symptoms, where selected for tonsillectomy. Patients were treated with broad-spectrum antibiotics before surgery. Patients

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with tonsillar malignancy and those who failed to give consent were excluded. The study was approved by Institutional Ethics Committee.

Two swabs were procured from the tonsillar surface intraoperatively by rotating sterile cotton wool swabs over the surface of the tonsil, avoiding any other part of the oropharynx, before tonsillectomy. The tonsillar specimen obtained after surgery was immediately dipped into povidone iodine solution for half a minute and then rinsed in sterile saline solution. It was sectioned into two parts following thorough asepsis. Two sterile swabs were applied to the inner surface of the sectioned tonsil, without coming in contact with the outer surface. One swab from each pairs was transported in thioglycollate medium for anaerobic culture. The four samples were transported to the Microbiology laboratory for culture. The samples were processed for isolation of aerobic bacteria and anaerobic bacteria as per the standard protocol.[1,2] Statistical analysis was done to determine percentage and the significance between the aerobic and anaerobic isolates from surface and core of the infected tonsil by application of Chi-square test and Fischer Exact test.

Results

Chronic tonsillitis most commonly (44%) affected the adolescent age group (11-20 years). There was a slight female predilection in chronic tonsillitis with females comprising 53% and males 47%. Twenty (20%) patients had grade 2 tonsillar hypertrophy, 66 (66%) patients had grade 3 tonsillar hypertrophy, and 14 (14%) patients had grade 4 tonsillar hypertrophy; 37% patients had adenoids. Majority of patients (73%) with chronic tonsillitis manifested with bilateral jugulodigastric lymphadenopathy. Indication for tonsillectomy in 63 (63%) patients was chronic tonsillitis and in 36 (36%) patients was chronic adenotonsillitis. One (1%) patient had chronic adenotonsillitis with bilateral chronic otitis media (COM). Eighty-three (83%) patients had parenchymatous tonsillitis, while 17 (17%) patients had follicular tonsillitis.

Sixty-two (62%) and sixty-three patients (63%) patients had bacterial growth on tonsil surface and core respectively. Fifty-four out of 62 (87%) and 57 out of 63 (90%) patients had aerobic growth on tonsil surface and tonsil core respectively. Thirty-seven out of 54 (69%) patients had aerobic growth in tonsil surface as well as tonsil core; of which 29 (78%) patients had same aerobic growth on tonsil surface as well as in tonsil core. The remaining 18 patients had aerobic growth in either tonsil surface or in core. Eight out of 54 (15%) patients had polymicrobial aerobic growth on tonsil surface, 9 out of 57 (16%) patients had polymicrobial aerobic growth in tonsil core.

Staphylococcus aureus was the commonest aerobic isolate in surface culture (40.7%) followed by Streptococcus pyogenes (18.5%), Klebsiella pneumonia (9.3%), Streptococcus pneumoniae, Pseudomonas aeruginosa, Enterococcus sp. (7.4%), Citrobacter sp. (3.7%), and Klebsiella oxytoca, Escherichia coli, Acinetobacter (1.9% each). In core cultures too, Staphylococcus aureus and Streptococcus pyogenes were the commonest aerobes isolated (33.3% & 21.1% respectively), followed by Streptococcus pneumoniae (14.0%), Klebsiella pneumoniae (10.5%), Pseudomonas aeruginosa (7.0%), and Neisseria catarrhalis, Escherichia coli, Acinetobacter sp. (1.8% each). No statistical difference between surface and core cultures was seen. (Table I).

Twenty-nine out of 62 (47%) and 30 out of 63 (48%) patients had anaerobic growth on tonsil surface and core respectively. Twenty-two out of 29 (76%) patients had anaerobic growth on tonsil surface as well as in tonsil core, of which 13 patients had the same growth on tonsil surface as well as core. The remaining 7 patients had anaerobic growth in either tonsil surface or in core. One out of 29 (3%) patients had polymicrobial anaerobic growth on tonsil surface. No patients had polymicrobial anaerobic growth in tonsil core.

Porphyromonas sp. was the commonest anaerobe isolated in both surface and core cultures (41.4% and 33.3% respectively) in the present study. Bacteroides fragilis (17.2%), Prevotella intermedia, Prevotella loescheii (10.3% each), Prevotella melaninogenica (6.9%) were the other anaerobic isolates in surface cultures. Fusobacterium sp., Peptostreptococcus sp., Bilophila sp., Actinomycetes concomitans (3.4%) were the uncommon anaerobic bacteria isolated

exclusively in surface cultures. The core cultures also isolated Bacteroides fragilis (26.7%), Prevotella melaninogenica (20.0%), Prevotella intermedia (16.7%) and Fusobacterium sp. (3.3%). There was no statistical

Table I: Comparison of Aerobic Bacteria in Tonsil surface and core

AEROBIC BACTERIA	TONSIL SURFACE (NO.)	TONSIL SURFACE (%)	TONSIL CORE	TONSIL CORE (%)	P VALUE
Staphylococcus aureus	22	40.7%	19	33.3%	0.693
Streptococcus pyogenes	10	18.5%	12	21.1%	0.739
Streptococcus pneumoniae	4	7.4%	8	14.0%	0.413
Klebsiella pneumoniae	5	9.3%	6	10.5%	0.824
Klebsiella oxytoca	1	1.9%	0	0%	0.486
Neisseria catarrhalis	0	0%	1	1.8%	0.486
Escherichia coli	1	1.9%	1	1.8%	1
Pseudomonas aeruginosa	4	7.4%	4	7.0%	0.774
Citrobacter freundii	2	3.7%	3	5.3%	0.949
Acinetobacter sp.	1	1.9%	1	1.8%	1
Enterococcus sp.	4	7.4%	2	3.5%	0.327
TOTAL	54	100%	57	100%	

Table II: Comparison of Anaerobic Bacteria in Tonsil surface and core.

ANAEROBIC BACTERIA	TONSIL SURFACE	TONSIL SURFACE	TONSIL	TONSIL	P VALUE
Porphyromonas sp.	12	41.4%	10	33.3%	0.522
Bacteroides fragilis	5	17.2%	8	26.7%	0.382
Prevotella intermedia	3	10.3%	5	16.7%	0.742
Prevotella melaninogenica	2	6.9%	6	20.0%	0.276
Prevotella loescheii	3	10.3%	0	0.0%	0.112
Fusobacterium sp.	1	3.4%	1	3.3%	1.00
Peptostreptococcus sp.	1	3.4%	0	0.0%	0.491
Bilophila sp.	1	3.4%	0	0.0%	0.491
Actinomycetes concomitans	1	3.4%	0	0.0%	0.491
TOTAL	29	100%	30	100%	

significant difference between the anaerobic bacteria found in tonsil surface and core. (Table II).

Discussion

Tonsillitis is a common problem that affects children between the ages of 5-10 years, and is often treated inadequately or inappropriately with antibiotics. This often results in persistent infection with resistant aerobic and/or anaerobic bacteria leading to recurrent attacks of infection and eventually chronic tonsillitis. This condition also affects adults and rarely, the elderly. The resultant chronic inflammation and/or enlargement of the tonsils cause considerable morbidity requiring therapeutic surgical intervention.

Our study showed that adolescents were more affected (44%) and there were more females than males (sex ratio of 1:1.12). Similar age incidence was observed in many of the previous studies.[3,4,5,6,7,8] However the gender incidence was more in men in many of the previous studies.

Majority of the patients who sought surgical intervention had grade 3 tonsillar hypertrophy (66%).[9] In 37% of patients, adenoids were present along with enlarged tonsils, which was comparable to the study by Hadi and co-authors.[10] Majority of patients (73%) with chronic tonsillitis manifested with bilateral jugulodigastric lymphadenopathy. Chronic tonsillitis was the major indication for surgery in 63% of patients followed by chronic adenotonsillitis in 36%. Chronic adenotonsillitis with bilateral chronic otitis media was seen in only 1%. The study group of Hadi and co-authors had more number of cases with adenotonsillitis than tonsillitis alone.[10]

In the present study, bacterial growth on the surface and core of tonsils was nearly equal (62% and 63% respectively). An equal incidence of surface and core isolates was seen in three studies;[4,11,12] whereas in three other studies, core isolates were nearly double that of surface isolates.[13,14,15] The lack of any growth in tonsillar surface and core in the rest of the patients could be explained by a possible role of viruses in precipitating chronic tonsillitis, which has not been investigated in our study. It could also be attributed to the fewer number of attacks of tonsillitis in those patients. Staphylococcus aureus was the commonest isolate from both surface and core of tonsils. Streptococcus pyogenes was the next common isolate from the core. The aerobic isolates of the present study are comparable to findings of some of the previous studies.[4,12,16]

Anaerobic isolates in the surface and core cultures in the present study were almost equal (47% and 48% respectively). Another study revealed anaerobic growth in 20% surface isolates and 62.5% core isolates. In 61.1%, anaerobes were isolated in both surface and core cultures. Same isolates were seen in 59.1% in cultures from surface and core.[17] Porphyromonas sp. was the commonest anaerobic isolate from surface and core in the present study. These findings differ from those of Mitchelmore et al, which showed Fusobacterirum sp. as the commonest organism from the surface and Peptostreptococcus micros from the core.[18] Bacteroides melaninogenicus was the most common anaerobe isolated from tonsil cores in a study by Reilly and co-authors.[19] Taylan et al concluded that Peptostreptococcus sp. was the commonest organism in tonsil core (37%).[16] In our study, Peptostreptococcus sp. was isolated from surface only.

Same isolates in both surface and core cultures were more common among aerobic group (78%) than among the anaerobic group of bacteria (45%). Patients with aerobic growth in tonsil surface as well as core (37) outnumbered patients with anaerobic growth in surface as well as core (29). Polymicrobial aerobic flora was more frequently encountered (15% on surface, 16% in core) when compared with polymicrobial anaerobic flora (3% in surface and 0% in core). Aerobic and anaerobic isolates together were slightly more in the tonsil core (90%) and 48% respectively) when compared to the same in tonsil surface (87% and 47% respectively).

Further studies are recommended to analyze the possible role of viral etiology and host factors like malnutrition, socio-economic status and poor oral hygiene in the causation of chronic tonsillitis. Also, in view of the fact that tonsillitis is a common condition existing in widespread geographical areas, studies with a greater sample size and over larger geographical regions are recommended.

Conclusion

Throat swab adequately represents the core pathogen, and is dependable in detecting the bacteriology of chronic tonsillitis. Staphylococcus aureus and Porphyromonas sp. were the most common aerobic and anaerobic pathogens respectively, among both children and adults.

References

1. Collee JG, Fraser AG, Marmion BP, Simmons A. Mackie & McCartney Practical Medical Microbiology. 14th ed. Churchill Livingstone; New York; 1996
2. Sutter VL, Citron DM, Edelstein M, Finegold SM. Wadsworth Anaerobic Bacteriology Manual. 4th ed. Star Publishing Company; California; 1985.
3. Agrawal A, Kumar D, Goyal A, Gupta R, Bhooshan S. Bacteriological evaluation and their antibiotic sensitivity pattern in tonsillitis. IOSR J Dental Med Sc. 2014; 13(3):51-5
4. Bista M, Sinha BK, Amatya RCM, Tuladhar NR, Pokharel BM. Comparison of core and surface cultures in recurrent tonsillitis. J Institute Med. 2005; 27:60-5
5. Kumar A, Gupta V, Chandra K, Gupta P, Varshney S. Clinico bacteriological evaluation of surface and core microflora in chronic tonsillitis. Ind J Otolaryngol Head Neck Surg. 2005; 57(2):118-20
6. Mallya PS, Abraham B. Clinico Microbiological Evaluation of Surface and Core Microflora in Chronic Tonsillitis. Ind J Otolaryngol Head Neck Surg. 1998; 50(3)281-3
7. Gul M, Okur E, Ciragil P, Yildirim E, Aral M, Kilic MA. The comparison of tonsillar surface and core cultures in recurrent tonsillitis.Am J Otol. 2007; 28(3):173-6
8. Jayasimha VL, Vinodkumar CS, Raghukumar KG, Basavarajappa KG. Surface Tonsillar bacteria versus deep tonsillar bacteria in tonsillitis. J Pub Health Med Res. 2013;1(2):92-4
9. Brodsky L. Modern assessment of tonsils and adenoids. PedClin North Am. 1989 ; 36(6):1551-69
10. Hadi U, El-Hajj M, Uwaydah M, Fuleihan N, Matar GM. Characteristics of Pathogens Recovered from the Tonsils and Adenoids in a Group of Lebanese Children Undergoing Tonsillectomy and Adenoidectomy.J Applied Research. 2005; 5(3):473-80
11. Shishegar M, Ashraf MJ. Post-tonsillectomy Bacteremia and Comparison of Tonsillar Surface and Deep Culture. Adv in Prev Med. 2014;1-5
12. Babaiwa UF, Onyeagwara NC, Akerele JO. Bacterial tonsillar microbiota and antibiogram in recurrent tonsillitis. Biomedical Research 2013; 24:298-302.
13. Pereira LMP, Juman S, Bekele I, Seepersadsingh N, Adesiyun AA. Selected bacterial recovery in Trinidadian children with chronic tonsillar disease. Rev Bras Otorrinolaringol. 2008; 74(6):903-11
14. Al-Roosan M, Al-Khtoum N, Al-Said H. Correlation between surface swab culture and tonsillar core culture in patients with recurrent tonsillitis. Khartoum Medi J. 2008;1(3):129-32
15. Yousef RY, Faza'a SA, Yousef RY. Comparison of The Bacteriology of Tonsil Surface and Core in Bacterial Profile Isolated from Children with Chronic Tonsillitis. Med J Babylon. 2014; 7(1):52-7
16. Taylan I, Ozcan I, Mumcuoglu I, Baran I, Ozcan KM, Akdogan O, Selcuk A, Balaban N, Dere H. Comparison of the surface and core bacteria in tonsillar and adenoid tissue with beta-lactamase production. Ind J Otolaryngol Head Neck Surg. 2011;63(3):223-8
17. Klug TE, Henriksen JJ, Fuursted K, Ovesen T. Similar recovery rates of Fusobacteriumnecrophorum from recurrently infected and non-infected tonsils. Dan Med Bull. 2011; 58(7):1-5
18. Mitchelmore IJ, Reilly PG, Hay AJ, Tabaqchali S. Tonsil surface and core cultures in recurrent tonsillitis: Prevalence of anaerobes and beta-lactamase producing organisms. Eur J Clin Microbiol Infect Dis. 1994;13(7):542-8
19. Reilly S, Timmis P, Beeden AG, Willis AT. Possible role of the anaerobe in tonsillitis. J Clin Pathol. 1981;34:542-7.

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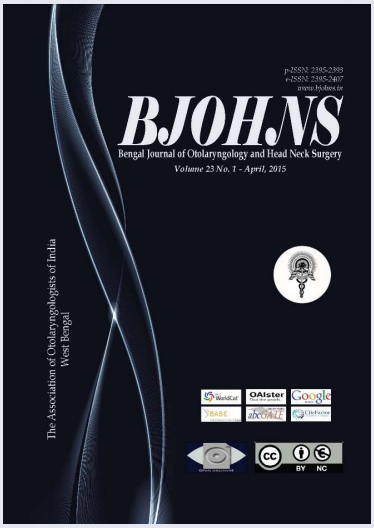

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Maxillofacial Prosthesis: A Review of Treatment Concepts for Better Prosthesis Prognosis

Sanjay Prasad[1]

ABSTRACT

Maxillofacial prosthesis currently finds itself experiencing more change than at any other time over past 50 years of its recognized existence. Rehabilitation of facial defect, either congenital or acquired, is a difficult challenge for the surgeon as well as prosthodontist. The prosthodontist is limited by the properties of the materials available for facial restorations, the mobility of soft tissue surrounding the defects, the difficulty of establishing retention for large prosthesis, and the patient ability to accept the outcome. However, the acceptance of prosthesis recently has improved remarkably due to better coordination between surgeon and prosthodontist and introduction of dental implant which has dramatically improved the retention and esthetic that result from accurate and repeatable positioning of the implant, and the ease of maintenance. Dramatic improvement in the acceptance of prosthesis is seen if the prosthodontist participation can begin early in the course of patient care which ultimately will increase the quality of life (QoL) of the patient.

Keywords

Maxillofacial Prosthesis; Surgeon; Prosthodontics; Dental Implants; Quality of Life

Maxillofacial prosthetics is a subspecialty of prosthodontics that involves rehabilitation of patients with defects or disabilities that were present when born or developed due to disease or trauma. Maxillofacial prosthodontics are accustomed to working co-operatively with ENTs, Oral Surgeons, Neurologists, Radiation Oncologists, Speech Pathologists, Anaplastologists, and various ancillary personnel. The overall goal of all maxillofacial prosthetic treatment is to improve the quality of life. Some common examples of prosthetic treatment are:

A) EXTRA ORAL PROSTHESIS

(i) Ocular Prosthesis (Replaces Eyes)

(ii) Orbital Prosthesis (Replaces Eyes & Surrounding tissues)

(iii) Auricular Prosthesis (Replaces Ear)

(iv) Nasal prosthesis (Replaces Nose)

(v) Mid facial prosthesis (replaces part of the face)

(vi) Somatic prosthesis (replaces a body part like fingers, hands, etc.)

(vii) Radiation shield

B) INTRA ORAL

(i) Immediate or surgical obturator[1]: Supports the surgical packing in resection cavity (Figs.1a, 1b)

(ii) Interim obturator[2]: Restores teeth and gums and has an extension which causes the defect to close.

(iii) Definitive obturator: Delivered after complete healing and remodeling to tissue.

(iv) Palatal lift prosthesis: Helps soft palate assume correct position for speech.

(v) Palatal augmentation (drop) prosthesis: Alter palate prosthetically for speech.

(vi) Mandibular Resection Prosthesis

(vii) Fluoride carrier: Helps to strengthen, protect and preserve compromised teeth.

Among all the above prosthesis discussed, the maxillary

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defect prosthesis is most frequently constructed and it presents an unlimited variety of possible configuration. Surgical defects were most frequent type of maxillary defect seen accounting for 89.5% of the case while congenital and traumatic defects accounted for 5.3% each.[3] Malignant tumors were main indication for surgery (76.5%) of which squamous cell carcinoma constituted 84.6% and adenocystic carcinoma (15.4%).

Fig.1.a: Surgical obturator placed on cast with holes for fixation.

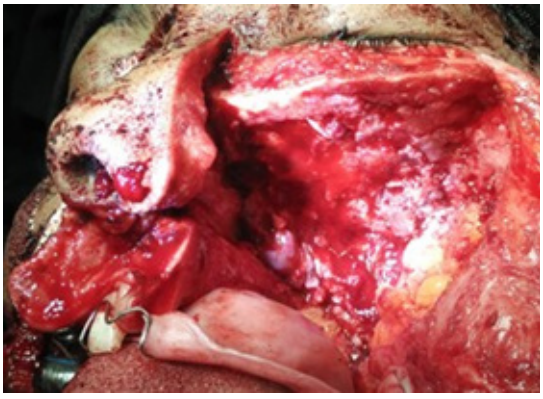

Fig.1.b: Surgical obturator placed in mouth after resection.

If properly planned the rehabilitation of maxillary defect is so effective that reconstructive surgery is not needed. However in total palatectomy defect surgical reconstruction followed by placement of dental implant and dental implant retained prosthesis is required.

Prosthodontist face many challenges and the main objectives[4] are:

1. To restore the function: Speech, respiration, chewing, and deglutition.
2. To restore the form: Facial appearance.
3. Separation between oral and nasal cavities to restore normal function of speech, respiration, and deglutition.
4. To provide support to the soft tissue to restore the mid-facial contour and an acceptable aesthetic results.
5. To provide support for the orbital contents to prevent ophthalmic complications such as enophthalmos and diplopia.

The challenges faced by the prosthodontist can be better managed if pre-surgical planning and coordination with concerned surgeon is executed properly keeping in mind the final restoration of defect. Some alterations at surgery to enhance the prosthetic prognosis are as follows:[5]

1.(i) Skin grafting the defect- In radical maxillectomy defects skin grafting the inside of the check flap creates a divergent lateral wall which when engaged by the obturator prosthesis, facilities retention, stability and support. The non-skin lined surface epithelializes spontaneously and is lined with poorly keratinized epithelium[6] which is not suitable to engage the obturator and withstand the abrasion trauma associated with obturator use. (Fig. 2)

Fig.2: Non skin lined defect showing poorly keratinized epithelium not suitable for prosthesis engagement.

(ii) The scar band at the skin graft mucosal junction creates an undercut superior to this junction. Engagement of the undercut with obturator prosthesis facilitates

retention on the defect side.

(iii) Skin lined defects provide keratinized surface in the defect that can be engaged more aggressively with the prosthesis thereby improving stability, retention and support for the obturator prosthesis.

2. Large defects should not be closed surgically and access to the defect should be maintained to be restored by obturator fabrication.

3. While resecting maxilla effort should be made to preserve the premaxilla. Retaining premaxilla on the defect side allows for more favorable obturator design which helps in improved retention, stability and patient compliance. (Fig.3)

Fig.3: Effort should be to preserve the premaxilla region.

Fig.4: Sufficient amount of bone present around the abutment tooth.

4. Abutment teeth adjacent to the defect are subjected to the greatest stress and bony cuts through the alveolus to these teeth should be interproximal rather than intraseptal to preserve sufficient amount of bone around the tooth.[7] (Fig.4)

5. Soft palate resection- Middle third of the soft palate is responsible for palate elevation (levator veli palatini) during velopharyngeal closure. In partial edentulous patients when the middle third is resected for tumour control the remaining posterior third should also be resected. This will ensure appropriate access to the residual velopharyngeal musculature.

6. Placement of dental implants can have a dramatic effect on the function of the maxillofacial prosthesis.[8, 9] Masticatory performance may be restored to presurgical levels in some patients[10] and with improved retention of the obturator prosthesis, speech and swallowing should be more efficient.

The forms of maxillofacial prosthesis are divided broadly into 4 categories[11]:

(i) the maxillofacial prosthesis of solid obturator

(ii) maxillofacial prosthesis with open type obturator

(iii) Maxillofacial prosthesis with open type obturator with removable lid

(iv) Maxillofacial with hollow obturator.(Figs.5a,5b) (Table:I)

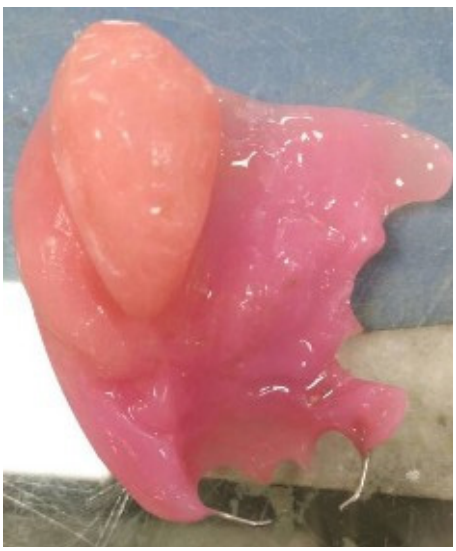

Fig.5.a: Hollow bulb obturator

Table I: A comparative evaluation of each form of obturator

FORM OF OBTURATOR	FEATURE OF FORM	ADVANTAGES	DISADVANTAGES
Solid obturator	The entire obturator is fabricated of resin used mainly for small defects	Easy Fabrication	Weight is greater
Hollow obturator	The inside is hollowed out to lightening the weight of the obturator. Conventional method	Lighter in weight than solid obturator	Water and conta-minants may invade the inside time consuming
Open type obturator	The upper section of the obturator is open	Light weight, Easier to insert.Cleaning is simple	Water and food debris may accu-mulate in the obturator
Open type obturator with removable lid.	The top of the open type obturator has a detachable lid	Periodic cleaning keeps the interior clean	Increase in weight

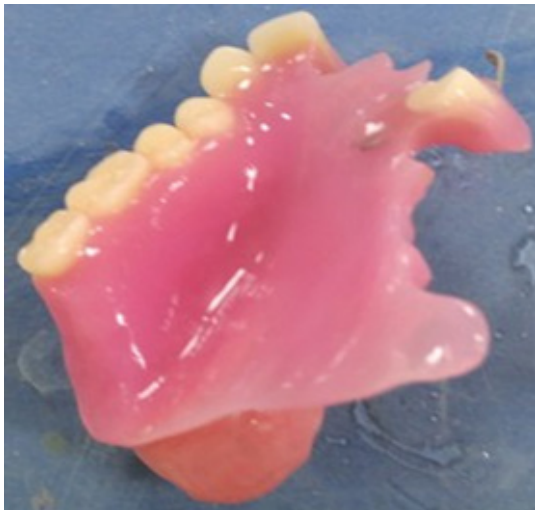

Fig.5.b: Hollow bulb obturator

Conclusion

Rehabilitation of patients with disabilities of the head and neck secondary to acquired and congenital defects is a difficult task, requiring close interaction among a number of heath science disciplines. Post surgical defects predispose the patient to hypernasal speech, leakage of food bolus and liquids into nasal cavity, impaired mastication and in some case various degrees of cosmetic deformity. Prosthetic techniques can provide excellent rehabilitation for patients with oral-facial defects.

With the advent of computer aided design and manufacturing technologies, new surgical and prosthodontic techniques are evolving, when properly executed in a multidisciplinary environment, these methods provide patients with implant supported prosthesis that very effectively and predictably restore form and function. It can bring smile to the despondent patients shooting out their psychological problems aside and bringing them back for daily routine work in the society.

References

1. Lang BR, Bruce RA. Pre surgical maxillectomy prosthesis. J Prosthet Dent. 1967;17:613-9
2. Jacob R, Martin J, King G. Modification of surgical obturator in interim prosthesis. J. Prosthet Dent. 1989; 62: 619-21
3. Omo J, Sede M, Enabulele J. Prosthetic Rehabilitation of Patients with Maxillary Defects in a Nigerian Tertiary Hospital. Annals of Medical and Health Sciences Research 2014; 4(4):630-3. doi:10.4103/2141-9248.139352
4. Chalian VA, Drane JB, Standish SM. Maxillofacial prosthetics. Multidisciplinary practice. United states. The William & Wilkins Company, 1972 p 133-48

5. Beumer J, Nishimura R, Roumanas E. Maxillary defects: Alteration at surgery which enhance the prosthetic prognosis In: Zlotolow I, Esposito S, Beumer J (eds). Proceeding of the First international congress and Maxillofacial Prosthetics New York: Memorial Sloan Kettering Cancer Center. 1995: 22-26
6. Buemer III John, Marunick Mark T, Esposito Salvatore J. Maxillofacial rehabilitation.ed3.Quintessence Publishing Co Inc.U.S.2011. p 161-2
7. Lyons KM, Beumer J, Caputo A. Abutment load transfer by removable partial denture obturator framework in different acquired maxillary defects. J. Prosthet Dent. 2005: 94: 281-8
8. Roumanas E, Nishimura R, Davis B, Beumer J III. Clinical evaluation of implants retaining maxillary obturator prosthesis. J Prothet Dent. 1997; 77: 184-90
9. Nilmi A, Ueda M, Kaneda T. Maxillary obturator supported by osseointegrated implants placed in irradiated bone: Report of cases. J Oral Maxillofac Surg. 1993; 51: 804-9
10. Garrett N. Outcome of maxillectomies with conventional and implant restorations. Presented at the international congress on Maxillofacial Rehabilitation, Bangkok, Thailand 24-27 Sept 2008
11. Kan-ichi Seto, Matsuura M, Shimazato K, Goto M, Namura T. Atlas of oral and Maxillofacial Rehabilitation, Quintessence Publication Co. Ltd. 2003 p. 29-30.

Simultaneous Bilateral Type I Tympanoplasty as a Day Care Procedure

Abhishek Vijay Sahu,[1] Dhrubajyoti Datta,[1] Jeumon Talukdar,[1] Narendranath Dutta[1]

ABSTRACT

Introduction:

Bilateral same day type I tympanoplasty scores over unilateral type I tympanoplasty in terms of convenience and conservation of resources but, it is rarely performed because of theoretical risk of postoperative sensorineural deafness.

Materials and Methods

A total of 60 patients with central perforation of tympanic membrane of both ears were included in this study. Thirty patients had undergone unilateral type I tympanoplasty and an equal number of patients were treated with bilateral type I tympanoplasty in the same sitting. The results were compared to evaluate the advantages and efficacy of single sitting bilateral type I tympanoplasty with unilateral type I tympanoplasty.

Result

Perforation closure was successful in 94.6% and 93.3% ears while hearing improvement in 82.1% and 86.6% in group I (bilateral tympanoplasty) and group II (unilateral tympanoplasty) respectively. Mean hearing gain for successfully operated ears in group I (both left and right) and group II is 18.1 dB and 16.5 dB. None of the patients developed iatrogenic sensorineural hearing loss.

Discussion

Bilateral perforations of the TM is a common finding and CSOM is found to be the most common cause in more than 90% of patients. The outcome of bilateral single stage tympanoplasty is sparse in the literature. Most of the reports pertain to unilateral operations with average success rates of about 60–100 %.

Conclusion

Single sitting bilateral type I tympanoplasty by transcanal routes is safe day care procedure with a high success rate.

Keywords:

Tympanoplasty; Perichondrium; Otitis Media.

Bilateral same day type I tympanoplasty is not routinely performed by otosurgeons because of the theoretical risk of iatrogenic sensorineural hearing loss (HL) in one ear, which, in cases of conventional two-stage procedures, would change the indication for operation or the nature of the procedure to be performed on the second ear. The risk of iatrogenic HL in ear surgery has been reported to be 1.2–4.5%.[1,2,3] It is however, crucial to note that these incidents with HL occurred in patients with cholesteatoma, congenital malformations or in cases in which ossiculoplasty was performed. Another disagreement against a bilateral procedure includes the use of ear canal pack with various materials.

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Materials and Methods:

A total of 60 patients with central perforation of tympanic membrane of both ears were included in this study. Thirty patients had undergone unilateral type I tympanoplasty and an equal number of patients were treated with bilateral type I tympanoplasty in the same sitting. The aims and objectives of the study are to compare the results and to evaluate the advantages and efficacy of single sitting bilateral type I tympanoplasty with unilateral type

I tympanoplasty. This is a prospective study.

A total of 60 patients with bilateral small to medium central tympanic membrane (TM) perforations, attending the ENT OPD from June 2012 to March 2016 were included in the study. They were divided into two groups by allotting them with alternate numbers, such that group I had 30 patients (60 ears) with even numbers for single sitting bilateral type I tympanoplasty and group II had 30 patients with odd numbers for unilateral type I tympanoplasty. All patients were subjected to full history taking, general and local examination, including otoscopic ear examination to ensure the diagnosis and if required diagnostic nasal endoscopy to rule out sinonasal disease which may cause eustachian tube dysfunction.

Patients with bilateral small to medium central perforation, with mild to moderate conductive HL (25–40 dB) and having wide external auditory canal with no anterior overhang, where anterior margin of perforation was visualised, were included in the study. The patients had healthy middle ear mucosa without any ossicular or mastoid pathology. Nasal airway and pharyngeal opening of the Eustachian tube were assessed by diagnostic nasal endoscopy. The ears were dry for more than one month.

Patients with actively discharging ear or dry perforation for less than 1 month were excluded from the study. Large, subtotal, total, attic or marginal perforation and central perforation with ill-defined margins or margins adhesive to promontory were also not included. Patients requiring revision ear surgery or the ears with suspected ossicular pathology with air bone gap of more than 40 dB were not considered for this study, as also the patients having sensorineural or mixed hearing loss.

Pure tone audiogram to measure the threshold level of hearing and routine haematological investigations was done for each patient. Patients were counselled regarding the pros and con of single sitting bilateral type I tympanoplasty techniques and were admitted in the morning on the day of surgery.

Cases were operated both under local and general anaesthesia depending upon the age and preference of the patient. Anaesthesia preferred was local and premedication for these cases was given half an hour before the operation.

Patients were positioned in a supine position with their head turned to one side. The side with a larger perforation was operated first so as to exclude concomitant pathology like granulation tissue, cholesteatoma or ossicular chain defect. Operative ear was cleaned and draped. Local infiltration was given with 2% pre-prepared lignocaine and adrenaline at the site of harvesting the tragal perichondrium, postaurally, incisura terminalis and in the four quadrants of the external auditory canal (EAC). All patients intraoperatively received single dose of 3rd generation cephalosporin injection 1.5 gram intravenous which was continued postoperatively in oral form for a week.

For harvesting the graft, an incision was made just behind and along the free margin of the tragus for cosmesis and the tragal cartilage along with the perichondrium was harvested. Adequate perichondrium was removed from the cartilage such that its diameter was larger than of the size of perforation. The tragal cartilage was then placed back in the tragal area and incision closed with 3.0 catgut.

Transcanal approach was used for all the procedures. Under microscopic vision, the margins of the perforations were freshened and undermined to promote good capillary blood. Tympanosclerotic patch, if present, was removed. Posterior tympanomeatal incision was taken around 4 to 6 mm lateral to the annulus from 6 to 12 O'clock position. In cases where the anterior margins of perforation were lying anterior to the handle of malleus, the superior limb of the tympanomeatal incision was extended anteriorly and the handle of malleus was skeletonized.

The posterior tympanomeatal flap along with the annulus was elevated and middle ear was explored. After placing gelfoam in the middle ear, the tragal perichondrium graft was placed using underlay technique in all cases and under the handle of malleus whenever skeletonised. The tympanomeatal flap was then repositioned and secured with gelfoam on the lateral surface in the EAC. After the operation of one ear, EAC packs were inserted and box ear dressing was done (Fig. 1). The head was then turned over to the other side, exposing the second ear for surgery and a similar

Fig.1: Anterior and lateral view of box dressing

procedure was carried out.

Patient were discharged on the same day after observation for 4 hours for cases which were done under local anaesthesia and 6 hours for cases which were done under general anaesthesia. They were instructed not to blow their nose for 1 month after surgery, to prevent water entry into their ear, to avoid catching cold and swimming. They were also instructed to avoid excessive activity or heavy lifting for 10–15 days. They were routinely kept on oral antibiotic for 1 week and antihistaminic for 3 weeks.

Box dressing and ear pack was removed at 10 days, after which antibiotic ear drops were prescribed for 2 weeks. Then, the patients were followed up on 3rd, 6th and 12th week. On each visit, patients were evaluated for level of discomfort, success for graft uptake, sensorineural HL and complication if any. Repeat audiogram to check the hearing improvement was carried out at 12th week.

Successful closure of the perforation was defined as an intact eardrum at 12th week postoperatively. Success in terms of hearing gain was defined as an improvement in air conduction thresholds by 10 dB or more in comparison with the preoperative audiogram.

Results:

The age of the patients ranged from 12 to 60 years (mean age 38 years). In group I, 28 patients fulfilled the inclusion criteria and were included in the study and 2 patients did not return for follow up at 12 week and hence was excluded from the study. Of the 56 ears operated upon, perforation closure was successful in 53 ears (94.64%), whereas the remaining 3 ears (5.35%) had a residual small perforation (Table I).

Table I: Effect of type I tympanoplasty on perforation closure

TOTAL EARS	GROUP I (N=28)	GROUP II (N=30)
Successful closure	53 (94.64%)	28 (93.33%)
Graft failure	3 (5.35%)	2 (6.66%)

46 ears (82.1%) gained hearing, whereas in the remaining 10 ears (17.8%) no hearing was gained, including 3 ears with residual perforations. In group II, successful perforation closure was seen in 28 ears (93.33%) and hearing gain in 26 ears (86.66%) (Table II). Worsening of hearing did not occur in any operated ear in this study.

Pre and post-operative hearing threshold and mean hearing gain for successfully operated ears in group I

Table II: Effect of type I tympanoplasty on hearing gain

TOTAL EARS	GROUP I (N=28)	GROUP II (N=30)
Hearing gain	46 (82.1%)	26 (86.66%)
No hearing gain	10 (17.8%)	4 (13.33%)

and group II is listed in Table III. Mean hearing gain for successfully operated ears in group I (both left and right) and group II is 18.1 dB and 16.5 dB. To compare hearing gain in the two group independent sample t-test was applied (Table IV). There was no statistically significant difference in hearing gain in the two groups. (p =0.231) but the gain in hearing in the two groups were comparable.

In group I the air bone gap was less than 10 dB in 46 and less than 20 dB in 51 operated ears where as in group II it was less than 10 dB in 19 and less than 20 dB in 26 operated ears (Table V).

In terms of success rate, it is interesting to note that all patients in group I had TM perforation closure and hearing gain at least in one ear. 25 of 28 patients (89.28 %) achieved bilateral graft uptake and 23 of 28 patients (82.14 %) had bilateral hearing improvement.

It was very encouraging that 27 patients in group I (96.42%) were not annoyed by the bilateral ear canal gauze packing and box dressing and only 1 patient (3.57%) was intolerant to the bilateral dressing in the

Table III: Pre and postoperative hearing threshold

HEARING	GROUP I (N=28)	GROUP II (N=30)
Mean preoperative hearing threshold	32.07 dB	30dB
Mean postoperative	13.96 dB	13.5dB
Mean hearing gain	18.1 dB	16.5dB

early postoperative period, as immediate postoperative hearing was compromised. During postoperative follow up no retraction pocket, no lateralization or medial displacement of the graft was observed in both the groups. Operative blood loss was minimal and postoperative pain was tolerable in all patients.

Discussion:

Perforation of TM is quite common among patients seen at the Otorhinolaryngology clinic. Bilateral perforations of the TM is a common finding as it represents about 39.4% of perforated TM, and CSOM was found to be the most common cause of TM perforation in more than 90% of patients.[4]

It has been found that the effect of enhanced ratio of the surface area of the TM and that of the oval window increases the sound pressure by about 27 dB, whereas

Table IV: Statistical analysis using independent sample t- test

		LEVENE'S TEST FOR EQUALITY OF VARIANCES		T-TEST FOR EQUALITY OF MEANS		
		F	Sig.	t	df	Sig. (2-tailed)
G	Equal variances	1.332	0.253	1.21	56	0.228
	Assumed			8		
H	Equal variances			1.21	53.5	0.231
	Assumed			2	63	

Table V: Air bone gap closure

ABG CLOSURE	GROUP I (N=28)	GROUP II (N=30)
ABG Less than 10 dB	46 (82.14%)	19 (63.33%)
ABG less than 20 dB	51 (91.07%)	26 (86.66%)

the lever action of ossicles contributes only about 3 dB.[5] TM perforation reduces the surface area of the membrane available for sound pressure transmission and allows sound to pass directly into the middle ear.[6] The objectives of tympanoplasty are obtaining an intact TM and a dry middle ear and audiometric improvement.[7]

In this study in group I on simultaneous bilateral type I tympanoplasty, the graft take rate at 12 week postoperatively is 94.64 %, which is within the average reported success rate of previous studies on bilateral ear surgeries as shown in the Table IV. The study has an additional advantage that all cases were done by transcanal approach using tragal perichondrium as the graft material thereby minimizing variations in the results. The failure rate of TM perforation repair in this

Table VI: Comparison of results of various studies on bilateral tympanoplasty

SR. NO.	STUDY	PROCEDURE	MATERIAL	APPROACH	NO OF EARS	SUCCESS RATE %	HEARING GAIN
1	Mitchell et al.[8]	Myringoplasty	Fat graft	Transcanal without tympano-meatal flap	56	91	-
2	Katsura et al.[9]	Myringoplasty	-	-	17	91	ABG <10 dB in 29% ABG <20 dB in 88%
3	Caye - Thomasen[10]	Myringoplasty	Temporalis fascia (56%), tragalperi-chondrium (38%), cartilage	Transcanal 83 %	52	94	ABG <10 dB in 92% ABG <20 dB in 100%
4	Hydr et al.[11]	-	-	-	100	84	Average ABG <15 dB
5	Homoe et al.[12]	-	-	-	34	65	Average gain 18 dB in right, 13dB in left
6	Mane et al.[13]	Type I tympanoplasty	20 fascia lata, 8 temoralis fascia	Endomeatal 17, endaural 6, postaural 5	28	96	ABG <10 dB in 92% ABG <20 dB in 100%

7	**Raghu-wanshi[14]**	**Type I tympanoplasty**	**59 temporalis fascia ,5tragal perichondrium**	**Postaural 27, endaural 22, endomeatal 15**	**64**	**93.7**	**ABG <10 dB in 70%** **ABG <20 dB in 91.6%**
8	**Rai[15]**	**Type I tympanoplasty**	**Temporalis fascia**	**Postaural**	**60**	**93**	**ABG < 20 dB in 94%**
9	**Sharma[16]**	**Myringoplasty**	**Temporalis fascia**	**Mini endaural and permeatal**	**50**	**90**	**-**
10	**Present study**	**Type I tympanoplasty**	**Tragalperi-chondrium**	**Transcanal**	**56**	**94.64**	**ABG <10dB in 66.07%** **ABG <20 dB in 83.92%**

study is 5.35%. There was no difference in the outcome among male and female patients.

The outcome of bilateral single stage tympanoplasty is sparse in the literature. Most of the reports pertain to unilateral operations with average success rates of about 60–100 %.[17,18] The take rate of 96% is in agreement with international standards of unilateral tympanoplasty type I.[19] Glasscock at el. had a graft take up rate of 93% in a sample of 1556 patient using autogenous and homograft temporalis fascia by underlay technique.[20] In the present study the graft uptake rate of 93.33% in the group II is also similar to the above studies.

In considering bilateral surgery for TM perforations, only dry ears with no suspicion of additional pathology should be included because granulation tissue or a need to perform ossiculoplasty will increase the risk fora iatrogenic sensorineural HL during the operation.1

In the study, the air bone gap for bilateral single sitting type I tympanoplasty was less than 10 dB in 46 operated ears (82.14%) and less than 20 dB in 51 operated ears (91.07%) which is also within the average reported success rate of the previous studies in the table V. No worsening of bone conduction threshold was detected in any ear in our study, which is concordant with the findings of Caye-Thomasenet al.[10] and Karkanevatos et al.[21]

Conclusion

Single sitting bilateral (type I) tympanoplasty by transcanal routes is safe day care procedure with a high success rate. It can be performed in most patients without apprehension of sensorineural HL with good results comparable to unilateral type I tympanoplasty. It reduces the cost of treatment, allows single hospital admission, decreases the frequency of exposure to anaesthesia and leaves the patient satisfied. It avoids the need for a second surgery thereby reducing the number of days of absence from school and work, and also reduces the burden on the healthcare system. The hearing impairment during postoperative period with ear canal pack is minimal and radially acceptable by the patients.

References:

1. Palva T, Karja J, Palva A. High-tone sensorineural losses following chronic ear surgery. Arch Otolaryngology 1973; 98:176-8
2. Smyth GD. Sensorineural hearing loss in chronic ear surgery. Annals of Otorhinolaryngology 1977; 86:1-6
3. Tos M, Lau T, Plate S. Sensorineural hearing loss following chronic ear surgery. Annals of Otorhinolaryngology 1984; 93:403-9
4. Olowookere SA, Ibekwe TS, Adeosun AA. Pattern of tympanic membrane perforation in Ibadan: a prospective study. Annals of Ibadan Postgraduate Medicine 2008; 6:843-53
5. Voss SE, Rosowski JJ, Merchant SN, Peake WT. Non-ossicular signal transmission in human middle ears: experimental assessment of the 'acousticroute' with perforated tympanic membranes. Journal Acoust Soc Am. 2007; 122:2135-53
6. Maharjan M, Kafle P, Bista M, Shrestha S, Toran KC. Observation of hearing loss in patients with chronic suppurative otitis media tubotympanic type. Kathmandu University Medical Journal 2009; 7:397-401
7. Kumar N, Madkikar NN, Kishve S, Chilke D, Shinde KJ. Using middle ear risk index and ET function as parameters for predicting the outcome of tympanoplasty. Indian Journal Otolaryngology Head Neck Surgery 2012; 64:13-6
8. Mitchell RB, Pereira KD, Younis RT, Lazar RH. Bilateral fat graft myringoplasty in children. Ear Nose Throat Journal 1996; 75:652-6
9. Katsura H, Sakagami M, Tsuji K et al. Reevaluation of bilateral same-day surgery for bilateral perforated chronic otitis media. Otology and Neurotology 2005 26:842-5
10. Caye-Thomasen P, Nielsen TR, Tos M. Bilateral myringoplasty in chronic otitis media. Laryngoscope 2007; 117:903-6
11. Hydr AS, Ashfaq M. Single stage bilateral myringoplasty. Pakistan Journal of Otolaryngology 2007; 23:66-7
12. Homoe P, Sorensen HC, Tos M. Mobile, one stage, bilateral ear surgery for chronic otitis media patients in remote areas. Journal of Laryngology and Otology 2009; 123:1108-13
13. Mane R, Patil B, Mohite A, Varute VV. Bilateral type 1 tympanoplasty in chronic otitis media. Indian Journal of Otolaryngology HeadNeck Surgery 2013; 65(4):293-7
14. Raghuwanshi SK, Asati DP. Outcome of single-sitting bilateral type I tympanoplasty in Indian patient. Indian Journal of Otolaryngology Head Neck Surgery2013; 65(Suppl. 3):S622-6
15. Rai AK, Singh GB, Sahu R, Singh S, Arora R. Evaluation of simultaneously bilateral same day tympanoplasty type I in chronic suppurative otitis media. Auris Nasus Larynx. 2014 Apr; 41(2):148-52
16. Sharma RC, Saroch M. Our experience with single sitting bilateral myringoplasty. Indian Journal of Otology 2013; 19(2): 59-61
17. Fukuchi I, Cerchiari DP, Garcia E, Rezende CE, Rapoport PB. Tympanoplasty: surgical results and a comparison of thefactors that may interfere in their success. Brazilian Journal of Otorhinolaryngology 2006; 72:267-71
18. Singh GB, Sidhu TS, Sharma A, Singh N. Tympanoplasty type I in children—an evaluative study. International Journal Pediatric Otorhinolaryngology 2005; 69:1071-6
19. Tos M. Manual of middle ear surgery, Thieme, New York 1993; Vol 1
20. Glasscock ME III, Jackson CG, Nissen AJ, Schwaber MK. Postauricular undersurface tympanic membrane grafting: A follow-up report. Laryngoscope 1982; 92(7 Pt 1): 718-27
21. Karkanevatos A, De S, Srinivasan VR, Roland NJ, Lesser THJ. Day-case myringoplasty: five years' experience. Journal of Laryngology and Otology 2003; 117:763-5.

Fractured Tracheostomy Tube- An Unusual Foreign Body in Tracheobronchial Tree

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ABSTRACT

Introduction

Approximately 20% of patients with tracheostomy are discharged from hospital with the tracheostomy tube in situ. Proper long term care and management of such tracheostomy patients remains as a challenge to care givers. Fracture of metallic tracheostomy tube (TT) with aspiration of the fragment into tracheobronchial airway is a rare complication of tracheostomy.

Case Report

Here we are presenting a case of a 42-year-old male patient, presented to the emergency department with complaint of mild respiratory distress following aspiration of fractured metallic TT and a novel method in removing the dislodged fragment.

Discussion

A detailed review of literature has been included to discuss different aspects of aspiration of fractured fragment of tracheostomy tube and best practice recommendations for proper tracheostomy care.

Conclusion

Educating the care-giver about care of the tracheostomized patient in general and care of the tracheostomy tube in particular, may help reduce accidental complications.

Keywords

Tracheostomy; Foreign bodies

Tracheostomy is a common procedure usually performed as part of modern airway management in many specialties like surgical, medical and critical care units. Globally the number of tracheostomies being performed is increasing[1] due to many reasons like cancer of larynx, nasopharynx, severe head injury, spinal cord injury, vocal cord paralysis motor neuron disease etc. Approximately 20% of tracheostomy patients are discharged from hospital with the tracheostomy tube insitu.[2,3] These patients with permanent tracheostomies need proper long term care and management. Inappropriate care can result in unexpected adverse outcomes.

Fracture of metallic tracheostomy tube (TT) with aspiration of the fragment into tracheobronchial airway is a rare complication of tracheostomy. In extreme cases, this can fail the whole purpose of tracheostomy by compromising the airway, which necessitates urgent medical attention. Hence there is a need to understand this particular complication, for prevention, early recognition and prompt management.

Here we present a case of a 42 year old patient, who attended the emergency department with the complaint of mild respiratory distress following aspiration of fractured metallic TT and showcase a novel method for the extraction of the same. We also include a review of literature and best practice recommendations for proper tracheostomy care.

Case Report

A 42-year-old male patient presented to emergency department with complaint of mild respiratory distress

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following aspiration of a broken tracheostomy tube. This happened while his wife was attempting the removal of tube for routine cleaning. She noticed that the tube part was missing and only neck plate (shield) was in place. The patient has undergone tracheostomy 3 years back due to bilateral abductor palsy following total thyroidectomy for papillary carcinoma thyroid in another institute. For last 2 years, he never had follow up with the hospital where he was initially treated and continued to use the metallic tube for two years.

At time of presentation in emergency room (ER) the patient was hemodynamically stable with mild tachypnea (respiratory rate was 22/minute). His oxygen saturation was 97% on air. Neck examination revealed a patent stoma. On auscultation air entry was reduced on left side of chest. Rhonchi was present. A chest X-ray (postero-anterior view) revealed fractured TT in left main bronchus.(Fig. 1) He was given oxygen inhalation, nebulization and steroids in the ER and then shifted to operating room (OR).

Fig. 1. Chest Xray showing fractured and aspirated tracheostomy tube in left main bronchus

In the OR, intravenous sedation was given. Patient was pre-oxygenated through the stoma. Under apnea-oxygenation-apnea technique a 0° 4mm Storz® nasal endoscope connected to camera and monitor was passed through the stoma with minimal difficulty. The broken fragment was visualized in lower trachea and left main bronchus. The fragment was gently dislodged with bronchoscope forceps and then withdrawn slowly along with the endoscope. The patient was oxygenated again to maintain the saturation. The scope passed again to visualize the tracheal lumen. The tracheal mucosa was appearing to be congested and edematous. After removal of the broken fragment, a new PVC tube (8 mm) was inserted and secured into the tracheostomy site. Inspection of the fractured piece showed severe corrosion at junction between tube and neck plate.

The patient was observed for 12 hours in the intensive care unit (ICU) and was then shifted to ward. The post-operative period was uneventful. He was discharged on next day with instructions for regular follow up and was educated regarding tracheostomy care.

Discussion

The first case of aspiration of fractured tracheostomy tube was reported by Bassoe and Boe in 1960.[4] Since then, similar cases are reported in literature from time to time. The largest case series was reported by Gupta et al in 1987, over a period of 8 years consisting 9 patients .[5]

Fracture and aspiration of TT have been reported in all age groups, with various tube materials including silver, stainless steel, polyvinyl chloride (PVC) and silicone. Piromachai et al, in their review of 20 cases from 18 published reports described fracture TT in 15 males (75%) and four females (20%). Fourteen cases were fracture of metallic tube, while three cases were PVC tubes.[6] In their review, the most common sites of lodgment were the trachea and right main bronchus.

In most of the cases, the fracture site was the junction between tube and neck plate. Fracture at distal end and fenestra are also reported.[6] The possible reasons for fracture is thought to be progressive weakening due to repeated boiling and sterilizing,[5,7] especially with use of bleaching powder.[8] Jensen et al proposed mechanical

stress due to repeated use is likely to be greatest at tube-flange junction area.[9] Okafor reported that stenosis of the tracheal stoma can increase the risk of fracture.[10] Other reasons postulated are due to aging of the tube, manufacturing defects or due to poor quality of the TT. Alkaline bronchial secretions accumulating around the TT can also corrode the tube.[11]

So-ngern and Boonsarngsuk in their series reported that tracheostomy tube fracture can happen any time between 5 days to 22 years after the placement.[12] Karakoc et al reported that, patients with a fractured tracheostomy tube can present within a duration of 1 day – 132 days, with a median interval of three months.[13] The presentation is most often with mild respiratory distress.[9] Other symptoms are cough, hemoptysis, wheezing, recurrent pneumonia, difficulty in suction or re-insertion of inner tube. Death also is reported, especially in pediatric population probably due to the small airway caliber.[8,14] The most common dislodged site of fractured TT is right main bronchus. This is because right main bronchus is consistently steeper and slightly wider.[15] There are other case reports involving left main bronchus, carina, left posterior basal segment also.[6] In our case, the fractured segment was located in distal end of trachea and left main bronchus.

The diagnosis can be made from history, clinical examination and with a plain x-ray of chest (postero-anterior view). Once diagnosed, primary care should be given to the patient. Foreign body aspiration is a medical emergency and prompt action is needed.[16] Rigid bronchoscopy under controlled environment like operation theatre is the recommended option for removal of large foreign bodies in literatures. Some authors have reported need for thoracotomy and bronchotomy also.[17] In this case we followed a novel method for removal of the fractured segment, by using a rigid 0° nasal endoscope under apnea-oxygenation technique.

Majority of case reports on aspiration of fractured TT is from developing countries. This may be because of continuous use of the same tube for prolonged periods due to economic constraints associated with replacing tubes or use of inferior quality tubes, loss in follow up, poor tracheostomy care etc.[18] Proper tracheostomy care is the most important step in prevention of this complication. There exists no consensus for proper tracheostomy care. From our experience and previous results, we are put forwarding following recommendations.

1. Planned discharge and ongoing support is essential for tracheostomy patients.[2]
2. Proper training and guidelines are needed for community practitioners, general practitioners, nurses and paramedics on discharge and care of patients with tracheostomy, especially in remote areas.
3. The tube should be checked for any manufacturing defects or signs of wear and tear before inserting.[17]
4. Regular follow up and twice yearly replacement of tracheostomy tube.[19,20]
5. Regular checking of tube for wears and tears.
6. Clean the inner cannula daily, every other day or more frequently as needed.[19,20]
7. Daily changing of dressings at tracheostomy site.[20]
8. Weekly replacement of tube ties.[20]
9. Proper education of patient and caregiver about tracheostomy care is most important.
10. In case of an aspiration, early identification and intervention with rigid bronchoscopic removal under controlled environment is recommended.[18]

Conclusion

Fracture and aspiration of tracheostomy tube is a rare complication which requires prompt diagnosis and immediate intervention. Patient and care giver education of tracheostomy tube maintenance, regular follow up, timely replacement of tracheostomy tube etc. are important for preventing such complications.

References

1. Parker V, Shylan G, Archer W, McMullen P, Smith K, Giles M, Morrison J, Austin N. Trends and challenges in the management of tracheostomy in older people: the need for a multidisciplinary team approach. Contemporary nurse 2007; 26(2):177-83
2. Everitt E. Care of patients with permanent tracheostomy. Nursing times 2016; 112(21-23):20
3. Lewis CW, Carron JD, Perkins JA, Sie KC, Feudtner C. Tracheotomy in pediatric patients: a national perspective. Arch Otolaryngol Head Neck Surg. 2003; 129(5):523-9
4. Bassoe HH, Boe J. Broken tracheotomy tube as a foreign body. The Lancet; 275(7132):1006-7
5. Gupta SC. Fractured tracheostomy tubes in the tracheobronchial tree: A report of nine cases. J Laryngol Otol. 1987; 101(08):861-

7

6. Piromchai P, Lertchanaruengrit P, Vatanasapt P, Ratanaanekchai T, Thanaviratananich S. Fractured metallic tracheostomy tube in a child: a case report and review of the literature. J Med Case Rep. 2010; 4(1):234
7. Sood RK. Fractured tracheostomy tube. J Laryngol Otol. 1973; 87: 1033-4
8. Brockhurst PJ, Feltoe CK. Corrosion and fracture of a silver tracheostomy tube. J Laryngol Otol. 1991; 105(01):48-9
9. Jensen OV, Pedersen U. Fractures in polyvinyl chloride tracheostomy tubes. J Laryngol Otol. 1988;102(04):380-1
10. Okafor BC. Fracture of tracheostomy tubes. Pathogenesis and prevention. J Laryngol Otol. 1983; 97(08):771-4
11. Krishnamurthy A, Vijayalakshmi R. Broken tracheostomy tube: A fractured mandate. J Emerg Trauma Shock. 2012; 5(1):97
12. So-ngern A, Boonsarngsuk V. Fractured metallic tracheostomy tube: A rare complication of tracheostomy. Respir Med Case Rep. 2016 ; 19:46-8
13. Karakoc F, Cakir E, Ersu R, Uyan ZS, Colak B, Karadag B, Kiyan G, Dagli T, Dagli E: Late diagnosis of foreign body aspiration in children with chronic respiratory symptoms. Int J Pediatr Otorhinolaryngol. 2007; 71: 241-246. 10.1016/j.ijporl.2006.10.006
14. Lynrah ZA, Goyal S, Goyal A, Lyngdoh NM, Shunyu NB, Baruah B, Dass R, Yunus M, Bhattacharyya P. Fractured tracheostomy tube as foreign body bronchus: our experience with three cases. Int J Pediatr Otorhinolaryngol. 2012; 76(11):1691-5
15. Tahir N, Ramsden WH, Stringer MD. Tracheobronchial anatomy and the distribution of inhaled foreign bodies in children. Eur J Pediatr. 2009; 168(3):289-95
16. Alqudehy ZA, Alnufaily YK. Fractured tracheostomy tube in the tracheobronchial tree of a child: Case report and literature review. J Otolaryngol Head Neck Surg. 2010; 39:E70–3
17. Ranjan K, Phookan J, Devi HR, Das MP. Broken Synthetic Tracheostomy Tube Presenting As Tracheobronchial Foreign Body-A Case Report. IOSR Journal of Dental and Medical Sciences (IOSR-JDMS);1(15):13-4
18. Loh TL, Chin R, Flynn P, Jayachandra S. Fracture and aspiration of a tracheostomy tube. BMJ Case Rep. 2014 Feb 19; 2014:bcr2013203232
19. Srirompotong S, Kraitrakul S: Fractured inner tracheostomy tube: an unusual tracheobronchial foreign body. Srinagarind Med J. 2001; 16: 223-5
20. Krempl GA, Otto RA: Fracture at fenestration of synthetic tracheostomy tube resulting in a tracheobronchial airway foreign body. South Med J. 1999; 92: 526-8.

A Rare Presentation of Cavernous Hemangioma of Both Inferior Turbinates

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ABSTRACT

Introduction

The nasal cavity presents with various types of neoplasms, including epithelial and mesenchymal tumors. Cavernous hemangioma of nasal cavity is quite rare. It usually presents as a unilateral mass arising from mucosa of nasal cavity.

Case Report

We describe here, a case of 25-year-old serving soldier, who was referred to our hospital with a mass in both nasal cavities with bilateral nasal obstruction. On examination, the mass originated from the inferior aspect of inferior turbinate of both sides. Subsequently on histological examination after complete endoscopic excision revealed that the mass was a cavernous hemangioma arising from both inferior turbinates.

Discussion

To our knowledge, this is the first case of cavernous hemangioma arising from both inferior turbinate reported in literature.

Keywords

Hemangioma, Cavernous; Nose Neoplasms

Hemangioma is a benign neoplasm that originates in the vascular tissue of skin, mucosa, bone, muscles and glands.[1] However it is usually located on the skin or oral mucosa, but its occurrence in the nasal cavity and paranasal sinuses is rare. Hemangioma comprises of about 20% of all benign neoplasms of the nasal cavity. Hemangioma of the nasal cavity occurs most commonly on the septum (65%), lateral wall (18%), and vestibule (16%).[2] Hemangioma are classified histologically according to the predominant type of vascular channel as capillary, cavernous, or mixed. This disease usually presents as unilateral epistaxis with nasal obstruction. To our knowledge, cavernous hemangioma involving both of inferior turbinates has not been reported in literature. Here we report a case of cavernous hemangioma arising from both of the inferior turbinates, successfully treated by trans-nasal endoscopic excision technique.

Case report

A 25 year old serving soldier referred to Dept of Otolaryngology with complaints of progressive nasal obstruction both side of six months duration and associated with mouth breathing. There was no history of epistaxis or facial trauma. Anterior rhinoscopic examination revealed a pedunculated mass with thin stalk arising from inferior aspect of both inferior turbinates. Endoscopic examination revealed a smooth polypoid, greyish mass arising from inferior aspect of inferior turbinates bilaterally compromising airway of both nostrils (Fig. 1).

The mass appears to be distinctly separate and hanging from inferior aspect of both inferior turbinates with pedicle. The mass was extending posteriorly till posterior choanae on both sides. Non contrast CT scan showed a soft tissue density arising from inferior turbinates, extending till posterior choanae without bony erosion (Fig-2).

Past history revealed that the patient had undergone an operative procedure for nasal blockade in Apr 2007. Details of correct diagnosis and procedure were not known. After the previous operation, he was

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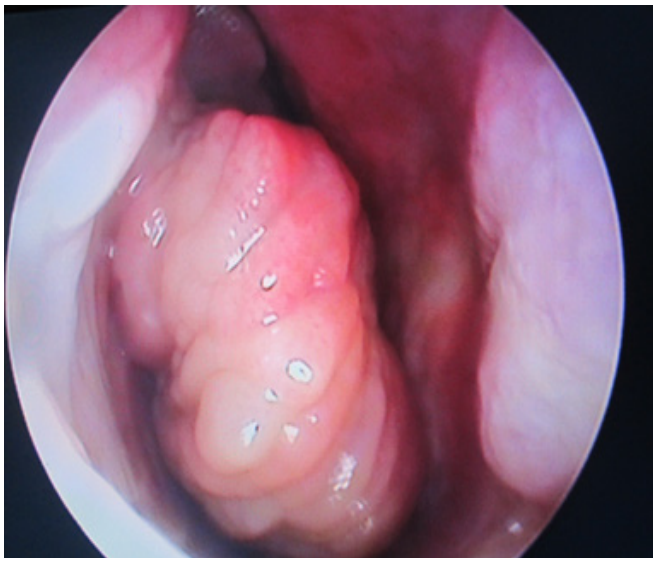

Fig. 1. Endoscopic examination: Smooth polypoid, greyish mass arising from inferior aspect of inferior turbinate

asymptomatic till six months back. Initial examination and the radiological assessment suggested that the lesion was a benign tumor. The patient underwent planned tumor excision via endonasal endoscopic approach. Complete wide resection of the tumor was achieved by transnasal endoscopic surgery and bleeding was controlled with coagulation suction and anterior nasal packing. During the immediate post operative period, patient had massive nasal bleeding. Patient was reintubated and nasal pack removed to access bleeding site, there was diffuse oozing and bleeding controlled with posterior and anterior nasal pressure packing. Blood transfusion was done for hypotension. Nasal pack removed after 48 hours and patient recovered well.

Macroscopically, the tumor was 3x5 cm in size with intact mucosa (Fig-3).

Microscopically, the tumor showed hemorrhagic polypoidal tissue with the presence of anastomosing blood vessels of variable sizes, lined with flattened endothelial cells. The histological diagnosis was cavernous hemangioma (Figs. 4 & 5).

The patient was followed up six monthly for three years and endoscopic examination showed no recurrence.

Discussion

Hemangioma is a benign tumor originating in the vascular tissue of mucosa, skin, muscles, glands, and bones. Head and neck is a common region for hemangioma. Hemangioma of the nasal cavity is extremely rare. The most common site for nasal hemangioma is nasal septum,

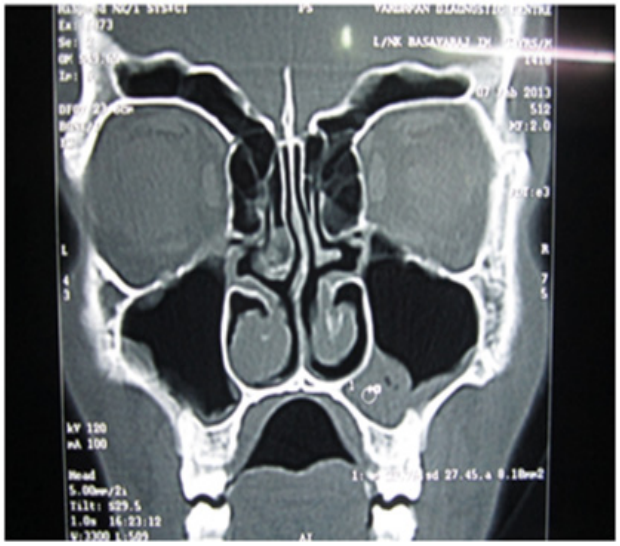

Fig. 2. NCCT showing a soft tissue density arising from inferior turbinates

Fig. 3. The Tumor specimen 3x5 cm in size with intact mucosa.

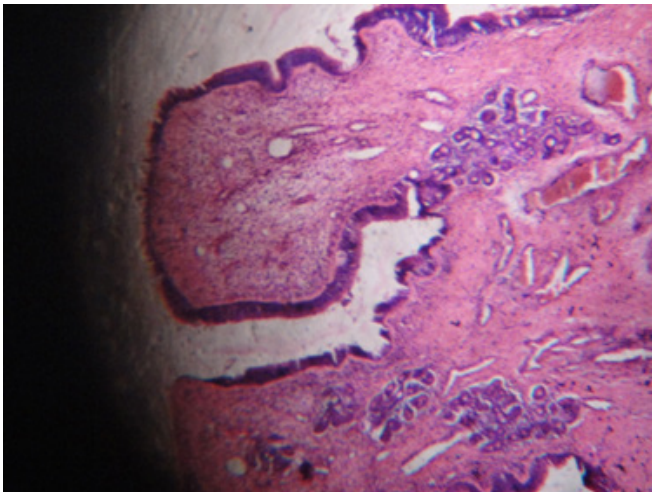

Fig. 4. Hematoxylin and eosin (H&E, 10X).

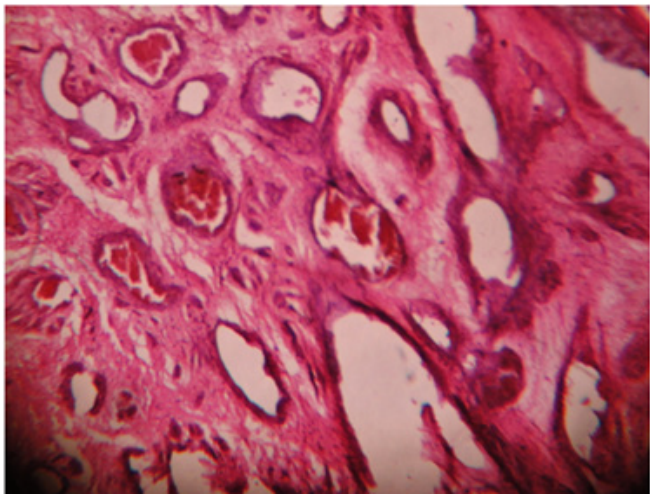

Fig. 5. Hematoxylin and eosin (H&E, 40X).

followed by the lateral wall and vestibule.[1] Many reports have shown a hemangioma arising in the turbinate and most of them arise from the mucosa.[2] Hemangioma is classified histologically as capillary, cavernous or mixed according to predominant vascular channels. The subtypes also vary in their clinical features. Capillary hemangiomas are more frequent than cavernous and usually present at a younger age and may involute spontaneously. In contrast, cavernous hemangiomas are very rare and typically seen in adults. They do not undergo spontaneous involution and are more likely to cause compression of surrounding structures. The lack of feeding vessels to capillary hemangiomas makes it easier to remove, as compared to the potential bleeding problem in existing cavernous hemangioma removal.[3]

Cavernous hemangiomas are comprised of large endothelium-lined vascular spaces. The thrombus within these vascular spaces of cavernous hemangiomas can occasionally calcify and can be identified as phlebolith on a CT Scan. Cavernous hemangiomas located in the nose or paranasal sinuses are uncommon. They are known to arise from the inferior turbinate, vomer, perpendicular plate of the ethmoid and maxillary sinus.[4] It is very essential to differentiate nasal mucosal hemangiomas and hemangiomas that arise from the nasal bones or maxilla, which are primary osseous lesions, the symptoms and surgical approach of which are completely different.

Mean age at presentation of cavernous hemangiomas of the nasal cavity is 40 years and with equal sex incidence. The lesion is a slowly growing, unilateral, hemorrhagic mass, frequently red or purple, which is sometimes coated with necrotic tissues. Painless growth is a characteristic symptom of nasal hemangiomas. When symptomatic, this tumor produces recurrent epistaxis or haemoptysis and nasal obstruction.[5] In our case, patient presented with only nasal obstruction of both sides with no other complaints.

The differential diagnosis of hemangiomas of the nasal cavity includes inverted papilloma, olfactory neuroblastoma, lymphoma, haemangiopericytoma, haemangioendothelioma, arteriovenous fistula, lymphangioma, glomangioma, melanoma, adenocarcinoma, squamous cell carcinoma and metastatic malignancies such as renal cell carcinoma.

The pre-operative biopsy of the tumor in order to obtain a histo-pathological diagnosis is risky and must be performed with great care to avoid severe bleeding. Imaging investigations should be performed prior to any attempt of biopsy. The definitive diagnosis is made by histopathological examination of surgical specimen.

CT imaging features of the cavernous hemangioma usually shows a soft tissue density of circumscribed mass, enhancing after injection of contrast. Contrast scanning usually determines exact anatomical location and extension of the tumor. The underlying bone is usually normal but remodeling of adjacent

surrendering structures may be seen with long-standing pressure from the expanding mass .The occurrence of phlebolith is considered to be more typical of cavernous hemangiomas. We performed non contrast CT scan because we never suspected mass to be cavernous hemangioma presenting bilaterally being extremely rare entity and not reported in literature.

MR images usually show the absence of clotted blood, which results in low signal intensity on T1-weighted images and very high signal intensity on T2-weighted images. Hypointense signals may represent foci of phlebolith. These lesions demonstrated little or no enhancement as they do not contain large vessels within, which is typical of other vascular malformations.[6]

If there is any suspicion concerning the nature of these vascular tumors, the risk of bleeding is high and angiography is always warranted, not only for diagnosis but also for pre-operative trans-arterial embolization. In the case we did not perform angiography because we never suspected that lesion was vascular. The diagnosis was a histopathological diagnosis post operatively.[7]

Many forms of treatment have been advocated to treat hemangiomas which includes surgical resection of the tumor, with a cuff of surrounding uninvolved tissue and ligation or cautery of the feeding surrounding vessels, being the most successful which we followed in our case. Other methods of treatment, including cryotherapy, sclerosing agent injections, corticosteroid treatment, and resection using YAG laser have been used with differing results. An alternative form of management is embolization of the hemangioma, however it may not reduce the mass completely and symptoms may persist due to mass effect.

The choice of the treatment modality is mainly surgery. The surgical approach depends on the exact location and extent of the tumor. Many surgical approaches have been suggested including the lateral rhinotomy, midfacial degloving, trans-palatal, trans-antral approach and the Le Fort I osteotomy procedure. The trans-nasal endoscopic approach has been proposed as the technique of choice in cases of intra-nasal haemangiomas of the nasal cavity and paranasal sinuses.[8]

In our patient, the minimally invasive trans-nasal endoscopic technique has proven to be reliable in terms of direct, fast with adequate exposure and visualization of the lesion. Because of controlled hypotensive anesthesia and cauterizing base of lesion, bleeding intraoperatively was minimal. However post operative massive bleeding required pressure anterior and posterior packing along with blood transfusion to control of bleeding. Tumor was completely removed and patient followed up six monthly for three years without recurrence. Main aim of this paper is to highlight the rare presentation of bilateral cavernous hemangioma at an unusual site with its management.

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References

1. Young K, Stearns G, Davidson TM. Hemangioma of the ethmoid sinus. Otolaryngol Head Neck Surg. 2000; 123:517-9
2. Genc S, Kurkcuoglu S et al. Giant lobular capillary haemangioma of the nasal septum. Turk J Med Sci. 2009; 39 (2):325-8
3. Batsakis JG, Rice DH. The pathology of head and neck tumors: Vasoformative tumors, part 9A. Head Neck Surg. 1981; 3:231-9
4. Webb CG, Porter G, Sissons GRJ. Cavernous hemangioma of the nasal bones: An alternative management option. J Laryngol Otol. 2000; 114:287-9
5. Iwata N, Hattori K, Tsujimura T. Hemangioma of the nasal cavity: A clinicopathological study. Auris Nasus Larynx 2002; 29:335-9
6. Dillon WP, Som PM, Rosenau W. Hemangioma of the nasal vault: MR and CT features. Radiology 1991; 180:761-5
7. Kim HJ, Kim JH, Kim JH, Hwang EG. Bone erosion caused by sinonasal cavernous hemangioma: CT findings in two patients. AJNR 1995; 16:1176-8
8. Iwata N, Hattori K, Tsujimura T. Hemangioma of the nasal cavity: A clinicopathological study. Auris Nasus Larynx 2002; 29:335-9.

Recurrent Parotitis due to Parotid Duct Calculi

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ABSTRACT

Introduction

Recurrent parotitis is frequently encountered in Otolaryngology practice. Parotid calculi, however is extremely uncommon as compared to submandibular calculi. Hence parotid duct calculi as a cause of recurrent parotitis need a special emphasis.

Case Report

We present here a rare case of recurrent parotitis due to parotid duct calculi in a 35 yr old female patient, who initially had presented to ENT OPD with recurrent pain and swelling for last eight months. Clinical examination was suggestive of calculi in the left parotid duct area which was confirmed by relevant radiological evaluation including USG, CT scan and parotid sialography. Patient was treated by superficial parotidectomy along with removal of the calculi from the parotid duct.

Discussion

Calculi arising from the submandibular duct and gland are well established and quite easy to diagnose, but parotid calculi are quite unheard of in clinical practice. According to Western literature, parotid calculi account for 15-20% of all salivary gland calculi. We present here the case along with the relevant review of the literature.

Keywords

Parotitis; Salivary Duct Calculi

Submandibular calculi are frequently encountered in clinical practice, but parotid calculi had rarely been heard of. The anatomical and physiological differences favour the pathogenesis of a submandibular calculus rather than a parotid calculus. Though the western literature provides an overall incidence of 15-20%,[1] no such data is available with respect to the Indian literature. We present here a very rare case of a 35 year old female patient who initially presented to us with three episodes of pain and swelling over her left cheek within a short duration of eight months. Clinical and radiological evaluation raised suspicion of recurrent parotitisdue to multiple parotid calculi which was treated by superficial parotidectomy. A detailed review of the literature including the various treatment options is mentioned herewith.

Case Report

A 35 year old female patient had presented to our ENT OPD with the chief complaint of three episodes of swelling and pain over her left cheek since last 8 months. Each episode used to last for few days only accompanied by high fever. During this period, the patient had been treated conservatively by the family practitioner.Patient remained symptom free for a few months and again there was recurrence of the swelling and pain over the same region. She also noticed spurt of saliva heralding the relief of symptoms. On meticulous history taking, she did not complain of any spontaneous expulsion of stone in her mouth.

General survey of the patient was unremarkable. Regional examination revealed a well defined swelling 5 cm in front of the tragus on the left side of her cheek. The swelling measured 1.25 cm x 2 cm in dimension, oval in shape with irregular surface, firm consistency and

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well defined margins. It was not tender on superficial palpation but slightly tender on deep palpation. The skin over the region was normal without any sinus or fistula or fixity to the underlying structures. Examination of the pre auricular region was normal without any palpable abnormality in the parotid region. No palpable lymph nodes could be appreciated in the neck. Rest of the clinical examination of all other salivary glands was within normal limits. Intra oral examination too did not reveal any significant abnormality in the region of the parotid duct opening. No stone was clinically palpable from within the mouth.

Routine hematological and biochemical parameters were within normal limits. Radiological evaluation by USG of the region was suggestive of multiple echogenic shadows in the left parotid region. CT scan too revealed multiple calculi involving the left parotid duct and the substance of the parotid gland (Fig. 1). Parotid duct

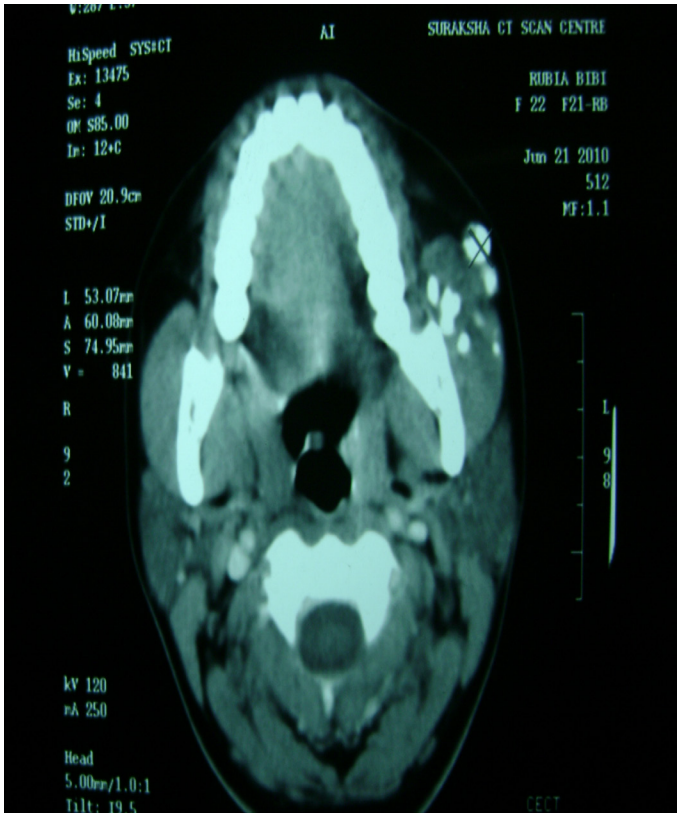


Fig. 1. CT scan showing multiple calculi in the parotid region, involving the parotid duct and the left parotid gland.

sialography was done which showed multiple irregular filling defects with dilated parotid duct proximal to the site of the obstruction. The radiological evaluations were all suggestive of multiple calculi in the left parotid duct and the left parotid gland without any involvement of other salivary glands.

We decided to perform a superficial parotidectomy of the left side along with removalof the calculi from the parotid duct under GA. After proper consent, antiseptic dressing and draping, the conventional lazy S incision was made for superficial parotidectomy and the incision was extended anteriorly 5 cm along the Langer's line from the level of tragus in order to facilitate the easy removal of the calculi from the parotid duct.Gentle dissection was then done to delineate the superficial lobe, the branches of facial nerve and the parotid duct area. The parotid duct was found to be fusiformly dilated in the mid 1/3rd region. Temporary ligatures were applied loosely at the proximal and distal end of the dilated duct area and incision was made over the duct. We could extract multiple firm calculi from within the parotid duct. The isolated parotid duct was thoroughly washed with normal saline to remove the sludge. Subsequently the temporary sutures were removed and the duct was sutured under microscope using 4-0 polyglactin taking care not to injure the opposite wall. Superficial lobe of the parotid gland was then removed taking utmost care not to injure the facial nerve (Fig. 2).The incision was then closed using 3-0 polyglactin (Vicryl®) and 3-0 monofilament silk.The above mentioned calculi were chalky white in color with hard but brittle consistency. (Fig. 3).There was no obvious change in the colour of the calculi on exposure to air.The post operative recovery was uneventful with no clinical features of facial nerve palsy or recurrence or any episodes of acute parotitis even after 30 months of follow up.

Discussion

Calculi arising from the submandibular duct and gland are well established and quite easy to diagnose, but parotid calculi are quite unheard of in clinical practice. According to Western literature, parotid calculi account for 15-20% of all salivary gland calculi,[1] though the same cannot be justified with respect to the Indian

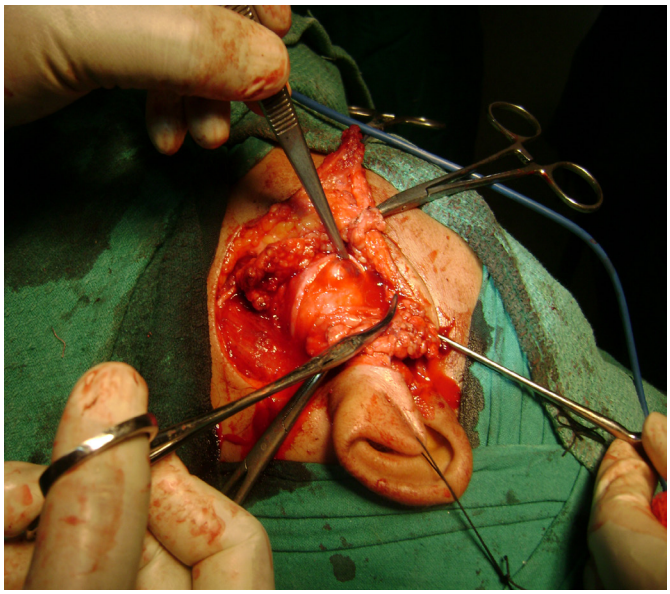


Fig. 2. Superficial parotidectomy being done with delineation of the branches of facial nerve.

Fig. 3. Specimen of the calculi removed from the duct.

population. They are more common in adults though slightly younger age group may predominate.[2]

The pathophysiology of submandibular duct calculi may not always be applicable in case of parotid duct calculi. The secretion from parotid duct is mainly serous and the gland drains along the gravity,which is in sharp contrast to the submandibular gland, which secretes mainly mucinous secretion against the gravity. This might explain the common occurrence of the submandibular duct calculi in contrast to the rarity of the parotid duct calculi.

Intermittent episodes of pre auricular pain and swelling raise the suspicion of recurrent parotitis. In our case, the patient had three episodes of acute parotitis which were relieved by medications.However the probability of calculi being the cause of recurrent parotitis was suspected only after meticulous clinical examination.

The important noteworthy characteristic feature of parotid duct calculi is the persistence of the pain and swelling for days in contrast to the submandibular duct calculi which persists for a few hours.This may be anatomically explained by the wider dimension of the submandibular duct which dislodges the stone rapidly and hence quicker relief of pain.[3] This also precisely explains the duration of attacks in our case which used to last for few days rather than hours.

Parotid duct calculi most often lodge in the masseteric portion of the parotid duct. A review of 1,200 cases of major salivary gland calculi was done in 1986 which was suggestive of less than 10% incidence of parotid calculi. The parenchymal incidence was even rarer to the ductal involvement in the ratio of 1:35.[4]

Various investigations have been mentioned in the literature to diagnose parotid calculi. Patey suggested regular use of intra oral films in all cases of chronic parotitis to exclude underlying calculi.[5]

Parotid sialography is another reliable way to diagnose calculous disease. Parotid sialogram if done, will not only demonstrate the calculi, but will also demonstrate the radiopaque microcalculi, in addition to the secondary dilatation and constriction of the duct system.[1]

With the advent of newer and better imaging techniques the use of ultrasonography for the diagnosis of parotid calculi was established in 1978.[6] It is non-invasive as well as will not carry the harmful effects of ionizing radiation. In present day scenario, USG is in fact the first line and the most convenient way to diagnose the disease. Further imaging by CT scan may be done to

have a better anatomical location of the calculi.

The differential diagnosis of recurrent unilateral pain and swelling of the parotid gland are viral parotitis, Sjogren syndrome, ascending infection after tooth extraction or due to poor oral hyeigene in terminal stages of head neck malignancies. In our case, the typical history, clinical examination, aided by the radiological confirmation helped in coming to the provisional diagnosis of recurrent parotitis due to parotid duct calculi.

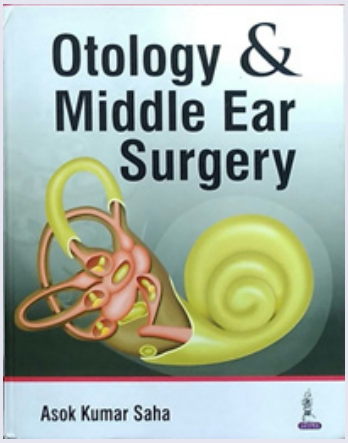
Though spontaneous expulsion of the stones are reported in the literature, but the ideal treatment of parotid calculi is surgical.[7] If the calculus is confined to the intra oral part of the parotid duct close to the duct orifice,stomaductoplastyis more viable.[7] In those cases where the calculi is located distal to the duct orifice, where intra oral approach is difficult, pre auricular incision may be made to shell out the stone.[8] If however there is involvement of the parotid gland in the form of parenchymal calculi or recurrent parotitis, superficial parotidectomy is the treatment of choice.

USG of the parotid region, in our case, was suggestive of multiple echogenic shadows in the left parotid region. CT scan too revealed multiple calculi involving the left parotid duct and the substance of the parotid gland, thus implying that the disease also had involved the superficial lobe. So we performed superficial parotidectomy. Total conservative Parotidectomy would not have been justified for such a benign innocuous lesion, as also recurrent inflammation of the deep lobe is extremely rare and is not mentioned in literature. Though there are some complications associated with superficial parotidectomy like facial nerve palsy, Frey's syndrome or gustatory sweating, but the excellent surgical outcomes outweigh its potential complications in competent hands.[7] Parotid calculi are rare in the pediatric age group.[9] If diagnosed, conservative measures like chewing and milking are well justified.[10]

Recent treatment of the parotid calculi needs a brief mention. With the technological advances, Ultrasound-guided piezoelectric extracorporeal shockwave lithotripsy (ESWL) has been used in Europe for the treatment of parotid calculi with good results.[11,12] The procedure was done in 42 patients and 5 out of the 10 patients, who had intraparenchymal disease, had no evidence of recurrence after treatment.[11] No document however exists regarding use of sialoendoscope for extraction of calculi from the parotid duct, but it may well be used in remote future.

References

1. Bullock K N. Parotid and submandibular duct calculi in three successive generations of one family. Postgrad Med J. 1982, 58:35-6
2. Elmostehy MR. Parotid salivary calculus. Report of a case. Oral Surgery Oral Medicine and Oral Pathology 1968; 26:18
3. Thomson J P S and Hobsley M. Parotid duct calculus. Proceedings of the Royal Society of Medicine 1973, 66:352-3
4. Seifert G, Miehlke A, Haubrich J, Chilia R. Diseases of the Salivary Glands: Pathology, Diagnosis, Treatment, Facial Nerve Surgery. Stuttgart: Georg Thieme Verlag, 1986:85-90
5. Patey, D.H.The clinical features and diagnosis of parotid calculi. Practitioner 1966: 197: 67
6. Pickrell K L ,Trought W S, Shearin J C. The use of ultrasound to localize calculi within the parotid gland. Annals of Plastic Surgery 1978; 1:542
7. Suleiman S I, Thomson J P S and Hobsley M. Recurrent unilateral swelling of the parotid gland. Gut 1979; 2:1102-8
8. Seward GR. Anatomic surgery for salivary calculi.part VI. Calculi in the intraglandular part of the parotid gland. Oral Surgery, Oral Medicine, oral pathology 1968; 26:1
9. Fesharaki R, Baloochy M, Sonbolastan M and Fotuhi A. Parotid gland calculus-Report of a case. Journal of laryngology and otology 1979;93:737
10. Eddey H.H. Recurrent parotitis and associated calculus, cyst or tumour. Medical Journal of Australia 1966; 2:581
11. Kulkens C, Quetz JU, Lippert BM, et al. Ultrasound-guided piezoelectric extracorporeal shock wave lithotripsy of parotid gland calculi. J Clin Ultrasound 2001; 29:389-94
12. Ottaviani F, Capaccio P, Rivolta R, et al. Salivary gland stones US evaluation in shock wave lithotripsy. Radiology 1997; 204:437-41.



Title: Otology & Middle Ear Surgery
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When an eminent teacher and otologist like Dr Asok Kumar Saha comes out with a book on Otology, the expectations would naturally be high. I must admit that the presentation and contents of the book have surpassed my expectations. It has been a pleasant experience to review the book.

The profusely illustrated book is ideal for the students of Otology to develop a clear conception of the anatomical complexities of the ear and to clear doubts on the critical steps of the surgical operations. The author has incorporated all the recent developments in audiological, vestibular and radiological investigations and yet has been able to restrict the volume of the book to 366 pages. The reader would also have clear ideas on recent advances like endoscopic surgeries and the vexing issue of biofilms.

This informative, concise and contemporary textbook of Otology & Middle Ear Surgery would be helpful for the postgraduates as well as practising otologists.

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