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INFORMATION FOR AUTHORS

The Bangladesh Journal of Otorhinolaryngology is published twice a year, in the month of April and October. The Journal is the official organ of the Society of Otolaryngologists and Head Neck Surgeons of Bangladesh. It publishes original papers, research topics, case reports and review articles of different fields related to Otolaryngology. Papers submitted solely to this Journal will be published after peer review.

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Transoral Laryngeal Microsurgery

Transoral Laryngeal Microsurgery (TLM) is a relatively new type of conservation surgery using specialized endoscopic instruments, microscopes and lasers. Pioneered in Boston, Massachusetts, it is the Strong and Jako, who introduced the carbon dioxide (CO₂) Laser to endolaryngeal surgery in the early 1970s by coupling the laser to an operating microscope. John Salassa of Mayo Clinic in the 1990s first coined the term TLM. His observation was to closely examine the host-disease interface by using an operating microscope, with the advantage of binocular vision and stereoscopic depth perception, combined with superb optics, making it truly a microsurgical technique.\(^1\)

Initially CO₂ Laser surgery was rejected by many surgeons because the earliest micro-manipulators could coagulate tissue making histological confirmation in a doubt to find out the negative margins with post-operative extensive scars compromising organ function. But with the advent of modern microspot manipulators, these obstacles were minimized to a great extent that produces a fine incision like sharp surgical scalpel.\(^1\)

The key to the success of this technique is patient selection, as inadequate endoscopic access to facilitate satisfactory oncologic resection is the main contraindication to TLM. The usual caveats of endoscopic exposure apply to the TLM technique: think of the fi-ve Ts, Tongue, Trismus, Teeth, Tumour and Tilt (neck extension). However, the microscope-mounted laser is limited to line-of-sight view. Therefore, appropriate tissue retraction and positioning of endoscope blades is essential for efficient and effective surgery.\(^2\)

The aim of TLM is to preserve as much normal tissue as possible, thereby maximizing the potential for functional recovery. Small super-ficial T\(_{\text{1a}}\) glottic tumours may be excised en bloc with the CO₂ laser. More complex glottis and supraglottic tumours (T\(_{\text{1b}}\), T\(_{\text{2}}\)-T\(_{\text{3}}\)) bene-fit from an initial cut through tumour to assess depth of invasion. Assessment of the tumour should take into account the functional consequences of resection. To prevent signi-ficant functional impairment at least one competent arytenoid complex should be preserved.\(^2\)

The use of TLM as a treatment for Oropharyngeal Carcinoma (OPC) was first reported by Steiner et al. Due to the line-of-sight constraints, complete exposure of the tumour is not the norm and tumour resection has to proceed in a super-ficial to deep direction, appreciating the 3D orientation of the base of tongue and vallecula. The management of large hypopharyngeal tumours using TLM is contraindicated in all but the most experienced hands. However, TLM removal of smaller tumours (T\(_{\text{1/2}}\)) is often surprisingly straightforward and results in highly favourable swallowing function outcomes. An absolute contraindication to TLM in the hypopharynx includes tumour invading through thyroid cartilage into the tissue of the neck and relative contraindications include large tumours, the
resection of which will also include the hemilarynx\(^2\).

Although there are many advantages of TLM over traditional open surgical approaches, such as a decreased need for tracheostomy and gastrostomy with improved post-operative speech and swallowing function, it is not without risk of significant intra-operative and postoperative complications. Routine laser safety precautions are observed to reduce the risk of inadvertent burns to the patient and operating theatre staff. The patient’s eyes and face must be covered with wet towels soaked in saline and all operating theatre personnel (with exception of the operating surgeon) must wear protective eye-glasses. It is common practice to display notices outside the operating theatre to warn staff the laser is being used\(^2\).

By TLM, it is possible to divide and remove tumor by piecemeal, allowing the surgeon to microscopically map tumor depth and assess margins in multiple planes. This method offers several advantages: (1) thoroughly mapping the tumor-host interface assuring margin clearance and minimum loss of healthy tissue; (2) Less surgical contractions; (3) The avoidance of extensive reconstruction eliminating the morbidity of donor site and resulting insensate laryngopharyngeal graft; (4) a general avoidance of tracheostomy; (5) early swallowing postoperatively as there is no suture lines to heal; (6) early return home with serviceable voice. (7) providing a significant cost benefit; and (8) maintenance of all options in terms of salvage treatments should recurrence occur. The major exception is that soft tissue replacement is not possible. Hence Procedures of sufficient amounts of soft tissue to compromise the sphincter function of larynx should not be done transorally with the CO\(_2\) Laser. TLM surgery is performed from the inside working outward as opposed to working from the outside in hence there is minimum damage to the supporting structures lying external to the tumors\(^3\).

Though the instrument is deceptively simple to use, the unusual surgical approach and the changed appearance of tissue following laser vaporization may confuse the operator until considerable expertise has been gained in the animal laboratory\(^4\). The facility for skill lab is utmost important for mastering in the field of transoral laryngeal surgery, how to use laryngoscope, endoscope & CO\(_2\) Laser, in future transoral robotic surgery.

There are versatile applications of TLM in treating head-neck lesions Including larynx, pharynx and oropharynx. Among the laryngopharyngeal lesions: recurrent respiratory laryngeal papillomatosis, laryngo-tracheal stenosis, bilateral recurrent laryngeal nerve palsy, benign neoplasm of larynx & hypopharynx (cysts, polyps, Reinke edema, vocal cord nodules, Hemangiommas, Pheochronucytomas), hypopharyngeal diverticula (Zeuker Diverticula), Laryngeal and hypopharyngeal carcinoma, even many congenital lesions of laryngopharynx are treated with this modern equipments successfully\(^1\). Although transoral laser micro surgery (TLM) is primary use for early stage laryngeal cancers, in recent some surgeons are performing endoscopic partial laryngectomy for the treatment of locally advanced gottic and supra glottic tumors with variable documented outcomes. Hinni & his colleagues showed in their patient that TLM offers acceptable rates of organ preservation and loco-regional control with low morbidity\(^5\). Transoral Robotic Surgery (TORS) represents a new, less intrusive surgical method. This type of surgery goes through a patient mouth eliminates scarring and quacking recovering time. TORS allows the area to function normally after surgery, also the healing time is shorter. During TORS the cancer is reached
by placing the needed tools down the throat with a high definition camera and specialized instruments. The tools used to remove the cancer are controlled by the doctor outside the body allowing the tools to move in the same way the doctor is moving. This allows them to operate in areas they could not otherwise reach. Potential benefits of transoral robotic surgery for patients: (i) less blood loss; (ii) lowers the amount of chemo-radiation or eliminates the need for it; (iii) no need for tracheostomy; (iv) shorter hospital stay; (v) quicker recovery normal speech and swallowing; and (vi) no visible scarring or disfigurement\(^6,7\).

The extensive continued development of minimally invasive surgically approaches through endoscopic & laser equipments offer and alternate to traditional open surgical method. Recently transoral robotic surgery (TORS) is integrated with transoral laser microsurgery (TLM), increasing the spectrum in the treatment of all head-neck lesions\(^8\). Developing surgical experience and expertise, understanding the equipments required to achieve optimal surgical access and the pertinent factors influencing the patient selection are the key practice of TLM. Surgeons need to familiarize themselves with the operating room setup and operative technique of TLM throughout their training to offer modern and integrated service.

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References
Comparison of Reinforcement Cartilage Graft and Temporalis Fascia Graft in Type 1 Tympanoplasty

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Abstract:

Background: Chronic otitis media (COM) is the long-standing infection of a part or whole of middle ear cleft characterized by ear discharge and perforation. It is the commonest ear problem in adult and children. Most common presenting symptoms are ear discharge, mild to severe hearing loss, sometimes tinnitus even vertigo. Treatment of COM is mainly operative. Inactive mucosal variety of COM presents with the perforation in tympanic membrane with non-inflamed middle ear mucosa. The treatment of inactive mucosal variety of COM is Type 1 tympanoplasty. It can be done by conventional temporalis fascia or cartilage graft. Both have some merits and demerits.

Objective: To compare the outcomes between reinforcement cartilage graft and temporalis fascia graft in type 1 tympanoplasty.

Methods: 86 (43 patients in each group) patients with COM (inactive mucosal) who were admitted in the department of Otolaryngology – Head and Neck Surgery, Bangabandhu Sheikh Mujib Medical University, Dhaka from January 2018 to June 2019, and had fulfilled the inclusion and exclusion criteria were selected for the study. History, examinations, investigations were done. All patients underwent type 1 tympanoplasty. Prior to surgery relevant investigations

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were done and informed written consent was taken from all patients. In Group-A reinforcement cartilage tympanoplasty cases and in Group-B temporalis fascia tympanoplasty cases were placed. Post-operative graft uptake rate and hearing gain were compared in two groups.

**Results:** The surgical outcomes between reinforcement cartilage tympanoplasty in comparison with temporalis fascia tympanoplasty showed no significant difference of graft uptake rate and hearing gain.

**Conclusion:** Cartilage tympanoplasty has been practised for reconstruction of perforated tympanic membrane in COM since long with variable results. Graft uptake rate in cartilage reinforcement is comparatively better than temporalis fascia graft. So, reinforcement cartilage graft can be adopted as an alternative to temporalis fascia graft in type-I tympanoplasty.

**Keywords:** Chronic otitis media, tympanoplasty, cartilage tympanoplasty, graft uptake, reinforcement, hearing gain.

**Introduction:**
Chronic otitis media is a chronic inflammatory disease of the middle ear and mastoid causing conductive hearing loss. The mainstay of therapy of COM is surgery. Tympanoplasty is the surgical choice with the main goals being eradication of disease, prevention of recurrent discharge, and preservation or improvement of hearing.1

Tympanoplasty was introduced by Wullstein2 in 1952 and Zollner3 in 1955. Since then numerous graft materials such as skin, fascia, vein, perichondrium and dura matter have been used to reconstruct the tympanic membrane (TM). Temporalis fascia and perichondrium remain the most employed materials for closure of TM perforation till date. In the last decade, it had shown a renewed interest an increasing use of cartilage graft as an alternative to more traditional grafting materials for TM reconstruction. Cartilage is like fascia in that it is mesenchymal tissue. Besides that, it has more rigid quality to resist resorption and retraction, even in the milieu of continuous eustachian tube dysfunction.4

Cartilage was first used as graft material for reconstruction of middle ear by Utech in 1959. Salen and Jansen in 1963 first reported the use of cartilage perichondrial composite graft for reconstruction of the TM. Heermann was the main advocate of cartilage tympanoplasty who extensively used cartilage since 1962 for middle ear and mastoid reconstruction, and popularized palisade cartilage tympanoplasty.5,6

Cartilage is pliable, can resist deformation due to its high elasticity and nourished by diffusion that may improve its graft uptake.7

Different graft materials have been used for repair of tympanic membrane perforation by different surgeons in their own choice with variable outcomes. To the best of our knowledge there is no protocol-based study conducted in our country regarding reinforcement cartilage tympanoplasty. This study had compared the graft uptake and hearing outcome of tympanoplasty by using reinforcement cartilage with temporalis fascia.

**Methods:**
This is an observational type of cross-sectional comparative study conducted in the Department Otolaryngology – Head & Neck surgery, Bangabandhu Sheikh Mujib Medical University, Dhaka from January 2018 to June 2019. After obtaining clearance and approval from Institutional Review Board, 86 (43 patients in each group) patients with COM (inactive mucosal), fulfilled the inclusion and exclusion criteria, were selected for the study. Inclusion criteria were a) Only inactive mucosal variety of COM cases b) Age-11 to
50 years of age and Exclusion criteria were: a) Sensorineural type of hearing loss, b) Patients with squamous disease/active mucosal disease c) COM with ossicular fixation or disconnection d) Patients were not fit for general anesthesia. All patients with a clinical diagnosis of inactive variety of mucosal COM underwent a detailed clinical examination including otoscopic and microscopic examination, and all findings were recorded. Audiological evaluation was done by pure tone audiogram.

All cases were operated under general anesthesia through post auricular approach. Tragal cartilage was used as graft material in case group (Group-A) and temporalis fascia in the control group (Group-B). Temporalis fascia graft was harvested by a standard postauricular incision in both groups. Transcanal incision was given. Margin of perforation was freshened. Tympanomeatal flap was elevated. For harvesting a tragal cartilage a horizontal incision was given at 2-3 mm below and behind the tip of tragus to maintain the cosmesis of tragus. The tragal cartilage was harvested by keeping the perichondrium attached to medial wall and perichondrium free lateral wall. Then the perichondrium was separated from the harvested cartilage. Then it was sliced and reshaped with the scalpel. A wedge-shaped piece of cartilage was excised from superior border to accommodate the malleus handle. In cartilage group, the cartilage was placed underneath the remnant tympanic membrane or fibrous annulus and over handle of malleus to accommodate within the notch. The previously harvested temporalis fascia was placed over the cartilage and medial to margin of perforation. In temporalis fascia group, the harvested temporalis fascia was placed in underlay technique (under the remnant tympanic membrane or fibrous annulus, and or under or over the handle of malleus). The patients were kept under regular follow up. Graft uptakes were evaluated by otoendoscopic examination. PTA and Impedance were done at the end of 3 months. Postoperative air conduction and bone conduction threshold and Air-Bone Gap (ABG) were calculated at 500, 1000, 2000 Hz.

Successful surgical result was considered when patient had intact new tympanic membrane without any perforation and postoperative hearing gain than preoperatively. Those patients who failed the criteria was considered as failure

Data collection technique:
Relevant data were collected in a predesigned data collection sheet for each of the patient with chronic otitis media.

Presentation of data: After compiling data were arranged and presented in simple ways.

Statistical Analysis: Data were processed and analyzed by using Microsoft Office Excel, 2007 software. Data were presented as mean± standard deviation (SD) or percentages. Finally, the result was evaluated by using proper statistical test of significance. To compare between intervention groups, a CHI-SQUARE (÷2) was used and data of each parameter before and after operation were compared using a paired t-test. A P value less than 0.05 was considered statistically significant.

Result:
Results was tabulated and analyzed as shown below

<table>
<thead>
<tr>
<th>Operated Ear involvement</th>
<th>Operated Ear Group A</th>
<th>Operated Ear Group B</th>
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<tr>
<td>Right</td>
<td>15(34.88%)</td>
<td>16(37.2%)</td>
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<tr>
<td>Left</td>
<td>28(65.12%)</td>
<td>27(62.79%)</td>
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### Table II:
Comparison of graft uptake between intervention groups

<table>
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<tr>
<th>Intervention</th>
<th>Graft Uptake</th>
<th>Total</th>
<th>$\chi^2$</th>
<th>p-value</th>
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<tr>
<td></td>
<td>Success</td>
<td>Failed</td>
<td></td>
<td></td>
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<tr>
<td>Group A (Reinforcement cartilage)</td>
<td>41</td>
<td>2</td>
<td>43</td>
<td>1.3996</td>
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<tr>
<td>Group B (Temporalis fascia)</td>
<td>38</td>
<td>5</td>
<td>43</td>
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<tr>
<td>Total</td>
<td>79</td>
<td>07</td>
<td>86</td>
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Chi-square ($\chi^2$) = 1.3996; $P$-value >0.05.

### Table III:
Comparison of graft uptake between intervention groups

<table>
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<th>Intervention</th>
<th>Audiological result</th>
<th>Total</th>
<th>$\chi^2$</th>
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<tbody>
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<td></td>
<td>Success</td>
<td>Failed</td>
<td></td>
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<tr>
<td>Group A (Reinforcement cartilage)</td>
<td>20</td>
<td>23</td>
<td>43</td>
<td>.211</td>
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<td>Group B (Temporalis fascia)</td>
<td>28</td>
<td>15</td>
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<td></td>
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<tr>
<td>Total</td>
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<td>38</td>
<td>86</td>
<td></td>
</tr>
</tbody>
</table>

Chi-square ($\chi^2$) = .2118; $P$-value >0.05.

### Table IV:
Comparison of graft uptake between intervention groups

<table>
<thead>
<tr>
<th></th>
<th>Group A (Reinforcement cartilage) (n=43)</th>
<th>Group B (Temporalis fascia) (n=43)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Audiological success</td>
<td>20 (46.51%)</td>
<td>28 (65.11%)</td>
</tr>
<tr>
<td>Audiological fail</td>
<td>15 (34.88%)</td>
<td>38 (44.18%)</td>
</tr>
<tr>
<td>Total</td>
<td>43</td>
<td>43</td>
</tr>
</tbody>
</table>

### Table V:
Complications between two intervention groups

<table>
<thead>
<tr>
<th>Complications</th>
<th>In Reinforcement cartilage group (Group-A)</th>
<th>In Temporalis fascia group (Group-B)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wound infection</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Sensory neural hearing loss</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Facial nerve palsy</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Tinnitus</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Myringitis</td>
<td>No</td>
<td>No</td>
</tr>
</tbody>
</table>
Discussion:
Various graft materials including temporalis fascia, perichondrium, skin, vein, cartilage etc. have been using to repair the tympanic membrane perforation for long time. There are variable results having merits and demerits of each graft material used in tympanoplasty. In this study tragal cartilage and temporalis fascia were used as graft materials. Total numbers of subjects in this study were 86 where 43 were selected in each group. Among them in group—A, 25 male, 18 female patients underwent type-1 tympanoplasty which was reinforced with tragal cartilage, while in group-B, 19 male, 24 female underwent temporalis fascia tympanoplasty in group-B.

The mean ± standard deviation (SD) age was 28.2± 8.65 years (range,11 to 50 years) in the reinforcement cartilage group and 30.39 ± 9.6 years (range, 11 to 50 years) in the temporalis fascia group; the difference in mean age was not statistically significant (p=0.2669). This finding was quite similar to Kulkarini et al. In reinforcement cartilage group (Group-A) right ear was operated in 15 (34.88%) cases and left ear was operated in 28(65.12%) cases and in temporalis fascia group (Group-B) right ear was operated in 16 (37.2%) cases and left ear was operated in 27 (62.79%) cases. (Table I). These findings coincided with the findings of Yung et al.

All patients were followed up for at least 03 months. Overall graft uptake rate was 91.8% (79/86). In reinforcement cartilage group graft uptake was achieved in 41(95.34 %) out of 43 patients and 88.34% (38/43) in the temporalis fascia group. The difference was statistically not significant. (p=0.2367). This finding correlated with the results of Ozdamar et al. The graft uptake results in cartilage group was near to similar in some other studies- Onal et al 92.3%, Pradeep et al 96.7% and Gun et al 96.7%. But there are variable results 65-84% in temporal fascia graft uptake rate in same study group.

New graft was rejected in 02 cases (4.6 %) in reinforcement cartilage group and 05 cases (11.62 %) in temporalis fascia group. This finding was not statistically significant.

Pure tone audiometry was done after 03 months of operation. The mean preoperative and post-operative air conduction threshold in the reinforcement cartilage group (Group-A) was found to be 23.16 ± 5.75 dB and 13.98 ± 4.9 dB, respectively with 9.82 ± 4.5 dB closure of the air bone gap (ABG). Air bone gap was calculated in frequency level in both Group-A and Group-B in 500, 1000 and 2000 Hz. In temporalis fascia tympanoplasty patients (Group-B) mean preoperative and postoperative air conduction threshold were found to be 23.53 ± 3.7 dB and 12.36 ± 3.49 dB, respectively with 11.26 ± 7.32 dB closure of the ABG. The mean gain was 9.82 dB and 11.26 dB in the reinforcement cartilage group and temporalis fascia group respectively.

Air bone gap closure in PTA e" 10 dB were considered as audiological success. In our study, overall audiological success was 55.81% (48/86). In the reinforcement cartilage group 46.5% (20/43) and temporalis fascia group 65.11 per cent (28/43), (Table -V). In this study showed audio logical improvement in temporalis fascia group (Group-B) was better than reinforcement cartilage group (Group-A) but the difference was statistically not significant (p=0.082). This result was almost similar to Ozdamar et al, Onal et al and Yakup et al and Tan et al.

No major intraoperative and immediate postoperative complications like wound infection, sensory neural hearing loss and facial nerve palsy were found in any patient of either group in the procedures. No cosmetic deformity of tragus was observed in reinforcement cartilage group.
These encouraging anatomical and functional results may be due to the nature of the cartilage. As cartilage is nourished by simple diffusion from surrounding tissue, it can survive in a relatively avascular condition thus reinforcement cartilage may be a valid alternative to conventional temporalis fascia graft for the reconstruction of tympanic membrane.

**Conclusion:**
Cartilage tympanoplasty has been practised for reconstruction of perforated tympanic membrane in COM since long with variable results. Graft uptake rate in cartilage reinforcement is comparatively better than temporalis fascia graft. So, reinforcement cartilage graft can be adopted as an alternative to temporalis fascia graft in type- I tympanoplasty.

**References:**
of temporalis fascia muscle and full thickness cartilage graft on type 1 paediatric tympanoplasties. Brazil Journal of Otorhinolaryngology 2016;82(6), 695–701.


Original Article

Study of Antibiotic Sensitivity of Aural Swab and Aetiological Factors of Chronic Otitis Media-Active Mucosal Type

Md Nesar Uddin¹, Mohammed Sirazul Islam², Mohammad Delwar Hossen³
Mohammed Iftekharul Alam⁴, Mohammad Kamal Hossain⁵

Abstract:

Background: Chronic otitis media (COM) refers to chronic inflammation of mucoperiosteal lining of middle ear cleft resulting in aural discharge and deafness. The objective of this study is to evaluate the antibiotic sensitivity and aetiological factors of COM.

Methods: This cross-sectional study was conducted from July 2017 to June 2018 for duration of one year among the patients who attended with COM-active mucosal disease at Department of ENT & Head Neck Surgery, Combined Military Hospital (CMH) Chattogram. Total 50 cases were isolated and among them 5 cases had been suffering from bilateral COM. Aural swab was taken from 55 ears and a predesigned data collection sheet was duly filled up with the information of socioeconomic status of the patient. The laboratory records of every case was systematically organized. The data were analyzed with simple manual analysis using percentage and frequency.

Results: About 24% patients were in 31-40 years age group. Out of 50 patients 62% were male. 44% patient lived in barrack. Ear cleaning habit shows, 32% has got the cleaning habit with cloth and stick. Out of 50 patients 5 had bilateral COM. So out of 55 ears, Culture & sensitivity test viewed that Pseudomonas aeruginosa was the most predominant organism - 41.8% followed by S. aureus- 30.9%. Antibiotic sensitivity profile shows, 80% cases showing sensitivity to Amikacin then gentamycin-73.3%. Resistant 5 cases showed 100% sensitivity to Tazobactum. Again out of 19 cases of Gram positive organism 78.9% were sensitive to Amoxyclav. 3 resistant cases showed 100% sensitivity to Meropenem.

Conclusion: By studying this topic we hope to able to make an idea about the aetiological and predisposing factors and antibiotic sensitivity of COM-active mucosal variety.

Keywords: COM, Culture and Sensitivity, Antibiotic, Aetiological Factors

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Introduction:
Chronic otitis media and its complications are the most common conditions seen by otologists, pediatricians and general practitioners. Early bacteriological diagnosis of all cases will assure accurate and appropriate effective therapy. Knowledge of the local microorganism pattern and their antibiotic sensitivity is the essential to formulate a protocol for empirical antibiotic therapy. In Bangladesh COM is a common disease in clinical practice. Prevalence of COM on developing countries represent a wide range-0.4% to 33.3%. In Bangladesh its prevalence is 7.39%. The word COM implies a permanent abnormality of the pars tensa or pars flacida, most likely a result of earlier acute otitis media, negative middle ear pressure or otitis media with effusion. Here a long standing inflammatory disease affecting mucoperiosteal lining of the middle ear cleft is found.

It is generally believed that mucosal COM arise from an episode of acute otitis media where after rupturing the tympanic membrane fails to heal. Repeated infection occurs in the middle ear from the nasopharynx either by aspiration of nasopharyngeal microbes or due to reflux from the nasopharynx. Repeated infection also occurs by transportation of microbes from the ear canal through the perforation. Malnutrition, lack of personal care, low socioeconomic condition, poor hygiene, overcrowding, cleaning ear with unsterile material, trauma to the ear all are individual factor in the development of chronic otitis media. Insertion of tympanostomy tube is also a recognized cause of subsequent tympanic membrane perforation.

Treatment is directed to make the ear dry, prevent recurrent infection and improve hearing and also make the ear safe from various complications. Treatment includes ear toileting, topical antibiotic, systemic antibiotic and surgical treatment. It depends upon the condition of the ear and also directed to improvement of the predisposing factors and other causative factors.

A wide range of organisms are isolated from the cases of COM which vary from study to study. Predominating organisms are Pseudomonas aerugenosa. Besides Staphylococcus aureus, Proteus species, E.coli, Diphtheroids, Streptococci, bacteroids. Mixed pathogen and fungi may also be present. The subject of my study is chronic mucosal disease in relation to their bacteriological pattern, isolated from the affected ear. By studying these, we hope to able to make an idea about the aetiologial and predisposing factors of disease. We also hope to detect the most sensitive antibiotic for appropriate treatment.

Methods:
This cross sectional study was conducted from July 2017 to June 2018 for duration of one year among the patients who attended with COM- active mucosal disease at Department of Otolaryngology & Head Neck Surgery, CMH Chattogram.

Inclusion Criteria:
1. Chronic aural discharge for more than 3 months
2. Patient not receiving antibiotics for at least last 14 days
3. COM active mucosal disease

Exclusion Criteria:
1. COM squamous type
2. Otomycosis
3. Otitis externa
For all procedures, written informed consent from all study subjects were taken. Confidentiality of subjects was maintained. All relevant history and data were collected in a pre-designed data collection sheet on the basis of age, sex, educational status, socioeconomic condition, area of residence, and laboratory record of causative organism and antibiotic sensitivity.

The data were analyzed with simple manual analysis using percentage & frequency.

**Results:**
Out of 50 Patients, 31 (62%) were male and 19 (38%) were female. Male, female ratio was 1.6:1. Most of the patients are in the 31-40 age group.

### Table I:
**Age group distribution (n=50)**

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Age (in years)</th>
<th>Total number of cases n=50</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td>&lt;01</td>
<td>02</td>
<td>4%</td>
</tr>
<tr>
<td>02</td>
<td>01-10</td>
<td>11</td>
<td>22%</td>
</tr>
<tr>
<td>03</td>
<td>11-20</td>
<td>08</td>
<td>16%</td>
</tr>
<tr>
<td>04</td>
<td>21-30</td>
<td>10</td>
<td>20%</td>
</tr>
<tr>
<td>05</td>
<td>31-40</td>
<td>12</td>
<td>24%</td>
</tr>
<tr>
<td>06</td>
<td>41-50</td>
<td>4</td>
<td>8%</td>
</tr>
<tr>
<td>07</td>
<td>51-60</td>
<td>02</td>
<td>4%</td>
</tr>
<tr>
<td>08</td>
<td>&gt;61</td>
<td>01</td>
<td>2%</td>
</tr>
</tbody>
</table>

### Table II:
**Ear cleaning habit of study population (n=50)**

<table>
<thead>
<tr>
<th>Materials</th>
<th>No.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cotton bud</td>
<td>06</td>
<td>12%</td>
</tr>
<tr>
<td>Match stick</td>
<td>08</td>
<td>16%</td>
</tr>
<tr>
<td>Feathers</td>
<td>05</td>
<td>10%</td>
</tr>
<tr>
<td>Cloth with sticks</td>
<td>16</td>
<td>32%</td>
</tr>
<tr>
<td>Hair clips</td>
<td>04</td>
<td>08%</td>
</tr>
<tr>
<td>No habit</td>
<td>11</td>
<td>22%</td>
</tr>
</tbody>
</table>

### Table III:
**Organisms identified (n=55)**

<table>
<thead>
<tr>
<th>No organism of cases</th>
<th>Name of organism</th>
<th>Total number</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Pseudomonas</td>
<td>23</td>
<td>41.8%</td>
</tr>
<tr>
<td>2</td>
<td>Staph. aureus</td>
<td>17</td>
<td>30.9%</td>
</tr>
<tr>
<td>3</td>
<td>Proteus</td>
<td>03</td>
<td>5.45%</td>
</tr>
<tr>
<td>4</td>
<td>Esch. coli</td>
<td>03</td>
<td>5.45%</td>
</tr>
<tr>
<td>5</td>
<td>Strept. pneumoniae</td>
<td>02</td>
<td>3.63%</td>
</tr>
<tr>
<td>6</td>
<td>Klebsiella</td>
<td>01</td>
<td>1.81%</td>
</tr>
<tr>
<td>7</td>
<td>Mixed organism</td>
<td>01</td>
<td>1.81%</td>
</tr>
<tr>
<td>8</td>
<td>No organism</td>
<td>05</td>
<td>9.09%</td>
</tr>
</tbody>
</table>

### Table IV:
**First line antibiotic Sensitivity test (n=30).**

<table>
<thead>
<tr>
<th>Sl.</th>
<th>1st line sensitive No. of antibiotic cases</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Amikacin</td>
<td>24</td>
</tr>
<tr>
<td>2</td>
<td>Gentamycin</td>
<td>22</td>
</tr>
<tr>
<td>3</td>
<td>Ciprofloxacin</td>
<td>21</td>
</tr>
<tr>
<td>4</td>
<td>Azythromycin</td>
<td>16</td>
</tr>
<tr>
<td>5</td>
<td>Cefalosporin</td>
<td>15</td>
</tr>
<tr>
<td>6</td>
<td>Clindamycin</td>
<td>5</td>
</tr>
<tr>
<td>7</td>
<td>Resistant</td>
<td>5</td>
</tr>
</tbody>
</table>

### Table V:
**Second line antibiotic sensitivity test (n=5)***

<table>
<thead>
<tr>
<th>Sl.</th>
<th>2nd line sensitive No. of antibiotic cases</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Carbenicillin</td>
<td>4</td>
</tr>
<tr>
<td>2</td>
<td>Tazobactum</td>
<td>5</td>
</tr>
</tbody>
</table>
Table VI:
Gram positive organism sensitivity test
(n=19)

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>1st line sensitive antibiotic</th>
<th>No. of cases</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Amoxyclav</td>
<td>15</td>
<td>78.9%</td>
</tr>
<tr>
<td>2.</td>
<td>Ceftriaxone</td>
<td>14</td>
<td>73.6%</td>
</tr>
<tr>
<td>3.</td>
<td>Flucloxacillin</td>
<td>14</td>
<td>73.6%</td>
</tr>
<tr>
<td>4.</td>
<td>Gentamycin</td>
<td>13</td>
<td>68.4%</td>
</tr>
<tr>
<td>5.</td>
<td>Ciprofloxacin</td>
<td>13</td>
<td>68.4%</td>
</tr>
<tr>
<td>6.</td>
<td>Resistant</td>
<td>3</td>
<td>15.7%</td>
</tr>
</tbody>
</table>

Discussion:
Among 50 patients, the age distribution showed that highest 24% cases of chronic otitis media (COM) were found in the 31-40 years of age group. But the prevalence of COM were more common in the 0-10 years old age group. This is also supported by Vikram BK et al\(^{10}\) and Elden LM et al\(^{11}\) which were carried out in developing countries. The difference of our study may be due to the study carried out in a particular group of population where in proportion, adult population were more common. Similar results were found in two studies which were carried out by Vikram Bk et al\(^{10}\) and Loy AHC et al\(^{12}\) in Singapore and India.

This study showed that COM has slight male predominance (1.6:1), also in persons who had a habit of cleaning ears by cloth and sticks (42%). These results were supported by most of the studies which were carried out in different parts of the world. Like Agarwal A et al\(^{13}\) and Gul AA et al\(^{14}\).

This study showed 64% patient came from urban area, 44% has pakka housing. But other study showed that the disease were more prevalent in poor housing status, lack of personal hygiene, illiterate populations. As described by Biswas AC et al\(^{15}\). The difference was may be due to the fact that in this study most of the patients came from a particular group of population of Armed Forces where their living statuses were better than others. This results were also supported by studies which were carried out in urban population by Ahmed KU et al\(^{16}\).

In this series it was revealed that Pseudomonas aeruginosa (41.8%) was the most common isolated organism in COM followed by Staphylococcus aureus (30.9%). This findings were also supported by many studies which were carried out in south-east Asia region showed by Gul AA el al\(^{17}\) and JHA Ak et al\(^{17}\). Another studies carried out in Nigeria, Pakistan and North America by Nwabuisi C\(^{16}\), Ahmed B el al\(^{19}\) and Rajat P et al\(^{20}\) showed Staphylococcus aureus was found the most common isolated organism in chronic suppurative otitis media\(^{18-20}\). Our study depicted that Gram negative organism specially Pseudomonas aeruginosa was highly (80%) sensitive to Amikacin and Resistant species 100% was sensitive to Tazobactum. Which was supported by Swayamisidha A et al\(^{21}\) and Shyamala R et al\(^{22}\).

The study also showed Gram positive organism including staphylococcus aureus having highest (78.9%) sensitivity to Amoxyclav. Another study revealed 91% sensitivity of Pseudomonas aeruginosa to Amikacin and 88% to Gentamicin. Moreover Gram negative organism showed 100% sensitivity to Imipenem. Supported by Rahimgir Md et al\(^{23}\).

Conclusion:
Pseudomonas aeruginosa is the commonest pathogen in chronic otitis media, Staphylococcus aureus is another Gram positive organism found. Most of the Gram positive organism are sensitive to Amoxyclav and Gram negative organism are sensitive to Amikacin. So people are to be educated...
regarding their hygiene, housing, personal habit and also to be prescribed appropriate antimicrobial agents that will minimize the period of treatment, misuse of antibiotics and also the relative cost of treatment.

References:


Comparison of Uncomfortable Loudness Level in Stapedotomy with or without Stapedial Tendon Preservation

Tamanna Nawshin¹, Kanu Lal Saha², Shah Sohel³, Sabyasachi Talukdar⁴, Sheikh Mohammad Tanjil Ul Alam⁵

Abstract:

Background: Otosclerosis is one of the commonest diseases of the ear mostly involves the otic capsule. Most often otosclerotic foci appear in stapes region leading to stapes fixation, predominantly affect the adolescence female. The most common presenting symptom of clinical otosclerosis is conductive deafness. The mainstay of treatment for otosclerosis is surgery. Surgical options include stapedectomy, stapedotomy with or without stapedial tendon preservation. The latter being is the procedure of choice.

Aim: The aim of this study is to compare the outcome of uncomfortable loudness level in stapedotomy with or without stapedial tendon preservation.

Methods: A prospective observational study was conducted in the Department of Otolaryngology-Head & Neck Surgery, Bangabandhu Sheikh Mujib Medical University (BSMMU), Dhaka for 18 months in patients with otosclerosis. Total 30 subjects were selected based on the inclusion and exclusion criteria. All patients were assessed pre-operatively by clinical examination, otoscopy and microscopic examination. Hearing was assessed by pure tone audiometry. Uncomfortable level and stapedial reflex threshold were tested in all cases. The selected cases were placed into two groups. Stapedial tendon resection in Group-I and stapedial tendon preservation in Group-II. Post-operative follow up was done at 3 months and 6 months. Hearing and uncomfortable loudness level were evaluated with PTA during follow up by calculating the average of 500Hz, 1000Hz, 2000Hz and 4000HZ. The data were calculated manually. The statistical significance was set to P< 0.05. Results of the study were expressed

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as mean, standard deviation (± SD), frequency and percentages. Means and standard deviations were reported for continuous variables. Frequencies and percentages were reported for categorical variables. Unpaired Student’s t test was done to compare the continuous variables and Chi Square test was done to compare the categorical variables.

**Results:** In this study preoperative average ABG for group I and group II were 35 ± 4.57 dB and 34 ± 4.17 dB respectively. In group I, post operative average ABG after 3 months and 6 months were 14 ± 3.7 dB and 13±3.3 dB respectively. Post operative average ABG after 3 months was 13 ± 5.7 dB and was 12 ± 4.4 dB for group II. But the hearing improvement between two groups was not statistically significant. In case of preoperative mean UCL was 95 ± 1.8 dB and 96 ± 2.5 dB for group I and group II respectively. Postoperative mean UCL after 3 months was 96 ± 3.57 dB and after 6 months was 99 ± 6.28 dB in group I. For group II, postoperative mean UCL after 3 months and 6 months was 107±4.2 dB and 113 ± 3.2 dB respectively. Here mean UCL was on average 11 dB higher for group II in 3 months and additional 6 dB improvement noted after 6 months, but show minimal change in group I. This finding was statistically significant. **Conclusion:** Preservation of the stapedial tendon is the choice in the surgical treatment of otosclerosis which helps to improve functional outcomes as well as to provide the more physiologic protection of middle ear. Postoperative discomfort threshold levels were increased in patients who had their stapedial tendon restored.

**Key words:** Otosclerosis, stapedotomy, Stapedial tendon preservation stapedotomy, Stapedial tendon resection stapedotomy, Loudness discomfortable level.

**Introduction:**
Otosclerosis is a clinico-pathological condition which occurs due to abnormal bone resorption and formation at the oval window, and it causes fixation of stapes footplate. It is one of the commonest causes of conductive hearing loss in adult population with intact tympanic membrane. It is an autosomal dominant hereditary disease with incomplete penetrance and varied expression. It is an anklylosis of the stapes to the margins of the oval window.

Otosclerosis is more common in Caucasians and Asians than in Africans. Though definite etiology of otosclerosis is still not identified, some factors associated with it such as pregnancy and measles virus, have been reported in various literatures. The period of onset is mainly between 20 to 45 years of age, with a higher prevalence in women than in men. It occurs approximately twice as often in women than men. It usually affects both ears (85% - 90%) in.

At the end of 19th century stapedial surgery as stapedectomy was started by Kassel et al. The mobilization of the stapes to treat otosclerosis was firstly advocated by Rosen in 1952. Shea revolutionized the otosclerosis surgery in 1958, initially as stapedectomy then stapedotomy.

Silverstein et al, had conducted the study to see the difference in hearing outcome and uncomfortable loudness level between stapedial tendon preservation and resection stapedotomy. There was a conclusion that the stapedial tendon should be preserved whenever possible during stapes surgery.

Among various surgical techniques including stapedectomy or stapedotomy, the surgical choice for otosclerosis is stapedotomy. Stapedotomy is relatively easier, less traumatic, shorter duration surgery, has fewer complications than stapedectomy. The stapedial tendon preservation stapedotomy may have advantages of cochlear protection.
during intense noise. Stapedial reflex produced by the contraction of stapedial muscle, which can produce a low frequency filter function help to protect against acoustic trauma, and serve for a better hearing in noise. It may help in preservation of the vascularity that prevents the necrosis of long process of incus by ischemia thereby preventing the prosthesis displacement. Audiometric test showed similar type of hearing outcome whether the tendon is preserved or not. In the recent years, stapedial tendon preservation surgery has been advocated by some surgeons in hopes of obtaining better functional outcomes.

Methods:
This is a prospective observational type of study conducted in the Department of Otolaryngology – Head & Neck surgery, Bangabandhu Sheikh Mujib Medical University, Dhaka from January 2019 to June 2020. After obtaining clearance and approval from Institutional Review Board, 30 patients (15 in each group) of otosclerosis, fulfilled the inclusion and exclusion criteria, were selected for the study. Inclusion criteria were: a) Diagnosed cases of otosclerosis by clinical examination and audiometric tests, b) Age - 18 to 50 years, c) Characteristic changes in audiogram (air–bone gap at least 20 dB) and exclusion criteria were: a) Patients with sensorineural hearing loss b) Patients present with muscular dystrophy and neurogenic muscular atrophies c) Patients with only hearing ear and d) Patients were not fit for general anesthesia. All patients with a clinical diagnosis of otosclerosis underwent a detailed clinical examination including otoscopic and microscopic examination and all findings were recorded. Audiological evaluation was done by pure tone audiometry, impedance audiometry, and stapedial reflex threshold. Selected patients were treated by two different surgical procedures. One group of patients was submitted to stapedotomy without tendon preservation (group I) and another stapedotomy with tendon preservation (group II). An informed written consent was taken before operation. Operation was performed under general anesthesia. Stapedotomy was carried out by transcanal incision or endaural incision. Then tympanomeatal flap was elevated. The mobility of malleus, incus and stapes were checked in both cases. Posterosuperior bony meatal was scooped and or drilled to proper visualize the long process of incus, horizontal segment of facial nerve canal, pyramid, stapedial tendon and foot plate. Then in tendon resection stapedotomy the following steps were followed as- stapedial tendon was cut by microscissor, incudostapedial joint was disconnected, then posterior and anterior crurotomy was done, stapes superstructure was removed. Stapedotomy was made on posterior one third of footplate with 0.7mm diamond skeeter burr. After measuring the distance between long process of incus and stapedotomy hole a Teflon piston prosthesis (according to the size of measuring rod) was placed between long process of incus and stapedotomy hole, and few pieces of fat or gelfoam was placed around stapedotomy hole. Chorda tympani nerve was preserved in most of the cases if possible. Tympanomeatal flap was repositioned. In tendon preservation stapedotomy most of the steps were similar except the preservation of stapedial tendon and incudostapedial joint with remnant stapes superstructure.

Post-operative PTA, impedance audiometry and stapedial reflex threshold were done. Uncomfortable loudness level threshold was recorded at the end of 3months and 6 months. Postoperative A-B gap was noted at 500 Hz, 1000Hz, 2000Hz, 4000Hz.

Data collection technique: Data were collected from self-reported questionnaires and history sheet.
Presentation of data: After compiling data were arranged and presented in simple ways in tables and figures.

Statistical analysis: Data were processed and analyzed by using Microsoft Office 365, Excel 365 (version 2019) software. Data presented as mean±standard deviation (SD) or percentages. Finally, the results were evaluated by using proper statistical test for significance. To compare the data of each parameter before and after operation unpaired student’s t-test were used. P value of less than 0.05 was considered statistically significant.

Results:
The results of total 30 patients were assessed. Tendon resection and tendon preservation technique were used in 15 patients of each group. Post-operative follow up was done after 3 months and 6 months of surgery.

All results has shown in tables.

Table I: Distribution of study subjects according to site of otosclerosis (N=30)

<table>
<thead>
<tr>
<th>Side</th>
<th>Group I (n=15)</th>
<th>Group II (n=15)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Right</td>
<td>1 (6.7 %)</td>
<td>2 (13.3 %)</td>
</tr>
<tr>
<td>Left</td>
<td>1 (6.7%)</td>
<td>1 (6.7%)</td>
</tr>
<tr>
<td>Both</td>
<td>13 (86.6%)</td>
<td>12 (80.0%)</td>
</tr>
<tr>
<td>p value</td>
<td>&gt;0.3</td>
<td>&gt;0.2</td>
</tr>
</tbody>
</table>

Table II: Post-operative hearing gain with stapedial tendon resection

<table>
<thead>
<tr>
<th>ABG (dB)</th>
<th>Pre-operative</th>
<th>3rd month Post-operative</th>
<th>6th month Post-operative</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-10 (Excellent)</td>
<td>0</td>
<td>0</td>
<td>3 (20%)</td>
</tr>
<tr>
<td>11-20 (Good)</td>
<td>0</td>
<td>14 (93.3%)</td>
<td>12 (80%)</td>
</tr>
<tr>
<td>21-30 (Fair)</td>
<td>3 (20%)</td>
<td>1 (6.7%)</td>
<td>0</td>
</tr>
<tr>
<td>&gt;30 (Poor)</td>
<td>12 (80%)</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

Table III: Hearing outcome (ABG) of study subjects in Group I (Stapedial tendon resection group)

<table>
<thead>
<tr>
<th>Preoperative (dB)(Mean ± SD)</th>
<th>Post-operative (dB)(Mean ± SD)</th>
<th>Improvement (dB)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>35 ± 4.47</td>
<td>After 3rd months 14 ± 3.7</td>
<td>21</td>
<td>&lt; 0.0001</td>
</tr>
<tr>
<td></td>
<td>After 6th months 13 ± 3.3</td>
<td>22</td>
<td>&lt; 0.0001</td>
</tr>
</tbody>
</table>

Table IV: Post-operative hearing gain with stapedial tendon preserve:

<table>
<thead>
<tr>
<th>ABG (dB)</th>
<th>Pre-operative</th>
<th>3rd month Post-operative</th>
<th>6th month Post-operative</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-10 (Excellent)</td>
<td>0</td>
<td>5 (33.3%)</td>
<td>8 (53.3%)</td>
</tr>
<tr>
<td>11-20 (Good)</td>
<td>0</td>
<td>7 (46.6%)</td>
<td>7 (46.6%)</td>
</tr>
<tr>
<td>21-30 (Fair)</td>
<td>2 (13.3%)</td>
<td>3 (20%)</td>
<td>0</td>
</tr>
<tr>
<td>&gt;30 (Poor)</td>
<td>13 (86.6%)</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>
Discussion:
This study was conducted to assess the surgical outcome of stapedotomy with or without stapedial tendon preservation. Action of stapedial tendon is to reduce the incidence of middle ear complication by preserving vascularization, preserving the necrosis by ischemia and maintain the stabilization of prosthesis. On the other hand, it protects the inner ear by damping of excessive vibration of stapes and increasing the stiffness of ossicular chain\textsuperscript{15}. The total population in this study was 30 which were divided into two groups. Among them 15 patients were selected in each group. The majority of patient in this study were female, with male female ratio were 2:3 and 1:2 in tendon resection and tendon preservation group respectively. This finding was like the finding of Al-Husban and Iannella\textsuperscript{16,17}. But dissimilar with the findings of Fakir et al, where male was more than female. This difference may be due to demographic variation. Regarding the occupation in the study population were service holders, housewives and students\textsuperscript{18}. Most of the patient in both groups were within 21-30 years of age, with an age range from 18-50 years. But the mean age of tendon resection group was 26.6 years and tendon preservation group were 28.6 years, which was almost like the findings of Harikumar and Kumar\textsuperscript{1}.

Preoperative average ABG for tendon resection was 35±4.57 dB with a range of 28 to 45 dB. The average post-operative ABG

---

### Table V:

*Hearing outcome (ABG) of study subjects in Group II (Stapedial tendon preservation)*

<table>
<thead>
<tr>
<th>Preoperative (dB) Mean ± SD</th>
<th>Post-operative (dB) Mean ± SD</th>
<th>Improvement (dB)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>34 ± 4.17</td>
<td>13 ± 4.17</td>
<td>21</td>
<td>&lt; 0.0001</td>
</tr>
<tr>
<td>After 6\textsuperscript{th} month</td>
<td>12 ± 4.4</td>
<td>22</td>
<td>&lt; 0.0001</td>
</tr>
</tbody>
</table>

### Table VI:

*Uncomfortable level (UCL) in Group I (Stapedial tendon resection group)*

<table>
<thead>
<tr>
<th>Preoperative (dB) Mean ± SD</th>
<th>Post-operative (dB) Mean ± SD</th>
<th>Improvement (dB)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>95±1.8</td>
<td>96±3.57</td>
<td>1</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>After 3\textsuperscript{rd} months</td>
<td>99±6.28</td>
<td>4</td>
<td>&lt;0.0001</td>
</tr>
</tbody>
</table>

### Table VII:

*Uncomfortable level in (UCL) Group II (Stapedial tendon preservation group)*

<table>
<thead>
<tr>
<th>Preoperative (dB) Mean ± SD</th>
<th>Post-operative (dB) Mean ± SD</th>
<th>Improvement (dB)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>96±2.5</td>
<td>107±4.28</td>
<td>11</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>After 6\textsuperscript{th} month</td>
<td>113±3.21</td>
<td>17</td>
<td>&lt;0.0001</td>
</tr>
</tbody>
</table>
after 3rd months was 14±3.7 dB with a range 10-22 dB. After 6th months was 13±3.3 dB with a range of 10 to 20 dB.

Preoperative average ABG for tendon preservation was 34±4.17 dB with a range of 25-42 dB. The average post operative ABG after 3rd month was 13±5.7 dB and a range of 6-23 dB and after 6th month was 12±4.4 dB and a range of 6-20 dB. There was significant postoperative hearing improvement in both groups.

But there was no statically significant hearing improvement noted between stapedotomy with or without tendon preservation. This finding of study was correlated with the study conducted by Arnold et al12 and Vallejo et al13.

In the study preoperative mean UCL for tendon resection group was 95±1.8 dB and with a range of 94 to 98 dB. The post operative UCL after 3rd months was 96±3.57 dB with a range from 95 to 100 dB and after 6th months 99±6.28 dB with a range from 98 to 100 dB.

Preoperative mean UCL for tendon preservation group was 96±2.5 dB with a range of 92 to 100 dB. The post operative UCL after 3rd months was 107±4.2 dB with a range of 105 to 110 dB and after 6th months was 113±3.2 dB with a range of 111-117 dB. Here mean UCL was on average 11 dB higher for tendon preservation group in 3rd months of surgery and additional 6 dB improvement noted after 6 months but show minimal change in tendon resection stapedotomy. This finding of stapedial tendon preservation stapedotomy was statistically significant which was quite similar to finding of Silverstain et al10 Gross et al14 and Rasmy et al1.20

Conclusion:
Stapedotomy is the definite surgical treatment for otosclerosis. Stapedial tendon preservation shows better outcome of uncomfortable loudness level than stapedial tendon resection stapedotomy. So, preservation of stapedial tendon should be tried whenever it is possible.

References:


Original Article

Role of Fine Needle Aspiration Cytology (FNAC) in Preoperative Diagnosis of Parotid and Submandibular Gland Neoplasm

Mohammad Nazrul Islam¹, A.F. Mohiuddin Khan², Shaikh Nurul Fattah³, Dipankar Lodh⁴, Md. Zahirul Islam⁵, Uzzal Chandra Ghosh⁶

Abstract

Background: The overall incidence of salivary gland neoplasm is 2.5-3.0 per 100000 per year. Salivary gland malignancies account for about 5% of head-neck malignancies. Though, it is uncommon but not rare in our country. Fine Needle Aspiration Cytology (FNAC) has been widely used for many years as a method for assessing salivary gland lesion preoperatively. It is a simple, quick, inexpensive and minimally invasive technique used to diagnose different types of salivary gland neoplasm.

Objectives: To see the frequency of malignancy in parotid and submandibular salivary gland neoplasm and also to find out the role of FNAC in their preoperative diagnosis. Histopathological examination of the resected parotid and submandibular gland neoplasm was considered as gold standard to compare FNAC report of this study.

Methods: This was a cross-sectional study which was conducted in the Department of Otolaryngology – Head & Neck Surgery, Dhaka Medical College Hospital, Dhaka from January 2017 to June 2018. Purposive sampling method was used to collect data. Pre-tested structured data sheet was used to record information. After collection, data were edited by meticulous checking and re-checking. Data were analyzed using SPSS for windows version 22.

Results: After histopathological confirmation of the resected specimen, most common benign parotid tumour was pleomorphic adenoma 76.7% followed by warthin’s tumour 16.7%. In benign submandibular gland neoplasm, pleomorphic adenoma was the commonest 87.5% followed by haemangioma 12.5%. Commonest malignant tumour of submandibular gland was adenoid cystic carcinoma 50.0%. In our study sensitivity of FNAC was 75.0%, specificity 94.74% and overall accuracy was 90%. Positive predictive value and negative value were 81.82% and 92.31% respectively.

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Conclusion: It can be concluded that fine needle aspiration cytology is a safe, cheap and useful preoperative diagnostic tool in the diagnosis of malignancy in parotid and submandibular gland, but as fine needle aspiration cytology partly depends on operator skill, it may give false negative and false positive result.

Keywords: Salivary gland neoplasm, salivary gland FNAC, parotid gland neoplasm, submandibular gland neoplasm, salivary gland biopsy

Introduction:
Salivary gland malignancies account 1-3% of all head-neck malignancies and 0.3% of all malignancies of the body¹. Worldwide incidence of salivary gland neoplasm, however, reported to be 0.4-13.5 cases per 100,000². 70% of the salivary gland tumors arise in the parotid gland. The remaining arise in the submandibular gland 8% and minor salivary glands 22%. Although 75% of all parotid neoplasm are benign, about 50% of the submandibular gland neoplasm and 80% of minor salivary gland neoplasm are found to be malignant. Pleomorphic adenoma is the most common benign salivary gland neoplasm, comprising 85% of all the salivary gland neoplasm³. Incidence of malignancy is relatively higher in submandibular, sublingual and minor salivary glands than parotid. One sixth parotid tumors and 40% submandibular gland tumors are malignant⁴. The tumors of sublingual and minor salivary glands are uncommon representing about one tenth of all salivary gland neoplasm⁵. Mucoepidermoid carcinoma is the most common salivary gland malignancy which contributes about 5 to 9% of all salivary gland neoplasm. It commonly occurs in the major salivary glands, mostly in parotid 45 to 70%⁶. Other common malignancies are adenoid cystic carcinoma, acinic cell carcinoma, adenocarcinoma and squamous cell carcinoma. Almost one-third of adenoid cystic carcinoma occurs in the major salivary glands and it is particularly common in the submandibular gland- 43%⁴. Salivary gland lesions present as enlarged neck mass which are usually accessible for FNAC, a simple, inexpensive and well tolerated diagnostic tool. FNAC of suspected salivary gland lesions has an important role in preoperative diagnosis and further management of the patient. However, diverse morphological patterns and overlapping features make it a challenging job to give a precise diagnosis, at times⁷. FNAC has gained widespread acceptance and popularity among head-neck surgeons in the assessment of thyroid and other neck masses but its use in the evaluation of parotid and submandibular gland tumors has not attained similar enthusiasm. As the sensitivity and specificity of FNAC for parotid tumors is between 57-98% and 86-100% respectively, some authors believe that it is not accurate enough to influence the decision making process⁷.

Regarding frequency of malignancy in parotid and submandibular gland neoplasm and role of FNAC in their preoperative diagnosis, numerous studies have been done in abroad. But very few studies have been accomplished in our country. Realizing the condition, this cross section study has been designed.

Materials and Methods:
This is a Cross Sectional Study conducted in the Department of Otolaryngology – Head & Neck Surgery, Dhaka Medical College Hospital, Dhaka, from January 2017 to June 2018, among the patients with parotid and submandibular gland neoplasm admitted in the department for operative management. Total 50 subjects were included in this study. All FNAC proved neoplastic swelling, involving parotid and submandibular gland of all age and sex included in the study, but inflammatory, autoimmune and granulomatous lesions and Neoplasm of sublingual and minor salivary glands were excluded.
Results:
Results of study is shown in following tables.

### Table I:
**Age distribution of the patients with different neoplasm (n=50)**

<table>
<thead>
<tr>
<th>Age groups (years)</th>
<th>Benign(n=39)</th>
<th>Malignant (n=11)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n %</td>
<td>n %</td>
</tr>
<tr>
<td>11-20</td>
<td>5 12.82</td>
<td>0 0.00</td>
</tr>
<tr>
<td>21-30</td>
<td>4 10.26</td>
<td>1 9.09</td>
</tr>
<tr>
<td>31-40</td>
<td>5 12.82</td>
<td>3 27.27</td>
</tr>
<tr>
<td>41-50</td>
<td>17 43.59</td>
<td>3 27.27</td>
</tr>
<tr>
<td>51-60</td>
<td>6 15.38</td>
<td>2 18.18</td>
</tr>
<tr>
<td>61-70</td>
<td>1 2.56</td>
<td>1 9.09</td>
</tr>
<tr>
<td>71-80</td>
<td>1 2.56</td>
<td>1 9.09</td>
</tr>
<tr>
<td>Total</td>
<td>39 100.00</td>
<td>11 100.0</td>
</tr>
<tr>
<td>Mean±SD</td>
<td>41.11±7.35</td>
<td>47.25±6.85</td>
</tr>
</tbody>
</table>

### Table II:
**Distribution of benign and malignant neoplasm in parotid and submandibular gland (n=50)**

<table>
<thead>
<tr>
<th>Gland involved</th>
<th>Benign(n=39)</th>
<th>Malignant (n=11)</th>
<th>Total (n=50) p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N %</td>
<td>N %</td>
<td>n %</td>
</tr>
<tr>
<td>Parotid</td>
<td>31 86.1</td>
<td>05 13.9</td>
<td>36 100.0</td>
</tr>
<tr>
<td>Submandibular gland</td>
<td>08 57.1</td>
<td>06 42.9</td>
<td>14 100.0</td>
</tr>
<tr>
<td>Total</td>
<td>39 78.0</td>
<td>11 22.0</td>
<td>50 100.0</td>
</tr>
</tbody>
</table>

Chi-squared Test ($\chi^2$) was done to analyze the data.

### Table III:
**Distribution of different types of benign neoplasm in parotid gland & submandibular gland (After FNAC) (n=39)**

<table>
<thead>
<tr>
<th>Different types of neoplasm</th>
<th>Parotid (n=31)</th>
<th>Submandibular (n=8)</th>
<th>Total (n=39)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N %</td>
<td>n %</td>
<td>N %</td>
</tr>
<tr>
<td>Pleomorphic adenoma</td>
<td>24 77.4</td>
<td>07 87.5</td>
<td>31 79.5</td>
</tr>
<tr>
<td>Warthin’s tumour</td>
<td>05 16.1</td>
<td>0 0.0</td>
<td>05 12.8</td>
</tr>
<tr>
<td>Oncocytoma</td>
<td>01 3.2</td>
<td>0 0.0</td>
<td>01 2.6</td>
</tr>
<tr>
<td>Haemangioma</td>
<td>01 3.2</td>
<td>01 12.5</td>
<td>02 5.1</td>
</tr>
<tr>
<td>Total</td>
<td>31 100.0</td>
<td>8 100.0</td>
<td>39 100.0</td>
</tr>
</tbody>
</table>
Table IV:

Distribution of different malignant neoplasm in parotid and submandibular gland (after FNAC) (n=11)

<table>
<thead>
<tr>
<th>Different types of neoplasm</th>
<th>Parotid (n=05)</th>
<th>Submandibular (n=06)</th>
<th>Total (n=11)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
<td>%</td>
<td>n</td>
</tr>
<tr>
<td>Mucoepidermoid carcinoma</td>
<td>03</td>
<td>60.0</td>
<td>02</td>
</tr>
<tr>
<td>Adenoid cystic carcinoma</td>
<td>01</td>
<td>20.0</td>
<td>03</td>
</tr>
<tr>
<td>Adenocarcinoma</td>
<td>01</td>
<td>20.0</td>
<td>-</td>
</tr>
<tr>
<td>Squamous cell carcinoma</td>
<td>-</td>
<td>-</td>
<td>01</td>
</tr>
<tr>
<td>Total</td>
<td>05</td>
<td>100.0</td>
<td>06</td>
</tr>
</tbody>
</table>

Table V:

Distribution of different types of benign neoplasm in parotid and submandibular gland (Histopathologically confirmed) (n=38)

<table>
<thead>
<tr>
<th>Different types of neoplasm</th>
<th>Parotid (n=30)</th>
<th>Submandibular (n=8)</th>
<th>Total (n=38)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>%</td>
<td>n</td>
</tr>
<tr>
<td>Pleomorphic adenoma</td>
<td>23</td>
<td>76.7</td>
<td>07</td>
</tr>
<tr>
<td>Warthin’s tumour</td>
<td>05</td>
<td>16.7</td>
<td>0</td>
</tr>
<tr>
<td>Oncocytoma</td>
<td>01</td>
<td>3.3</td>
<td>0</td>
</tr>
<tr>
<td>Haemangiomia</td>
<td>01</td>
<td>3.3</td>
<td>01</td>
</tr>
<tr>
<td>Total</td>
<td>30</td>
<td>100.0</td>
<td>8</td>
</tr>
</tbody>
</table>

Table VI:

Distribution of different malignant neoplasm in parotid and submandibular gland (after histopathology) (n=12)

<table>
<thead>
<tr>
<th>Different types of neoplasm</th>
<th>Parotid (n=06)</th>
<th>Submandibular (n=06)</th>
<th>Total (n=12)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>%</td>
<td>n</td>
</tr>
<tr>
<td>Mucoepidermoid carcinoma</td>
<td>03</td>
<td>50.0</td>
<td>01</td>
</tr>
<tr>
<td>Adenoid cystic carcinoma</td>
<td>02</td>
<td>33.3</td>
<td>03</td>
</tr>
<tr>
<td>Adenocarcinoma</td>
<td>01</td>
<td>16.7</td>
<td>01</td>
</tr>
<tr>
<td>Squamous cell carcinoma</td>
<td>-</td>
<td>-</td>
<td>01</td>
</tr>
<tr>
<td>Total</td>
<td>06</td>
<td>100.0</td>
<td>06</td>
</tr>
</tbody>
</table>

Discussion:

In present study the mean age in benign cases was 41.11 years with SD ± 7.35 and in malignant cases was 47.25 years with SD ± 6.85. This result corresponded with a study where mean age for benign and malignant tumour was 41.3 years and 47 years respectively. Chattarjee and Panda showed in their study, for benign neoplasm mean age was 35.5 years and for malignant neoplasm, mean age was 47.5 years.
In our study, 72% neoplasms were involved the parotid gland and 28% involved the submandibular gland. This result consistent with a study where they found 74% parotid gland involvement and 26% submandibular gland involvement\(^9,10\). In present study, out of 14 submandibular glands tumours, 08 (57.1%) were benign and 06 (42.9%) were malignant. Benign tumours are more common in parotid gland 31(86.1%) and malignant tumours are relatively more common in submandibular gland 42.9%. Statistically malignant neoplasm was significantly common in submandibular gland. Nagarkar et al. showed that 80% salivary gland tumours were of parotid gland and 15% submandibular gland of which 80% of parotid tumours and 50% of submandibular tumours were benign\(^11,12\). Tsai et al. showed that 85% major salivary tumours are benign and 12% malignant\(^13\). Similarly in Huq et al. reported 85.1% of parotid tumours were benign and 14.9% tumour malignant\(^2\).

After doing fine needle aspiration cytology of the swelling, pleomorphic adenoma was the commonest benign neoplasm involving both parotid and submandibular glands 79.5%. In case of malignant neoplasm mucoepidermoid carcinoma was the commonest variety 45.5%.

In our study, after histopathological confirmation of the resected specimen, most common benign parotid neoplasm was pleomorphic adenoma 76.7%, followed by Warthin's tumour 16.7% and most common malignant parotid tumour was mucoepidermoid carcinoma 50.0% followed by adenoid cystic carcinoma 33.3%. In one series most frequent malignant neoplasm of parotid gland was mucoepidermoid carcinoma\(^6\). This is similar to our study.

In case of benign submandibular gland neoplasm, after histopathological confirmation, pleomorphic adenoma was the commonest benign tumour 87.5% followed by haemangioma 12.5%. Commonest malignant tumour of submandibular gland was adenoid cystic carcinoma 50.0%. In one study, commonest benign submandibular neoplasm was pleomorphic adenoma and adenoid cystic carcinoma was the commonest malignant neoplasm\(^10\). So, our study strongly correlates with that series. But doesn't correlate with another, where lymphoma was the most common malignant submandibular neoplasm\(^11\).

Histopathological examination of the surgically resected specimen was taken as gold standard, to compare the fine needle aspiration cytology report in our series. Here fine needle aspiration cytology findings of all 50 cases were compared with post-operative histopathological examination report. Out of 50 cases, 45 (90.0%) were accurately diagnosed pre-operatively by FNAC. In 5 cases fine needle aspiration cytology findings didn’t matched with post operative histopathological report.

In this series, out of 50 cases 39 cases were diagnosed as benign and 11 cases were diagnosed as malignant by fine needle aspiration cytology. Among 39 benign neoplasm reported on fine needle aspiration cytology, 36(72%) cases were confirmed as benign on final histopathological examination. So there were 3 cases 6% of false negative. Out of 11 cases reported as malignant lesion by FNAC, 9 were confirmed as malignant by histopathology. So there were 2 false positive results 4%. In accordance with present study Correiasa et al. reported when comparing FNAC and histological evaluation of the surgical specimen, an overall concordance of 78% (51/65) was established, 71% with malignant and 82% with benign cases on break up\(^14\). The overall diagnostic accuracy of their series was 87.5%, the sensitivity was 90.3% and specificity was 80%.
**Conclusion:**
Malignancy is more frequent in the submandibular gland neoplasm than in the parotid gland neoplasm and FNAC is a useful preoperative diagnostic tool. As FNAC partly depends on operator’s skill, it may give false negative and false positive result. So, every surgically resected specimen of parotid and submandibular gland neoplasm should be confirmed by histopathological examination.

**References:**
The study showed that most commonly (50%) involved group of occult metastasis was upper deep cervical lymph node in submandibular area (level-I). Occult nodal metastasis
was significantly common 87.5% among male patients than females (p=0.039) and also common 87.5% among <50 years age group (p=0.023). Neck node positive was significantly more 62.5% in $T_2$ lesion (p=0.002) of oral tongue carcinoma.

**Conclusion:** In this study, we found that a number of patients had been histopathologically detected micro-metastases in regional neck nodes in clinically N0 patients. So, Extended Supraomohyoid Selective neck dissection (I-IV) was appropriate in $T_1, T_2, N0$ Neck Oral Tongue Carcinoma.

**Key words:** Oral Tongue Carcinoma, Neck Node Metastasis, Selective Neck Dissection.

**Introduction:**
Carcinoma tongue is a common head-neck cancer. Among all oral cancer, carcinoma tongue is the commonest. Tongue squamous cell carcinoma has tendency for occult metastasis in early stage. The incidence of occult metastasis ranges from 20-30%. Oral tongue squamous cell carcinoma is very aggressive & prognosis is poor.\(^1, 2\)

The incidence of oral cancer is high in Asian countries especially in south and south East Asia like India, Pakistan, Bangladesh, Taiwan and Sri Lanka. People of this subcontinent practice betel –quid chewing and tobacco smoking and alcohol consumption. These are important risk factors for cancer of oral cavity. Low socioeconomic status, diet low in nutritional value, lacking vegetables, fruits contribute risk factors. In addition, viral infections such as Human Papilloma Virus (HPV) & Poor oral hygiene are also important risk factors. The mean age of cancer of oral cavity is usually 51-55 years in most countries. Most common site is the tongue among oral cancers.\(^3\)

The outcome of an early tongue carcinoma depends on various factors like age, tumor thickness or Depth Of Invasin (DOI) in underlying connective tissue, neck node metastasis, its extracapsular spread.\(^4, 5\) For measurement of tumor size & thickness, digital palpation, USG of tongue, MRI of tongue was done. Treatment of carcinoma tongue is done by Wide Excision with Neck Dissection depending up to stage of tumor. Biopsy for histopathology was done routinely.\(^6\)

Local invasion & distant metastasis is more common in early tongue carcinoma. Metastasis first to sentinel node & then to other cervical lymph nodes. It has a great impact on patient’s survival. Prognosis is related to tumor thickness & cervical lymph node metastasis.\(^5\) Most important prognostic factor is neck node metastasis. Survival rate lowers to 50% with neck node metastasis than without neck metastasis.\(^7, 8\) Clinical examination had a sensitivity of 75% & specificity of 80% to detect lymph nodes. Efficacy of USG, CT and MRI is compared to detect cervical lymph node metastasis. Clinical examination and CT scan detect 75-91% of neck metastasis.\(^9\)

Byers et al.\(^10\) did Supraomohyoid Neck Dissection (SOND) (level I-III) for primary tumors of oral cavity in N0 patients. In another study Byers showed skip metastasis in level III or IV in 15.8% patients with oral tongue carcinoma.

In a study, subsequent to diagnosis, treatment was given on stage at diagnosis. Survival after surgical treatment depends on pre-operative characteristics of tumor including thickness, positive nodes, differentiation of tumor, the surgery itself, performance of neck dissection & post-operative positive resection margin.\(^11-13\) Tumor thickness, presence of perineural invasion,
cervical metastasis all influence prognosis of tongue carcinoma. Patients with greater thickness has more chance to regional metastasis. The management of N0 patients consists followings: watchful waiting, neck dissection when metastasis detected or prophylactic Selective Neck Dissection (SND) with hispathological examination of specimen. Most to author is in favor of prophylactic Selective Neck Dissection which is important in diagnostically and therapeutically.

Several studies were done in abroad about the role of selective neck dissection, very few study was done in our country. In our study, after selective neck dissection, we found micrometastasis in a number (eight) of patients who were clinically N0 neck patients. This helped in formulating treatment of the patients. So, the importance of selective neck dissection in primary T_{1}, T_{2}, N0 neck oral tongue carcinoma was observed in this study.

Materials and Methods:
This cross sectional study was carried out in the department of Otolaryngology-Head & Neck Surgery at BSMMU, Dhaka Medical College Hospital and National Institute of ENT, Dhaka with the duration of 24 months July 2017 to June 2019. A total number of 30 patients with primary T_{1}, T_{2}, N0 neck oral tongue carcinoma was selected by purposive sampling technique who fulfill the inclusion criteria admitted into the hospital for selective neck dissection.

Selection criteria:
Inclusion criteria:

i. Early oral tongue carcinoma i.e. T_{1} (greatest diameter d<2cm, d<5mm DOI) and T_{2} (>2 cm but d>4 cm &> 5mm-d<10 mm DOI)

ii. Clinically non-palpable neck node.

Exclusion Criteria:

i. Tumor more than 4 cm in greatest diameter & depth of Invasion > 10mm.

ii. Tumor involving base of tongue or grossly invading floor of mouth

iii. Recurrent oral tongue carcinoma

iv. Carcinoma tongue as second primary carcinoma in oral cavity

v. Palpable neck node metastasis

vi. Radiologically detectable neck node.

Study Procedure: Patients with early oral tongue carcinoma, admitted in the department of Otolaryngology- Head & Neck Surgery, BSMMU; Dhaka Medical College Hospital and National Institute of ENT, Dhaka who had fulfilled the inclusion criteria were enrolled in this study. After taking informed written consent, detailed history was taken in a preformed questionnaire as a data sheet (instrument). Clinical examination was done to assess primary tumor and neck. Imaging (MRI) was done to measure tumour size, thickness, extension and neck assessment. After Surgery, tongue specimen & neck dissection specimens were sent for histopathological examination. Pathological size and thickness of tongue lesion was assessed. Histopathological examination of neck nodes at different levels were done to see whether metastasis was present or not. Pathological size>4cm & thickness> 10 mm (DOI) was excluded from the study.

Data processing and analysis: All the data were compiled and sorted properly. Data was processed and analyzed by using Microsoft office Excel 2010, software. The numerical data were analyzed statistically; results were expressed as percentage and mean ± SD. Chi-square (x^2) test or Fisher’s Exact test was done for comparison of data presented in categorical value. P-value <0.05 was considered as the level of significance.
Results:
Among 30 patients with early oral tongue carcinoma ($T_1$, $T_2$) with clinically N0 (absence of nodal metastasis), 17 males and 13 females (M:F=1.3:1), age ranged from 26 years to 78 years (mean $\pm$SD= 52.6$\pm$9.26). Among those patients 23 (76.7%) were in $T_1$ stage and remaining 7 (23.3%) patients were in $T_2$ stage. All patients were clinically and radiologically negative for nodal metastasis (N0). All patients had undergone wide excision of primary tumour with Extended Supraomohyoid Selective Neck Dissection (I-IV) for nodal sampling. This sampling revealed histologically positive in 8 (26.67%) patients and negative in 22 (73.33%) patients.

**Figure 1** $T$ (Tumour size) stage of the early Carcinoma of Oral Tongue (n=30)

<table>
<thead>
<tr>
<th>Variables</th>
<th>True N0</th>
<th>Occult N+ve</th>
<th>Total</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt; 50 years</td>
<td>9 (40.91%)</td>
<td>7 (87.5%)</td>
<td>16 (53.33%)</td>
<td>0.023*</td>
</tr>
<tr>
<td>&gt; 50 years</td>
<td>13 (59.09%)</td>
<td>1 (12.5%)</td>
<td>14 (46.67%)</td>
<td></td>
</tr>
<tr>
<td>Sex</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>10 (45.45%)</td>
<td>7 (87.5%)</td>
<td>17 (56.67%)</td>
<td>0.039*</td>
</tr>
<tr>
<td>Female</td>
<td>12 (54.54%)</td>
<td>1 (12.5%)</td>
<td>13 (43.33%)</td>
<td></td>
</tr>
</tbody>
</table>

**Table II** : Positive node sampling in relation to the age and gender of the patients in early Oral Tongue Carcinoma (n=30)

<table>
<thead>
<tr>
<th>Duration</th>
<th>Betel nut plus raw tobacco chewing</th>
<th>Smoking</th>
<th>Both (Betel nut plus raw tobacco chewing and smoking)</th>
<th>None</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 10 years</td>
<td>4 (14.8%)</td>
<td>2 (10.5%)</td>
<td>3 (15.0%)</td>
<td>0</td>
</tr>
<tr>
<td>10-20 years</td>
<td>6 (22.2%)</td>
<td>4 (21.1%)</td>
<td>5 (25.0%)</td>
<td>0</td>
</tr>
<tr>
<td>&gt; 20 years</td>
<td>17 (62.9%)</td>
<td>13 (68.4%)</td>
<td>12 (60.0%)</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>27 (100.0%)</td>
<td>19 (100.0%)</td>
<td>20 (100.0%)</td>
<td>3</td>
</tr>
</tbody>
</table>
Table IV:
Distribution of the patients by presenting symptoms, anatomical sites and macroscopic features (n=30)

<table>
<thead>
<tr>
<th>Variables</th>
<th>Frequency</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Presenting complaints</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ulcerated tongue</td>
<td>28</td>
<td>93.3</td>
</tr>
<tr>
<td>Dysphagia</td>
<td>22</td>
<td>73.3</td>
</tr>
<tr>
<td>Pain in tongue</td>
<td>18</td>
<td>60.0</td>
</tr>
<tr>
<td>Excess salivation</td>
<td>9</td>
<td>30.0</td>
</tr>
<tr>
<td>Earache</td>
<td>2</td>
<td>6.7</td>
</tr>
<tr>
<td>Anatomical sites</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lateral border of the tongue</td>
<td>22</td>
<td>73.3</td>
</tr>
<tr>
<td>Dorsum</td>
<td>4</td>
<td>13.3</td>
</tr>
<tr>
<td>Ventral surface</td>
<td>2</td>
<td>6.7</td>
</tr>
<tr>
<td>Tip of tongue</td>
<td>2</td>
<td>6.7</td>
</tr>
<tr>
<td>Macroscopic features</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ulcerative</td>
<td>20</td>
<td>66.7</td>
</tr>
<tr>
<td>Exophytic</td>
<td>6</td>
<td>20.0</td>
</tr>
<tr>
<td>Fungating</td>
<td>3</td>
<td>10.0</td>
</tr>
<tr>
<td>Infiltrative</td>
<td>1</td>
<td>3.3</td>
</tr>
</tbody>
</table>

Table V:
Categorization of early oral tongue carcinoma (T₁ and T₂) according to node positive status (n=30)

<table>
<thead>
<tr>
<th>T-Tumour size (greatest diameter in cm) and depth of invasion</th>
<th>N₀(%)</th>
<th>N+ve (%)</th>
<th>Total (%)</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>T₁ (≤2 cm)</td>
<td>20 (90.9%)</td>
<td>3 (37.5%)</td>
<td>23 (76.7%)</td>
<td>0.002^a</td>
</tr>
<tr>
<td>T₂ (&gt;2 - 4 cm)</td>
<td>2 (9.1%)</td>
<td>5 (62.5%)</td>
<td>7 (23.3%)</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>22 (100.0%)</td>
<td>8 (100.0)</td>
<td>30 (100.0)</td>
<td></td>
</tr>
</tbody>
</table>

Table VI:
Relation between tumor thickness and Neck Node metastasis among study subjects (N=30).

<table>
<thead>
<tr>
<th>Tumor thickness(mm)</th>
<th>Neck Node Metastasis</th>
<th>t-test</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Positive (n=8)</td>
<td>Negative(n=22)</td>
<td></td>
</tr>
<tr>
<td>Mean ± SD</td>
<td>5.55±1.07</td>
<td>2.88±0.75</td>
<td>8.32</td>
</tr>
<tr>
<td>Range</td>
<td>4.3 - 7.8</td>
<td>1.10 - 4.0</td>
<td></td>
</tr>
</tbody>
</table>
Most common 4 (50%) involved group was upper deep cervical lymph node in submandibular area (level-I) followed by level-II 3 (37.5%) and level-III 1 (12.5%).

**Discussion:**

The present study was conducted to determine the incidence of occult metastases in patients with T_1 and T_2 oral tongue carcinoma and to assess the pattern of involvement of cervical nodal metastasis in different lymph node levels. This cross-sectional study was conducted among 30 clinically N_0 patients with early T_1, T_2 Oral Tongue Carcinoma in three different tertiary hospitals in Dhaka.

The primary tumor was clinically T_1 in 23 (76.67%) patients and T_2 in 7 (23.33%) patients. Neck of all patients was clinically negative (N_0). Wide excision of primary tumour and Extended Supraomohyoid Selective Neck Dissection (I-IV) was done in all patients.

Among those patients, male were dominant. Total 17 (56.67%) male and 13(43.33%) females (M:F=1.3:1). In a different study in Pakistan it was 1.6:1^{15} and in India was 1.5:1.^{16} Incidence of tongue cancer in India is second highest in the world. Among males the age adjusted incidence rate is as high as 14/100,000 per year in Ahmedabad while among females it is 74/100,000 in Mumbai.

Age of the patients ranged from 26 years to 78 years (mean ±SD: 52.6±9.26). Highest frequency of age among the patients with early oral tongue carcinoma was in 4th decade 50%, next to this was in 5th decade 20%. Study in Pakistan^{15} the age of the patients ranged from 34 to 72 years, in India^{17,18} ranged from 22 to 75 years, These patients were exposed to risk factors for long time.

Most of the patients 90% with early oral tongue carcinoma had the habit of taking raw tobacco and betel nut chewing (Table-I). 63.3% patients had the habit of smoking and most of them were male. Our study is similar with other study^{20} who reported most of the patients were practicing betel nut with raw tobacco chewing 60.0% and smoking 64.7% more than 20 years.

Tongue ulceration was most common presenting feature 28 (93.3%) followed by dysphagia 22 (73.33%) and pain in tongue 18 (60%) (Table-IV). This study is similar with another study.^{21} The commonest involved site (Table-IV) of carcinoma was in lateral border of the tongue 73.3%. Ulcerative lesion was more common 66.7%, exophytic, fungating and infiltrative was 20%, 10% and 3.3% respectively (Table-IV). Ulcerative lesion was found common in early oral tongue carcinoma^{22,23}, Probably the reason is that tongue is a mobile organ. So any malignant growth which has less blood supply tends to become ulcerative with contact of sharp teeth.

Following selective neck dissection, neck node sampling revealed histologically positive for metastasis only in 8 (26.67%) patients; 22 (73.33%) patients revealed no metastases. Occult lymph node metastasis was more in
stage 62.65% of the carcinoma of oral tongue. The proportion of sampling node positive in the two different tumour stage (T\textsubscript{1}, T\textsubscript{2}) was significantly different (p= 0.002) (Table-5). Node positive found more in male patients (Table-II). This is similar to another study\textsuperscript{18}. This is because male are exposed to more risk factors like betel nut & tobacco chewing, smoking and alcoholism. Occult lymph node metastasis was common in patients less than fifty years (Table-III), similar to previous study\textsuperscript{18}. This group of patients were exposed to risk factors for long duration. The tumor size and depth of the tumor had important role in lymph node metastasis; larger tumor with more depth of invasion had more nodal metastasis (Table-VI).

Most commonly 50.0% involved group was upper cervical node in submandibular area (level-I), level- II and level-III were 37.5% and 12.5% respectively. There was no involvement of level- IV node (Figure-2). In a study\textsuperscript{16} they found that level- II lymph node was commonly involved 63.6% followed by level-I 51.5%, level-III 18.2% and level- IV 15.2%.

Elective neck treatment is traditionally recommended when risk of occult metastasis exceeds 20%. Present study demonstrated a 26.67% incidence of occult metastasis in primary T\textsubscript{1}, T\textsubscript{2} oral tongue carcinoma. So, Extended Supraomohyoid Selective Neck Dissection (I-IV) was justified in patients presenting with T\textsubscript{1}, T\textsubscript{2}, N\textsubscript{0} Neck Oral Tongue Carcinoma.

**Conclusion:**

This study revealed that a number 8 (26.67%) of patients had histopathologically detected micrometastases in the regional neck nodes in clinically N\textsubscript{0} patients. This was significantly common among male patients with T\textsubscript{2} stage of carcinoma and patients aged below fifty years. So, Extended Supraomohyoid Selective Neck Dissection was beneficial for treating primary T\textsubscript{1}, T\textsubscript{2}, N\textsubscript{0} Neck Oral Tongue Carcinoma. So, early Oral Tongue Carcinoma (T\textsubscript{1}, T\textsubscript{2}, N\textsubscript{0} neck) should be treated by surgery, wide excision maintaining safe margin accompanied by Extended Supraomohyoid Selective Neck Dissection (SOSD)+ followed by Radiotherapy.

**References:**


Outcome of Total Laryngectomy in Regional Hospitals of Bangladesh

M Saiful Islam¹, Md Shahjahan Kabir², Md. Abdullah Al Harun³, Md. Abdur Razzak⁴, Mohosana Khanam⁵, A K M Shaif Uddin⁶, A K M A Sobhan⁷, M A Matin⁸

Abstract:

Objectives: To analyze post operative complications, local recurrence, functional outcome of speech & swallowing and survival rate following total laryngectomy.

Methods: This prospective observational study was done in four major tertiary care medical college hospitals of Bangladesh from July 2000 to December 2019. All operations were done by a single surgeon, one of the authors of this study based on the personal experience. 45 patients were selected who underwent total laryngectomy for biopsy proven advanced (T₃ and T₄) laryngeal cancer as primary case & recurrent cases following radiotherapy. Patients were followed up monthly for three months and then six monthly for two years and yearly for rest of their life.

Results: Age of the patients ranged from 42 to 80 years with mean age 56.7 years. In postoperative period 03 (6.6%) patients developed wound infection, 03 (6.6%) stomal stenosis, 03 (6.6%) stomal recurrence, 02 (4.4%) seroma, 02 (4.4%) pharyngo-cutaneous fistula and 01 (2.2%) case developed pharyngeal stenosis. In post laryngectomy voice rehabilitation 33 (73.3%) cases used esophageal voice, 07 (15.5%) cases used electrolarynx and 05 (11.1%) cases used bloom singer valve. Out of oesophageal speech, 2 patients had poor speech, Regarding swallowing all patients had very good swallowing except one patient who got pharyngeal stenosis, needed dilation. 3 patients died in subsequent 2 years follow-up and overall survival was 93.3%.

Conclusion: Outcome of total laryngectomy depends on site and size of tumour, nodal metastases, recurrent cases and co-existing co-morbidities. Total laryngectomy with or without radiotherapy offers significantly higher local control and survival benefit with advanced laryngeal cancer, compared to radiotherapy only.

Key words: Carcinoma larynx, total laryngectomy, complications.

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Introduction:
Incidence of head and neck cancer is increasing day by day all over the world including Bangladesh. It accounts for 4% of new malignancy in the USA each year. Laryngeal cancer is the commonest carcinoma of the head and neck region. A higher incidence of laryngeal carcinoma has been reported from Asian population. Carcinoma larynx is an important malignancy in head and neck region. It represents 1% of all malignancies. Despite advances in chemoradiotherapy (RT), surgery continues to play an important role in the management of advanced laryngeal cancer. Laryngeal carcinomas are identified by their location in one of three anatomic regions: supraglottic, glottic, or sub-glottic. Symptoms of laryngeal cancer also vary according to location, size and degree of tumour invasion. Advanced T3 and T4 laryngeal carcinoma may present with hoarseness of voice, dysphagia or with compromised airway. The treatment of patients with laryngeal carcinoma should be planned to provide optimal survival, free of disease with maximum functional results. The treatment for T1 and T2 lesions usually involves radiotherapy or endoscopic surgery with or without laser. Total laryngectomy alone or in conjunction with neck dissections and/or radiotherapy with or without chemotherapy is used for advanced T3 and T4 lesions. The British Medical Journal Best Practice Guide suggests that treatment of advanced T3-T4 glottic carcinoma should involve either concurrent chemoradiotherapy or surgery. For T3 glottic carcinoma chemoradiation or surgery will not offer any further benefit in overall survival and cancer specific survival. Patients with T3 laryngeal carcinoma (glottic or supraglottic) treated surgically with or without radiotherapy, have higher overall survival compared to patients treated nonsurgically with RT, with or without chemotherapy.
Inclusion criteria:
1. $T_3-T_4$ laryngeal cancer with or without lymph node metastases.
2. Recurrent laryngeal cancer following chemoradiation.

Exclusion criteria:
1. $T_1$ & $T_2$ laryngeal cancer
2. Advanced laryngeal cancer involved pyriform fossa, tongue base.
3. Patients with COPD and co-existing morbidities. Patients undergoing partial laryngectomy were also excluded from this study.

Every patient was selected pre-operatively by CT scan of Neck, thorough clinical examination and Direct Laryngoscopy under general anesthesia to see the primary site and extension and biopsy was taken for histological confirmation of diagnosis. Preoperative counseling regarding the nature, consequences and outcome of the disease was done. Surgery of all the patients were performed in four tertiary level hospitals with best possible facilities. All operations were done by a single surgeon, one of the authors of this study based on his personal experience. Regular post operative monitoring were done to assess any post-operative complications. Oral feeding was started on 11 to 12th postoperative day and between fourteen to twenty days all patients were discharged from hospital and a regular follow up visit record was maintained. Patients were followed up monthly for three months and then six monthly for two years and yearly for rest of their life. The patients were examined at regular intervals monthly for three months. Functional and quality of life was assessed regarding speech and swallowing. Later on patients were called for follow up after every six months for one year. During follow up the patients were examined and searched for complications, if any. Records were maintained during their visit.

Results:
Age of the patients ranged from 42 to 80 years with mean age 56.7 years. Out of 45, 44 were male and 1 was female patient with male female ratio 44:1. Topographically 29 (64.4%) cases were supraglottic, 15 (33.3%) cases were glottic tumors and 1 (2.2%) case was subglottic (Figure-1). Among these patients 34 (75.5%) cases were done as primary surgery and rest 11 (24.5%) cases were done in recurrent cases following chemoradiation (Table-I). Most common symptoms were dysphagia 77.7% followed by hoarseness of voice 73.3% and stridor 55.5%. Regarding treatment procedure, total laryngectomy with neck dissection followed by chemoradiation 27 (60%), total laryngectomy 10 (22.2%), followed by total laryngectomy with postoperative radiotherapy 08 (17.8%) (Table-II). In postoperative follow up 3 (6.6%) patients developed wound infection, 3 (6.6%) stomal stenosis, stomal recurrence 3 (6.6%), 2 (4.4%) patients developed seroma, 2 patients 4.4% developed pharyngo-cutaneous fistula, 1 patient (2.2%) developed pharyngeal stenosis (Table-III). Regarding voice rehabilitation esophageal voice developed in 33 patients 73.3%, 7 patients 15.6% used electrolarynx, 5 (11.1%) patient used Bloom singer valve (Table IV). During postoperative follow up, one patient died after two months, one patient on six month and one patient on 12 months. Rest of the patients were followed up to two years without any recurrence. So 2 years survival was 93.3% and 5 years survival was not recorded as because most of the patients were lost from follow up after 2 years excepting 1 patient who survived up to 19 years following laryngectomy. All operations were done by single surgeon.
Table IV:
Post laryngectomy voice rehabilitation (n=45)

<table>
<thead>
<tr>
<th>Voice</th>
<th>Number</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Esophageal voice</td>
<td>33</td>
<td>73.3</td>
</tr>
<tr>
<td>Electrolarynx</td>
<td>07</td>
<td>15.5</td>
</tr>
<tr>
<td>Bloom singer valve</td>
<td>05</td>
<td>11.1</td>
</tr>
</tbody>
</table>

Figure-1: Topographical distribution (n=45)

Table I:
Number of surgery (n=45)

<table>
<thead>
<tr>
<th>Operations</th>
<th>Number</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary cases</td>
<td>34</td>
<td>75.5</td>
</tr>
<tr>
<td>Recurrent cases</td>
<td>11</td>
<td>24.5</td>
</tr>
</tbody>
</table>

Table II:
Treatment procedures (n=45)

<table>
<thead>
<tr>
<th>Types of surgery</th>
<th>Number</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total laryngectomy with neck dissection (II, III, IV, V)</td>
<td>27</td>
<td>60.0</td>
</tr>
<tr>
<td>followed by chemo radiation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total laryngectomy</td>
<td>10</td>
<td>22.2</td>
</tr>
<tr>
<td>Total laryngectomy followed by post operative radiotherapy</td>
<td>08</td>
<td>17.8</td>
</tr>
</tbody>
</table>

Table III:
Post operative complications (n=45)

<table>
<thead>
<tr>
<th>Complications</th>
<th>Number</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wound infection</td>
<td>03</td>
<td>6.6</td>
</tr>
<tr>
<td>Stomal stenosis</td>
<td>03</td>
<td>6.6</td>
</tr>
<tr>
<td>Stomal recurrence</td>
<td>03</td>
<td>6.6</td>
</tr>
<tr>
<td>Seroma</td>
<td>02</td>
<td>4.4</td>
</tr>
<tr>
<td>Pharyngocutaneous</td>
<td>02</td>
<td>4.4</td>
</tr>
<tr>
<td>Fistula</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pharyngeal stenosis</td>
<td>01</td>
<td>2.2</td>
</tr>
</tbody>
</table>

Figure-2: Post laryngectomy specimen.

Figure-3: Post laryngectomy patient at 2 years follow up
Discussion:
This prospective observational study focused on complications following total laryngectomy, functional status regarding swallowing and speech, local recurrence and survival of patients with locally advanced T3-T4 laryngeal cancer. One study done by Spector et al, on 96 patients of T4 glottic carcinoma all except 7 underwent total laryngectomy with neck dissection and postoperative radiotherapy showed 75% locoregional control with 18% local recurrence. In Bangladesh the cancer of larynx and hypopharynx comprised around 21% of all cancer in males. In this study age distribution of laryngeal carcinoma ranged from 42 to 80 years with mean age 56.7 years. This finding is almost consistent with the study of Aslam MJ et al. In this series, among 45 patients, 29(64.4%) had supraglottic growth, 15(33.3%) had glottic growth and 1(2.2%) had subglottic growth (Figure-1). The incidence of supraglottic growth is higher in our country.

In the present study, pharyngo-cutaneous fistula developed in 2(4.4%) patients (Table-III) but one study of Parikh SR et al, who in large series of 125 patients of laryngectomy reported 22% incidence of fistula. The highest incidence of pharyngo-cutaneous fistula was reported as 66% by Bresson K et al. The lowest incidence of pharyngo-cutaneous fistula (2%) was reported by Thawley SE which is similar to our study. Esophageal speech was the mainstay of alaryngeal communication until the early 1980s and had been used as a method of voice restoration for over 100 years. In our series out of 45 patients 33 (73.3%) used oesophageal voice (Table-IV). Although fistula voice is the most effective way of post laryngectomy voice rehabilitation but the prosthesis is very expensive for the patients, so we encouraged oesophageal voice.

Conclusion
Although organ preservation is more preferable than organ sacrifice but most of the patients presented with advanced laryngeal cancer with nonfunctional larynx where total laryngectomy with or without radiotherapy offered good disease free survival and better functional outcome with minimal postoperative complications.

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Figure-4 : Post laryngectomy patient with Bloom Singer valve.
announcing the diagnosis to long Total Laryngectomy 37 JUMHS January-
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Outcomes of Canal Wall Down Mastoidectomy following Type III Tympanoplasty

Shoukat Ali¹, S.M. Masudul Alam², K.M. Nurul Alam³, K.M. Mamun Morshed⁴, Sirajul Islam Mahfuz⁵, Md. Mosleh Uddin⁶

Abstract:

Objectives: To see the hearing outcomes following Type III tympanoplasty with stapes columella grafting after canal wall down mastoidectomy and find out the recurrence rates in patients undergoing this procedure.

Methods: This prospective observational study includes 120 cases undergoing Type III tympanoplasty with stapes columella grafting following canal wall down mastoidectomy for cholesteatoma at a tertiary care center from 2018 to 2020. Patient charts were reviewed for demographic data, diagnosis, and operative details. Patients were included in statistical analysis if they were found to have undergone the aforementioned procedure. Evaluation of hearing improvement was made by comparing preoperative air-bone gap (ABG) and ABG at follow-up at 6 months and 1 year postoperatively.

Results: One hundred and twenty patients were included for this study. Erosion of the otic capsule, posterior fossa plate, or tegmen was noted in 20% of cases, highlighting disease severity. One hundred and two (85%) had undergone prior otologic surgery. Mean time to short-term follow-up was 6 ± 3 months. The average short-term ABG was 25 ± 12 dB HL; 36% achieved an ABG <20 dB and thirteen had follow-up at least 1 year postoperatively (mean = 33 ± 16 months). At longer-term follow-up, mean ABG was 24 ± 11 dB HL. Hearing remained stable over time (P = .26).

Conclusion: In some patients undergoing canal wall down mastoidectomy for advanced or recurrent cholesteatoma, Type III tympanoplasty with stapes columella grafting yields marginal hearing benefit.

Keywords: outcomes, hearing loss, tympanoplasty, mastoidectomy

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Introduction:
Treatment of chronic otitis media and cholesteatoma comprises clearance of disease and reproducing an adequate ventilation pathway to prevent recurrence of tympanic membrane (TM) retraction or cholesteatoma formation. Surgical management of chronic otitis media is aimed to eradicate the disease, where hearing restoration is considered as secondary importance. Traditionally, canal wall up (CWU) mastoidectomy has been associated with a higher risk of disease recurrence or need for reoperation than is seen with modified radical or canal wall down (CWD) mastoidectomy. Though, CWU tympanomastoidectomy may preserve more native anatomy, and can lead to improved hearing outcomes and is often considered as an primary surgical approach. Where disease burden is more or revisions are required, CWD is often performed in those cases. CWD mastoidectomy allows greater access to the middle ear for more adequate disease clearance, in many cases obviating the need for a second-look procedure prior to ossicular reconstruction.

But this removal of the canal wall reduces the volume of the middle ear cavity may cause more exposure to the middle ear via CWD procedures which can be difficult for ossicular reconstruction as. Sometimes partial or total ossicular chain reconstruction (PORP or TORP) can be attempted depending on individual case status, but due to be minimal space between the stapes and the neo-tympanic membrane in ears with a CWD cavity these options are often not feasible. However, if standard prosthetics can be used to reconstruct the ossicular chain good results are often achieved. There is an alternative to prosthetic ossicular chain reconstruction which is Type III tympanoplasty with stapes columella grafting. In this technique, cartilage or other tissue used to fashion a neo-tympanic membrane is placed directly onto the capitulum of a mobile stapes. This paper aims to describe the experience with Type III tympanoplasty with stapes columella grafting in patients undergoing CWD mastoidectomy at a single institution.

Materials and Methods:
It is a prospective observational study of two years from 2018 to 2020 at a tertiary care specialized hospital in Bangladesh. Prior to the study Ethical Review Board approval is obtained from the institution. In this study we have taken all cases of Type III tympanoplasty with stapes columella grafting in CWD mastoidectomy performed over a 2 year period.

To find out whether the patient undergone ossicular reconstruction in any capacity, CPT codes are routinely done. All information are kept in an excel sheet and updating and clearance was done for all patients who had undergone Type III tympanoplasty with stapes columella grafting following CWD. Information was collected on demographic and clinical variables including the age of the patient at surgery, gender, and various characteristics regarding the disease burden of the individual patients and operative findings. We also collected data regarding the presence or absence of drainage and/or cholesteatoma at the time of surgery, presence or absence of the ossicles, and whether this was an initial or revision surgery. Using the above factors, an Ossiculoplasty Outcomes Parameters Staging (OOPS) index score was calculated for each patient. This index attempts to predict likelihood of success in ossiculoplasty based on middle ear status and includes items such as presence or absence of drainage, middle ear mucosal status, type of mastoidectomy performed, presence or absence of the malleus, and whether the surgery is a revision.
Operative technique involved CWD mastoidectomy. In this technique, the canal wall is removed medially to the level of the facial ridge and typically to the level of the facial nerve itself. In the study place the surgeon removes ossicles, apart from the stapes, if still present. Cartilage, typically harvested from the tragus, is placed over the capitulum of the stapes, and fascia is placed over the cartilage to complete the tympanoplasty. Cartilage is used routinely in all instances of stapes major columella grafting as opposed to fascia only grafting.

For analysis both pre and post postoperative audiometric data are collected. The audiometric data collected included air and bone conduction thresholds recorded at 0.5 kHz, 1 kHz, 2 kHz, and 3 kHz as is in accordance with the guidelines set forth by the American Academy of Otolaryngology-Head and Neck Surgery\(^\text{15}\). This allowed for determination in changes of ABG and assessment of hearing improvement postoperatively. Statistical analysis was conducted using SPSS, version 23. (IMB, Armonk, New York, USA) to see the significant change between pre- and postoperative ABG.

**Results:**

Between the years of 2018 and 2020, 168 consecutive ossiculoplasty have been performed at the study place. Out of 120 cases (<0.01%) were Type III tympanoplasty with stapes columella grafting. The mean age at the time of surgery was 43 ± 14.2 years; 65% (n = 13) of patients were male. Baseline disease-specific and operative characteristics are summarized in Table 1. The mean preoperative air conduction pure tone average (AC PTA) and ABG were 49.20 dB HL and 28 ± 13 dB HL, respectively. Eighteen patients had moderate to severe sensorineural hearing loss preoperatively (median = 62 dB HL; range, 55-65 dB HL) with poor word recognition (median = 35%; range, 29%-41%) and were excluded from further analyses assessing improvement in conductive loss.

In regards to middle ear status, the OOPS index was calculated for each patient to determine the likelihood of success with OCR based on middle ear status. All patients had scores of 4 or greater. Sixty six patients (55%) had an absent malleus secondary to middle ear disease, and the remaining fifty four (45%) had their malleus removed due to either partial erosion or lack of continuity.

<table>
<thead>
<tr>
<th>Patient Characteristics</th>
<th>No. (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Diagnosis</strong></td>
<td></td>
</tr>
<tr>
<td>COM with cholesteatoma</td>
<td>120(100)</td>
</tr>
<tr>
<td>COM without cholesteatoma</td>
<td>00(00)</td>
</tr>
<tr>
<td><strong>Ossicles</strong></td>
<td></td>
</tr>
<tr>
<td>Normal</td>
<td>00(00)</td>
</tr>
<tr>
<td>Abnormal, malleus present</td>
<td>120(100)</td>
</tr>
<tr>
<td>Abnormal, malleus absent</td>
<td>00(00)</td>
</tr>
<tr>
<td><strong>Status of mastoid preoperatively</strong></td>
<td></td>
</tr>
<tr>
<td>Intact canal wall mastoidectomy</td>
<td>24(20)</td>
</tr>
<tr>
<td>Canal wall down mastoidectomy</td>
<td>116(80)</td>
</tr>
<tr>
<td><strong>Revision surgery</strong></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>102(85)</td>
</tr>
<tr>
<td>No</td>
<td>18(15)</td>
</tr>
<tr>
<td><strong>Labyrinthine fistula</strong></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>18(15)</td>
</tr>
<tr>
<td>No</td>
<td>102(85)</td>
</tr>
<tr>
<td><strong>Tegmen erosion</strong></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>12(10)</td>
</tr>
<tr>
<td>No</td>
<td>108(90)</td>
</tr>
</tbody>
</table>

With the remainder of the ossicular chain. Finally, 42 patients (35%) were found to have chronic drainage, and 102 patients (85%) were undergoing revision surgery. It is noted...
that all patients were found to have good aeration of the neotympanum in follow-up, indicated by mobility of the membrane on pneumatic otoscopy.

The mean time to short-term follow-up was 6 ± 3 months. The average short-term ABG was 25 ± 12 dB HL, yielding a mean ABG improvement of 6 ± 11 dB HL. The improvement in preoperative to postoperative ABG at short-term follow-up was not statistically significant (P=.06). Thirty six percent of patients achieved an ABG d"20 dB. The mean postoperative AC PTA was 47 ± 15 dB HL.

Seventy eight patients had followed up at least 1 year post operatively (mean = 29 ± 17 months). At longer duration follow up, the mean ABG was 24 ± 11 dB HL, with an improvement of 8 ± 12 dB on average. The improvement in preoperative to postoperative ABG was not significant (P=.26). Forty two percent of patients achieved an ABG d"20 dB beyond 1-year postoperatively. The mean long-term AC PTA was 49 ± 19 dB HL.

Discussion:
Type III tympanoplasty with stapes columella grafting is a technique for ossicular reconstruction in which cartilage or other graft material for the neo-tympanic membrane is placed directly on the stapes capitulum. This requires a mobile stapes to allow for any chance at meaningful hearing postoperatively. At our institution, this type of reconstruction is performed most commonly in patients undergoing CWD mastoidectomy. Even in these patients, other methods to reconstruction (PORP or TORP) are sometimes feasible. We perform stapes columella grafting tympanoplasty when there is contracted neo-tympanum secondary to either disease or the mastoidectomy, thus limiting the available space for placement of a prosthesis.

In the current study it is found that there is hearing improvement post operatively with stapes columella grafting but no significance analysis was performed. Despite lack of significance, some patients did have marginal hearing benefit with this type of reconstruction. In this patient population, disease clearance is the more important factor given that nearly all of these patients were undergoing revision surgery. In fact, 102 patients (85%) had previously had CWD procedures. Patients requiring CWD mastoidectomy may have severe disease at baseline as CWD procedures frequently are reserved only for patients in whom cholesteatoma cannot be safely removed with a canal wall sparing approach. In this series as we have attempt reconstruction, hearing outcome is better. Most importantly, patients undergoing revision procedures clearly have had difficulty with disease control previously. The low revision rate following surgery with this technique highlights its usefulness as a potential means for reconstruction following CWD procedures.

Few other studies exist regarding this type of procedure in this patient population. Parveen16 reported on 30 patients who had OCR with Type III tympanoplasty following modified radical mastoidectomy in 2013. In this study, 43.3% of the patients had AGB closure of 20 dB or less, and 6.7% had ABG closure of 30 dB or less, similar to the results found in this study. In that particular study, 102 patients underwent Type III tympanoplasty without augmentation, indicating that a fascia-only graft was utilized. Only 30 patients had cartilaginous grafts, which was performed routinely in our study. Shresha et al17 showed a reduction in the mean AB 37.8 dB to 29.8 dB, which did show statistical significance, though the authors note that there was wide variation in hearing outcomes between patients. Although our results did not show statistically significant improvement between pre-and postoperative levels, the
mean ABG of 25±12 dB at 1 year postoperatively is lower than the mean ABG in the Shresha et al\textsuperscript{17} study.

Merchant et al\textsuperscript{18,19} previously published results on Type III tympanoplasty with stapes columella grafting. In 1 study,\textsuperscript{18} the authors describe 34 cases of stapes columella grafting with an aerated middle ear using fascia only and just 9 instances of fascia-cartilage grafting (similar to the procedure described in this article). They determined that fascia-cartilage grafting led to improved hearing results and middle ear aeration additionally led to better hearing outcomes\textsuperscript{18}. In this initial report by Merchant et al\textsuperscript{18}, there is no discussion of length of follow-up or rates of disease control. The importance of tympanic membrane mobility and its middle ear aeration is highlighted by this study as patients with poor middle ear aeration postoperatively were noted to have significantly worse hearing outcomes. Middle ear aeration allows for increased conduction of sound to the oval window even when there is no ossicular reconstruction.\textsuperscript{13} In our cohort, all patients were found to have good aeration postoperatively despite a contracted neo-tympanic space. It is likely that there would have been poorer outcomes had there been poor middle ear aeration following tympanoplasty.

In further review of their patients, Merchant et al\textsuperscript{19} commented on an additional 8 patients, bringing the total cohort to 17 patients. They again described a significant improvement in cartilage grafting over fascia only grafting\textsuperscript{19}. They stated that disease-free ears should be achievable in 90% or more of the patients undergoing this procedure.\textsuperscript{19} Similarly, in our institution, we routinely use cartilage grafting. While some of the patients in the present cohort did not experience as robust improvement in their hearing compared to those in Merchant et al’s\textsuperscript{19} study, the majority of patients in this cohort did have serviceable hearing following surgery. Of note, in these studies, Merchant et al\textsuperscript{18,19} compared different subsets of patients and the procedures that were performed rather than comparing hearing results from pre and postoperative levels. As such, it is unclear how much patients improved in these studies from their preoperative state.

In all cases described in this series, the malleus was either absent (n = 12) or removed (n = 7) at the time of surgery. By Merchant et al.\textsuperscript{19} Presence of the malleus has been shown in previous studies to be an important prognostic indicator for outcomes following tympanoplasty\textsuperscript{14,20,21}, though its relevance specifically in CWD mastoidectomy is less clear. In some instances, the malleus is of primary importance because it is used during placement of prostheses. In cases of CWD mastoidectomy with a contracted neotympanum, the malleus could potentially be an impediment to ossicular reconstruction of tympanoplasty. Although this series does not definitively show a benefit in removing the malleus in these patients, stapes columella grafting in CWD mastoidectomy is ultimately made easier by its removal.

As noted previously, patients undergoing CWD mastoidectomy are more likely to have disease that is more difficult to control. In other instances, these patients typically have undergone 1 or more canal wall–sparing procedures in an effort to preserve hearing through more conservative surgery. It is prudent that control of disease takes priority in order to prevent more serious complications in the future, such as labyrinthine fistula or encephalocele. Some of the patients in our present study were noted to have already suffered these complications at time of surgery. Our results indicate that even in patients with complex disease, CWD with stapes columella tympanoplasty is a safe
procedure with excellent disease control rates, even for patients who have had disease that has proven to be difficult to control previously. Moreover, in some patients, there is a reasonable chance for improvement in hearing without placement of prosthetic that may prove to be quite difficult in a contracted neotympanum.

The present study does have limitations. First, despite the large number of patients treated for chronic ear disease at our institution, only 120 cases met the criteria for this study. The number of patients that had follow-up extending beyond a year was even less. As such, the ability to draw statistically significant conclusions is somewhat limited. Additionally, given the low numbers in this study, we considered longer-term follow-up to be a year or more. Ideally, assessment of hearing outcomes would involve following patients for at least 2 years or more as complications or hearing deficit can develop greater than 2 years out from surgery with other types of ossicular reconstruction. Finally, patients with better hearing outcomes may be less likely to follow up long-term, and as such there is potential for selection bias wherein only the patients with worse hearing outcomes achieved long-term follow-up in this study.

Conclusions:
Type III tympanoplasty with stapes columnella grafting leads to varying rates of hearing improvement following canal wall down mastoidectomy. Though the improvement vary with patient but recurrence rates of cholesteatoma is less. and as such, this should be considered a safe means of ossicular reconstruction for patients undergoing canal wall down mastoidectomy.

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Original Article

Frequency of COVID-19 Infection in Patients with Sudden Loss of Smell

Md. Harun Ar Rashid Talukder¹, Shariff Asfia Rahman², Ahmmad Taous³, Md. Abul Hasnat Joarder⁴

Abstract:

Background: The novel human corona virus disease (COVID-19) is the fifth documented pandemic in history since the 1918 flu pandemic. Along with other clinical features, loss of smell has been reported as a prime symptom in COVID-19 positive patients. The aim is to determine the frequency of COVID-19 infection in patients who came with a history of the sudden development of loss of smell.

Materials & Methods: This study was done in Uttara Crescent Hospital, a private hospital in Dhaka, Bangladesh. Data were collected retrospectively from hospital records in between 01 April 2020 and 30 November 2020, total 48 patients were included in this series. All the patients came with history of fever, sore throat, cough, loss of smell and altered taste, proper history were taken and examined. The patient with suspected COVID-19 infection was sent for RT-PCR testing. About 24 patients were included in the study with the history of loss of smell with or without other symptoms from the recorded data.

Results: Among the 48 patients male were 34 and female 14. The age of the patients was in between 13 and 64 years. COVID-19 infection was confirmed in 34 patients (70.83%) in RT-PCR testing.

Conclusion: Loss of smell is a significant symptom of COVID-19 infection, along with other symptoms. In the current study, the prevalence of COVID-19 infection is 70.83% in patients with history of sudden loss of smell. It does not reflect the country’s actual picture because of a minimal number of study populations. Further study is needed find out prevalence in Bangladesh.

Keyword: COVID-19, loss of smell, SARS-CoV-2, Corona virus.

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Introduction:
The novel human corona virus disease COVID-19 is the fifth documented pandemic in history since the 1918 flu pandemic. Corona virus disease 2019 (COVID-19) is a highly contagious disease which affect respiratory and vascular system. The disease is caused by severe acute respiratory syndrome corona virus 2 (SARS-CoV-2) is a novel corona virus. The disease was first identified in December 2019 in Wuhan, China and the virus first isolated from three people with pneumonia connected to the cluster of acute respiratory illness cases in Wuhan. Since then the whole world is infected subsequently. The Chinese authorities gave the name novel corona virus (nCoV). On 11 February 2020 WHO announced the name of the disease as Corona virus disease-19 (COVID-19) and the name of virus as Severe acute respiratory syndrome corona virus 2 (SARS-CoV-2).

Fever, cough, fatigue, shortness of breath or breathing difficulties and loss of smell & taste are the most common symptoms. Incubation period is ranging from one to fourteen days. Mode of spread of the disease is thought to spread through respiratory route by both droplet and aerosol after infected person cough, sneezes, talks or breathes in close contact.

Olfactory dysfunction following the upper respiratory tract infections may be allergic, bacterial or viral are common. Post-viral anosmia has been reported in previous studies. Nasal mucosa damage and nervous system involvement are found as the probable causes, however, the exact pathogenesis remains unclear.

Mao et al. initially reported on neurological symptoms of COVID-19 in February 2020. Since then different authors have reported that a recent increase in patients presenting with anosmia in COVID-19 pandemic has been reported by different authors. Because of increasing awareness olfactory and taste dysfunction as potential early symptoms of COVID-19 infection CDC recently added “new loss of taste or smell” to its list of symptoms that may appear 2 to 14 days after exposure to COVID-19.

The mucosa of nasal and paranasal sinus cavities is increasingly recognized for COVID 19 infection and transmission. It may be a major site of infection by SARS CoV 2, where susceptibility of genes required for infection are expressed at high levels and may be modulated by environmental and host factors.

Kevin Jiang in 24 July 2020 published a paper in Harvard medical school webpage in research section the cause of loss of smell. Renowned researchers led by neuroscientists identified that olfactory sensory neurons do not express the gene that encodes the ACE2 receptor protein, which SARS-CoV-2 uses to enter human cells instead ACE2 is expressed in cells that provide metabolic and structural support to olfactory sensory neurons, as well as stem cells and blood vessel cells. The findings indicate that the novel corona virus changes the sense of smell in patients not by directly infecting neurons but by affecting the function of supporting cells and the loss of smell is temporary.

In the consultation center patients used to come with impairment of smell with different causes. But during this pandemic period history is little different. So far in my knowledge I did not find any article on prevalence of COVID-19 infection in patients with anosmia in Bangladesh perspective. This study was conducted in a very small number of populations my private consultation center.
which does not reflect the real scenario of prevalence of COVID-19 infection in patients with history of loss of smell of the country.

**Materials and Methods:**
This study was done in Uttara Crescent Hospital, a private hospital in Dhaka, Bangladesh. Data were collected retrospectively from hospital records in between 01 April 2020 and 30 November 2020. Patients came with history of different features like fever, sore throat, cough, loss of smell and altered taste, detailed history were taken and examined. All the patients with suspected COVID-19 infection were sent for RT-PCR testing. About 48 patients were included in the study with the history of loss of smell with or without other symptoms from the recorded data and analyzed.

**Results:**
Total number of patients in the study population was 48, male 34 and female 14. Lowest age was 13 years and highest 64 years. Among the 48 patients 34 (70.83%) were confirmed as COVID-19 infection by RT-PCR test of which male patients were 26 (54.17%) and female 08 (16.66%). Most of the patients had other common symptoms along with loss of smell. Only history of sudden loss of smell was found in five patients.

**Table I:**
*Age distribution of patients (n=48)*

<table>
<thead>
<tr>
<th>Age in Year</th>
<th>Total</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>11 – 25</td>
<td>10</td>
<td>20.83%</td>
</tr>
<tr>
<td>26 – 40</td>
<td>18</td>
<td>37.50%</td>
</tr>
<tr>
<td>41 – 55</td>
<td>14</td>
<td>29.17%</td>
</tr>
<tr>
<td>56 – 65</td>
<td>06</td>
<td>12.50%</td>
</tr>
</tbody>
</table>

**Table II:**
*Sex distribution of patients (n=48)*

<table>
<thead>
<tr>
<th>Sex</th>
<th>Total</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>34</td>
<td>70.83%</td>
</tr>
<tr>
<td>Female</td>
<td>14</td>
<td>29.17%</td>
</tr>
</tbody>
</table>

**Table III:**
*Patient’s presenting symptoms, (n=48)*

<table>
<thead>
<tr>
<th>Symptoms</th>
<th>Number of patients</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fever</td>
<td>48</td>
</tr>
<tr>
<td>Nasal blockage</td>
<td>34</td>
</tr>
<tr>
<td>Nasal discharge</td>
<td>38</td>
</tr>
<tr>
<td>Pain in the throat</td>
<td>48</td>
</tr>
<tr>
<td>Cough</td>
<td>22</td>
</tr>
<tr>
<td>Loss of smell</td>
<td>48</td>
</tr>
<tr>
<td>Loss of taste</td>
<td>38</td>
</tr>
<tr>
<td>Diarrhea</td>
<td>04</td>
</tr>
</tbody>
</table>

**Table IV:**
*Patients presenting alteration of taste and smell (n=48)*

<table>
<thead>
<tr>
<th>Findings</th>
<th>Male</th>
<th>Female</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anosmia with altered taste</td>
<td>22</td>
<td>10</td>
</tr>
<tr>
<td>Hyposmia with altered taste</td>
<td>04</td>
<td>04</td>
</tr>
<tr>
<td>Anosmia only</td>
<td>08</td>
<td>04</td>
</tr>
<tr>
<td>Altered taste only</td>
<td>01</td>
<td>01</td>
</tr>
</tbody>
</table>

**Discussion:**
The pandemic of Coronavirus Disease 2019 (COVID-19) has caused a vast disaster throughout the world. There is increasing evidence that olfactory dysfunction can present in COVID-19 patients. Anosmia can occur alone or can be accompanied by other symptoms of COVID-19, such as a dry cough, fever, breathing difficulty etc. However, the pathogenic mechanism of olfactory dysfunction and its clinical characteristics in patients with COVID-19 remains unclear.
Multiple cross-sectional studies have demonstrated that the incidence rate of olfactory dysfunction in COVID-19 patients varies from 33.9–68% with female dominance. COVID-19 is the fifth documented pandemic in history\(^1\). COVID-19 infected cases in Bangladesh was 449,760 and deaths 6,416 as per report of DGHS, Bangladesh updated in the time frame of 23rd November 2020, now it is 1.55 million infected cases with 27,470 death on 30\(^{th}\) September 2021.

Fever, cough, fatigue, shortness of breath or breathing difficulties and loss of smell & altered taste are the most common symptoms\(^6\). Post-viral anosmia has been reported in different studies\(^9,10\). Mao et al initially reported on neurological symptoms of COVID-19 in February 2020\(^13\). Since then different authors have reported that a recent increase in patients presenting with anosmia in COVID-19 pandemic\(^14\). A recent study by Sungnak et al.\(^18\) suggested that nasal epithelial cells show a high angiotensin converting 2 (ACE2) expression in SARS-CoV-2 infection, and thus this may allowing wide viral entry. Thus anosmia can be a possible a typical feature of COVID-19 patients.

In the current study male: female ratio is 2.42:1 and lowest and highest age of patients were 13 years and 64 years respectively. Among the 24 cases 17 patients (70.83%) confirmed as COVID-19 infection on RT-PCR test. So the prevalence of COVID-19 infection in sudden loss smell is 70.83% in Bangladesh. Prasun Mishra et al.\(^19\) in a study found prevalence of anosmia 14.8% in COVID-19 patients. Prevalence of anosmia in other study showed by Klopfenstein et al.\(^20\) 47%, Lechien et al.\(^21\) 86% and Seyed Hamid Reza Bagheri et al.\(^22\) 7.3%. Studies in different COVID hospital in Dhaka city prevalence of anosmia found by Quazi Tarikul Islam et al.\(^23\) is 19.5% and by Syed Ghulam Moghi Mowla et al.\(^24\) 10.10% but so far I studied I did not find study on prevalence of COVID-19 infection in the patients with history of loss of smell attended the hospital in Bangladesh.

According to a research group of Harvard Medical School, temporary loss of smell, or anosmia, is the main neurological symptom and one of the earliest and most commonly reported indicators of COVID-19. Studies suggest it 'better predicts' the disease than other well-known symptoms such as fever and cough, but the underlying mechanisms for loss of smell in patients with COVID-19 have been unclear. Now, the team of researchers led by neuroscientists at Harvard Medical School has identified the olfactory cell types in the upper nasal cavity most vulnerable to infection by SARS-CoV-2, the virus that causes COVID-19. There is a large study compilation by Endang Mutiawati and Marhami Fahriani et al, out of 32,142 COVID-19 patients from 107 studies, anosmia was reported in 12,038 patients with a prevalence of 38.2% (95% CI: 36.5%, 47.2%); Furthermore, the prevalence of anosmia was 10.2-fold higher (OR: 10.21; 95% CI: 6.53, 15.96, \(p < 0.001\)) in COVID-19 patients compared to those with other respiratory infections or COVID-19 like illness\(^25\).

This evidence may be helpful in the present COVID-19 pandemic situation because the real-time reverse transcriptase polymerase chain reaction (RT-PCR) test has certain limitations for screening. This test becomes false negative in 30-40% cases. the manifestation of anosmia or hyposmia could be used as an early warning for practitioners or clinicians to build a rationale to reach a firm conclusion on patients with SARS-CoV-2 infection\(^26\). Additionally, a recent study reported that anosmia and dysgeusia are among the earliest symptoms observed in
COVID-19 patients. However, in-depth analysis of this dysfunction and its relation to the pathogenesis, severity, and mortality of COVID-19 was not the aim of this small series but only find out frequency of Covid-19 patients among the patients of anosmia.

According to study of Brämerson A and Johansson L et al, Olfactory dysfunction is common: estimates of point prevalence in the general population before the covid-19 pandemic suggest that 19.1% of adults (80% in people over 75) suffer from complete or partial loss of smell28.

So many research, research paper are available now in the pandemic situation, but the study on frequency or incidence of Covid-19 in patients of anosmia is not available in world literature. This is another pitfall of this small study but can reflect the reality.

Limitations:
In the present review, the number of patient was very small at that time, as the number of Covid-19 was declined in the specific study period. In some cross-sectional studies, patients were identified by the reported questionnaire submitted by them, which were not verified by the researchers. For covering the latest knowledge, this review also uses data from several preprints literature that has not been undergone full peer review.

Conclusion:
Loss of smell is the significant symptom of COVID-19 infection along with other symptoms. In the current study prevalence of COVID-19 infection is 70.83% in patients with history of sudden loss of smell. It does not reflect the actual picture of the country because of a very small number of study populations. Further study is needed find out the prevalence in Bangladesh.

References:
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5. "Naming the coronavirus disease (COVID-19) and the virus that causes it". World Health Organization (WHO).
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27. Hjelmesæth J, Skaare D: Loss of smell or taste as the only symptom of COVID-19. Tidsskr Nor Laegeforen 2020. 10.4045/tidsskr.20.0287 [PubMed] [CrossRef] [Google Scholar]

Original Article

Otological Presentation of Obstructive Nasal Lesions: A Study of 50 Cases

Md. Zahidul Islam¹, Md. Shafiul Akram², Mashuque Mahmud³, Md. Shahjahan Sarker⁴, Mahmudul Hasan⁵, Md. Abdur Rahman⁶, Md. Sirajul Islam Mahfuz⁷

Abstract:

Purpose: To analyze and realize the importance of the Eustachian tube dysfunction (ETD) in the pathogenesis of the middle ear infections as to raise the awareness amongst the Otolaryngologists consider the tubal dysfunctions in the management of the otitis media.

Materials and methods: 50 patients of aural discharge, aural fullness, aural pain, hearing loss and tinnitus along with nasal obstruction were selected from July 2013 upto December 2013 in the outpatient department (OPD) of Otorhinolaryngology - Head and Neck Surgery dept. of Dhaka Medical College Hospital under a specific prospective study protocol. All patients of aural fullness, hearing loss, aural pain, tinnitus, aural discharge along with nasal obstruction with or without sore throat were included; patients of sensorineural hearing loss, primary external ear pathology, ear malignancy and congenital ear diseases were excluded.

Results: 58% patients were below 20 years, 50% were children, 64% were male and 36% female. 62% patients got aural fullness, 60% hearing loss 40% mild, 14% moderate, 6% severe conductive and 8% mixed), 26% tinnitus, 32% aural discharge and 30% aural pain and amongst the patients of otitis media with effusion (OME), 100% got hearing loss, 73% aural fullness, 33% tinnitus, 27% aural pain and 13% dizziness. 78% patients got septal deviation, 58% hypertrophied inferior turbinates (HIT), 32% enlarged adenoids (EA), 62% allergic rhinitis, 26% acute upper respiratory tract infection (URTI), 4% nasal polyps and 48% sinusitis/mucosal thickening and amongst the children, 64% got enlarged adenoids, 56% HIT, 76% septal deviation (SD), 74% acute URTI, 4% antrochoanal polyp, 20% adenoid with HIT and 44% adenoid with SD. Regarding findings in the patients of enlarged adenoid, 37.5% patients got eustachian tube dysfunction (ETD) and 62.5% got hearing loss due to OME as well as acute otitis media (AOM), chronic otitis media (COM) and it showed that mild adenoid caused ETD occasionally on URTI but mild adenoid with HIT caused OME.

Conclusion: The obstructive nasal lesions are intermingled with otitis media, so this association should be sought out and underlying nasal lesions must be managed if any as a part of treatment of the otitis media.

Key words: Eustachian tube dysfunction, Acute otitis media, Chronic otitis media, Otitis media with effusion.

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Introduction
The small Eustachian tubes (ET) with tiny canals, responsible for proper vibration of the tympanic membrane (TM) by equalizing middle ear pressure and draining fluid from the middle ear, on getting plugged for a variety of reasons cause not only aural pain, aural discomfort but also muffled hearing or partial hearing loss, feeling of fullness/plugging in one or both ears, ringing or clicking or popping or ticking sounds in the ears, even tenderness around the ear and trouble with balance - a phenomenon referred to as ETD\textsuperscript{1,2}. This results in the pathogenesis of the middle ear infections or inflammation viz. AOM, COM and otitis media with effusion (OME). Nasal obstruction is probably the most common symptom of the diseases of nasal and paranasal sinuses and it is due to septal deviation, adenoidal hypertrophy with nasopharyngitis, allergic and infective rhinitis, rhinosinusitis and nasopharyngitis, HIT and nasal polyps\textsuperscript{3} amongst them allergies and acute coryza and influenza viral infections of nose, sinuses and nasopharynx causing severe nasal obstruction are the most common causes of ETD. Allergies by provoking edema and clogging with mucus, viral infections by provoking edema, clogging with mucus and destroying ciliary apparatus (viral infection probably being the most common cause of ciliary damage), adenoidal hypertrophy and nasal polyps, particularly the antrochoanal variety, by physical compression and nasopharyngeal neoplasia by invasion disrupt the proper tubal functions and give rise to aural symptoms of which the most frequent one is hearing loss by OME secondary to ETD\textsuperscript{1,2,4}. People with sinusitis are more likely to develop plugged ET and it is the smoking causing ciliary damages in throat and middle ear, obesity causing fat deposition around the tubes, allergies causing increased mucus and congestion, childhood having much smaller tubes and still developing immune system rendering them prone to frequent colds and sinus infections and some activities associated with altitude changes suffer some people more regularly than the others\textsuperscript{1,2}. Sometimes ETD may be mistaken for patulous ET, and nasal polyps rather than the cystic fibrosis or allergic fungal sinusitis that obstruct nasal cavities and nasopharynx or both affect the tubes\textsuperscript{1,5}. When the air pressure in the nasopharynx is more than that in the middle ear pressure simply the tubal blockage commences, gradual pressure difference by one atmospheric pressure blocks the tube totally - thus the length and severity of ETD symptoms depend upon their initial causes, mostly it settles by itself within a couple of weeks which is especially true for children with common cold, hearing returns to normal within a week or two once the cold has gone as well as for minor bothersome symptoms in patients with altitude change which goes off on forcing a yawn or with chewing gum swallowing but when the symptoms are severe and persist for more than two weeks should be attended by doctors; children also should be attended since they are at an overall higher risk of getting ear infection or their symptoms mimic an ear infection\textsuperscript{1,2,6}. For chronic ETD (when the symptoms persist for more than six weeks) which is common in some adults - URTI, allergies, nasal obstruction by other cause viz. EDs in old children, nasal polyp, rarely nasopharyngeal tumour must be searched out; sometimes muffled hearing or aural fullness does not go away even the original cause (usually a bad cold) has gone away, sometimes symptoms persist despite trying all the usual treatments\textsuperscript{6}. Chronic ETD does not get any genetic predisposition and constant ear pain, tinnitus and dizziness alongside muffled hearing usually are the harbingers of the complications of ETD like recurring symptoms and AOM, OME, COM, retracted membrane\textsuperscript{6}.\textsuperscript{6}
Treatment for ETD also depends upon both the severity and cause of the condition, thus may include home remedies (chewing, swallowing, suckling, saline nasal spray), OTC medications (antihistamines for allergies, NSAIDs) and prescribed drugs (oral and nasal steroid) and supplements (pressure equalization implant, balloon dilator in eustachian tube) for severe cases, even myringotomy with or without tympanotomy and surgery for nasal obstruction for long-lasting severe cases; regarding the treatment of or prevention of the complications the restoration of eustachian tube patency is a mandatory since pressure equalization help with chronic middle ear infections and treating the underlying causes is the best way treat and prevent recurring symptoms hence the otitis media-thus children or adult getting frequent ear infections should be treated with the thinking of ETD\(^1,2\).

Childhood deafness is a common health problem worldwide and in the developing countries, the greater proportion of childhood deafness is due to infection and in a study it was 38\(^7\). Eustachian tube is traditionally assumed to be the main route for organisms reaching the middle ear and studies showed that shorter, straighter and more patulous tubes are more prone to AOM but research has found no difference in tubal dimensions in otitis prone and non-prone children rather significantly poorer active tubes are more prone to OM\(^6\). OME is virtually universal in children. Both infection and allergies cause adenoidal enlargement and major risk factor for OME is the eustachian tube blockage by this enlarged adenoid superadded by infection\(^8\). The important question is whether the allergic children are more prone to OME and if they do so whether their OME is more protracted than normal and several studies in different age group concluded that allergies not as a risk factor for occurrence or persistence of OME\(^9-11\). Risk factors for AOM in young children are prematurity, frequent URTI and no breast feeding\(^12\); and recurrent episodes of AOM is likely to be the single factor in developing their OME\(^8\). Important middle ear disease COM is one of the most common ear diseases in South East Asia having a prevalence rate about 5.2% in general population, which is 12.44%, 7.39% in Bangladesh; studies in Bangladesh, India, some countries in Africa and amongst certain underprivileged ethnic groups have shown that COM prevalence rate is 2-17% among children\(^12-15\). Recurrent attack of AOM and OME in children renders degeneration of outer and inner fibrous layers of lamina propria as well as submucosal layer of tympanic membrane resulting chronic perforation or retraction. Adult COM, which is not uncommon, results from episodes of AOM and some risk factors for AOM and OME are also common for COM like ETD, URTI and socioeconomic status cleft palate etc\(^16\).

Rather than the racial variation in eustachian tube anatomy, repeated acute URTI, ultimately nasopharyngitis, with nasopharyngeal colonization by a wide variety of otological pathogens became recognized as a pivotal risk factor hence it prevents resolution of OM\(^4,17\). Early nasopharyngeal colonization is associated with early onset of AOM\(^18\), which is in turn with the early onset of COM- higher rate of tympanic membrane perforation is seen in the 02-04 years age group which is roughly three times the rate seen in the adult\(^19,20\) and this implies the higher prevalence of childhood rhinitis and nasopharyngitis\(^4\). URTI produce transient ETD in healthy individuals may result OM-specifically repeated episodes of AOM results in chronic mucosal OM if the TM fails to heal after the first episode whereas OME predisposes to chronic squamous OM\(^21\). Adult- onset OME is less than childhood OME since its prevalence rate has been
reported as only 6% in a population aged 15 years or over and adults account for about 15% of OME cases. Directly related to OME in adults is ET obstruction and indirectly related pathologies are URTI, nasal and nasopharyngeal allergies, nasal obstruction, nasopharyngeal pathologies, barotrauma, poorly pneumatized mastoid, prolonged intubation, autoimmune disease, CSF otorrhoea may present with the symptoms; sinusitis being the main correlating disease since 63% patients of adult- OME got a prior URTI regarding which S. pneumoniae and H. influenza (15 specimen out of 19), M. catarrhalis, adenovirus were as common as in childhood-OME and OME is highly prevalent in HIV- infected adults (18%, in a series, were having COM, mostly OME) and regarding allergies, 57% had a positive skin prick test in a study with 53 adult-onset OME cases and in another series with 48 non-acute OME, 97% got presence of allergy by using IgE level, RAST and skin test of which 89% got clinical corroboration and 88% eosinophilic effusions and regarding nasopharyngeal lesions, 20% of adult-OME had enlarged adenoids, branchial cysts and Wegener’s Granulomatosis were also reported to be the causes and in the endemic zones of nasopharyngeal carcinoma (NPC), adult-OME incidence were also high as to be 85% before and 48% after irradiation- and however, position of the tube is less important than invasion of the tube by NPC and barotrauma as well as HBO therapy render the ET unable or difficult to equalize negative middle ear pressure—out of 33 adult underwent HBO therapy, 52% got OME and 24% of them required ventilation tube and poorly pneumatized mastoid exhibited higher chance of OME following URTI in comparison with normal mastoid. Clinical diagnoses of NPC are confirmed by tympanometry, MRI should be the more routine investigation in endemic zone of NPC, aspiration of fluid during myringotomy was considered to be the confirm diagnosis in some studies but it is emphasized that absence of fluid does not imply an absence of OME since one-third patients in the same MRI study had fluid in the mastoid rather than in the mesotym-panum.

Results:

<table>
<thead>
<tr>
<th>symptoms</th>
<th>No. of the patients</th>
<th>Diagnosis</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aural fullness</td>
<td>31 (intermittent-20; often, disappears on swallowing/valsalva-11)</td>
<td>ETD/OM</td>
<td>62% (40%+22%)</td>
</tr>
<tr>
<td>Hearing loss</td>
<td>30 (mild-20; moderate-07; severe-03; mixed-04)</td>
<td>OM</td>
<td>60%</td>
</tr>
<tr>
<td>Tinnitus</td>
<td>13</td>
<td>ETD/OM</td>
<td>26%</td>
</tr>
<tr>
<td>Aural discharge</td>
<td>16 (AOM-03; OME-01; COM-often 03; on cold attack-09)</td>
<td>OM</td>
<td>32%</td>
</tr>
<tr>
<td>Aural pain</td>
<td>15 (AOM-03; mild pain OME-04, discomfort ETD-08)</td>
<td>ETD/OM</td>
<td>30%</td>
</tr>
</tbody>
</table>

Methods:

Type of study: Prospective study
Place of study: Department of ENT, Dhaka Medical College Hospital.
Period of study: 6 months from July 2013 to December 2013.
Number of patients: 50 patients of aural fullness/hearing loss, aural pain, tinnitus, aural discharge along with nasal obstruction with or without sore throat were selected randomly.
### Table II:

**Symptoms of provocative obstructive nasal lesions (n=50)**

<table>
<thead>
<tr>
<th>Symptoms</th>
<th>No. of patients</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>SD (mild-20, moderate-12, gross-07)</td>
<td>39</td>
<td>78%</td>
</tr>
<tr>
<td>HIT (only HIT-07, along with septal dev.-22)</td>
<td>29</td>
<td>58%</td>
</tr>
<tr>
<td>EAs (only adenoid-06, along with HIT-05, along with septal dev.-11)</td>
<td>16</td>
<td>32%</td>
</tr>
<tr>
<td>Allergic rhinitis</td>
<td>31</td>
<td>62%</td>
</tr>
<tr>
<td>Acute URTI (children-06, adolescent-04, adult-03)</td>
<td>13</td>
<td>26%</td>
</tr>
<tr>
<td>Nasal polyp (ethmoidal-01, antrochoanal-01)</td>
<td>02</td>
<td>04%</td>
</tr>
<tr>
<td>Sinusitis/Mucosal thickening</td>
<td>24</td>
<td>48%</td>
</tr>
</tbody>
</table>

### Table III:

**Otological findings (n=50)**

<table>
<thead>
<tr>
<th>Side</th>
<th>Tinnitus</th>
<th>Aural fullness/ETD</th>
<th>Middle retraction</th>
<th>Tympanic membrane (n=50)</th>
<th>Tympanogram type (n=50)</th>
<th>Tuning fork test (n=50)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Right</td>
<td>04</td>
<td>04</td>
<td>03</td>
<td>02</td>
<td>01</td>
</tr>
<tr>
<td></td>
<td>Left</td>
<td>05</td>
<td>05</td>
<td>04</td>
<td>04</td>
<td>02</td>
</tr>
<tr>
<td></td>
<td>Bilateral</td>
<td>04</td>
<td>11</td>
<td>05</td>
<td>04</td>
<td>02</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>13</td>
<td>20</td>
<td>12</td>
<td>10</td>
<td>09</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(26%)</td>
<td>(40%)</td>
<td>(24%)</td>
<td>(20%)</td>
<td>(18%)</td>
</tr>
</tbody>
</table>

### Table IV:

**Otolological investigations (n=50)**

<table>
<thead>
<tr>
<th>Side</th>
<th>Hearing loss (n=30)</th>
<th>Tympanogram type (n=50)</th>
<th>Bilateral</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mild</td>
<td>Moderate</td>
<td>Severe</td>
</tr>
<tr>
<td></td>
<td>Right</td>
<td>04</td>
<td>02</td>
</tr>
<tr>
<td></td>
<td>Left</td>
<td>06</td>
<td>03</td>
</tr>
<tr>
<td></td>
<td>Bilateral</td>
<td>10</td>
<td>02</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>20(67%)</td>
<td>07(23%)</td>
</tr>
</tbody>
</table>

### Table V:

**Provocative obstructive nasal lesions-findings (n=50)**

<table>
<thead>
<tr>
<th>Side</th>
<th>SD</th>
<th>HIT</th>
<th>EA</th>
<th>URTI</th>
<th>Nasal polyp with HIT</th>
<th>EAs with SD</th>
<th>EAs with SD</th>
<th>Bilateral nasal obstruction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Right</td>
<td>12</td>
<td>HIT-02, HIT + SD-10</td>
<td>-</td>
<td>04</td>
<td>-</td>
<td>01</td>
<td>03</td>
<td></td>
</tr>
<tr>
<td>Left</td>
<td>17</td>
<td>HIT-03, HIT+SD-06</td>
<td>-</td>
<td>06</td>
<td>01</td>
<td>02</td>
<td>05</td>
<td></td>
</tr>
<tr>
<td>Bilateral</td>
<td>10</td>
<td>HIT-02, HIT+SD-06</td>
<td>16</td>
<td>03</td>
<td>01</td>
<td>02</td>
<td>03</td>
<td>27</td>
</tr>
<tr>
<td>Total</td>
<td>39(78%)</td>
<td>29(58%)</td>
<td>16(32%)</td>
<td>13(26%)</td>
<td>02(4%)</td>
<td>05(10%)</td>
<td>11(22%)</td>
<td>27(54%)</td>
</tr>
</tbody>
</table>
Table VI:
*Childhood distribution of the obstructive nasal lesions (n=25)*

<table>
<thead>
<tr>
<th>Lesions</th>
<th>No. of the patients</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>EAs</td>
<td>16</td>
<td>64%</td>
</tr>
<tr>
<td>HIT</td>
<td>14</td>
<td>56%</td>
</tr>
<tr>
<td>SD</td>
<td>19</td>
<td>76%</td>
</tr>
<tr>
<td>URTI</td>
<td>06</td>
<td>24%</td>
</tr>
<tr>
<td>Polyp(antrochoanal)</td>
<td>01</td>
<td>4%</td>
</tr>
<tr>
<td>EAs with HIT</td>
<td>05</td>
<td>20%</td>
</tr>
<tr>
<td>EAs with SD</td>
<td>11</td>
<td>44%</td>
</tr>
</tbody>
</table>

Discussion:
A full history of middle ear disease in childhood, earache, symptoms of nasal obstruction and fullness, cigarette smoking, any profession related with altitude change and barotrauma, a family history of middle ear disease specially for NPC and whether onset of symptoms are associated with episodic URTI or AOM should be carried out and to assess the functional and organic obstruction of the ET, transnasal endoscopy of the pharyngeal orifice revealed edema of the orifice 27%, blockage by mucopurulent discharge 23%, atrophy of the orifice 10% and normal appearance 40% in a study of 78 adult-OME cases and tubotympanoaurodynamography revealed 52% functional and 46% organic obstruction in a study of 162 ears with OME. In our study, 58% patients were below 20 years of age and 50% were children, and 64% were male and 36% female. In a study on COM prevalence in one district level hospital in Bangladesh, maximum (36.5%) patients were of 11-20 years age group and 43.5% were below 20; in another study on degree and pattern of hearing impairment in national institute of ENT of Bangladesh, 61.27% patients were male-so they almost mimic our age and sex distribution.

In our study, 62% patients got aural fullness (40% intermittent-due to ETD, 22% often-due to OM), 60% hearing loss 40% mild, 14% moderate, 6% severe conductive and 8% mixed), 26% tinnitus, 32% aural discharge 6% of AOM, 2% of OME, 24% of COM-6% often and 18% on cold attack) and 30% aural pain 6% marked pain in AOM, 8% mild pain in OME, 16% just discomfort in ETD); and amongst the patients of OME, 100% got hearing loss, 73% aural fullness which is often and only disappears on effort of swallowing / valsalva, 33% tinnitus, 27% aural pain and 13% dizziness. In a study on hearing impairment degree and pattern in Bangladesh, 40.9% patients got mild hearing loss which mimics our result and another study on symptoms of OME revealed hearing loss- 97%, aural fullness- 77% and earache, dizziness were also often reported by the subjects which also almost mimics our result. From the sincere history taken, the patients of ETD make air thrashings open the eustachian tube by frequent swallowing or hawking or yawing or even valsalva but when the tube is no more ready to open mechanically the OME is invited; the AOM is invited if any superadded infection-they simply narrate that on a cold attack or on an exposure to an allergen their ear/ears starts/ start discharge or weep or being full, the ear on the side of more nasal obstruction starts first or do more or both and even a mild cold attack affects the ears on the side of nasal obstruction; more on the side of more obstruction.

Distribution of the causative or correlating factors in adult-onset OME varies in the literatures-in an Israel study, they were as sinus disease 66%, enlarged adenoid (19%-some of which were related to smoking), NP tumours13% and unidentifiable 2% but in endemic zone for NPC, it is relatively high and in another series, as URTI 22%,
chronic sinusitis 14%, NPC 6%, another causes 14%\textsuperscript{21}. In our study, 78% patients got septal deviation (40% mild, 24% moderate, 14% gross), 58% got HIT, (14% only HIT, 44% with SD), 32% got EAs (12% only adenoid, 10% with HIT, 22% with SD), 62% got allergic rhinitis, 26% got acute URTI (12% children+8% adolescent, 6% adult), 4% got nasal polyps (2% antrochoanal, 2% ethmoidal) and 48% got sinusitis/mucosal thickening (40% with allergic rhinitis, 4% URTI, 4% polyposis) which were provocative for OM/ETD and amongst the children, 64% got enlarged adenoids, 56% HIT, 76% SD, 24% acute URTI, 4% antrochoanal polyp, 20% adenoid with HIT and 44% adenoid with SD. Adenoiditis alone as well as adenotonsillitis which is a common ENT problem bearing 20% of all throat infection cause the tubal blockage\textsuperscript{30}. one study showed that the more the size of enlarged adenoid the more is the chance of occurring OME (about 73% with severe adenoids), having more hearing loss (about 38% OME patients with severe adenoids got moderate deafness) and more negative middle ear pressure (63% patients with severe adenoids got pressure ranging from -201 to -400 daPa)\textsuperscript{8} and another study with adenoid surgery showed that 51% patients were of 4-10 years and sufferings like nasal obstruction with mouth breathing was 46%, nasal obstruction with ETD was 7% and associated tonsillitis was 30%\textsuperscript{38}– so adenoid is not always responsible to develop OME but in most OME patients usually have enlarged adenoid and in this study, 42% patients got no hearing loss audiometrically\textsuperscript{8}.

Regarding findings in the patients of enlarged adenoid, 38% patients got ET and 62% got hearing loss due to OME as well as COM and it showed that mild adenoid caused ETD occasionally on URTI but mild adenoid with HIT caused OME; 6% patients with mild adenoid caused 11% OME in which hearing loss was 100% mild and 100% got -100 to -200 middle ear pressure, 19% with moderate adenoid caused 33% OME in which hearing loss was 100% mild and 75% got -101 to -200 and 25% -201 to -400 pressure and 31% with severe adenoid caused 56% OME in which 60% hearing loss was mild and 40% moderate and 20% got -101 to -200 and 80% -201 to -400 pressure and rest 6% with severe adenoid got COM having -201 to -400 pressure – in a study on effect of enlarged adenoid in the development of OME in Bangladesh revealed 42% normal hearing and 58% hearing loss; mild adenoid caused 14.2% OME in which hearing loss was 83% mild, 17% moderate and 75% got -101 to -200 and 25% -201 to -400 pressure and severe adenoid caused 72.7% OME in which 62.5% hearing loss was mild and 37.5% moderate and 37.5% got -101 to -200 and 62.5% -201 to -400 pressure and another study with adenoid surgery showed 7% ETD by nasal obstruction with enlarged adenoid and 42% case got normal hearing audiometrically\textsuperscript{8,38} which almost mimic our result; another audiological study also revealed OME related hearing loss in the children being 18-35 dB\textsuperscript{39} – another also revealed fluctuating hearing loss ranging from 15-40 dB with a mean of 27 dB found in most children having middle ear effusion resulted from OME or AOM; after resolution of symptoms middle ear effusion may persists even for weeks to months following AOM, although this condition is indistinguishable from OME, it is the volume rather than the viscosity/quality of the fluid that matters on hearing threshold and duration of the effusion can be acute (<3 weeks), sub acute(3 weeks-3 months) and chronic(Â 3 months)\textsuperscript{40} but our study revealed 78% hearing loss being mild in the adenoid induced OME and this small variation is since our study is
not only on adenoids rather on all the benign obstructive nasal lesions. Clinically OME is more apparent in adult than in young children who cannot easily express themselves with mild to moderate hearing loss and 42-69% adult- OME were reported to be bilateral\textsuperscript{29}. ETD is more common in patients of COM than in normal individuals and incidence of COM in cleft palate patients followed upto 10 years of age is around 20%, with 2% of them having cholesteatoma and hypoplastic tensor veli palatine muscle in cleft palate predispose to ETD\textsuperscript{41,42}.

In our study, regarding aural fullness (20-40% due to ETD) it was 4 in right, 5 in left, 11 bilaterally; regarding tinnitus 13-26% it was 4 in right, 5 in left, 4 bilaterally; regarding OM (30-60%)-amongst the OME 15-50% it was 3 in right, 4 in left, 8 bilaterally, amongst the COM (12-40%) it was 3 in right, 3 in left, 6 bilaterally and amongst the AOM 3-10% it was 1 in right, 2 in left; regarding tympanic membrane status, amongst dull membrane (12-24%) it was 3 in right, 4 in left 5 bilaterally, amongst mildly retracted membrane 10-20% it was 2 in right, 4 in left, 4 bilaterally, amongst moderately retracted membrane 9-18% it was 3 in right, 4 in left, 2 bilaterally, amongst grossly retracted membrane 4-8% it was 1 in right, 2 in left, 1 bilaterally, amongst COM perforation 12-24% it was 3 in right, 4 in left 5 bilaterally and amongst AOM 3-6%, perforation was 1 in left, 1 bilaterally and in the rest, the membrane was ragged sodden featureless; regarding tunning fork test, amongst 20(40%) patients 17 got bilaterally normal test of which 3 got Weber lateralization to left being added to another 5, lateralization also to right was 5(10 got Weber lateralization), amongst Rinne negative (20-40%) 4 was on right, 5 on left, 11 bilaterally; regarding hearing loss, amongst the mild loss (20-67%) 4 was in right, 6 in left, 10 bilaterally, amongst the moderate loss (7-23%) 2 was in right, 3 in left, 2 bilaterally, amongst the severe loss (3-10%) 2 in left, 1 bilaterally and amongst mixed loss (4-13%) 1 in right, 2 in left, 1 bilaterally and regarding tympanogram in the concerned aural fullness and hearing loss, 18 out of 20 (40%) of ETD got bilateral A type, rest 2 got As type in left being added to another 3 (total 5-10%; 5 in right-3 bilaterally), this rest 2 got C type in left being added to another 12 (total 15-30%; 15 in right-12 bilaterally), this rest 3 got B type in left being added to another 4 (total 6-12%; 6 in right-4 bilaterally), this rest 2 got flat type in left being added to another 3 (total 4-8%; 3 in left, 1 bilaterally) having a left preponderance and in the context of provocative obstructive nasal lesions, regarding SD (out of 39 it was 17 towards left, 12 towards right, 10 bilaterally); regarding HIT (out of 29 it was 3 only HIT, 6 along with SD in left; 2 only HIT, 10 along with SD in right; 2 only HIT and 6 along with SD bilaterally); Enlarged adenoids were 16 causing bilateral obstruction and adenoid with HIT were 2 in left, 1 in right 2 bilaterally and adenoid with SD were 5 in left, 3 in right, 3 bilaterally; regarding URTI (out of 13 it was obstruction 6 in left, 4 in right, 3 bilaterally in children); regarding nasal polyp (out of 2-1 was antrochoanal in left, 1 ethmoidal bilaterally)- thus implying that both provocative obstructive nasal lesions as well as otological lesions and findings got preponderance in the left side and proving as well as establishing that there is a sound and profound association between obstructive nasal lesions and middle ear pathologies via Eustachian tube involvement which is also supported by other previous studies viz.an Israeli study showed sinus diseases as 66% cause, enlarged adenoid as 19% cause and another study showed URTI as 22% cause of adult-OME, another study declaring the sinusitis being the main correlating disease for OME showed 63% patients of adult-OME got a prior
Our study also showed sinusitis/mucosal thickening in 48% cases, enlarged adenoid in 32% cases and URTI in 26% cases being related to OME in both children and adult-and regarding URTI in enlarged adenoid, it is the removal of a chronic source of nasopharyngitis rather than removal of mechanical obstruction of ET which is achieved by adenoidectomy. According to the statement given by the patients, they being used to make repeated swallowing, hawking, yawning or even valsala as an effort open the blocked eustachian tube suffer from eructation, belching and this is the relation with GERD which needs further research. MRI showed tensor veli palatini destruction and eustachian tube erosion, localised effusion in mastoid or tympanum or both in NPC; study revealed that 33% such OME resolved after radiotherapy although radiation to ears, ET and NP for NPC and other head-neck cancers itself is also a causative factor in OME but luckily or unluckily we did not have any NPC in our study. Overall, reduction or alleviation of the nasal obstructive lesions should lessen the magnitude of the otological lesions or even heal up them totally but leaving the obstructive nasal lesions as it is may not improve/heal up the otological lesions even after surgical procedures which we found clinically and it will explore the field of further study. Both medical as well as surgical addressing of the obstructive nasal lesions aided the clinical improvement of our cases; on the contrary, failing of this addressing resulted recurrence or no marked improvement in the treatment in some of our patients.

**Conclusion:**
This study implies that there is a sound and profound association between obstructive nasal lesions and middle ear pathologies via Eustachian tube involvement. If the study could be performed in a large scale, eustachian tube involvement in the pathogenesis of the otitis media would be more established; hence its management will carry more credit in the management of otitis media. So commencement of treatment or finalization of treatment plan for otitis media should not ignore the checking for or exclusion of the underlying causes of as well as risk factors for eustachian tube dysfunction, specially the nasal obstructive lesions.

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Original Article

Key Considerations in Practices and Principles of Endoscopic Septoplasty: Lessons, Mistakes and Future

Ajaz ul Haq1, Chetan Bansal2, Apoorva Kumar Pandey3, Arvind Varma4, Sonal Kala5

Abstract

Background: Conventional surgeries of the nasal septum improve the nasal airway but recent development and advancement of the knowledge about the endoscopic septoplasty has significantly changed the treatment modality and had brought focus over several aspects of possible advantages. This study aims to see the advantages, complications and limitations of endoscopic septoplasty.

Methods: It was an observational prospective study conducted over 90 patients of symptomatic deviated nasal septum. It evaluated symptoms, anterior rhinoscopy and nasal endoscopy findings, objective and subjective improvement of symptoms using the nasal obstruction symptom evaluation (NOSE) score, post-operative pain using the visual analogue scale (VAS) and complication following the surgery.

Results: Deviated nasal septum (DNS) either left or right side was the most common examination finding 97.78%. Post-operatively there was a good symptom relief and significant subjective improvement in NOSE scores with average decline in the score by 96.26%. Objective assessment of all patients showed improved airway. The complication rate was minimum 7.78%.

Conclusion: Endoscopic septoplasty (ES) was found to have distinct advantages with good subjective and objective improvement of symptoms and lesser rate of complications. It should be an option offered to all patients requiring septoplasty. We also found that it helps in improving the learning curve and surgical skill of the trainees.

Keywords: Deviated nasal septum, Endoscopic septoplasty, subjective improvement, Nasal obstruction

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Introduction
Septum surgery has come a long way since its outset. They have evolved from primitive intrusive procedures to procedures with better outcome and fewer complications. Over the decades, technique has changed from forcible fractures and splinting to submucous resection, classical septoplasty to endoscopic septoplasty (ES)\(^1,2\). In 1991, Lanza\(^3\) and Stammberger\(^4\) initially introduced a minimal invasive technique named endoscopic septoplasty. Since then it is rapidly evolving and gaining popularity in rhinological practice. It permits accurate identification of septal pathology and associated lateral wall abnormalities. It is a conservative procedure which provides adequate visualization, room for instrumentation, access to paranasal sinuses, visualization and stoppage of post nasal bleeds and also provides scope for revision surgeries\(^5-8\).

The present study was undertaken to assess the advantages, limitations and outcomes of ES in terms of relief of symptoms, anatomical correction, post-operative morbidity. And also to assess its utility as a learning tool for teaching purpose.

Materials & Methods
This observational prospective study was conducted at a tertiary care center over a period of 2 years from January 2019 to December 2020 amongst 90 patients of symptomatic DNS who attended the outpatient department of Otorhinolaryngology and Head & Neck Surgery after taking consent from the patient.

Inclusion criteria- Patients with symptomatic DNS (nasal obstruction, nasal discharge, hyposmia, headache, post nasal drip, sneezing, nasal bleeding, snoring, dry mouth, hyposmia, and dry mouth), septal spur, and refractory to conservative treatment were included in the study. All the patients in whom ES was performed as a preliminary step of another nasal surgery like functional endoscopic sinus surgery (FESS), dacryocystorhinostomy (DCR) were also included in this study.

Exclusion criteria- Patients who were medically unfit for surgery, age less than 10 years, acute rhinosinusitis, nasal polyps, malignancy, grossly deviated septum, upper respiratory tract infection and revision cases were excluded from the study.

At the first visit, the patient was subjected to a detailed clinical history. Anterior rhinoscopy was done. Diagnostic nasal endoscopy was performed. Patients symptoms were assessed and recorded using a validated Nasal Obstruction Symptom Evaluation (NOSE) score\(^9\). The patients were subjected to X ray paranasal sinuses to rule out sinus pathology.

Technique for endoscopic septoplasty
The procedure was performed under general anaesthesia. The septum was injected with 1% xylocaine in 1:20,000 adrenaline on both the sides of septum using 0-degree rigid endoscope. After giving hemi-transfixation incision, submucoperichondrial flap was raised using a Freer’s elevator under direct visualization with an endoscope, exposing the underlying bone, and further removing the most deviated part of septum including both the bony and cartilaginous septum. Later, the flap was repositioned, hemostasis was ensured and edges of the incision were just approximated with absorbable sutures. For isolated septal spur, ipsilateral incision was given on the apex of spur just parallel to the floor of the nose. Superior and inferior flaps were elevated to expose the septal spur, which was then removed. The nasal packing was done with Merocel. Post-operative pain for all patients was assessed using the VAS\(^10\). Difference between pre-operative and post-
operative NOSE score was compared using paired T-test and p-value less than 0.05 was considered as significant.

Results
A total number of 90 patients underwent ES over a period of two years from January 2019 to December 2020. Amongst these, 59 were male and 31 were female. The male:female distribution was 1.9:1. The youngest patient was 12 years old and the oldest one was 59 years old. Most commonly affected age group was 21-30 years (46.67%). (Figure 2) Mean age of the study population is 33.97 years.

During surgical procedure, only ES was done in 51 (56.67%), rest were combination of procedure such as: ES with Inferior turbinate resection in 20 (22.22%) patients, ES with FESS in 11 (12.22%) patients and ES with DCR in 8 (8.89%) patients.

The most common presenting complaint among the study population was nasal obstruction (87.78%) followed by nasal discharge (47.78%), sneezing (37.78%), postnasal drip (32.22%), headache (24.44%). Least common symptoms were snoring and dry mouth (16.67%), hyposmia (15.55%), epiphora (8.89%) and nasal bleeding (6.67%). The duration of the presenting complaints varied from four months to 5 years. (Table I)

DNS (either left or right side) was the most common finding 97.78%. The next common finding was hypertrophied inferior turbinate 54.44% followed by bony spur 25.55%.

The mean time taken for the surgery was 71.34 minutes. All the patients were assessed for the intra-operative blood loss. Majority of them 86% had minimal blood loss (<45ml) while 14% had >45ml blood loss. When we assessed the post-operative pain, we found that majority of patients 82.3% had mild pain.

Subjective improvement was also assessed by comparing the pre-operative and post-operative NOSE score. All the patients with extreme (n=26) and severe (n=55) nasal obstruction were relieved post-operatively. Moderate and mild nasal obstruction was present in (3 and 11 patients respectively) following the surgery. The average pre-operative and post-operative NOSE score were 65.33 and 2.44 respectively. The average

<table>
<thead>
<tr>
<th>Symptom</th>
<th>No. of patients (%)</th>
<th>No of patients in which symptom got relieved post-operatively (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Nasal obstruction</td>
<td>79 (87.78%)</td>
<td>78</td>
</tr>
<tr>
<td>b) Nasal discharge</td>
<td>43 (47.78%)</td>
<td>43</td>
</tr>
<tr>
<td>c) Headache</td>
<td>22 (24.44%)</td>
<td>20</td>
</tr>
<tr>
<td>d) Postnasal drip</td>
<td>29 (32.22%)</td>
<td>29</td>
</tr>
<tr>
<td>e) Sneezing</td>
<td>34 (37.78%)</td>
<td>34</td>
</tr>
<tr>
<td>f) Nasal bleeding</td>
<td>6 (6.67%)</td>
<td>6</td>
</tr>
<tr>
<td>g) Snoring</td>
<td>15 (16.67%)</td>
<td>11</td>
</tr>
<tr>
<td>h) Hyposmia</td>
<td>14 (15.55%)</td>
<td>11</td>
</tr>
<tr>
<td>i) Dry mouth</td>
<td>15 (16.67%)</td>
<td>14</td>
</tr>
<tr>
<td>j) Epiphora</td>
<td>8 (8.89%)</td>
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</table>
There was significant subjective improvement in NOSE scores post-operatively. Amongst the complications following surgery, immediate complications occurred in 7(7.78%) patients. Amongst them, unilateral flap tear occurred in 5 patients and hemorrhage from septal branch of superior labial artery occurred in 2 patients. Synechiae formation in between septum and inferior turbinate was seen in 7 patients. Septal perforation, septal hematoma and external deformity were not encountered in any patient. (Table II).

Table II :  
Distribution of complications following ES  

<table>
<thead>
<tr>
<th>Intra-operative and post-operative complications</th>
<th>No. of patients</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Haemorrhage from septal branch of superior labial artery</td>
<td>2</td>
<td>2.22%</td>
</tr>
<tr>
<td>b) Unilateral flap tear</td>
<td>5</td>
<td>5.55%</td>
</tr>
<tr>
<td>c) Synechiae formation in between septum and inferior turbinate</td>
<td>7</td>
<td>7.78%</td>
</tr>
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</table>

ES is a conservative and precise approach and provides better illumination, visualization, accurate access and complete correction of the deviated part of the septum without causing much complication thus improving the surgical outcome.

In present study, we found male preponderance 65.55% with the most common affected age group being the 2nd decade. This was in concordance with studies of Kour B et al and Mandour ZM et al. In our study, isolated ES was done in 56.67% cases, rest of the cases was a combination procedure such as ES with Inferior turbinate resection, ES with FESS and ES with DCR. This is comparable to the study of Islam A et al who noted that isolated septoplasty was done in 49.26% cases. While doing DCR, sometimes it is difficult to approach the lacrimal sac, so in these cases ES is done as a preliminary surgery to gain easy access to the sac.

On assessing the surgical time, we found that intra-operative time for our study (71.34 minutes) was almost comparable to Singh A et al (76.36 minutes). Further in their study, they found that time taken for ES was more as compared to conventional method. As stabilizing and manipulating the endoscope in the nasal cavity is difficult, it takes more time for the surgery. It is possible that as surgeons gain more experience, the intra-operative time will reduce further. On assessing the blood loss during surgery, we found that majority of patients 86% had minimal blood loss which was similar to the study of Aiyer RG et al who found that 82% had minimal blood loss with ES. This could be because the incision is given only in the most deviated part leading to lesser amount of bleeding. As there is less dissection and resection of tissues in ES, so the perception of pain post-operatively is also less. Majority of our patients experienced mild post-operative pain. Singh A et al and Aiyer RG et al also observed that patients who underwent ES had mild pain (77.3% and 64% respectively).

As ES provides a direct targeted approach to the septal anatomic deformity, allowing a minimally invasive procedure with limited septal mucosal flap dissection and removal of a small cartilaginous and/or bony deformity so it helps in relieving the
symptoms effectively. We observed that there was significant relief in symptoms of nasal obstruction, nasal discharge, nasal obstruction, post nasal drip, nasal bleeding, sneezing and dry mouth. This was consistent with the studies of Rajguru R et al\(^1\) and Tukaram KV et al\(^16\) who observed that persistence of symptoms was more with conventional septoplasty. In our study, 73.3% patients were relieved of snoring. Persistence of snoring may be due to the pathology associated with nasopharynx, epiglottis or tongue base. Similarly Rajguru R et al\(^1\) also did not get good relief of snoring as only 64% patients were relieved. Virkkula et al\(^17\) observed that operative treatment of structural nasal obstruction did not seem to decrease snoring time, snoring intensity or sleep-disordered breathing.

Since objective evaluation of nasal obstruction by acoustic rhinometry, rhinomanometry does not correlate well with patients' subjective feelings of patency\(^18\), so physicians focus on patient reported outcome measures to determine treatment efficacy\(^19\). NOSE score has emerged as a frequently used health related quality of life instrument specific to nasal obstruction in surgical patient\(^20\). In our study, there was a significant subjective improvement in the NOSE score postoperatively and the decline was 96.26%. Singh A et al\(^12\) compared the NOSE score in conventional as well as ES and they also observed a significant decline (74% and 92.76% respectively).

In this study, immediate per-operative complications occurred in 7.78% patients and they included undue haemorrhage from septal branch of superior labial artery in 2 (2.22%) patients that occurred during removal of maxillary crest and unilateral flap tear in 5 (5.55%) patients. Both of these were minor complications and were managed without any difficulty. In concurrent to our study, Islam A et al\(^11\) also noticed hemorrhage in 1.66% and flap tear in 2.5% patients. We observed synechiae formation in between septum and inferior turbinate in 7 (7.78%) patients. Rajguru R et al\(^1\) and Tukaram KV et al\(^16\) had synechiae in 2% and 1.92% patients respectively whereas Islam A et al\(^11\) did not observed any case of synechiae in their study.

Several studies concluded that ES is beneficial in regards to illumination, avoiding unnecessary tissue handling, flap tear, septal perforations and hematoma\(^1,8,11\). We found that there are reduced chances of synechiae formation and flap tear which may be due to the limited extent of flap dissection along with limited manipulation and resection of septal framework. In cases of endoscopic removal of spur, sometimes there is no need of suturing of the flap as it gets approximated by itself. Incision is given only in the most deviated part leading to precise repair and lesser amount of blood loss.

We have found it to be a valuable teaching tool which provide excellent opportunity for recording and studying. By direct visualization on the monitors, it helps in improving the learning curve and surgical skill of the trainees\(^1,8,11,13\).

The limitations of ES which we experienced during our study period were need for frequent cleaning of the tip, loss of binocular vision, inability to use both hands, adequate additional training was required for the procedure, longer surgical time as it is a single handed surgery, anterior and caudal deformities cannot be corrected as there is minimal support for the endoscope in these segments, higher cost of instruments and surgery as it requires endoscope, camera, telescope, monitor.
Summary
ES is found to have a significant edge in treating a DNS patient as it enables accurate identification of the pathology. The technical advantage of ES is that it is performed with minimal manipulation and resection of pathological area resulting in minimal damage to the tissues, minimal removal of septum and hence precise repair. As it provides better visualization, it is considered to be excellent learning tool for teaching purposes.

References


Case Report

Complicated Paediatric Bronchial Foreign Body: A Novel Extraction Technique

Fathiyah Idris², Zaid Nailul Murad², Boon Chye Gan³, Khairul Bariah Noh⁴, Yeoh Xing Yi⁵, Ong Fei Ming⁶, Ng Siew Peng⁷, Zakaria Zahirrudin⁸, Goh Bee See⁹

Abstract:
A paediatric bronchoscopy procedure for foreign body inhalation is indeed a highly challenging procedure due to multiple risk factors such as lower physiological functional residual capacity and adverse pulmonary function effects by anaesthetic agents in addition to concurrent active lungs infection. Here we elucidate a novel technique of foreign body removal located at the distal airway in a paediatric patient and in a situation where a paediatric flexible bronchoscopy with built-in working channel is not available. A 1-year 7-months-old boy presented with acute respiratory distress syndrome following a one-week history of active respiratory infection. On examination, he was tachypnoeic with audible soft inspiratory stridor and intermittent barking cough despite being supplemented with 3 liters /minute oxygen mask. Chest x-ray showed right upper lobe collapse. He was referred to the otorhinolaryngology team after a suspicious history of foreign body aspiration obtained from his mother. Bedside flexible nasopharyngolaryngoscopy showed granulation tissue at the junction of laryngeal surface of epiglottis and anterior commissure. He underwent emergency direct laryngoscopy, tracheoscopy, bronchoscopy, excision of granulation tissue and removal of foreign body under general anaesthesia. Herein, some of complicated bronchoscopy demand critical thinking of alternative or modified techniques to achieve a successful and safe surgery.

Keywords: Foreign bodies; bronchoscopy; general anaesthesia; laryngoscopy

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Introduction:
Foreign body (FB) inhalation incidence was reported highest in 3 years old and younger children. This is attributed to their developmental achievements such as exploring their surrounding by mouthing, eating while playing and mature pincer grasp to collect even small objects. However, incomplete dentition and immature swallowing coordination predispose them to the risk of FB inhalation. In the cases of aspirated FB, 82% were witnessed by adults, 6% were associated with a suspicious history of ingesting a foreign body and 12% were unwitnessed with no obvious ingestion history. Foods namely vegetables are the most common documented foreign bodies 83% and located predominantly in the right main bronchus 55%. This significant number of cases with predominant dislodgement in the lower airway reflecting the importance of conducting a risky yet successful and safe bronchoscopy procedure.

Case Report:
A 1-year 7-months-old boy with no previous medical illness presented with a one-day history of rapid and noisy breathing. It was associated with a week history of fever, prolonged cough and reduced oral intake. However, the mother only sought medical treatment after the child developed rapid and noisy breathing. He was referred to the otorhinolaryngology (ORL) team for airway evaluation after further history taking revealed a suspicious history of choking episode during eating banana one day before the admission. On examination, the child was feverish, mildly dehydrated, tachypnoeic with mild subcostal recession. He required 3 Liters/minute oxygen mask supplement as his oxygen saturation was only able to maintain about 85% under room air. He had barking coughs, hoarseness with audible soft inspiratory stridor. Lung auscultation revealed intermittent ronchi. Cardiovascular and abdominal examination was unremarkable. Otherwise, the child was haemodynamically stable. He was given intravenous (IV) dexamethasone, adrenaline nebulization, budesonide nebulization, metered-dose inhaler (MDI) salbutamol. Chest X-ray (CXR) showed right upper lobe collapse. Bedside flexible nasopharyngolaryngoscopy was arranged in the Paediatric Intensive Care Unit (PICU) collaborated with the paediatric team. The endoscopy revealed granulation tissue located at the junction of the laryngeal surface of epiglottis and anterior commissure (Figure 1).

Figure 1: An endoscopic view of a granulation tissue (arrow) located at the junction of laryngeal surface of epiglottis (epiglottis marked by star shape) and anterior commissure during bedside flexible nasopharyngolaryngoscopy.

He underwent emergency direct laryngoscopy, tracheoscopy, bronchoscopy and excision of granulation tissue under general anaesthesia.
Anaesthesia was induced with an inhalational volatile agent (Sevoflurane). Vocal cords were sprayed with topical anaesthesia (2\% lignocaine) under direct visualization with direct laryngoscopy before tracheoscopy with a rigid telescope. Unfortunately, the patient developed laryngospasm. Airway management was taken over by the anaesthetist and anaesthesia was deepened with IV Fentanyl, IV Propofol and IV Rocuronium. The patient was intubated with a non-cuffed endotracheal tube (ETT) size 4.0 to protect the airway and maintain the oxygenation. Then, suspension laryngoscopy was fitted. Subsequently, catheter mount was disconnected from the ETT and a 2.7mm 0Ú Hopkins rod telescope was introduced through the ETT and advanced distally until the level of the carina. Another granulation tissue was visualized situated at the right upper lobe secondary bronchus (Figure 2).

The patient suddenly desaturated at this juncture. Therefore, the rigid telescope was withdrawn and the ETT was reconnected to the ventilation circuit. With the ETT in situ, the previously visualized supraglottic granulation tissue was excised. After achievement of good oxygen saturation, the catheter mount was disconnected from the ETT again and the rigid telescope was reinserted into the ETT lumen. The rigid telescope was withdrawn along with the ETT to inspect the airway of the subglottic and proximal trachea which were not seen as planned previously due to the desaturation during initial direct laryngoscopy. There were no other sites of granulation tissue or abnormality noted during the tracheoscopy. The patient was then reintubated with an ETT size of 3.5mm. A 2.5 mm neonate flexible nasopharyngolaryngoscopy was employed along with flexible grasping forceps due to the unavailability of flexible bronchoscopy with a built-in working channel in our centre. With the aid of suspension laryngoscope, both instruments were first inserted sideways to the ETT and then advanced distally until the grasping forceps seen reached the granulation tissue. The flexible nasopharyngolaryngoscopy was pulled out while the grasping forceps was kept in situ. The flexible nasopharyngolaryngoscopy inserted into the ETT via the catheter mount opening then was advanced distally to optimize the view of the foreign body. With proper visualization, we noticed that the granulation tissue was partially surrounded a foreign body. The foreign body with the granulation tissue was completely extracted using the grasping forceps (Figure 3).
The forcep was withdrawn together with the ETT under endoscopic visualization due to relatively large foreign body size. The foreign body was a piece of plastic toy with sharp ends measuring about 1.6 cm in length (Figure 4).

Figure 4: The foreign body (a plastic toy piece), partially enveloped by granulation tissue measuring about 1.6 cm in length completely removed.

Rigid tracheoscopy was reperformed looking for any post-operative complications. Finally, the patient was re-intubated with size 4 non-cuffed ETT under rigid endoscopic guidance. He was sent to PICU for post-operative care. He was kept intubated and covered with IV Cefepime 50mg/kg every 8 hourly, IV Dexamethasone 0.2mg/kg every 6 hourly and Budesonide nebulization. He responded well to the treatment given and stable during the weaning off process from the ventilator support. He was extubated 4 days after the procedure. He was discharged home 6 days post-operation with total resolution of his respiratory symptoms. A repeated CXR on the third-day post-operation showed expanded and clear bilateral lungs fields. Figure 5 shows the side view picture taken during simulation of the surgical procedure on a patient simulation mannequin to show the arrangement of the instruments.

Figure 5: The flexible nasopharyngolaryngoscope (labelled as FE) inserted through the opening of the catheter mount (labelled as CM) which is readily connected to the ETT. The flexible grasping forceps (labelled as FG) introduced sideway to the endotracheal tube (labelled as ETT). A light clip (labelled as LC) was used for proximal illumination. The the suspension laryngoscopy system labelled as SL.

Figure 6 shows The endoscopic view taken during simulation of the surgical procedure on a patient simulation mannequin at the level of laryngeal inlet to show the arrangement of the instruments.

Figure 6: The direct laryngoscopy blade (labelled as DL) used to elevate the epiglottis. The flexible grasping forceps (labelled as FG) located sideway to the ETT were advanced to the distal airway. The endotracheal tube labelled as ETT.
Discussion:
Extraction of inhaled FB in the paediatric group carries a significant risk of mortality. Children are prone to hypoxia due to their lower functional residual capacity (FRC), greater oxygen consumption, ineffective respiratory musculature, higher ventilation and perfusion (V/Q) mismatch and a highly compliant airway compared to the adult. In addition, general anaesthesia may adversely affect breathing control, bulbar function and patency of upper airway in a paediatric patient. Undoubtedly it is a challenging procedure for both the ORL surgeon and the anaesthesiologist. Thus, a team approach is highly required between anaesthetist and ORL surgeon in the management of shared airway procedures.

Bronchoscopy is the cornerstone procedure for diagnosis and removal of inhaled foreign body. Rigid bronchoscopy is the standard choice as it allows better visualization, airway control, multiple instrumentations and simultaneous ventilation. On the other hand, flexible bronchoscopy has the advantage of reaching a foreign body in the distal and smaller airway due to the smaller scope calibre. The higher flexibility of the scope allows good retrograde access such as in upper lobe bronchus. Both instruments demonstrated high success rate in foreign body removal which are 97% and 91.3% in rigid bronchoscopy and flexible bronchoscopy respectively. A few cases of modified extraction of foreign body techniques using both rigid and flexible bronchoscopy were reported. Mohd Nazir Othman et al described an extraction technique of an aspirated tooth in right lower bronchus using the rigid bronchoscope in a tracheostomized patient with limited neck extension due to cervical vertebra fracture. The rigid bronchoscope was inserted through the tracheostomy stoma and the foreign body was successfully removed using rigid optical forcep. Noh KB et al reported an extraction technique of a metallic hair pin from the left tertiary bronchus using angiocatheter and flexible optical forceps guided by flexible bronchoscopy.

In our case, we used a flexible endoscope due to the location of the foreign body in the distal and smaller airway which required a smaller and longer endoscope insertion shaft. The inverted location of the upper lobe secondary bronchus needs slight retrograde flexion of a flexible scope. It also was chosen as it was able to fit into the opening of the catheter mount without significant gas leakage. Due to the unavailability of flexible bronchoscopy with a built-in working channel, the 2.5mm neonate flexible nasopharyngolarygoscope was used as it still able to serve an almost similar function as flexible bronchoscopy. However, we had to insert the flexible grasping forcep separately from the endoscope due to the limitation of space via the catheter mount.

We selected smaller ETT size (3.5 mm) in second intubation after considering the narrowed airway caused by the laryngospasm and to provide some space to place the instruments sideway to the ETT. Smaller size ETT has the advantage of allowing clear visualization of both vocal cords and enable the passage of flexible forcep outside the ETT without injuring the vocal cords and trachea.

By maintaining the suspension laryngoscopy throughout the procedure, we were able to interchange the ventilation method between apnoeic ETT sheath and CMV techniques. We were also able to conduct the necessary procedures without compromising the airway.
Figures 5 and 6 illustrate the arrangement of the instruments that were used.

Maintaining oxygenation is the major challenge as hypoxia is a common complication during bronchoscopy. Rigid bronchoscopy has the advantage of simultaneous ventilation during the procedure. However, instrumentation during the procedure may lead to suboptimal oxygenation. Endotracheal intubation is recommended if profound hypoxia occurs during a complicated bronchoscopy. In our case, the decision to intubate the patient was made due to several factors such as airway protection in laryngospasm and for optimum oxygenation in a readily compromised pulmonary function due to ongoing lungs infection.

We report this novel technique of foreign body removal located at the distal airway in a paediatric patient and in a situation where a paediatric flexible bronchoscopy with built-in working channel is not available. This technique was proven to be successful in retrieving the foreign body with no intraoperative or postoperative complication.

**Conclusion:**
Any child with a suspicious history of foreign body aspiration with corresponding clinical conditions is justified for a bronchoscopy procedure. Profound understanding of paediatric respiratory physiology, judicious anticipation of anaesthetic or surgical effects on paediatric airway with sound anatomical knowledge and competent surgical skills are crucial in conducting a safe and successful paediatric bronchoscopy. Dynamic airway changes during this procedure require a re-evaluation of the surgical plan or modification of surgical techniques.

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Case Report

Nasolabial Flap and Simultaneous Cartilage Graft for Nasal Alar Reconstruction- A Case Report

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Abstract

A case of full thickness defect involving left ala of nose reconstructed with nasolabial flap for the coverage of skin and mucosal lining, along with simultaneous insertion of septal cartilage, which completes the reconstruction.

Key words: Nasolabial flap, cartilage graft

Introduction

Nasal reconstruction is always challenging due to it's aesthetic as well as functional importance. The uninvolved contralateral subunit is used to create a template for reconstruction¹. The appropriate reconstruction depends on involvement of subunit and size of injury as well as the layers involved.

The nasolabial flap is a small but useful flap for reconstruction of nasal ala, sidewall, columella, and intraoral reconstruction²-⁵.

This flap was originally advocated by Dieffenbach for the partial reconstruction of nasal alar defects.⁶ Reconstruction of the alar rim necessitates the addition of cartilaginous support to prevent the external nasal valve collapse that may result in difficulty breathing⁶.

Case History

A 38 year old male presented with full-thickness defect of the left alar subunit following human bite 20 days back. The patient was initially managed conservatively in a local hospital to allow the wound to heal by secondary intention. He was then referred to our unit for nasal reconstruction. Patient was counselled regarding the procedure and informed written consent was taken for surgery under general anesthesia.

After wound excision, a nasolabial flap was designed along the ipsilateral nasolabial fold. Nasal bleeding was controlled by applying...
pressure and bipolar electrocautery. A template was made for the missing cartilage. Submucosal resection was performed to obtain septal cartilage according to the measurement of the template. After harvesting, cartilage was preserved in a saline soaked gauze. The nasolabial flap was harvested from distal to proximal manner as previously outlined. Viability of the flap was checked at distal margin. The lateral aspect of cheek was undermined and the donor site was closed primarily. The cartilage was trimmed to fit into the defect and fixed with 5-0 prolene. The distal portion of the nasolabial flap was thinned by excising fat and subcutaneous tissues and folded on itself to form the lining of the newly reconstructed ala. The tip of the flap was sutured to nasal mucosa with interrupted suture using 5-0 vicryl. Lateral edges of the flap was sutured to outer skin using 6-0 prolene. A nasal tube was applied on affected side and fixed to base of columella to maintain the nasal opening. Dressing done with petroleum impregnated gauze. Flap monitoring was done daily and check dressing performed on 3rd postoperative day. Patient was discharged after the initial dressing and advised to follow up after 21st postoperative day for flap division and final inset.

On division and inset, the pedicle was excised sharply and the donor site was closed primarily with remaining portion of flap base. The flap inset with nasal skin was done using 6-0 prolene by interrupted suture. (Fig.1)

Discussion

Full thickness defects in nasal ala and soft triangles bears a considerable challenge in reconstruction. Several methods of possible reconstruction includes chondrocutaneous graft, simultaneous cartilage graft and local or distant flap coverage, composite free flaps from the helical root. A chondrocutaneous composite graft can be used reliably for full-thickness defects of the alar rim up to 1.5 cm. The graft naturally retracts over time and thus while designing the graft it is preferable to take 10-20% larger than the defect size to get a more natural result.

Figure 1.(a) Full thickness defect involving left ala of nose. (b) Defect reconstructed by nasolabial flap and cartilage graft, donor area closed primarily. (c) Postoperative view at 3 weeks (d) After flap division and final flap inset. A composite chondrocutaneous graft initially survives on plasma imbibition from bed. Inosculation occurs after 3 days and angiogenesis occurs after approximately 5 days when the new blood vessels grow into the graft. Because of the poor nutrient supply and the higher metabolic demand of composite grafts, the metabolic needs of the graft has to be reduced immediately after grafting. Metabolic demand can be reduced by cooling.
it with ice packs (every 2 hours for 15-20 minutes at a time in one series) or limiting graft size. Necrosis, poor graft appearance, skin color mismatch can be problematic in composite graft cases.

Among the local flaps, bilobed flap is not suitable for full thickness defect. Superiorly based nasolabial flap can be used as a turnover flap for mucosal lining as well as skin cover. Nasolabial flap can be done in one or two stages. Staged procedure gives a better aesthetic outcome.

Distant flap transfer from the forehead is needed to reconstruct very large, even near-total, defects of the nose. The disadvantage of this flap is that the donor defect is much more obvious and the delicate contours of the nose become obliterated. Multiple secondary procedures, including debulking are needed to achieve an acceptable result.

Many authors have performed alar reconstruction with composite free flaps from the helical root. The major limitation of the free flaps from the helix is that the pedicle length is short, for which some surgeons use vein grafts to reach the recipient vessels. Constantine et al. (2013) summarize alar rim/soft triangle defects reconstruction based on the layers involved. In Type I defects (the skin is intact with cartilaginous and mucosal lining defects), a composite graft from the conchal bowl was used to provide support and lining. In Type II defects (the mucosa is intact with an absence of cartilage and overlying skin), a nasolabial flap with an underlying cartilage graft was used. In Type III defects (all three tissue layers are affected), a paramedian forehead flap was used in conjunction with a cartilage graft to reconstruct all three layers. But in this case, we reconstructed a type III defect with nasolabial flap and simultaneous cartilage graft with good outcome.

The nasolabial flap has many qualities that make it ideal for nasal reconstruction. Importantly, the tissue of the cheek has similar color and texture to that of the nose, and its proximity provides for easy transposition of the flap. Also, there is very little donor-site deformity. The flap’s main vascular supply is by means of a rich subdermal plexus, bestowing the flap with a high level of viability and a capability to tolerate bold thinning and contouring. This characteristic gives the surgeon a very unique piece of tissue to use for reconstruction. This soft tissue flap gives excellent aesthetic results and is subject to secondary contracture, making it ideal for mimicking the convexity of the alar subunit of the nose.

Alar defects can be reconstructed successfully with nasolabial flap and simultaneous cartilage graft. Adequate planning of the flap with appropriate sized cartilage can provide a better aesthetic result and prevent cicatricial distorsion of nasal alae.

Conclusions
Nasolabial flap is a good choice for reconstruction of alar defects due to its reliable vascularity and possibility of thinning the flap for coverage of mucosal lining as well as nasal skin. Nasolabial flap with a simultaneous cartilage graft from nasal septum is an excellent option for reconstruction of alar defects.

References


Case Report

Antrochoanal Polyp in a 4 Years Old Child

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Abstract:
Antrochoanal polyp (ACP) is a benign, solitary polypoid lesion arises from the maxillary antral mucosa that traverses through the ostium to the choana extending in a variable extent to the naso/oropharynx. It is usually unilateral and appears mainly in adults and rarely in children. It should be on differential diagnosis of any patients with nasal obstruction and chronic nasal discharge. Nasal endoscopy, computed tomography (CT), cone beam computed tomography (CBCT) and magnetic resonance imaging (MRI) are the main diagnostic techniques. Complete endoscopic surgical removal from the antral portion is recommended to prevent recurrence. Here a 4-year-old child of antrochoanal polyp that underwent functional endoscopic sinus surgery (FESS) with complete clearance from the maxillary antrum is presented.

Key words: Antrochoanal polyp; computed tomography (CT), FESS.

Background:
Dutch anatomist Fredyk Ruysch in 1661, first known scientist published a description of polyps arising from the maxillary antrum¹. Palfyn in 1753 described a two-sac polyp arising from the maxillary sinus mucosa². In 1891, Zuckerland described a case of a solitary polyp originates from the maxillary sinus³. In 1906, the term antrochoanal polyp (ACP) was first coined by Professor Gustav Killian who described it as a unilateral, solitary, and pear shaped mass with a cystic stalk arising from the maxillary antrum, differing from the other nasal polyps in the formation of two constrictions where one when passes through the maxillary ostium in the nasal cavity and the other when it traverses from the nose through the choana towards the nasopharynx⁴. This definition is still used, and given ACP the eponym of Killian Polyp.

References:
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Introduction:
Antrochoanal polyps are benign solitary lesions affecting mainly adult and young children. It arises due to hypertrophy of the mucosa of maxillary sinus and comes to nasal cavity through natural or accessory maxillary ostium and goes to posterior choana from the nose to the nasopharynx. These are mostly unilateral and children are less commonly affected than adults, with approximately 4–6% of all nasal polyps in general population and about 35% of all pediatric cases of nasal polyps.

The etiopathogenesis of ACP remains unclear, nevertheless it is thought that it could be due to an increased pressure level within the maxillary sinus caused by obstruction of the sinus natural ostium and/or anatomical alteration at the ostiomeatal complex at middle meatus level, in a patient with a pre-existing silent antral cyst, subsequently forced to herniate outside, through the sinus fontanelle. Although, allergy immune response, chronic sinusitis, cystic fibrosis are also thrown to be responsible for its development. One study shown 24% patient had Aspirin-sensitive asthma triad. Chen and his colleagues found 50% of the patients in their series had association with allergic diatheses.

The patients of ACP mainly present with nasal obstruction but nasal discharge, snoring, headache, ear block and rarely epistaxis may be the associated symptoms. Nasal endoscopy, computed tomography, cone beam computed tomography and magnetic resonance are the main diagnostic techniques. Endoscopic complete surgical removal is the treatment of choice and that can prevent recurrence as well. Previously treated by Caldwell-Luc operation to remove the antral part and nasal part was removed by pulling or grasping by different instruments. To minimize recurrence, complete removal in mandatory. Radical surgery (Caldwell-Luc operation) of the maxillary sinus for ACP has been replaced by Functional Endoscopic Sinus Surgery (FESS).

ACP is rare in pediatric age group. Throughout the literature search, 6 years old child was the youngest who was diagnosed and operated.

Case summary:
A 4-year boy was brought to us with left sided nasal obstruction, chronic nasal discharge, mouth breathing and snoring, disturbed sleep, insufficient weight gain. He is non asthmatic. He had no positive family history and no known drug sensitivity.

On local examination, there was no external nasal deformity. He had muco-purulent discharge on both nasal cavities. Anterior rhinoscopy showed a pale polypoidal lesion at the mid part of left nasal cavity, coming from lateral nasal wall. Left nasal airway was completely obstructed. Further examination to assess its attachment and sensitivity was difficult to perform, as the child was irritable. On intraoral examination the same lesion was seen in the nasopharynx hanging from choana. There was poor dental hygiene with multiple carious teeth.

Figure-1: a) Picture showing mucopurulent nasal discharge, b) Showing nasopharyngeal component
On general examination his body weight was below average, lean and thin. On other systemic examination there was nothing significant.

On Computed tomography scan there was an isodense lesion in the left maxillary antrum and left nasal cavity hanging through the choana into oro-pharynx. No bony erosion was evident. Right antrum and nasal cavity were found normal. Adenoid was also enlarged. Radiologically it was suggestive of left antrochoanal polyp.

He underwent functional endoscopic sinus surgery under general anesthesia. Nasal cavity was prepared with repeated cut pieces of meroccele soaked with topical preparation of 1:5000 adrenaline xylocaine solutions. Karl Storz High definition (HD) camera and 4mm telescope were used during surgery. The polyp was seen to coming out from the maxillary antrum through the natural ostium. There was an accessory ostium was present posterior to the natural ostium. After removal of vertical and horizontal portion of uncinate process the antral attachment made free. There was retained secretion within the antrum. The pedunculated portion removed per-orally. Other sinuses were not examined as these were free of disease according to CT. Ipsilateral nasal cavity was packed with small piece of Merocele nasal pack. Histopathology confirmed our clinical diagnosis as ACP.

Figure-2: Large green arrow indicating lesion at nasopharynx, small green arrow indicating opacity in ipsilateral maxillary antrum

Figure-3: Per-oral removal of polyp

Figure-4: Nasal component of ACP
Discussion:

Antrochoanal polyps are rare lesions in pediatric age group and most commonly affecting the young adult and adults\(^6,7\). In the pediatric age group ACP is recorded above 10 years of age that is found in most of the published literature\(^7\). One 6-year-old boy presented with ACP which is considered as the youngest patient reported as per “Google Search”\(^15\). In our case we think this 4-year-old child diagnosed ACP is the youngest one (confirmed histopathologically).

Antrochoanal polyp most commonly originates within maxillary antrum that comes out of the maxillary sinus to the nasal cavity through the natural or accessory ostium and then goes to the choana along the floor of nose towards the naso/oropharynx\(^16\). Very occasionally it comes to anterior nares. Increased pressure level within the maxillary sinus caused by obstruction of the sinus natural ostium and/or anatomical alteration at the ostiomeatal complex at middle meatus level could be the predisposing factor for the development of ACP \(^8\). Chronic sinusitis, cystic fibrosis, allergic immune response are also considered to be the etiology behind its origin\(^9\)\(^\sim\)\(^12\). The presented case reported with nasal obstruction and nasal discharge.

Osteomeatal complex is not a wide space in the nasal cavity. It can be obstructed due to any chronic inflammatory condition of the maxillary sinus or ethmoid sinus; and that can be augmented by anatomical variation on that region or middle meatal level thus compromising the ostium\(^8\). Due to increase pressure within the antrum air transport to and from the antrum during breathing is usually impaired. Developing intramaxillary force due to normal mucociliary movement, the growing ACP passes through the natural ostium and/or posterior frontanelle\(^11\). This process is in turn further enhanced by pressure gradient between middle meatus and antrum\(^11\)\(^,\)\(^12\).

The most common symptom is unilateral nasal obstruction; others are chronic nasal discharge, snoring and sleep apnea, epistaxis etc.\(^13\). Though epistaxis is rare in ACP but if present, Angiofibroma (especially in male children), rhabdomyosarcomas should be excluded\(^16\).

As the anatomy and extent of development of sinuses is different in children than in adult,
variations in technique are frequently required. Due to the smaller intranasal anatomy of children, the surgical sites become more vulnerable to trauma. That's why; surgeon performing pediatric FESS should have a proper knowledge about sinonasal anatomy. Patients CT scan should be personally reviewed by the surgeon himself during and before the operative procedure. That helps to make a preconceived surgical plan to avoid any unwanted preoperative surprise, minimize the trauma and postoperative morbidity\textsuperscript{14,15}. CT was done and studied in this case very meticulously.

Complete endoscopic surgical removal from the maxillary sinus is mandatory to prevent recurrence\textsuperscript{14,15}. Previously ACP was used to treat by Caldwell-Luc operation. But after development of nasoendoscope, the procedure has been replaced by FESS (Functional Endoscopic Sinus Surgery). Nowadays after the development of powered Microdebrider, precise excision of ACP is carried out without jeopardizing the normal mucosa of maxillary sinus that to establishing existing the mucociliary activity\textsuperscript{16}. As a result, the recurrence rate and the functional activity are relatively low in expert hand. The ACP of presented 4-year-old child was operated by Karl Storz HD camera and 4 mm telescope (O and 70 degree); and with Medtronic microdebrider. The excised tissue was sent for histopathological examination that also confirmed the diagnosis of ACP.

An adequate preoperative preparation is necessary before performing surgery. Antibiotic, antihistamine and montelukast are given preoperatively to minimize bacterial colonization as well as inflammation, so that per-operative bleeding will be less\textsuperscript{12,17}. Postoperatively nasal packing is a big issue in case of children as they usually do not allow to keep in the nasal cavity. In our case anterior nasal packing was done in the ipsilateral nasal cavity with a slice of Merocele. It was removed after 12 hours. The child accepted Merocele packing as he was used to be with nasal obstruction preoperatively for a prolonged period of time.

It is difficult to follow up these patients for any recurrence as these small children does not allow nasoendoscopic examination in the outpatient department. A follow up CT scan is essential to see any recurrence but in this CT was not done as this article is written within a month of surgery.

Conclusion:
Antrochoanal polyp should be considered as a differential diagnosis in any child with nasal mass or nasal obstruction. Thorough clinical and radiological evaluation is mandatory for further management. Preoperative reading of CT scan by the surgeon himself is important to avoid any unwanted complication.

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