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CONTENTS

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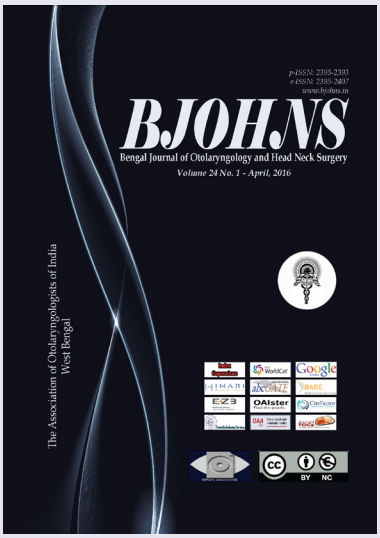

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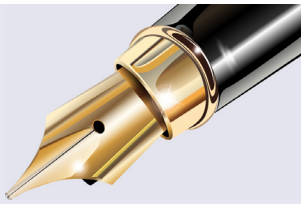

The recent exponential rise in the number of academic journals worldwide has led to immense confusion among authors regarding the relative value of these journals and consequentially their published research articles. With varying terms being bandied about by the indexing sites and even the publishers, a large number of which are misleading and downright unscrupulous, authors are often duped into paying for publication in 'predatory' journals and lose money as well as valuable exposure of diligently accumulated research work. The term 'Impact Factor' or 'Journal Impact Factor' was devised by Eugene Garfield to help in this regard.

The Impact Factor is calculated based on the number of citations in a particular year, of articles published in the previous two years, and the total number of articles published in the journal in the past two years. Although it seems to be a simple mathematical calculation and has often been used as a proxy measure of the relative importance of a journal, there has been a lot of criticism from various quarters regarding numerous ways it may be manipulated or misinterpreted.

The term 'Impact Factor' should only be used for values obtained from Journal Citation Reports but dubious companies often produce fake impact factors, a fact taken advantage of by predatory publishers to deceive authors. Even the original Impact Factor may be influenced indirectly in various ways. For example, journals may try to publish more review articles as they generate more citations per article rather than low yield ones like medical case reports. A journal may further force authors to cite articles from their previous issues in an attempt to increase the impact factor. Also, as the citation numbers may be heavily skewed across different articles in the same journal, the actual citation of an individual article may be well below the average of all the articles in that particular journal.

Given the controversies associated with Impact Factors, it is probably best to keep in mind the official statement of the European Association of Science Editors recommending "that journal impact factors are used only - and cautiously - for measuring and comparing the influence of entire journals, but not for the assessment of single papers, and certainly not for the assessment of researchers or research programmes."

Dr Saumendra Nath Bandyopadhyay
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A Comparative Study of Conventional versus Endoscopic Septoplasty

Ankita Singh,[1] Nalini Bhat,[1] Pallavi Bhandarkar,[1] Ram Singh[1]

ABSTRACT

Introduction

The standard surgical treatment for symptomatic deviated septum is septoplasty. This is usually done conventionally using the headlight. However, in recent years the endoscopic method has emerged as an alternative technique. This study aims to compare results of conventional and endoscopic septoplasty

Materials and Methods

A study comprising of 44 patients, randomly divided in two groups, was undertaken to compare the efficacy of both the techniques. This study evaluated parameters like postoperative subjective improvement in symptoms, using the NOSE questionnaire, intra-operative blood loss, duration of surgery, post-operative pain and complications across the two groups.

Further, cases were subgrouped according to the site of deviation as anterior, posterior or combined and the efficacy of these two methods for correcting different sites of deviation was assessed, using the same parameters.

Results

The endoscopic approach showed better overall clinical results, irrespective of the site of deviation. It was noted that correcting posterior deviations required shorter time and had lesser blood loss when operated using the endoscope whereas anterior deviations were dealt faster and had lesser bleeding by the conventional method. There was less pain and morbidity in the postoperative period in the endoscopic group as compared to conventional group.

Discussion

Historical perspective of the conventional and endoscopic septal surgery is mentioned. In review of literature on the four parameters of this study – Symptomatic improvement, intra-operative blood loss, post-operative pain and surgical complications, were compared with published reports.

Conclusion

Endoscopic septoplasty was found to have distinct advantages over the conventional method, more so for posterior septal deviations. It should be an option offered to all patients requiring septoplasty.

Keywords

Nasal Septum; Septoplasty; Endoscopy; Symptom Assessment; Nasal Obstruction; Pain, Postoperative; Operative Time

Septoplasty is the standard treatment offered for symptomatic deviated nasal septum. It is conventionally performed under direct visualization using a headlight and nasal speculum. However, this method has the drawbacks of relatively poor illumination and accessibility and no magnification, calling for a larger incision and elevation of larger flaps often on both sides of the septum. As a result, there are higher chances of over-resection and over manipulation.[1]

Endoscopic septal surgery is a promising alternative, with several advantages over the conventional headlight method, preoperatively, intra operatively as well postoperatively. Though endoscopic nasal surgery is widely used to treat sinus pathologies and other related conditions, it has not yet gained enough popularity for correction of deviated septum.

The present study aims to compare results of conventional and endoscopic septoplasty.

Materials and Methods

This was a prospective study carried out over 2 years (June 2013 to June 2015). It was approved by the hospital scientific and ethical committee. Adult patients

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with a symptomatic deviated nasal septum, who visited the ENT department and who were willing and fit to undergo septal surgery were included in this study. These patients had symptoms for at least 3 months and had not responded to maximal medical management.

Patients undergoing septal surgery along with other nasal pathologies were excluded from the study. Other exclusion criteria were, patients with head and neck malignancy, patients who had received radiotherapy of head and neck region or a maxillofacial trauma in the preceding 1 year, had a history of previous nasal surgery or had an existingexternal nasal deformity. Also excluded were patients undergoing septoplasty for reasons such as access to anatomical areas in close proximity or obtaining graft etc.

44 patients were enrolled into this study after taking informed consent.

A detailed history was taken and clinical examination was done for all patients, which included a diagnostic nasal endoscopy and details of the deviated septum were recorded in terms of site i.e. anterior (localised to anterior quadrilateral cartilage) / posterior (bony deviations) or combined deviations. Caudal deviations were grouped as anterior deviations unless there was also a significant bony deviation, in which case it was grouped as combined. Similarly, significant spurs were grouped as per their location. The more detailed Mladina classification was not used as the sample size in the study was not large enough to have enough cases in each subgroup.

Patients symptoms were assessed and recorded using a validated NOSE (Nasal Obstruction Symptom Evaluation) scale. The patients were randomly assigned into either of two groups viz the conventional septoplasty(CS) group and the Endoscopic septoplasty (ES) group.

The randomisation was done on day of surgery. Equal number of chits for conventional and endoscopic surgery were prepared. The operating nurse was asked to draw a chit for the patient.Septoplasty was performed by either of the techniques, as per the allotted group, under general anaesthesia.

All surgeries were performed by either of the two senior consultant surgeons.

Data of the two groups were collected and analysed on the following parameters:

a) Subjective improvement using the NOSE scale, pre and post operatively 3 months after surgery.

b) Intraoperative time taken and blood loss during surgery

c) Post-operative pain using the visual analogue scale and

d) Complications, if any.

Analysis on the parameters (a) & (b) was also extended to the subgroups of anterior, posterior and combined deviations to compare the results of both the techniques.

Results obtained were analysed using the student Paired 't' test and Chi square test.

Technique for Conventional Septoplasty:

Bilateral nasal decongestion was done using 4% lignocaine with adrenaline 10 minutes prior to surgery. Under headlight vision, after infiltration with 2% lignocaine with adrenaline (1:200000) into the septum, a vertical hemitransfixion incision was made 2-3 mm from the caudal end of septum on concave side along the entire height of the septum.Anterior tunnel was created by raising the mucoperichondrial flap, posterior tunnel by raising mucoperiosteal flap, and inferior tunnel created by raising flap over the maxillary crest.

Bony-Cartilaginous junction was dislocated, and periosteal flap was raised on opposite side. Part of perpendicular plate of ethmoid and vomerine spur were removed to correct the bony deformity. Inferiorly a small cartilaginous strip was removed. Any further cartilage was removed as per requirement of the particular case, in which case muco-perichondrial flap on opposite site was also raised. Incision was sutured with catgut and nasal cavities packed with polyvinyl alcohol nasal pack.

In case of caudal dislocation needing correction, a complete transfixion incision was made. Here the mucoperichondrial flaps were elevated on both sides of the caudal septum. If the deviation appeared to be due to be excessively long, it was accordingly shortened in the most caudal aspect of the caudal strut. In case the

caudal strut was malpositioned, but not long , it was separated from the bony nasal spine and repositioned appropriately. The caudal strut was then secured to the columela(where a small tunnel was created by sharp dissection) with 4-0 vicryl sutures and the transfixion incision was closed meticulously

Technique for Endoscopic septoplasty:

Infiltration was done using 0° 4mm endoscope. A vertical incision was made anterior to the deviation. Incision was not usually extended from dorsum to the floor but was extended both superiorly and inferiorly just as needed to expose the most deviated part. For more posterior isolated deformities or spur, the incision was placed posteriorly in the immediate vicinity of the deformity.

The mucoperichondrial-periosteal flap elevation done was often limited over the most deviated portion of the nasal septum. After exposing the deformity bilaterally, only the most deviated part of septum, either bony or cartilaginous, was resected. Flap was reposited and a check endoscopy was performed in the end. Nasal packing was done.

For correcting caudal dislocations endoscopically, the two surgeon technique was used where an assistant held the scope while the surgeon made a complete transfixion incision and followed the same procedure as in conventional method.

Blood loss was recorded as per the readings marked on the suction bottle.A fixed amount of saline was taken before the surgery for cleaning and flushing the suction canulas.At the end of the surgery the amount of saline was deducted from the total collection in the suction bottle.Also the number of blood soaked gauze pieces were counted and added to the total value(1soaked gauze piece approximately 3ml).

All patients were given perioperative surgical prophylaxis as per hospital policy (intravenous cefuroxime), and postoperative oral analgesics, nasal decongestant drops and steam inhalation after nasal pack removal (24 hours after surgery).Thereafter, patients were followed up in the outpatient department after 1 week for nasal cleaning and complications if any were noted. Post-operative NOSE scores were taken at end of 3 months.

Results

Mean age of study population was 33.92 years. The

Table I: Conventional septoplasty (CS) group. Pre operative and post operative NOSE scores.

	PRE-OP.MEAN (S.D)	POST-OP.MEAN (S.D)	DECLINE IN MEAN
Nasal blockage	**3.86 (.351)**	**1.55 (.510)**	**2.31**
Trouble breathing through my nose	**3.36 (.658)**	**1.00 (.309)**	**2.36**
Trouble Sleeping	**2.77 (.752)**	**0.27 (.456)**	**2.5**
Nasal Stuffiness	**3.64 (.492)**	**1.18 (501)**	**2.46**
Unable to breathe air during exertion	**2.91 (.684)**	**0.23 (0.429)**	**2.68**
Total score	**16.36 (1.560)**	**4.18 (1.181)**	**12.18**

Table II: Endoscopic Septoplasty (ES) group.Pre operative and post operative NOSE scores

	PRE-OP. MEAN (S.D)	POST-OP. MEAN (S.D)	DECLINE IN MEAN
Nasal blockage	3.73(.456)	0.41(0.503)	3.32
Trouble breathing through my nose	3.64(0.492)	0.27(0.456)	3.37
Trouble Sleeping	3.18(0.733)	0.05(0.213)	3.13
Nasal Stuffiness	3.77(0.429)	0.45(0.510)	3.32
Unable to breathe air during exertion	2.68(0.716)	0.05(0.213)	2.63
Total score	17.00(1.447)	1.23(1.020)	15.77

study included 34 males and 10 females. Number of patients with anterior, posterior and combined deviation were 15, 10 and 19 respectively.

Subjective Improvement after Surgery: The mean preoperative and post-operative NOSE score in conventional (CS) group were 16.36 and 4.18 respectively. The mean decline in the score was 12.18 (Table I).

In the endoscopic (ES) group the average preoperative and postoperative scores were 17.0 and 1.23.The average reduction in score was 15.77 (Table II).

There was significant subjective improvement in NOSE scores among participants in both the groups as found using Paired 't' test (TableIII).

The subjective improvement was further assessed based on site of deviation and found to be significant as shown in Fig. 1.

In cases with anterior deviations, the mean preoperative and post-operativeNOSE scores in CS group was 16.29 and 3.57 respectively; ES group was17.25 and 1.88 respectively. The mean decline in CS group was 12.74 (78%) and ES group was 15.37 (89%). ($p<0.05$)

In cases with posterior deviations, the mean preoperative and postoperative scores in CS group was 16.00 and 4.80 respectively; ES group was 16.80 and 0.4 respectively. The mean decline in CS group was 11.20 (70%) and ES group was 16.40 (98%).This difference was found statistically significant.

In cases with combined deviations, the mean

Table III: Pre and postoperative mean NOSE scores of the Conventional and Endoscopic groups

GROUP	PREOP MEAN NOSE SCORE	POSTOP MEAN NOSE SCORE	DROP IN MEAN NOSE SCORES	PERCENTAGE OF FALL IN MEAN NOSE SCORES
CONVENTIONAL (CS)	16.36	4.18	12.82	74%
ENDOSCOPIC (ES)	17.00	1.23	15.77	92.76%

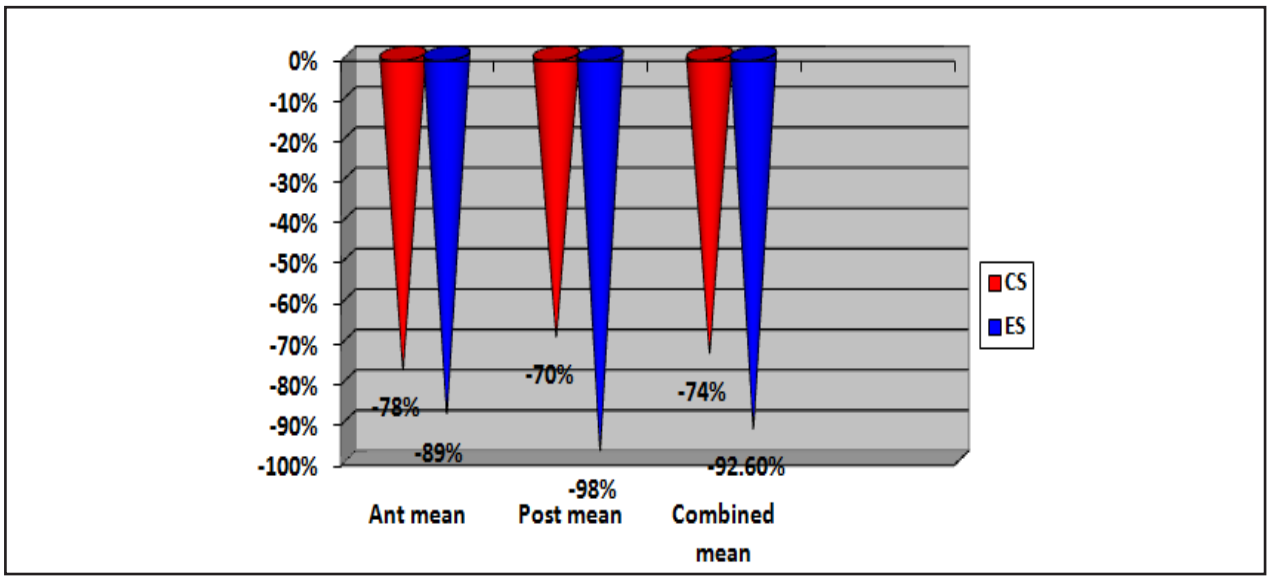

Fig. 1. Comparison between the % of fall in NOSE scores amongst 3 types of deviations. (Ant – Anterior, Post – Posterior) in both Conventional and Endoscopic groups.

preoperative and post-operative scores in CS group was 16.60and 4.30 respectively; ES group was 16.89 and 1.11 respectively. The mean fall in CS group was 12.30 (74%) and ES group was 15.77 (93%). This difference in decline of symptoms was found to be statistically significant.

The decline in mean NOSE scores (indicating improvement in symptoms) was significantly more in the Endoscope group ($p<0.05$) thus indicating that the endoscopic group had better relief of symptoms than the conventional septoplasty group, irrespective of the site of deviation.

Time taken during Surgery: The mean time taken (in minutes) for conventional septoplasty was 68.18

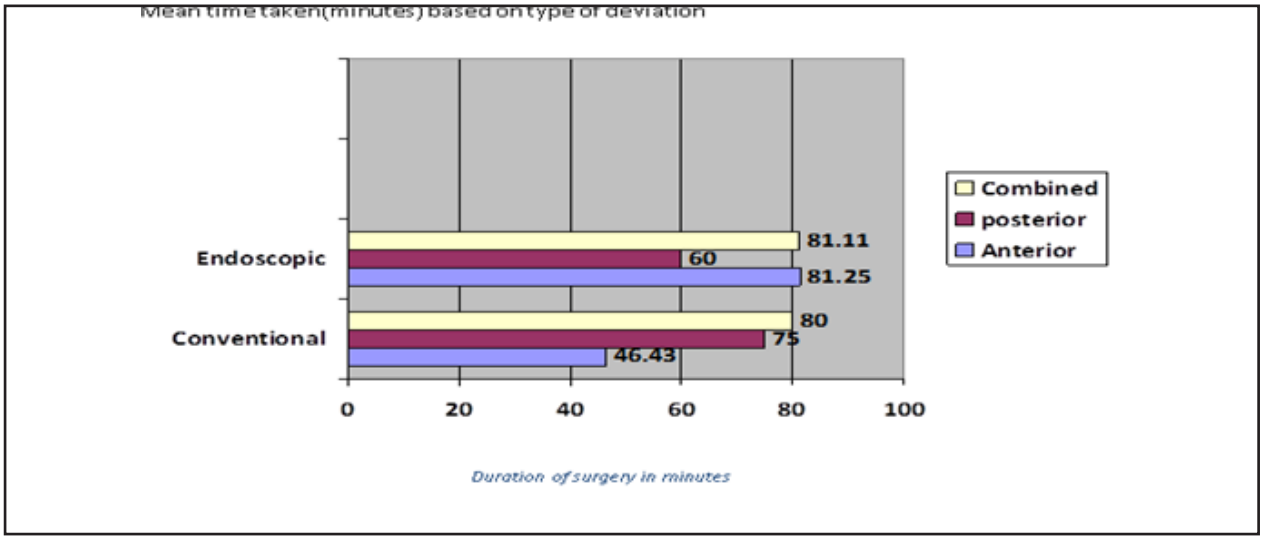

Fig. 2. Mean time taken for surgery (in minutes) based on type of deviations in both the Conventional and Endoscopic groups

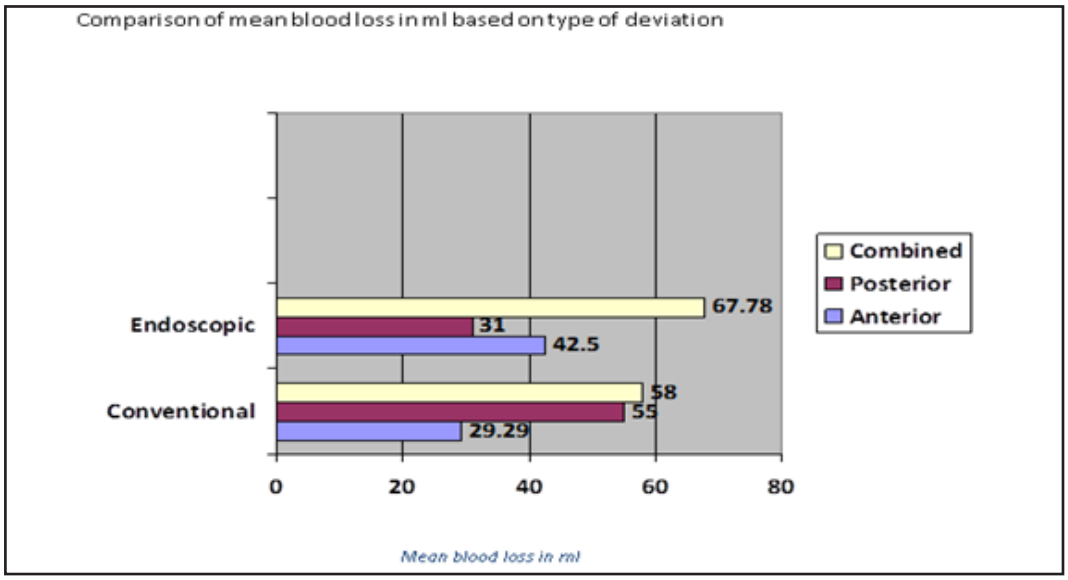

Fig. 3. Intraoperative blood loss in ml

and endoscopic septoplasty was 76.36 and this was not statistically significant.

As shown in Fig.2, mean time taken for surgery (in min) was significantly less for anterior deviations corrected by conventional method (46.42), as compared to the endoscopic method (81.25) ($p<0.001$).Similarly, the mean time for posterior deviations was significantly more in CS group (75) as compared to ES group (60). ($p=0.05$)

In the combined subgroup time taken for CS and ES were 80 and 81.11 respectively ($p=0.4$)

Intra Operative Blood loss: Average blood loss (in ml) in the CS group was 48.18 while that in ES group was 50.23 ($p=0.6$). No statistically significant difference was noted.

On assessing for blood loss depending on site of deviation, intraoperative bleeding was significantly less for the cases having anterior deviation undergoing conventional septoplatsy (29.29) as compared to those undergoing endoscopic correction (42.50)($p=0.00$). Average blood loss for posterior deviations in CS group was 55 while it was 31 in ES group.($p=0.05$)

In the combined subgroup the mean blood loss recorded in CS group was 67.78 while it was 58 for cases in ES group ($p=0.010$). (Fig. 3)

Postoperative Pain: Post-operative assessment of pain, using the visual analogue scale showed, majority of patients (77.3%) who underwent endoscopic

Table IV: Comparison of post-operative pain in the Conventional and Endoscopic groups

PAIN	CONVENTIONAL(CS)	ENDOSCOPIC (ES)	TOTAL
MILD	9 (40.9%)	17(77.33%)	26
MODERATE	13(59.1%)	5(22.77%)	18
TOTAL	22(100%)	22(100%)	44

septoplasty had mild pain, whereas moderate pain was reported by 22.7% cases in the same group. In CS group majority of cases (59.1%) experienced moderate pain, while mild pain was noticed among 40.9% patients. In our study patients undergoing endoscopic septoplasty had significantly less postoperative pain as calculated by the chi-square test (p=0.04). (Table IV)

Complications:In conventional group, total of 4 patients had complications (18.2%) - 2 had synechiae, 1 patient had infection and 1 patient had delayed hemorrhage.

In endoscopic group, complications were seen in 3 patients (13.6%) 2 cases of synechiae, and 1 of septal perforation (Table V)

Though the incidence of complications was slightly more in conventional group this was not statistically significant.

The numbers being small we could not assess the rate of complications across the subgroups of deviations based on their location.

Discussion

Deviation of the nasal septum is very common, but not always symptomatic. Septal surgery is the treatment for symptomatic deviated nasal septum. Surgical techniques to correct deviated nasal septum date back to ancient Egyptian medical texts dated around 3500 BC and over time many techniques had evolved but most were short lived and fell out of favour till the early 1900 when the sub mucous resection was described and popularized by Freer [1902] and Killian [1904] separately. These too underwent modifications to evolve into the more conservative septoplasty notably by Metzenbaum [1929], Galloway [1946] and Cottle [1958].

With advent of nasal endoscopic surgery in 1978 it was not long before Lanza et al and Stammberger initially described the application of endoscopic techniques to the correction of septal deformity in 1991.[2]

Our study aimed at comparing the results of endoscopic septal surgery versus conventional septal surgery using 4 parameters – subjective improvement in symptoms 3 months after surgery using validated NOSE scores, intra operative blood loss, post-operative pain and incidence of complications. We further tried to compare whether the site of deviation had any effect on our results.

We inferred that the conventional and endoscopic techniques were both effective in relieving symptoms of a deviated nasal septum, but endoscopic septoplasty was significantly better than the conventional method of surgery. This is probably because the endoscopic technique provides a direct – targeted approach to the septal anatomic deformity, allowing a minimally

Table V: Numberof complications in the Conventional and Endoscopic septoplasty group

COMPLICATION	CONVENTIONAL(CS)	ENDOSCOPIC (ES)
Synechiae	2	2
Post Op infection	1	0
Post op bleeding	1	0
Septal perforation	0	1
Total	4	3

invasive procedure with limited septal mucosal flap dissection and removal of a small cartilaginous and/or bony deformity.[3]

Our observations were in consensus with other similar studies. Gulati et al, in their comparative study enrolling 50 cases stated that 90.5% cases reported improvement of their obstruction by the endoscopic method while 80% cases of conventional got relief.[4]

Paradise et al performed a similar study on 63 patients, using NOSE scores and reported both endoscopic and conventional septoplasty to be effective in improving the mean scores of the patients. But no statistical difference was found between the groups.[5]

We further observed that septoplasty done by endoscopic approach has showed significantly better results when compared to conventional approach irrespective of the site of deviation (anterior, posterior or combined) and this improvement was most marked in posterior deviations.

A similar experience was obtained Gupta et al. They found that 80% had subjective improvement in conventional group while 96% in endoscopic group in patients with posterior septal deviations.[1]

Our study showed that overall the average time taken for endoscopic septoplasty was more as compared to conventional method, but the difference was not statistically significant. But on assessing the surgical time for the various sub groups, we found that for predominantly anterior deviations the time taken was significantly less by conventional method and for posterior deviations the endoscopic surgical time was significantly shorter, it being almost same for combined deviations.

It is possible that as surgeons gain more experience with endoscopic septoplasty this difference will reduce or maybe even reverse.

On assessing the blood loss during surgery, we found there was no significant difference in blood loss during surgery by either of the methods. This was different from the results of the study by Aiyer,who stated that majority of patients (82%) who underwent endoscopic septoplasty had minimal (< 50 ml blood loss) while 18% had bleeding (>50ml), as compared to 45% in conventional group.[6]

On further assessing blood loss based on site of deviation, we observed that blood loss was significantly less in anterior deviation correction by conventional surgery and predominantly posterior deviation corrections that were performed by endoscopic septoplasty. Thus, an important observation in our study was that the surgical time and blood loss during correction of anterior deviation with endoscopic approach was more and it was significantly less for predominantly posterior deviations. This could probably be because stabilizing the endoscopes and instrument in the anterior nose is difficult for the surgeons requiring more time and manipulation and consequently more bleeding.

The posterior deviations and spurs which were relatively inaccessible by the conventional method, due to tunnel vision and narrow space for manipulation, were better dealt endoscopically. Nayak et al had found the endoscopic septoplasty to have distinct advantages in correcting posterior deviations and have advocated an endoscopic approach for inaccessible posterior deviation and a conservative traditional technique for accessible anterior segment.[7]

We found that the patients undergoing endoscopic septoplasty had significantly less postoperative pain (p=0.04). Our observation was in agreement with the study done by Aiyer who found that 64% cases of endoscopic group experienced mild pain while 9% cases had moderate pain, while 59% patients in conventional group noted moderate pain and 23% had mild pain.[6]

Gulati also, in his study, concluded that postoperative perception of pain was higher in conventional category as compared to endoscopic group. This is probably because endoscopic septoplasty requires less dissection and resection of tissues as compared to the conventional method.[4]

There were slightly more complications in the conventional group (18.2%) than the endoscopic group (13.6%) in our study, but the difference was not statistically significant. Similar observations have been reported in studies done by Jain et al,[8] Talluri et al.[9]

Prakash et al reported a statistically significant higher incidence of complications in the conventional

group(35%) as against the endoscopic group(15%).[10]

Conclusion

Both the conventional and endoscopic septoplasty techniques were found to be very effective in relieving nasal obstruction, but endoscopic method was found to have a significant edge over the conventional technique, irrespective of the site of deviation.

Though there was no statistical difference in the time taken and blood loss during surgery between the endoscopic septoplasty and the conventional group, the anterior deviations could be corrected significantly faster and with lesser bleeding using the conventional method while posterior deviations had significantly lesser bleeding and operating time when corrected endoscopically.

There is significantly less postoperative pain in endoscopic group as compared to conventional group.

Considering the distinct advantages of endoscopic septoplasty over the conventional technique, we recommend that all surgeons be well versed with the endoscopic technique.

Further surgical experience and larger similar studies will help in coming to a greater consensus. Till then we strongly suggest that at least the posterior deviations are approached by the endoscope.

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Sino-Nasal Outcome Test - 22 : Translation, Cross-cultural Adaptation, and Validation in Local Language

Aditya M Yeolekar,[1] Vidya Rokade,[1] Kiran Shinde,[1] Netra Pathak,[1] Haris Qadri,[1] Kaustubh Kahane[1]

ABSTRACT

Introduction:

Quality of life questionnaires have been increasingly used in clinical studies to help estimate the magnitude of problem. Sino-Nasal Outcome Test -22 (SNOT-22) is considered to be a good tool to measure the severity of Sino-Nasal Diseases. As this test is in English, it may be difficult for the local population to express their symptoms correctly. Therefore we have translated and validated the SNOT- 22 test in local Indian language, Marathi.

Materials and Methods

An early Indian (Marathi) version of the SNOT 22 questionnaire was prepared. This was a prospective study,where forty patients with Sino-nasal Diseases confirmed on DNE & CT(PNS) filled the questionnaire. This was repeated after a period of 14 days to retest. For validation the questionnaire was also filled by healthy individuals.

Results

The mean SNOT-22 score ± SD was 50.17 ± 18.65 (range 10–93) in the initial test, and 49.61 ± 18.40 (range 21–91) in retest in the study group. Cronbach's alpha was 0.835 and 0.837 at the initial and retest examination respectively, both values were suggesting a good internal consistency. The mean SNOT-22 score ± SD was 13 ± 11.68 in the control group and 49.61 ± 18.40 (range 21–91) in the sino-nasal disease group and proved by Mann- Whitney U test.

Conclusion

The Marathi SNOT-22 is a valid instrument to assess the symptomatology of patients of Sino-nasal Diseases in Maharashtra.

Keywords:

Nose Diseases; Quality of Life; SNOT-22; Marathi

Quality of life questionnaires have been frequently employed in clinical studies in order to determine the severity of disease and the impact of medical or surgical intervention.[1] Health status may be described by functional handicaps, physical limitations or the social experiences reported by the patients. According to this definition, physicians and other healthcare professionals may describe the health status of the patient only to some extent, but it is only the patient, individually, who can describe his/her own quality of life.[2]

Chronic Rhinosinusitis (CRS), which forms a major chunk of Sino-Nasal Diseases is a multifactorial disease that affects the patients' health-related Quality Of Life (HRQOL). In terms of incidence as well as prevalence, CRS is comparable to heart disease and diabetes.[3,4] Similar patterns of prevalence have been reported in Germany.[4] The European position paper on rhinosinusitis and nasal polyps recommends the subjective assessment of symptoms using validated questionnaires.[5]

This has resulted in the development of a number of CRS specific assessment tools that are the following: SF36, RSOM-31,RSUI, RQLQ,SNOT-16,SN-5, SNOT-11, SNOT-20, NOSE,CQ7. SNOT-20 and SNOT-22 are the two validated patient reported measures of the symptom severity and health related QOL in sinonasal conditions.[2,6] SNOT-22 (2009) is a modified version of SNOT-20 and RSOM-31. SNOT-22 covers the physical problems, functional limitations as well as the emotional consequences of patients who suffer from

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CRS.[7] The SNOT-22 scoring has already been adopted by many clinicians for the assessment of CRS and also for evaluating the outcome of the treatment of nasal polyposis[8] and in surgery of nasal septum.[9,10] Morley AD, Sharp HR et al.[11] have analysed indices on reliability, validity and responsiveness and concluded that SNOT-22 can be applied as a tool for the QOL. Hopkins C et al[12] have concluded that SNOT-22 can significantly discriminate between healthy and the diseased and further identified differences in subgroups of CRS. The author earlier studied SNOT-22 score in subjects not known to be suffering from rhino-sinusitis in India.[13]

Since this is a questionnaire in English, to use it in our country we need to translate it into a local language which could possibly eliminate the observer bias. Moreover, the meaning of quality of life and the ways through which health problems are expressed vary between the different cultures.[1] Similar adaptations of SNOT 22 English version have been done elsewhere in the world i.e Denmark,[4] Lithuinia,[3] Brazil,[14] Persia, [15] Hebrew,[16] Moroccan,[17] Spanish,[18] French,[19] and Chinese.[20]

The goal of the present study was to do the translation, cultural adaptation and validation of the SNOT-22 questionnaire from English into local Indian language of state of Maharashtra, Marathi, fourth most spoken language in India (about 73 million-2001 census). It is also ranks 19th in the list of most spoken languages in the world. Therefore, the main purpose of the present study is to evaluate the modified version in Marathi of the SNOT-22 for its psychometric properties.

Materials and Methods

A prospective study was conducted on patients with Sino-nasal disease at SKN Medical College and General Hospital, Pune, Maharashtra, India. The study was accepted/approved by the hospital ethics committee. Validation of the Marathi questionnaire included translation of the original instrument from English to Marathi by two independent native Marathi language experts. A pilot study was undertaken among thirty medical students who knew both English and Marathi and were not known to be suffering from sino-nasal diseases. They were given original SNOT 22 in English and also our translated Marathi version of SNOT-22. The mean scores were comparable, 13 for SNOT 22 and 12 for Marathi version respectively. This proved the intelligibility of the questionnaire.

Inclusion criteria:

1) Patients diagnosed to be suffering from Sino-Nasal Diseases i.e. Deviated Nasal Septum, Chronic Rhinosinusitis, Sinonasal Polyp and confirmed on Diagnostic Nasal Endoscopy and CT- Paranasal Sinuses.

2) Those patients who could read and write Marathi.

Exclusion criteria were subjects below 18 years of age and acute infection at the time of presentation. Patients were informed about the nature and need of the study.

Missing data: Patients who were not available for retest examination and those who filled less than 50% of test were excluded from the study.

Test–retest study: The test–retest reliability was carried out in patients with sino-nasal diseases, by employing SNOT-22 questionnaire twice during routine visits of the patient by two different physicians two weeks apart. Patients with change in treatment and with acute change of symptoms due to common cold/ influenza/ upper respiratory tract infection during the time period between completing the questionnaire were excluded from the study.

Control study: The Control group were recruited from healthy relative or attendant of patients, who were not known to be suffering from any sino-nasal diseases. Respondents were asked if they were, or had ever been diagnosed with sino-nasal disease or if they were using nasal medication and were excluded if they responded positively to any of the above. SNOT-22 (modified i.e. marathi) scores were obtained for the control group subjects.

The reliability of the tool was analyzed in following two ways: internal consistency as well as test and re-test reproducibility. Internal consistency has to do with the way with which each question is associated with others in the questionnaire which is measured by Cronbach's alpha coefficient.[3] The value that is minimum acceptable is 0.7. The test and retest reproducibility measures stability of an instrument along time after repetitive tests and is evaluated by the use of the questionnaire

Table I: The Marathi translation of SNOT-22 questionnaire

SINO-NASAL OUTCOME TEST – (SNOT) – 22 – MARATHI VERSION

नाकाच्या आजारा मध्ये होणाऱ्या त्रासामुळे उद्भवणाऱ्या तक्रारी खाली नमूद केल्या आहेत. तक्रारी आणि होणारा त्रास यांचे एक कोष्ठक बनवले आहे.

तक्रारींचे स्वरुप आणि त्यामुळे होणारा त्रास ०ते ५ या पट्टीत आपल्याला सांगायचा आहे.

तरी आपणांस गेल्या दोन आठवड्यात होणाऱ्या त्रासानुसार खालील माहिती पूर्ण करावी.

किती त्रास होतो ते ० ते ५ या पट्टीवर गोलाकार करा	त्रासाचे प्रमाण ० ते ५ या पट्टीत						
तक्रारी	त्रास नाही	क्वचित/ खूप कमी त्रास	थोडा/ कमी	मध्यम	जास्त	खूप जास्त/ असहाय्य	५ प्रमुख तक्रारी ✓
१. शिंकरणे	०	१	२	३	४	५	
२. शिंका येणे	०	१	२	३	४	५	
३. नाकातून पाणी येणे	०	१	२	३	४	५	
४. खोकला/ बेडका/ कफ	०	१	२	३	४	५	
५. घशात सर्दी येणे	०	१	२	३	४	५	
६. जाड सर्दी / घट्ट सर्दी	०	१	२	३	४	५	
७. कान बंद होणे/दडे बसणे	०	१	२	३	४	५	
८. चक्कर येणे	०	१	२	३	४	५	
९. कान दुखणे	०	१	२	३	४	५	
१०. चेहरा दुखणे/जडपणा/ गच्च	०	१	२	३	४	५	
११. झोप न येणे	०	१	२	३	४	५	
१२. रात्रीत उठावे लागणे	०	१	२	३	४	५	
१३. झोप पूर्ण न होणे	०	१	२	३	४	५	
१४. झोपेतून दमून उठणे	०	१	२	३	४	५	
१५. दिवसा थकवा येणे	०	१	२	३	४	५	
१६. काम कमी होणे	०	१	२	३	४	५	
१७. लक्ष न लागणे	०	१	२	३	४	५	
१८. चिडचिड होणे	०	१	२	३	४	५	
१९. उदास वाटणे	०	१	२	३	४	५	
२०. लाज वाटणे	०	१	२	३	४	५	
२१. वास/चव न कळणे	०	१	२	३	४	५	
२२. नाक बंद होणे/ कोंडणे	०	१	२	३	४	५	
एकूण							
या शिवाय इतर काही तक्रार असल्यास							

in different occasions, examining correlation among the scores. Pearson's test was used to compare test with retest scores in the Marathi SNOT-22 subscales.

The validity of the measures is the capacity the questionnaire has to reflect differences between known groups. The validity of the questionnaire was assessed using the Mann–Whitney test to compare Marathi SNOT scores between the control group and the Sino-Nasal disease group of the retest study. All statistical analyses were performed using SPSS statistical software. Values of $p<0.05$ were considered as significant results.

Result

Translation: An early Indian (Marathi) version of the SNOT 22 questionnaire was prepared. (Table I)

Forty-six patients with Sino-nasal disease were recruited for the study. Two patients were not available for retest examination. On retest evaluation, two patients filled less than 50% of the questionnaire and two had an acute change of symptoms due to upper respiratory tract infection, thus they were excluded from the study. Test-retest reliability reflects stability over time with repeated testing. It is evaluated by correlating initial test and subsequent retest scores.[4]

Test-retest evaluation was finally accepted on 40 patients, 26 male (65%) and 14 female (35%). Mean time between test and retest evaluation was 8 days (range 6-10). The mean Marathi SNOT-22 score was 50.17 ± 18.65 (range 10–93) in the initial test, and 49.61 ± 18.40 (range 21–91) in retest. The minimum acceptable value for Cronbach's alpha test to represent and evaluate internal consistency for ordinal responses is 0.7.3,[11] Cronbach's alpha was 0.835 and 0.837 at initial and retest examination respectively, both values suggesting good internal consistency within the Marathi SNOT-22 (homogenicity among different items).

Pearson's test (parametric correlation coefficient) in SNOT-22 has been evaluated by Schalek et all,[21] Lange et al[4] and Vaitkus et al.[3] They have reported a Pearson's correlation coefficient of 0.86, 0.70 and 0.72 respectively. In our study, Pearson's correlation analysis was calculated for each item with a mean value of 0.99, ($p <0.001$), suggesting reliability.

Control study: The control group consisted of 40 volunteers, 21 male (52.5%) and 19 female (47.5%). The mean SNOT-22 score ± SD was 13 ± 11.68 in the control group and 49.61 ± 18.40 (range 21–91) in the sinonasal disease group. The difference was statistically significant ($p < 0.0001$). (Table II)

The instrument was capable to differentiate the groups studied, demonstrating its validity. (Fig. 1) (Table III)

Discussion

There are over 15 known disease specific sinonasal outcome questionnaires in English.[3] Among them, SNOT-22 questionnaire showed better internal consistency and responsiveness than other questionnaires and the SNOT-22 has already been validated in other languages worldover.[3] This was the main reason for choosing SNOT-22 for validation in local language i.e. Marathi for patients of Maharashtra. This led to extraction of high quality data in patients own language which he/she can relate better. This Marathi SNOT-22 questionnaire proved to be reliable. The Marathi SNOT-22 proved capable of differentiating groups of patients with sinonasal diseases from individuals without nasal

Table II: Total scores in two groups

	MEAN ± SD	RANGE	P-VALUE
With Sino-nasal disease	**49.61 ± 18.40**	**21-91**	**p < 0.0001)**
Healthy volunteers(control)	**13 ± 11.68**	**0-21**	

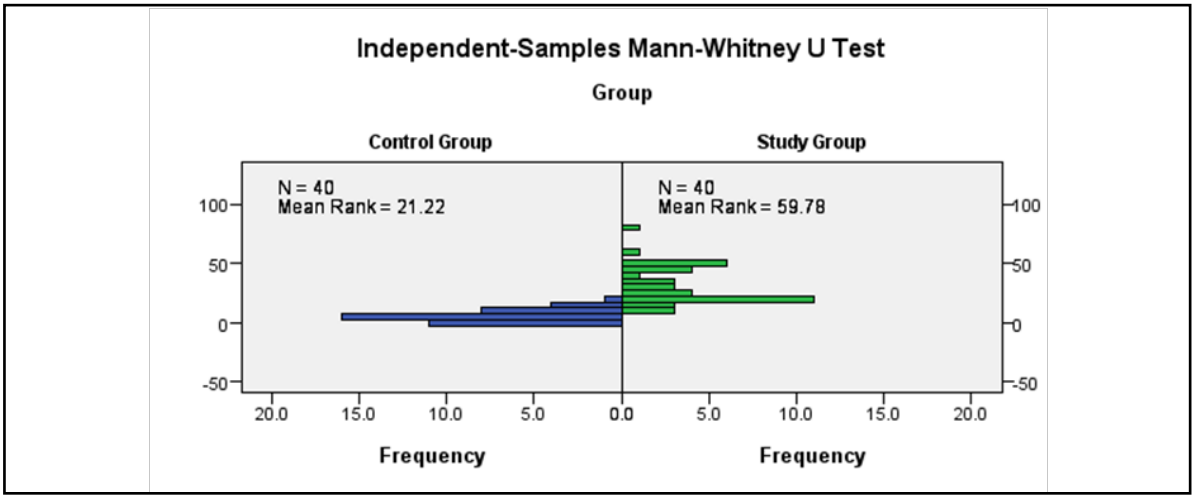

Fig. 1. Mann-Whitney U test

disease, hence the validity.

Our sample of healthy individuals (control) had a mean score of 13 points (marathi SNOT 22), close to the one presented by Hopkins et al.[12] - 9.3 and the author 8.06.,[13] both using original SNOT-22. This points towards easy intelligibility and understanding of the questionnaire.

Conclusion

Our study demonstrates that the Marathi version of the SNOT-22 has good internal consistency, reliability and validity. It is a valid instrument for assessing quality of life (QOL) of patients of Sino-nasal diseases in Maharasthra. It is a very simple tool to use as it is in local language for the patient, nursing staff, health attendant and doctor alike. It can be put to use at all levels of health care intervention, primary ,secondary and tertiary to detect the severity of sino-nasal disease of the patient. It could also be used as an instrument for audit. It could further be used to determine the effectiveness of medical or surgical intervention in sino-nasal diseases. Similarly, translation of other quality of life health questionnaires could be employed to extract quality data in local Indian languages.

Acknowledgments

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Ethical approval

All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Table III: Mann-Whitney U Test (p value < 0.05 to be considered significant)

	MANN – WHITNEY U TEST	P VALUE	RESULT
Study Group (Initial Value)	29.00	0.000	Significant
Control Group			

Informed consen

Informed consent was obtained from all individual participants included in the study.

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Do Socio-Economic Factors Play a Role in Delayed Presentation of Complicated Chronic Otitis Media (Squamous type)?

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ABSTRACT

Introduction:

The influence of Socioeconomic (SE) status on delayed reporting and consequent complications in cases of Chronic Otitis Media-squamous (COMS) has been investigated.

Materials and Methods

This prospective observational study included 34 patients with complicated COMS who presented to Otolaryngology Department at a tertiary care teaching hospital between December 2012 and December 2016. The patients were classified into 5 classes namely upper, upper middle, lower middle, upper lower, and lower based on a standardised real-time Kuppuswamy's SE status scale (KS) taking an average of consumer price indices for Industrial workers over 4 years (Jan '12 to Dec '16) as 267 and calculating their incomes. Level of education and occupation of the head of the family were the other components of KS which was calculated for each presenting patient.

Results

Of the 34 patients, 15 were males (44%) and 19 females (56%) with their ages ranging from 18 months to 61 years (Mean-24.1 years, SD-17.3). 15 of the 34 patients (44.1%) were in the Upper-lower SE class as per KS Scale, 13 were in lower-middle class (38.23%), 5 were in Upper-middle class (14.70%) and 1 patient belonged to Upper class (2.9%). Though the literacy levels are integral to KS Scale a differential analysis showed 23 of the 34 patients/guardians had education level poorer or equal to Intermediate high school (67.64%). The time gap between onset of symptoms of COMS and presentation with complications of COMS ranged from 9 months to 8 years with a mean time gap of 3.48 years (SD-2.01). There were 24extracranial complications and 21 intracranial complications with 10 patients having more than one complications. There was a strong inverse correlation between time gap and composite KS (-0.51). A differential analysis showed that Time gap most strongly correlated with education level of the head of the family (-0.615), followed by total family income (-0.403) and occupation of the head of the family (-0.329).

Conclusion

There is a strong association between the SE status of the family and the occurrence of complications in COMS that is otherwise highly amenable to successful management. Level of education, nature of employment and family income that constitute KS scale have significant inverse correlation with delayed reporting and consequent complications of COMS. Level of Education is the greatest influence on the time gap.

Keywords:

Otitis Media; Complications; Social Class; Literacy; Income

The older terminology 'chronic suppurative otitis media' has been replaced by chronic otitis media (COM) as this condition may not always be associated with presence of a purulent discharge. However, the differentiation between active COM and inactive COM needs to be appreciated becauseactive COM is associated with inflammation in the middle ear cleft with production of purulent discharge, while in a case of inactive COM it may not be so (though there is the potential for the ear to become active).[1]

Complications develop in a case of COM when the infection spreads from the middle ear to other important structures in its vicinity like the seventh nerve, inner ear, sigmoid sinus, duramater, meninges and intra

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cranial spaces. Traditionally the squamous disease has been considered to be the one more likely to cause complications, but a study by Singh and Maharaj reported that COM-mucosal also frequently results in complications.[2]

Although the incidence of complications of COM has reduced significantly with the advent of effective antimicrobial treatment, they still remain a relatively common occurrence in developing countries. Lack of awareness, illiteracy, poor SE status, practise of using medication from non-qualified practitioners, use of home remedies and deficient health care facilities are important contributory factors towards this high incidence.[3]

It has been observed by various workers that incidence of complications is significantly higher in patients from low SE status, due to disease negligence, poor access to medical facilities and delayed treatment.[4] India has a standardised Kuppuswamy's scale (KS) to determine the socio-economic status of its population.[5] We have carried out a prospective observational study on patients suffering from complications of COMS and their correlation, if any, with their SE status as measured objectively by KS. (Fig. 1)

Materials and Methods

34 patients who developed complications associated with COMS were treated in the Department of Otolaryngology between December 2012 and December 2016 and were included in this study. Extracranial complications of COMS studied were mastoiditis/ mastoid abscess, facial nerve palsy, labyrinthine fistula, petrositis and lateral sinus thrombosis. Intracranial complications of COMS were meningitis, brain abscess, sub-dural abscess and extra-dural abscess.

Patients who had undergone any ear surgery in the past, patients suffering from any pre-existing neurological co-morbidity or patients suffering from Diabetes Mellitus were excluded from this study.

All patients were evaluated by recording a detailed history (from guardians in case of children), a general physical examination, complete oto-laryngological examination, examination of the ear under microscope, an Oto-neurological assessment, microbial culture and antibiotic sensitivity, pure tone audiometry and radiological examination in form of Computerized tomography (CT) scan and/or magnetic resonance imaging .

All patients/guardians were thoroughly interviewed to ascertain their degree of literacy, levels of employment and cumulative family income to incorporate into Kuppuswamy's Socioeconomic Status Scale (Fig. 1). It is the most widely used scale for urban populations and was devised by Kuppuswamy in 1976. KS is a composite score of education and occupation of the head of the family along with monthly income of the family, which yields a score of 3-29. This scale classifies the study populations into high, middle, and low SE status5. The original 1976 version of KS scale has been updated several times primarily due to changes in income and inflation rate. Most significant upgrades were done by Mishra and Singh in 2003[6] and later by Kumar et al in 2007.[7]

The patients were classified into 5 classes namely upper, upper middle, lower middle, upper lower, and lower based on a standardised real-time Kuppuswamy's SE status scale (KS) taking an average of consumer price indices for Industrial workers over 4 years (Jan 12 to Dec 16) as 267 and calculating their incomes. Figure 1 shows the original KS which has undergone many modifications. The income levels were calculated on basis of a real-time link that calculates the current income on basis of the prevailing "Consumer Price Index".

All demographic parameters and the time gap between time of onset of symptoms of COMS and symptoms of complications were meticulously recorded.

All patients were given parenteral antibiotics covering gram positive, gram negative and anaerobic microorganisms and the antibiotics were modified (if required) depending on the result of culture and sensitivity reports. Supportive management in the form of analgesics, antipyretics, antiepileptics, steroids, osmotic diuretics and intravenous fluids were started as per the requirement of an individual case. All cases of intracranial or extracranial complications were managed appropriately with Neurosurgeon or Neurophysician

Education	Score
Profession or honors	7
Graduate or postgraduate	6
Intermediate or post-high school diploma	5
High school certificate	4
Middle school certificate	3
Primary school certificate	2
Illiterate	1
Occupation	
Profession	10
Semiprofessional	6
Clerical, shopowner, farmer	5
Skilled worker	4
Semiskilled worker	3
Unskilled worker	2
Unemployed	1
Family income per month (in Rs. as per year 1976)	
≥2000	12
1000-1999	10
750-999	6
500-749	4
300-499	3
101-299	2
≤100	1
Socioeconomic class	
Upper class	26-29
Upper middle class	16-25
Lower middle class	11-15
Upper lower class	5-10
Lower class	<5

Fig. 1. Kuppuswamy's Socioeconomic Status Scale (1976)

Table I: Age-wise distribution of the patients

AGE	NUMBER
0-10 Years	03
11-20 Years	10
21-30Years	07
31-40 Years	08
41-50 Years	02
>50 Years	04

participation, wherever necessary. Age, gender, duration of symptoms, presenting signs and symptoms, laboratory and radiographic evaluations, treatment, operative findings, outcome, and hospital stay were recorded.

Time gap between the onset of the disease and the presentation due to symptoms of complications was recorded with great accuracy as were other parameters of KS of education, occupation and monthly income. KS collects data as ordinal data and also depicts it as a numerical quantity thus making the data highly amenable to statistical analysis.

Results

Of the 34 patients, 15 (44%) were male and 19 (56%) were female. The youngest patient was 18 months of age and the eldest 61 years. (Table I)

24 patients had a single complication and 10 had more than one complications. There were 21 intracranial complications and 24 extra cranial complications. (Table II)

The time gap/duration of ear symptoms of COMS i.e. otorrhea and hearing loss before the patient presented with symptoms of complications was on an average 03 years and 07 months (range-09 months to 8 years). None of the patients were aware of the potential life-threatening complications of an ear infection.

Table II: Observed complications in patients

COMPLICATION	NUMBER OF PATIENTS
Mastoid abscess/ mastoiditis	18
Labyrinthine fistula	02
Facial nerve palsy	02
Petrous apicitis	01
Meningitis	08
Brain abscess (Temporal / cerebellar abscess)	06 (4/2)
Subdural abscess	02
Extra dural abscess	05
Lateral sinus thrombosis	01

3 patients were seropositive for HIV and none of them had any knowledge of their underlying condition and its influence on their otorrhea and hearing loss. The clinical presentations varied with the type of existing complications.

Of the 34 patients, 15 patients (44.1%) belonged to a family of Upper-lower strata of KS scale, 13 patients (38.23%) to Lower-middle strata, 5 patients (14.70%) to Upper-middle strata and only 1 patient (2.9%) belonged to Upper strata (Table III).

Only 08 of the 34 patients had consulted a qualified medical practitioner (MBBS and above)for their symptoms ,21 patients were being treated by unqualified local practitioners and remaining 5 patients presented for the first time ever with symptoms of complications to us. 21 of the total of 34 patients (61.76%) were also found to be practising home remedies in the form of instillation of oil in the ear.

Surgical management was done in all cases in form of modified radical mastoidectomy. In cases of intracranial complications, the initial management was done by

Table III: Numbers of patients in various classes as per KS scale

STRATA	NO. OF PATIENTS (N=34)	PERCENTAGE	AVERAGE TIME GAP (YEARS)
Upper-lower	15	44.11%	4.3
Lower-middle	14	41.17%	3.13
Upper-middle	`5	14.7%	2.3
Upper	1	2.9%	1.75

neurophysician/neurosurgeon followed by definitive management for ear pathology (after the patient was stable).

The average time gap in various SE strata was Upper-lower-4.3 years, Lower-middle -3.13 years, Upper-middle- 2.3 years and Upper-1.75 years (Table III).

There was an inverse correlation (Correlation coefficient -0.51) between time gap and KS scale. The higher the KS scale, higher was the strata the family belonged to and less was the average time gap.

We also correlated time gap with various constituents of the KS scale. The correlation between time gap & education level of the head of the family was -0.615, between time gap & occupation of the head of the family was -0.329 and between time gap & family income was -0.403 (Table IV).

Discussion

COMS is a disease of insidious onset and is often persistent in its course. It clinically manifests with aural discharge and hearing loss. Untreated, it frequently leads to severe, irreparable destruction and serious consequences.[8]

COMS is a serious healthcare concern worldwide, not only because of the distress it causes to the patients and their families but also because of the substantial economic burden, financial losses in productivity and reduced quality of life of the affected individuals.[9]

This is one of the most common community health disorders of childhood in many developing countries including India.[10] The availability of effective anti-microbial therapy by antibiotics has dramatically reduced the incidence of complications from acute otitis media (AOM) and COM. Antibiotics have largely replaced the earlier surgical intervention approach for treatment of complicated COM.[11,12] Nevertheless,

Table IV: Correlation coefficients between time gap and KS scale & components

ENTITY 1	ENTITY 2	CORRELATION COEFFICIENT
Time Gap	Composite KS	-0.51
Time Gap	Education level	-0.615
Time Gap	Occupation of head	-0.329
Time Gap	Family income	-0.403

complications remain quite frequent, have high morbidity and mortality rates, and pose a challenge to the otorhinolaryngologist.[13,14,15]

The prevalence of COM in Southeast Asia, Africa, and Western Pacific countries is estimated to be 2–4%, and that in North America and European countries is < 2%.[16] Many studies from various countries have reported a significant decline in the prevalence of COMS on an annual basis due to wide use of antibiotics, improved nutrition and hygiene status secondary to economic growth, improved public welfare and easy access to medical facilities.[13] COMS is virtually non-existent in the developed world but still constitutes a major public health problem in Africa, Asia and Latin America and Nigeria.[17] Wakode and Joshi in a landmark study of 4104 school students in Yavatmal district of Western India found an overall 3% prevalence of COM and found a statistically significant association between SE status, as determined by a India-specific standardised KS scale, and occurrence of COM.[18]

We decided to conduct a prospective study on patients who presented to us with symptoms of a complicated COMS and tried to find a correlation with the SE status of the families that they belonged to. India has a standardised Kuppuswamy scale for SE status that varies each year based on Consumer Price Index (CPI) for the year and since the study was conducted over 4 years, the average CPI for Industrial workers was taken as 267 and calculation of KS done.

We observed that there was no significant gender difference between the patients (15 males, 19 females). 14 of the 34 patients (41.17%) were less than 18 years of age. 10 of these 14 patients (29.41%) were less than 8 years of age. In a study by Qureshi et al the incidence of complicated COMS in children under 5 years was 31.1% which is very close to our observations.[4] 20 of the 34 patients were in the adult age group (20 to 61 years).

The time gap from onset of symptoms of COMS i.e. otorrhea and/or hearing loss, to presenting symptoms of complications ranged widely from 9 months to 8 years with a mean of 3.48 (approximately 3 years and 6 months).Interestingly the mean time gap between onset and complications was on an average only 1.5 years in paediatric age group thus indicating a significant early reporting in children. Qureshi et al found this mean time gap to be only 1.69 years in their study of 65 patients.[4] Our study reveals a significantly greater delay in reporting (3.48 years).

15 of the 34 patients (44.11%) belonged to Upper-lower strata of composite KS scale.

A further analysis of these 15 patients revealed that 11 of these patients/guardians were employed in unskilled jobs and none of these had education beyond Intermediate. 3 of them were in a semi-skilled employment and 1 of them ran a retail shop. 14 of these families earned less than Rs. 10294 per month and the only exception (Shopkeeper) earned over Rs. 15000.

14 of the 34 patients (41.17%) belonged to Lower-middle strata of the KS scale. 10 of these 14 patients were in a semi-skilled employment, 2 in skilled employment and one of them had a clerical job. 8 of these 14 patients had family income between Rs. 10295-15441, 4 families earned less than Rs. 10294 and one family earned around Rs. 17000 per month. Education levels in this group also were rather modest though 4 of the 14 patients were graduates.

Five of the 34 families (14.7%) belonged to the Upper-middle strata of KS scale. All of them were graduates and 3 of them were in clerical or semi-professional employment and 2 were in skilled employment.

Only one patient came from Upper strata of KS scale who was an employed professional and his income exceeded Rs.20590 per month.

An extensive search of available literature did not show us an Indian study that objectively determined the correlation between occurrence of complicated COMSand a standardised composite SE status scale such as KS scale. In order to further refine the inferential scope of the collected data, we determined the correlation coefficient between time gap and 3 components of KS scale viz. education level of the head of the family, occupation of the head of the family and the total family income. Understandably, there was an inverse correlation (-0.51) between time gap and KS scale. The higher the KS scale, higher was the strata the family belonged to and less was the time gap. Further analysis revealed that there was a stronger inverse correlation between educational level of the head of

the family and the time gap (-0.615). The correlation coefficient between time gap and occupation of the head of the family was again inverse at -0.329, though much weaker than with education status. The correlation coefficient between time gap and family income was -0.403 (Table IV). Therefore, as per this study within the KS scale it was the education level that most strongly correlated inversely with delayed presentation of patients of complicated COMS.

Conclusion

COMS is a common disease of the developing world with malnutrition, over-crowding, substandard hygiene, frequent upper respiratory tract infections and under-resourced health care listed as risk factors.[13,16,17,19] The poorer rural communities have the highest prevalence.[15,18] Patients in the developing world report very late and tolerate its discomfort with potentially fatal consequences not only because of insufficient work force and health care facilities but also due to unawareness and cost or accessibility of health care.[18,20,21] We have tried to evaluate the impact of socioeconomic status on the neglect of early symptoms of COMS, a delay in reporting and the consequent complications that are potentially fatal, in an objective manner. We have observed that SE status indeed correlates inversely with delay in reporting but within that parameter the level of education is the foremost influence on the delay.

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A Novel Technique of Using Sponge as Post-Operative Nasal Packing

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ABSTRACT

Introduction

In an effort to find a comparable but less expensive nasal pack with the qualities of Merocel®,this study was aimed at comparing the clinical efficacy and patient comfort level, while simultaneously using Merocel® and commercially available sponge as packing material in the same patient.

Materials and Methods

This study included those patients who underwent septoplasty, turbinoplasty or FESS and nasal packing was done randomly with Merocel® and commercially available sponge (polyurethane foam) on the same patient. Patients shared their experience on the symptom questionnaire on the first post-operative day and they underwent sequential diagnostic nasal endoscopy to assess the endoscopic status of the nasal cavity, which were documented meticulously.

Result

The post-operative bleeding control, pain during pack removal, general satisfaction, willingness to reuse and post-operative adhesion were same for both Merocel® and sponge.

Conclusion

The innovative technique of using a commonly available, commercially prepared sponge which is as good as Merocel® is well supported due to its efficacy in hemostasis, less mucosal trauma and less pain during pack removal. So it may be used in developing countries where cost is a factor for compliance of patients for undergoing surgeries without compromising on quality.

Keywords

Nasal Packing; Polyvinyl Alcohol; Polyurethanes

Nasal Packing is one of the most common procedures done by Otorhinolaryngologists worldwide. It is often done after septoplasty and it aims at preventing postoperative bleeding, septal hematoma or nasal synechiae, ensuring mucoperichondrium flap to be in position and cartilage stabilization in order to get the best surgical results.[1]

It is done after Functional Endoscopic Sinus Surgery (FESS) to prevent postoperative bleeding. The ideal packs are easy to insert and remove without causing pain and discomfort. A wide variety of nasal packing materials are available in the market. Use of nasal packs vary in different countries.[2] It may even vary in different places or institutions. Generally used nasal packing materials are antibiotic cream coated ribbon-gauze packs, custom made glove packs, Merocel® and the newer additions are Rapidrhino® and biodegradable nasal packs like Nasopore®. Most of the patients feel pain, pressure and discomfort while packing and on removing the pack on the first post-operative day.[3] Merocel® is a foam type non-absorbable nasal packing material which is a cross-linked polyvinyl alcohol, which is commonly used nowadays. It is equally effective for haemostasis and less traumatic to the operated nasal mucosa, but it is expensive when compared with ribbon-gauze and glove packs.

Nowadays, there is an increasing trend of avoiding nasal packs for better patient comfort. Our effort is to find a comparable nasal pack which has the qualities of Merocel® which is less expensive. Commercially produced Sponge (Polyurethane foam) is one such material, which is commonly available, less expensive and can be cut into specific sizes, autoclaved and used

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as nasal pack.This study was aimed at comparing the clinical efficacy and patient comfort level, while simultaneously using Merocel® and commercially available sponge as packing material in either nasal cavity in the same patient.

Materials and Methods

This prospective randomized clinical study was conducted from July 2009 to June 2014. The study protocol was approved by the institutional ethical committee. The authors asserts that all procedures contributing to this work comply with the ethical standards of the relevant national and institutional guidelines on human experimentation and with the Helsinki Declaration of 1975, as revised in 2008. The patients included in the study were counselled in detail regarding the use of two different nasal packs and their properties and a detailed informed consent was taken.

This study included patients age ranging from 17 years to 58 years, with chronic moderate to severe rhinosinusitis, septal deviations and turbinate hypertrophy who were planned for septoplasty surgery, turbinoplasty surgery or Functional Endoscopic Sinus Surgery (FESS) under general anaesthesia. The exclusion criteria for the study was revision FESS, patients with bleeding diathesis, patients on aspirin or anti-platelet drugs and hypertensive patients. Prior to the surgery, all patients underwent routine ENT examination and diagnostic nasal endoscopy. Computed tomography evaluation of paranasal sinuses were done for FESS and septoplasty patients. Patients were explained regarding the symptom questionnaire prior to their participation in the study. The patients included in the study were unaware of the type of nasal pack given in either nasal cavity.

The operating surgeon selected each side of the nose randomly for packing with Merocel® or Sponge without any bias. The size of the Merocel® was standard (custom made to 4cm along with a draw string used for removal) and the size of the commercially available sponge was cut and made into a size of 4cm long, 1 cm breadth and 1.5 cm height, which was then autoclaved and used for nasal packing(Fig. 1).

All the patients were provided with oral antibiotics from the day of surgery for a period of one week and intranasal saline douches after pack removal from the first postoperative day. Patients shared their experience on the symptom questionnaire on the first post-operative day, after removal of the packs on both sides. The questionnaire was based on the standard Visual Analog Scale (VAS), wherein score score '0' meant no symptom and score '10' meant unbearable symptoms. The VAS questionnaire evaluated the various aspects of patient comfort with respect to pain and pressure during removal of pack, sleep disturbance and general satisfaction where the patients willingness to use the material in future for any other nasal surgeries.

The patients underwent sequential diagnostic nasal endoscopy on the 10th day and 30th day to assess the endoscopic status of the nasal cavity with regard to mucosal injury and healing status, adhesion, synechiae, infection and granulation. A grading scale from 0 to 3 was created for assessment of the severity of each of the above signs and for the assessment of bleeding in the immediate post-op, which were documented meticulously. The various proportions were compared using chi-square test statistic. The statistical analysis of was done by using the statistical software R.

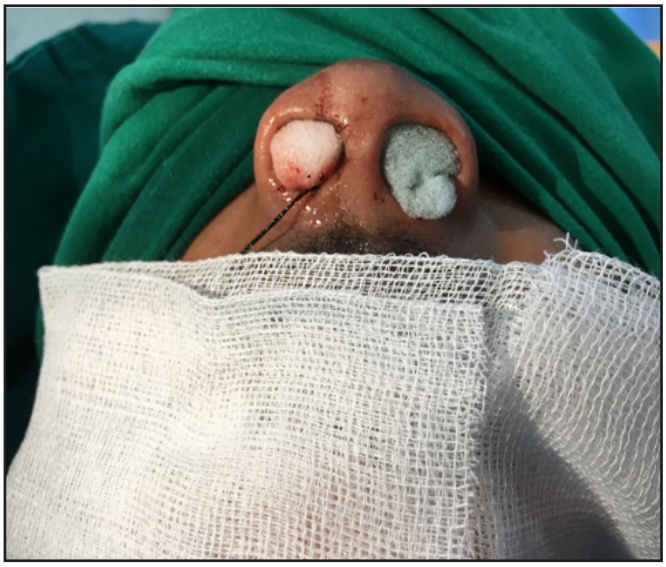

Fig. 1. Nasal packing with Merocel^{R} (with string attached to it) on one side and the other side packed with autoclaved sponge

Result

In our study, a total of 50 patients were considered, out of which 5(10%) patients were less than 20 years of age, 36(72%) patients aged between 21 years to 40 years and 9(18%) patients above 40 years. In this, 31 (62%) patients were males and 19 (38%) patients were female. Out of these 50 patients, 21 (42%) patients underwent septoplasty, 13 (26%) patients had FESS and 16 (32%) patients underwent turbinoplasty.

The first observation which was made during the study was regarding the hemostatic property or the bleeding control in the immediate postoperative period. The hemostatic property between the two materials in the immediate postoperative period was statistically similar. With regard to the hemostatic property, 41/50 patients (82%) had excellent bleeding control on the sponge pack side with no bleeding and 3/50 patients (6%) had minimal bleeding, where there was minimal filling up of blood within the nasal cavity which did not flow out of the nostril and did not require repacking (TableI). 4/50 patients (8%) on sponge pack side had moderate bleeding, 2/50 patients (4%) had severe bleeding and required repacking. The results on the sponge pack side were as comparable to the side with Merocel® pack,where 42/50 patients (84%) had excellent hemostsis with no bleeding and 4/50 patients (8%) had minimal bleeding, 3/50 patients (6%)with moderate bleeding and 1/50 patients (2%) had severe bleeding which required repacking. We did not face any secondary haemorrhage in any of the patients due to infections, on either side.

On analysing the data of the pain experienced by the patient during the time of pack removal, there was no statistical difference between the Merocel® side and the sponge side. On the Merocel® side, 27 (54%) had no pain to mild pain and 23 (46%) had moderate to severe pain (Table II). On the other hand, on the sponge side, 40 (80%) had no pain to mild pain and 10 (20%) had moderate to severe pain (Table II). Most notable finding is that 6 patients in the Merocel® side had severe pain while removing the nasal pack but none of the patients complained of severe pain on the sponge side, which may be due to the more rigid structure of the Merocel® in comparison with the sponge.

On evaluation of the general satisfaction of the patients regarding reusing the packing material in the future for any nasal surgeries and for recommending any specific packing material for friends, relatives or for others, there was no statistical difference between Merocel® and sponge group. On considering Merocel®, 34 (68%) patients were willing to reuse the material but 16 (32%) patients were not willing to reuse. On considering sponge side, 46 (92%) patients were willing to reuse sponge as packing material in future but 4 (8%) patients were not willing to reuse (Table III).

In this evaluation, even though it is statistically not significant, one of the notable finding is that, out of the 16 patients who were not willing to reuse Merocel® as packing material in future, 15 (93.8%) are willing to

Table I: Grading of Postoperative bleeding control/Hemostasis

BLEEDING CONTROL	MEROCEL® (N=50)	SPONGE (N=50)
No bleeding	42	41
Minimal bleeding	4	3
Moderate bleeding	3	4
Severe bleeding	1	2

*p = 0.686

Table II: Grading of pain during removal of nasal pack

PAIN DURING REMOVAL	MEROCEL® (N=50)	SPONGE (N=50)
No pain	1	4
Mild pain	26	36
Moderate pain	17	10
Severe pain	6	0

*p = 0.089

Table III: General Satisfaction of patients

GENERAL	MEROCEL® (N=50)	SPONGE (N=50)
Willingness to reuse	34	46
Not willing to reuse	16	4

***p = 0.617**

reuse sponge as packing material (Table IV).

On analysing the post-operativeadhesions and synechiaeafter 10 days of pack removal, no statistically significant difference seen (*p=0.314).

On the Merocel® side, 35 (70%) had no adhesions and 15 (30%) had adhesions. On the sponge side, 39 (78%) had no adhesions and 11 (22%) had adhesions. All the adhesions in both groups were mild and easy to release and done as OPD procedure. No adhesions or synechiae seen on any side on the 30th day nasal endoscopy.

Discussion

Chronic rhinosinusitis (CRS), septal deviation, and inferior turbinate hypertrophy are among the most common diseases seen in the ENT department in current practice. These conditions are present in patients of all ages and both genders. Surgical procedures such as functional endoscopic sinus surgery (FESS), septoplasty and turbinoplasty, are often considered when medical treatments have failed. At the end of each of these procedures, nasal packs are placed into the nasal cavities to prevent bleeding of the wound.

Generally nasal packings include removable nasal packs like antibiotic cream coatedribbon-gauze packs, custom made glove pack,Merocel® etc. and recently introduced biodegradable nasal packing materials like Nasopore[R]. FESS and other nasal surgeries are constantly evolving and it makes otorhinolaryngologists to create modifications in the nasal packs.

The innovations in nasal packing were motivated by the innate defects of conventional packing materials in quality of life during early postoperative period and the pain tolerated during nasal pack removal.

The postoperative treatment regimen of FESS is as important as the surgery itself, since the ultimate goal is to re-establish normal mucociliary clearance in the sinuses. So the nasal packs were expected to improve mucosal healing and avoid adhesion of mucosa in the nasal cavity. But, the foremost use of nasal pack is to control bleeding after sinus or septal surgery. Hence, many packing materials were time tested and proven, and some still being in the evaluation phase.

The use of removable nasal packs like antibiotic cream coated ribbon-gauze packs, glove packs and

Table IV: Comparison of General satisfaction of patients on using MerocelR and sponge as packing material

		SPONGE		TOTAL
		WILLING TO REUSE	NOT WILLING TO REUSE	
Merocel®	Willing to Reuse	31 -91.2%	3 -8.80%	34 -100%
	Not Willing to Reuse	15 -93.8%	1 -6.3%	16 -100%
Total		46 -92%	4 -8%	50 -100%

***p = 0.617**

Merocel® are widely used worldwide. The advantages for Merocel® nasal pack includes easy manipulation and alignment within the nasal cavity, and provide better supporting ability.[4] But they have some disadvantages also. They are costlier than the ribbon- gauze pack or glove packs which are made in the hospital itself.[5]

Pain and pressure present when the pack is inside the nose and during removal are the common complaints of patients with Merocel® pack, which often decreases the quality of life of patients after nasal surgeries.[1] Some patients have mentioned that the removal of packing material was the most painful experience in the whole of their life.[6] Biodegradable nasal packs does not require the removal, as it gets absorbed inside the nose and thereby avoiding the pain during the pack removal. But, it increases the cost of nasal packs further. Hence, we developed the innovative idea of reducing the cost of nasal packs by using a material which is commonly available in the operation theatre and hospitals, and it is as good as other nasal packs.

Commercially produced Sponge (Polyurethane foam) is one such material. It is freely available in the operation theatre, which can be cut into specific sizes, autoclaved and used as packing material. Today's polyurethanes have been formulated to provide good biocompatibility, flexural endurance, high strength and high abrasion resistance. These attributes are important in supporting new applications of sponge by medical device manufacturers including artificial hearts, catheter tubing, feeding tubes, surgical drains, intra-aortic balloon pumps, dialysis devices, non-allergenic gloves, medical garments, hospital bedding, wound dressings and more.

Akita et al studied the benefits of polyurethane in split thickness skin graft donor wound healing, and they found out that the polyurethane dressing was superior to hydrogel in the wound healing time, amount of exudates, and frequency of dressing changes.[7] Handel N et al studied the long term safety and efficacy of polyurethane foam covered breast implants and the result showed that the incidence of capsular contracture was dramatically lower with polyurethane foam-covered implants compared to smooth or mechanically textured implants; this beneficial effect persisted at least 10 years after implantation.[8] These studies proved that the sponge can be used inside the body with long term durability without any complications. Long-term in vitro durability of polyurethane heart valves has been achieved and polyurethane valves manufactured from a commercially available textile polyurethane were capable of achieving more than 800 million cycles in laboratory fatigue testing (equivalent to more than 20 years of normal function).[9]

In our study, 46% patients had moderate to severe pain while removing the pack on the Merocel®side while only 20% patients had moderate to severe pain. Even though it is not statistically significant, the most notable finding is that, 6 patients in the Merocel® side had severe pain while removing the pack but none of the patients complained of severe pain on the sponge side, which may be due to the more rigid structure of the Merocel® in comparison with the sponge. Many studies compared the pain during removal of various nasal packs with Merocel®. Hesham et al reported that Rapidrhino® packs were less painful than Merocel® packs.[10] In our study, pain during pack removal ofMerocel® and sponge are statistically similar.

Likewise, sponge had comparable hemostatic property and post-operative adhesion as that of the Merocel® in our study with no statistical difference between the two. Ragunandhan et al reported that 86.6% Merocel® pack patients provided excellent hemostasis with no bleeding. In our study, 84% Merocel® pack and 82% sponge pack patient had excellent hemostasis with no bleeding.[3] Hence, the hemostatic property of sponge was at par with Merocel®. Yilmaz et al stated that adhesion developed in 7 (28%) patients in the Merocel® group in the 4-week follow-up.[11] In our study it was 30% and all the adhesion were mild and easy to release and did not proceed to become a synechiae.

While considering the general satisfaction of patients in reusing the packing material in future 68% patients were willing to reuse Merocel® and 92% patients were willing to reuse sponge. Out of total number of patients who are not willing to reuse Merocel® in future, 93.8% patients are willing to reuse sponge instead of Merocel®. Raghunandhan et al reported that the general satisfaction and willingness to reuse Nasopore^{R} was significantly high on comparison with Merocel®.[3] In our study, the general willingness to reuse sponge as

a packing material is at par with Merocel® and many patients prefer to use sponge instead of Merocel®, which is in accordance with the above quoted study. Hence, sponge is comparable to Merocel®.

Conclusion

Merocel® is a novel packing material which is used by most ENT surgeons after nasal surgeries due to its clinical efficiency in hemostasis and less trauma to nasal mucosa comparing to ribbon-gauze packing, but the disadvantages are the cost of Merocel® and the pain during removal of pack.

Even though 'no-packing technique' is there, but many ENT surgeons are not practicing it and still sticking on to the age old concept of nasal packing.

Biodegradable nasal packs are rejected due to its significant cost difference against other routine nasal packs. Hence, our innovative technique of using a commonly available, commercially prepared sponge (polyurethane foam) is well supported due to its efficacy in hemostasis, less mucosal trauma and less pain during pack removal.

The efficacy of sponge is as comparable to Merocel®, which is a time tested packing material which is already in use. Also the cost of sponge is less, as it is freely available in hospitals which can be autoclaved and used.

So sponge may be considered as an alternative packing material in developing countries where cost is a factor for compliance of patients for undergoing surgeries without compromising on quality.

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A Study of Efficacy of Intraoperative Application of Mitomycin-C in Endoscopic Dacryocystorhinostomy

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ABSTRACT

Introduction

Common cause for failure of endonasal dacryocystorhinostomy is closure of the intranasal ostium usually due to granulation tissue formation. Attempts have been made to improve the success rate of lacrimal surgery by using different methods like using balloon catheters, lasers and antimetabolites. This study aims to see change in success rate with and without the use of using Mitomycin-C in endonasal Dacryocystorhinostomy (DCR) surgery.

Materials and Methods

Sixty patients of acquired chronic dacryocystitis with nasolacrimal duct blockage, in the age group of 11-50 yrs were taken for study. Patients were alternatively divided into two groups A & B (30 patients in each group). Endoscopic dacryocystorhinostomy with Mitomycin-C application was performed in Group A and without Mitomycin-C application in Group B patients. Subjective assessment for symptomatic improvement and objective analysis obtained from results of syringing. The result data was subjected to Student's t test and chi square analysis.

Result

Age of patients varied from 11 to 50 yrs. The male to female ratio was 7:8 in group A while 2:3 in group B. The commonest age group was between 21 -30 years in both the groups. After 12 month follow up the success rate was 93% in both the groups. The results between the groups were found to be statistically not significant ($p>0.05$).

Conclusion

Mitomycin C was used in this study to assess its efficacy in improving the results of endoscopic DCR. Mitomycin C did not have significant effect on the outcomes of endoscopic DCR surgery for chronic dacryocystitis.

Keywords

Dacryocystitis; Dacryocystorhinostomy; Antimetabolites; Mitomycin

Epiphora or imperfect drainage of tears is a very common condition and form an almost universal symptom of disease of the lacrimal passage.[1] Its commonest cause is obstruction in the drainage channel of normally produced tear fluid. Obstruction of lacrimal pathway is either congenital or acquired. Congenital causes include conditions such as congenital nasolacrimal duct obstruction, lacrimal fistula, lacrimal duct cyst.[2] Acquired causes may be primary or secondary. Primary is idiopathic while secondary acquired causes include infections, neoplasm, sarcoidosis, Wegener's granulomatosis and radiation therapy.[3]

Once dacryocystitis is well established it has little tendency to resolve with medical treatment and hence surgical treatment remains the only choice of management.[4] Dacryocystorhinostomy (DCR) is the most popular surgical technique and endoscopic DCR represent a well established approach for this condition.

Despite its advantages, various causes of failure of endoscopic DCR have been mentioned.[5] Osteotomy closure by granulation tissue has been reported as the most important region of failure in endoscopic DCR.[5,6] Attempts have been made to improve the outcome by using balloon catheters, stents and antimetabolites. Modulation of wound healing response to prevent excessive scar formation plays a major role in endoscopic

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lacrimal surgery.[7] Many studies have been done using Mitomycin-C as antimetabolites. However the results are variable. Mitomycin-C is an alkylating agent derived from Streptomyces caespitosus. The present study was conducted to evaluate the success rate and to compare the results of endoscopic DCR with and without intraoperative Mitomycin-C.

Materials and Methods

Sixty patients in the age group of 11-50 years, who presented with symptoms and signs suggestive of chronic dacryocystitis secondary to distal nasolacrimal duct blockage, refractory to medical treatment were taken up for study. The cases were mostly referred from the Dept of Ophthalmology. All patients were subjected to detailed history and clinical examination.

Study design

This prospective study was done in a tertiary care centre in North India comparing the results of two groups formed by alternate sampling of the patients with nasolacrimal duct obstruction, who underwentdacryocystorhinostomy.

Establishing the diagnosis

The initial evaluation of the degree and site of obstruction was evaluated by lacrimal sac syringing with saline.Reflux of fluid through the opposite punctum indicated distal nasolacrimal duct obstruction i.e., the obstruction was in the or beyond the common canaliculus. Reflux from the same punctum indicated proximal obstruction. If the fluid passed into the nose freely with no reflux into the eye, the lacrimal system was labelled as patent not requiring surgery. Thereafter probing was performed using the Bowman's probe for the cases where there was suspicion of distal obstruction.

The probe was inserted through the lower punctum and led towards the common canaliculus. If it stopped 'hard' against the bone, it ruled out the canalicular block. If it stopped 'soft', a blockage in the canaliculus was likely. Dye disappearance test was used for assessing functional patency. Dacryocysto-scintigraphy and imaging studies was used in cases where there was a doubt in the level of obstruction.

Cases of canaliculi block or normal flow into the nose were not considered in the study. The patients were alternatively assigned into two groups of 30 patients each preoperatively.

Exclusion criteria

Patients having following pathology were not included in the study: (a) Marked deviated nasal septum to same side, (b) Features of Chronic rhinosinusitis, (c) Nasal tumours, (d) History of previous DCR, (e) Cases diagnosed with canalicular block.

Group A patients underwent endoscopic dacryocystorhinostomy followed by application of Mitomycin-C (0.5mg/ml solution of Mitomycin-C applied at stoma site for 5 minutes). Group B patients underwent endoscopic dacryocystorhinostomy without application of Mitomycin-C. The diameter of the ostium and that of the healed ostium at follow up was measured using a Bowman probe No 000 which was marked at 1mm intervals.

Method of application of Mitomycin C

A surgical sponge was embedded in 0.5 mg/ml solution of Mitomycin C and applied to the mucosal border of the osteotomy site for 5 minutes under endoscopic visualisation. Maximum care was taken in order to have all circumferential mucosa in contact with the sponge. After removal of the sponge, the area was irrigated thoroughly with saline solution. A change in the colour of the nasal mucosa from red to white-grey was visible immediately after application. Commercial Nasal haemostatic packs were given for 24 hours.

Post-op care

Patients were discharged on the next day, after removing the nasal pack. They were advised not to blow nose for 10 days post op. Antibiotic eye drops, steroid eye drops, and nasal decongestant drops were given for 7 days. Saline nasal spray twice daily was also used for 15 days to reduce crusting. Systemic antibiotics were not prescribed as a routine. Patients were reviewed on 7th day when endoscopic nasal toilet and sac syringing were done.

Follow-up

The patients were called for follow-up at 03, 06 and 12 months. The follow-up visit comprised inquiry into symptoms, nasal endoscopy, sac syringing, dye

Table I: Age and Sex distribution

AGE RANGE	GROUP A			GROUP B		
	Male	Female	Total (%)	Male	Female	Total (%)
11-20	4	2	6 (20%)	2	2	4 (13.3%)
21-30	5	9	14 (46.6%)	5	10	15 (50%)
31-40	2	3	5 (16.7%)	3	2	5 (16.7%)
41-50	3	2	5 (16.7%)	2	4	6 (20%)
Total	14	16	30 (100%)	12	18	30 (100%)

disappearance test and documentation of complications.

Result

Sixty patients of chronic dacryocystitis with nasolacrimal blockage as confirmed clinically with sac syringing and probing were included in the study. In this study the age of patients varied from 11 to 50 yrs. The male to female ratio was 7:8 in group A and 2:3 in group B. The commonest age group was 21 -30 years in both the groups. (Table I). All the cases presented with epiphora and blocked nasolacrimal duct as assessed clinically by sac syringing and probing (TableII). Observations were made regarding relief, complications or recurrence of symptoms and patients were evaluated subjectively and objectively.

Subjective assessment

Complete relief from symptoms

Partial relief from symptoms

No relief from symptoms

Objective assessment

Syringing of the lacrimal sac was performed postoperatively at 1 month, 6 months and 12 months. Results were analysed as per patency of flow of saline into the nose as under:-

Patent: when there was no resistance to the flow of fluid

Partially patent: when some fluid regurgitates through the punctum and some passed into nasal cavity.

Blocked: When the entire amount of fluid regurgitates through the punctum and no fluid passes to nasal cavity.

Measurement of ostium size at surgery and at 12 month follow up was another parameter recorded for objective assessment.

These two groups were compared according to sex, age, and follow up subjective and objective assessments.

Both groups showed satisfactory improvement in results in terms of subjective and objective assessments (TableIII). Average ostium size obtained was 35.2 mm^2 in the Mitomycin C treated group and 35.0 mm^2 in the untreated group. Healed intranasal ostium sizes measured in the follow up examinations were 1.6 mm^2 and 1.4 mm^2 respectively. There was no statistical difference between them according to Student's t test ($p>0.05$). The success rate in the Mitomycin C treated group and the non-Mitomycin C treated group were 93% on 12 months follow up, i.e. there was no significant difference in in the results of outcomes with or without the intraoperative use of Mitomycin-C in endoscopic DCR (Fisher's exact $\chi 2$test, $p>0.05$). No nasal or other systemic effects of Mitomycin-C were observed during or after its application.

Table II: Clinical presentation

PRESENTING SYMPTOMS	GROUP A (N=30)	GROUP B (N=30)
Epiphora	30	30
Purulent discharge	12	9
External swelling	4	4
CLINICAL FINDINGS	**GROUP A (N=30)**	**GROUP B (N=30)**
Swelling Lacrimal fossa area	4	3
Discharge on pressure in lacrimal fossa area	13	11
Regurgitation on Syringing	30	30

Fisher's exact χ2test, $p>0.05$- not significant

Table III: Results

SUBJECTIVE IMPROVEMENT	GROUP A (N=30)			GROUP B (N=30)		
	1month	6month	12month	1month	6month	12month
No of patients with complete relief	26	28	28	27	28	28
No of patients with partial relief	4	2	1	3	1	0
No of patients with no relief	0	0	1	0	1	2
OBJECTIVE IMPROVEMENT (ON SYRINGING)	**GROUP A (N=30)**			**GROUP B (N=30)**		
	1month	6month	12month	1month	6month	12month
Free flow into nose	26	28	28	27	28	28
Partially blocked	3	1	1	3	1	0
Blocked	1	1	1	0	1	2

Discussion

The decrease in the size of the healed intranasal ostium after DCR surgery is the result of a normal wound healing response. Recurrent nasolacrimal duct obstruction after primary DCR is mainly due to reclosure of the nasolacrimal stoma and osteotomy site with granulation tissue.[8] One of the attempts to prevent closure of the stoma is local application of Antimetabolitesfor the inhibition of the wound healing process and the prevention of excessive scar formation in the rhinostomy site.

Mitomycin-C is an anti-neoplastic antibiotic agent isolated from soil bacterium Streptomyces caespitosus. It is an anti-metabolite with anti-proliferative effect on cells showing the highest rate of mitosis by inhibiting DNA synthesis and interferes with RNA transcription and protein synthesis. The cell cycle is most affected during the late G-I and early S-phase. The chemical formula is $C_{15}H_{18}N_4O_5$. Mitomycin is available as a drypowder mixture of Mitomycin and mannitol in the ratio 1:2. On reconstitution with normal saline, each ml will contain 0.5mg Mitomycin with a pH between 6.0 - 8.0.[9]

Use of Mitomycin-C in endoscopic DCR has been studied earlier but the results are varied. Zilelioglu et al[7] reported a success rate of 77.3% in Mitomycin-C group and 77.8% in control group. They conclude the use of Mitomycin-C seems to be easy and safe. But the study did not show any benefit of using it. Camara et al[10] reported a success rate of 99.2% in Mitomycin –C group and 89.6% in control group.Their study supports the safety and efficacy of intraoperative use of Mitomycin-C in endonasal DCR. Liao et al[11] reported a success rate of 95.5% in Mitomycin-C group and 70.5% in control group. They conclude that intraoperative Mitomycin-C application is effective in increasing success rate of DCR surgery. Kao et al[12] performed DCR on fifteen eyes. The success rate was 100% in Mitomycin-C group while in control group it was 87.5%. Roozitalab MH et al[13] reported 130 patients with nasolacrimal duct obstruction undergoing lacrimal surgery. The success rate in Mitomycin-C group was 90.5% while in control group it was 92.4%. Ghosh et al did not find any statistical difference with the use of Mitomycin-C in their study of thirty cases.[14]

Thus, different studies have different opinion regarding efficacy of using Mitomycin-C. In our study we included sixty patients of chronic dacryocystitis showing features of nasolacrimal duct obstruction. We divided patients into two group (A & B) of 30 patients each. A group underwent endoscopic DCR with intraoperative Mitomycin-C application while group B underwent endoscopic DCR without Mitomycin-C. We used Mitomycin-C in concentration of 0.5mg/ml for five minutes at the stoma site. Patients were evaluated subjectively and objectively at 1,6 and 12 months post surgery. At the end of 12 months the success rate was same in both study as well as in control group. There were no major intraoperative or postoperative complications in both groups.

The mean ostium size in our series was around 35.1 mm^2. Welham and Wulc[15] noted that the scarring of the rhinostomy site was one of the reasons for failed external DCR. Exuberant scarring caused failure in 93% of 15 patients who had undergone secondary surgery in their series. Majority of the surgical failures in Endoscopic DCR surgery occurs within 4 months.[5,6] These studies reported that the average onset of ostium closure after the primary operation was 6 to 26 weeks (mean 12.7 weeks). No patient in our series had ostium closure after 16 postoperative weeks. All of these findings indicated that the critical period was 4 - 6 months after endoscopic surgery.

Conclusion

Endoscopic DCR represent a new and promising approach for treatment of chronic dacryocystitis. Attempt has been made to improve the success rate of lacrimal surgery by using stents, laser and antimetabolites to prevent closure of the stoma. We used Mitomycin-C in our study. After 12 months of follow up period, the present study did not show any additional benefit of using Mitomycin-C at stoma site in endonasal DCR in terms of success rate. However a longer follow up must be undertaken before a definite conclusion can be made. A larger multicentric study is essential to establish the efficacy Mitomycin-C in endoscopic DCR success.

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Juvenile Nasopharyngeal Angiofibroma: Changing Paradigms in Management

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ABSTRACT

Introduction

Juvenile Nasopharyngeal Angiofibroma (JNA) is a tumor of young and adolescent males. It is a benign vascular tumor arising from the spheno-palatine foramen. It is best managed surgically at present by endoscopic methods with or without pre-operative embolization. Tumor attributes like intracranial extent and residual vascularity after embolization need to be assessed pre-operatively before undertaking endoscopic surgery, in order to reduce surgical blood loss and morbidity.

Materials and Methods

Twenty-three cases of JNA (n=23) were operated endoscopically at a tertiary level military hospital. They were staged with the Snyderman staging system. Demographic variables including stage wise management were brought out with intraoperative time and blood loss recorded for different stages.

Results

The intraoperative surgical time, intra-operative blood loss and recurrence/residual rates were compared with similar studies in existing literature and correlated well.

Conclusion

Endoscopic Endonasal approach to JNA is now a well-established technique. With improvements in embolization techniques and better instrumentation like HD camera systems, endo-bipolar cautery, Coblation and endo-liga clips and neuro-navigation, better visualization and better haemostatis can be achieved, resulting in significant reduction in the morbidity and improvement in surgical results.

Keywords

Angiofibroma; Endoscopic Surgery

Juvenile Nasopharyngeal Angiofibroma (JNA) is a benign vascular tumor of the nose and nasopharynx in young and adolescent males, which is primarily managed surgically. Due to the peculiar nature of the tumor, propensity to spread through various foramina, fissures, spaces and tendency for post surgical residual persistence of tumor; it poses a formidable challenge to ENT surgeons, who are managing these tumors. These tumors are locally aggressive, erode bones and can spread outside the confines of the nose and nasopharynx to involve the paranasal sinuses,pterygo-palatine, infratemporal, parapharyngeal spaces, orbit and so also intracranially.

The standard of care for decades and centuries has been open surgical techniques with major morbidity including blood loss and recurrences.[1] Over a period of time, these open surgeries have been supplemented with angiography and embolization, which has reduced the per-operative blood loss considerably.[2] Further, the advent of endoscopic surgery has improved our knowledge and behavior of these tumors and they can now be excised with much greater precision with reduction in the per-operative blood loss and residual tumor.[3] This article gives an overview of the endoscopic management of JNAs, at a tertiary level military hospital.

Materials and Methods

This is a retrospective cohort study of 23 cases of JNA, managed endoscopically at a tertiary level military hospital during the period 2011 to 2016. The aim of this study is to evaluate the advantagesof endoscopic management technique for JNAs and validate its

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advantages. All the patients underwent CECT scans for determining the extent of spread with bony erosion. The stage of tumors considered for endoscopic excision was based on the Snyderman classification[4] for JNAs (Table I). Contrast enhanced MRI was done in all cases to detect intracranial and intradural spread of tumor. Of the large tumors, only those that had intracranial but extradural spread were included in the study. Patients of Grade V who may require craniotomy for intra-dural involvement of tumor were excluded, as only those cases that had undergone endoscopic surgery, were included in the study.

Table I: Snyderman et al. classification of JNA

I	**Nasal cavity, pterygopalatine fossa**
II	**Paranasal sinuses, lateral pterygopalatine fossa; no residual vascularity**
III	**Skull base erosion, orbit, infratemporal fossa; no residual vascularity**
IV	**Skull base erosion, orbit, infratemporal fossa; residual vascularity**
V M	**Intracranial extension, residual vascularity; M: medial extension**
V L	**Intracranial extension, residual vascularity; L: lateral extension**

Operative Technique: All the patients underwent pre-operative angiography and embolization 24 hours prior to the surgery. Residual vascularity after angiography and embolization was noted.

A four-hand technique for endoscopic removal of JNAs was used. The same surgeon operated all the cases. Inferior and Middle turbinates were excised to create more endoscopic space. Endoscopic medial maxillectomy was performed and posterior wall of maxilla was exposed and removed. The main trunk of the Internal maxillary artery was identified and vascular control achieved either with Liga clips or with endo-bipolar cautery.

The tumor was gradually mobilized from all the attachments to achieve complete removal. In view of the embolization and resultant shrinkage of the tumor, the cancellous bones of the pterygoid base, including Vidian canal and basisphenoid, which are likely to harbor residual tumor,[5] were drilled out in all cases, to remove any tumor remnants. All patients were assessed for per-operative blood loss.

Post-operatively, all the patients underwent anterior nasal packing with Merocel for 48 hrs. All patients were given injectable antibiotics for 2 days only after which they were given oral antibiotics. All patients underwent an MRI after 72 hrs post-operatively, for detecting any residual tumor left behind. They were further followed up to look for residual tumor after six months and then at one-year post-op.

Variables analyzed included patient age, tumor stage, preoperative embolization with residual vascularity, surgical approach, duration of surgery, volume of intraoperative bleeding, length of hospitalization, residual/recurrence.

Results

All were male patients in the age range of 09 to 19 years (Average age: 13.91 yrs). The variables assessed are given in Table II. As per the Snyderman staging system the distribution of the cases was as given in Table III.

Tumors involving the paranasal sinuses and infratemporal fossa are shown in Fig. 1. 21/23 (91%) patients showed tumor blush feeding from the External Carotid Artery, which were embolized with no residual vascularity (Fig.2). 02/23 patients (9%) with Stage IV tumor showed residual vascularity, due to supply from the ipsilateral Internal Carotid Artery (Fig.3 and 4).

The average duration of surgery stage wise is as follows- Stage I- 100 min, StageII-160 min, Stage-III-265 min, and Stage-IV-315 min.The average intraoperative blood loss is as follows –Stage I- 200 ml, Stage II- 363 ml, Stage III- 586 ml, Stage IV- 1300 ml. (Table IV). Both the patients with Stage IV tumors underwent a staged resection due to large tumors with residual vascularity (Fig. 4). Their combined average blood loss in the staged surgery was 1300 ml each, in two surgeries put together. The data distribution in Table IV is negatively skewed due to multiple surgeries in Stage IV disease.

Residual tumour was detected on MRI within one

Table II: Variables assessed vide the master chart

CASE NO	AGE (YRS)	PRE-OP STAGE	SURGICAL APPROACH	PRE-OP	RESIDUAL	SURGICAL TIME TAKEN	DURATION OF STAY	INTRA-OP BLOOD LOSS ML	RESIDUAL TUMOR
1	12	II	Endoscopic	+	-	3 ½ hrs	3 days	400	-
2	11	I	Endoscopic	+	-	1 ½ hrs	3 days	200	-
3	16	II	Endoscopic	+	-	2 ½ hrs	4 days	350	-
4	18	III	Endoscopic	+	-	5 hrs	5 days	450	-
5	13	III	Endoscopic	+	-	4 ½ hrs	5 days	500	-
6	19	II	Endoscopic	+	-	3 hrs	3 days	400	-
7	10	I	Endoscopic	+	-	2 hrs	3 days	250	-
8	14	III	Endoscopic	+	-	4 ½ hrs	5 days	650	+
9	13	II	Endoscopic	+	-	2 ½ hrs	4 days	300	-
10	17	I	Endoscopic	+	-	1 ½ hrs.	2 days	150	-
11	19	III	Endoscopic	+	-	4 hrs	5 days	550	-
12	16	III	Endoscopic	+	-	4 ½ hrs	5 days	600	-
13	9	II	Endoscopic	+	-	3 ½ hrs	4 days	400	-
14	10	I	Endoscopic	+	-	2 hrs	2 days	150	-
15	16	1V	Endoscopic Staged	+	+	5 hrs	5 days	1200	+
16	17	II	Endoscopic	+	-	3 hrs	4 days	300	-
17	13	I	Endoscopic	+	-	1 ½ hrs	2 days	250	-
18	11	III	Endoscopic	+	-	4 hrs	4 days	650	-

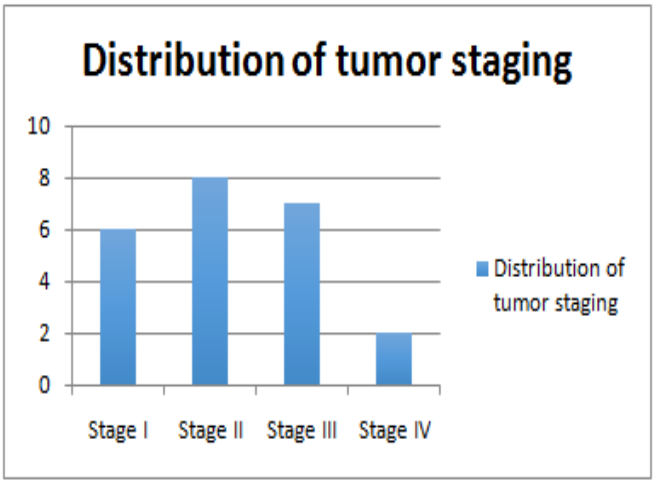
Table II: Variables assessed vide the master chart (Contd.)

CASE NO	AGE (YRS)	PRE-OP STAGE	SURGICAL APPROACH	PRE-OP	RESIDUAL	SURGICAL TIME TAKEN	DURATION OF STAY	INTRA-OP BLOOD LOSS ML	RESIDUAL TUMOR
19	10	I	Endoscopic	+	-	1 ¾ hrs	2 days	200	-
20	19	II	Endoscopic	+	-	2 hrs	3 days	300	-
21	16	IV	Endoscopic Staged	+	+	5 ½ hrs	6 days	1400	+
22	12	II	Endoscopic	+	-	2 ½ hrs	4 days	450	-
23	9	III	Endoscopic	+	-	4 ½ hrs	5 days	700	+

year in 04(17%) patients- Stage III-02 (8.5%) and Stage-IV – 02(8.5%). In all the cases, residual tumor was found in the region of the basisphenoid.

These were advanced tumors, which were also operated endoscopically, in a staged manner. The figures of residual tumor corroborate with a similar study by Nicolai. The average blood loss and residual tumor rate also statistically corroborated well with other studies given at Table V.

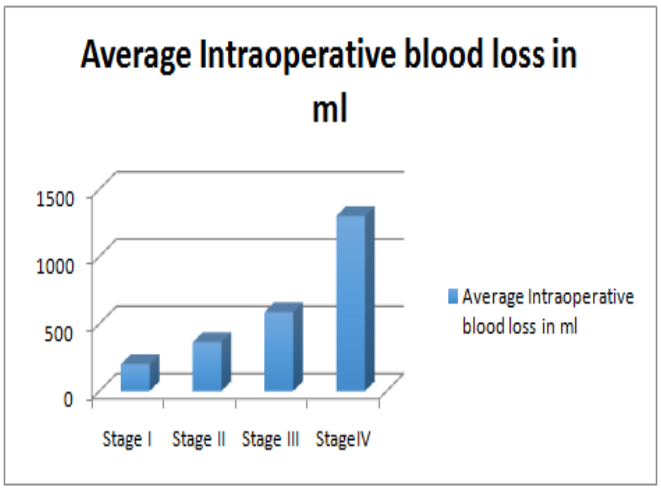
Table III: Distribution of tumor as per Snyderman staging system for JNA



Discussion

JNA is a benign vascular tumor of young adolescent males, which is hypothesized to be arising from the spheno-palatine foramen. However, there are reports proposing its site of origin from the vidian canal also. It spreads by locally expanding and eroding bony confines and involving the paranasal sinuses, pterygo-palatine and infra-temporal fossae. It can also spread intracranially through the skull base foramina like foramen ovale, parasellar areas around the cavernous

Table IV: Intra-operative Blood loss



sinuses.

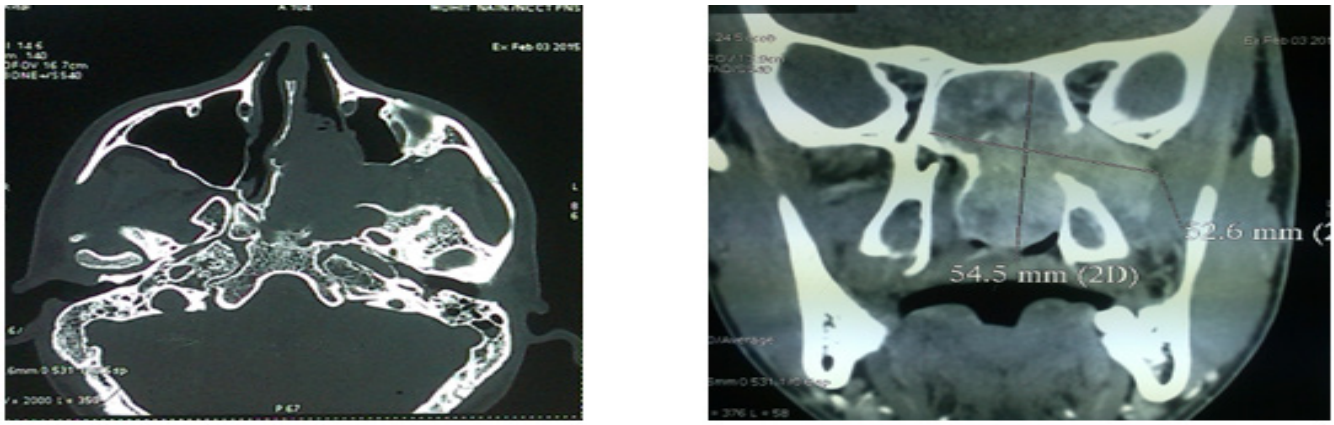
JNA has conventionally been classified and staged based on Fisch[6] staging system or the Radkowski[7] staging system. Both these staging systems are good staging systems for open procedures. They were proposed and followed during the pre-endoscopic surgery era for JNA. Ever since JNAs have been operated with endoscopic techniques, it is felt that the above staging systems does not offer the kind of information required for endoscopic surgeon, like degree of vascularity, whether it had blood supply from one or both ECA or ICA and whether there was a residual vascularity in the tumor after embolization. To meet this requirement, the classification used for our study was the Snyderman staging system.

JNAs have a tendency to enter into the skull base canals/foramina and spread along the sub-periosteal planes. Therefore, in order to achieve a total removal, the cancellous area of the skull base i e. pterygoid wedge and basisphenoid need to be adequately drilled out.[8] The recurrence/residual tumor rates in open surgical approaches were reported in the range of 36-40% in 1990s.[9] Later in 2008, Danesi et al reported excellent results on open procedures to 13.5 to 18.2 %.[10]

The tumor usually takes its blood supply from the Internal Maxillary Artery (IMA). However, in cases of contralateral spread, it can also take supply from the contralateral IMA. Bilateral vascular supply in around 36% has been reported by Wu et al.[11] When it spreads intracranially, it can take supply from the branches of the Internal Carotid Artery (ICA), most commonly from the meningo-hypophyseal trunk or its branches.

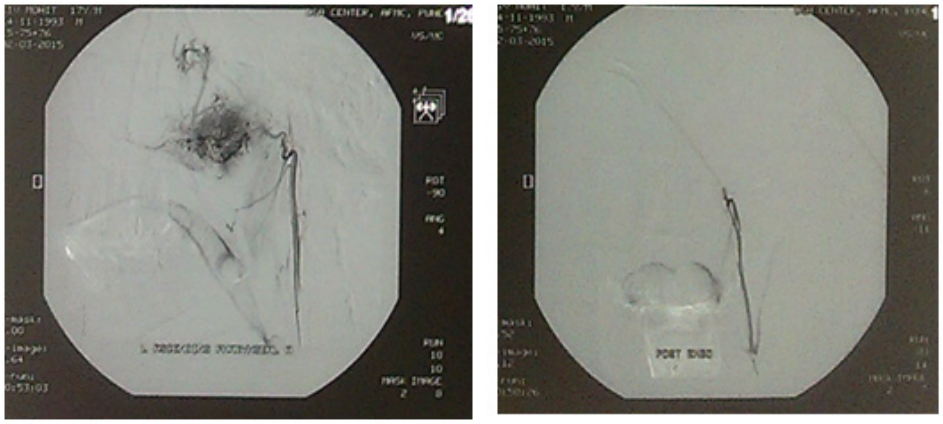
The traditional surgical methods commonly performed to remove JNA were once transpalatal, transpharyngeal, transfacial through lateral rhinotomy, midfacial degloving, and Le Fort I osteotomy, apart from infratemporal and subtemporal lateral approaches.[12,13] Improvements in the imaging and embolization techniques have improved the evaluation and reduced the per-operative blood loss, which have greatly improved the rates of complete removal. Further, a paradigm shift from open techniques to endoscopic surgery for not so extensive tumours have also improved the visualization and helped in achieving good per-operative vascular control for these tumors, thereby improving the surgical results and reducing morbidity, due to open surgical techniques. Endoscopic excision of JNA was first reported in 1998.[14]

Even large angiofibromas with intracranial extension and residual vascularity can be successfully managed by a skull base team using endoscopic techniques.[15] Similar results were obtained in other series by Snyderman, who have operated by the same surgical technique and followed the same tumor staging system.[16] Among all the staging systems proposed till now, the staging system which addresses the most essential tumour attributes



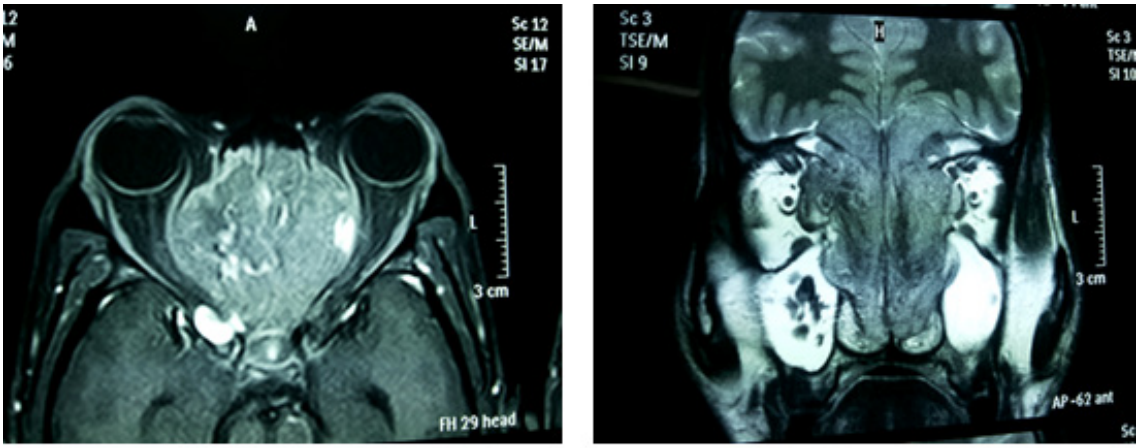
(a) (b)

Fig. 1. (a). NCCT axial view of a JNA extending through the pterygopalatine fossa to involve the infratemporal fossa (Stage - III). (b) Contrast enhanced coronal CT showing the same tumor lateral to the pterygoid plates into the infratemporal fossa.



(a) (b)

Fig. 2. (a) Pre-embolization angiography showing the tumor blush from the Lt maxillary artery. (b) Post-embolization with glue showing complete disappearance of the tumor blush with no residual vascularity (Stage-III)



(a) (b)

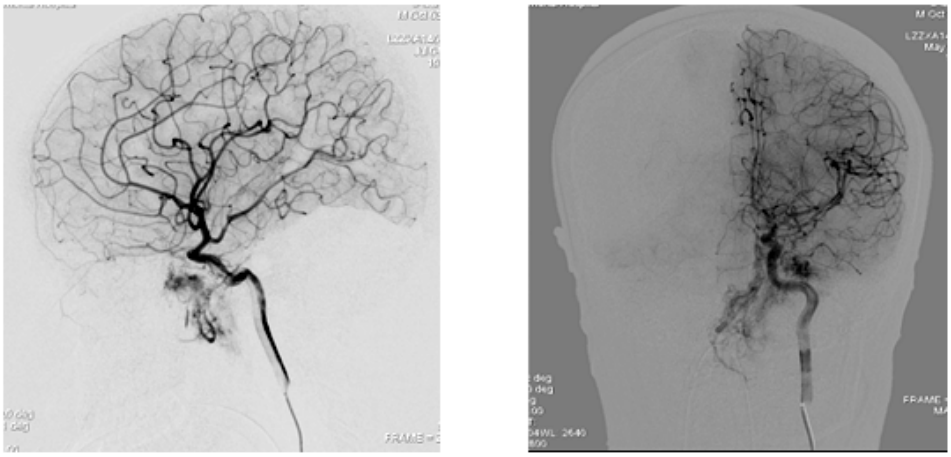
Fig. 3. Gadolinium enhanced MRI showing a large JNA extending into both the orbits and also intracranial extension but extradural

for endoscopic surgery like skull base extension and residual tumour vascularity is the one proposed by the University of Pittsburgh Medical Center.[17] Availability of better and safe embolization materials have also reduced the morbidity considerably. Direct Percutaneous Embolization directly into the tumor, is now available especially for those tumors, which have a dual supply from both the carotid systems, where endovascular embolization into both carotids systems cannot be done.[18]

Radiation has been used to treat JNAs in far advanced tumors, adjuvant in unresectable tumors, extensive intracranial extension and residual tumours in critical areas such the ICA, cavernous sinus, dura and the optic nerve.[19] However, there exists a reported risk of sacomatoid transformation[20] or radiation induced neoplasms in a long term follow-up. The role of androgen receptor blocker flutamide been investigated and it has shown regression in a series of 20 advanced staged JA, in postpuberal patients.[21]

Conclusion

Endoscopic Endonasal approach for excision of JNA is now a well-established technique. With improvements in embolization techniques and better instrumentation



(a) (b)

Fig. 4. Sagittal (a) and coronal (b) views of angiogram showing residual vascularity due to additional blood supply to tumor from the meningo – hypophyseal trunk of the ICA. (Stage – IV)

like HD camera systems, endo-bipolar cautery, Coblation, Endo-Liga clips and neuro-navigation, better visualization and better haemostatis can be achieved resulting in significant reduction in the morbidity. Newer staging systems have helped in assessing the tumor with respect to intracranial extension and intratumoral blood supply and embolization results, which is so very important in predicting the surgical course, likely intraoperative blood loss and likelihood of residual disease. Some of the surgical corners of consternation like pterygoid base and basisphenoid need to be addressed intra-operatively, to reduce the rates of recurrence.

Table V: Comparative data in other studies with endoscopic excision of JNA

AUTHOR	NO OF CASES	AVERAGE BLOOD LOSS	RESIDUAL TUMOR
Ardehali[22]	47	770ml	19.10%
Roger G[23]	20	350 ml	Nil
Pryor[24]	6	225 ml	Nil
Kopec[25]	10	250 ml	10%
Cloutier[26]	72	380 ml	8.30%
Present Study	23	612 ml	17%

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A Correlative Study Between Size of Tympanic Membrane Perforation, Pure Tone Audiometry and Intraoperative Findings in Tympanoplasty

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ABSTRACT

Introduction

Chronic otitis media (COM) is the most common and prevalent disease of the middle ear. COM has been defined as a longstanding inflammatory condition of middle ear and mastoid, associated with perforation of the tympanic membrane. Tympanoplasties are common surgeries performed for chronic otitis media in inactive mucosal type.

Any otological surgery may involve a menace/ hazard of hearing loss post operatively. In this study, an attempt was made to correlate, size of tympanic membrane perforation, pure tone audiometry and intra-operative findings in tympanoplasties, results were analysed and conclusion drawn.

Materials and Methods

Forty patients attending ENT OPD with chronic otitis media (COM), inactive mucosal type, with conductive hearing loss undergoing tympanoplasties who were willing to participate in the study were selected.

Ear was examined pre-operatively to assess the size of perforation and then, pure tone audiometry (PTA) was done to assess the type of hearing loss and its severity. During tympanoplasty, middle ear was inspected for ossicular status and any other pathology was noted. Later, the size of tympanic membrane perforation, pure tone audiometry and intra operative findings were correlated with each other and analysed.

Result

In small and medium sized perforation, PTA and intraoperative findings correlated with each other. Whereas, in large and subtotal perforation, there was no correlation.

Conclusion

In small and medium sized perforation, middle ear inspection may not be necessary. Whereas, in large and subtotal perforation it is necessary.

Keywords

Deafness; Infant, Newborn; Hearing Tests; Evoked Potentials, Auditory, Brain Stem; Audiometry, Evoked Response; Otoacoustic Emissions, Spontaneous

Chronic otitis media (COM) is the most common and prevalent disease of the middle ear.[1] COM has been defined as a longstanding inflammatory condition of middle ear and mastoid, associated with perforation of the tympanic membrane.[2] COM is most commonly a result of acute otitis media. COM with perforation is often accompanied by varying degree of conductive hearing loss.[3]

The surface area of an intact and normally vibrating tympanic membrane plays an important role in transmitting sound energy to middle ear. Perforation of the tympanic membrane is a very common cause of conductive hearing loss as there is loss in the vibrating area of tympanic membrane.

Tympanoplasty is a common surgery, performed for chronic otitis media in inactive mucosal type. The procedure includes inspection of middle ear cleft with

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Table I: Age distribution

SOCIO DEMOGRAPHIC FACTORS (AGE IN YEARS)	FREQUENCY	PERCENT
20 & below	6	15
21-30	19	47.5
31-40	13	32.5
41 & above	2	5

closure of tympanic membrane perforation with a graft (most commonly used graft is autologous temporalis fascia).

In otological surgeries, manipulation of intact ossicular chain may be hazardous; the hearing loss in tympanoplasties is not rare and there are very few publications in this regard.[4] The post-operative hearing loss may occur due to various reasons. One of the reasons attributed is the manipulation of ossicular chain occurring during the routine inspection of the ossicular chain.

In this study, an attempt was made to correlate, size of tympanic membrane perforation, pure tone audiometry and intra operative findings in tympanoplasties, results were analysed and conclusion drawn.

Chronic otitis media, inactive, mucosal type, with Conductive hearing loss with 38 dB limit,[5] Size of tympanic membrane perforation (Small, Medium, Large, Subtotal), Type 1 to Type 3 Tympanoplasties were included in our study.(Fig. 1) Patients not fitting in the inclusion criteria, were excluded from the study.

Materials and Methods

This prospective study was carried after obtaining institutional ethical committee clearance on a total of 40 patients attending ENT OPD with COM, inactive mucosal type, with conductive hearing loss undergoing tympanoplasties, who were willing to participate in the study were selected, informed and written consent was taken from all patients. The Study period was between August 2016 to June 2017.

Pre-operatively, ear examination was done to visualise size of perforation and then patients were

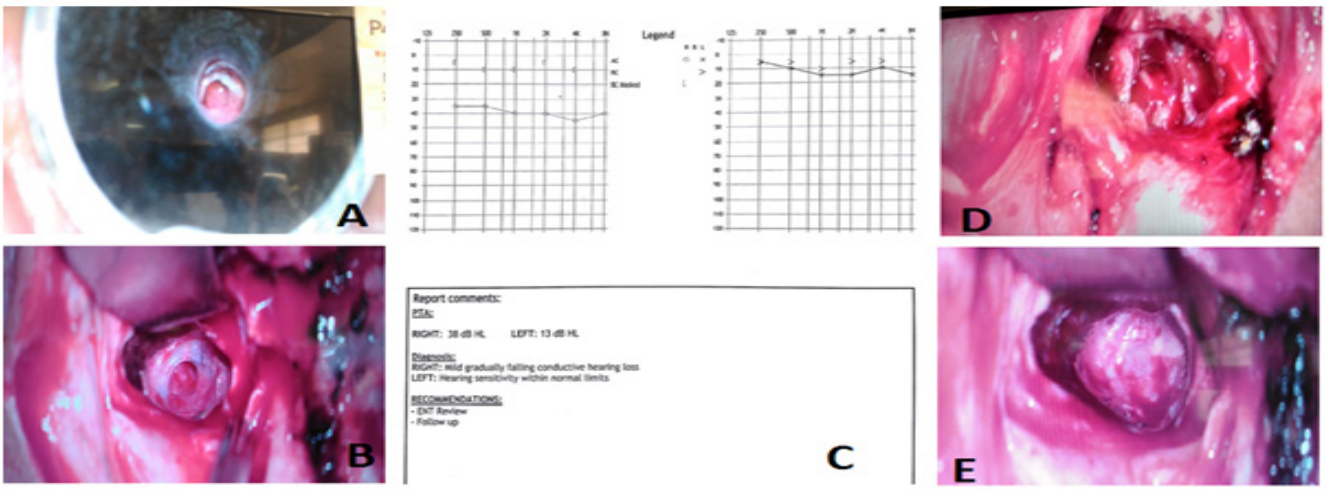

Fig. 1. (A) Tympanic membrane perforation **(B)** Intra operative picture of tympanic membrane perforation **(C)** PTA showing mild conductive hearing loss **(D)** Intra operative picture **(E)** After placement of temporalis fascia graft.

Table II: Statistical analysis

SIZE OF TYMPANIC MEMBRANE PERFORATION	PTA	INTRAOPERATIVE FINDINGS		FISHER'S EXACT T TEST
		Correlated (N=33)	Not correlated (N=7)	
Small & Medium	Correlated 38 & Below (N=23)	22	1	P<0.02, Significant CORRELATED
	Not correlated Above 38 (N=7)	4	3	
Large & Subtotal	Not Correlated 38 & Below (N=4)	3	1	Not Significant NOT CORRELATED
	Correlated Above 38 (N=6)	4	2	

segregated according to the size of perforation, into four categories as:(a) Small (area involving <1 quadrant) (b) Medium (area involving >1 and < 2 quadrants) (c) Large (area involving >2 and < 3) (d) subtotal(involving all 4 quadrants).[6]

Pure tone audiometry was done to assess the severity and type of hearing loss.

These tympanoplasties were operated by a single surgeon to maintain uniformity. Under general anaesthesia, through post aural approach, temporalis fascia graft was harvested, external auditory canal entered and tympanic membrane visualised,freshening of margin was done. Tympanomeatal flap elevated, middle ear inspected for ossicles and any other pathology was noted (e.g. fibrosis/ adhesions/ sclerosis/ any other). Temporalis fascia graft was placed by underlay technique, secured with gel foam, wound closed in layers, mastoid dressing was done and regular post-operative care was given.

Later, the size of tympanic membrane perforation, pure tone audiometry and intra operative findings were correlated with each other and analysed.

Result

In our study, patients were in the age group of 16 to 45 years. Maximum number of patients were between 21 to 30 years of age.(Table I) Fifteen patients (37.5%) in this series were male twenty-five (62.5%) female.

In our study, it was found that, in 23 patients with small and medium sized tympanic membrane perforation, with a PTA of 38 dB(AB gap) and below,

Table III: Showing correlation between size of tympanic membrane perforation and intra operative findings Nc*- Ossicular Necrosis, G*- Glue in middle Ear, F*- Ossicular Fixity

SIZE OF TYMPANIC MEMBRANE PERFORATION	INTRAOPERATIVE FINDINGS			
	NOT CORRELATED			CORRELATED
	Nc*	G*	F*	
Small & Medium	2	2	0	26

Table IV: Correlation between size of tympanic membrane perforation and intra-operative findings Nc*- Ossicular Necrosis, G*- Glue in middle Ear, F*- Ossicular Fixity

SIZE OF TYMPANIC MEMBRANE PERFORATION	INTRAOPERATIVE FINDINGS			
	CORRELATED			NOT CORRELATED
	Nc*	G*	F*	
Large & Subtotal	2	1	4	3

size of perforation correlated with PTA findings. Out of these 23 patients (100 per cent), in 22 patients (95.6 per cent), size of tympanic membrane perforation, PTA findings and intra operative findings correlated with each other. In 1 patient (4.4 per cent) the size of tympanic membrane perforation and PTA findings correlated, but intra operative finding did not correlate and showed necrosis of the Incus.(Table II and III)

In 7 patients, with small and medium sized tympanic membrane perforation, with a PTA of above 38 dB, size of tympanic membrane perforation did not correlate with PTA findings. Out of these 7 patients (100 per cent), in 4 patients (57.1 per cent), size of tympanic membrane perforation, did not correlate with PTA findings, but correlated with intra operative findings. In 3 patients (42.9 per cent) the size of tympanic membrane perforation, PTA findings and intra operative finding did not correlate, among these 3 patients One patient had necrosis of the incus and two patients had glue in the middle ear.(Table III)

Applying Fisher's exact t test, the P value was < 0.02 (in small and medium size perforation, with PTA and intra operative findings), which is significant.(Table II)

In 4 patients, with large and subtotal sized tympanic membrane perforation, with a PTA of 38 dB and below, size of tympanic membrane perforation did not correlate with PTA findings. Out of these 4 patients (100 per cent), in 3 patients (75 per cent), size of tympanic membrane perforation, did not correlate with PTA findings, but correlated with intra operative findings as expected, among these 3 One had necrosis of the handle of malles and 2 had ossicular chain fixity[one had fixed incudomalleolar joint and other had fixed incudomalleolar and incudostapedial joint].(Table IV)In 1 patient (25 per cent) the size of tympanic membrane perforation, PTA findings and intra operative finding did not correlate.

In 6 patients with large and subtotal sized tympanic membrane perforation, with a PTA of above 38 dB, size of tympanic membrane perforation correlated with PTA findings. Out of these 6 patients (100 per cent), in 4 patients (66.7per cent), size of tympanic membrane perforation, PTA findings and intra operative findings correlated with each other as expected, among these 4 patients one has necrosis of incus one had glue in middle ear and two had ossicular fixity [both had incudostapedial joint fixed]. (Table IV) In 2 patients (33.3 per cent) the size of tympanic membrane perforation and PTA findings correlated, but intra operative finding did not correlate.

Applying Fisher's exact t test, the P value was not significant (in large and subtotal size perforation, with PTA and intra operative findings).

Using the software IBM SPSS version 22 for windows, the above statistical analysis was done.

Discussion

COM (Tympanic membrane perforation)is a very common disorder caused either by infection or trauma, resulting in decreased hearing. So, a meticulous examination, diagnosis and treatment of tympanic membrane perforation are necessary for the assessment

and restoration of hearing loss.

According to the study done by Nepal et al,[7] hearing loss was greater in larger perforations as compared to small perforations. But in our study, we found that, in small and medium sized perforations, size of tympanic membrane perforation correlates with PTA results, whereas in large and subtotal perforation it was not correlating.

Similarly, in a study done by Singh et al,[8] concluded that the hearing loss is directly proportional to the size of the perforation. But in our study we found the above mentioned observation.

In a study done by Ribeiro et al,[9] there was no significant relationship between the size of tympanic perforations and hearing loss.

This is a unique study, in which three variables are correlated (size of tympanic membrane peroration, PTA and intra operative findings).

Routinely during surgery, while inspecting the middle ear, the chances of manipulation of the ossicular chain is there, causing deterioration of post-operative hearing. A detailed correlative study is necessary in this regard, because even in a straight forward case, any manipulation during the inspection of an intact ossicular chain might be hazardous.[3] However, this study has to be conducted with a larger sample size.

Conclusion

In small and medium sized perforation, PTA and intraoperative findings correlated with each other. Whereas, in large and subtotal perforation, there was no correlation.

In small and medium sized perforation, middle ear inspection may not be necessary. Whereas, in large and subtotal perforation it is necessary.

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A Comparative Study between ORIF and ORIF with Mandibulomaxillary Fixation in Unfavourable Mandible Fractures

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ABSTRACT

Introduction

This study aims to evaluate the efficacy of open reduction and the combination of open reduction with mandibulomaxillary fixation (MMF) in cases of unfavourable mandible fractures.

Materials And Methods

This is a prospective study carried out from 2010 to 2015 on 60 patients with mandible fracture attending the Dept. of ENT. The diagnosis and classification of mandible fracture into favourable and unfavourable types were done on the basis of clinical and CT faciomaxillary findings. The outcomes were assessed by comparing the preoperative and postoperative occlusion, mouth opening and symmetry of mandibular ramus. Patients with favourable mandible fractures were excluded from the study.

Results

We found that out of 60 patients, 40 cases were of the unfavourable type. ORIF with MMF gave better outcome compared to ORIF alone. The data were statistically analysed using Z score and P value.

Conclusion

Initial assessment of mandible fractures into favourable and unfavourable category plays a significant role in planning the management. Management of unfavourable mandible fractures with ORIF and MMF gives functionally and aesthetically better results as compared to ORIF alone..

Keywords

Mandibular Fractures; Open Fracture Reduction; Mandibulomaxillary Fixation

Mandible fracture is one of the most common facial skeletal injuries but causes may vary from one country to another. The treatment prinicples of mandible fractures have changed recently, although the objective of reestablishing the occlusion and masticatory functions remains. The aim of our study is to evaluate the efficacy of open reduction alone and the combination of open reduction with mandibulomaxillary fixation in cases of unfavourable mandible fractures.

Materials and methods

This is a prospective study performed over a period of 5 years from 2010 to 2015 on 60 patients with mandible fracture attending the Department. The diagnosis and classification of mandible fractures were often done on the basis of clinical and CT faciomaxillary findings. We have assessed the outcomes by comparing the preoperative and post-operative occlusion, jaw mobility/ mouth opening by measuring the inter-incisor distance and symmetry of mandibular ramus on mouth opening. Patients with favourable mandible fractures and oral submucosal fibrosis were excluded from the study.

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Results

A total of 60 cases of mandible fractures were diagnosed over a period of 5 years. Out of these, 40 cases accounting for 66.67% were diagnosed as unfavourable types. We divided the study sample randomly into two groups of 20 cases each with one group undergoing ORIF alone and the other MMF and ORIF. The results

in both groups were compared postoperatively by Z test using occlusion, mouth opening and symmetry of the mandibular rami as criteria for assessment. The P value calculated from Z test was found to be statistically significant for occlusion (0.00236), mobility (0.00804) and symmetry (0.00578) in favour of management of unfavourable mandibular fractures with ORIF and IMF.

Discussion

Fracture of the mandible occurs more frequently than that of any other bone of the facial skeleton.[1,2] Oikarinen and Lindqvist (1975) studied 729 patients with multiple injuries sustained in RTA. The most common facial fractures were in the mandible. The distribution of facial skeletal fractures being Mandible (61%), Maxilla (46%), Zygoma(27%), Nasal Bone(19%), with a 6:2 proportion between mandibular and zygomatic fractures.[3,4] Increased incidence is seen in males aged 21-30yrs. Most common sites of fracture was condyle 29%, angle of mandible 26 %, symphysis 22%, ramus 2%, coronoid process 1.5%. The most common mode of injury is RTA. (Table I)

Mandibular fractures are classified into (a)Simple: includes closed linear fractures of the condyle, coronoid, ramus and edentulous body of the mandible. (b)Compound: Fractures of tooth bearing portions of the mandible, into the mouth via the periodontal membrane and at times through the overlying skin. (c) Comminuted: Usually compound fractures characterized by fragmentation of bone (d)Pathological: Results from an already weakened mandible by pathological conditions.

Table I: Causes of injury of facial skeleton

CAUSE OF INJURY	N	%
Road traffic accident	33	55
Work-related/ self-fall	12	20
Assault	15	25
Sports injury	0	0
Miscellaneous	0	0
Total	60	100

Mandibular fractures are also classified on the basis of stability of the fracture fragments. (a)Favourable fractures are those where the muscles tend to draw fragments together. Ramus fractures are almost always favorable as the jaw elevators tend to splint the fractured bones in place (b)Unfavourable fractures are those where the muscles tend to draw fragments apart. Most angle fractures are horizontally unfavourable. Most symphyseal/parasymphyseal fractures are vertically unfavourable.

The objective of the treatment of mandibular fracture is to reestablish normal occlusion and masticatory function. Conservative treatment to achieve this is performed by immobilizing the mandible for the healing period by intermaxillary fixation which is achieved by dental wiring, archbars, cap, splints and gunning splints.[5,6] Operative treatment of mandibular fractures involves intraoral or extraoral opening of the fracture site and direct osteosynthesis with transosseous wires (Schwenzes 1982), lag screws (Niederdellmann 1982), bone plates (Schilli 1975, Spiessel 1976) or locking plate/screw which was initially developed by Raveh et al.[7,8,9] Closed reduction is usually carried out in cases of non-displaced favourable fractures, grossly comminuted fractures (to reduce stripping of periosteum), children in developing dentition, coronoid fractures without impingementonzygoma and condylar fractures. Open reduction is done in following cases - displaced unfavourable fractures, severely atrophicedentulous mandibles, complexfacial fractures, mandibular non-unions / malunions, condylar fractures.

Many researchers recommended closed reduction because of problems of surgical approach, such as infection, injury to nerves and blood vessels and scar formation.[10,11,12] However, compared to previous open reduction, it is currently more widely used by minimizing complications such as TMJ pain and arthritis and mouth opening limitation via accurate reduction of bony fragments with the development of surgical instruments and surgical approaches. However, there is plenty of controversy over the selection of either closed or open reduction to treat mandibular fractures depending on

displacement severity and fracture site.

Hence, unfavourable mandible fractures require special attention as biomechanics of he facial skeleton has to be taken into account and can significantly alter the postoperative results. The mandible provides support to the dentition during biting and chewing. As this bone swings from the cranium, forces generated when a bolus of food is compressed between the teeth results in a fulcrum effect that generates tension and compression zones. Early explanations of mandibular biomechanics assumed a simple beam with forces along the top of the beam always creating tension zones superiorly and compression zones inferiorly. In the simple beam model, a fracture of mandible body is distracted superiorly and compressed inferiorly when a force is applied to the dental surface anteriorly. Unfortunately, not all aspects of mandible function follow this simple model. Irregularities of the mandibular bone make some areas potentially more unstable than others and thus resulting in unfavourable varieties. For example, the potential for torque and rotational motion appears to be greater in the symphyseal and parasymphyseal region, making fractures in this region usually unfavourable.The angle region, having thick bone superiorly and thin bone inferiorly, also presents similar problem.

Kroon and co-workers first noted that depending on where the food bolus was placed along the mandibular dentition, the location of the compression and tension zones could change from compression to tension and vice versa. In our study, we have tried to achieve normal occlusion first by doing maxillomandibular fixation to counteract distracting muscle pull and afterwards securing the reduction with orif at the fracture site, comparing results with reduction obtained using orif alone. The results in both groups were compared postoperatively by z test using occlusion, mouth opening and symmetry of the mandibular rami as criteria for assessment. Angles classification was used to determine the pre and post operative occlusion. Inter-incisor distance was used to assess mouth opening with < 4cm considered as reduced mouth opening. Symmetry for jaw was determined by presence of deviation. The p value calculated from z test was found to be statistically significant for occlusion (0.00236), mobility (0.00804) and symmetry (0.00578) in favour of management of unfavourable mandibular fractures with orifandimf as compared to ORIF alone.

Conclusion

Classification of mandible fractures into favourable and unfavourable categories plays a significant role in planning the management.Unfavourable mandible fractures usually do not follow the simple beam model of compression and tension. ORIF and MMF give functionally and aesthetically better results as compared to orif alone in unfavourable mandibular fractures.

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A Multi-Modality Surgical Management in Laryngeal Stenosis

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ABSTRACT

Introduction

Postintubation laryngo-tracheal stenosis requires a precise diagnosis and an experienced operator in both endoscopic and surgical treatment. This report presents surgically treated cases of laryngo-tracheal stenosis secondary to long-term intubation/ tracheostomy with review of the literature.

Case Reports

In this retrospective study, we present 5 cases (23-year-old male, 13 year old male, 22 year old male, 19 year old male and 33 year old female) of post-intubation/tracheostomy laryngo-tracheal stenosis (glottic/subglottic) stenosis in the year 2016 to 2017. Each patient was managed differently. A patient with history of multiple subglottic stenosis dilations and stenting underwent open surgical subglottic stenosis resection and anastomosis, LASER assisted resection of stenosis with stenting was done in a patient with history of dilation, LASER assisted resection and dilation followed by Mitomycin C application was done in another patient with history of poisoning, plain endoscopic dilation was done in one patient with history of head injury and Kashima's Cordotomy with release of interarytenoid adhesion by LASER was done in one patient.

Conclusion

Resection of stenotic segment by open surgical anastomosis and laser assisted resection is a safe option for the treatment of subglottic stenosis following intubation without the need for repeated dilation. Endoscopic dilation can be reserved for unfit patients.

Keywords

Laryngostenosis; Tracheal Stenosis; Intubation; Endoscopy; Anastomosis, Surgical; Cordotomy

Laryngo-tracheal stenosis is a congenital or acquired narrowing of the airway that may affect the supraglottis, glottis, and/or subglottis. It has several grades. Incidence of laryngo-tracheal stenosis following intubation has been reported upto 21%.[1] However, only a few (1-2%) of these patients present with the symptoms. Resection and anastomosis has been established as the definitive treatment of stenosis more than one cm in length.[2] The current study aims to present cases of laryngo-tracheal stenosis managed by different methods at our hospital.

Case Reports

CASE 1:

A 23 years old male came to our OPD with complains of change of voice and noisy breathing. Examination revealed the young man had inspiratory stridor and hoarseness of voice with portex tracheostomy tube no 8 in situ. History revealed that he was admittedpreviously for organophosphorus poisoning 3 years back, during which he was intubated for 15 days. After extubation, he was kept in the ward for 5 days after which he was discharged. Patient developed dyspnoea 1 month after discharge from primary hospital, patient was admitted and taken up for emergency tracheostomy. Following which a clinical diagnosis of tracheal stenosis was made.

CT Neck revealed subglottic stenosis proximal to tracheostomy stoma involving length of 2 cm and transverse diameter of 6mm.

After which patient underwent 6 check bronchoscopies

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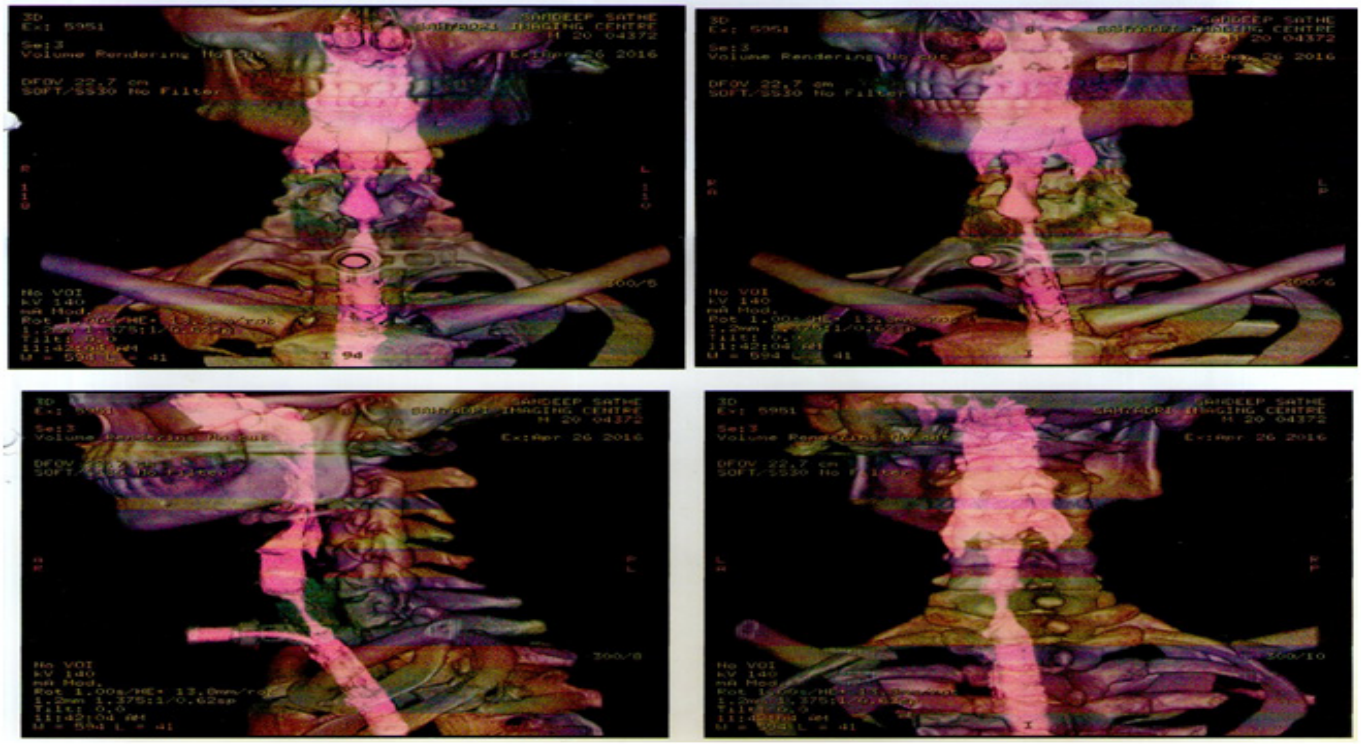

Fig. 1. 3D CT neck showing stenotic portion

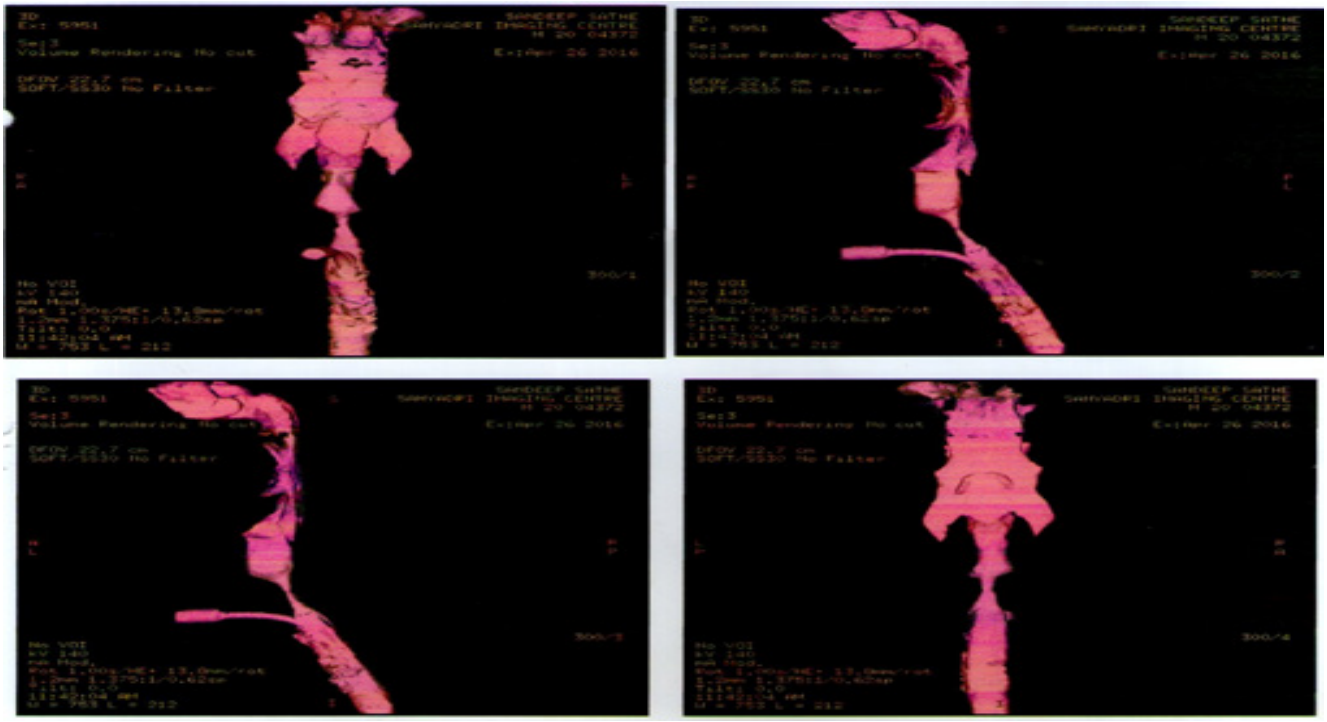

Fig. 2. 3D CT neck showing stenotic portion

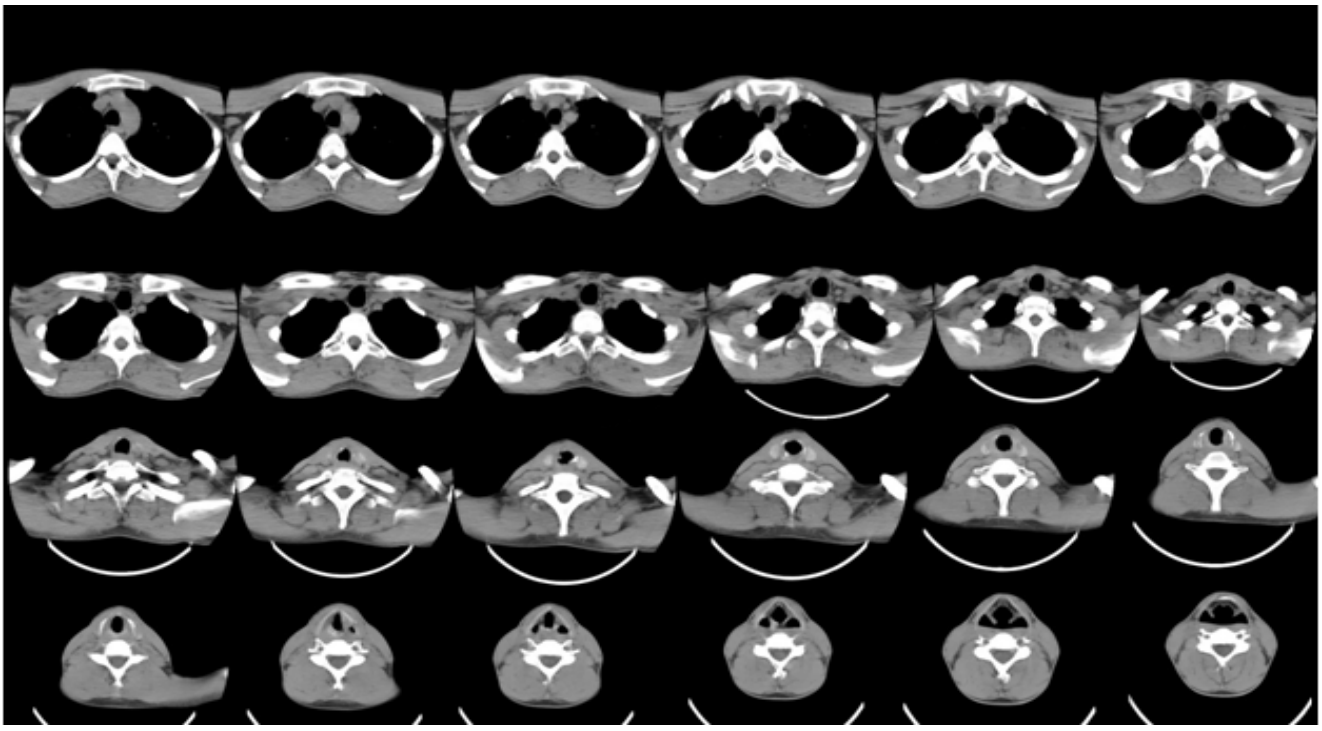

Fig. 3. CT Neck 6 month post operatively

and 3 dilations and followed by stenting of the subglottic stenosis in at the previous hospital, which did not relieve him of his complains. He underwent a check bronchoscopy with dilation of the tracheal stenosis at our hospital1 year later.

Patient returned back to our ENT OPD 1 year after the dilationwith complains of hoarseness of voice and stridor. 3 DCT neck (Fig. 1 & 2) revealed subglottic stenosis over approx. length 11mm, noted at level of cricoid cartilage. Transverse diameter 5.5mm and AP diameter measures 5.1mm. There was grade III (90%) stenosis over the third tracheal ring with narrowing extending proximally up to second ring. CT scan showed a stenotic segment of 2.5 cm. The patient and his relatives were explained about the condition and the procedure to be performed. They agreed for a reconstructive surgery and a tracheal resection and anastomosis was planned.

Patient underwent surgery, Apron neck incision was given. Flaps elevated superiorly till the hyoid bone and inferiorly till the clavicle. Strap muscles separated and thyroid gland dissected. Trachea visualized and stenotic portion of the trachea was resected and end to end anastomosis done with 3/0 monofilament polypropylene suture material a vacuum drain was kept insitu. A mento-sternal suture with neck in flexion to restrict neck movement was placed with 1/0 polypropylene. Post operatively patient was kept in ICU with nasal intubation. Nasal intubation and drain were removed on the 5th postoperative day. Patient was shifted out of ICU on the 8th post-operative day made uneventful recovery and was discharged on 14th postoperative day. During follow up after one month, patient was asymptomatic with normal breathing and voice.

CT Neck 6 month post operatively suggested of no evidence of stenosis. (Fig. 3) Tracheal lumen and tracheal bifurcation were normal and on 70°. Rigid fibre-optic laryngoscopy, vocal cord mobility was normal.

CASE 2:

A 13 year old male was referred to our OPD with complains of dyspnea, noisy breathing. Examination revealed patient had inspiratory stridor with metallic tracheostomy tube insitu. On indirect laryngoscopy bilateral vocal cords were mobile. History revealed that

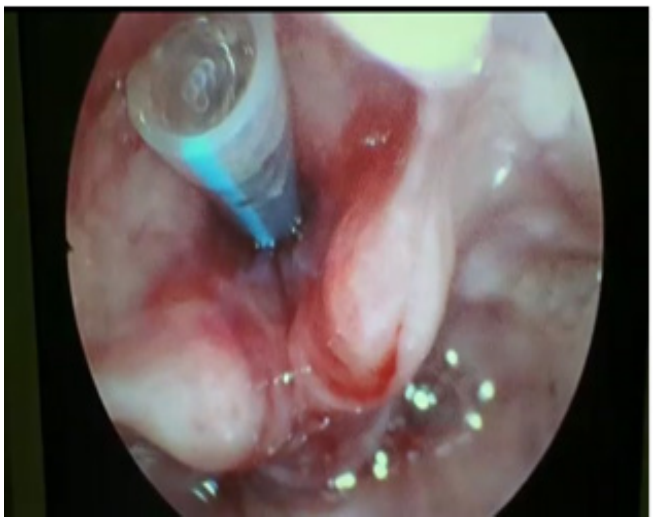

Fig. 4. Endotracheal tube number 4 inserted after LASER assisted release of stenosis

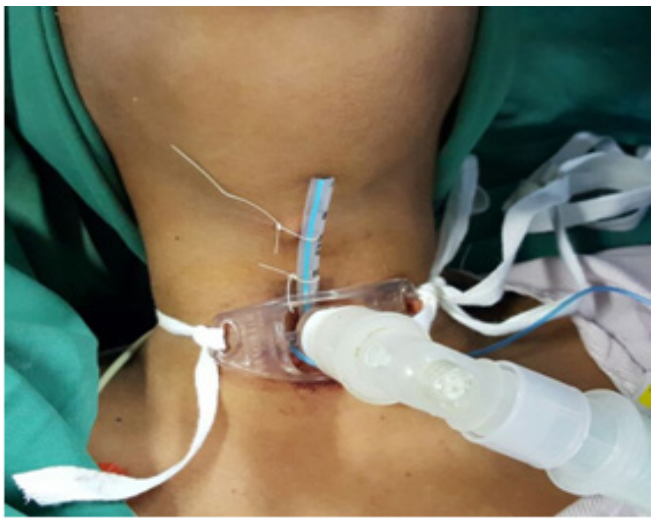

Fig. 5. Endotracheal tube number 4 inserted after LASER assisted release of stenosis

patient was admitted in view of neuroparalysis secondary to snake bite 2 months back. Patient was ventilated through an endotracheal tube for 10 days after which underwent a tracheostomy. Patient was shifted to ward on the 23rd day after admission. Patient was discharged with a metallic tube insitu. Post discharge patient complained of noisy breathing. Patient underwent flexible bronchoscopy which revealed subglottic stenosis, bilateral fixed vocal cords due to thickening and fibrosis. Patient underwent balloon dilation which did not relieve his complaints Patient was referred to our hospital for further management. The patient's relatives were explained about the condition and the procedure to be performed. They agreed for the surgery and LASER assistedtransglottic stenosis excision was planned.

Patient underwent the surgery under general anaesthesia, flexible bronchoscopy was done. Flappy epiglottis visualized, glottis stenosis with interarytenoid adhesion seen. Subglottic soft stenosis (Cotton Myer's grade 4) visualized. Rigid bronchoscopy was done and stenotic segment length was assessed. Bogdasarian grade 4 post glottic stenosis was noted and partly released with CO2 laser. Bougie was used for dilation of the subglottic stenosis. CO2 laser was used to release the stenotic bands of the subglottic stenosis. Endotracheal tube number 4 was inserted through the tracheostomy(Fig. 4 & 5) site upwards in a retrograde fashion through the stenosis to maintain patency.

Post operatively patient was kept in ICU. Patient was shifted out of ICU on the 3rd post-operative day. Patient made uneventful recovery with no complains of dyspnea and noisy breathing. Patient was discharged on 20th postoperative day after Montgomery T-tube insertion. Post operatively after 6 month the Montgomery T- tube was removed. One month after T tube removal there was no evidence of stridor and no recurrence of stenosis.

CASE 3:

A 22 year old male our OPD with complains of dyspnea on lying down, hoarseness of voice. Examination revealed patient had orthopnea, stridor. On laryngoscopy bilateral vocal cords were fixed with inter-arytenoid adhesion and with subglottic stenosis. History revealed that patient had history of hospitalization in view of OP poisoning. Patient was intubated for 2 weeks. Patient was shifted to ward post extubation on the 3rd week after admission. Patient was discharged. Post discharge patient complained of hoarseness of voice and dyspnoea.

Patient came to our OPD where on indirect laryngoscopy it was revealed patient has bilateral abductor cord palsy with interarytenoid adhesion and on flexible bronchoscopy there was astenosis

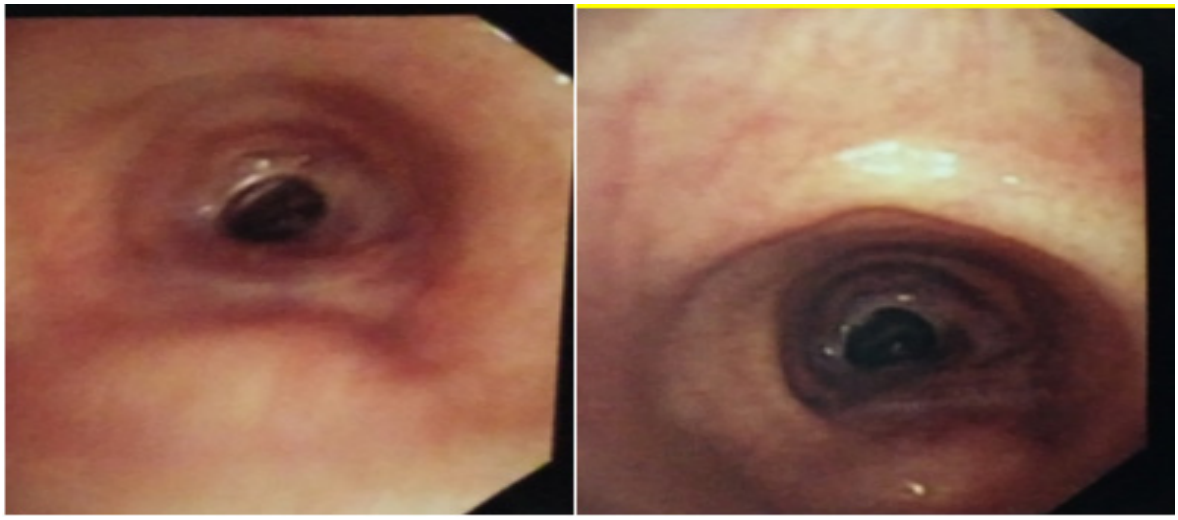

Fig. 6. Stenosis seen 4 cm below glottis

seen 4cm below the glottis, which was grade II soft stenosis. (Fig. 6) The patient's relatives were explained about the condition of the patient and the procedure to be performed. They agreed for the surgery and microlaryngoscopic Kashima's cordotomy by LASER was planned with dilation of subglottic stenosis.

Patient underwent surgery under general anaesthesia, after intubation, the scope was introduced. Bilateral vocal cords were visualized, posterior commissure was visualized. Right side cordotomy was done using LASER. Followed by dilation of stenotic portion using rigid bronchoscope. Patient was shifted to ICU post operatively and was shifted out on 3rd post-operative day.

Patient made an uneventful recovery and was discharged from ENT ward on 9th post-operative day. Six months postoperatively on endoscopic examination there was no evidence of glottis or subglottic stenosis or stridor.

CASE 4:

A 19 year old boy was brought to our OPD with complains of dyspnea. Examination revealed patient had stridor and a PVC tracheostomy tube insitu. On indirect laryngoscopy bilateral vocal cords were mobile. History revealed that patient was admitted in another hospital 1 month prior to visit at our hospital in view of head injury. Patient had undergone craniotomy for the same with tracheostomy. Patient was discharged after an uneventful recovery after decannulating him. Patient developed dyspnoea 15 days post discharge. Patient underwent tracheostomy once again. Patient was discharged with PVC tracheostomy tube no 8. Patient came to our OPD in view of dyspnea after which a CT neck was performed suggestive of tracheostomy insitu 3cm from the carina with tracheal stenosis at the level of tracheostomy tube. The patient's relatives were explained about the condition of the patient and the procedure to be performed. They agreed for the surgery and flexible bronchoscopy with dilation of subglottic stenosis was planned.

The surgery was done under local anaesthesia. Rigid bronchoscope was introduced and 8 no PVC tracheostomy tube was removed. Tracheal stenosis visualized at level of tracheostoma.(Fig. 7) Tracheal stenosis was mild and granulation tissue was present. Dilation was done using balloon dilator and tracheostomy tube no 7 was inserted. Patient was shifted to ward post operatively and was discharged with metallic tracheostomy tube on the 3rd postoperative day.Patient followed up on 15th postoperative day and tracheostomy decannulation was done after check bronchoscopy. There was no evidence of subglottic stenosis.

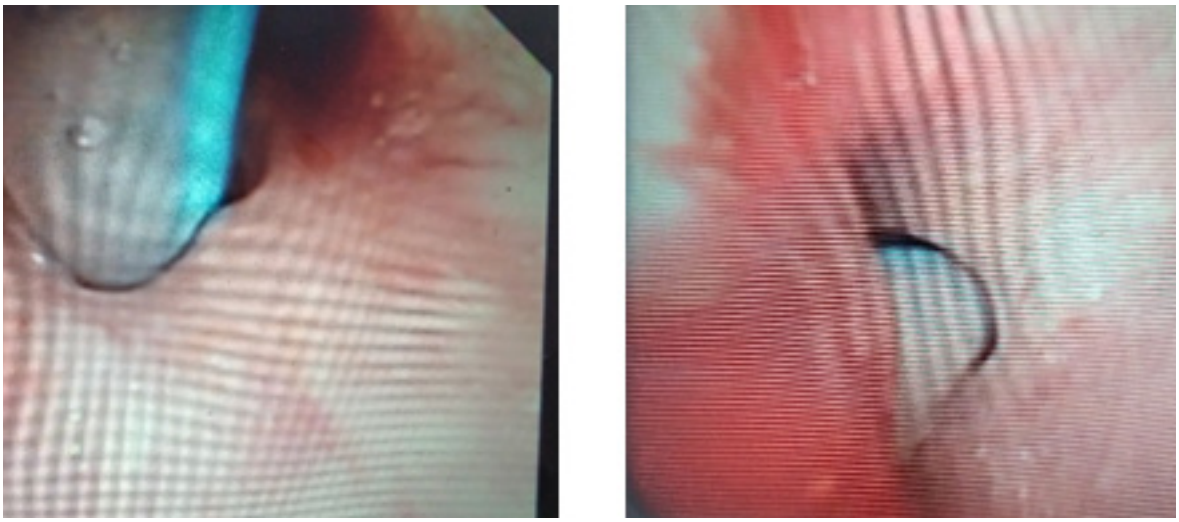

Fig. 7. Tracheal stenosis at level of tracheostoma

CASE 5:

A 33 year old female was referred to our OPD with complaints of hoarseness of voice and dyspnea on exertion. Examination revealed patient had stridor. On indirect laryngoscopy bilateral vocal cords mobile. History revealed that patient was admitted in view of clozapine poisoning and was kept intubated for 10 days. Post extubation patient made an uneventful recovery and was discharged on the 5thday after shifting to ward. She subsequently developedhoarseness and dyspnea on exertion. CT scan revealed narrowing of trachea for an approximate length 2cm from C7-T1 to T1-T2. The patient's relatives were explained about the condition of the patient and the procedure to be performed.

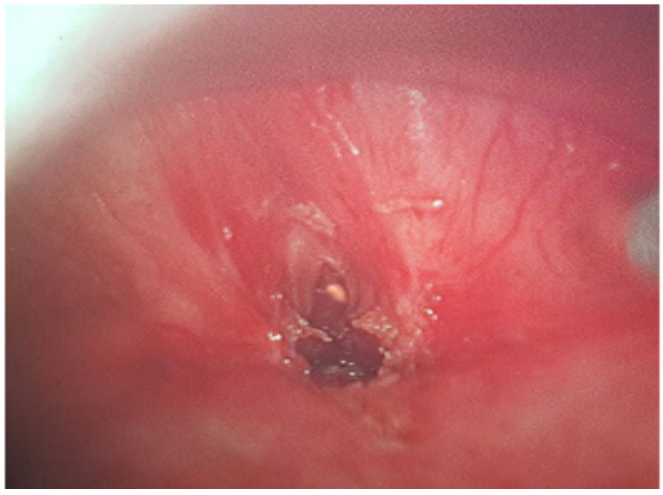

Fig. 8. LASER excision of stenosis

They agreed for the surgery and excision of stenosis done by Holmium LASER (Fig. 8) with balloon dilation followed by Mitomycin C application. Patient was shifted to ICU post operatively and was shifted out on 2nd postoperative day. Patient made an uneventful recovery and was discharged from ENT ward on 5thpost operative day.Post operative[6] month check bronchoscopy revealed no evidence of subglottic stenosis.

Discussion

Endotracheal intubation is a known cause of glottic/ subglottic stenosis. The other important cause being complication of tracheostomy and surgical/external trauma.

Post intubation stenosis is a clinical problem caused by regional ischaemic pressure necrosis of the airway.[3] Stenosis can occur anywhere from the level of the endotracheal tube tip till the glottic and subglottic area. The most common sites of stenosis are where the endotracheal cuff has been in contact with the tracheal wall and at the tracheal stoma site following a tracheostomy.[4] As a result, stenosis occurs most commonly following the two types of airway intubation:- endotracheal intubation and tracheostomy.[5]

Causative factor of stenosis is the pressure exerted by the cuff on the tracheal mucosa. At a cuff pressure of >30 mmHg, there is an increase in mucosal capillary perfusion pressure, which leads to mucosal ischemia and consequent inflammation of the tracheal cartilages. These pathological changes may eventually lead to fibrosis of circumferential lesions, resulting in progressive tracheal stenosis.[6] Ischemic injury can occur even within minutes after insufflation of the cuff, and subsequent fibrotic changes within the following 3–6 weeks. Although the use of large-volume, low-pressure cuffs markedly reduces the occurrence of cuff injury, glottic stenosis continues to occur at a high frequency, with the incidence of post-intubation tracheal stenosis in intensive care units being 6–21 %, although only 1–2 % of patients are symptomatic or have severe stenosis.[7]

The diagnosis of laryngo-tracheal stenosis is often missed, and the related symptoms are generally evident only when stenosis of 30 % of the original diameter of the trachea has occurred. Sometimes, the diagnosis may be delayed for as long as three months after the intubation.[8] Several risk factors of post-intubation stenosis have been recognized thus far, including the size of the endotracheal tube relative to the tracheal lumen, frequent replacement of the endotracheal tube, traumatic intubation, concurrent infection, blood pressure during the intubation period, female gender, estrogen effect, steroid administration, obesity, smoking history, etc. [9,10]

Intubation needed during treatment is the most likely cause of stenosis in the three cases. Development of stenosis following intubation has been reported to occur even with two days of intubation.[11] A period up to two weeks in adults and even longer in children is generally consider safe.

In the above 5 cases patients were asymptomatic after discharge from their primary care and started showing symptoms of stenosis within 1 month.

The factors that are related to development of stenosis with shorter duration of intubations are large size of the tube, high pressure in cuff, not deflating cuff periodically, struggling or restless patient, traumatic intubation, multiple intubation, infection around the cuff site.[11-13] All these factors may play a role in development of stenosis.

The assessment of the degree of stenosis is an important step for each patient. Although several grading systems have been proposed, the universally accepted grading of subglottic stenosis was devised by Myer et al in 1994.Grade 1:<50% obstruction; Grade 2: 51–70% obstruction; Grade 3: 71–99% obstruction; Grade 4: no detectable lumen.[14]

Galluccio et al proposed classifying subglottic stenosis as either simple or complex.[15] They defined simple stenosis as lesions <1cm in length with no associated tracheomalacia or loss of cartilaginous support. Complex lesions were >1cm and had the greatest benefit from surgical intervention. This is significant for our study as our patients had complex lesions.

Complications of open surgical end to end anastomosis include restenosis, dehiscence, granulation, dysphagia and RLN damage.

Granulation tissue formation occurs in proportion to the traction at the anastomosis site, choosing an appropriate type of suture is important we preferred polypropylene. Suture tension should be appropriate and the suture knot should be formed outside the trachea to prevent formation of granulation tissue. Behrend and Klempnauer used three types of suture material (polypropylene, polydioxanone and polyglactin) in tracheal surgery in sheep.[16] The results were similar in all three groups but it was noted that the suture material should be of high tensile strength and should not be absorbed in under six months. The authors concluded that the technical details (especially tension) are more important than the choice of suture material for postoperative results.

In case 1, the patient had previous history 4 endoscopic dilations followed by stenting and case 2 underwent dilation prior to LASER excision, both patients were not relieved of their complaints.In case 4 patient had undergone plain flexible bronchoscopy with dilation there was no evidence of recurrence post operatively. Dilation is achieved with lubricated bougies of increasing diameter applying radial pressure circumferentially to the narrowed airway. Balloon dilation is an alternative method. Flexible then rigid bronchoscope can also be

used to perform blunt dissection and dilation of stenosed areas under direct vision.

For all dilating techniques, it is important that the path of the true airway lumen is identified.[17] Preoperative imaging is useful for defining patient anatomy. With the associated risk of perforation and the high chance of recurrence of stenosis, one can see that dilation alone is very rarely a definitive therapy (especially in complex, high grade stenosis) and patients will ultimately need surgical intervention.

There is a paper published in 2014 by Ortiz et al, who treated 18 children with repeated endoscopic tracheal dilation.[18] There was no recurrence of stenosis in any of the patients (median follow-up duration: 36 months, range: 5–72 months). However, this finding may not be replicable in the adults. Children have more favourable results with tracheal dilation as their inflammatory response is less pronounced and there is therefore less fibrous tissue formation, meaning they have a lower risk of restenosis. Ortiz et al applied mitomycin C as an antifibroblast agent to reduce the chance of recurrence.[18] In case 5 Mitomycin C was applied post LASER excision and balloon dilation. There was no evidence of recurrence after 6 month follow up.

There is a lot of literature supporting the use of stents in treating benign and malignant laryngeal stenosis. Dass et al.[19] conducted a study between the year 2000–2010, where out of 111 patients with laryngotracheal trauma, 71 underwent tracheal T-stenting for laryngotracheal stenosis. It was concluded that the ideal treatment option should be individualized based on patient characteristics. Stenting remained a relatively conservative treatment, was successful in a proportion of cases, and does not preclude the possibility of future reconstructive surgery if it fails.In case 1 our patient who subsequently underwent open resection and anastomosis of the stenotic segment had history of stenting after multiple failed dilations which provided him with little improvement. In case 2 patient who underwent laser assisted resection was discharged with a stent there was no evidence of recurrence.

Another method of treatment for postintubation laryngo-tracheal stenosis is Neodymium-doped yttrium aluminium garnet laser and cryotherapy. They have not been reported as being used in the treatment of postintubation laryngeal stenosis except in very small series or case reports with no long-term follow-up review.

In two of our cases (case 2 and 3), CO_2 diode LASER was used for excision of the subglottic stenosis. In one of our cases (case 5) Holmium LASER was used for subglottic stenosis excision. In all the three cases of LASER there was improvement in airway and no evidence of stridor post operatively.

It is seen that open surgical procedures involved certain potential risks not associated with endoscopic techniques including increased anaesthesia time, lengthy hospitalization. Because of these reasons there has been a general tendency to treat laryngo-tracheal stenosis with endoscopic techniques. Addition of LASER has offered new dimension in improving the conventional endoscopic technique in the management of laryngotracheal stenosis. Use of LASER coupled to a rigid/flexible bronchoscope and ventilating bronchoscope allowed the surgeon to perform hands off endoscopic surgery such as scar excision or vaporization with increased precision. In our three cases treated by endoscopic laser, the patient could be decannulated after the procedure giving a fairly good success rate. Simpson et al[20] successfully treated 1 of 5 (20%) patients having combined laryngeal and tracheal stenosis with endoscopic laser excision. Minimal pain, low levels of intraoperative and postoperative oedema, faster healing with less scar and improved hemostasis are advantages of laser use.

There is much evidence in the literature suggesting that for the treatment of subglottic stenosis, resection by endoscopy with laser and open surgical technique end to end anastomosis are the best available modality with regard to long-term results.[21-24]

Our study supports this theory to perform resection for stenosis by end to end anastomosis or endoscopy with laser on patients who have had previous interventions.

Conclusion

Endotracheal intubation is lifesaving when there is a need for artificial ventilation, but it isn't without

risk. Development of tracheal stenosis, that too of higher grade, is one of the most dreaded complication. However, such conditions can be managed with high degree of success.

Resection and primary anastomosis and LASER assisted excision of stenotic portion is a safe option for the treatment of subglottic stenosis following intubation in grade 3 or 4 stenosis without the need for repeated dilation. Collaboration is needed between thoracic and ENT surgeons to develop protocols for management of postintubation laryngo-tracheal stenosis as patients may present to both specialties.

Improved hemostasis, lesser pain, lesser postoperative oedema, faster healing with less scar are advantages of LASER, thus making it a safe option in management of tracheal stenosis.

Given the high rates of recurrence, we cannot see a role for dilation alone in centres where specialised tracheal surgeons are available. Endoscopic dilation can be reserved for unfit patients or as a measure in non-equipped centres.

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Case Report

Aberrant Thyroid in the Parapharyngeal Space

Sharanabasappa Rudragouda Malipatil,[1] Ciju K George,[2] Isha Vidisha,[3] Ravindrakumar Ningappa Karadi[1]

ABSTRACT

Introduction:

Aberrant thyroid is a mass of tissue having the structure of a normal or pathological thyroid gland and situated at some definite distance from normal thyroid, with which it has no connection. The prevalance of ectopic thyroid is 1 case per 100,000- 300,000 persons1 and the incidence of aberrant thyroid in parapharyngeal space is even rarer.

Materials and Methods

A rare case of aberrant thyroid in parapharyngeal space is reported, which presented as oropharyngeal mass and dysphagia. She also had thyroid gland in the usual position.

Result

She was managed surgically with transcervical approach and was euthyroid postoperatively.

Conclusion

Aberrant thyroid should be one of the differential diagnoses for parapharyngeal space masses.

Keywords:

Thyroid Dysgenesis; Neck

Parapharyngeal space is a potential space and the lesions here usually arise from anatomical structures within. The pre-styloidspace lesions frequently arise from salivary gland and almost always arise from the deep lobe of parotid.

The post-styloid space lesions are commonly neurogenic in origin and the most common ones are paraganglioma, schwannoma and neurofibroma. Aberrant means "wandering," and thyroid tissue anywherein the body outside the thyroid gland can becalled aberrant. We present an unusual case of parapharyngeal lesion, i.e. an aberrant thyroid in the presence of a normal functioning thyroid gland, which is extremely rare.

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Case report

A 35-year-old female presented with a slowly progressive, painless swelling in the oropharynx since two years. There was associated bilateral nasal obstruction, more in the right side and dysphagia since last one year. There was no history of heat intolerance, palpitations, excessive sweating or anxiety. There was no family history of thyroid disorders or malignancies. On examination, she was comfortable, and no stridor was observed. There was a firm, non tendermass in the oropharynx pushing the right tonsil medially and extending into posterior pharyngeal wall (Fig. 1). There was no obvious swelling in the neck.

Blood investigations, which included a full blood count, renalprofile and random blood glucose, were normal.Magnetic resonance (MR) imaging of the neck and thoraxshowed a heterogenous mass with few cystic areas, fat components and calcifications involving the right parapharyngeal space. The mass measured 50 x 30 x 75 mm extending from clivus to C5 vertebral body, obliterating the nasopharynx and extending upto the the oropharynx (Fig. 2). The leftparapharyngeal space was clear. It also showed thyroid in the normal site with few

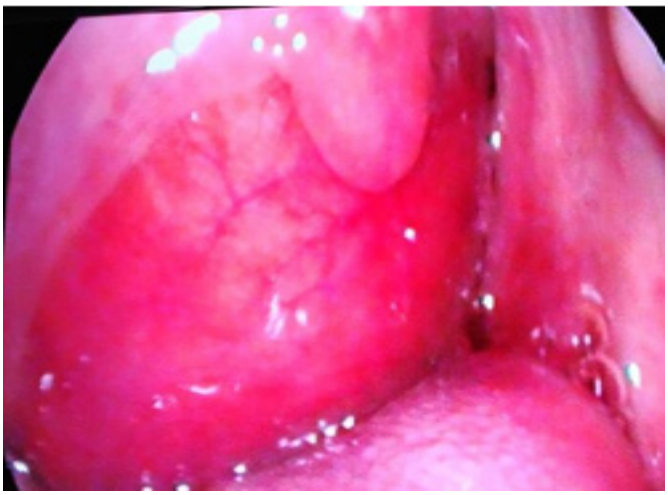

Fig 1.Right parapharyngeal mass causing bulge in the oropharynx

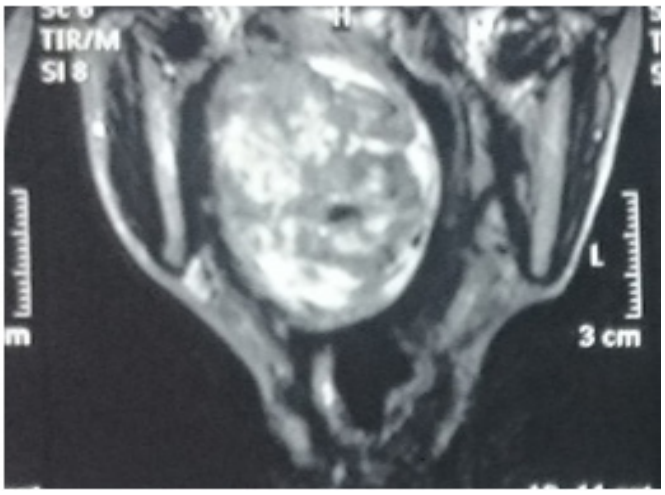

Fig 2. MRI showing right parapharyngeal mass

specks of coarse calcification and few hypodense areas. Following admission, fine-needle aspiration cytology was performed. Histology showed mainly thyroid follicular cells arranged in mononuclear sheets, clusters and in follicles with background of hemosiderin laded macrophages. The thyroid function test performed preoperatively was within normal range.

A transcervical excision of the tumourwas performed to remove the tumour in toto from the right parapharyngeal space (Fig. 3). Jugulo-digastric lymph node was sampled. Histologicaldiagnosis of the tumour mass showed normal thyroid follicles lined by cuboidal epithelium and filled with colloid. There was no evidence of malignancy. The enlarged lymph nodesshowed reactive lymphadenitis. Postoperativethyroid function, after one week of surgery was within normal limits.

Discussion

Thyroid follicular cells are derived from both a median thyroid and a lateral thyroid bud. These lateral thyroid anlagens are derived from the ultimo-branchial body, a descending diverticulum of the fourth pharyngeal pouch.[1] Aberrant thyroid tissues found in the lateral

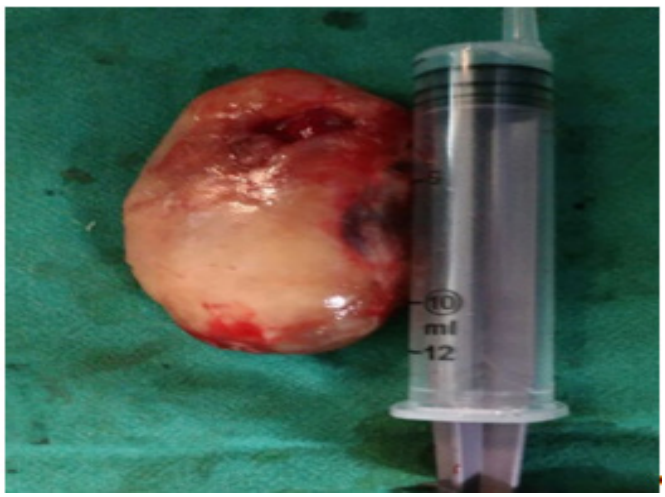

Fig. 3.Surgical specimen of the parapharyngeal mass

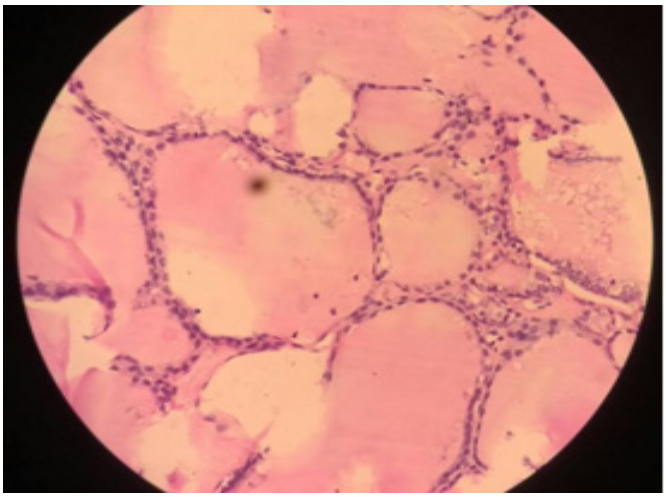

Fig. 4. Thyroid follicles filled with colloid (H&E, 40x)

neck regions could originate from defective lateral thyroid components, which fail to migrate and fuse with the median thyroid anlage.[2] This failure could lead to the ectopia of the lateral anlage in such unusual sites like parapharyngeal space. The existence of the lateral thyroid anlagen has been a topic of controversy, but its existence may explain the occurrence of non-midline ectopic thyroid tissue in the neck.[3] Many researchers have described that gene of transcription factorsTITF-1(Nkx2-1), Foxe1(TITF-2) and PAX-8 are essential for thyroid morphogenesis and differentiation.[4,5] Mutation in these genes may be involved in abnormal migration of thet hyroid resulting in ectopic and aberrant thyroid.[5]

These lateral aberrant groups of cells which fail to meet the thyroid proper later become activated and may give rise to tumours. Seventy percent of these aberrant thyroids give rise to neoplasms of papillary type. The other lesions are papillary adenocarciinoma, epithelioma, and alveolar carcinoma. The tumor is usually slow-growing and subject to involutional changes such as cystic degeneration hemorrhage and calcification. A well-defined capsule is usually present. They may undergo malignant changes and give rise to metastases.[6] Such cases of lateral aberrant thyroid malignancies were previously reported by Johnson and Saha.[7] To our knowledge, we are aware of only four published reports of ectopic thyroid inthe pharynx.[8-11]

This patient had an ectopic parapharyngeal thyroid gland in the presence of a normal functioning thyroid. Her main presenting complaint had been a mass in the oropharynx, which was slowly increasing in size over two years. She also developed bilateral nasal obstruction and dysphagia since one year. Following complete excision, no further intervention was planned as the tumour was proved to be benign thyroid tissue by histopathological examination and she was euthyroid on subsequent thyroid function tests. It is important to exclude malignancy because a differential diagnosis of lateral aberrant thyroid is metastasis from a primary thyroid carcinoma.[12] The treatment of ectopic thyroid depends on its location, size and on the presence of symptoms or complications. For a nonfunctioning ectopic thyroid in the presence of a normal thyroid gland, the indication for surgery depends on the patient's symptoms. Surgical excision was warranted in this patientas the mass effect by the tumour caused nasal obstruction and dysphagia. The transcervical approach to the tumour in this case allowed the surgeona wider access to post styloid compartment of parapharyngeal region for complete excision of the tumour mass. The surgical team was ready for an extended transmandibular approach if needed. Postoperatively, the histopathology reported no evidence of malignancy and the patientwas biochemically euthyroid, thus rendering no further intervension. Thus, an aberrant thyroid should be considered in the differential diagnoses of parapharyngeal neoplasm.

Conclusion

Aberrant thyroid in the parapharyngeal space is a rare disease. Although the cause is not fully known, genetic factors is thought to play an important role in such cases. The majority are asymptomatic; however, symptoms related to tumor size and location may develop. MRI imaging, Fine Needle Aspiration cytology and thyroid function tests are the main diagnostic tools. Surgical excision is the treatment of choice in symptomatic cases, with a role for radioiodine ablation only in recurrent disease. The clinician should always take into account the potential of this rare entity while dealing with parapharyngeal masses.

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Case Report

Near Complete Laryngopharyngeal Obstruction due to Vegetable Foreign Body in an Infant

Rahul Gupta,[1] Ashok Gupta[2]

ABSTRACT

Introduction:
Impaction of foreign bodies and obstruction in the upper aero-digestive tract is a medical emergency.

Case Report
A 5-month-old male infant presented with impacted large vegetable foreign body lying in the hypopharynx of an infant causing almost complete laryngeal obstruction. Cardiopulmonary resuscitation was initiated and back blows were given between the blades of the scapula to assist in its removal. Only available curved artery forceps was gently passed beyond the foreign body; blades of the forceps were opened to engage it and foreign body was swept and rolled out. Patient was revived after intensive resuscitation.

Conclusion
Suspect foreign body in the upper aero-digestive tract in any child presenting with severe respiratory distress or apneic spells or choking. Foreign body may be removed with only available curved artery forceps by gently passing beyond it, followed by opening and engaging blades of the forceps to sweep and roll it out of the upper aero-digestive tract.

Keywords:
Foreign Bodies; Infant; Hypopharynx; Vegetables; Emergencies

Impaction of ingested foreign bodies in the upper aero-digestive tract is not a rare paediatric emergency.[1] Most of the foreign bodies in the paediatric patients present between 1-3 years age group.[1] Complete or near complete laryngeal obstruction is rarely observed and is associated with high percentage of mortality in children.[2,3] We report a rare case of an impacted large vegetable foreign body lying in the hypopharynx of an infant causing almost complete laryngeal obstruction, which was managed successfully.

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Case Report

A 5-month-old male infant presented to the paediatric emergency in an unconscious state with respiratory distress and cyanotic episode. No specific history was available. On examination, patient was unconscious, there was severe respiratory distress, central cyanosis, chest indrawing, pooling of saliva in the mouth, feeble pulse, marked tachycardia and absent air entry on chest auscultation. An urgent direct laryngoscopy was performed in the emergency room to rule out airway obstruction, which revealed a large vegetable foreign body lying in the laryngeal vestibule causing almost complete laryngeal obstruction (Fig.1).

A long curved artery forceps was available in the emergency trolley; it was negotiated beyond the foreign body and an attempt was made to remove it. As the foreign body looked spherical and was impacted in the hypopharynx, attempt failed. Emergency OT was informed for emergency tracheotomy, but, within few seconds patient became apneic with bradycardia.

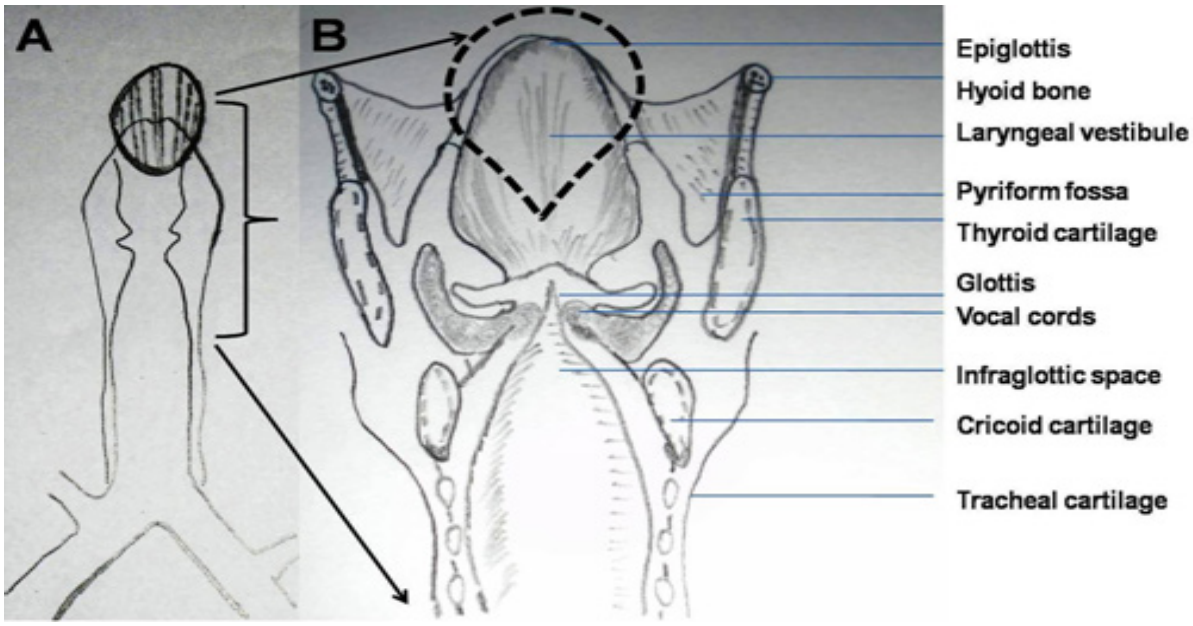

Fig.1: Diagrammatic representation showing oval vegetable foreign body (Kachri) impacted in the laryngeal vestibule causing near complete hypopharyngeal obstruction.

Cardiopulmonary resuscitation (CPR) was initiated; back blows were given between the blades of the scapula, both in prone (Fig.2) and upside down position to assist in its removal.

A final attempt was made to remove it with same artery forceps, before performing an emergency tracheotomy. The artery forceps was again gently passed beyond the foreign body; blades of the forceps were opened to engage it and foreign body was swept and rolled out of the laryngeal vestibule and finally removed. Inspection revealed average sized vegetable (Kachri) foreign body (Fig.3). Patient was intubated with endotracheal tube no.3.5, CPR was reinitiated and patient was revived with advanced cardiac life support system. Ventilatory support was initiated and patient was shifted to ICU for critical care. The patient was gradually weaned from the ventilatory support. Radiographs were performed followed by Computed Tomography (CT) of the chest to rule out any pneumothorax, aspiration pneumonitis and to detect any residual foreign body. Bronchoscopy was done to recheck presence of any residual foreign body. The patient was started on breast feeds, observed for 2 days and was discharged. He is doing well on follow-up. On further enquiring, mother revealed that patients elder sister was playing with the vegetable and during fun activity, unknowingly she put it in patient's mouth.

Discussion

Impaction of foreign bodies in the upper aero-digestive tract and airway obstruction is a medical emergency requiring urgent intervention to save the patient's life.[1-3] Children between the age groups of 1-3 years are most susceptible,[1] while it is rare in infants below 6 months of age group.[1-4] Choking is commonly seen in young children below 5 years of age because their swallow functions are inadequate, usually putting things in their mouth to recognize them, inability to appreciate the size of a piece of food, small airways, inadequate dentition for chewing and weaker cough reflex.[1-4]

Foreign bodies of vegetable origin in the upper aero-digestive tract and laryngo-tracheobronchial tree are common in children less than 4 years of age. The most common vegetable foreign bodies among the paediatric patients being peanut, and its shell, or bits of peanut), seeds and fruits.[1] Other commonly seen are coins, toy parts, stones, bones, screws, button batteries and nails.[1-4] In the present case the foreign body was

Fig.2. Diagrammatic representation showing right method of performing back blow maneuvers with heel of the hands between the shoulder blades in a conscious infant, who is being held prone on rescuer's forearm with head down and jaw tightly supported by hand.

Fig.3. Kachri (vegetable foreign body) which was removed successfully from the hypopharynx.

Cucumis Callosus or Cucumis melo sp agrestis. It is a fruit, ovoid in shape, found in Rajasthan and western India and commonly known as Kachri or Kaachri. It is a wild variety of cucumbers and looks like miniature watermelon. It has numerous seeds and little flesh inside. Other names are wild melon, wild musk melon, and small gourd. It is rarely seen in other parts of India. It was large (4cms) for the size of the infant (5months) and is rarely reported in the literature.

Presentation and damage incurred by the impacted foreign body varies according to its site, size, shape and consistency.[5] Prior surgery for esophageal atresia, anastomotic stricture, esophageal stenosis are important considerations. Preceding history of playing with small items just before the onset of symptoms may or may not be available.[3-4] In our case, the baby was brought by a passerby who saw the mother of the child weeping for his baby, as he was having severe breathing difficulty.

Paediatric patients especially infants may present with inability to breathe, respiratory distress, choking, cyanosis and stridor. Older children may complain of coughing, hemoptysis, intractable asthma, change in voice quality, inability to speak, neck pain and swallowing problems.[5-6] In our case the patient was unconscious with severe respiratory distress, cyanosis and apneic spells. A high degree of suspicion and evaluation is required even if there is a single clue pointing towards foreign body aspiration. Usually, history of aspiration, clinical examination and plain radiogram (lateral and antero-posterior) of neck and chest is diagnostic.

Complete blockage of the airway is not required as sudden death due to laryngeal spasm can occur by small object with partial obstruction.[7] Urgent respiratory resuscitation and treatment is required in case of

complete airway obstruction to prevent anoxic cerebral injury and unfavourable outcome.[1-7] Initial management in a conscious infant with choking consists of back blows and chest thrusts.[8] The infant is held prone on rescuer's forearm with head down and jaw, head tightly supported by hand. Five back blows with heel of the hands between the shoulder blades are given (Fig.2), followed by five chest thrusts in supine position.[8] While in older children five back blows with five abdominal thrusts are given, but, abdominal thrusts are contraindicated in infants. The sequence is repeated until obstruction is relieved or patient becomes unconscious.[8] This maneuver alone may lead to expulsion of the foreign body.[2] We believe that in our case, back blows maneuver partly dislodged the impacted foreign body in the hypopharynx, which led to its removal using artery forceps.

In an unconscious child with choking, mouth is opened and attempt should be made to remove it. Removal with the help of curved laryngeal forceps/Magill forceps is recommended. This is known as Magill forceps technique. Its use has been associated with the improved outcome in emergency management of life threatening hypopharyngeal obstruction.[9] Blind finger sweep should not be performed in a conscious patient; finger sweep should only be performed for foreign bodies that can be seen and in an unconscious patient.[3] CPR should start if unsuccessful.[8] In our case, direct laryngoscopy was performed and removal was performed with help of available curved artery forceps. Emergency tracheotomy is required when there is failure of successful removal in case of large foreign bodies with completely blocked airway.[1] For the foreign bodies below the level of vocal cord, pushing the foreign body into the right main bronchus and restoring the ventilation by the left lung has been mentioned.[10]

Most of time, impacted foreign bodies in the upper airway are relatively small and patient is hemodynamically stable. These are routinely removed by direct endoscopy (Macintosh laryngoscope) using Magill forceps technique or rigid bronchoscope (instrument of choice) under general anesthesia.[1,4,5,10] Some centers perform indirect fiber-optic bronchoscopy with adequate local anesthesia.[4]

Chest radiographs and computed tomography should be done to detect foreign body and rule out presence of secondary complications like pneumonia, mediastinitis, empyema, obstructive emphysema, obstructive atelectasis, pneumothorax and mediastinal emphysema.[1] These complications are seen with incomplete obstruction. Missed pneumothorax has been reported to cause mortality in one study.[1] Airway obstruction results in high alveolar pressure and rupture followed by interstitial, mediastinal and subcutaneous emphysema.[1]

ICU care is mandatory to treat chemical pneumonia especially in vegetable foreign bodies due to presence of its fat content.[1] Antibiotics and chest physiotherapy are given to prevent infection and removal of secretions respectively. In our case, after successful removal proper evaluation was done by performing check bronchoscopy and CT to rule out residual foreign (may be multiple) body. Educating parents about the possible objects which lead to such catastrophic event and minimizing the complications by mass education for management of choking due to foreign body in the upper aero-digestive tract is very important.

Conclusion

Clinicians should suspect foreign body in the upper aero-digestive tract in any child presenting with severe respiratory distress or apneic spells or choking and carrying urgent intervention for favorable outcome. Initial management in a conscious infant with choking consists of back blows and chest thrusts. Abdominal thrusts are contraindicated in infants. In case of extreme emergency, foreign body may be removed with only available curved artery forceps by gently passing beyond it, followed by opening and engaging blades of the forceps to sweep and roll it out of the upper aero-digestive tract.

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A Peripheral Primitive Neuro-ectodermal Tumor (pPNET) of Larynx

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ABSTRACT

Introduction

Primitive neuroectodermal tumors (PNETs) are malignant tumors comprised of small round cells of neuro-ectodermal origin that affect soft tissue and bone. Though the occurrence of pPNETs in the head and neck region is rare, these are aggressive malignant tumors, and long-term survival rates following diagnosis remain poor.

Case Report

In the present case, a tumour was located in larynx (as globular/cystic mass of epiglottis) of the patient and was diagnosed as pPNET. Immunohistochemical analysis indicated that tumor cells were positive for CD99 and NSE, focally positive for EMA but negative for synaptophysin and chromogranin. The mass was surgically excised with negative margins. In post op period patient was planned for post-op chemotherapy and radiotherapy.

Conclusion

pPNETs are very rare in head and neck region. Significant advances in the neoadjuvant and adjuvant chemotherapeutic regimens, as well as improved facility in diagnosing these tumors through cytogenetic and immunohistochemical analysis improves the long-term disease-free survival.

Keywords

Neuroectodermal Tumors, Primitive, Peripheral; Epiglottis

Primitive neuro-ectodermal tumors (PNETs) are malignant tumors comprised of small round cells of neuro-ectodermal origin that affect soft tissue and bone.PNET mainly occurs in the brain, extremities, pelvis, and the chest wall.Approximately, 9% arise in the upper aero-digestive tract or head and neck region, making it the third most common anatomic site, after the extremities and the thoracic/abdominal region.[1]

Here, we present a case study of PNET originating from larynx in a 11 year old girl.

Case Report

A 11 year old girl presented with a progressively increasing difficulty in swallowing with a mild change in voice. There was no associated complaint of difficulty in breathing. On clinical examination a smooth globular mass was coming out behind the base of tongue (Fig.1). Indirect laryngoscopy was not possible due to large size of mass. CECT scan of neck showed a moderately large mass measuring approximately 2.5 x 4.5 cm at level of hyoid bone, not involving the bone, highly suggestive of neoplastic process (Fig. 2). Magnetic resonance imaging neck showed altered signal intensity mass arising from lingual surface of epiglottis, filling vallecula more on left side. Excision of the mass was planned. Findings were confirmed on operating table before excision. The mass was excised from lingual surface of epiglottis by blunt dissection (Figs. 3,4,5,6) and sent for histo-pathological examination. HPE revealed a tumor composed of small cells having round nuclei. Immuno-histochemistry gave a diagnosis of PNET. The tumor was strongly positive for CD99, NSE, and focally positive for EMA(epithelial membrane antigen). It was negative for chromogranin, synaptophysin, cytokeratin (CK). Immunohistochemistry

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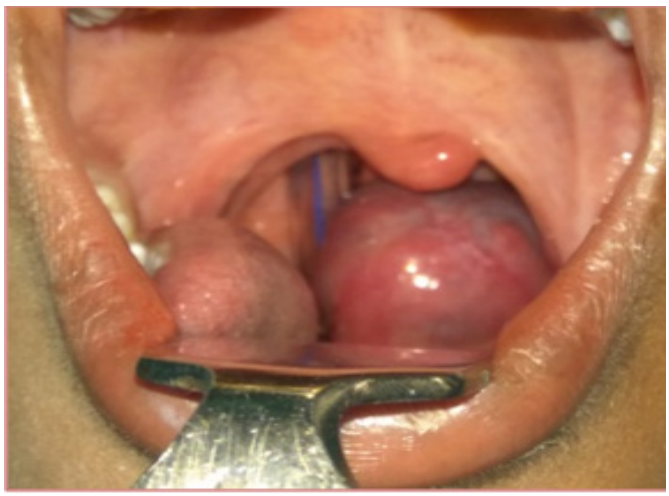

Fig 1. Showing globular mass coming from behind the base of tongue

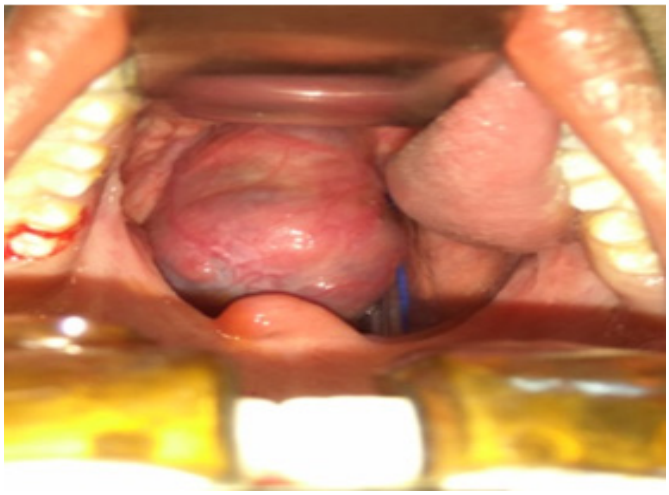

Fig 3. Intra-op photograph showing globular mass after applying Boyle Davis mouth gag.

ruled out small round cell tumor differential diagnoses of rhabdomyosarcoma (desmin negative), small cell carcinoma (CK, synaptophysin and chromogranin negative), basaloid squamous cell carcinoma (CK and p63 negative) and extramedullary round cell tumor (MPO and CD34 negative). Patient was screened for bone, abdomen and pelvic metastasis, was found free of any metastasis. Postoperatively, Patient was planned to give three cycles of chemotherapy comprising of ifosfamide, etoposide and mesna, along with granulocyte colony stimulating factor, with 21 days interval. But patient was lost in the follow up.

Discussion

Primitive neuro-ectodermal tumors are a group of highly malignant tumors composed of small round cells of neuro-ectodermal origin, Primitive neuro-ectodermal tumor family of tumors have been classified into the following three groups based on the tissue of origin.[2]

1. Central nervous system (CNS) PNETs — Tumors derived from the CNS.
2. Neuroblastoma — Tumors derived from the autonomic nervous system.
3. pPNETs — Tumors derived from tissues outside the

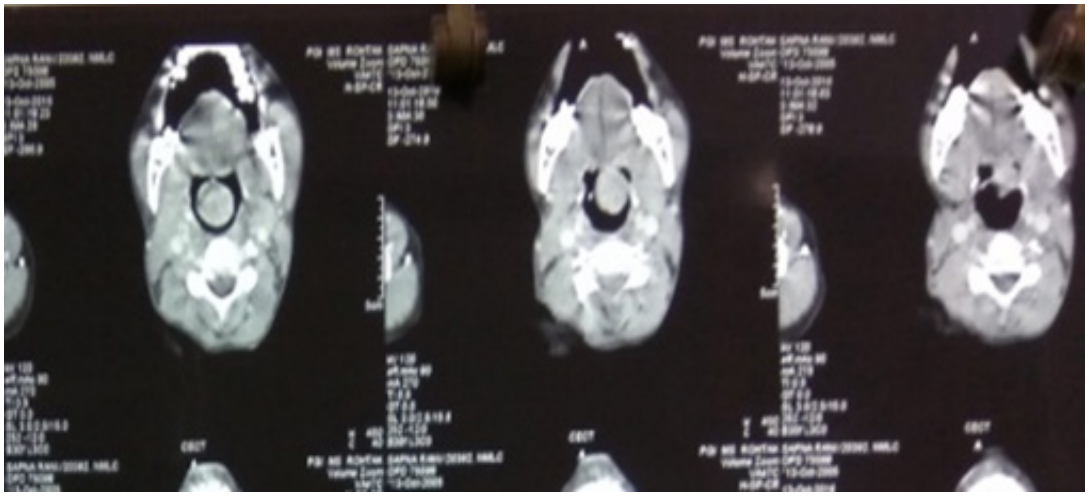

Fig. 2.CECT Scan of neck showing a mass

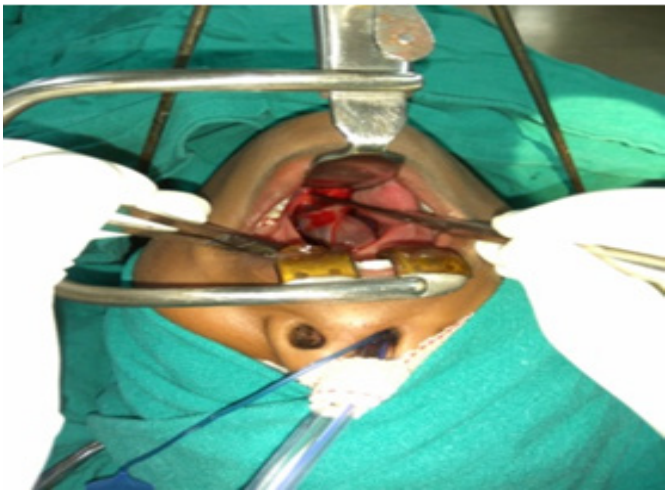

Fig 4. Intra-op photograph showing base of mass while doing blunt dissection.

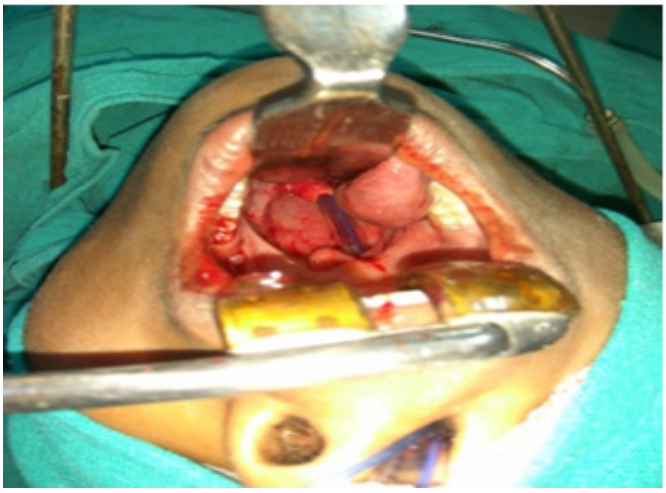

Fig 5. Intra-op photograph showing tip and lingual surface of epiglottis after complete excision of mass.

central and autonomic nervous system. pPNETs are also classified as part of the Ewing family of tumors (EFTs). Primitive neuro-ectodermal tumors and EFTs are referred as synonyms in the literature. Ewing sarcoma, however, is more common in bone, while PNETs are more common in soft tissues.

Immuno-histochemical and cytogenetic studies suggest that all these tumors have a common origin. First described PNETs in 1918, these tumors were earlier thought to arise directly from nerves.[3] Based on molecular cytogenetic analysis, both Ewing's sarcoma and PNETs are known to share the same reciprocal translocations, most commonly between chromosomes 11 and 22. PNETs often exhibit aggressive clinical behavior, with worse outcomes than other small round cell tumors.

Most pPNETs manifest in the thoracopulmonary region (Askin tumor), pelvis, abdomen, and extremities.[4] Rud et al . in a large series of 42 cases of extraosseous Ewing's sarcoma reported few cases in head and neck region.[3] In a series of 26 cases, Jones and McGill reported 11 of 26 patients with disease in the head and neck.

Of the published cases involving the head and neck, the sites of presentation are diverse, including, but not limited to, the paranasal sinuses, jugular foramen, oral cavity, nasal cavity, neck, skull, lingual nerve, parotid gland, larynx, retropharyngeal space, masseter, temporal area, pterygomaxillary space, and orbit. Significant advances in the neoadjuvant and adjuvant chemotherapeutic regimens, as well as improved facility in diagnosing these tumors through cytogenetic and immuno-histochemical analysis, should improve long-term disease-free survival.[4]

Conclusion

Peripheral primitive neuro-ectodermal tumor is an aggressive malignant small round cell tumor that very rarely present in the head and neck, hence timely

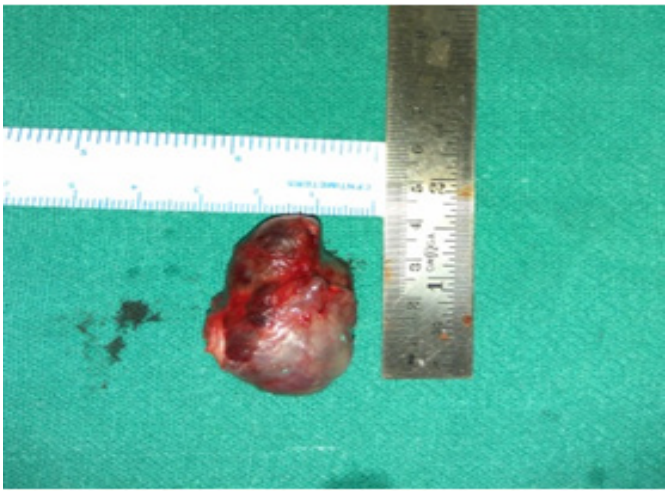

Fig 6. Showing the excised mass.

diagnosis, and treatment is a professional challenge. Long-term survival for patients with PNET is still poor. However, significant advances in the neoadjuvant and adjuvant chemotherapeutic regimens combined with aggressive surgical control of primary disease and in some cases, radiation therapy as well as improved facility in diagnosing these tumors through cytogenetic and immunohistochemical analysis improves the long term disease free survival.[4]

Compliance with ethical standards

FUNDING - no funding.

CONFLICT OF INTEREST - all authors declare that they have no conflict of interest.

ETHICAL APPROVAL - this case report does not contain any studies with animals performed by any of the authors.

ETHICAL APPROVAL - the present clinical report contain a study with human participant.

INFORMED CONSENT - informed consent was obtained from all individual participants included in study.

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External Laryngocoele or Anterior Jugular Vein Aneurysm (A Rare Clinical Entity): A Paradox Solved by A Few Simple Non-Invasive Radiological Tests

Somesh Mozumder,[1] Shirish Dubey,[1] Aniruddha Dam,[1] Anup Kumar Bhowmick[1]

ABSTRACT

Introduction

The differential diagnosis of a cystic upper neck mass that becomes prominent on coughing, straining, breath holding, or Valsalva manoeuvre includes mediastinal tumours and cysts, external laryngeal diverticula, and jugular venous aneurysms. Jugular venous aneurysms, while extremely rare, must be considered. We report the fifth case of anterior jugular aneurysm in an adult patient.

Case Report

A 55 year old female patient presented with a swelling in the upper part of right side of neck near the greater cornu of hyoid bone. The swelling increased with Valsalva, straining and while stooping forward. Clinically it was thought to be an external laryngocoele. However Colour Doppler Ultra-sonography and C.T angiogram of neck established it as of anterior jugular venous aneurysm by distinguishing from external laryngocoele.

Discussion

Patient presenting with unilateral cystic swelling in upper neck at upper border of thyroid cartilage which clinically bears the common provisional diagnosis of external laryngocele must be differentiated radiologically from anterior jugular venous aneurysm, (though rare in occurrence) to avoid a catastrophic incident during surgery.

Keywords

Aneurysm; Neck; Jugular Vein.

The differential diagnosis of a cystic upper neck mass that becomes prominent on coughing, straining, breath holding, or Valsalva manoeuvre includes mediastinal tumours and cysts, external laryngeal diverticula and laryngocele, and jugular venous aneurysms.[1,2,3] Primary isolated venous aneurysm involving the low pressure superior vena caval reservoir system is extremely rare, particularly in the absence of an underlying cardiovascular disease or trauma.

Anterior jugular phlebectasia or aneurysm is very rare, with only seven cases published in medical literature, out of which three were in a paediatric population.[4] We report the fifth case of anterior jugular aneurysm in an adult patient.

Recognition that jugular venous aneurysms are a differential diagnosis for neck masses, and that Anterior Jugular Venous aneurysm may occur in isolation is important to avoid diagnostic confusion.

The diagnosis is suggested by clinical features and can be confirmed by non-invasive radiology. Surgery is indicated to avoid thromboembolic manifestations and for cosmetic reasons.[5]

Case report

A 55 year old female patient from rural Bengal presented

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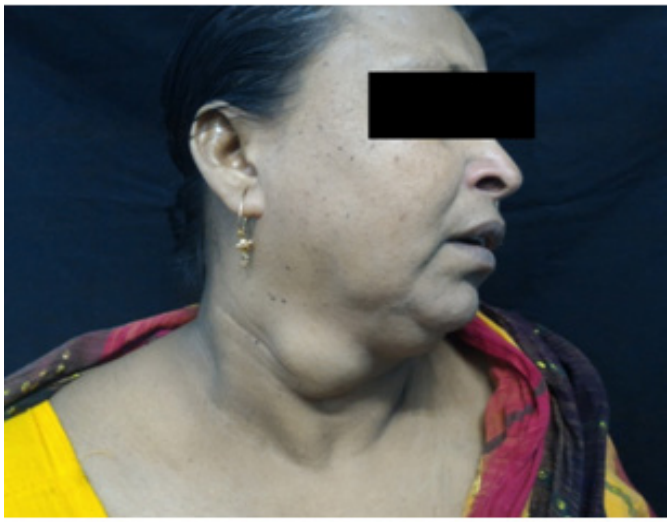

Fig.1. Clinical photograph

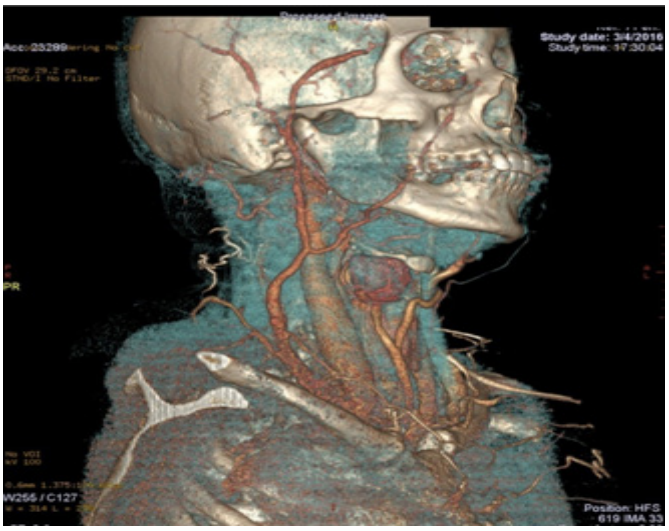

Fig.2. CT angiogram of neck showed aneurysmal swelling of right anterior jugular vein.

with a swelling in the upper part of right side of neck near the greater cornu of hyoid bone. The swelling was incidental in onset, gradually increasing in size, soft, cystic, compressible, non translucent, non fluctuant, non expansile, but grows in size with Valsalva manoeuvre, straining and while stooping forward. Patient gave a history of regular conch blowing before the onset of the swelling. Thus, clinically it was thought to be an external laryngocoele, but x-ray soft tissue neck (AP and lateral view) with and without Valsalva revealed a soft tissue swelling which is non translucent.

Colour Doppler Ultra-sonography of neck revealed the swelling was getting blood filled during Valsalva manoeuvre. CT Angiogram was carried out which showed aneurysmal swelling of right Anterior Jugular Vein without any other feeder.

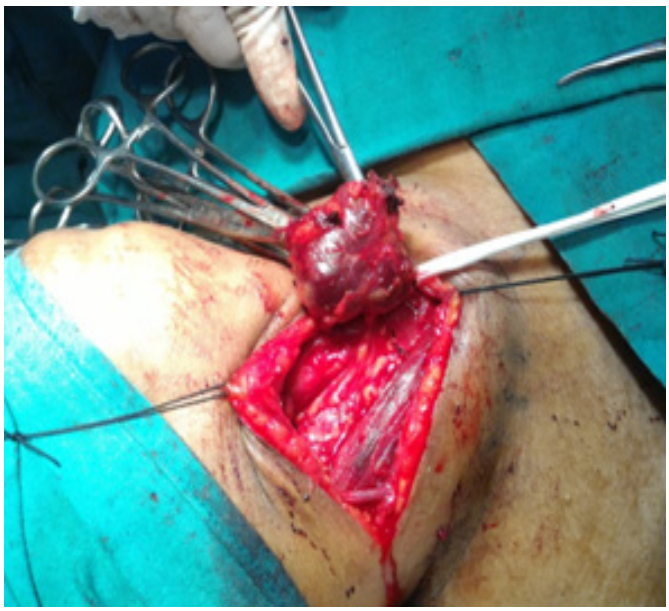

Fig.3. Aneurysm is being removed.

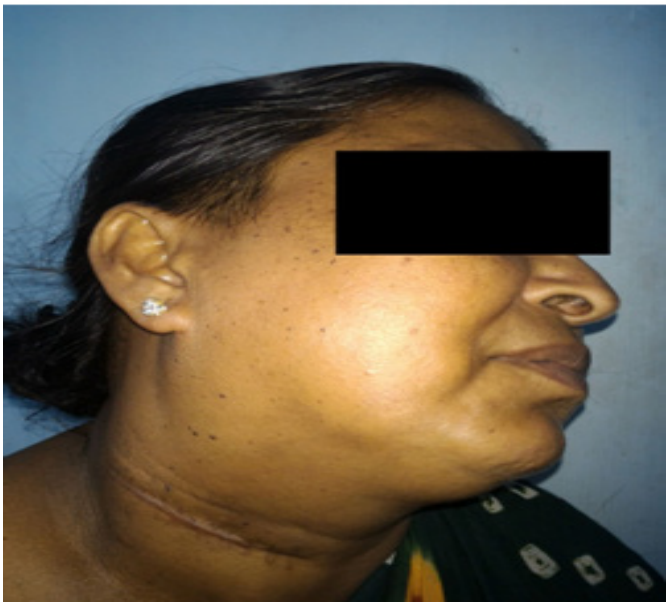

Fig.4: Post Operative photograph

Under general anaesthesia the aneurysm was removed after clamping the anterior jugular vein.

The patient was kept under regular follow up for 6 months with no signs of recurrence.

Discussion

Venous dilatation in the neck involves the internal, external and anterior jugular vein, in descending order of frequency.[6] Clinically, by a careful process of elimination, the preoperative diagnosis can often be accurately established. Aneurysm of the anterior jugular vein mostly presents as a painless swelling. Thrombosis within the aneurysm can produce pain in the swelling and symptoms secondary to pressure effect on surrounding structures.[2]

The radiological investigations may be in the form of digital soft tissue x-ray neck (AP and lateral view) with and without Valsalva, Doppler ultra-sonogram to sophisticated tools such as CT angiography, and magnetic resonance angiography.

Digital soft tissue x-ray neck (AP and lateral view) helps to differentiate between a cystic air filled sac and solid soft tissue lesion in upper neck and thus virtually eliminates the differential diagnosis of external laryngocoele.

Ultrasound with Doppler allows differentiation between cystic and solid lesions, differentiation of vascular from non-vascular lesions, identification of site of origin of the lesion, and its relationship with the surrounding structures in the neck.[7,8]

CT-angiogram is the final investigation used to delineate the type, origin of lesion and feeding vessels therefore helping to prepare the surgical plan5.

Asymptomatic aneurysms can be managed expectantly with reassurance and regular follow-up. Surgical excision is offered for either cosmetic reasons or a painful aneurysm secondary to thrombosis or phlebitis of the jugular venous system.[9] Surgical resection also eliminates the theoretical risk of aneurysmal rupture, pulmonary embolism and allows for histopathological diagnosis.[10] A symptomatic jugular venous aneurysm can be safely managed by excision and ligation.[5]

Conclusion

Patient presenting with unilateral cystic swelling in upper neck at upper border of thyroid cartilage which is non-tender, soft, and non-pulsatile and enlarges with straining, crying, sneezing, or Valsalva manoeuvre bears the provisional diagnosis of external laryngocele, but must be differentiated radiologically from anterior jugular venous aneurysm (though rare in occurrence) to avoid a catastrophic incident during surgery.

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Case Report

Nuchal Fibroma: An Uncommon Neck Mass

Soumyajit Das,[1] Subhasish Mukherjee,[2] Barun Sharma,[3] Subash Tamang[1]

ABSTRACT

Introduction:

Nuchal fibroma or collagenosis nuchae is a rare benign tumour. It is a slow growing neoplasia of unknown etiogenesis, asymptomatic and of variegated histology. They are more common in males but our case was a female patient. The presentation may mimic sarcoma at times.

Case Report

An unusual case of a very large neck mass in a 62 years old female patient is reported. The growth involved the dorso-cervical region over a period of approximately 8 years but remained asymptomatic. The mass was excised and post excision histopathology was reported as nuchal fibroma.

Discussion

The case reported is large compared to the usual size of nuchal fibroma. Association with diabetes mellitus and Gardner's syndrome has been reported in literature. MRI is the imaging of choice to establish the differential diagnosis.

Keywords:

Head and Neck Neoplasms; Fibroma; Neck

Nuchal fibroma is a rare benign entity. This was first described in 1988 by Enzinger and Weiss.[1] It consists of a subcutaneous and dermal proliferation of collagen tissue with hypocellularity, entrapped adipocytes, lack of elastin tissue with interspersed nerve fibers.[1,2] This arises mostly in the dorso-cervical area with predilection for interscapular and paraspinal regions.[1,2] The nomenclature has recently undergone a change from nuchal fibroma to nuchal type fibroma as it was observed to occur at anatomic sites other than the neck region. The age group affected generally ranges from 25 to 60 years but occurrence in younger age group is also known.[1,2] The condition has been found to be associated with Diabetes Mellitus and Gardner's syndrome.[2] Apart from the nuchal region, the other sites involved are the trunk area, forearm and the knee.[3] Till date, total excision remains the treatment.

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Case Report

A 62 year old female presented with a history of swelling in the right side of neck for the last six years. The swelling was painless and gradually progressive without any symptoms of neurological deficit. There was no history of sudden increase in size of the swelling or any respiratory or breathing difficulty. On examination a firm non-tender swelling of approximately 10cm X 8 cm was noted in the right side of neck extending from the mastoid process to the upper border of clavicle. There was no fixity to the underlying structures or the overlying skin. (Fig. 1)

Ultrasonography of the neck swelling revealed a well-defined encapsulated mass lesion with internal heterogeneous echotexture along with posterior shadowing in right posterior triangle. Contrast enhanced computed tomography (CECT) of neck swelling revealed a well-encapsulated hypodense mass lesion measuring 10.9 cm x 10.8 cm x 12.2 cm in right posterior triangle with surrounding intact fat plane, thin capsule and showing heterogeneous internal density of 20HU - 55HU

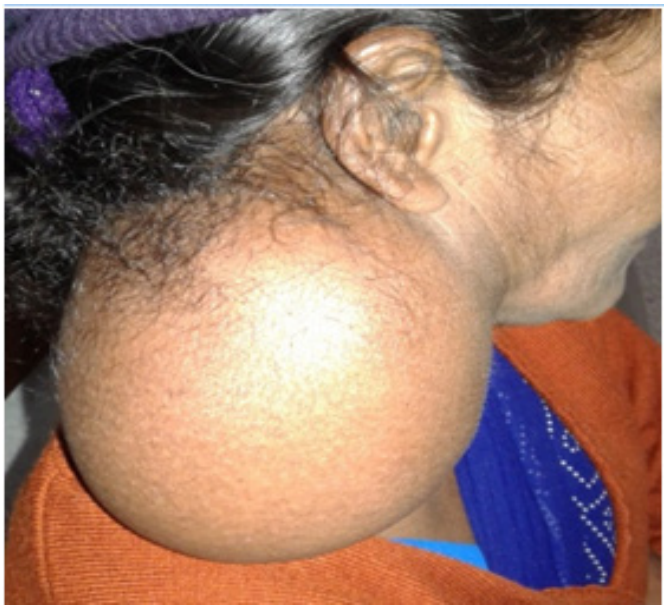

Fig. 1. Clinical photograph of the swelling in the neck

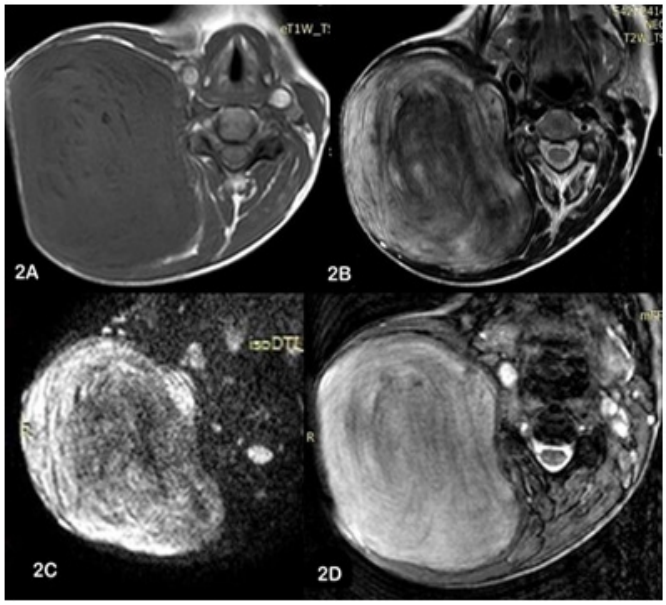

Fig. 2. Magnetic Resonance Imaging (MRI) showing heterogeneous signal intensities with whorl appearances in T1 weighted (2A) and T2 weighted (2B) images with areas of diffusion restriction (2C) without any GRE blooming (2D).

and without any significant contrast enhancement. The mass was displacing the sternocleidomastoid muscle and parotid gland anteriorly, trapezius muscle posteriorly and levator scapulae muscle medially. MRI of neck swelling revealed T1 and T2 heterogeneity with whorl appearance and predominant T1 isointensity and T2 hyperintensity along with hypointensity in between. Areas of diffusion restriction seen without any evidence of GRE blooming (Fig. 2A-D)

The mass was excised by a transverse neck incision. Intraoperatively a well defined mass was found which showed minimal adherence to the trapezius muscle in the posterior aspect of the tumor. The cut surface of the tumor was pale and firm. Microscopic features included a hypocellular stroma with bundles of collagen (Fig 3).

During the follow up visit the patient was evaluated for colonic polyposis by colonoscopy. The patient was not diabetic and there was no evidence of polyposis of the colon. Her family history was unremarkable. The clinical features were unremarkable for associated Gardner's syndrome.

Discussion

Nuchal type fibroma as described by Enzinger and Weiss in 1988 is a solitary, non encapsulated, subcutaneous swelling usually located on the back of the neck or dorsum1. They are slow growing asymptomatic tumours of unknown etiopathogenesis. It is more commonly seen in males in the age group of 25 to 60 years but the limits may stretch on either side. Mostly the size recorded till date is between 2 cm to 8 cm but in our case the tumour measured approximately 13.5 cm by 10 cm. Association with diabetes mellitus and Gardner's syndrome has been seen in many cases. However, in some cases a spectrum of lesions consisting of osteomas, various soft tissue tumours and adenomatous polypii of the colon has led to the belief that this maybe a sentinel condition for Gardners' syndrome.[4] In majority of cases nuchal type fibromas are solitary lesions but multiple tumours have also been reported.

The pathogenesis of nuchal type fibroma till date has not been established but co morbidities like diabetes mellitus and Gardner's syndrome are documented. There may be genetic predisposition specially in patients with Gardner's syndrome. Repeated trauma has recently been claimed as a possible etiopathogenetic factor.[5] The

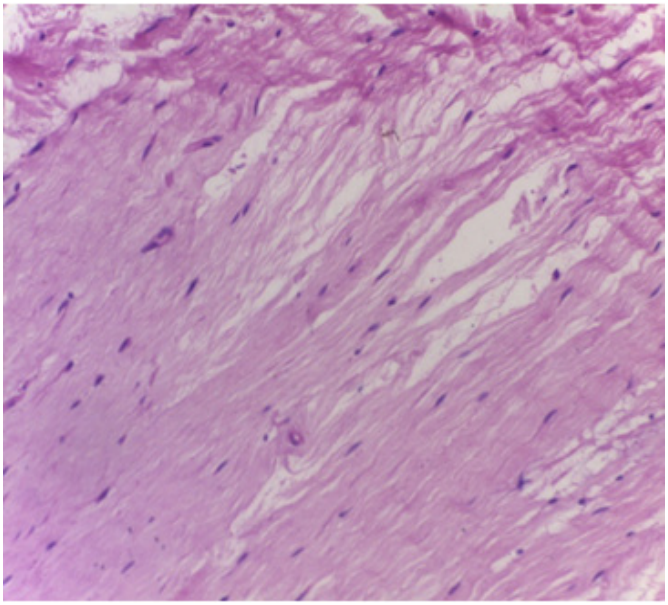

Fig. 3. Microscopic features of the tumor showing bundles of collagen tissue with hypocellular stroma (H&E, 10X)

present case did not have any other co morbidity. The macroscopic appearance of the tumor may appear tan to greyish lobulated mass and tan to white cut margins which may be irregular and mimick sarcoma.[6]

Histopathologically nuchal type fibroma consists of haphazardly arranged collagen fibers with scattered fibroblasts and entrapped adipose tissue, nerve fibers and adenexal structures.[7] Histopathologically, differential diagnosis includes fibrolipoma – an encapsulated tumour unlike nuchal type fibroma. Collagenous and desmoid fibromas are ruled out by positive CD34 expression and negative Betacatenin reaction. Dermatofibroma is differentiated as the epidermis usually has pseudoepitheliomatous hyperplasia and hypertrophied basal cell.[5]

MRI is the imaging of choice to establish the differential diagnosis. Nuchal type fibromas may appear as ill defined low signal intensity lesions in T1 and T2 weighted images.[5]

Complete excision is the treatment of choice. This tumor has a tendency to recur.[2] In the present case there was no recurrence at six month follow up.

Conclusion

Nuchal type fibroma of the cervical region are rare benign tumors and should be considered in the differential diagnosis of neck swellings. These tumors can cause symptoms due to the mechanical effect of enlarging size and at time may be associated with Gardner's syndrome and diabetes mellitus.

Acknowledgement

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