**Original article:**

**Usefulness of rigid nasal endoscope for the complete disease removal in performing Tympanomastoid surgeries**

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**Abstract:**

**Introduction:** Management of squamosal type of chronic otitis media has been a challenging task in otology as the chance of residual disease and morbidity associated with conventional post aural microscopic surgery has been high.Morbidity associated with conventional post aural microscopic surgery has been high .Endoscopic tympanoplasty has been in practice for the last several years.

**Methodology:** Our study was conducted to assess the usefulness and ease of using the rigid nasal endoscope for complete disease removal.The patients operated for COM Squamosal type at Northern Railway Central Hospital ,New Delhi (NRCH) by a single surgeon

between June 2018to may 2019 by exclusively endoscopic technique were included in this study .

**Results:** Mean age of the patients in our study was 34.0625 years.Incus and stapes were not found in 4 (25%).12.5% of patients were found to have only the incus missing while rest 12.5% had both malleus and incus absent..In 25% of patients limited attic disease was identified involving anterior and posterior epitympanum ,head of malleus and incus.25% of patients were found to have disease limited to Mesotympanum.

**Conclusion:** Our study concludes that rigid nasal endoscope can not only be used as an excellent primary tool for access to mastoid and middle ear cleft but also enables complete disease removal and functional middle ear reconstruction with less postoperative morbidity.

**Keywords:** Endoscopic ear surgery ,Mastoidectomy ,Squamosal disease.

**Introduction:**

The treatment of cholesteatoma remains a challenge for otologists. Invasive cholesteatoma can erode bone, destroy ossicles, erode the facial canal causing facial paralysis, vertigo, and total sensorineural hearing loss.Endoscopic ear surgery was first tried in the 1960s and has become popular with anatomic and physiologic concepts1. The field of Otology appears to be in an era of debate regarding the use of endoscopes for middle ear surgeries.Contemporary middle ear surgery employs operative microscopes for visualization of the tympanic cavity.While modern microscopes provide excellent views of surgical field and confer ability for binocular vision and two handed surgery,visualization of deeper recesses in the middle ear is limited.The optical properties of a microscope require an adequate amount of light to reach the surgical plane.As a result,current microscope based operative approaches frequently require soft tissue retraction and /or bony drilling to adequately visualize the targeted pathology. Advantages of endoscopic surgery over microscopic surgery are that it offers the advantage of higher magnification, precise localization of the disease, visualization of inaccessible areas (not possible with Microscopes like sinus tympani , facial recess,anterior and posterior epitympanic spaces and hypotympanum) with light delivery closer to the area of interest,better patient acceptance due to lesser pain ,lesser postoperative complications,morbidity ,absence of scar ,lesser operating time due to the reduction in time needed to gain access into the middle ear cleft and subsequent closure.Portability of endoscope is another factor that wins over the microscope.Muaaz Tarabichi 2(2000) conducted a study on long term results of endoscopic management of cholesteatoma. In this study 69 ears with primary acquired cholesteatoma were divided into two groups, Group 1 included 38 patients with endoscopically accessible disease and Group 2 included 31 patients with extensive disease within the mastoid cavity.In group 1 six ear required revision surgery, with 4 patients undergoing revision endoscopic procedures to convert into an open attic and antrum cavity and 2 patients undergoing classing canal wall down postauricular procedures.Nine ears in group 2 required office-based minor procedures.M.Badr-el-dine (2002) 3published study on 92 ears with acquired cholesteatoma operated by him and concluded that incorporation of endoscopes into the surgical armamentarium contributes much to the concept of minimally invasive surgery, the use of endoscopes did reduce the residual cholesteatoma and the endoscopes should be accepted as a new horizon in ear surgery. Our study was conducted to assess the usefulness and ease of using the rigid nasal endoscope for complete disease removal.

**AIM** - To demonstrate the usefulness and ease of using Rigid nasal endoscope for the complete disease removal in performing Tympanomastoid surgeries

**Materials and Methodology:**

The patients operated for COM Squamosal type between June 2018to may 2019 by exclusively endoscopic technique were included in this study . All the patients were operated at Northern Railway Central Hospital ,New Delhi (NRCH) by a single surgeon .Patients with Intracranial complications of Chronic otitis media ,Patients with middle ear abnormalities ,congenital and acquired and Patients operated for COM by post aural technique with microscope were excluded from the study .Pre operatively complete ear ,paranasal sinuses and systemic examination was done .Otoendoscopy and audiometric tests were done preoperatively .All routine and required pre anaesthetic investigations were conducted.

All patients were operated under General anaesthesia. 4mm wide angled 00 endoscope used in nasal surgeries was used for performing all the surgeries, Storz camera with monitor and routine micro instruments were used for ear surgeries.Sliced Tragal Cartilage and perichondrium were used as graft material in all cases .Reconstruction of hearing mechanism was done when needed. No gel foam was placed inside the middle ear .External auditory canal was filled with gel foam .The tragal incision line was sutured and a light dressing was applied. Sutures were removed on the seventh postoperative day .Oral antibiotics were continued for 3 weeks.Patients were followed up fortnightly for the first two months,then monthly for next two months and three monthly for the first year.During fortnightly follow up patients were evaluated for any ear discharge or any postoperative complications .During monthly follow up patients were evaluated for persistence of discharge /debris ,take up of graft.

**Operative technique**:

Local infiltration was given in all four quadrants of the external auditory canal and tragus .Endomeatal incision was given 5 to 6 am lateral in the posterosuperior and posteroinferior quadrants extending from 1 O'clock to 3 O'clock position.Tympanomeatal flap was elevated down to annulus exposing the middle ear.Handle of malleus identified and skeletonised .Middle ear mucosa was assessed.disease identified in the middle ear and epitympanum.Scutum drilled to visualise the aditus ,facial recess and exposed to the desired extent.Cholesteatoma,granulations ,soft tissue cleared from attic,aditus ,retro tympanum and antral region. Intermittent irrigation and drill speed of 25000Hz was used as one handed surgery was being performed.Complete disease removal was ensured and angled scope were used when needed.After disease removal thorough washing with normal saline was done.During the procedure, status of the middle ear ossicles, their continuity was assessed.The following areas were assessed and disease cleared from epitympanum, anterior and posterior isthmuses, aditus, facial recess,sinus tympani and antrum.Ossiculoplasty was done using sliced tragal cartilage of appropriate size and placed as required in each surgery .Sliced tragal cartilage was used for soft wall reconstruction.Grafting was done with thinly sliced tragal cartilage and perichondrium.Tympanomeatal flap reposited and external auditory canal filled with gel foam .Tragal incision sutured and light dressing applied.

**Observations and Results:**

Statistical analysis was done for quantitative variables like age ,incidence percentages were calculated.The study consisted of 16 patients with COM squamosal type who were operated at NRCH.Following observations were made

Table 1 : Age and Gender Distribution

|  |  |  |  |
| --- | --- | --- | --- |
| Age in years | No of cases | Females | Males |
| 11-20 | 4 (25%) | 1 (6.25%) | 3 (18.75%) |
| 21 - 30 | 3 (18.7%) | 2 (12.5%) | 1 (6.25%) |
| 31 - 40 | 3 (18.7%) | 1 (6.25%) | 2 (12.5%) |
| 41 - 50 | 4 (25%) | 3 (18.75%) | 1 (6.25%) |
| 51 - 60 | 2 (12.5%) | 2 (12.5%) | 0 |
| Total | 16 | 9 (56.25%) | 7 (37.5%) |

In our study the youngest was 16 year old and the eldest was 57 years .In our study 56.25% were females and 43.75% were males. Maximum incidence was seen in 41 - 50 year age group and 11- 20 years age group (25% each ) followed by equal incidence seen in 21- 30 and 31- 40 year age group (18.7%).Least incidence was in 51 - 60 year age group(12.5%).

Mean age is 34.0625 years.

Table 2 : Ossicular status

|  |  |
| --- | --- |
| M+I+S+ | 8 |
| M+I+S- | 4 |
| M+I-S+ | 2 |
| M-I-S+ | 2 |

50% 0f the patients in our study had all three ossicles present .Incus and stapes were not found in 4 (25%).12.5% of patients were found to have only the incus missing while rest 12.5% had both malleus and incus absent.Hence incus was the most nEcrosed ossicle in our study .

Table 3 : Extent of disease

|  |  |  |
| --- | --- | --- |
| Extent of disease | No of patients | Percentage % |
| Perforation with epithelialization /granulation limited to mesotympanum | 4 | 25 |
| Limited attic disease | 4 | 25 |
| Extension to posterior tympanum | 8 | 50 |
| cholesteatoma/granulation extending medial to incus | 0 | 0 |

In our study 50 % of patients were found to have disease in mesotympanum extending to posterior tympanum involving sinus tympani ,aditus and antrum .In 25% of patients limited attic disease was identified involving anterior and posterior epitympanum ,head of malleus and incus.25% of patients were found to have disease limited to mesotympanum .

Table 4:Graft uptake after 6 months

|  |  |  |
| --- | --- | --- |
| Success | 15 | 93.75% |
| Failure | 1 | 6.25% |

The graft uptake was successfully seen in 15 /16 patients,while one patient developed a central perforation at 12th month ,following an episode of ear infection.

**Discussion:**

Management of squamosal type of chronic otitis media has been a challenging task in otology as the chance of residual disease and morbidity associated with conventional post aural microscopic surgery has been high .Endoscopic tympanoplasty is being performed for the last several years with enough published data to prove its success as a tool for repair of the tympanic membrane perforation which comes with many added advantages too.Clearance of disease from mesotympanum, epitympanum ,retrotympanum ,aditus and mastoid is possible.The eradication of disease from accessible and microscopically difficult areas has also been possible.The use of angled endoscope carries on added advantages.The endoscope is an excellent tool not only for disease clearance,for restoration of ventilation of the middle ear cleft and also reconstruction of the middle ear.

Our study was conducted to assess the usefulness and ease of using the rigid nasal endoscope for complete disease removal .Patients who underwent endoscopic tympanomastoidectomy were included in our study . Patients in age group 15 -67 years were included.56.25% were females ,43.75% were males .Maximum number of patients were of age group 41 - 50 years, least were in 51-61 years .In a study by Tarabichi4 60.5 % were females and 39.47 % were males and in a study by D.Marchioni5 80.9% were females and 9% were males.These findings are similar to our study .Mean age in our study was 34.06% which is similar to the study by Tarabichi(35 years ) and D.Marchioni et al (38.4 years ).The mean age group in a study by Sukamal das6 was 28.12 years and patients ranged between 9-58 years of age .

With regards to the extent of disease, 50 % of our patients were found to have disease extending into posterior tympanum,25% of patients had limited attic disease involving antrum and posterior epitympanum while rest 25 % were found to have perforation with epithelialisation /granulation which was limited to mesotympanum.In a study conducted by Tarabichi2 38 out of 69 (55.07%)were found to have attic disease.28/69(40.57%) had disease involving the antrum while 3/69 (4.34%)patients had disease extending to mastoid .In the study by Marchioni5 21/87(24.13%) had attic disease, while 66/87 (75.8%)were found to have disease extending upto antrum.In the study by 7Sanjay Kumar et al 6/35 (17.14%) patients had disease limited to the attic ,12/35 (34.28%)patients has disease involving the antrum while 10/35 (28.57%) patients had disease extending upto the mastoid tip.Exposure of the attic was performed by using a curette initially followed by powered drill .2.4mm diamond burr was used for bone removal and drill was used in lower speed setting .Soft wall reconstruction was done using sliced tragal cartilage .The anterior and posterior isthmus patency was ensured in all cases.Regarding intraoperative ossicular status in our study 50% 0f the patients in our study had all three ossicles present .Incus and stapes were not found in 4 (25%).12.5% of patients were found to have only the incus missing while rest 12.5% had both malleus and incus absent.Hence incus was the most necrosed ossicle in our study .With regard to the graft uptake after 6 months 15/16 patients (93.75%) had successful graft uptake while one patient who had a successful initial graft uptake , developed a central perforation at 12 months following an episode of ear infection .Takahashi8 in a study (2000) reported 6/54 patient (11.11%)patient developed residual perforation.Our results are in accordance with the series by Yung et al9 (1994) who studied the use of endoscope in cholesteatoma surgeries and documented that endoscopes provided better control over pathology in difficult to visualise areas.Mohammed et al 10 (2009) have also documented that using endoscope for ear surgery gives higher degree of control over middle ear disease and reduces the incidence of cholesteatoma recurrence particularly in hidden areas like sinus tympani .Sukamal Das6 in his study have also found that complete clearance of cholesteatoma (100%) could be achieved when otoendoscopy was added in the surgical armamentarium during mastoidectomy .We are of the opinion that rigid nasal endoscope is an excellent and primary tool for access to mastoid and middle ear cleft not only,enabling complete disease removal and functional middle ear reconstruction but also less postoperative morbidity. This technique is also cosmetically more acceptable to the patients.

**Conclusion:**

Endoscope enables complete disease clearance from the hidden areas of the middle ear cleft thereby reducing the possibility of residual or recurrent disease giving cosmetically acceptable result .A rigid nasal endoscope ,as used in our study ,serves the purpose very well.

**References**

1. Balasubramanian T, Venkatesan U. Endoscopic Otology A supplement. Otolaryngology 2012; 2: 1-25
2. Tarabichi M Endoscopic management of cholesteatoma:long-term results,Otolaryngol Head Neck Surg 2000;122;874-81 DOI: [10.1016/S0194-59980070017-9](https://doi.org/10.1016/S0194-59980070017-9)
3. Badr-Ei-Dine Surgery of sinus tympani cholesteatoma.Endoscopic necessity   
   Int Adv Otol 2009;5:158-165
4. Tarabichi M. Endoscopic management of acquired cholesteatoma. Am J Otol 1997;18:5444–9.
5. Marchioni, D., Mattioli, F., Alicandri-Ciufelli, M., & Presutti, L. (2009). *Endoscopic approach to tensor fold in patients with attic cholesteatoma. Acta Oto-Laryngologica, 129(9), 946–954.* doi:10.1080/00016480802468187
6. DAS, Sukamal. Endoscopic Tympanomastoid Surgery - Our Experience. Bengal Journal of Otolaryngology and Head Neck Surgery, [S.l.], v. 22, n. 2, p. 13-15, dec. 2014. ISSN 2395-2407
7. Sanjay Kumar K, Muthukumar R , Balasubramanian T,Endoscopic Tympanomastoid Exploration [Functional Endoscopic Ear Surgery-Fees] Otolaryngology Online Journal (2012) Volume 2, Issue 1
8. Takahashi H, Hasebe S, Sudo M, Tanabe M, Funabiki K. Soft-wall reconstruction for cholesteatoma surgery. Reappraisal . Am J Otol 2000;21:28-31.
9. Yung MMW. The use of rigid endoscopes in cholesteatoma surgery. J Laryngol Otol. 1994;108(4):307–9.DOI: [10.1017/s0022215100126611](https://doi.org/10.1017/s0022215100126611)
10. Mohamed M.K. Badr-El-Dine. Surgery of Sinus Tympani Cholesteatoma: Endoscopic Necessity. Int. Adv. Otol. 2009; 5:(2) 158-165.

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