



ENDOSCOPIC MIDDLE EAR SURGERY CASE STUDY

KEYWORDS

Endoscope. Ear surgery. Trans canal tympanoplasty

Dr.V SUDHIR BABU

Assistant professor of ENT, Siddhartha medical college Vijayawada.

Dr.Sreenivasulu M

Senior resident in department of ENT, Siddhartha medical college, Vijayawada.

ABSTRACT *The wide angle view provided by the endoscope enables trans canal access to the tympanic cavity and its extensions: the attic, sinus tympani, facial recess, and hypo-tympanum. These areas are the primary sites of disease and surgical failure to cure. This report is a summary of the use of trans canal operative endoscopy as the primary approach to the management of middle ear disease¹.*

INTRODUCTION

Tympanoplasty is a descriptive term used to define the surgical procedure of not only reconstruction of the tympanic membrane but also the management of pathology of middle ear cleft, such as chronic otitis media, cholesteatoma and ossicular chain problems. Since modern tympanoplastic procedures were described by Wullstein and Zollner in 1950, numerous techniques have been developed for the reconstruction of tympanic membrane.

The advantages of rigid endoscope is the ability to change rapidly from close up to wide angle and possibility of an all round vision just by rotating the angled scope. The deep anterior canal wall recess, anterior canal wall bulge, anterior marginal perforations, sinus tympani, facial recess, hypo-tympanum and attic can be visualized by rotating the angled endoscopes.^{1, 2, 3}

HISTORY

The introduction of the binocular operating microscope, which was a landmark event in the development of modern otology, clearly changed the scope and character of ear surgery. Despite continuous technical improvements, basic optical principles and their limitations have remained the same over the last decades.¹ Structures in the Retrotympanum and Epitympanum were not visible with an operating microscope. First attempt to visualize these hidden areas was performed by Zini who invented Stainless Steel Micromirrors by "Indirect Micro Tympanoscopy". Mer-et-al in (1967)⁴ was the first to use fiberoptic endoscopes through existing tympanic membrane perforation for studying the middle ear structures. Eichner (1978)⁵ introduced the use of rigid endoscopes with 2.7mm diameter with higher resolution. Willemot (1978)⁶ succeeded in visualizing the hypotympanum, protympanum, retrotympanum, attic by inserting 1.7mm endoscopes. Nomura (1982)⁷ introduced the concept of passing right-angled needle endoscopes through a myringotomy.

Gonzalez (1986)⁸ introduced 1.7mm 55° endoscopes for identification of residual cholesteatoma during tympanomastoidectomy. Takahashi (1990)⁹ utilized 1.7mm, 75° rigid endoscopes to inspect tubal ostium of children undergoing myringotomy for placement of ventilation tubes. Thomassin (1993)¹⁰ used 2.7mm 0° and 70° endoscopes for endoscopic guided otosurgery to prevent residual cholesteatoma at the end of microscopic procedure also did second look procedure through retroauricular ap-

proach with 4mm 0° endoscopes. Ahmed El-Guindy (1992)¹¹ studied 36 cases with dry central perforation of the tympanic membrane who underwent Endoscopic transcanal myringoplasty, with the rigid endoscope which is a significant advance in middle ear surgery. The graft up take rate was 91.7 per cent with this technique. Poe (1994)¹² utilized endoscopes for detecting perilymph fistula through exploratory tympanotomy by 1.8mm 0° and 30° endoscopes. Rosenberg (1994)¹³ introduced endoscopes in acoustic neuroma surgery through retro sigmoid approach 4mm 30° and 70°.

Okada (1998)¹⁴ used 0.5mm flexible fiberoptic endoscopes in determining probable margin of external auditory canal. Wackym (1998)¹⁵ studied endoscopic assisted vestibular neurectomy in 10 patients with intractable meniere's disease through retro-sigmoid craniotomy.

Karhuketo (1998)¹⁶ using flexible 0.8mm fiberscope defined 43 anatomic structures as viewed through Eustachian tubes in 10 cadaveric temporal bones. He also conducted endoscopic examination with 1.7mm 0°, 30°, 90°; 2.7mm 30°, 70° endoscopes in 151 ears with conduction hearing loss. In about 95% of cases endoscopic findings were confirmed by surgery and in 17% it changed the management.

INSTRUMENTATION

Tools used for endoscopic tympanoplasty :

1) Eighteen cm long, 4mm, wide-angled, zero-degree and 30-degree Hopkins II telescopes are most often used.



Wide-angled telescope

2) Video equipment consists of a video camera and a monitor. Procedures are performed directly off the monitor and recorded.

3) Standard microscopic ear surgery instruments are used.

DISCUSSION

The present study was undertaken on 35 patients who had chronic suppurative otitis media of tubo tympanic type in inactive stage. The study was done in the Department of E.N.T. Siddhartha Medical College and general hospital, Vijayawada.

Patients were in the age group of 18-50 years. Similar age group was selected in a study conducted by Yadav et al.¹⁷

All patients underwent transcanal endoscope assisted tympanoplasty by underlay technique. Similar technique was adopted in studies done previously by Balasubramanian Thiagarajan¹⁸ and Harugop A.S et al.¹⁹

For all the 35 cases, the integrity of ossicular chain was tested, mucosal disease was cleared. Eroded long process of incus was found in 07 cases and reconstruction with type II tympanoplasty was done for all of them. Out of these 07 cases ossiculoplasty was performed by incudoverision in 5 cases and with spur cartilage in 2 cases. Greater number of incus erosions was observed than in the study proposed by Saurabh Varshney et al.²⁰

Results of surgery in Transcanal Endoscopic tympanoplasty are usually expressed in terms of graft take up rate and hearing improvement. 4th month assessment was considered to report graft uptake and hearing results.

Graft take up was seen in 30 patients (86%) of the 35 patients operated. The take up rates are less than those described by T S Karhuketo²¹ (90%), Anoopraj²² (90%) but better than those reported by Harugop&Mudhol²³(82%), Yadav & Aggarwal et al.²⁴ (80%). Males had a success rate of 92% whereas females of 82%. The rate of healing does not seem to be significantly affected by the sex of the patient.

Out of 35 patients evaluated, 5 failures were observed. Among the failures, 3 were due to graft rejection, and 2 were due to graft retraction leading to residual perforation.

Out of 35 patients evaluated tympanosclerosis was found in 4 cases intraoperatively. It was found to be less when compared with the study done by Kamaljit Kaur et al.²⁵

When we evaluated the preoperative and postoperative pure tone threshold there was an improvement in pure tone average threshold postoperatively with healed tympanic membranes. Pre operative pure tone thresholds were ranging from 30-65db while the post operative pure tone thresholds were ranging from 10-45 dBs. Postoperatively pure tone average for 33% were below 20dBs and 60% were in the range of 21-35dB and 7% was in the range of 35-50dBs in healed tympanic membranes.

The results obtained by transcanal endoscopic tympanoplasty in inactive mucosal chronic otitis media are equal to the results obtained by postaural microscopic tympanoplasty in terms of graft take up and hearing improvement,²⁶ but with minimal morbidity, less postoperative pain,^{27,28} decreased rate of wound infection as postaural incision was avoided. Even the time taken for the surgery is minimized.

Advantages of endoscope:

1) Middle ear can be better visualized using an endoscope. This is facilitated by key features of Endoscope like close placement of tip of endoscope to the field of view, provides a large angular view by tilting the endoscope.

This abolishes the requirement for removal of bony external auditory canal wall.

2) Even difficult areas to visualise under microscopy like sinus tympani, epitympanic recess, facial recess, incudostapedial joint, can be easily visualised²⁹ by usage of angled endoscopes. In our study in 97 % (34) of the cases we could visualise the like sinus tympani, epitympanic recess, facial recess. In our study, in 91% of the patients we were able to visualise the incudostapedial joint with a zero degree endoscope and with the usage of thirty degree endoscope we were able to visualise the incudostapedial joint in 97% of patients without removal of postero-superior bony meatal wall.

3) In presence of external auditory canal abnormalities like anterior canal wall bulge, a 2.7mm endoscope was used.

4) Endoscope decreases the need for manipulating the patients head during surgery.

5) Endoscopic procedure is less morbid as it decreased the need for a post aural incision.

CONCLUSION:

Endoscope usage has improved the visualization of the hidden areas in the middle ear cavity even through the trans canal approach without removal of any bony meatal wall. Current study confirmed that as quoted in results were able to visualize hidden areas of the middle ear along with incudostapedial joint in 97% of the patients without any bone removal.

Effectiveness of transcanal endoscopic tympanoplasty in terms of successful outcome when compared with microscopic tympanoplasty is also established in this study. All the 35 cases underwent Trans canal endoscope tympanoplasty by underlay technique, 30(86%) cases healed successfully which is highly acceptable success rate for tympanoplasty by any means.

Average pure tone threshold observed preoperatively in all 35 patients was 46.42 dBs and post operatively was 24.86 dBs. This is highly acceptable improvement in hearing threshold levels when compared with the previous studies.

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