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Original Article

Ear surgery without microscope; is it possible

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Abstract Our experience of endoscope usage in otological surgery is presented. We included 17 patients with secretory otitis media for grommet insertion, 49 cases of myringoplasties and 6 cases of ossiculoplasties operated between May 2005 and 2008. All the procedures were performed through transcanal route. The success rate regarding perforation closure was 91.5% and average air-bone gap improved from 22.24–12.28 db in myringoplasty group and from 27.5–13 db in ossiculoplasty group. Secretory changes subsided in 16 out of 17 patients in secretory otitis media group. Endoscopic surgery offers many advantages over microscopic surgery which have been discussed.

Keywords Otologic surgery · Endoscope · Microscope

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Introduction

Since the advent of endoscope, the management and understanding of rhinological disorders has undergone a revolutionary change. Over the past few years now, the endoscope has been used increasingly for otological inspection and surgery. Endoscope or endoscope assisted myringoplasy is being performed increasingly by various surgeons for the past 10–15 years [1]. I am presenting my experience in 72 patients with endoscope in ear surgery without using any other aid such as microscope.

We have been using an endoscope for otological surgery for the past 4 years in various types of ear surgeries ranging from grommet insertion to ossiculoplasties. In this communication. I am presenting my experience with endoscope, it's merits and demerit's.

Subjects and methods

I have included 72 ear surgeries performed via transcanal approach with the help of an endoscope (Table 1, 2 and 3). This includes 17 grommet insertions (Fig. 1), 49 myringoplasties and 6 (Figs. 2 and 3) ossiculoplasties (Fig. 4). The age range was 6–58 years. After surgery the follow up range was 6 months to 2.9 years .

The telescopes reffered to in this study are 4mm diameter Hopkins telescopes with 0 and 30°. All the procedures were performed with 0 degree endoscope. 30° endoscope was mainly used for inspection of ossicles and for assisting ossiculoplasty.

A skin incision above the hair line was needed to harvest the temporalis fascia graft for myringoplasty. A tympanomeatal flap was elevated in all the cases requiring myringoplasy and ossiculoplasty. Ossicles were inspected and palpated for mobility in all myringoplasy and ossiculoplasty cases and eustachian tube was examined and irrigated with normal saline.

General anesthesia was given for 16 patients which included children and uncooperative adult patients. The rest

Table 1 Summary of myringoplasty group

Age range	No. of patients	Preoperative average AB gap	Postoperative average AB gap	Perforation closure
5–10 years	6	18 db	8.6 db	100%
11–15 years	8	19.57 db	11.28 db	100%
16–20 years	9	30.04 db	14.71 db	100%
21–25 years	4	18 db	5.75 db	75%
26–30 years	9	23.87 db	10 db	87.5%
31–35 years	6	23 db	13 b	100%
36–40 years	2	27.5 db	18 db	50%
41–45 years	2	28.5 db	17.5 db	50%
46–50 years	0	–	–	–
51–55 years	2	26.5 db	18 db	50%
56–60 years	1	7.5 db	6 db	100%
Total	49	22.24 d	12.28 db	91.84%

Table 2 Summary of ossiculoplasty group

S. no.	Age/sex	Pathology	Preoperative AB gap	Postoperative AB gap
1	32/M	Ossicular discontinuity	23 db	15 db
2	32/M	Ossicular fixation	38 db	8 db
3	45/F	Ossicular fixation	48 db	21 db
4	18/M	Ossicular fixation	17 db	5 db
5	34/M	Ossicular discontinuity	27 db	10 db
6	27/M	Ossicular fixation	25 db	11 db
		Average	29.66 db	11.66 db

Table 3 Summary of secretory otitis media group

Age range	No. of patients	Unilateral	Bilateral	Preoperative impedence (no. of ears)		Resolution
				Type B	Type C	
1–10 years	13	9	5	9	4	100%
11–20 years	2	1	1	1	1	100%
21–30 years	2	1	1	2	0	50%
Total	17	11	7	12	5	94.11%

of the patients were operated under local anesthesia using 1% xylocaine with 1 in 2 lakh adrenaline.

A large central perforation was present in most of the cases in myringoplasty group. In the ossiculoplasty group 2 patients had ossicular discontinuity four had ossicular fixation. A preserved cartilage was used in both the patients to bridge the ossicular discontinuity. In the ossicular fixation group the ossicles were adherent to the tympanosclerotic patch which could be freed easily and ossicular mobility attained. Secretory otitis media resolved in all the patients in the grommet insertion group except one who presented with otitis media during the first follow up which necessitated the removal of grommet.

Closure of perforation was achieved in 45/49 cases. Air-bone gap had decreased in all the patients except two patients one of whom had severe ossicular fixation and the other had preoperative profound sensori-neural hearing loss. There was subjective and objective improvement in hearing in all the patients with ossiculoplasty.

Discussion

In today's era of minimally invasive surgery the endoscopes are proving to be very useful. Endoscopy allows excellent view with minimum exposure [1]. With the use of endoscope

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Fig. 1 Endoscopic view of tympanic membrane in a patient with otitis media with effusion

Fig. 2 Clearly visualized multiple perforations in a patient with chronic suppurative otitis media, with grossly edematous external auditory canal

Fig. 3 Previous picture with a magnified view clearly showing grossly hypertrophied middle ear mucosa and unhealthy margins of the tympanic membrane. A part of eustachian tube orifice can also be visualized

Fig. 4 A crystal clear view of the incudostapedial joint, rarely available while viewing with a microscope. Fracture of the anterior crura of the stapes can also be visualized

a postauricular incision was not required in any of the cases and the procedure could be completed satisfactorily through the transcanal route in all the patients which is rarely possible with microscope. It enables rather easy application of minimally invasive myringoplasty to patients in whom the edge of perforation of the tympanic membrane is invisible [2].

The surgical results are comparable to microscpic surgery [3–5]. Sixteen to seventeen patients with secretory otitis media showed complete resolution of their symptoms both subjectively and objectively. One patient presented with purulent ear discharge in the postoperative period which required removal of grommets. He was aymptomatic after 10 days of systemic broad spectrum antibiotic. In the myringoplasty group a sufficient rate (91.5%) of perforation closure was achieved. Regarding the hearing outcome the average hearing level improved from 22.24–12.28 db in myringoplasty group and from 27.5–13 db in ossiculplasty group. In addition in the ossiculoplasty group neither there was a need to curette the posterior canal wall nor was scutum lowering required to visualize the ossicles thereby minimizing the risk of chorda tympani and facial nerve damage. In cases with difficulty, inclusion of an angled endoscope was sufficient to visualize the ossicles. All the structures in the middle ear could be visualized with the rotation of endoscope without manipulating the head of the patient. The similar objective is impossible to achieve with a microscope, the line of vision being limited to a straight line.

We have also tried to evaluate endoscopic surgery

as a teaching aid. It is a better aid in demonstrating the surgical steps and the anatomical structures are more clearly visualized. All the structures can be seen in the same field and hence their relationship is better appreciated.

Though endoscopic ear surgery is beneficial in many ways, it has its own disadvantages. With the use of endoscope the procedure becomes single handed. The procedure becomes all the more difficult if there is excessive bleeding. Depth perception with the endoscope is not very good but with training this problem can be tackled. Limited magnification is another problem with the endoscope. The excellent clarity of visualization more or less compensates for it's disadvantages. All these problems can be minimized with further advancement in technology and manufacture of proper fixation devices. However a systematically conducted prospective study is required to prove it's superiority over the microscope.

Conclusion

The conclusion we draw from the study is that, the endoscope can be successfully applied to ear surgery for most of the ear procedures through transcanal route with a reasonable success rate both in terms of perforation closure and hearing improvement and with minimal exposure. It offers an advantage of minimal exposure, thereby avoiding unnecessary incisions on the patient and an improved visualization of all the quadrants of the tympanic membrane and the middle ear structures and their relationship to the surgeon and the observers alike.

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