



A COMPREHENSIVE STUDY OF ENDOSCOPIC EAR SURGERY

KEYWORDS

Otoendoscope, PTA – Pure Tone Audiometry, Tympanoplasty, Myringotomy.

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ABSTRACT

The use of endoscopes in the field of ear surgery has significantly transformed the otologic surgery from open procedures to minimally invasive or key-hole procedures with an advantage of shorter operating time period, improved cosmesis, lower complication rates and better surgical outcomes. Endoscopes used in otology was initially limited to diagnostic purposes. Later the evolution of otoendoscopes and endoscopic holders facilitated performing endoscopic ear surgeries like myringotomy and grommet insertion, tympanoplasty, stapedectomy and mastoidectomy procedures with both hands. In this study we are going to discuss the current techniques for endoscopic middle ear dissection, particularly endoscopic myringoplasty, discussing the equipment needed, surgical indications, and technique and also showing the potential advantages and disadvantages of the procedure.

INTRODUCTION: Middle ear surgery can generally be performed with the aid of an operating microscope since a very long time. Operating microscope provides excellent view to middle ear when working post-aurally. However, under minimally invasive technique of surgery through trans-canal approach, it is very difficult to operate using a microscope alone because the field of view is limited to the narrowest part of the external auditory canal. The operating microscope provides a very good quality magnified image in a straight line, however, the surgeon's field of view is limited to the narrowest segment of the ear canal. The one major advantage of endoscopes is that it provides a good quality image in a magnified view and also in wide field which can't be obtained with operating microscope. The other advantage is that we can quickly change the field of view just by moving the endoscopes and also can examine certain inaccessible areas like attic and epitympanum by using angled endoscopes. Endoscopes are being used in middle ear procedures ranging from simple diagnostic procedures like tympanic membrane perforations and perilymph fistulas etc. to all the way surgeries like Myringotomy, Tympanoplasty, Endoscopic assisted Tympano-mastoid exploration and Stapedotomy.

In this study we are going to discuss the current techniques for endoscopic middle ear dissection, particularly endoscopic myringoplasty, discussing the equipment needed, surgical indications, technique and also showing the potential advantages and disadvantages of the procedures.

MATERIALS AND METHODS

The present prospective study "ENDOSCOPIC EAR SURGERY" is done in the Department of E.N.T., Govt. General Hospital, Guntur Medical College, Guntur, A.P. during the period DEC 2010 to JUNE-2012.

In this study 25 patients of either sex with CSOM (Tubo -Tympanic type with small central perforation) were selected randomly. The details pertaining to age, sex, laterality, duration of symptoms were recorded. The patients posted for surgery were subjected to detailed preoperative work up and Audiometric evaluation.

Inclusion criteria: Patients in the age group of 20 -40 years of both the sexes with dry central perforation of ear drum and conductive deafness less than 35 dB were included. Results of this procedure was compared to that of standard results of microscopic myringoplasty.

Exclusion criteria: Children, as they require general anesthesia, and

also they are more prone to get recurrent URI, wet ears, large perforations as subtotal and total, because of technical difficulty. Pure Tone Audiometry more than 35 dB as these cases may have mucosal adhesions between malleus and incus, and sometimes parts of ossicular chain may be eroded which requires ossiculoplasty. Revision myringoplasty and sensorineural hearing loss.

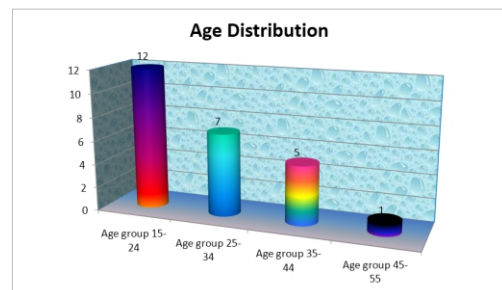
RESULTS : The present study "A COMPREHENSIVE STUDY OF ENDOSCOPIC EAR SURGERY" was carried out in Govt. General Hospital, GUNTUR, during the period of December 2010 to June 2012. The results and analysis of this study are as follows.

I. Age distribution: Of the 25 cases who were operated, the age of the patient varied between 15 and 55 years.

Table 1: Age distribution

Age group	No. of patients	Percentage (%)
15-24	12	48
25-34	7	28
35-44	5	20
45-55	1	4
TOTAL	25	100

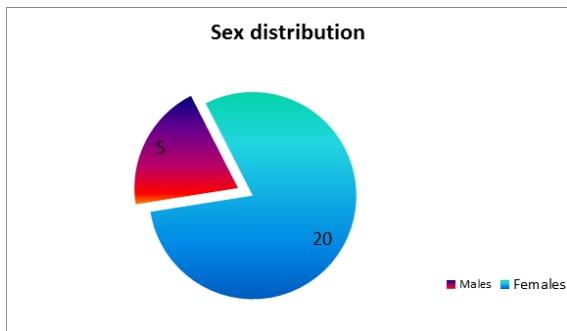
There were 12 patients (48%) in the age group of 15 – 24 years, 7 patients (28%) in the age group of 25 – 34 years, and 5 patients (20%) in 35 – 44 years age and 1 patient (4%) in 45-55 years age group.



II. Sex distribution: In our study out of 25 cases 20 (80%) patients were female, and only 5 (20%) were male, with the ratio of 4:1 in favor of female.

Table 2: Sex distribution

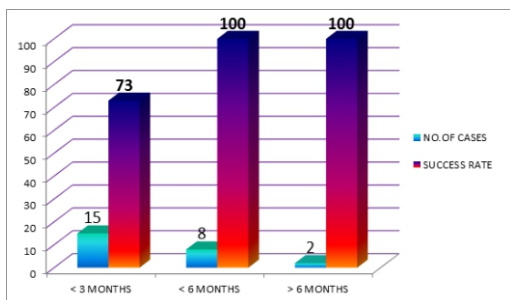
Sex	Number	Percentage
Male	5	20
Female	20	80
Total	25	100



III. Pre-operative dry ear: In our study 15 (60%) of our patients had dry ear for less than 3 months, and 8 (32%) had dry ear since 6 months and only 2 (8%) since more than 6 months.

Table - 3: Pre-operative dry ear dry ear

DURATION	NO. OF CASES	PERCENTAGE	SUCCESS RATE
< 3 MONTHS	15	60	73
< 6 MONTHS	8	32	100
>6 MONTHS	2	8	100
TOTAL	25	100	



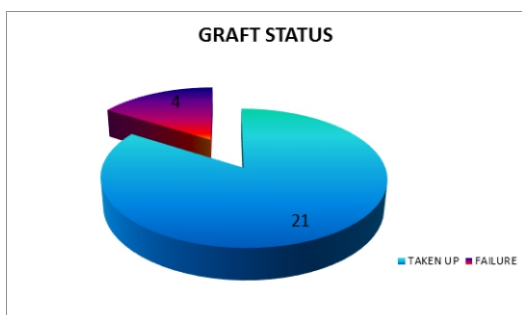
IV. Results of surgery : This is assessed in the form of graft status post operatively and also the improvement in hearing in dB.

a) Graft Status: Out of 25 cases, who had undergone Myringoplasty Endoscopically in our hospital, there was graft take up in 21 cases (84%) and in 4 cases (16%) graft did not take up. These patients had infection and also cold attacks in the postoperative period, assumed to be the cause of failure,

Table - 4: Results of surgery

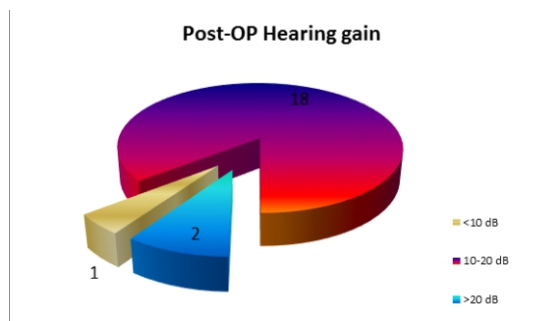
(a) Graft status:

Graft	Number	Percentage
Taken	21	84
Not taken / Failure	4	16



(b) Postoperative hearing gain: this is assessed only in the surgery success patients. There is no improvement in the failure cases.

Hearing gain	Number	Percentage
<10 dB	1	4.7
10-20 dB	18	85.7
>20dB	2	9.6



DISCUSSION: The present study “A comprehensive study of Endoscopic ear surgery” was conducted in the Department of ENT, Govt. General Hospital, during the period DEC 2010 to JUNE-2012. The study included 25 patients. Though the factors like age and sex distribution etc. (except the graft uptake status and audiological improvement) are not having much importance in discussion yet we carried out these for comparison with the conventional microscopic myringoplasty.

When it comes to ENDOSCOPIC EAR SURGERY the results were assessed in,

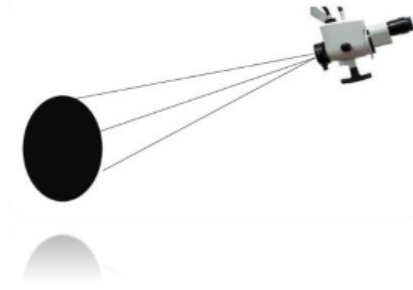
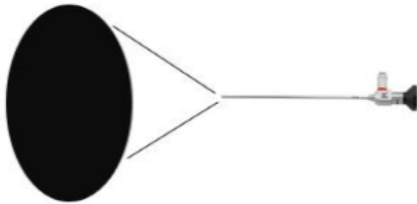
- a) **SUBJECTIVE** - Improvement in hearing acuity , absence of ear discharge and absence of tinnitus.
- b) **OBJECTIVE** - Healed perforation as seen in otoendoscopy and improvement in hearing threshold demonstrated by performing puretone audiometry.

In our study of 25 cases, the age of patient varied between 15 and 45 years, the take up rate of graft for different age group was the same, which suggests that age did not made any difference in take rate. This is in keeping with observations of existing literature. In our present study of 25 cases, we had 20 females and 5 males who underwent Myringoplasty, with Female to male ratio of 4:1, which is in contrast to existing literature.

Hearing gain is an important finding for assessing the success rate of the surgery and its feasibility for usage and adaptation of endoscopic ear surgical technique widely. In our study of 25 cases, the preoperative pure tone average showed that 4 cases (12%) had PTA of < 30 dB, 18 cases (72 %) had PTA of 31-40 dB and 3 cases (12%) had PTA of more than 40 dB and the average PTA is 35.74 dB. The post operative PTA was taken 2 months after the surgery, which shows that, 21 cases (84 %) of the total cases in which graft was taken had PTA average gain of more than 10 dB. The postoperative pure tone average mean was 20.37 dB. Thus that hearing gain in our study was 14.87 dB.

In our study of 25 cases of Myringoplasty, all are done under endoscopic guided underlay temporalis fascia grafting, in which the graft take up was seen in 21 cases and so the graft take rate in our study was 84%, which very nearly correlates with the conventional microscopic technique, clearly indicates that the success rate is equal and endoscopes can be used widely to perform myringoplasty. Causes of graft failure in our study of 25 cases, there were 4 cases of graft failure, the most common cause for failure was post-operative infection.

ADVANTAGES OF ENDOSCOPES IN EAR SURGERY: Endoscopes offers an excellent magnified image with a good resolution and also offer wide field view which is very useful for ear surgery, which can't be obtained with microscope.

View offered by operating microscope:**View offered by endoscope**

This surgical procedure fulfils the criteria of **minimally invasive surgical procedure**. Because in endoscopic myringoplasty the approach is through transmeatally, instead of postaural/endastral . The surgery also requires less operating time. There is minimal trauma to patient, causing less intra operative bleed. Also less morbidity in the post operative period. With minimal effort endoscopes can be used to visualize the nook and corners of middle ear cavity. This is another potential advantage particularly useful to inspect middle ear for presence of any granulations, cholesteatoma mass, even ossicular integrity etc. Antero inferior recess of external auditory canal can be visualized using an endoscope. Even difficult areas to visualize under microscopy like sinus tympani can easily be examined using an endoscope. Magnification can be increased by just moving the endoscope closer to the surgical field, where as in microscope we need to repeatedly adjust and also should focus on the object. Equipment is portable so we can carry them to anywhere, particularly to organize camps etc. It is less costlier than microscopes, well suited for developing countries.

DISADVANTAGES Since one hand is used to hold the endoscope only one hand is available for surgery. For simple myringoplasty this is not a big disadvantage, because there is minimal bleeding. Sharing space for scope and instruments in patients with narrow external auditory canal is difficult. In our experience this is not a big issue, if we use smaller size endoscopes like 2.7mm endoscopes. Fogging of scope lens needs periodical cleaning of the scope. No 3D stereoscopic view with endoscopes, but this can be overcome just by moving scope, so that we can reconstruct a 3D image mentally, by evaluating how the objects are moving. Accidental injury to ear due to unwanted head movements, or else endoscope movements.

Conclusion: Endoscopic myringoplasty was found to be equally effective, less morbid and very cost effective in central perforations as our study showing equally higher rate of success after myringoplasty which is commonly performed surgery in ENT. This is minimally invasive surgery as there is less trauma to patient. Though surgeries like Myringoplasty, Myringotomy can be done exclusively by using endoscopes only, however, they have their own limitations. It is not applicable in all cases, especially in those with large perforations , or with certain attic cholesteatomas where we can have the endoscope assisted explorations, but not exclusive usage of endoscope only. Definitely Endoscopic Myringoplasty has a scope in the future.

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