MICROSCOPIC TYMPANOPLASTY VERSUS ENDOSCOPIC TYMPANOPLASTY: A COMPARATIVE STUDY IN A TERTIARY CARE CENTRE OF WEST BENGAL

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ABSTRACT

BACKGROUND

Chronic otitis media is one of the most common health problems of our country. Perforation in their tympanic membrane and hearing loss are the presenting feature of chronic otitis media. Reconstruction of the hearing mechanism can be done by surgical procedure namely tympanoplasty. This study is being conducted to compare the success rate of tympanoplasty regarding graft uptake, hearing improvement and also to assess the advantage and disadvantage of endoscope and microscope during surgery.

MATERIALS AND METHODS

This randomized prospective study was conducted in Malda Medical College between August 2015 to July 2018. In this study, 60 patients of chronic otitis media with dry perforation for at-least 3 weeks, in the age group 16-49 years were divided into two equal groups of 30 each. First group underwent type 1 tympanoplasty by microscope and another group underwent type 1 tympanoplasty by endoscope. Data was collected from above patients and statistically analysed regarding graft taken or rejected and hearing improvement.

RESULTS

This study included 60 patients, 30 patients in each group. Success rate regarding the drum closure in endoscopic group is 86.66%, whereas in microscopic group it was 83.33%. Post-operative A-B gap improvement is also little better in endoscopic group than microscopic group. In endoscopic technique, one patient had medialisation of graft postoperatively. We got one case of medialisation and another case of lateralisation of graft in microscopic method postoperatively.

CONCLUSION

Endoscope is better for closure of perforated tympanic membrane than microscope because of better field of vision.

KEYWORDS

Microscopic, Endoscopic, Tympanoplasty.

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BACKGROUND

Chronic otitis media is a common health problem in our country. Patients with chronic otitis media presented with discharge from his ears with perforations in their tympanic membrane. Poor living standard and poor hygiene due to low socioeconomic standard and inadequate access to the proper health facilities in the peripheral area of the state exaggerate the picture. Another common cause of tympanic membrane perforation is trauma.

Tympanic membrane perforations lead the middle ear prone for infectious particle and external allergen. The loss of vibratory area of the tympanic membrane due to perforation and loss of shielding effect of round window cause hearing loss. Tympanoplasty is a surgical technique used for removal of the disease from the middle ear cleft and repair of the tympanic membrane with or without ossicular chain reconstruction. Among different types of graft materials used to close the perforated tympanic membrane, temporalis fascia and perichondrium are most commonly used. In conventional endaural or postaural microscopic approach skin incision and soft tissue dissection was needed which results in surgical scar and significant pain to the patient. To minimize these problems minimal invasive endoscopic otologic surgery recently developed. Endoscopic ear surgery first tried in 1990s[1] has become popular with anatomic and physiologic concepts.[2] Advantage of endoscopic approach are 1) There is no need of external incision and tissue dissection 2) better visualisation of hidden area of middle ear cavity like, anterior and posterior epitympanic recess, sinus tympani, facial recess and hypotympanum, endoscopic otological surgery decreases residual cholesteatoma and recurrences of cholesteatoma surgery.[3,4,5] This study is being conducted to compare the success rate of endoscopic and microscopic tympanoplasty regarding graft uptake, hearing improvement and also to assess the advantage and disadvantage of endoscope and microscope during surgery.

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MATERIALS AND METHODS

This study was a prospective one conducted in the ENT and Head and Neck Surgery Department of a Malda medical college of West Bengal during August 2015 to July 2018. Patient attending the ENT outpatient department with chief complaints of ear discharge and decreased hearing was screened. Written and informed consent was taken, preoperatively tuning fork test and pure tone audiometry was done to know the type and degree of hearing loss. Number of subjects in this study was 60. Endoscopic tympanoplasty was done in 30 individual and another 30 patients underwent microscopic tympanoplasty. All tympanoplasty were type 1 tympanoplasty and done under local anaesthesia. Temporalis fascia was used as graft materials.

Inclusion Criteria

1. Chronic otitis media patient with central perforation.
2. Dry perforation for at least 3 weeks.
3. Age between 16 to 49 years.
4. Conductive deafness below 40 decibels.
5. Patient willing for surgery.

Exclusion Criteria

1. Discharging ear.
2. Patient with cholesteatoma or attic perforation.
3. Ossicular discontinuity or fixity.
4. Narrow external auditory canal.
5. Revision tympanoplasty.
6. Patient with sensory neural hearing loss.
7. Age below 16 years and above 49 years.

Surgical Procedure

After through haematological, radiological, audiometric and endoscopic assessment patients were divided into two groups. Group-A & Group-B and planned for surgery under local anaesthesia. Group A undergone type 1 endoscopic tympanoplasty by underlay technique and group B undergone type 1 microscopic tympanoplasty by underlay technique.

0- and 30-degree 4 mm rigid endoscope was used through transcanal route in endoscopic tympanoplasty. In microscopic tympanoplasty endaural route used. In both these technique temporalis fascia graft used as graft material. In each technique margin of the perforation was freshened. Rosen Incision was made 6-8 mm lateral to the tympanic annulus posteriorly from 6 o'clock to 12 o'clock position. Middle ear cavity was visualized after elevation of tympanomeatal flap. Ossicular integrity checked. Temporalis fascia graft was placed medial to the tympanic annulus. Gelfoam was placed in the middle ear cavity to prevent medialisation of graft. Gelfoam was also put in the external auditory canal. Incision closed by silk suture in microscopic variety. Mastoid bandage applied and kept for 7 post-operative day. In Post-operative period antibiotics, analgesic, antacid and antihistaminics were prescribed and patient were advised to avoid nose blowing, sneeze forcefully, avoidance of heavy weight lifting. Post operatively ear drop was started after 3 weeks, gel foam was removed, and audiometric evaluation was done after one month, 3 month and 6 months to know the improvement of hearing and oto-endoscopy was done to see the graft uptake. Success was defined as ear-drum closure with no residual perforation. Hearing improvement was defined as air-bone gap less than 10 db. Collected data were analysed and statistical test were done with the help of Microsoft excel.

RESULTS

We had included 60 patients in our study. Of them, 30 had endoscopic tympanoplasty and the other 30 had microscopic tympanoplasty with the following aspects of the study were analysed: -

Age Group	Microscopic Group	Endoscopic Group	Total
< 19	9	7	16
20-29	7	8	15
30-39	7	10	17
40-49	7	5	12
Total	30	30	60

Table 1. Age Distribution

Table 1 showed the age distribution of the patients. Most of the patients were between 30 to 39 years of age and least are between 40 to 49 years of age.

	Microscopic Group	Endoscopic Group
Male	14	17
Female	16	13

Table 2. Sex Distribution

In table 2 we got the sex distribution there are 31 male patients and only 29 female patients.

	Microscopic Group	Endoscopic Group
Right	16	18
Left	14	12

Table 3. Laterality of the Perforations

In table 3 we got that among the operated ears, 34 were right ear (56.66%) and 26 were left ear (46.33%). The incidences of successful closure and residual perforation in the two groups were as follows-

	Microscopic Group	Endoscopic Group
Successful Closure	25	26
Residual Perforation	5	4

Table 4. Drum Closure

In table 4 we got the success rate of underlay tympanoplasty with microscope using temporalis fascia graft

was 83.33%. In 25 patients out of 30 patient grafts were taken. There were only 5 failure cases.

The pre-operative and post-operative air-bone gap of microscopic group was shown in table 5. Where we found postoperatively 18 patients had A-B gap below 10 dB and 5 patients had A-B gap below 20 dB.

Microscopic Group		
A-B Gap	**Pre-Operative**	**Post-Operative**
<10	0	18
10-20	6	5
21-30	13	3
31-40	11	4

Table 5. The Pre-Operative and Post-Operative Air-Bone Gaps in the Microscopic Group

Endoscopic Group		
A-B Gap	**Pre-Operative**	**Post-Operative**
<10	0	20
10-20	3	6
21-30	19	2
31-40	8	2

Table 6. Pre-Operative and Post-Operative Air-Bone Gap of Endoscopic Group

The pre-operative and post-operative air-bone gap of endoscopic group was shown in table 6. Where we found postoperatively 20 patients had A-B gap below 10 dB and 6 patients had A-B gap below 20 dB.

Post-Operative Assessment	Microscopic	Endoscopic
Drum Closure	25(83.33%)	26 (86.66%)
Perforation	5	4
Medialisation	1	1
Lateralisation	1	0
Anterior Blunting	0	0

Table 7. Post-Operative Results and Complications

The post-operative complication rate was less in both type of tympanoplasty except residual perforation which was 5 in microscopic group and 4 in endoscopic group. Only single case of medialisation of graft in underlay technique via endoscopic approach and there is one case of medialisation of graft and one case of lateralization of graft when we used the microscope as shown in Table 7.

DISCUSSION

Tympanoplasty is the main surgical treatment for chronic otitis media tubotympanic variety. It is defined as any operation involving reconstruction of the tympanic membrane and/ or the ossicular chain.[6] The ideal tympanoplasty restores sound protection for the round window by constructing a closed, air containing middle ear against the round window membrane. This also restore sound transfer for the oval window by connecting tympanic membrane or substitute membrane with stapes footplate via either an intact or a reconstructed ossicular chain.

Out of 60 patients there were 31 males (51.66%) and 29 females (48.33%). Among the cases where endoscope was used, out of 30 patients, male patients were 17 (56.66%) and females were 13 (43.33%). Among the group of 30 patients where microscope was used male patients were 14 (46.66%) and females were 16 (53.33%).

In our study, most patients were in the 30-39 age group. Of the operated ears, 34 were right ear (56.66%) and 26 were left ear (46.33%). In the study conducted by Gibb using temporalis fascia as graft material by underlay technique the percentage of graft take rate was 87.5%[7] Mishra et al performed 100 underlay tympanoplasties with superiorly based circumferential flaps using temporalis fascia graft for dry subtotal perforation. They underwent this study during the period August 2001- Feb. 2004. To close subtotal perforations and could achieve good results both in terms of drum healing (97%).[8]

Strahana achieved graft uptake success rate of 87% by underlay method[9] using microscope.

Dhabolkar et al performed a comparative study between temporalis fascia and tragal perichondrium where he achieved a success rate of 84% with microscope in respect to drum closure by temporalis fascia underlay method.[10]

In our study we got the success rate of underlay tympanoplasty with microscope using temporalis fascia graft was 83.33%. In 25 patients out of 30 patient grafts were taken. There were only 5 failure cases. The pre-operative and post-operative air-bone gap of microscopic group was shown in table 5. Where we found postoperatively 18 patients had A-B gap below 10 dB and 5 patients had A-B gap below 20 dB.

Endoscope has been established by Tarabichi, Usmani et al as and adjunct to microscope for examination of middle ear now have the world wide acceptance.[11,12] There are many advantages of endoscopic technique but still it has some limitations like, one handed surgery by endoscope having difficulty in suction of blood from the operative field and heat generation from endoscope during surgery can damage external auditory canal and middle ear structure. However recently two-handed endoscopic technique innovated by Khan et al[13] to minimized heat related damage Kozinet et al[14] recommended using sub maximal light intensity and frequent repositioning of endoscope.

The study of Tarabichi M,[15] where graft taken tare 97.8% in 46 cases with by endoscope.

The result of our study can be compared with the study of Yadav SPS and et al,[16] where a graft uptake rate was 80% reported in underlay technique using endoscope. In our study the outcome in terms of drum closure in case of underlay technique (86.66%) 26 patients out of 30 patients.

The pre-operative and post-operative air-bone gap of endoscopic group was shown in table 6. Where we found postoperatively 20 patients had A-B gap below 10 dB and 6 patients had A-B gap below 20 dB.

Complications rate in our present study was very low, only single case of medialisation of graft in underlay technique via endoscopic approach and there is one case of medialisation of graft and one case of lateralization of graft when we used the microscope.

Limitations of the Study

1. The limitation of this study was small sample size.
2. We had to perform the endoscopic surgery single handedly due to absence of endoscope holder which can be overcome by using endoscope holder.

CONCLUSION

Endoscope is better for closure of perforated tympanic membrane than microscope because of better field of vision and when we used angle endoscope, we can easily access the hidden parts of middle ear cavity like anterior and posterior epitympanic recess, sinus tympani, facial recess and hypotympanum. Further studies with larger sample is needed.

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