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Endoscope assisted versus Microscope assisted Transcanal Underlay Myringoplasty: A comparative Study

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ABSTRACT

Background: The present study compares the results of endoscopic and microscope assisted underlay myringoplasty.

Methods: A retrospective study was undertaken to compare the results of endoscope assisted and microscope assisted underlay myringoplasty 40 cases of inactive (mucosal) chronic otitis media with perforations at a tertiary care centre. Patients were divided into two groups of twenty each. Group A underwent microscope assisted underlay myringoplasty and group B underwent endoscope assisted underlay myringoplasty. In both groups patients were operated through transcanal approach. Graft take up rate, hearing improvement and operative time were compared.

Results: The overall graft uptake of group A microscope assisted myringoplasty was 80% with an average post-operative hearing gain of 13 dB as compared to 85% graft uptake in Group B group endoscope assisted myringoplasty with an average post-operative hearing gain of 14.1dB. There was no significant difference in the operative time between group A and B.

Conclusion: The results of endoscope assisted underlay myringoplasty are comparable to microscope assisted underlay myringoplasty.

Key Words: Inactive (mucosal) chronic otitis media; Tympanic membrane perforation; Underlay myringoplasty: Transcanal approach; Endoscope; Microscope.

INTRODUCTION

Operating microscope has revolutionized the otological surgery. In recent years endoscopes are frequently used in ear surgery[1-5]. There are few studies comparing the results of endoscope assisted myringoplasty with microscope assisted myringoplasty[6-9]. In most of these studies transcanal approach was used in endoscope assisted myringoplasty while a post-aural approach was used in microscope assisted myringoplasty. In this retrospective study we report the results of microscope assisted underlay myringoplasty with endoscope assisted myringoplasty using transcanal approach.

MATERIAL AND METHODS

This retrospective study included forty patients suffering from inactive (mucosal) chronic otitis media with perforation and underwent myringoplasty at department of Otorhinolaryngology, Pt. B.D. Sharma Post Graduate Institute of Medical Sciences, Rohtak Haryana (India) from January 2009 to December 2012. Patients of either sex in the age group of 18-40 years suffering from inactive (mucosal) chronic otitis media with central perforation, an air-bone gap of more than 25 dB were included. Patients with wet ears, infection in the nose or throat, a previous history of ear surgery and hearing loss more than 60dB were excluded.

A detailed history and findings on general physical and otorhinolaryngological examination were noted. Hearing threshold levels using pure tone audiometry test were recorded. All patients were subjected to relevant laboratory tests as per pre-anaesthetic protocol. After pre-anaesthetic check-up, written and informed consent patients were posted for surgery. These patients were divided into two groups of 20 each. Group A: patients were operated by microscope assisted transcanal underlay myringoplasty and Group B: patients were operated by endoscope assisted transcanal underlay myringoplasty. These groups were matched with respect to all factors affecting the outcome of procedure.

All patients included in the study were operated under local anaesthesia. Temporalis facia was used as a grafting material in both the groups. In both groups transcanal approach was used for myringoplasty. Temporalis fascia graft was harvested by a 2 cm incision just above the hair line and the wound was closed with silk sutures. In endoscope assisted group the endoscopes 0^{o} 4 mm, 17 cm endoscope was used through transcanal approach. Other angled endoscopes were used if required for inspection of middle ear. In all cases a camera attachment and video monitor was used. The margins of the perforation were visualized and freshened with a sickle knife, a circular knife was passed through the perforation and the under surface of perforation margins were de-epithelised. The handle of malleus was skeletonised. An incision was made in the EAC 5 mm lateral from the annulus from $10^{,}$ clock to $2^{,}$ clock and a tympanomeatal flap was elevated and middle ear entered. Temporalis fascia graft was trimmed and placed as underlay graft. The tympanomeatal flap was repositioned. Hearing was checked and EAC was packed with medicated gel foams. Similar surgical technique was followed in the microscope assisted myringoplasty group.

Post operatively all patients were given oral antibiotics, antihistamines and analgesics. Patients were discharged from the hospital after 24 hours of surgery. All the patients at the time of discharge were instructed to take adequate precautions to prevent the entry of water into the ear canal. They were advised to avoid blowing of nose or lifting heavy weights. Further follow up was done on out-patient basis. All the operated patients were regularly followed up for a minimum period of 3 months in the out-patient department. Patients were followed up on 10^{th} post-operative day, and then at 4^{th}, 8^{th} and 12^{th} week. At 12^{th} week a pure tone audiogram was taken.

The factors compared included the operative time, graft take up rate and hearing improvement. The difference between the pre-operative and post-operative values at frequencies 500, 1000.2000, and 4000Hz were assessed. The parameters noted on follow-up of both groups were compared.

RESULTS

In group A out of 20 patients there were 13 male (65%) and 7 female (35%), while group B included 11 male (55%) and 09 female (45%). Patient's age in both groups ranged between 18 to 40 years. All the patients in this study had a history of ear discharge in the past. The duration of discharge varied from 6 months to 9 years. However, only the patients with dry ear for at least four weeks were enrolled for myringoplasty.

Unilateral perforation was present in 17(85%) cases in group A and bilateral perforation was noted in 3(15%) cases. While in group B unilateral perforations were present in 15(75%) cases and bilateral perforation was seen in 5(25%) cases.

Subtotal perforation was seen in 17(85%) cases in group A and 03(15%) cases had large central perforation, while in group B 12(60%) cases had subtotal perforation, 03(15%) cases had large central perforation and 5 (25%) had medium size perforations. Handle of malleus was medially retracted in 2 (10%) cases each in group A and group B. Mucoid discharge was noted in 02 (10%) cases in group A and none of the cases in group B had mucoid discharge.

Tuning fork test was done in all patients with 512 Hz frequency tuning fork and results were compared with the audiogram. In groups A 19(95%) patients had hearing loss in the range of 25-40dB and 1(05%) case had hearing loss of 45dB as compared to 17(85%) cases with hearing loss in range of 25-40dB and 03(15%) cases with loss in range of 41-55dB in group B. (Table-1).

Table-1: Showing the overall follow up result of microscope assisted myringoplasty (Group-A) and Endoscope assisted myringoplasty (Group-B)

		Group A	Group B
1.	Cases operated	20(100%)	20(100%)
2.	Cases followed	20(100%)	20(100%)
3.	Successful closure	16 (80%)	17(85%)
4.	Residual perforation	00	00
5.	Graft rejection	04(20%)	03(15%)
6.	Anterior sulcus blunting	00	00
7.	Graft lateralization	00	00
8.	Hearing improvement	Hearing gain in dB	Hearing gain in dB
	0-5	04(20%)	03(15%)
	6-10	00(00%)	03(15%)
	11-15	10(45%)	08(40%)
	16-20	05(25%)	05(25%)
	>21	01(10%)	01(5%)

All patients presented for regular follow up. Discharge was noted in 4(20%) patients in group A. The discharge resolved by change of antibiotics but all of these cases developed graft rejection. In group B discharge was noted in 3(10%) patients which resolved by change of antibiotic and graft rejection was seen in these cases. The overall graft take-up rate in group A graft was 80% and while in group B it was 85%.

Hearing levels were assessed at 3 months. In group A the mean preoperative hearing level was 35.5 dB while the mean postoperative hearing level was 22.5dB, giving a mean postoperative hearing gain of 13 dB. Majority of patients 15(75%) had a gain in the range of 11-20 dB; One (05%) patients had a gain of more than 20 dB. Four (20%) had no gain, this included patients with graft rejection. The overall hearing improvement was seen in 16 (80%) with mean gain of 13 dB. In group B the mean preoperative hearing level was 37.5 dB with mean postoperative hearing level of 23.5 dB thereby mean hearing gain of 14.0 dB. Thirteen (65%) patients had a hearing gain of 11-20 dB, 1(05%) had gain of > 20 dB, 3(15%) had gain of 6-10 dB. Three case (15%) cases had no improvement this comprised of all the cases with graft rejection. Overall hearing improvement was seen in 17 (85%) cases with a mean gain of 14.1 dB. (Table-I)

All the cases included in this study were operated by transcanal route and underlay myringoplasty. The only difference was the use of microscope and endoscope. We did not find any significant difference in the operating time between group A and B.

DISSCUSSION

Operating microscopes has revolutionized the outcomes of myringoplasty and is used in otological field for decades. It allows the use of both hands, provides excellent magnification and most important a binocular vision. However operating microscope provides magnification in a straight line. Sometimes due to the curvature of the external auditory canal or a bony overhang surgeons may have difficulty in visualizing the surgical field. It can be overcome by manipulation of patient head or the angle of microscope. However, sometimes a canalplasty is required[1-5].

Endoscopes bring surgeon's eye to the tip of the endoscope. It allows view of the whole view of tympanic membrane (TM) in a single field without need of manipulating patient's head. Through the perforation and with use of angled endoscopes the middle ear structures and anatomy can be visualized[7,9]. Endoscopes can be handy in curved external auditory canal where they can negotiate the curvature and can be helpful in visualizing the surgical field thus avoiding the need of canalplasty[5]. Moreover endoscopes are comparatively cheaper and easily portable. Endoscopes can be used with HD camera with video monitor system which provides a larger image. In the present study Karl Stroz endoscopes, high definition camera and monitor were used.

Endoscopic surgery also has its limitations. Since one hand is used for handling of the endoscope it is a single handed surgical technique[7-10]. Moreover handling of the endoscope with the camera unit for a prolonged period can lead to arm fatigue[9]. The magnification of the endoscope is fixed unlike that of microscope which can be increased or decreased[10]. Moreover endoscope provides a monocular vision which can lead to loss of depth perception[7]. There is fogging of the lens requiring frequent removal of endoscope from the operative field. In case of bleeding it becomes more difficult to operate using single operative hand where microscope is of proven advantage[7,-11].

Savlon is often used for cleaning and defogging during surgery. There is risk of exposure of middle ear mucosa to savlon. There are still no studies to prove the safety of savlon exposure to middle ear[9]. Since the endoscopes are inserted into the ear canal during surgery the possibility of thermal injury to middle ear structures cannot be ruled out. Moreover there is a risk of injury by the endoscope itself in case of accidental movement of the head by the patient[11].

The results of endoscopic myringoplasty and operating microscope assisted myringoplasty are comparable. In the present study success rate as defined by graft uptake was 85% in endoscope assisted myringoplasty as compared to 80% of microscope assisted myringoplasty. Hsu et.al. reported a success rate of 96.2% in endoscope assisted myringoplasty and 92% in microscope assisted myringoplasty[6]. Yadav et.al reported a success of 80% cases operated with endoscopic myringoplasty[1]. Lakpathi et.al reported a success rate of 88% cases with endoscopic myringoplasty and 90% with microscope assisted myringoplasty[7]. Patel et.al. reported equal success rate of 68.18% in both endoscope assisted and microscope assisted myringoplasty[12]. In our study we also observed comparable success rate between the two groups this in agreement with earlier reported studies[1,6,7,12].

The mean pre-operative hearing loss in group A was 35.5 dB while the mean post-operative hearing loss was 22.5 dB giving mean post-operative hearing gain of 13 dB. In group B, the mean pre-operative hearing loss was 37.5 dB with mean post-operative hearing loss of 22.5 dB with a mean hearing gain of 14.0 dB. Hsu et.al. reported hearing gain of 10.27 dB in endoscopic myringoplasty and 12.43 dB in microscope assisted myringoplasty[6]. Jyothi et.al reported 16.16 dB gain in endoscopic myringoplasty group and 19.54 dB in microscope assisted myringoplasty[8]. The results of present study are comparable to earlier reported studies[6,8].

Many authors have reported that the average operative time was less in endoscope assisted myringoplasty in comparison to operative time required for microscope assisted myringoplasty. The reported average time consumed for endoscope assisted myringoplasty between 60 minutes to 120 minutes, while the time consumed for microscope assisted myringoplasty varied from 110 minutes to 160 minutes.[6-8] In our study there was no significant difference between the two groups. It was probably due the fact that in our study we have used transcanal approach in both groups: endoscope assisted and microscope assisted myringoplasty.

Transcanal approach is a standard approach for middle ear surgery. Postaural approach requires a bigger incision and is associated with increased operative time. Transcanal approach in comparison to postaural approach is associated with shorter operative time, preserves the integrity of ear canal and causes less damage to the cartilaginous part of the external auditory canal. Moreover it is associated with less incidence of pain, swelling and bleeding and better cosmetic results [6-8, 13-15].

Both microscope and endoscope has their role in middle ear surgery. Each has its own advantages and disadvantages. Given the variations in anatomy and extent of disease both microscope and endoscopes can be complementary to each other as visualizing modalities. Moreover surgical outcomes depend on variety of factors including patient factors and surgical skills of the surgeon.

CONCLUSION

The results of endoscope assisted myringoplasty are comparable to microscope assisted myringoplasty. Operating microscope and endoscope are excellent visualizing modalities for the middle ear surgery and their use should be employed as per the patient requirement and surgeon's expertise.

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