

A Clinical Study of Endoscopic Myringoplasty using Autologous Temporalis Fascia.

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Abstract:

Background: Myringoplasty is commonly done under microscopy; Major disadvantage of operating microscope is that it provides a magnified image along a straight line. Now a day's Endoscope is widely used to perform various ear surgeries including Ventilation tube insertion Myringoplasty, Tympanoplasty, ossicular reconstruction, otosclerosis surgery, cholesteatoma removal etc..

Materials and Methods: In this prospective study 60 patient between age group 18-45 year (46 female and 14 male) underwent Transcanal Endoscopic Myringoplasty using autologous temporalis fascia graft.

Result: A study included 60 ears operated with technique of Transcanal Endoscopic Myringoplasty with temporalis fascia grafting, Graft uptake rate for temporalis fascia is 86.66%

Conclusion: Transcanal Endoscopic Myringoplasty is an effective and less invasive new surgical access technique in otology in which satisfactory results for graft uptake rates can be achieved even in the beginning stage.

Key Word: Endoscopic, Myringoplasty

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I. Introduction

Chronic Otitis Media is a common condition in India. The perforation seen in chronic otitis media may be the only sequelae remaining when pathological process in middle cleft has healed (1). It exposes middle ear mucosa to exogenous source of infection and also produce conductive hearing loss, to address this issue, surgical technique of Myringoplasty was developed. Myringoplasty is repair of the perforation of tympanic membrane when middle ear space, its mucosa and ossicles are free of disease. Different materials have been used to reconstruct tympanic membrane, most accepted of which is temporalis fascia, because of its qualities of low metabolic rate, requiring lesser blood supply and is more resistant to infection (2).

The term Myringoplasty was introduced in 1878 by Berthold, who successfully closed tympanic membrane perforation with full thickness skin graft. A simple underlay myringoplasty (SUM) using fibrin glue was introduced in 1992 by Yuasa et al (3). Major disadvantage of operating microscope is that it provides a magnified image along a straight line (4).

The first published description of imaging of the middle ear by endoscopy was by Mer and colleagues in 1967 (5). Middle ear surgeries, which were traditionally performed under a microscope, are now increasingly being done endoscopically (6). El-Guindy has contended that the otoendoscope could replace the operation microscope (7).

In 1958 Heerman first began to use temporalis fascia. In present study attempt is made to study effectiveness of temporalis fascia as graft material and the improvement in hearing following its grafting by Transcanal endoscopic method. Preoperative symptom analysis, Audio logical assessment, graft uptake, postoperative symptom analysis, postoperative Audio logical assessment, complication and follow presented in this study.

II. Materials and Methods

This is prospective clinical study carried out in department of Otorhinolaryngology, Maharaja Agrasen Medical College, Agroha, Hisar.

Total 60 patients were selected, who presented to ENT Department and after fulfilling inclusion criteria.

INCLUSION CRITERIA:

- Age between 18 to 45 year
- Patent Eustachian tube
- Healthy middle ear mucosa

- Good cochlear reserve
- Ear should be dry for at least 3 months

EXCLUSION CRITERIA:

- Ossicular chain discontinuity
- Conductive hearing loss due to acquired and congenital condition other than Tympanic membrane perforation.
- Sensorineural deafness
- Revision surgery

III. Method:

Sixty patients fulfilling inclusion criteria were selected for the study. These patients were evaluated Audio logically prior to enrolment, the ear drum perforation was quantified as small sized if the perforation involved less than 25% of the surface area of tympanic membrane, medium sized if it involved between 26%-50% and large sized if the perforation involved more than 50%. Before surgery, all subjects underwent X-ray bilateral mastoid to evaluate the status of the tympanic cavity and the mastoid cavity. Surgery was performed under local anaesthesia with sedation. The technique employed in all patients was Transcanal Endoscopic Underlay Myringoplasty using autologous temporalis fascia graft material. Audio logical evaluation was done postoperatively after 2 months.

The outcome was taken as :a) Successful – If at the end of 3 months the graft was still in situ.

b) Failure – If there was graft rejection after 3 months.

Mean hearing levels and air-bone gap (ABG) for each patient were determined by averaging the hearing thresholds at 0.5, 1, 2, and 3 kHz, yielding a 4-tone average based on the criteria of AAO-HNS. We used 0-, 30- or 70-degree angled rigid endoscopes with 4mm outer diameter together with a highdefinition video system. Surgery was performed with the endoscope held in one hand and the surgical instruments in the other hand.

Surgical steps:

Temporalis fascia graft is harvested under local anesthesia by supraauricular incision and allowed to dry. The external auditory canal is then anesthetised using 2 % xylocaine with 1 in 2,00000 adrenaline. About 1/2 cc is infiltrated at 3 - o clock, 6 - o clock, 9 - o clock, and 12 - o clock positions about 3mm from the annulus. The patient is premedicated with intramuscular injections of 1 ampule fortwin and 1 ampule phenergan.

Step I: Freshening the margins of perforation - In this step the margins of the perforation is freshened using a sickle knife of an angled pick. This step is very important because it breaks the adhesions formed between the squamous margin of the ear drum (outer layer) with that of the middle ear mucosa. These adhesions if left undisturbed will hinder the take up of the neo tympanic graft. This procedure will in fact widen the already present perforation. There is nothing to be alarmed about it. Step II: This step is otherwise known as elevation of tympanomeatal flap. Using a drum knife a curvilinear incision is made about 3 mm lateral to the annulus. This incision ideally extends between the 12 - o clock, 3 - o clock, and 6 - o clock positions in the left ear, and 12 - o clock, 9 - o clock and 6 - o clock positions in the right ear. The skin is slowly elevated away from the bone of the external canal. Pressure should be applied to the bone while elevation. Step III: Elevation of the annulus and incising the middle ear mucosa. In this step the annulus is gradually lifted from its rim. As soon as the annulus is elevated a sickle knife is used to incise the middle ear mucosal attachment with the tympanomeatal flap. This is a very important step because the inner layer of the remnant ear drum is continuous with the middle ear mucosa. As soon as the middle ear mucosa is raised, the flap is pushed anteriorly till the handle of the malleus becomes visible. Step IV: Freeing the tympanomeatal flap from the handle of malleus. In this step the tympanomeatal flap is freed from the handle of malleus by sharp dissection of the middle ear mucosa. Sometimes the handle of the malleus may be turned inwards hitching against the promontory. In this scenario, an attempt is made to lateralise the handle of the malleus. If it is not possible to lateralise the handle of the malleus, the small deviated tip portion of the handle can be clipped. The handle of the malleus is freshened and stripped of its mucosal covering. Step V: Placement of graft (underlay technique). Now a properly dried temporalis fascia graft of appropriate size is introduced through the ear canal. The graft is gently pushed under the tympanomeatal flap which has been elevated. The graft is insinuated under the handle of malleus. The tympanomeatal flap is repositioned in such a way that it covers the free edge of the graft which has been introduced. Bits of gelfoam are placed around the edges of the raised flap. One gel foam bit is placed over the sealed perforation. This gelfoam has a specific role to play. Due to the suction effect created it pulls the graft against the edges of the perforation thus preventing medialisation of the graft material.

IV. Result

Transcanal Endoscopic Myringoplasty done under local anaesthesia, graft take up rate was 86.66% at the end of 3 month. Preoperative pure tone average mean was 33.20 dB. The postoperative pure tone average mean was 16.87 dB. Thus hearing gain of 16.33 dB was seen in our study.

V. Discussion

Awad and Hamid (2015) reported that operation time is shorter in patients undergoing endoscopic surgeries(8). In the study of Ghaffar et al. (2006), mean operation time was found to be 62.85 min in patients undergoing endoscopic tympanoplasty(9). Huang et al. (2016) reported that the mean operation times was 50.4 min in patients undergoing endoscopic tympanoplasty(10). In the study of Patel et al. (2015), mean time of endoscopic tympanoplasty operation was found to be 75 min(11). The mean operation time in our study was 70min.

Karhuketo et al. (2001) stated that canaloplasty and outer ear curettage became necessary in some of their patients undergoing microscopic tympanoplasty. Conversely, none of their patients who underwent endoscopic tympanoplasty required interventions such as canaloplasty or curettage(12). In our study also no canaloplasty required.

In the study of Raj and Meher (2001), the rate of graft survival was 90% in patients undergoing endoscopic Myringoplasty(13). el-Guindy (1992) reported that graft success rate was 91.7% among their patients undergoing endoscopic Myringoplasty(7). In our study graft take up rate is 86.66%.

Endoscopic surgery, in contrast, is based on 2D images. These 2D images make depth perception difficult(15), and thus, the surgeon has to carefully ascertain whether the graft has been sufficiently lifted to make contact with the edge of the perforation. However, advances in full HD camera systems provide much clearer and contrasted endoscopic views and has greatly minimized the drawbacks of 2D images. One of the main shortcomings with an endoscopic approach is the need for “one-handed” surgery. The operator has to use one hand to hold the endoscope and the other hand to perform the actual surgery. However, one-handed surgery does not really constitute a shortcoming in transcanal endoscopic myringoplasty. A simple procedure such as myringoplasty can be easily performed using a one handed procedure without any increased risk or difficulties. Another shortcoming of endoscopic surgery is that hematomas can result if the endoscope makes contact with the external auditory canal. However, the endoscope’s wide field of view allows observation of the entire circumference of the perforation and approaching the edge of the perforation reveals the under surface of the tympanic membrane. According to the principles of minimally invasive surgery, minimal trauma of healthy tissue is produced with the result of minimizing local and general postoperative adverse reactions. Transcanal endoscopic myringoplasty is a minimally invasive technique. Transcanal endoscopic myringoplasty offers a number of advantages in comparison to the retroauricular microscopic approach including less invasiveness (no skin incision and no canaloplasty), superior visualization, and no hair loss.

VI. Conclusion

Endoscopic Myringoplasty is an effective and less invasive new surgical access technique in otology in which satisfactory results for graft intake rates can be achieved even in the beginning stage.

Advantages of endoscopic myringoplasty: 1. This surgical procedure fulfils the criteria of minimally invasive surgical procedure. 2. Equipment is portable 3. It is cost effective

Disadvantages: 1. Since the non-dominant hand is used to hold the endoscope only one hand is available of surgery 2. Learning curve is very steep.

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