

The Outcome of The Different Techniques of Myringoplasty in Safe Perforations of Tympanic Membrane in Kirkuk City

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Abstract

Background: Perforations of the tympanic membrane are common problem that usually arise after trauma (accidental or iatrogenic) or inflammation as chronic suppurative otitis media. They tend to heal spontaneously if the causative factor is disappeared. Myringoplasty will be necessary when perforations persist for long periods, to restore the normal anatomy and function of the middle ear.

Patients and methods: All patients with tympanic membrane perforation enrolled in elective myringoplasty procedure in the period between august 2022-july 2025 were included in the study. patients were examined and investigated by pure tone audiometry (PTA) preoperatively and postoperatively. patients were followed postoperatively for at least 6-9 months.

Results: A total of 30 patients included in the study had been operated by the author for closure of the perforation (myringoplasty) during the period of study. There were 21 female and 9 male patients and the age range of them 14-57 years and mean age of 35 years. Preoperative PTA done and showed 24 patients (80 %) had ABG > 20 dB. but postoperatively just seven patients remained with ABG > 20 dB. the success rate of perforation closure was 93%.

Conclusion: Myringoplasty is a useful technique for management of tympanic membrane perforation to improve hearing and prevent ear discharge. The success rate of myringoplasty in this series was 93%, which was comparable with other international studies. Endoscopic trans canal approach allows the access to the TM perforation avoiding the post-auricular approach. We think that endoscopic tympanoplasty approach will likely become the most performed technique to repair TM perforation even in children.

Keywords: perforation, Tympanoplasty type 1, Chronic otitis media.

Introduction

Perforations of the tympanic membrane are common problem that usually arise after trauma (accidental or iatrogenic) or inflammation as chronic suppurative otitis media [1]. They tend to heal spontaneously if the causative factor is canceled [2]. Surgery is requisite when perforations fail to close spontaneously to restore the normal anatomy and function of the middle ear [3].

Myringoplasty is one of the common reconstructive surgeries performed in otologic centers. The procedure is essential to prevent middle ear infections, restore hearing, and regaining the protective role of the tympanic membrane [4]. While conventionally performed using microscopic techniques, the endoscopic approaches are increasingly used because of their minimally invasive nature [5]. Myringoplasty aims to close perforations by excising the scarred perforation edges, establishing a new proliferative phase allowing regrowth of the freshened edges on a scaffold of various graft materials [6]. There are many factors influencing the closure rate of tympanic membrane perforations after myringoplasty, including the size and site of perforation, the function of the Eustachian tube, revision surgery in addition to the expertise of the surgeons [7-9]. However, the operative success rate of myringoplasty has been reported to be 75-100% [10, 11].

This study aims to assess the outcome of different techniques of myringoplasty in al-azadi teaching hospital in Kirkuk, Iraq.

Patients and Methods

Study Design

A cross-sectional study, descriptive design was applied.

Data Collection

Before surgery, each patient has undergone a full assessment including history, physical examination, and audiometry. Three months after surgery, patients were seen again and pure tone audiometry was repeated to assess the postoperative audiological improvement. Hearing improvement was assessed based on the calculation of means of audiometric changes at the four frequencies of 500, 1000, 2000, and 4000 Hz.

Inclusion Criteria

Both sexes were included and the age range from 14 to 57 years, Safe traumatic ear drum perforations and those due to chronic otitis media, patients with good eustachian tube function, patients with audiogram gap between 20-40dB.

Exclusion Criteria

included any case with cholesteatoma, tumor, tympanosclerosis, or ossicular erosion/fixation. Patients.

Thirty patients aged between 14 and 57 years diagnosed with dry ear drum perforation were enrolled in the study. The study was approved by the Ethical and scientific committee at the faculty of Medicine, university of Kirkuk. Written in-formed consents were obtained from all participants. All of the patients underwent myringoplasty in the ENT department in Al -Azadi hospital in the period between August 2022 and August 2025, performed by author and most patients have been followed for at least 6-9 months postoperatively.

Surgical Techniques

The surgery was performed under general anesthesia except two patients refused general anesthesia so operated under local anesthesia. The approaches applied in this study were Post aural, endaural approaches with microscope assistance and trans-canal endoscopic approach. The incision area behind the pinna and the auditory canal were injected by a solution of lidocaine/adrenaline 1.100.000. An incision was made 1 cm behind the postauricular crease with harvesting of the temporalis fascia graft for only 11 cases but in other 19 cases harvesting tragal cartilage done. Thereafter, the external auditory meatus was entered, refreshing the edges of tympanic membrane remnants in all patients by sickle knife, raising the tympan meatal flap and annulus by Rosen knife to reach the middle ear cavity, the graft was fixed using the underlay technique for both temporalis fascial and tragal cartilage but only in one patient butterfly technique applied and eventually a gel foam was used to cover the graft. Repositioning of the post aural flap was performed followed by closure of the wound and a wick of antibiotic impregnated gauze over the gel foam was inserted in all of the cases.

Postoperative Follow Up

The patients were discharged on the same day of the surgery, systemic antibiotics, analgesics were prescribed for 2 weeks after the surgery and instructions in the form of rest and avoiding straining, After 2 weeks, the dressing and sutures were removed. Patients are advised to keep the operated ear dry and away from water and sleep on the other side for at least one month. to be seen monthly for at least 6 months.

Outcome Measures

Assessment of Success of myringoplasty done both subjectively and objectively. The subjective factors like, Improvement of hearing, absence of ear discharge While Objective parameters were, Healed perforation as seen by endoscope and Improvement in hearing threshold demonstrated by pure tone audiometry. Postoperative complications were evaluated and included: infection, anterior blunting, graft lateralization, reperforation, cholesteatoma formation, facial nerve affection.

Statistical Analysis

Percentage analysis was used to show the outcome.

Results

The study sample consisted of 30 participants, 21 females and 9 males whose ages ranged from 14- 57 years old (35.5). The myringoplasty was done on the right ear in 16 patients (51%) and on the left side in 14 patients (49%). Two patients developed graft infection and only one patient developed graft lateralization and one female patient developed reperforation but on conservative treatment it was closed. One revision myringoplasty done in our study. The study sample characteristics are shown in Tables 1 and 2. Showing most cases were female presented for myringoplasty procedure.

Table 1. Sex distribution of patient with myringoplasty

Sex	NO.	%
Male	9	30
Female	21	70
Total	30	100

Great numbers of our patients were female 70%

Table 2. Age distribution of patients with myringoplasty

Age	No.	%
<25	19	63
26-50	10	33
51-70	1	4
Total	30	

Major number of cases presented with TM perforation were under 25 years.

Table 3. percentage of the Success in patients presented for myringoplasty according to the size of perforation in TM.

Success	<50% Size of perforation	>50% Size of perforation	Total
Failed	0	1	1
Success	6	22	28
Lateralized	0	1	1
Total	6	24	30

In this series the success rate of the graft was 93%). Graft failure was seen in only one total perforation size (>50%) and lateralization in one patient with subtotal perforation (>50%) (table3).

Some patients had been operated by microscope using postauricular approach, but greater number had been operated by transcanal endoscopic approach, and one patient with endaural approach as Table-4. Both of the grafts (temporalis fascia and tragal cartilage) used in this study had been positioned in underlay technique except in one patient tragal cartilage positioned in Butterfly technique.

Table 4. types of the operative Techniques for myringoplasty

Type of Technique	No.	%
TCE	18	
PAM	11	
Endaural	1	
Total		

Major percentage of the technique in this study was transcanal endoscopic approach.

Table 5. postoperative ABG (hearing gain) for patients with myringoplasty

ABG	NO.	%
<20dB	21	70
>20Db	7	23
TOTAL	28	93

The air-bone gap (ABG) was calculated as PTA_{for AC} minus PTA_{for BC}. Hearing gain was determined as preoperative PTA₄ minus postoperative PTA₄; a positive value implies improved hearing.

The table 5 shows the 70% posop. ABG <20dB in this study as hearing improvement.

Discussion

The present study analyzed the outcome of 30 patients who underwent myringoplasty during the last 3 years at Al-azadi teaching hospital, university of Kirkuk, Iraq. There was a large number of females among the patients in the study (70%). This is comparable with the study of Indorewala et al [12], who explained that female have been found to pay more attention to their health than males. Tympanic membrane perforations were mainly subtotal and total types 24 patients (80%) while 5 patients (20%) had central perforation and just one patient with posterior type, and this could be due to late presentation of the patients in case of CSOM or in cases of trauma due to aggressive trauma caused loss of major part of the ear drum. The results of this study showed that all grafts were closed postoperatively (93%). However, partial graft defect occurred in one patient while graft complication or infection occurred in one patient. A study by Philips et al [13] showed the closure rate (98.9) % for myringoplasty. Indorewala et al [12], reported that complete graft uptake was in (98.6) % of patients and more than 86% of patients had improvement of hearing function postoperatively. However, graft failure was shown in one patient only (7%) with total perforation and one partial graft defect in patient with subtotal/total perforation, similar results have been shown in some international studies about the graft intake and size of the perforation. In this study they achieved a success rate of 100% for small perforations (size less than 50%) and (71.42) % for large perforations (size greater than 50%). However, in the case of larger TM defects, perforation closure has less chance. It has been attributed to technical problems and poor vascularization and epithelialization with larger perforations. Study by Kotecha et al. [14] and Onal et al. [15]. have shown better graft take in a small size perforation as compared with a large perforation

In this study preoperative PTA indicated that 24 (80%) patients with large perforations of TM (> 50%) had a hearing gap >20 dB and 6 patient only with small perforations size of TM (less than 50%) had more than 10dB ABG, but after the surgery all of our patients had <20 dB but only 7 patients remained with a hearing gap >20dB. All of these 7 patients with a persistent hearing gap were found to have a healed graft. However, myringoplasty produces only a minor improvement in hearing, and patients should be counselled accordingly. Lee et al. [16] found a difference in the audiometric improvement of 7.2dB for small perforation had (< 50%) perforation size and 10.2dB for large perforation (> 50%). The greater loss for total or subtotal perforations was explained in the study of Glenna et al. by the reduction in the effective/ inertial mechanical drive to the umbo, causing decreased middle ear pressure gain [17]. However using of two types of grafts in this study because most recent studies showed no significant differences in the hearing and healing outcomes between the two types of the grafts [18-21].

The normal functioning eustachian tube is an integral part of the good aeration of the middle ear and good tubo-tympanic mucociliary clearance, so in our study more than two cases of septoplasty done before myringoplasty. limitation of this study is limited number of patients.

In conclusion the myringoplasty remains a useful technique for improving hearing and prevention of otorrhea. However, its outcome depend on the size of perforation and surgeons' skill. The success rate in this study is comparable with the international studies quoted. Endoscopic trans-canal myringoplasty is an alternative surgical approach to the traditional technique. It allows access to TM perforation avoiding the post-auricular approach. We think that endoscopic tympanoplasty approach will likely become the most performed technique to repair TM perforation even in children.

Recommendations

- 1-It is highly recommended to study different techniques of myringoplasty with a large number of patients with special stratifications about the age and different sexes.
- 2-Replicating the study in a multicenter trial to get more depth in representation of the population such as different environments and socioeconomic states, occupations .
- 3-Finally, longer follow up periods for current patients to detect any resorption or late failures.

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