ORIGINAL ARTICLE

OUTCOME OF POSTEROSUPERIOR BASED FLAPS IN SUBTOTAL TYMPANIC MEMBRANE PERFORATIONS

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ABSTRACT

Objective: To determine the outcome of posterosuperior (PS) based flap in subtotal perforation of the tympanic membrane in myringoplasty.

Material and Methods: It was a case series study, conducted in otorhinolaryngology department of Peshawar Medical Collage at Kuwait Teaching Hospital from January 2015 to March 2016. A total of 100 cases were studied in which male to female ratio was 3:2. All those cases where there was central, dry perforation of more than 6 months duration with age range of 15 to 55 year of both the gender were included. The patients with persistent aural discharge, acute otitis externa, active sinunasal disease, marginal perforation, with suspected cholesteatoma were excluded. In 60 patients we used postero superior based flap along with temporalis facia graft and in 40 patients we used only temporalis facia graft. 10 cases were operated through endaural approach while 15 cases were operated through postaural approach. Remaining 75 cases were operated through transcanal approach. All cases were operated under local anesthesia.

Results: Out of 100 patients 60 were female and 40 were male. In 60 patients PS based flap was used along with temporalis fascia graft and patients were followed up for 3 months. Only in 10 patients the perforation was not closed and the patient present with persistent ear discharge while in 50 patients the perforation was closed with improve hearing with no discharge. In these cases the success rate was 83.2%. Rest of the 40 patient were operated by under lay technique. In all these cases temporalis facia was used as a graft material with no flap because of its low metabolic requirement and easy availability. In 9 patients the perforation was not closed and the patients were having persistent ear discharged. Success rate in these cases was 77.5%.

Conclusion: In subtotal perforation posterior superior based flap provide additional blood supply to the center of graft and thus Improve the graft uptake rate and thus increase the percentage of success.

Key Words: Tympanic, membrane, flap, perforation, temporalis fascia, tragal cartilage, perichondrium.

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INTRODUCTION

Myringopasty is the surgical procedure in which perforation in the parstensa of tympanic membrane is closed[1]. The presence of perforation in the parstensa of tympanic membrane with intermittent discharge and conductive hearing loss is the indication for myringoplasty[2]. Different surgical approaches are used to repair the perforated tympanic membrane depending on the size of external auditory meatus, visibility of the margin of perforation and the surgeon personal experiences[3,4]. Different autologous materials are used to close the tympanic membrane perforation, they are temporalis fascia, tragal perichordium, cartilage and vein[5]. Temporalis fascia is most commonly used graft in Myringoplasty because it has low metabolic requirement and can be easily taken[6,7]. The causes of perforation are either middle ear infection or trauma[8]. Most of the traumatic perforation heal with conservative treatment by keeping the ear dry[9]. Perforation due to middle ear infection are divided in to small, medium, large subtotal and total perforation[10,11]. Small and medium size perforation heal spontaneously if the ear is kept dry and the Predisposing factor like deviated nasal septum, sinusitis and nasopharyngeal infection[12].

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Large, subtotal and total perforation need to be surgical closed[13].

Berthold was the first to introduce surgical repair of T.M perforation by using thick skin graft in 1878. Later on Wullstein and Zollner did myringoplasty by using split skin graft[14]. Later on the works on the surgical repair of TM was continued. Different graft materials were used by different techniques. Most commonly used techniques are Overlay, under lay and sandwich technique[15]. In Overlay the graft is placed lateral to the fibrous layer of TM while in under lay the graft is placed medial to the a remnants of TM and over the handle of maleus[16]. In sandwich technique the graft is placed anteriorly beneath the T.M and posteriorly between the remnants of TM and PS flap and over the bare bone of meatus. The aim of this study is to know the outcome of success of PS flap in sub total perforation of TM and reduce the morbidity of patients having chronic discharging ear[17].

MATERIAL AND METHODS

This study was carried out in the Department of Otorhinolaryngology, Peshawar Medical College at Kuwait Teaching Hospital, Peshawar from January 2015 to March 2016. A total of 100 cases were included in whom 60 female and 40 male were operated and followed up for 3 months. The inclusion criteria were chronic suppurative otitis media of tubotympanic type with dry central perforation for at least 2 months with no complication. Age limit for the patients was between 15 and 55 years of either sex. Exclusion criteria for the patient were persistent ear discharge, acute otitis externa, active sinunasal disease, marginal perforation and suspected cholesteatoma. In 60 patients PS flap along with the temporalis fascia graft was used while in 40 patients only temporalis fascia graft was used. In 10 cases endaural approach was used while 15 cases were operated through post aural approach. The remaining 75 cases were operated through transcanal approach. All the cases were operated under 2% xylocaine with 1 in 100000 adrenaline used as local anesthetic (L/A). Forty cases were operated by underlay technique and in 60 patients we used PS based flap along with the temporal fascia graft. All the patients fulfilling the diagnostic criteria were selected through consecutive sampling from OPD. Written and informed consent was obtained from the patient. History like previous episodes of any surgical intervention was obtained and basic investigation like full blood count, coagulation profile, virology. Pure tone audiogram, mastoid and sinuses x-ray were done.

All the information including name age sex and address was recorded. All data collected was analyzed using SPSS version 17. Frequency was calculated for qualitative variable like gender and graft take rate. Means and SD was calculated for quantitative variable like age of the patient graft take rate was stratified among age and gender to see a effect modifier. The result was presented in tables and charts. This study was conducted in the department of ENT Peshawar Medical College at Kuwait Teaching Hospital, Peshawar. The duration of study was 15 months. During that period 100 patients 60 female and 40 male were admitted and operated. They were observed and followed for 3 months to find out the success of Myringoplasty with PS based flap in sub total perforation of the tympanic membrane.

RESULTS

The patient in which PS based flap was used 50 patient (83.2%) had taken graft with improvement of hearing while 10 (16.8%) had not taken graft and show persistent discharged with conductive hearing loss. Patient in which the PS flap was not used 31 (77.5%) had taken graft while 9 (22.5%) patient had not taken graft and show persistent discharge and deafness.

Table 1: Age distribution of patients

Age Distribution	No. of patients and percentage
< then 20 years	10 (10%)
21-30 years	50(50%)
31-40 years	22(22%)
41-50 years	13(13%)
51-55 years	5 (5%)
Total	100 (100%)

Table 2: Gender-wise distribution of patients

Gender	Percentage
Male	40(40%)
Female	60(60%)
Total	100(100%)

Table 3: Percentage of graft taken

Myringoplasty without PS flap	Myringoplasty with PS flap
31 out off 40	50 out off 60
77.5%	83.2%
Total	100(100%)

DISCUSSION

Myringoplasty is the surgical procedure in which the anatomy and function of the middle ear is restored in cases of perforated tympanic membrane. The repair

of tympanic membrane was first described by Banzer in 1640. He utilized the bladder of pig which was stretched on the invory tube and was grafted into ear[18]. Lateron, an original skin graft was taken by Berthold as a graft for the repair of tympanic membrane perforation. He named this procedure as "myringoplastik"[11]. Wullstein in 1952, published a paper explaining method for closing perforations using skin graft[19]. Later on Zollner also published his paper regarding repair of perforation. However, the idea of selecting the skin graft from auricular region was given by House and Wullstein. After that Wullstein and Zollner classified tympanoplasty[20].

Wang reported 82.1% success rate with overlay technique while 85% success rate using underlay procedure while conducting a retrospective study[21]. With the advent of sophisticated microsurgeries and discovery of different antibiotics, two surgeons Zollner and Wullstein got an opportunity to come up with new techniques of myringoplasty[22]. Since then different surgical techniques have been developed with an effort to further improve the outcome of tympanoplasty. These different techniques include Underlay tympanoplasty[23], overlay tympanoplasty[24], "Crowncork" tympanoplasty[25], laser-assisted technique (which is often termed as "spot welding" tympanoplasty)[26], "swinging door technique"[27], micro-clip tympanoplasty[28] and facial pegging tympanoplasty[29].

In our study the minimum age of patient was 15 years and maximum age was 55 years. Mean age was 29 years. This correlate with the study done by Aina GJ where age rang was 18 to 40 years with the mean age was 31.2 years. TM perforation can occur in any age but more common in younger age due to increase frequency of upper respiratory tract infection. In our study the successes rate was 83.2% in which the PS flap was used along with the temporalis fascia graft while patient in which PS flap was not used the successes rate was 77.5%. We used temporalis fascia graft in all cases because of its easy availability and low metabolic requirement with large surface area and does not require any special preparation[17].

About 131 cases of tympanoplasty were reported by Doyle et al in a case series study in 1972. While analyzing the outcome of overlay technique, Dyle et al[23] observe recurrence in 23% of study participation during first year and upto 43% during second year. In contrast to overlay technique, in case of underlay tympanoplasty the proportion of recurrence during first year was 17% while that of after the course of three years was 12%[30]. Another study conducted by Glasscock comprising of 273 cases revealed success rate of 91% by overlay technique and 96% by underlay technique[31]. The study conducted by Sheehy and Anderson comprising of 472 overlay technique revealed 97% success rate[32]. Rizer conducted another study and reported 95.6% of success rate in overlay technique as compared to 88.8% success rate in case of underlay technique while evaluating 554 and 154 cases. respectively[33].

The revision tympanoplasty success rate has been reported as high by Packer et al[34] and Gibb and Chang[35]. Other studies have revealed success rate of about 59% in case series of revision tympanoplasty[36]. The underlay technique with graft has although been described but rarely evaluated[37].

Stage and Pedersen recommended this technique for perforation located anteriorly to the malleus handle[38]. Raghavan et al utilized onlay sandwich technique for the repair of perforations of tympanic membrane on a case series comprising of 124 patients and revealed 96.23% success rate in case of new operations and 77.78% success in case of revised myringoplasty[39]. Halik found out 60% success rate in patients developing perforation for the second time, which was considerably poor as compared to the success rate in case of fresh cases[40].

A study conducted by Feroze et al (this study) in India found out 93.3% success rate in males and 78.3% success rate in females. He inferred this finding to the difficulty of maintaining hygiene of auricular region among females due to presence of long hairs however there was no gender association in the study conducted by Kerala et al. In our study, we described the ratio of male and female patients that were included but we did not correlated gender association with the outcome of myringoplasty, which is the limitation of our study[41].

While correlating the association of age with outcome of myringoplasty, it was revealed by Feroze et al that the success rate among those who were less than 20 years of age was 80% while those ranging above 20 years but less than 46 years were having 88.1% of success rate. Patients having age above 45 years were having 77.7% of success rate[42]. The study conducted by Lin et al concluded that the outcome of ear surgery was more success in case of adult patients as compared to children. On the other hand, a study conducted by Emir et al reported 35% to 93% success rate in case of tympanoplasties of pediatric age group[43].

While comparing the outcome of unilateral perforations as compared to bilateral perforations, it was inferred by Caylan et al that the outcome of bilateral perforation was 55% while that of unilateral perforation was 96.9%[44]. The most decisive factor affecting the outcome appeared to be the surgeon experience. Thomas[7] similarly Mathai J[8] noted that results of surgery are not related to the age at operation, duration, mechanism, size and site of perforation or the condition of opposite ear. So still there is no consensus over the prognostic factor of myringoplasty. Glasscock et al[5], observed

88.6% successes rate in term of closure of perforation. This figure falls within wide range of successful closure of perforation mention in the literature (66% up to 91%) there are different clinical and technical factors which influence the results of myringoplasty.

On the other hand vartiaitianan observed that age of the patient, size, site and surgical technique did not affect the surgical result. Browning G.G[6] debated that usually myringoplasty is safe surgical procedure. It does not cause any fatal complications. Rare complication may be the worsening of hearing and late incidence of cholesteatoma formation. Similarly while making a comparison between the outcome of small perforations as compared to large perforations, it was observed by Lee et al that the outcome was better in case of small perforations (success rate was 74.1%) as compared to that of large perforations (success rate was 56.0%)[45]. However Wasson et al concluded that the determinant of size of perforation was not statistically significant while assessing the outcome of successful myringoplasty[46]. On the other hand the study by Gersdorff revealed better outcome in case of subtotal perforations as compared to that of partial posterior perforations[47].

Halik et al in his study concluded that the outcome of surgery was not affected by the presence of any particular type of secretion in middle ear cavity[40]. The study of Mill et al concluded that the presence of inactive or active ears before initiating the surgery had no significant difference in the outcome of surgery[48]. Holmquist in his study found that the outcome of surgery was better in case of greater amount of mastoid cells because of adequate tubal functioning[49]. Niazi et al concluded that the outcome of surgery is adversely affected by the presence of physiologic or anatomic dysfunction of upper respiratory tract resulting from sinusitis, tonsillitis, nasal allergy and deviated nasal septum[50]. Webb et al and Albu et al in their respective studies described that by performing cortical mastoidectomy there is no added advantage in myringoplasty of patients having chronic suppurative otitis media in case of on proof of presence of mucosal blockage or cholesteatoma in antrum[51,52].

CONCLUSION

In subtotal perforation posterior superior based flap provide additional blood supply to the center of graft and thus improve the graft uptake rate and thus increase the percentage of success.

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AUTHOR'S CONTRIBUTION

Following authors have made substantial contributions to the manuscript as under:

Shafiullah: Main idea.
Khattak MH: Data collection.
Qureshi MSH: Statistic & bibliography.
Arif A: Proof Reading.

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.