

Myringoplasty: comparison between different tissues grafts, a prospective study

Abstract

Myringoplasty is done to repair simple perforations of the pars tensa. Different tissue grafts such as temporalis fascia, lobule fat, tragal perichondrium, cartilage from tragus and helix, cartilage-perichondrium composite graft and vein grafts have been used historically with varying success rates. In this study, we have used temporalis fascia, ear lobule fat and tragal perichondrium as graft material for myringoplasty and divided the study population into three groups based on the graft used. The outcome of the surgery across the three groups have been compared in terms of successful graft uptake and hearing improvement to less than or equal to 25 dB using pure tone audiometry. The group where temporalis fascia was used showed greater graft uptake rate (88.71%). Hearing improvement was however comparable in all the three groups (80.64% in the temporalis fascia group, 81.57% in the lobule fat group & 81.25% in the perichondrium group).

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Introduction

Myringoplasty is a surgical procedure done for simple repair of tympanic membrane (TM) perforations involving the pars tensa of the TM. It doesn't involve reconstruction of the ossicular chain or inspection of the middle ear for disease. A graft is placed over or under the tympanic membrane so as to act as a scaffold over which epithelium can grow. The main purpose of performing a myringoplasty is to avoid recurrent disease of the middle ear cavity. Additionally, there may be some improvement in the hearing as well. Different tissue grafts are used for this purpose like temporalis muscle fascia, cartilage, cartilage-perichondrium composite, perichondrium, fat and venous graft. Apart from the use of antimicrobials to treat CSOM, a variety of techniques have evolved over the past few centuries in an attempt to close the tympanic membrane perforation and prevent recurrent infection of the middle ear. The attempt at repairing the tympanic membrane began in 1640 with Benzer's experiment with a pig bladder stretched over an ivory tube which was placed in the external canal to seal TM perforation. Thereafter in 1876, Roosa¹ introduced cauterizing of the TM perforation margin to stimulate healing when he applied silver nitrate to the rim of perforation. Blake² introduced paper patching in 1887 and in 1919, Joynt³ combined the techniques of paper patching with cauterizing of tympanic membrane perforation rim.

The modern era of myringoplasty ushered when Wullstein⁴ could produce results using split skin grafts. Hermann⁵ introduced temporalis fascia (1958), vein graft was introduced by Shea⁶ & Reinberg⁷ used fat (1962); Moon⁸ used the loose areolar tissue overlying the temporalis fascia (1970). The advantages of connective tissue graft over skin graft became apparent. Homograft fascia were used in the 60's and 70's with variable success. Tragal and auricular cartilage and perichondrium are other commonly used graft materials.

Temporalis fascia is now-a-days the most commonly used graft and is the material of choice for reconstruction of the tympanic membrane. Refinements applicable in particular situations have diversified the types of tympanic membrane reconstructions and with evolving techniques and use of minimal intervention; it has become a

day care procedure. With the introduction of endoscopes, the surgeon can access difficult areas without resorting to much tissue damage.

Materials and methods

A hospital based prospective, comparative clinical study was conducted in patients presenting with safe type of Chronic Suppurative Otitis Media either unilateral or bilateral involvement who subsequently underwent Myringoplasty. The basic criterion of inclusion was safe type of CSOM, with central perforation with no history of any complication with an ear that has been dry for at least 6 months. The patient must have normal middle ear mucosa, as evaluated by microscopic examination. Good cochlear reserve was also determined in these patients by a pure tone audiometry (PTA). The study group included patient age between 10 years to 65 years. Tympanic membrane perforations were classified as small, medium and large or subtotal depending on the area of the membrane involved. Those with a perforation upto 25% of the tympanic membrane area were called small, between 25–50% were called medium and more than 50% were called large or subtotal depending on the appearance of the perforation. PTA was done using frequencies of 250 kHz, 500 kHz, 1000kHz, 2000kHz, 4000kHz & 8000kHz. Air and bone conduction thresholds were determined and documented. A total of 132 patients aged between 12 years to 65 years with a dry, central perforation were included in the current study. A thorough statistical analysis of the results was done. As three tissue grafts were used in the process, the whole study population was divided into 3 groups and results were then compared:

1. Group A—Temporalis Fascia (n-62)
2. Group B—Ear Lobule Fat (n-38)
3. Group C—Perichondrium from Tragal cartilage (n-32)

The operation, myringoplasty was performed by a transcanal, postauricular or an endaural approach. Post-operative audiometric assessment was done after 6 weeks and then again after 3 months of surgery. Patients were advised follow up at every 3 month interval for the next one year. The patients were advised to keep their ear

absolutely dry. Antihistaminics were continued for the next 3 weeks.

The graft uptake of the study population was 84.85%. Group A (88.71%) had the maximum graft uptake followed by group B (81.58%). Hearing improvement less than or equal to 25dB assessed by pure tone audiometry after 3 months of surgery was considered successful in the present study. Hearing between >15–25dB assessed by pure tone audiometry was observed in maximum cases with 36, 8 and 20 cases in each of groups A,B and C. In group B however, maximum cases had post operative hearing levels between 0–15 dB. Persistent perforation (15.15%) was the most common late complication seen at follows up, followed by retractions (6.82%).

Discussion

Pardia et al.,⁹ achieved 80% success using temporalis fascia. While Mukherjee¹⁰ could obtain 92% success rate as far as graft acceptance is concerned with fat as graft material for myringoplasty. Williamson PA et al.,¹¹ advocated the use of posterior tragal perichondrium for small and medium sized perforations. Desarda¹² could get 96% success rate using perichondrium.

In the present study, hearing improvement less than or equal to 25dB assessed by pure tone audiometry after 3 months of surgery was considered successful. In 1971, Strahan et al.,¹³ concluded that hearing restoration could be judged as successful if the average post operative air- bone gap was less than 10 dB or if air conduction was less than 30 dB. Mendel L et al.,¹⁴ recommended post operative Pure Tone Audiometry in successful cases after a gap of 12 weeks from surgery. In the current study, the post operative audiogram was done at 3 months after surgery, which is in accordance to the recommendations made by Mendel et al.¹⁴ In this study, post operative hearing level of 25dB or less is considered successful which is similar to the recommendations made by Strahan et al.¹³ However, the result with fat graft myringoplasty in this study is much higher than that obtained by De S et al.¹⁵

Conclusion

In conclusion, myringoplasty is recommended for repairing simple tympanic membrane perforations. Proper case selection with good cochlear reserve and a dry and safe ear give satisfactory results. In our study, perforation closure was much higher when temporalis fascia was used as a graft material as compared to tragal perichondrium or lobule fat graft. Hearing improvement was however comparable in all groups. Better graft uptake was seen with smaller perforations and younger age.

Acknowledgments

None.

Conflict of interest

The author declares there is no conflict of interest.

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