Minimizingoplasty: Repair of Small Central Perforation of Tympanic Membrane by Fat Graft: A Prospective Study

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Abstract Ear lobule fat was used as graft material for the closure of small size central perforation of tympanic membrane. We describe this procedure as minimizingoplasty. This study was done over a period of 2 year on fifty properly selected cases. Closure of perforation was found in 92% of cases within 2–3 months of surgery. Hearing gain was 7 dB on an average and morbidity was insignificant in successful cases.

Keywords Minimizingoplasty · Small central perforation · Fat graft myringoplasty

Introduction

Large number of patient seek ENT consultation for central perforation of tympanic membrane. A significant portion of these cases are often found with very small central perforation. Minimizingoplasty is a very simple procedure to close such small perforations with ear lobule fat. By minimizingoplasty we can avoid tympanoplasty where tissue handling and morbidity is definitely more. This is a day care procedure and highly satisfactory in most of the cases.

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Aims and Objectives

Purposes of this study are as follows.

- (i) To find out the success rate of closure of TM perforation.
- (ii) To measure the hearing gain in successful cases.
- (iii) Study the improvement of subjective sufferings after minimizingoplasty.

Materials and Methods

All cases of this study were collected from ENT OPD of IPGMER & SSKM Hospital, Kolkata. Time period of this study is 2 year, from November, 2006 to October, 2008. All the operations were done by senior author or under his direct guidance, by junior author.

This study was done on 50 cases. Cases were properly selected depending on the following criteria.

- (i) CSOM with central perforation measuring ≤ 3.5 mm in longest diameter i.e. approximately $\leq 30\%$ area of tympanic membrane (parstensa).
- (ii) No discharge for last 3 months.
- (iii) No significant pathology in tympanic cavity (judged by clinical examination and investigations).

Causes of perforations of these cases were post inflammatory in 48 cases and post traumatic in 2 cases.

Investigations done were routine blood investigations, X-ray mastoids, pure tone audiometry both pre and post operative, examination under microscope, video-otoscopy/digital photography.

Cases were selected from ENT OPD on eye impression assessment of the area of central perforation occupying

≤30% of tympanic membrane. Exact measurements of central perforation was done during examination under microscope by slide calipers. Central perforations measuring ≤3.5 mm in longest diameter were selected for this study.

Surgical Steps

Standard antiseptic measures were taken. All cases were done under local anaesthesia by injection of 5 ml of 2% lignocaine with adrenaline (1:80,000) in four quadrants of external ear canal and behind the ear lobule.

A small (1 cm) horizontal incision was given on the skin behind the ear lobule. Adequate amount of fat according to the size of perforation was collected from ear lobule and preserved in normal saline. Margin of perforation was de-epithelialised by 15% TCA applied circumferentially with Zollner needle. Care is taken to avoid spillage of TCA inside the middle ear cavity. A piece of fat of suitable size was inserted through the perforation so that half portion goes inside middle ear and half portion remains outside the TM. It snugly fits in the perforation making a dumb-belle effect.

In postoperative period advice was given to avoid water entry in the ear for 3 weeks. They were prescribed oral antibiotic for 7 days and oral antihistaminic for 10 days to prevent cough and sneezing.

Patients were followed up regularly at least for 6 months. In the first month weekly, in the second month biweekly and third month onward monthly follow up was done. Post operative pure tone audiometry was done at 6 week.

Result Analysis

Among the 50 cases male was 28 and female was 22. Their average age was 27.3 years. Minimizingoplasty was the first ear operations for most of the cases i.e. in 42. The remaining 8 patient were post tympanoplasty with small persistent perforation.

Size of perforations were (Table 1) less than 1.5 mm in 10 cases, 1.5–2.4 mm in 19 cases and 2.5–3.5 mm in 21 cases.

Preoperative pure tone audiometry findings are described in Table 2. Most of the cases were

Table 1 Size of perforations of tympanic membrane

Size of perforation (mm)	No. of cases
<1.5	10
1.5–2.4	19
2.5–3.5	21

Table 2 Preoperative pure tone audiometry findings

PTA findings	No. of cases
Slight conductive loss (15–25 dB)	25
Mild conductive loss (26–40 dB)	20
Mixed loss with A-B gap <25 dB	5

Chart 1 The closure of T.M. perforation after minimyringoplasty

suffering from slight conductive loss (15–25 dB) as it was present in 25 cases. Mild conductive loss (15–25 dB) was found in 20 cases. Rest of the cases (5) were suffering from mixed loss with A-B gap <25 dB.

X-ray of mastoid was cellular in most of the cases. It was diploic only in 16 cases.

Closure of perforation as seen in this study is given by a flow Chart 1 above. One week after operation fat grafts were in situ in 38 cases. In remaining 12 cases that is 24% fat grafts were displaced. These cases were followed up conservatively. In 8 cases perforation reduced in size and healed on conservative management. In remaining 4 ears perforation increased in size and these are categorized as failure cases that needed tympanoplasty in later period. So ultimately perforation healed in 92% cases within 2–3 months.

Preoperative mean air-bone gap was 23.6 dB. Postoperative mean air-bone gap was found 16.4 dB. So average hearing gain is 7.2 dB.

Pre and post minimyringoplasty subjective sufferings are shown in the Table 3. Recurrent discharge was in 86% of cases before minimyringoplasty. After operation discharge was in 8% only i.e. in failure cases.

Abnormal sound in ear especially when exposed to air was present in all the cases. In postoperative period it was persistent only in failure cases.

Table 3 Comparative study of subjective sufferings before and after operation (described as percentage of cases)

Symptoms	Preoperative (%)	Postoperative (%)
1. Recurrent discharge	86	8
2. Abnormal sound	100	8
3. Pain and discomfort in ear	100	8
4. Hardness of hearing	60	20

Pain and discomfort in ear was the complaint of all the cases before operation. Pain was relieved in all successful cases and persisted only in failure cases.

Hardness of hearing was complained by 60% of cases. It was persistent in 20% cases post operatively i.e. in 12% cases even after successful closure of tympanic membrane perforation. Stiffness of repaired tympanic membrane may be responsible for this hearing loss as no one suffered from deterioration on sensorineural hearing loss.

Morbidity following minimyringoplasty was insignificant in cases with successful closure of tympanic membrane perforation. There was no pain after 2 days of surgery. No discomfort after 7 days of surgery. Healing of perforation was complete within 2–3 months in most of the cases.

Discussion

Different managements are available for small size central perforations of tympanic membrane.

Chemical cautery of the margin of perforation can promote healing. Derlacki [1] has shown 90% success rate of closure of perforation after an average 3.7 treatments per patient (quickest closure by two treatments and longest by 64 treatments). Here repeated attendance by the patient is required which is often not possible. Minimyringoplasty is a single stage operation. So patient compliance is much better for minimyringoplasty. Success rate of conventional tympanoplasty for small ($\leq 30\%$ area) central perforation is 100% in our institution and it is definitely better than minimyringoplasty. But morbidity and cost of therapy is much higher for tympanoplasty.

Hagemann and Hausler [2] noted closure of perforation in 91% of cases and hearing Gain of 5–10 dB. In our study we have found hearing gain of 7 dB on an average.

Chalishazar [3] described closure of TM perforation in 90% cases by fat graft myringoplasty. He has selected cases of tympanic membrane perforation occupying less than 25% of total area, where as in our study we have

selected cases with less than or equal to 30% of total area. Mitchel et al. [4] described a review of 342 children who under went fat graft myringoplasty and achieved successful closure in 92% of ears.

Roe Landsberg et al. [5] performed fat graft myringoplasty on 38 perforations and found successful closure in 81.6%. They also described significant improvement in speech reception threshold (18.5 ± 7.7 dB vs. 23.5 ± 8 dB). Average hearing gain in our study was 7.2 dB.

Healing of perforation is completed within 2–3 months in most of the cases. Healing occurs by epithealisation over the scaffolding of fat graft. But fat graft itself takes longer time for complete resumption to occur.

In 16% of cases repair of perforation were seen even after displacement of fat graft on first visit. This is because of denudation of margin of perforation by chemical cautery. Release of some tissue factor from the applied fat may have promoted growth of epithelium also.

Causes of failures are infection in the ear despite antibiotic coverage, RTI producing cough and sneezing leading to graft displacement. Few patients did not follow advice, took pond baths.

Conclusion

In this study we have achieved High success rate (92%) of repair of tympanic membrane perforation. This is an office procedure with very simple techniques. It is cost effective with minimum postoperative morbidity.

So minimyringoplasty is a highly successful simple procedure for repair of small size perforations. But it is an under used procedure. We should practice it more for the benefit of our patients.

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