Bilateral Type 1 Tympanoplasty in Chronic Otitis Media

Rajashri Mane · Balasaheb Patil · Anjana Mohite ·
V. V. Varute

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Abstract A theoretical risk of iatrogenic sensorineural hearing loss during surgery has induced a reluctance to perform bilateral tympanoplasty type I among some otosurgeons. This paper presents results of bilateral surgery in 14 patients (28 ears). Fourteen patients with bilateral, dry tympanic membrane perforations caused by chronic otitis media were selected prospectively for bilateral tympanoplasty type I (28 ears) at a tertiary referral center. All patients had a HL corresponding to the size and localization of the perforation (no suspicion of ossicular chain defect or other pathology). Mean age was 37.5 years. There were seven males and seven females in our study. All but five ears were operated through an endaural or endomeatal approach, and five ears operated by postaural approach. The Underlay technique was used in all cases. Total ten cases operated using Fascia Lata and four cases operated using Temporalis fascia as graft material. Follow-up examination and hearing tests (pure tone audiometry) were performed up to 20 months after surgery. The graft take rate was 96%, with no retraction pockets or displaced grafts observed during follow-up. One patient had small residual perforation which healed at the end of 3 months. Hearing improved significantly, and the air-bone gap was significantly reduced. The air-bone gap was closed to within 10 dB in 92% and within 20 dB in 100% of the ears. Surprisingly good hearing was found during postoperative, bilateral ear canal gauze packing. Iatrogenic sensorineural HL did not occur. We conclude that bilateral myringoplasty is safe, with good results, reduces costs, and leaves the patient satisfied. The hearing

impairment during postoperative ear canal packing is surprisingly modest and readily acceptable by the patients.

Keywords Chronic otitis media · Bilateral tympanoplasty · Hearing loss · Underlay

Introduction

Bilateral tympanoplasty type I for tympanic membrane perforation in chronic otitis media is not a routinely performed by otosurgeons. This has primarily been because of a theoretical risk of iatrogenic sensorineural hearing loss (HL) in one ear, which, in cases of conventional, two-stage procedures, would change the indication for operation or the nature of the procedure to be performed on the second ear. The risk of iatrogenic HL in surgery for ear disease has been reported to be 1.2–4.5% [1–3]. It is, however, essential to note that these incidents with HL occurred in patients with congenital malformations, cholesteatoma, or granulating otitis or in cases in which ossiculoplasty was performed. In a series of 439 patients operated by tympanoplasty type I for sequelae to otitis (including tympanic membrane perforation), no iatrogenic HL was observed [3]. Another argument against a bilateral procedure includes the use of ear canal packing with various materials for a period of typically 1–3 weeks after surgery in a number of centers. Accordingly, bilateral packing and the concurrent conductive hearing impairment has been claimed to leave the patient practically deaf for weeks after the operation. However, no data on hearing impairment caused by ear canal packing are retrievable from the literature. Only two international papers focus on the results and feasibility of bilateral tympanoplasty type I [4, 5], Mitchell et al. [4] reported good results of bilateral simple fat myringoplasty

R. Mane (✉) · B. Patil · A. Mohite · V. V. Varute
D. Y. Patil Medical College Hospital and Research Centre,
Kadamwadi, Kolhapur 416006, India
e-mail: manerajashri45@gmail.com

in 28 children, and Katsura et al. [5] evaluated 17 patients operated by underlay techniques, either transcanal or through a retroauricular approach. Per Caye-Thomasen and Torfinnur Rubek Nielsen studied the results of bilateral procedures in 26 patients (52 ears) operated transcanal primarily by onlay technique for tympanic membrane perforations caused by chronic otitis media. They conclude that bilateral myringoplasty is safe.

This paper documents the results of bilateral procedures in 14 patients (28 ears) operated by the inlay technique, with use of temporalis fascia (28.5%) and fascia lata [6] (71.5%) as graft material. The treatment strategy pertaining to patient selection criteria, perioperative decision making, and postoperative ear canal packing is discussed.

Materials and Methods

14 patients with bilateral tympanic membrane perforations caused by chronic otitis media were selected for bilateral tympanoplasty type I (28 ears) at a tertiary referral center. Selection criteria were simple perforations and dry ears bilaterally and a HL corresponding to the size and localization of the perforation (no suspicion of ossicular chain defect or other pathology). Mean age of the 10 patients was 37.5 (range 20–73) years at operation, and the male to female ratio was 1 with equal number of males and females. Perforation localization varied through all four quadrants, and size ranged from a few millimeters to a subtotal pars tensa defect (Table 1).

Surgical Procedures and Follow-Up

Out of 28 ears, 17 ears operated through the ear canal, 6 ears through endaural approach and 5 ears through a postauricular approach. Endaural approach was used for narrow external auditory canal and exposure was not good. Retroauricular approach was used in cases where temporalis fascia was required and in one case where the anterior perforation margin could not be viewed through the ear canal. The Underlay technique was used in all cases, as incidence of intratympanic cholesteatoma is less than 1% [7]. The worse-hearing ear was operated first. Temporal muscle fascia grafting was used in eight ears (28.5%) ears, and fascia lata in 20 ears (71.5%) as graft material depending on the preference of the surgeon. One week of postoperative ear canal packing with Gelfoam and gauze (moistened with hydrocortisone, Neomycin, and polymyxin B) was used standardly. Some ears were lightly packed where appropriate, but most ears were packed completely as the standard procedure. Five patients were randomly selected for either free-field or conventional

pure-tone audiometry during the days after surgery. After standard postoperative controls at 3 and 6 weeks, all patients were evaluated by otomicroscopy and audiometry approximately 1 year postoperatively (ten patients were examined after 2 years, three patients after 1 yr, patient after 4 months). The mean follow-up was 20 (range, 4–25) months.

Hearing Assessment

The pure-tone average (PTA) was calculated as the mean of the pure-tone hearing thresholds at 500, 1,000, 2,000, and 4,000 Hz. The air-bone gap (ABG) was determined as the mean of the differences between the air conduction thresholds and the bone conduction thresholds at 500, 1,000, 2,000, and 4,000 Hz.

Results

Perforation Closure

The graft take rate was 96%, with no retraction pockets or displaced grafts observed during follow-up at routine otomicroscopy. Only one patient had small residual perforation which also healed at the end of 3 months. Two patients had myringitis postoperatively, but it improved with antibiotic treatment.

Hearing Results

The hearing with ear canal packing during the days immediately after surgery was surprisingly good. When the patients were asked at ear canal packing removal 1 week postoperatively, all answered that the hearing was severely impaired for 1–3 days after the operation, after which no considerable hearing problems occurred during everyday activities. Primarily, all patients expressed an overall satisfaction with the treatment given and especially that they had been saved from going through more out-clinic visits and a second surgical procedure. The follow-up examinations approximately 1 year postoperatively showed that the PTA had improved significantly after surgery and that the ABG was significantly reduced. 5–15 db gain was seen in six cases, 15–30 db gain was seen in four patients, 30–40 db gain seen in four patients. Mean air-bone gap was improved from 8.4 to 15.8 dB.

Safety

No ears displayed a sensorineural HL in any part of the frequency spectrum after surgery, even when defining a

Table 1 Clinical profile of the patients

No.	Age	Sex	Type/site of perforation	Preop hearing (dB)	Postop graft	Postop hearing (dB)
1.	73	M	Rt medium Lt small	Rt 80 Lt 75	Fascia lata	Rt 65 Lt 70
2.	35	M	Rt medium Lt medium	Rt 75 Lt 40	Fascia lata	Rt 65 Lt 20
3.	25	F	Rt large Lt large	Rt 55 Lt 60	Fascia lata	Rt 23 Lt 20
4.	35	F	Rt small Lt small	Rt 35 Lt 40	Fascia lata	Rt 25 Lt 22
5.	24	F	Rt medium Lt medium	Rt 65 Lt 65	Fascia lata	Rt 35 Lt 20
6.	42	F	Rt large Lt medium	RT 55 LT 50	Fascia lata	RT 20 Lt 20
7.	20	F	Rt large Lt medium	Rt 45 Lt 50	Fascia lata	Rt 35 Lt 30
8.	26	F	Rt large Lt small	Rt 40 Lt 45	Fascia lata	Rt 25 Lt 25
9.	34	M	Rt small Lt medium	Rt 25 Lt 40	Temporalis fascia	Rt 15 Lt 20
10.	42	M	Rt medium Lt medium	Rt 40 Lt 45	Temporalis fascia	Rt 25 Lt 25
11.	40	M	Rt medium Lt small	Rt 40 Lt 30	Temporalis fascia	Rt 20 Lt 20
12.	30	M	Rt small Lt small	Rt 30 Lt 30	Fascia lata	Rt 15 Lt 15
13.	36	F	Rt medium Lt medium	Rt 45 Lt 40	Fascia lata	Rt 25 Lt 20
14.	64	M	Rt small Lt medium	Rt 42 Lt 74	Temporalis fascia	Rt Lt

loss conservatively as at least 5 dB loss at two adjacent frequencies.

Discussion

This paper documents the feasibility of a bilateral surgical procedure in bilateral tympanic membrane perforation caused by chronic otitis media. The ears were operated primarily by the underlay technique through a transcanal approach, endaural and postaural approach using either temporalis fascia (28.5%), or fascia lata (71.5%) as graft material. The take rate was 94%, and a significant hearing improvement was shown at a mean follow-up of 20 months. The ABG was closed to within 10 dB in 92% and within 20 dB in all patients. The tests of hearing acuity showed no case of postoperative, iatrogenic sensorineural HL. The hearing during postoperative, bilateral ear canal packing is

bad for only a few days, after which the packing dries somewhat and allows passage of air between the packing material and the ear canal skin. Thus, the patients experience only minor or moderate hearing impairment during packing, as documented by the hearing tests. The take rate of 96% is in agreement with international standards of unilateral tympanoplasty type I [8] but not in accordance with three previous studies showing that the presence of bilateral perforations adversely influence the success rate [9–11]. No adverse influence was noted in the two previous studies on bilateral surgery, in which the take rate was 91% in the study by Mitchell et al. [4] of fat myringoplasty and 85% in the study of Katsura et al. [5] of 17 patients operated by underlay techniques.

The advantages of a bilateral procedure are evident only one scheduled operation and anesthesia, reduced operating time (only one theater and patient preparation procedure and only one graft harvesting procedure), reduced number

Fig. 1 Pure Tone Audiogram showing preoperative and postoperative hearing after bilateral type 1 tympanoplasty

of postoperative outpatient control visits, reduced overall treatment period, reduced costs, and, very importantly, satisfied patients. The main, if not only, disadvantage is the hearing impairment during the ear canal packing period, as referred to above. In considering bilateral surgery for tympanic membrane perforations, only dry ears with no suspicion of additional pathology should be included because granulation tissue or a need to perform ossiculoplasty will increase the risk for infliction of a iatrogenic sensorineural HL during the operation [3]. Surgery should begin on the ear with the most severe pathology/largest perforation, and the second-ear procedure should be abandoned in case of unexpected events increasing the risk for iatrogenic HL during first-ear surgery (e.g., need for ossiculoplasty) (Figs. 1, 2).

Fig. 2 Photo of a patient showing bilateral mastoid bandage immediate postop period

Conclusion

We conclude that bilateral myringoplasty is safe, with good results, reduces costs, and leaves the patient satisfied. The hearing impairment during postoperative ear canal packing is surprisingly modest and readily acceptable by the patients.

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