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Original Research Article

Study of outcome of type 1 interlay tympanoplasty

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ABSTRACT

Background: The aim of this study is to assess the success rate of interlay tympanoplasty and its related complications.
Methods: This study was carried out in the department of otorhinolaryngology and head and neck surgery, GMERS medical college and hospital, Sola, Ahmedabad, Gujarat. In this observational study, 50 patients aged between 20-58 years with chronic otitis media were selected. Tuning fork test, pure tone audiogram, HRCT temporal bone, hemogram, anaesthesia fitness was done in all patients.
Results: All patients underwent type 1 interlay tympanoplasty with success rate of 96 % (48 cases out of 50).
Conclusions: Patients were followed up for a period of 2 months at which point they were assessed both endoscopically and from an audiological point of view.

Keywords: CSOM, ABG, EAC, TM

INTRODUCTION

Objectives were to assess the success of type 1 interlay tympanoplasty in 50 patients. Chronic suppurative otitis media (CSOM) is a longstanding inflammation of the middle ear and mastoid cavity which is often associated with tympanic membrane perforation, and conductive hearing loss.

CSOM is the most common childhood infectious disease in world.[1] It is caused by inadequately treated acute otitis media.

Treatment involves a combination of medical and surgical intervention, when and where needed. CSOM can impact a person's quality of life and can lead to complications both intracranial as well as extracranial. Tympanoplasty is a surgical procedure performed to repair the perforated tympanic membrane.

Tympanic membrane perforations can be present in the pars tensa or pars flaccida and can be marginal/central and wet or dry.[2,3]

TM perforations due to trauma that do not heal (typically, acute perforations will heal without treatment in 80% patients) may also have to be repaired.[2] Heerman introduced the concept of temporalis fascia as a graft material.[4] Type I tympanoplasty, is the most common otological procedure closely following myringotomy.[5] It is a surgical technique to repair the tympanic membrane in cases of tympanic membrane perforation, in the absence of any other concurrent ear pathologies such as cholesteatoma. It was introduced by Berthold and was further refined by Wullstein and Zollner.[6-8] Tympanoplasty can be classified based on the placement of graft in relation to the remnant tympanic membrane: Underlay technique: graft is placed medial to the mucosal layer, overlay technique: graft is placed lateral to the fibrous layer of tympanic membrane after elevating all

squamous epithelium and interlay technique: graft is placed between the fibrous layer and the endothelial (mucosal) layer of the drum remnant.[9]

METHODS

Study design

Study design was of retrospective observational study.

Study place

Study conducted at GMERS medical college and hospital Sola, Ahmedabad, Gujarat.

Study period

Study carried out from March 2023-November 2023.

Inclusion criterion

All patients in the age group of 20-58 years who came to the ENT OPD and tympanic membrane perforation either unilateral or bilateral, and some degree of hearing loss were included in the study.

Exclusion criteria

Revision cases were excluded from this study.

Ear perforation has a major impact on the social life of a person in the form of hearing disability.[10] In our study all patients were prepared preoperatively and were given antibiotics along with antihistaminic and nasal decongestant drops. All 50 cases were examined and a detailed history along with CT scan were performed. Computed tomography (CT) is the choice of investigation in simple tympanoplasty.[11] Most cases were operated under local anaesthesia with sedation and general anaesthesia was given in the patients that required a cortical mastoidectomy. All patients were operated via post aural approach. Post-aural region hair was shaved and lidocaine with adrenaline is administered, and local haemostasis achieved. Temporalis fascia graft was harvested and tympano-meatal flap was raised circumferentially. Ossicles mobility was checked. Temporalis fascia graft was kept on the bony canal all around and below the handle of malleus. Graft was stabilised by AbGel but no AbGel was kept in the middle ear. Antibiotic-soaked wick was kept in external auditory canal that was not removed till 3 weeks. Post-aural wound was stitched using vicryl 3-0. Patients were discharged the next day with dressing, which was kept for 10 days postoperative. Canal was filled with ointment for total 4 weeks. No ear drops were advised. Total 3 weeks of antibiotic were given along with 8 weeks of nasal decongestant drops. Patients were examined postoperatively using otoendoscope during follow ups at 4, 6 and 8 weeks postoperatively. Post operative PTA was done at 8 weeks.

RESULTS

Interlay tympanoplasty was done on 50 patients between March 2023 to November 2023.

The minimum age of the patient was 20 years and the maximum age was 58 years, with the median age being 38.36 years. Females comprised of 60% (30 cases) and males comprised of 40% (20 cases) (Figure 1) 94% (47 cases) had dry ears while 6% (3 cases) had discharging ears (Figure 2) 28% (14 cases) had bilateral ears perforations while 72% (36 cases) had unilateral perforations. In wet ear that is 6% (3 cases) we performed a cortical mastoidectomy while cases where we have performed a simple tympanoplasty without cortical mastoidectomy was in 94% (47 cases) (Figure 3). Lignocaine induced facial palsy was seen in 12% (6 cases) which recovered within 5 hours leaving the patients without any residual facial weakness Figure 4. We have observed a successful graft uptake in 96% of cases with an average postoperative gain of 10 dB seen. Preoperatively audiometry was performed which showed that out of 50 patients, preoperative air bone gap (ABG) between 11 to 20 dB was 12% (6 cases), 21 to 30 dB was 46% (23 cases), 31 to 40 dB was 30% (15 cases) and >40 dB was 12% (6 cases) showing that the maximum number of cases of this study had a preoperative air-bone gap of 21-30 dB Figure 5. Postoperative audiogram was done at 8 weeks after the operation. Patients had an ABG of <10 dB in 26% (13 cases), 11 to 20 in 58% (29 cases), 21 to 30 in 16% (8 cases) and no cases showed an ABG of greater than 30 dB postoperatively Figure 6.

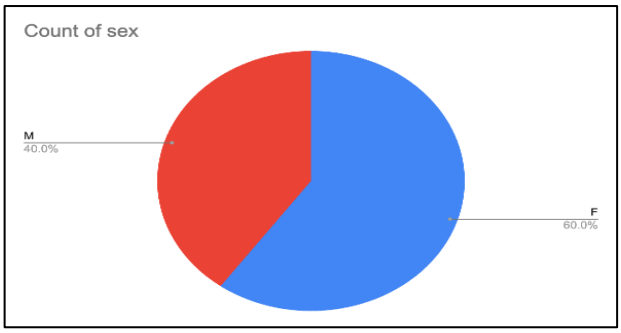

Figure 1: Count of sex.

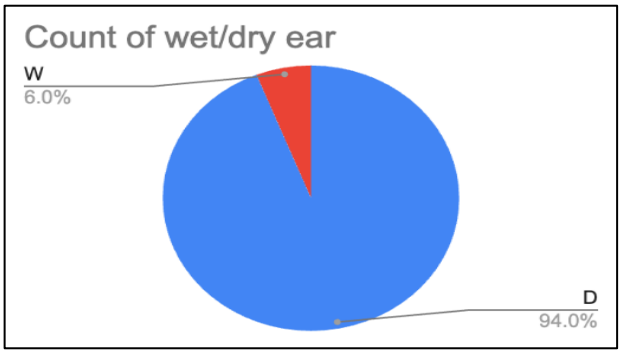

Figure 2: Count of wet or dry ear.

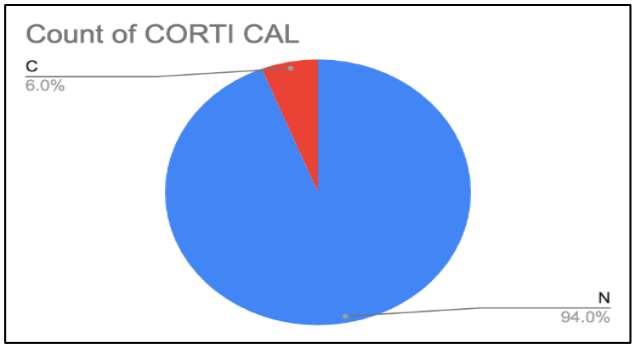

Figure 3: Count of cortical.

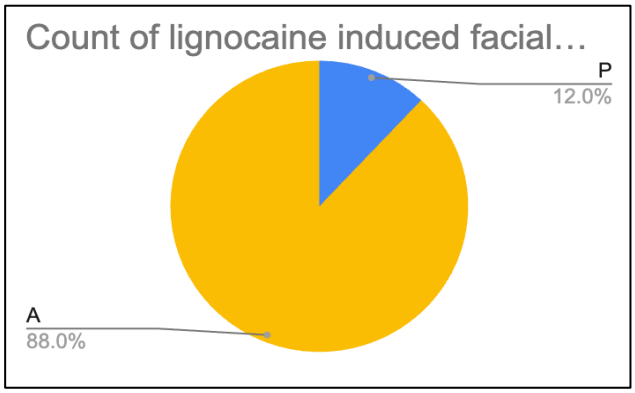

Figure 4: Count of lignocaine induced facial palsy.

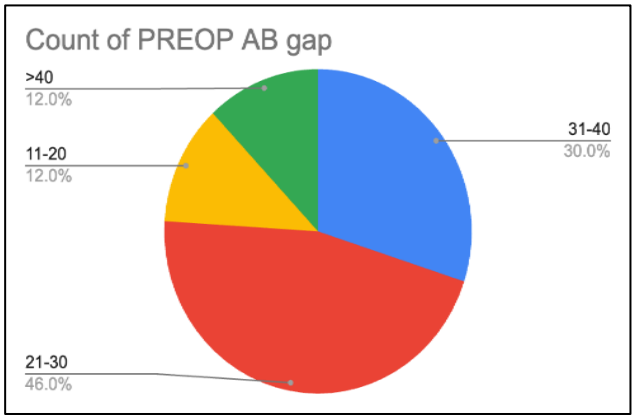

Figure 5: Count of pre-op AB gap.

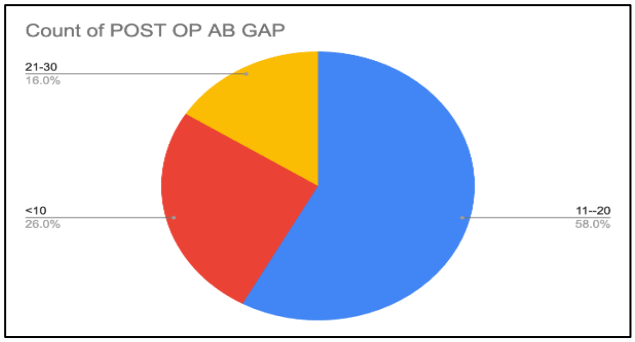

Figure 6: Count of post op AB gap.

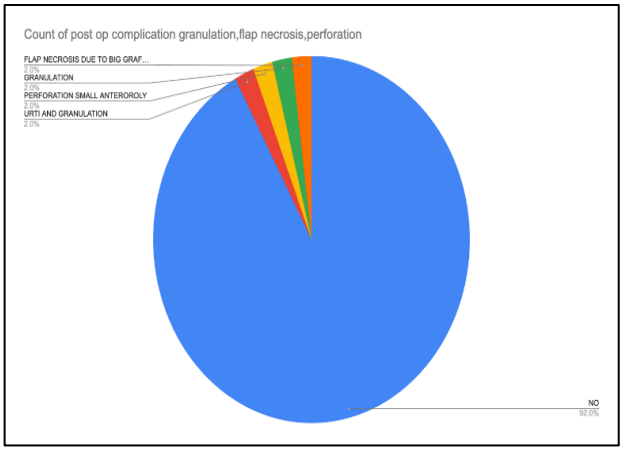

Figure 7: Count of post op complication granulation, flap necrosis and perforation.

Chandra et al quoted in his study that out of the 50 patients, 2 (4%) had a pre-op ABG in the range 11-20 dB, 8 (16%) had ABG range 21-30 dB, 24 (48%) had ABG range 31-40 dB and 16 (32%) had ABG range above 40 dB. The ABG closure at the end of 3rd month, 39(78%) patients had ABG range within 10 dB, 8 (16%) had ABG range 11-20 dB, 2(4%) had range 21-30 dB and 1(2%) had range of 31-40 db.[12]

In Patil et al study out of 100 cases, 34 patients (34%) had pre operative air bone (A-B) gap within 31-40 dB, 32 cases (32 %) had A-B gap above 40 dB, 26 cases (26%) and 8 cases (8 %) had A-B gap in the range of 21-30 dB and 11-20 dB respectively. In the 3rd month 76 (76%) cases had ABG within 10 dB, 4 (4%) cases had ABG in the range of 21-30 dB, 2 (2%) cases had ABG between 31-40 dB and no case (0%) had ABG 40 dB all of which were statistically significant. 18 (18%) cases had ABG in the range of 11-20 dB.[13]

DISCUSSION

Complications took place in 5 cases in our study and were as follows: 2 cases showed granulation in external auditory canal, but the graft was intact, 2 cases had perforation and 1 case showed flap necrosis due to large size of the graft with no perforation Figure 7. There are no chances of anterior canal wall blunting when the interlay technique is used, as the fibrous annulus which is elevated during the procedure is placed back onto the bony annulus, as per its original position, and secured in place with AbGel. Medialisation or lateralisation of the graft does not occur, as the graft is supported medially by the mucosal layer and laterally by the fibro squamous layer.[14] The fibro-squamous layer of the tympanic membrane is elevated completely hence the chance of an iatrogenic cholesteatoma is reduced. The interlay technique of type I tympanoplasty has a high success rate, both in terms of graft uptake as well as closure of the ABG. Thus, the failure rate is less as compared to other techniques.

Table 1: Graft uptake up in various other studies.

Study	Technique	Graft uptake (%)
Jain et al[15]	Interlay	96.6
Guo et al[16]	Interlay	96
Glasscock[17]	Underlay	96
Komune et al[18]	Interlay	94.2
Kawatra et al[19]	Interlay	93.3
Hay and Blanshard [20]	Interlay	91
Our study	Interlay	96

Table 2: Graft uptake up in various other studies.

Study	Technique	N	Graft uptake (%)
Sengupta et al[21]	O + U	40	92.5
Umar et al[22]	U	85	92.95
Lima et al[23]	U	39	95
Sergi et al[24]	U	52	94.2
	O	63	91.5
Lee et al[25]	Loop overlay	42	98.8
Mehta et al[26]	U	50	94
Singh et al[27]	U (with temporalis fascia)	80	95
Karela et al[28,22]	U	211	91.5
Mishra et al[29]	U	100	97
Singh et al[30]	O	30	93.3
	U	30	93.3
Stage et al[31]	U	39	97
Our study	I	50	96

O-overlay, U-underlay, I-interlay.

Limitation

Limitation of this study was that revision cases were not included.

CONCLUSION

Based on our study, in all cases, type 1 interlay tympanoplasty was performed and meticulous graft placement and postoperative care resulted in excellent result of the surgery. Our study shows type 1 interlay tympanoplasty using temporalis fascia graft is successful in 96% of patients with minimal complications and post operative AB gap being 11-20 dB in majority of patients. This technique takes more time to perform and requires a skilful experienced surgeon.

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Ethical approval: The study was approved by the Institutional Ethics Committee

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