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A PROSPECTIVE ANALYSIS AND COMPARISON OF SURGICAL OUTCOMES IN TYPE I ENDOSCOPIC AND MICROSCOPIC TYMPANOPLASTY.

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ABSTRACT Tympanoplasty is the surgical procedures aimed at restoring the hearing loss and eradication of middle ear disease. Assessment of the hearing improvement and graft uptake in type I endoscopic and microscopic tympanoplasties was made in this study. **Objectives:** To evaluate and compare the surgical outcomes of type I microscopic and endoscopic tympanoplasty. **Methods:** A prospective observational study was carried out in 120 patients of inactive mucosal type COM in age group of 15-75 (87 males and 33 females with mean age being 29.55 ± 10.36 years). All the patients underwent either microscopic or endoscopic tympanoplasty with different types of graft; outcomes of which were analysed based on graft uptake and hearing improvement. **Results:** Out of 120 patients, 61 underwent endoscopic and 59 microscopic types of tympanoplasty. There was no statistically significant association between age, gender, localisation of tympanic membrane perforation with outcomes of both types of tympanoplasty ($p>0.05$). The postoperative improvement in the air-bone gap value did not demonstrate a significant difference between both types. The graft retention rates were 90 and 98% in microscopic and endoscopic type respectively. **Conclusion:** Endoscopic tympanoplasty is minimally invasive and more feasible than microscopic tympanoplasty with similar surgical outcomes in both the groups.

KEYWORDS : grafts, tympanoplasty, A-B gap

INTRODUCTION

Tympanoplasty is an operation to eradicate disease in the middle ear and to reconstruct the hearing mechanism, with or without tympanic membrane grafting [1].

The modern tympanoplasty techniques were defined in the 1950s with the introduction of operating microscopes. The majority of the cases may require a retroauricular incision and tissue resection. However, a retroauricular scar formation, displacement of the pinna anteriorly, and the development of significant pain in the patients are the disadvantages of the microscopic tympanoplasties[2]

A prominent anterior canal wall, and anterior quadrant or marginal perforations limit the exposure or surgical manipulations in conventional tympanoplasty.[3] Invasive procedures that enlarge surgical field such as canaloplasty or a postauricular approach are needed.

Endoscopic ear surgeries were introduced in the 1990s and they gained popularity in otology. The anatomical structures of the middle ear, the anterior and posterior epitympanic spaces, tympanic sinus, and the facial recess can be visualized more clearly by endoscopy.

Varying types of grafts are available for use in tympanoplasties. The most frequently used include the fascia of the temporal muscle, tragal cartilage, perichondrium, fat, skin, and veins. The types of the grafts to be used vary depending on the experiences and preferences of the surgeons. [11,12]The fascia of the temporal muscle is the most commonly used graft in primary tympanoplasties with success rates of 68-97% for graft retentions.

Approach to the middle ear and the instruments and techniques used decide the site and length of incisions and extent of surgical dissection; these may influence postoperative pain scores and healing. Transcanal tympanoplasty can be performed with both microscope and endoscope, but postaural approach is traditionally used with microscopic ear surgery.

MATERIALS AND METHODS: A descriptive observational study was carried out in 120 patients with inactive mucosal type of chronic otitis media in the age group o 15-75 in the study period of 18 months.

Following patients were included in the study:

- No evidence of active infection in nose and throat
- Patients with dry ear.
- Conductive type of Hearing loss less than 60 dB

Patients with wet ear, middle ear malignancy, otitis externa, marginal or attic perforation or sensorineural type of hearing loss were excluded from the study.

The presentation, complete history was documented in the case record proforma. Mode of onset and duration of symptoms like otorrhoea, hearing loss, tinnitus, vertigo, otalgia, facial paralysis.

Complete examination of the affected ear was at first done with an otoscope and suitable sized aural speculum; findings were then confirmed with examination under otomiscroscope and all deep and hidden areas inspected with otoendoscopy.

Hearing assessment was done in all the patients both preoperatively and postoperatively with tuning forks and later confirmed with Pure tone Audiometry.

Eustachian tube patency was confirmed in all cases with tympanometry and X ray mastoid (Schuller's View) was done in all patients to see mastoid pneumatisation.

Patients were selected for either endoscopic or microscopic tympanoplasty on random basis and patient's preference. After complete anaesthetic evaluation and physician fitness patients were posted for surgery under Local anaesthesia with Intravenous Sedation. 3 major types of graft were used: temporalis fascia, tragal cartilage and fascia lata. Graft selection was done based on surgeon's experience, size and extent of perforation. Temporalis fascia was harvested with postaural approach. In all cases graft was then placed in underlay fashion.

In cases of endoscopic tympanoplasty where tragal cartilage was used, graft was placed using push through technique.

In cases with ossicular erosion incus reshaping with interpositioning was done. Tragal cartilage was then kept to support the same. Antibiotic soaked abgel was placed over the graft.

All the patients were given IV antibiotics, analgesics, antihistaminic, topical nasal decongestants postoperatively. Mastoid dressing was changed on the 1st, 4th and 7th postoperative days.

At 3 weeks- residual abgel was removed from external auditory canal.At 3 months assessment of the graft uptake done by otoendoscopic examination and post-operative audiogram done.

Postsurgical healing was defined by complete closure of wound with no gaping and a vascularized and epithelialized graft seen with otoendoscopy.

Post operative outcomes of surgery was measured under 2 parameters:

- Closure of perforation was assessed as full take, partial take with residual perforation, or graft rejection 3 months after surgery.
- Postoperative hearing gain was calculated as the difference between the ABG (Air-Bone gap) before and after 3 months of surgery. Anatomical success was defined as an intact graft with a dry ear, whereas an air-bone gap <20 dB after the procedure was defined as functional success.

RESULTS:

A total of 120 cases were studied for a period of 18 months. Results obtained were summarized in tables and charts.

Majority patients belonged to age group 15-25 years (40%) followed by 36-45 years (32%), 26-35 years (31%), 56-65 years (1%) and 66-75 years (1%) with mean age being 29.55 ± 10.36 years. 73% were females and 27% were males with female to male ratio being 2.6:1.

Majority belonged to upper lower class (51%) followed by lower middle class (26%), lower class (13%) and upper middle class (10%). Otorrhea (98%) was the most common presenting complaint followed by reduced hearing (86%). Unilateral disease was more common with left ear (51%) being more involved than right (43%).

Majority patients had moderate perforation (35%) followed by large perforation (31%) and small perforation (31%) and subtotal (3%).

Ossicular chain erosion was seen in 3% cases and myringosclerosis in 7% cases. Sclerotic mastoid bone was seen in x ray in 35% cases and diploic mastoid in 27% cases.

Preoperative PTA showed 58.3% cases having mild conductive hearing loss followed by moderate conductive hearing loss in 37.5 % cases.

Cases with smaller perforations had mean preoperative A-B gap as 33.88 ± 6.9 dB and subtotal perforations with mean preoperative A-B gap of 49.92 ± 6.20 dB. The hearing loss increased as the size of perforation increased.

For 120 patients that underwent tympanoplasty preoperative mean air-bone gap was 37.35 ± 7.75 dB preoperatively and postoperative mean air-bone gap was 16.27 ± 5.62 dB (p<0.05). Postoperative A-B gap was <20 dB in 92% cases. 59 patients underwent conventional tympanoplasty and 61patients underwent endoscopic tympanoplasty.

Mean preoperative A-B gap for conventional group was 39.05 ± 7.83 dB and post operative A-B gap was 15.95 ± 5.36 dB. (p value<0.05). Mean preoperative A-B gap for endoscopic group was 35.7 ± 7.36 dB and post operative A-B gap was 16.59 ± 5.89 dB (p value <0.05).

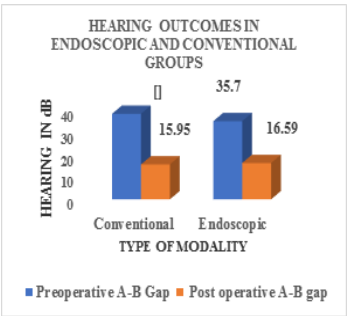

Fig 1: Hearing outcomes in endoscopic and conventional groups

Out of 33 patients where tragal cartilage was used; mean postoperative A-B gap was 16.4 ± 5.8 dB. Out of 80 patients where temporalis fascia graft was used; mean postoperative A-B gap was 15.64 ± 4.7 dB.

After 3 months of surgery complete graft uptake was seen in 94% of cases, residual perforation seen in 4% of cases and complete graft rejection was seen in 2% of cases. Thus, anatomical success was thus 94%.

Out of 59 conventional tympanoplasties done only 90% cases had complete graft uptake. Out of 61 endoscopic tympanoplasties done;98% cases had complete graft uptake (p>0.05).

In microscopic group hearing outcome post operatively with tragal cartilage was 15.54 ± 5.8 dB and 15.86 ± 5.55 dB in temporalis fascia groups.

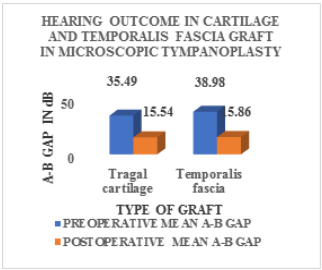

Fig 2: Hearing outcome in cartilage and temporalis fascia graft in microscopic tympanoplasty

Similarly hearing outcome postoperatively with endoscopic group was 16.9 ± 6 dB with tragal cartilage and 15.33 ± 6.38 dB with temporalis fascia.

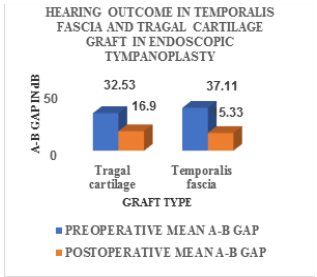

Fig 3: Hearing outcome in temporalis fascia tympanoplasty

In patients who underwent conventional tympanoplasty; 9% cases had postoperative impaired wound healing; 2% cases of both hypertrophic scar and stitch abscess and 5% cases of wound gaping.

In the endoscopic group only 4% cases had impaired wound healing of 2% cases were of stitch abscess and wound gaping each.

DISCUSSION:

Our study showed surgical success of tympanoplasty in about 93% cases of type I tympanoplasty for inactive chronic otitis media which is in concordance with other published surgical success rates.

The maximum number of patients in our study were in the age group of 15-25 years (40%). with mean age being 29.3 years. These findings were consistent with Kumar N. et al. [4]

The average hearing losses, of the entire study group were in the range of 26–70 dB, most of the patients having mild conductive hearing loss (58.3%).

Jiyothi et al. [5] compared endoscopic and microscopic tympanoplasties in a study, reporting the anatomical success rate as 91.67% for endoscopic tympanoplasty and as 93.3% for microscopic tympanoplasty.

In our study conventional tympanoplasty had anatomical success rate of 90% and that of endoscopic tympanoplasty being 99%. Similar findings were seen in a study by Huang et. al. (2016).

In this study preoperative mean A-B gap for conventional group was 39.05 ± 7.83 dB and post operative A-B gap was 15.95 ± 5.36 dB. While in the endoscopic group the preoperative mean A-B gap was 35.7 ± 7.36 dB and post operative A-B gap was 16.59 ± 5.89 dB; values being statistically significant (p<0.05).

Thus, functional outcome (hearing improvement) in both the groups was almost the same.

However, the conventional group had more cases of graft rejection (90%) and residual perforation than the endoscopic group (98%).

Huang et al. [6] compared microscopic approach and endoscopic approach. They reported that endoscopic approach reduces postoperative bleeding and pain and achieve superior cosmetic results. Similar findings were noted in our study with healed postoperative wounds in 96% of cases of endoscopic tympanoplasty and 91% cases of microscopic tympanoplasty.

In a study comparing the anatomical and functional results of fascia and perichondrium used in microscopic type 1 tympanoplasty, Dabholkar et al. [7] reported similar functional and anatomical success rates.

In this study with microscopic tympanoplasty functional and anatomical outcome was almost the same in cartilage and temporalis fascia graft groups.

In our study with endoscopic tympanoplasties the functional outcome was same with both cartilage and temporalis fascia group. However, graft uptake was more with cartilage group (100%) than temporalis fascia (97%). The findings were consistent with Ozdamar K et al. [8]

CONCLUSION:

In this present study, the functional success rates of grafts were similar in both endoscopic and conventional tympanoplasty, however anatomical success rate was more with endoscopic type with less postoperative complications such as paraesthesia and wound healing.

Perichondrium and fascia were found out to be accepted for use in both endoscopic and microscopic tympanoplasties.

In conclusion, endoscopic technique has anatomical and functional results comparable with the literature, and it is an effective, minimally invasive, and feasible method.

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