

SURGICAL AND AUDIOLOGICAL OUTCOME OF ANTERIOR TUCKING AND OVER-UNDERLAY MYRINGOPLASTY: A PROSPECTIVE STUDY

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ABSTRACT:

Background: Various modifications in tympanomeatal flap elevation in tympanoplasty were described by otolaryngologist all over the world to achieve best surgical outcome. In this study the surgical and audiological outcomes of anterior tucking tympanomeatal flap elevation and over-under technique of flap elevation were compared in type 1 tympanoplasty. **Objective:** The aim of this study is to compare surgical outcomes of two techniques of tympanomeatal flap elevation in tympanoplasty.

Material and methods: This prospective randomised study included 200 patients. Patients were randomly allocated in 2 groups. Patients were followed for 3 months and compared surgical and audiological outcomes in 2 groups.

Result: In anterior tucking (group A) techniques overall success (97.3%) and anterior blunting (9.1%) were more whereas residual perforation (2.7%), granulation formation (2.7%) and lateralisation (0.0%) were less common as compared to over-underlay technique (group B). In over-underlay technique (group B) success, residual perforation, lateralisation and anterior blunting were seen in 82.2%, 17.8%, 4.4%, 2.2% respectively.

Conclusion: Both anteriortucking underlay and over-underlay techniques of tympanoplasty are effective surgical technique with satisfactory outcome.

Keywords: anterior tucking, underlay, over-underlay, tympanomeatal flap, tympanoplasty

INTRODUCTION: Tympanoplasty is the commonest procedure performed by otolaryngologists in patients with chronic suppurative otitis media. Various techniques and approaches have been described to obtain good graft uptake and hearing gain. Common technique of tympanic membrane repair is underlay, overlay, over-underlay and interlay [1]. Each of these approaches and techniques has its advantages and disadvantages [2,3]. Elevation of tympanomeatal flap with placement of graft is crucial for successful graft uptake. This study was conducted to compare surgical and audiological outcome of anterior tucking underlay and over-underlay technique of tympanoplasty. In anterior tucking underlay

tympanoplasty, the tympanomeatal flap was elevated with posterior tympanic annulus, an incision was made on anterior canal wall about 5mm lateral to the anterior annulus and a subcutaneous tunnel was made connecting to anterior mesotympanum. In over-underlay technique, anterior annulus was not elevated and graft is placed lateral to (over) the handle of malleus and medial to (under) the drum remnant and anterior annulus.

MATERIAL AND METHODS: IN this prospective randomized study, 200 patients between 9 and 55 years of age with chronic suppurative otitis media with central perforation who presented to ENT outpatient department of maharishi vashishth autonomous state medical college , Basti, UP willing to participate in the study were included. Surgery were performed by same surgeon and followed up for 3 months.

Inclusion criteria:

Chronic suppurative otitis media tubotympanic type

Age < 9 years and > 55 years

Exclusion criteria:

Chronic suppurative otitis media attico-antral type

Patients with poor follow up

Patients with sensory or mixed hearing loss

Patients with comorbidities like diabetes, hypertension.

All patients were selected serial wise as and when they were admitted for surgery. All patients were subjected to detailed history, ENT examinations, relevant laboratory investigations and preoperative pure tone audiometry (PTA). Patients were allocated in two groups randomly. Group A contained 115 patients who underwent anterior tucking underlay type 1 tympanoplasty and Group B contained 85 patients who underwent type 1 tympanoplasty by over-underlay technique. The two groups were followed up for 3 months postoperatively. The surgery was done under local or general anaesthesia by post-aural route in both group by same surgeon.

Surgical technique:

Group A (anterior tucking underlay technique): In anterior tucking underlay tympanoplasty, the tympanomeatal flap was elevated with posterior tympanic annulus, an incision was made on anterior canal wall about 5mm lateral to the anterior annulus and a subcutaneous tunnel was made connecting to anterior mesotympanum. Once middle ear is inspected for ossicular integrity, the dried temporalis fascia graft is placed all over the bony canal wall and below handle of malleus. Now the canal flap is pushed back into its original position. Gelfoam soaked with ciprofloxacin and dexamethasone were paced in middle ear.

Group B (over-underlay technique): In this group of patients, canal flap elevated and annulus was elevated around 240degree except anterior. Entire flap was now pushed forward and separated from handle of malleus and its lateral process, along with the pars flaccida. Once middle ear was inspected for ossicular integrity, the dried temporalis facia graft is placed over handle of malleus (over) and below remnant of tympanic membrane. Gelfoam is placed in eustachian tube orifice area, anterior to handle of malleus and antero-inferior to graft. Now entire elevated flap and graft pushed back on posterior bony wall. Air from middle ear was sucked out with the help of suction canula and gelfoams were placed over the graft.

In both group Pulva flap was closed by 3-0 catgut suture and skin closed by 3-0 silk suture. Outer mastoid dressing was done. Patients were discharged on next day. Patients were given antibiotics (amoxycylav), analgesic and antihistaminics for 7 days. Suture removal was done on the 7th postoperative days and patients were given ciprofloxacin with dexamethasone ear drops for 2 weeks. Patients were followed up at 1st week, 2nd week, 1st month, and 3rd months postoperatively. The success of surgery was defined as complete closure of tympanic membrane perforation and hearing improvement.

RESULTS:

A total of 200 cases were selected for the study. Age range was 9 years to 55 years and mean age was 25.83 ± 10.4 . Out of 200 cases 84 (42%) were males and 116 (58%) were female. A female preponderance was noticed in this study. In anterior tucking underlay type (Group A), 44 were male and 66 were female and in over- underlay type (Group B), 40 were male and 50 were female. Demographic details of cases involved in the study are briefed in table 1.

Table 1	Group A	Group B
Female	44	40
Male	66	50
Total	110	90
Age range	9 years to 55 years	
Mean age	25.8 ± 10.4	

Chief complains were ear discharge (80%), decreased hearing (70%), otalgia (20%), tinnitus (5%), itching ear (4%) and vertigo (2%). Preoperative mean air bone gap in group A was 42.14 ± 8.32 dB and group B was 40.56 ± 6.32 dB. Postoperative mean air bone gap in Group A was 27.657 dB and in group B was 27.13 ± 19.12 dB (summarise in table 2).

Table 2	Preoperative mean AB gap (dB)	postoperative mean AB gap (dB)	P value (intergroup)	95% confidence interval
Group A	42.14 ± 3.32	27.91 ± 6.57	0.139	-0.519 to 3.680
Group B	40.56 ± 6.32	27.13 ± 19.12	0.691	-3.070 to 4.621

Overall success rate of tympanoplasty in Group A was 97.3 % and Group B was 82.2% which when compared with each other shows no statistical significant difference (P value > 0.05). Postoperative residual perforations were seen in 3 (2.7%) patients in group A and 16 (17.8%) patients in group B. Anterior blunting 10(9.1%) and granulation formation 3(2.7%) were seen in group A patients. In group B, anterior blunting 2(2.2%) and lateralisation of graft 4(4.4%) were noticed. No granulation formation in group B and no lateralisation of graft were seen in group A.

Various outcomes of both techniques in group A and group B is summarised in table 3 and figure 1.

Table 3	Group A	Group B	P value
success	107(97.3%)	74(82.2%)	>0.05
Residual perforation	3 (2.7%)	16 (17.8%)	<0.05
Anterior blunting	10 (9.1%)	2(2.2%)	0.069
Lateralisation	0 (0%)	4 (4.4%)	0.04
Granulation formation	3 (2.7%)	0 (0%)	0.25

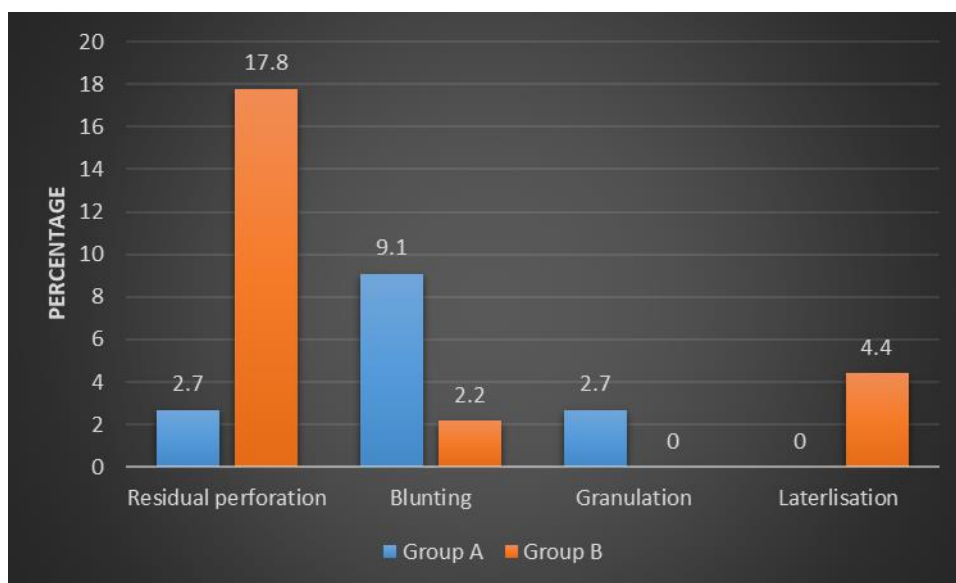


Figure:1

DISCUSSIONS:

Various grafting techniques have been described in the past. There have been many modifications and variations of the technique of tympanoplasty. There is still no consensus about the optimal technique, which is often employee on the basis of surgeon's preference and skill, and not on the type of the tympanic membrane perforation. There are several ways in which canal incision are given during tympanoplasty. For large perforation, it is very important to provide support to the graft.

In our study we compared two techniques of elevating tympanomeatal flap in tympanoplasty viz anterior tucking and over-underlay for all type of perforations. In our study we included patients of age ranging from 9 years to 55 years and mean age 25.8 ± 10.4 . Age has been identified as a possible confounding factor having impact on outcome of in present study both extreme ends were excluded from our study to rule out any such confounding factor [4]. In present study, majority of patients irrespective of the group were female similar to study by Webb and Chang [4].

Preoperative mean AB gap in Group A and group B was $42.14 \pm$ dB and 40.56 ± 6.32 dB respectively and postoperatively at 3 months mean AB gap was 27.91 ± 6.57 dB and 27.13 ± 19.12 dB and hearing gain 14.14 dB and 13.43 dB respectively. When compared with preoperative mean AB gap and postoperative mean AB gap showed significant improvement (p value <0.05). But inter-comparison between group A and group B postoperative mean AB gap at 3 months showed no statistical significant difference (p value >0.05). Our study

showed comparable hearing improvement result as study conducted by Murugendrappa et al. [5]

In our study overall success rate of tympanoplasty in group A and group B was 97.3% and 82.2% respectively. A retrospective study of 200 cases was conducted by Moras et al. showed success rate of 96% by 360degree subannular tympanoplasty [6]. Dhanapala et al.[7] and Venkatesha et al. [8] study showed success rate of 94% and 92% respectively in circumferential grafting technique. Verma et al [9] study showed success rate of 95% with canaloplasty and 85% without canaloplasty .While grafting by over-underlay technique showed success rate of 94.9% by a retrospective study in Turkey[10] and success rate of 92.85% by Mehrdad et al[11]. Residual perforations were seen more (17.8%) in group B as compared to group A (2.7%) and showed significant association ($p < 0.05$). Anterior blunting was seen 10 patients (9.1%) in group A and 2 patients (2.2%) in group B. Mishra et al[12] reported 1% anterior blunting while Moras et al [6] reported 3% anterior bunting in 360degree circumferential subannular tympanoplasty. As the circumferential flap was elevated all around the bony annulus, flap repositioning was important to prevent blunting. In our study more blunting in group A may be due to inadequate repositioning of circumferential flap and annulus. No lateralisation of graft was observed in circumferential technique (group A) because graft was placed by underlay technique and supported by annulus all around the circumference and it was held firmly by tympanomeatal flap. Mishra et al [12] reported graft lateralisation of 1% while Mokhtarinejad et al[13] didn't encounter lateralisation by same technique. Postoperative granulation formation seen in 3 patients (2.7%) in group A while no any granulation formation seen in group B patients. Thakur et al [14] study showed granulation in 10% cases of anterior tucking technique.

Conclusion:

Both anterior tucking technique and over- under technique of myringoplasty are good for all types central perforations in chronic suppurative otitis media of mucosal type. Residual perforation and lateralisation of graft is less common while anterior blunting and granulations are more in anterior tucking technique. In over-underlay technique residual perforation and lateralisation is more as compared to circumferential flap technique. Hearing gain is similar in both techniques. Anterior tucking technique is a skilled technique which requires expertise. Over-underlay is fairly simple technique so commonly done.

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