Original Article

Surgical Management of Chronic Suppurative Otitis Media; A Cross sectional Comparative Study Between Microscopic and Endoscopic Tympanoplasty

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ABSTRACT

Objective: To compare the surgical outcomes of Microscopic and Endoscopic Tympanoplasty.
Study Design: Observational/ cross sectional study.
Place and Duration of Study: This study was conducted at the two different hospitals. 1- Al-Tibri Medical College and hospital karachi and Social security Landhi hospital Karachi from July 2017 to June 2018.
Materials and Methods: 76 Patients of both genders were included in this study who had dry tympanic membrane perforations. Age ranges were 18-40 years. Patients were divided in two groups A and B. 38 patients in each group. In group A, Microscopic Tympanoplasty was performed with temporalis fascia graft via post aural approach. In group B, Endoscopic tympanoplasty was performed with the help of tragal cartilage/perichondrium graft via per meatal approach. Observed outcomes of both procedure after 1 day, after 1 week, after 1 month and after 2 months. Variable were pain, bleeding, hearing assessment with PTA in which measured air conduction, bone conduction and AB gap (Air-Bone), duration of surgery, vomiting and vertigo.
Results: 37 patients out of 38 had intact grafted tympanic membrane in group A (M.T.) while all 38 patients had intact grafted tympanic membrane in group B (E.T.). Bleeding was less in group B, as compare to group A. There was no blood-soaked gauze in endoscopic tympanoplasty group. Mean duration of surgery was in endoscopic tympanoplasty group 65.1 + 3.7 minutes and mean duration of microscopic tympanoplasty was 82.0 + 5.6 minutes. P value was < 0.001 is significant. Duration of surgery was less in endoscopic tympanoplasty. Hearing was also improved in both groups after tympanoplasty. Post- operative AB gap reduction seen in all patients in both groups. Weber test performed 1st post -operative day it was lateralized towards operated ear which indicate integrity of inner ear. Vomiting and vertigo not present after tympanoplasty in both groups which indicate the safety of vestibular system.
Conclusion: Results of both Microscopic and Endoscopic Tympanoplasty were almost same but endoscopic tympanoplasty is better because this procedure consumed less time, less post- operative pain, less post- operative bleeding and no scar after surgery.
Key Words: Surgical Management, Chronic Suppurative Otitis Media; Microscopic, Endoscopic Tympanoplasty

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INTRODUCTION

Chronic suppurative otitis media and its sequelae convey huge money related and general expenses.[1]

It has been assessed that 65– 330 million people have discharging ears, 60% of whom experience the insidious effects of phenomenal hearing debilitation [2].

Among the South-East Asian nations, inevitability rates in Thailand continued running from 0.9 to 4.7% while the Indian typicality of 7.8% is high.[3]

Otitis media (OM), aggravation of the middle ear, remains the most outstanding explanation behind hearing disability in adolescents. Intense scenes of OM in infant and youths are habitually related with focus ear infections including the pathogens Streptococcus pneumoniae and Haemophilus influenza.[4]

Traditionally, temporalis fascia was utilized for reconstruction of perforated tympanic membrane. Presently exchange is accessible as cartilage. The immovability and strength of cartilage play an important role.[5]

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Endoscopic procedure playing a key role in the ear surgery as endoscope assistance has improved the visual exposure of hidden and deep structures of middle ear.[6]

Inspite of various technical advancements in operating microscope, basic limitations could not be resolved. After approach of rigid endoscope for sinus surgical procedure, Mer and his partners in 1967 presented middle ear endoscopy first time.[7]

Huge disadvantage of working magnifying microscope is that it gives an intensified picture along a straight line. Endoscope can come closer to the surgical field. Sinus tympani can be viewed easily with endoscope[8].

CSOM is ordinarily assembled into two sorts, tubo-tympanic and atticoantral.[9]

Pseudomonas aeruginosa and Staphylococcus aureus are the most generally perceived high-affect microbial confines in patients with CSOM.[10]

The saturated and moist condition underpins the prevalence of infectious illnesses of the ear.[11] Poor adolescents are more prone of this sickness.[12]

The existence frameworks of the Eustachian tube are connected with otitis media. Focus ear ventilation, drainage and protection of the inside ear to pathogens are critical components of the The more even edge of the Eustachian tube, the more it may cause otitis media in youngsters. CSOM in a grown-up is foreseen by dull extraordinary otitis media (AOM) or spreads otitis media (EOM) in youth.[13]

Patients with steady suppurative otitis media (CSOM) respond to anti-microbial drops, regular aural toilet, and control of granulation tissue.[14] Tympanic membrane rupture is recognized alongside focus ear mucositis with or without otorrhea.[15]

Tympanoplasty is gathered into five kinds as demonstrated by Wullstein.[16]

Trans-canal tympanoplasty can be performed with both magnifying instrument and endoscope.[17]

MATERIALS AND METHODS

76 Patients were participated in this study randomly from Al-Tibri Medical College & Hospital and from Social Security Landhi Hospital Karachi. Duration of study from July 2017 to June 2018. Patients divided into A & B groups. 38 patients were in each group. Microscopic Type 1 tympanoplasty performed in Landhi Hospital via post aural approach and Endoscopic Type 1 tympanoplasty via per meatal approach in Al-Tibri Medical College & Hospital. Temporalis fascia was used as a graft material in group A (MT). Tragal cartilage was used for graft in group B (ET). Pre-operative PTA advised for hearing assessment in which air conduction, bone conduction and air-bone gap noted. After surgery 1st post-op day weber test done for checking the reservation of inner ear.

Pain, bleeding, vomiting, vertigo in 1st post-operated day, after 1 week, after 1 and 2 months. After 2 months integrity of grafted TM and reduction of air-bone gap noted.

RESULTS

A total 76 patients were studied after divided into two groups, in each group 38 pats were participated. Different variables like pain, discharge, bleeding, vomiting, vertigo, PTA, weber test, oto-endoscopic/oto-microscopic examination and duration of surgery in both procedures are used. Graph 1 Shows pain measurement in Endoscopic Tympanoplasty (n=38). It represents mild, moderate and no pain on post-operated day, after 1 week, after 1 month and after 2 months of surgery. Graph 2 Shows pain measurement in Microscopic Tympanoplasty (n= 38). It is the graphical representation of mild, moderate and no pain after surgery, after 1 week, after 1 month and after 2 months. It shows less pain was noted in group B(ET) as compare to group A(MT)

Graph 3 Comparison of bleeding in both groups. It shows the graphical representation of bleeding after tympanoplasty in both groups. Bleeding was less in group B(ET) as compare to group A(MT) due to less trauma and small incision. Table 7 Shows reduction in air-bone gap (AB-gap). In group B, all 38 patients had significantly reduced air-bone gap while in Microscopic Tympanoplasty 37 patients had reduced air-bone gap.

Graph 4 is the graphical representation of air-bone gap reduction in both procedures.

Table 1 showing group statistics on PTA. Showing mean, Standard deviation and p-value noted for air conduction, bone conduction and A-B gap in both procedure groups

Table 2 Shows groups comparison of different variables. Over all mean age was

24.6 + 6.1. In endoscopic tympanoplasty (group B) mean age was 26.1 + 6.4 while

in group A mean age was 23.2 + 5.7. P-Value was 0.304.

Over all male female ratio was 34:42. In group A the ratio was 14:24 and in group B

it was 20:18. Over all graft success rate was 75(98.7%). In group A success rate was 37(97.4%) while in group B, graft success rate was 38(100%)

Pre-operatively mean air conduction was 42.3 + 2.3. in group A pre-operative air

conduction was 42.0+2.5 while in group B it was 42.6 + 2.1. Pre-operative P- value was 0.199. Post-operative mean air conduction was 26.9+2.9. post-operative air conduction in group A was 26.7 + 2.6 while in group B it was 27.1 + 1.9. Post-operative P-value was found <0.001 in both groups. Bone conduction remained same after surgery in both groups. Over all mean air-bone gap pre-operative was 29.4 + 3.1dB in group A, air bone

gap was 29.4 + 3.2 (pre-operative) in group B, air bone gap was 29.4 + 3.0 (pre-operative) Post-operated over all mean of AB-gape was 15.5 + 1.5 in group A. AB gape 15.4 + 1.4 while group B, AB gape 15.5 + 1.7dB.

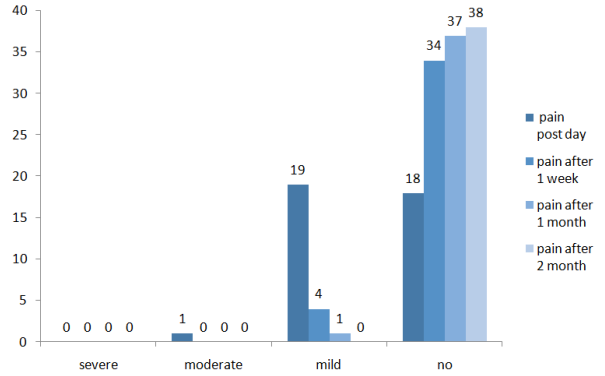
Table No.1: Group statistics on PTA (N=38)

Tympanoplasty		Mean (dB)	Std. Deviation	p-value
	Air Conduction			
Endoscopic Tympanoplasty via permeatal approach	Before After	42.68 27.18	2.055 1.872	<0.001
	Bone Conduction			
	Before After	13.24 13.05	2.247 2.130	<0.715
	AB-gap			
	Before After`	29.42 15.47	3.099 1.688	<0.001
	Air Conduction			
Microscopic Tympanoplasty Via post aural approach	Before After	42.0 26.74	2.526 2.596	<0.001
	Bone Conduction			
	Before After	12.87 13.00	2.195 2.169	<0.793
	AB-gap			
	Before After	29.37 15.42	3.191 1.388	<0.001

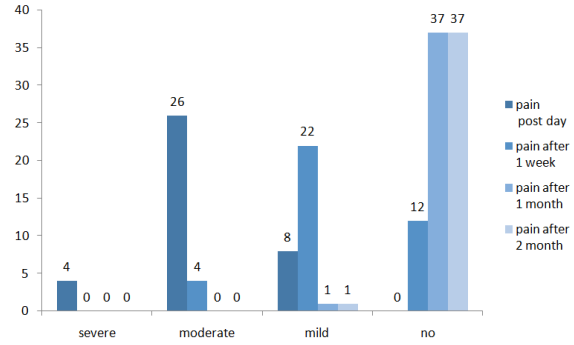
Table No.2: Overall groups comparison

Variables	Overall (n=76)	ET (n=38)	MT (n=38)	P-value
Age (year)	24.6 ± 6.1	26.1 ± 6.4	23.2 ± 5.7	0.304
Sex (male: female)	34:42	20:18	14:24	0.249
Graft success rate	75 (98.7%)	38 (100%)	37 (97.4%)	0.999
Air conduction (dB)				
Pre-operation	42.3 ± 2.3	42.6 ± 2.1	42.0 ± 2.5	0.199
Post-operative	26.9 ± 2.3	27.1 ± 1.9	26.7 ± 2.6	0.391
p-value	< 0.001	< 0.001	< 0.001	
Bone conduction (dB)				
Pre-operation	13.1 ± 2.2	13.2 ± 2.3	12.9 ± 2.2	0.472
Post-operative	13.0 ± 2.1	13.0 ± 2.1	13.0 ± 2.2	0.915
P-value	0.941	0.715	0.793	
AB-gap (dB)				
Pre-operation	29.4 ±3.1	29.4 ± 3.0	29.4 ±3.2	0.942
Post-operative	15.5 ± 1.5	15.5 ± 1.7	15.4 ± 1.4	0.822
P-value	< 0.001	< 0.001	< 0.001	
Duration of Surgery (mins)	73.6 ± 9.8	65.1 ± 3.7	82.0 ± 5.6	<0.001

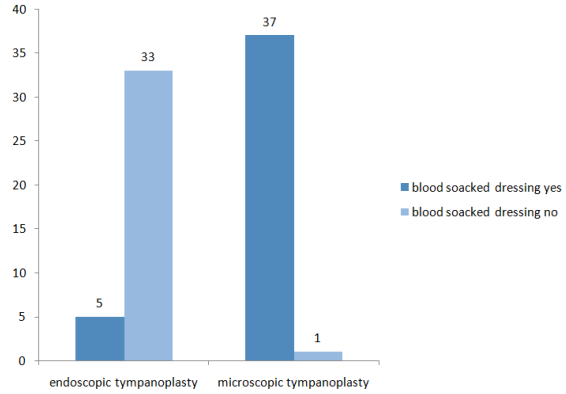
After surgery AB gape reduced in both groups. In group A reduction was from 29.4 + 3.2 to 15.4 + 1.4. AB gap reduction gained 14dB. In group B, AB- gap reduced from 29.4 + 3.2 to 15.5 + 1.7 db. Gain reduction of AB gape was 14dB. Over all mean duration of surgery was 73.6 + 9.8 minutes.



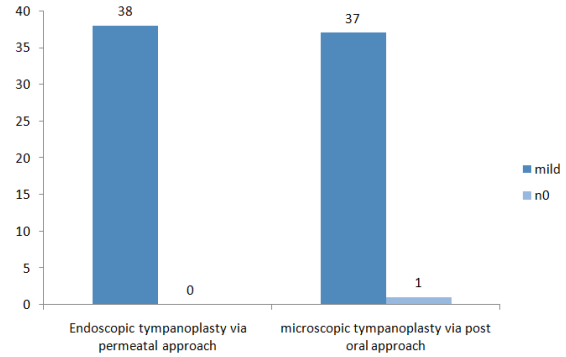
Graph No.1: Pain in endoscopic tympanoplasty



Graph No.2: Pain in microscopic tympanoplasty



Graph No.3: Bleeding comparison between Endoscopic and Microscopic Tympanoplasty



Graph No.4: AB-gap reduction in Endoscopic and Microscopic Tympanoplasty

In group A duration of surgery was 82.0 + 5.6 minutes while in group B, it was 65.1 + 3.7 minutes. Endoscopic tympanoplasty consumed less time as compared to microscopic tympanoplasty. Weber test lateralized towards operated ear in all patients in both groups very next day of surgery which indicate that there were intact ossicles and vastibulo-cochlear system.

DISCUSSION

Sanji, et al; Indian Journal of Otology July 2016 showed in his study, the mean operative time for the Endoscopic Tympanoplasty group was 78.13 minutes and for Microscopic Tympanoplasty group was 94.38 minutes. The difference was statistically not significant (t= -2.95, P= 0.0099). This study was also showed that endoscopic tympanoplasty consumed less time which is similar to our study. Sinha M et al, Int. J Otorhinolaryngology and Head & Neck Surgery 2017 Oct 2017 3(4): 874-877. Described in his study that Graft uptake was 95% in Microscopic Tympanoplasty and 91% in Endoscopic Tympanoplasty. Improvement in AB-gap reduction was 23.68dB in Microscopic Tympanoplasty and 16.13dB in Endoscopic Tympanoplasty.

Niteshor, et al: Journal of Medical Society Sep-Dec 2014 was mentioned in his study that 14db gain post operatively. 29 patients showed AB-gap improvement.

Aftab A, Shamsheer A et al: Glob J Oto. 2016 showed in their study that duration of surgery in trans canal Endoscopic Tympanoplasty was 62.37 minutes and post aural mean duration of surgery was 72.15 minutes in Microscopic Tympanoplasty. P value was less than 0.001 which is significant.

Duration of endoscopic tympanoplasty was less as compared to post aural microscopic tympanoplasty, which is similar to our study.

Hsun- Mo Wang et al: J Int. Adv. Otol. 2016: 12(1) 28-31 showed average operation time was 75.5 minutes in Group 1(MT) while average operation time was 50.4 minutes in Group 2(ET). This study revealed less time consumption in Endoscopic group as compared to Microscopic Tympanoplasty. This is also similar to our study.

Kumar Manish, Kanaujia Sk, et al Otolaryngol clinics: An international journal Sep-Dec 2015 have described in their study that pre-operative air-bone gap in conventional myringoplasty (MT) was 31.53 dB while in (ET) group it was 30 dB. Post-operative average air-bone gap was 16.03 dB in conventional myringoplasty, while in endoscopic myringoplasty it was 15 dB. Average hearing gain in conventional myringoplasty was 15.96 dB and in endoscopic myringoplasty it was 16.03 dB. These results are also similar to our study's result. Graft uptake in microscopic tympanoplasty was 86% while in endoscopic tympanoplasty it was 83%.

Shoeb M et al Int. J Otol. Head & Neck Surgery. Oct 2016 2(4): 184-188 discussed pre-operative average air-bone gap was 38.87 dB in MT while post-operative air-bone gap was 18.13 dB in MT. Reduction of air-bone gap was 20.47 dB in MT while in endoscopic tympanoplasty, air-bone gap reduction was 17.4 dB. Mean reduction of air-bone gap in both procedures was 19.47 dB. P-value was < 0.05 which was significant in both procedures. Graft uptake in both groups MT and ET showed no statistical difference.

Nayeon Choi, Yangseop Noh et al: Clin Exp Otol. 2017 March; 10(1): 44-49 explained in their study mean operation time was 88.9 min in MT group, significantly longer than the ET group (68.2 min). Graft success rate in ET and MT group was 100% and 95.8% respectively which was not statistically significant. This result is also similar to our study's result. Pre-operative audiometric parameters including bone conductions, air conductions and air-bone gap were not significantly different between ET and MT group (P = 0.0174, P = 0.276 and P = 0.995 respectively).

Pre and post-operative air-bone gap was analyzed with pair t-test separately in each group. In the ET group the pre and post-operative air-bone gap was 18.9 and 9.2 respectively which showed significant improvement (P<0.001). the respective value in the MT group (18.6 dB and 12.5 dB) also represented significant(P<0.001).

Pre-operative bone conduction and three months' later post-operative bone conduction were compared using pair t-test in each group to evaluate inner ear damage. All groups had no significant difference between pre and post-operative bone conduction (ET=23.9dB vs MT=29.9dB).

DJ Jenina Rachel, Escaldron et al: Philippine journal of Otol-Head and Neck surg., Jan-June 2018 vol.33, described in their study that the mean operation time for the ET group was 86.7 minutes compared to 140.6 minutes for the MT group. The ET group had significantly lower mean operative time than the MT group with a mean difference of 53.9 minutes. Graft uptake was 100% in both Endoscopic tympanoplasty and Microscopic tympanoplasty group. It showed similarity to our study`s result.

Muzafar Dr. Rahil et al: Int. Journal of Scientific and Research Publications, vol 7, August 2017 has described in his study that Mean operative time of the MT group (88.9 minutes) was significantly longer than the ET group (68.9 minutes). Graft success rate in the ET and MT groups were 92% and 95% respectively.

Pre and post-operative AB gap was analyzed with paired t-test separately in each group. In the ET group pre and post-operative AB gap were 18.9dB and 9.2dB respectively which showed significantly improvement (P < 0.001). The respective values in the MT group (18.6dB and 12.5dB) also represented significant (P < 0.00)

CONCLUSION

Endoscopic Tympanoplasty is superior to Microscopic Tympanoplasty because it takes shorter duration of time, less bleeding during and after surgery due to minimal area of incision, less pain and no post-operative visible scar. Although graft uptake and hearing improvement were also similar in both groups.

Author's Contribution:

Concept & Design of Study:	Tahir Hussain Khan
Drafting:	Ashfaq Hussain Rana
Data Analysis:	Sohail A. Malik
Revisiting Critically:	Tahir Hussain Khan, Ashfaq Hussain Rana
Final Approval of version:	Tahir Hussain Khan

Conflict of Interest: The study has no conflict of interest to declare by any author.

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