International Journal of Medical and Pharmaceutical Research

Online ISSN-2958-3683 | Print ISSN-2958-3675
Frequency: Bi-Monthly
Available online on: https://ijmpr.in/

Original Article

A comparative study of Endoscopic Tympanoplasty versus Microscopic Tympanoplasty in Chronic Otitis Media Tubotympanic Disease

Dr. Karthik. M
Assistant professor, Department of ENT, ESIC MC PGIMSR, Rajajinagar, Bengaluru, Karnataka.

OPEN ACCESS

Corresponding Author:

Dr. Karthik. M
Assistant professor, Department of ENT, ESIC MC PGIMSR, Rajajinagar, Bengaluru, Karnataka

Received: 20-05-2026
Accepted: 03-06-2026
Available online: 16-06-2026

ABSTRACT

***Background*:** To compare the outcomes of Endoscopic Tympanoplasty versus Microscopic Tympanoplasty in Chronic Otitis Media Tubotympanic Disease.
Methods: The study was conducted from November 2024 to November 2025 in ESIC medical college and PGIMSR, Rajajinagar Bengaluru.
Patients diagnosed Chronic Otitis Media Tubotympanic Disease attending ENT department in ESI MC PGIMSR Rajajinagar, about 97 patients were divided into two groups, Endoscopic group - 48 and microscopic group -49 patients respectively as per the inclusion criteria. They underwent endoscopic and Microscopic Tympanoplasty.
Results were obtained as per the statistical Analysis. Age group between 36-45 was majority of patients about 40%, followed by 26-35 which was 23%. There is significant difference in pre op PTA -41.8dB and post op PTA –27.9dB in patients undergo with microscopic procedure. Hearing Gain -14 dB There is significant difference in pre op PTA -39.1dB and postop PTA 28 dB in patients undergo with Endoscopic procedure, Hearing gain - 11dB. No significant statistical difference in the Hearing gain between the two groups. Graft uptake rate was 90% in Microscopic and 94 %in Endoscopic. However, the total average time taken was significantly lower in Endoscopic compared to microscopic groups.
Conclusion: Endoscopic Tympanoplasty had relatively shorter operative time and ideal tympanic membrane healing rate and hearing results in patients with chronic otitis media TTD, compared to Microscopic Tympanoplasty.

Keywords: Chronic Otitis Media Tubotympanic Disease, Microscopic Tympanoplasty, Endoscopic Tympanoplasty.

INTRODUCTION

Otologic surgeries are usually done using an operating microscope. In many surgical fields, there is also a trend and need towards minimally invasive intervention in the field of otology. Smaller incisions and with the guidance of endoscopes are preferred over conventional large incisions. Previously, Endoscopic Unit was used for sinus surgeries only. It was only later that they were applied in the area of otology. In otologic surgeries, 0 degree and angled endoscopes were used to visualize epitympanum and retrotympanum, before being used to assist with visualization of instruments during cholesteatoma surgeries. Now a days Limited Otologic surgeries are been performed using Endoscopes. Using the endoscopic approach, similar or improved outcomes can be achieved as compared to the microscopic approach and postoperative recovery period can be reduced. Therefore, endoscopic ear surgery implementations are becoming increasingly popular. The endoscopic approach can also be preferred in procedures such as ventilation tube insertion, myringoplasty, tympanoplasty, ossicular reconstruction for malformation and ossicle trauma, cholesteatoma surgeries, otosclerosis surgeries and cochlear implantation.

It has been reported in that the final results of Microscopic Tympanoplasty in terms of uptake rate of the graft ranges from 74% to 96 %. (Large central perforation – 86%, subtotal perforation – 78%). hence the hearing outcome has been 85%-90% with minor complications of post auricular scar, postoperative pain, EAC Narrowing. Hence In this era of Minimally Invasive surgeries, Endoscopic Ear Surgeries has been practised recently to overcome complications.

Advantage

1. Endoscopes gives us wide angled view of the structures.
2. Hidden deep areas ,i.e the anterior tympanic perforation, facial recess and
3. hypotympanum can be visualized.
4. Smaller Incisions can be used. (postauricular incisions),hence better cosmetic outcomes
5. Need for canalplasty is minimal .
6. Relatively shorter duration for surgery.
7. Postoperative pain is less and faster recovery.
8. Monitor used during endoscopic surgery helpful for teaching purposes.

Hence, we would like to study outcomes of Endoscopic tympanoplasty and microscopic tympanoplasty, in terms of hearing and graft uptake outcomes.

Study Design and Setting:
This prospective randomized controlled trial was conducted at the Department of Otorhinolaryngology, ESIC Medical College PGIMSR and Model Hospital, Bengaluru, between November 2024 and November 2025. The study protocol received approval from the Institutional Ethics Committee (No 532/L/11/12/Ethics/ESICMC&PGIMSR/Estt.Vol.IV/184-B/2024).
Study Design: Prospective randomized controlled trial
Setting: Tertiary care teaching hospital.

Study Population: All patients diagnosed Tubotympanic Disease with Subtotal perforation attending ENT department in ESI MC PGIMSR Rajajinagar
Inclusion Criteria
All patients above 10 years of age with:
1. 1.Inactive Tubotympanic disease having subtotal perforations of the tympanic membrane
2. 2.Intact ossicular chain
3. 3.Conductive hearing loss < 50dBHL

Exclusion Criteria
1. Patients who were diagnosed with CSOM tubotympanic type with complications.
2. Patients with sensory neural hearing loss. patients in whom hearing loss >50dBHL
3. (suggestive of ossicular discontinuity),
4. Patients undergoing revision Tympanoplasty,
5. Patients with congenital anomalies.

Sample size- is calculated using the study conducted in India in the year 2017 by
With an Calculated Effect size of (d) 0.564 , at 95%confidence Level and 80% Power, with an allocation Rate 1:1 , the sample size is calculated using G*power 3.1: the study needs ----- patients in each group with a total sample size of------ .

SAMPLE COLLECTION
The patients who fulfilled the above inclusion criteria will be selected. - Total of 102 patients will be included and selected randomly into two groups - anterior tucking and Interlay technique. Patients will be allotted in each group by lottery method.

Randomization: Simple randomization sampling
Detailed pre operative and post-operative clinical including otoscopy and audiometric findings will be compiled.

Surgical Procedure
In Microscopic approach, All the cases will be operated under general anaesthesia , post aural Incision is given, temporalis fascia as a graft is harvested. After meatotomy, Using Microscope, tympanomeatal flap was elevated circumferentially. Canalplasty was done in cases with Narrow External Auditory canal or bony overhang obscuring the view of annulus.
Incision is given from 10 clock to 30 clock through 60 clock in the right Ear and from 110 clock to 90 clock through 60 clock in the Left Ear. The flap will be elevated at posteroinferior region and annulus lifted and mesotympanum will be reached, ossicles will be inspected for continuity and the mobility was checked, Temporalis Fascia graft was placed in such a fashion that it rested on the mucosal layer and bony canal all around and below the handle of malleus. The Tympanomeatal flap will be repositioned carefully, gel foam will be kept in external auditory canal and the incision sutured in two layers. Patients will be discharged on 2nd post operative day with oral antibiotics and Day 7 sutures will be removed.

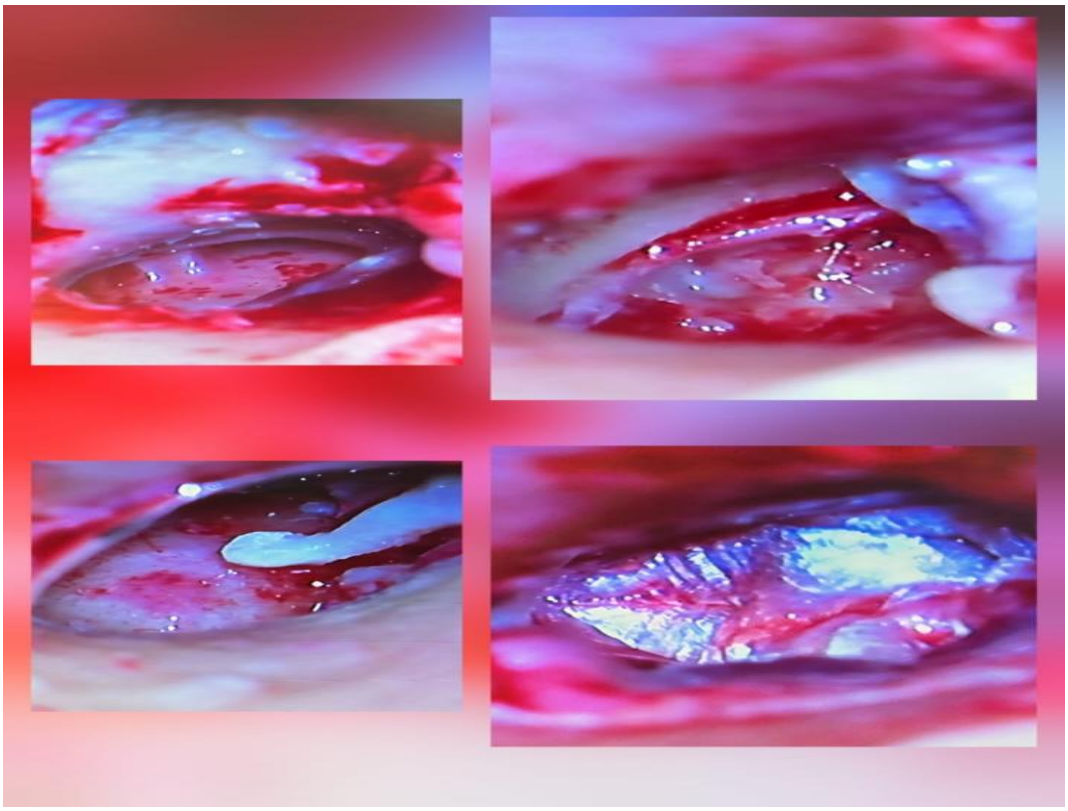


Figure 1 Microscopic Tympanoplasty showing Tympanomeatal flap elevation and and post graft placement

In Endoscopic Approach,
In this approach, temporalis fascia harvested after giving small supratemporal region,
Incision is given from 10 clock to 30 clock through 60 clock in the right Ear and from 110 clock to 90 clock through 60 clock in the Left Ear. The flap will be elevated at posteroinferior region will be elevated and annulus lifted and mesotympanum will be reached. Ossicles will be inspected for continuity and the mobility was checked, Temporalis Fascia graft was placed in such a fashion that it rested on the mucosal layer and bony canal all around and below the handle of malleus. The Tympanomeatal flap will be repositioned carefully, gel foam will be kept in external auditory canal.

After 4 weeks Patients will undergo otoscopy to assess the graft uptake and complications (if any) at every follow up visit and a pure tone audiometry at the end of 3rd month to evaluate the hearing improvement. Results will be tabulated and statistical analysis will be done using statistical software.

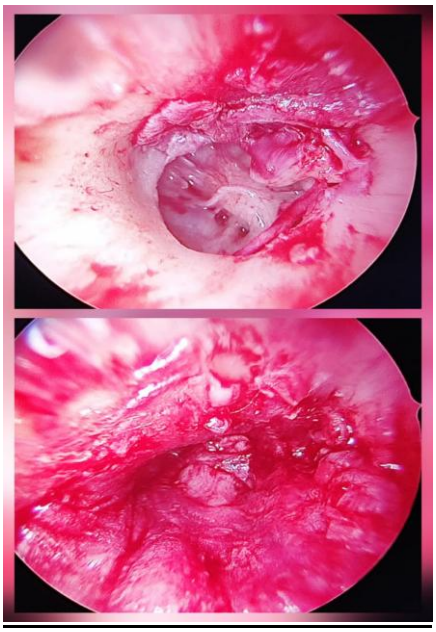


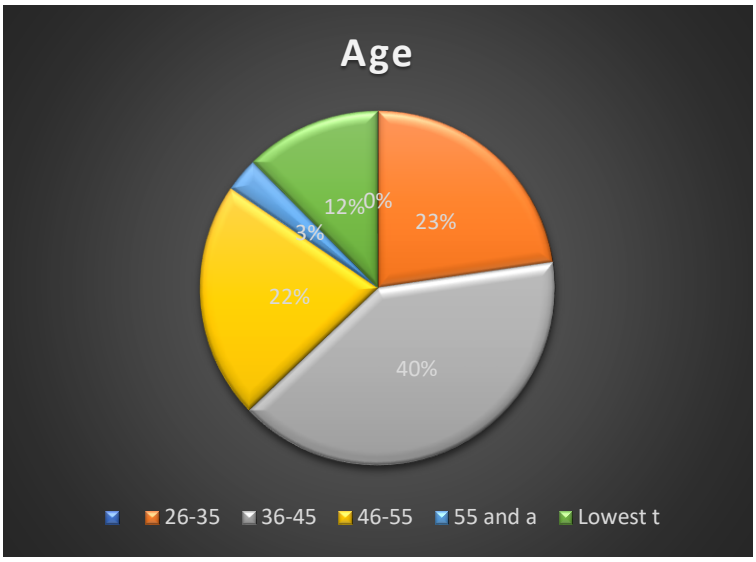
Figure 2: Endoscopic Tympanoplasty showing Underlay with Anterior Tucking with Post graft placement

Pie chart 1

		Frequency	Percent
	26-35	22	22.7
	36-45	39	40.2
	46-55	21	21.6
	55 and a	3	3.1
	Lowest t	12	12.4
	Total	97	100.0

Statistical methods employed for analysis of data

Graphs

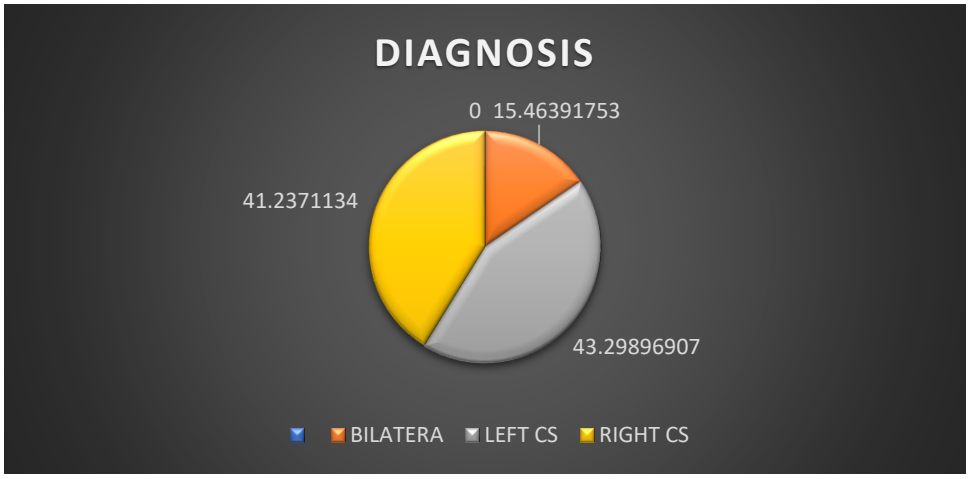


Sex

		Frequency	Percent
	F	65	67.0
	M	32	33.0
	Total	97	100.0

DIAGNOSIS

		Frequency	Percent
	BILATERA	15	15.5
	LEFT CS	42	43.3
	RIGHT CS	40	41.2
	Total	97	100.0



Age and Gender

		F	M	Total
Age	26-35	11	11	22
	36-45	30	9	39
	46-55	15	6	21
	55 and above	3	0	3
	Lowest through 25	6	6	12
Total		65	32	97

Age and side				
side		L	R	Total
Age	1.00	9	9	18
	2.00	13	13	26
	3.00	16	20	36
	4.00	8	11	19
	5.00	2	1	3
Total		48	54	102

Age and DIAGNOSIS					
DIAGNOSIS		BILATERA	LEFT CS	RIGHT CS	Total
Age	26-35	3	7	12	22
	36-45	7	19	13	39
	46-55	1	9	11	21
	55 and a	0	2	1	3
	Lowest t	4	5	3	12
Total		15	42	40	97

Gender and Side				
Side		L	R	Total
Gender	F	29	36	65
	M	18	14	32
Total		47	50	97

Gender and DIAGNOSIS					
DIAGNOSIS		BILATERA	LEFT CS	RIGHT CS	Total
Gender	F	7	28	30	65
	M	8	14	10	32
Total		15	42	40	97

Age and SURGERY TECHNIQUE				
SURGERY		Endoscopic	Microscopic	Total
Age	26-35	9	13	22
	36-45	22	17	39
	46-55	12	9	21
	55 and above	2	1	3
	Lowest through 25	3	9	12
Total		48	49	97

Gap reduction and SURGERY TECHNIQUE				
SURGERY		Endoscopic	Microscopic	
Gap reduction	0-12	35	14	49
	13-25	13	35	48
Total		48	49	97

	Procedure	N	Mean	Std. Deviation	Std. Error Mean
AB_gap_closure	Microscopic	49	14.41	4.869	.696
	Endoscopic	48	10.13	5.072	.732

Microscopic and Endoscopic(independent sample t test is used)

	t-test for Equality of Means						
						95% Confidence Interval of the Difference	
	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
AB_gap_closure	4.243	95	.000	4.283	1.009	2.279	6.287

There is significant difference in AB_gap_closure in procedure with Microscopic and Endoscopic

PRE_OP_PTA and POST_OP_PTA comparison **for** Microscopic procedure (**Paired t test)**

		Mean	N	Std. Deviation	Std. Error Mean
	PRE_OP_PTA	41.88	49	4.715	.674
	POST_OP_PTA	27.96	49	4.852	.693

Paired Samples Test								
	Paired Differences							
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference		t	df	Sig. (2-tailed)
				Lower	Upper			
PRE_OP_PTA - POST_OP_PTA	-13.918	6.103	.872	12.165	15.671	15.965	48	.000

There is significant difference in pre and post op pta in patients undergo with Microscopic procedure

PRE_OP_PTA and POST_OP_PTA comparison **for** Endoscopic procedure (**Paired t test)**

		Mean	N	Std. Deviation	Std. Error Mean
	PRE_OP_PTA	39.13	48	5.147	.743
	POST_OP_PTA	28.98	48	4.684	.676

Paired Samples Test								
	Paired Differences							
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference		t	df	Sig. (2-tailed)
				Lower	Upper			
PRE_OP_PTA - POST_OP_PTA	-10.146	5.186	.749	8.640	11.652	13.555	47	.000

There is significant difference in pre and post op pta in patients undergo with Endoscopic procedure.

In this study, it was found that mean air-conduction threshold preoperatively in the endoscopic group was 39 ± 4.45 decibel (dB) and 41.86 ± 8.85 dB in microscopic preoperatively. Preoperative mean air-conduction threshold comparison between the endoscopic and microscopic group was statistically not significant (P > 0.140) .

The mean air-conduction threshold postoperatively in endoscopic group was 28.40 ± 4.94 dB, whereas in microscopic , it was 27.96 ± 4.62 dB. Data were statistically not significant (P > 0.416) .
The mean air–bone gap postoperatively in endoscopic group was 10.66 and 13.1 dB in microscopic group . Postoperative mean air–bone gap comparison between the endoscopic and microscopic group was statistically not significant (P > 0.272).
Hearing gain postoperatively was 10.2dB in the endoscopic group and 13.9dB in microscopic group, respectively, with P = 0.132 (not significant).

Duration of surgery
In endoscopic tympanoplasty, the mean duration of surgery was 36 min, and in microscopic tympanoplasty, the mean duration of surgery was 48 min. Duration of surgery in endoscopic tympanoplasty was significantly lower than microscopic tympanoplasty with P < 0.001 which was statistically significant.

Graft uptake
Postoperatively at the 6th month, temporalis fascia graft uptake was seen in 91.30% of patients who underwent endoscopic tympanoplasty with residual perforation in 8.70% of patients and in 93.40% of patients who underwent microscopic tympanoplasty with residual perforation in 7.60% of patients.

DISCUSSION
Conventionally most ontological surgeries are performed under the guidance of a microscope. thoughit provides a linear view, deep recesses visualisation is difficult.

If the external ear canal is narrow or blocked by bony overhang, a microscopic surgeries should be done after canaloplasty. The main advantage of the microscopic approach is that it provides a stereo-view and allows bimanual operation.
Endoscopes provide us magnification of the surgical field. Microscopes require image adjustment during operation, whereas back-and-forth movements of the endoscope can easily produce close-up and angled images when needed. Moreover, rotational movement of angled endoscopes can provide panoramic images of the deep and hidden regions of the middle ear. An endoscopic approach ,during surgery improves visualization of retrotympanum. Advantages of the endoscopic approach include shorter operation time, reduced exposure to anesthetic agents and associated side effects, and improved surgeon concentration (Huang et al., 2016)[1]
The endoscopic approach is less invasive, as it does not require large post auricular incision or canaloplasty. Compared with the microscopic approach, an endoscopic approach is associated with less postoperative bleeding and pain, and it provides improved cosmetic outcomes

Huang et al. (2016) reported that the mean operation times were 50 min and 75 min in patients undergoing endoscopic and microscopic tympanoplasty, respectively[1]. In our study , endoscopic tympanoplasty, the mean duration of surgery was 36 min, and in microscopic tympanoplasty, the mean duration of surgery was 48 min.In the study of Patel et al. (2015), mean time of endoscopic and microscopic tympanoplasty operations was found to be 75 min and 90 min, respectively.[3]

Huang et al. (2016) performed type 1 tympanoplasty in 50 patients by microscopic approach and in another 50 patients by endoscopic approach. Similar hearing recovery and rate of perforation closure were found between the two patient groups. Moreover, shorter operation times, better views of surgical field, improved outcomes, reduced tissue injury and particularly lower rate of postoperative nausea were noted in patients undergoing endoscopic surgeries[1].

Karhuketo et al. (2001) stated that canaloplasty and outer ear curettage became necessary in some of their patients undergoing microscopic tympanoplasty. Conversely, none of their patients who underwent endoscopic tympanoplasty required interventions such as canaloplasty or curettage [6].

Advantages of Endoscopic Tympanoplasty are:
1. The enhanced visual acuity, wide angled Imaging and superior illumination ,allows us to visualise better quality images of Middle Ear .
2. Deep Hidden areas can be visualised easily – Posterior tympanic sinus, sinus tympani, anterior epitympanic recess,
3. Eluminates the need for changing position of patient head frequently.
4. Requires small incisions, helps us to preserve normal tissue .better cosmetic outcome
5. less post-operative pain and faster recovery
6. Requirement of canaloplasty and curettage is very minimal
7. Time duration of surgery is reduced, shorter hospital stay and low financial burden .
8. Recording purpose, teaching students , training for junior colleges .

Disadvantages are

1. 1.Surgical manipulations are performed using one hand
2. Monitor provides only Two – Dimensional views, as depth perception is absent
3. Frequent Defogging is required.
4. Requires good Hemostasis.
5. Limited Field of Magnification
6. Requires a longer learning curve.

CONCLUSION

Endoscopic tympanoplasty is an alternative to the conventional microscopic technique in terms of duration of surgery and graft uptake, the endoscopic approach provides better postoperative cosmesis, post op pain, and early mobilization. Further research involving a larger sample sized randomized trials could find its place as a common daycare procedure.

Compliance with Ethical stantards

Disclosure of potential conflits of interest

1. The authors did not receive support from any organization for the submitted work.
2. All authors certify that they have no affiliations with or involvement in any organization or entity with any financial interest or non-financial interest in the subject or materials discussed in this manuscript.

Research involving Human Participants and/or Animals

This study was performed in line with the principles of the Declaration of Helsinki.The study was approved by the Institutional Ethics committee of ESIC Medical college and PGIMSR Rajajinagar, Bengaluru. (No 532/L/11/12/Ethics/ESICMC&PGIMSR/Estt.Vol.IV/184-B/2024).

Informed consent

Consent to participate – Informed consent was obtained from all individual participants included in the study.
Consent to publish – The participants have consented to submission of the study to the journal

REFERENCES

1. Huang T.Y., Ho K.Y., Wang L.F., Chien C.Y., Wang M. A comparative study of endoscopic and microscopic approach type 1 tympanoplasty for simple chronic otitis media. J. Int. Adv. Otol. 2016 Apr;12(1):28–31. doi: 10.5152/iao.2015.1011.
2. Kojima H., Komori M., Chikazawa S., Yaguchi Y., Yamamoto K., Chujo K., Moriyama H. Comparison between endoscopic and microscopic stapes surgery. Laryngoscope. 2014 Jan;124(1):266–271. doi: 10.1002/lary.24144.
3. Patel J., Aiyer R.G., Gajjar Y., Gupta R., Raval J., Suthar P.P. Endoscopic tympanoplasty vs microscopic tympanoplasty in tubotympanic CSOM: a comparative study of 44 cases. Int. J. Res. Med. Sci. 2015;3(8):1953–1957.
4. Karhuketo T.S., Ilomaki J.H., Puhakka H.J. Tympanoscope-assisted myringoplasty. ORL: J. Otorhinolaryngol. Relat. Spec. 2001;63:353–357.
5. Kumar H, Seth S. Bacterial and fungal study of 100 cases of chronic suppurative otitis media. J Clin Diagn Res 2011;5:1224-7.
6. Ologe FE, Nwawolo CC. Chronic suppurative otitis media in school pupils in Nigeria. East Afr Med J 2003;80:130-4.
7. Browning GC. Medical management of chronic mucosal otitis media. Clin Otolaryngol Allied Sci 1984;9:141-4.
8. Mudry A. History of myringoplasty and tympanoplasty type I. Otolaryngol Head Neck Surg 2008;139:613-4.
9. el-Guindy A. Endoscopic transcanal myringoplasty. J Laryngol Otol 1992;106:493-5.
10. Thomassin JM, Korchia D, Doris JM. Endoscopic-guided otosurgery in the prevention of residual cholesteatomas. Laryngoscope 1993;103:939-43.
11. Alabbasi AM, Alsaimary IE, Najim JM. Prevalence and patterns of chronic suppurative otitis media and hearing impairment in Basrah city. J Med Med Sci 2010;1:129-33.
12. Vadiya SI, Makwana P, Khetani S, Mehta N. Comparison of tragal cartilage and conchal cartilage in tympanoplasty. Indian J Otol 2022.