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Effect of Tympanoplasty with Cartilage and Temporal Fascia Grafts and Platelets Rich Plasma on Perforation and Water-Bone Gap Closure in Patients with Chronic Suppurative Otitis Media Without Cholesterolatom

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OMSK without cholesterol; type 1 tympanoplasty; tragus cartilage grafts; fascia temporalis; platelet rich plasma

ABSTRACT
Chronic suppurative otitis media (CSOM) without cholesteatoma may result in persistent tympanic membrane perforation and conductive hearing loss. This quasi-experimental pretest–posttest study compared anatomical graft success and hearing outcomes following type I endoscopic tympanoplasty using tragal cartilage or temporalis fascia grafts, with platelet-rich plasma (PRP) administered in both groups. Twenty-two ears were consecutively enrolled at Dr. M. Djamil Hospital, Padang, Indonesia, between October 2025 and April 2026. Eleven ears received tragal cartilage grafts, and 11 received temporalis fascia grafts. Tympanic membrane closure was evaluated using otoendoscopy, while hearing outcomes were assessed through pure-tone audiometry by measuring the air–bone gap (ABG) at eight weeks postoperatively. Complete perforation closure was observed in all 22 ears (100%) at follow-up. In the cartilage group, the mean ABG decreased from 23.39 to 10.34 dB, representing an improvement of 13.05 ± 7.12 dB. In the fascia group, the mean ABG decreased from 25.90 to 12.95 dB, representing an improvement of 12.95 ± 11.66 dB. The between-group difference in ABG improvement was not statistically significant ($p = 0.828$). These findings suggested comparable short-term anatomical and hearing outcomes for tragal cartilage and temporalis fascia grafts when combined with PRP. However, the independent therapeutic contribution of PRP could not be established because both groups received the intervention. The small sample size and eight-week follow-up period limited the evaluation of long-term graft integrity, recurrent perforation, and sustained hearing improvement.

INTRODUCTION

Chronic suppurative otitis media (CSOM), commonly referred to as otitis media supuratif kronis (OMSK) in Indonesian clinical literature, is characterized by persistent tympanic membrane perforation and chronic middle ear inflammation, which may result in otorrhea and hearing loss. The condition remains a significant clinical concern, particularly among populations with limited access to otologic health care (Bhutta et al., 2024; Gisselsson-Solen et al., 2024; Khairkar et al., 2023). Chronic middle ear mucosal inflammation can impair sound conduction and may be associated with varying degrees of hearing loss (Chhatbar & Ruparel, 2022). In patients with inactive disease and persistent tympanic membrane perforation, treatment aims to restore membrane integrity and improve auditory function. These clinical

considerations highlight the importance of identifying surgical techniques that achieve reliable perforation closure while minimizing postoperative complications and procedure-related morbidity.

The development and persistence of CSOM are influenced by multiple factors, including environmental exposures, recurrent infections, host immune responses, socioeconomic conditions, hygiene practices, and access to medical care (Dhingra & Dhingra, 2018; Khairkar et al., 2023; Singh et al., 2023). Disease prevalence varies across populations, with a greater burden reported in underserved communities (Bhutta et al., 2024; Leach et al., 2021). Recurrent middle ear infections and Eustachian tube dysfunction may compromise healing and affect the long-term integrity of reconstructed tympanic membranes (Niazi et al., 2021; Sayed et al., 2022). Because tympanic membrane perforation may persist after active infection has resolved, treatment should address both infection control and structural restoration. Accordingly, postoperative outcomes should be evaluated through anatomical assessment of tympanic membrane closure and functional assessment of hearing improvement, particularly changes in the air–bone gap (ABG) measured by pure-tone audiometry (Lewis et al., 2021; Valentine & Wright, 2018).

Type I tympanoplasty involves reconstruction of the tympanic membrane in patients with an intact and functional ossicular chain, with the primary objectives of achieving a dry, intact ear and improving hearing outcomes (Al Busaidi & Al Rahbi, 2024; Bojrab et al., 2016; Job et al., 2019). The procedure can be performed using either an endoscopic or microscopic approach, with graft selection influenced by perforation characteristics, surgical exposure, and middle ear conditions (Bianchini et al., 2022; Desai et al., 2022). Temporalis fascia is widely used as a graft material because of its accessibility, flexibility, and favorable acoustic properties. However, fascia grafts may be susceptible to retraction or recurrent perforation under unfavorable middle ear pressure conditions (Sayed et al., 2022; Venkatesan et al., 2022). Tragal cartilage provides greater structural stability and resistance to deformation, making it particularly useful in challenging perforations or ears at increased risk of graft failure. Nevertheless, its relative stiffness and thickness have raised concerns regarding potential effects on sound transmission and postoperative hearing outcomes (Chhatbar & Ruparel, 2022; Singh et al., 2023; Varma et al., 2021).

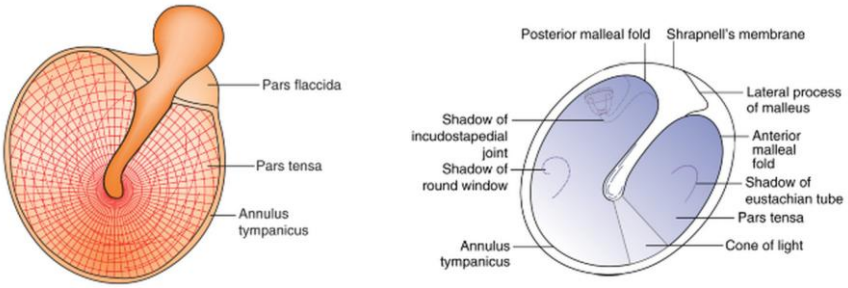

Figure 1. (A) Radial, circular and parabolic fiber types in the tense pars of the tympanic membrane; (B) Markers of normal tympanic membranes in the right ear.

Source: Dhingra and Dhingra (2018) in the manuscript; original image rights require verification.

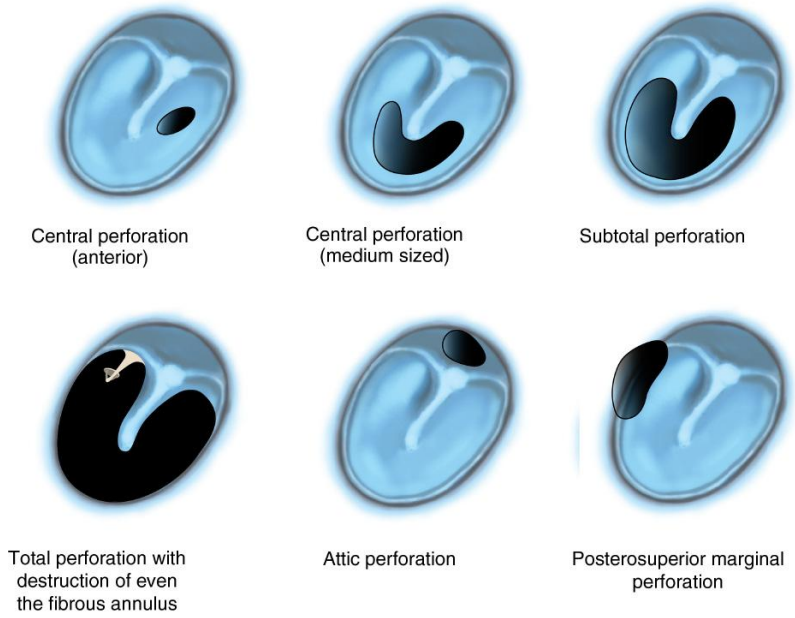

Figure 2. Tympanic membrane perforation type.

Source: Dhingra and Dhingra (2018) in the manuscript; original image rights require verification.

Accurate anatomical classification and comprehensive preoperative assessment are essential for planning tympanoplasty and evaluating surgical outcomes. The tympanic membrane comprises three layers: an outer epithelial layer, a middle fibrous layer, and an inner mucosal layer. Tympanic membrane perforations vary in location and extent, as illustrated in Figures 1 and 2 (Dhingra & Dhingra, 2018; Valentine & Wright, 2018). The Wullstein classification, summarized in Table 1, distinguishes type I tympanoplasty, which involves tympanic membrane reconstruction with an intact ossicular chain, from procedures requiring ossicular reconstruction (Brar et al., 2025). For type I tympanoplasty, perforation characteristics, Eustachian tube function, and ossicular chain integrity are important considerations in graft selection, surgical planning, and the interpretation of postoperative outcomes (Aboshanif et al., 2021; Bayram et al., 2020; Rasool et al., 2022). However, successful anatomical closure does not necessarily indicate clinically meaningful or sustained hearing improvement.

Table 1. Classification of tympanoplasty according to Wullstein (Brar et al., 2025)

Type	Remarks
Type I	Tympanic membrane repair only, no abnormalities in the middle ear (miringoplasty)
Type II	Repair of the tympanic membrane and middle ear with maleus erosion; grafts are placed on the nose or the rest of the maleus
Type III	The maleus and inus are absent, the graft is placed directly to the head of stapes (oblique tapediopexation)
Type IV	The tympanic membrane is attached to the footplate stapes, between the oval window and the round window
Type V	Repair involves permanent footplate stapes (fenestration on horizontal semicircular canals)

Source: Wullstein classification as summarized by Brar et al. (2025) of the original manuscript; attribution requires verification.

Existing comparative evidence does not support an unqualified claim that one graft material is superior in every setting. Chhatbar and Ruparel (2022) and Varma et al. (2021)

report hearing outcomes following cartilage-based procedures (Chhatbar & Ruparel, 2022; Varma et al., 2021), whereas other comparisons describe differences in graft uptake and audiometric results according to material and follow-up duration (Nithya et al., 2022; Raju et al., 2022). The graft-thickness and surgical-placement issues illustrated in Figures 3 and 4 add technical context (Ayache et al., 2015; Bojrab et al., 2016; Parab & Khan, 2018; Singh Nagi et al., 2024). These studies underline the need to evaluate closure and ABG improvement separately, because a mechanically stable graft and a thinner graft may offer different benefits under different conditions.

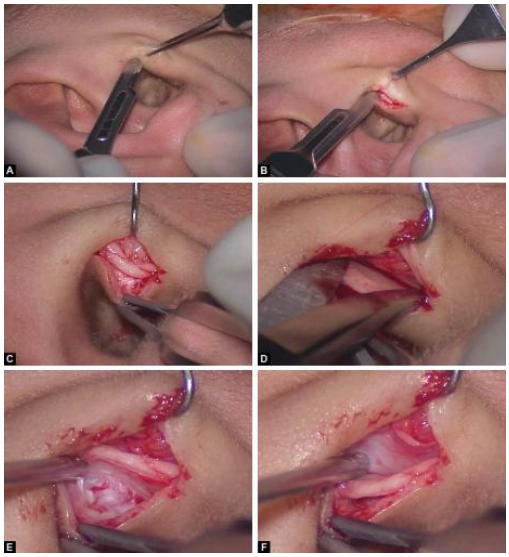

Figure 3. (A) Cartilage graft is taken from posterior tragal incision; (B) incision through skin and cartilage; (C) cartilage is injected without penetrating the anterior perichondrium; (D) subperichondrial dissection on the anterior surface; (E) supraperichondrial dissection on the posterior surface; (F) the tragal cartilage is isolated with the posterior perichondrium still attached.

Source: Bojrab et al. (2016) in the manuscript; original image rights require verification.

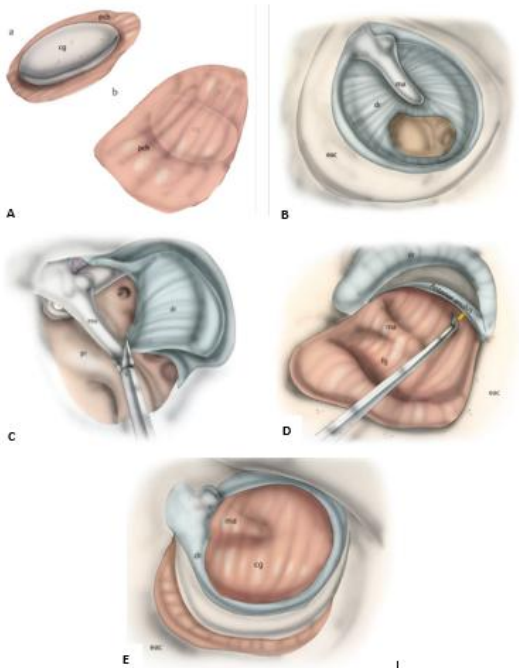

Figure 4. (A) Cartilage graft: a circular cartilage island is formed according to the defect with the perichondrial layer on the posterior surface; (B) the incision of the tympanic flap on the posterior perforation of the right ear; (C) dissection of the tympanic membrane from the handle of the malleus; (D) the installation of the cartilage graft under the annulus fibrosus; (E) the tympanic membrane is repositioned above the graft.

Source: Ayache et al. (2015) in the manuscript; original image rights require verification.

Platelet-rich plasma (PRP) has been investigated as an adjunct because platelet concentrates contain growth factors associated with epithelialization, angiogenesis, and tissue repair (Choudhury, 2024; Dohan Ehrenfest et al., 2014; El-anwar et al., 2015; Gupta et al., 2021; Huang et al., 2021; Huang et al., 2022; Majewska et al., 2025; Yadav et al., 2018). Related investigations and reviews report promising healing outcomes, but PRP protocols, observation periods, and outcome definitions vary (Huang et al., 2021; Huang et al., 2022; Wu & Lou, 2020). Figure 5 illustrates PRP/PRF preparation as cited in the source manuscript (Majewska et al., 2025). Importantly, evidence from a study in which every participant receives PRP can compare graft types under the same adjunct treatment, but cannot isolate PRP's own effect from the effect of surgery. This distinction is central to a scientifically defensible interpretation of the planned comparison.

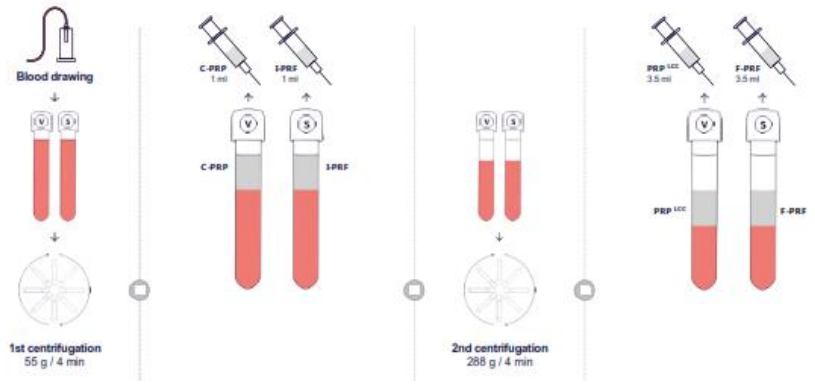

Figure 5. Centrifugation of PRP and PRF.

Source: Majewska et al. (2025) in the manuscript; original image rights require verification.

The specific gap addressed here is the limited local comparison of short-term anatomical closure and ABG improvement after endoscopic type I tympanoplasty with tragal cartilage versus temporalis fascia when PRP is given to both groups. The issue is clinically relevant because graft selection must balance feasibility, closure durability, and auditory function. This study therefore compares the eight-week outcomes of these two graft approaches among patients with CSOM without cholesteatoma treated at Dr. M. Djamil Hospital, Padang. It seeks to estimate observed differences in closure and hearing improvement, not to establish that PRP independently improves outcomes or that short-term closure predicts long-term success. Its contribution is preliminary local comparative evidence and a basis for longer follow-up and larger controlled research.

METHOD

This quasi-experimental pretest–posttest comparative study was conducted at the Department of Otorhinolaryngology–Head and Neck Surgery, Dr. M. Djamil Hospital, Padang, Indonesia, between October 2025 and April 2026. The study population comprised patients with chronic suppurative otitis media (CSOM) without cholesteatoma who underwent type I endoscopic tympanoplasty. Consecutive sampling yielded 22 ears, of which 11 received tragal cartilage grafts and 11 received temporalis fascia grafts. Platelet-rich plasma (PRP) was administered in both groups. Eligible patients were approximately 14–55 years old, had central or subtotal perforations of the pars tensa, and demonstrated an intact ossicular chain on preoperative assessment. Exclusion criteria included recent active otorrhea, significant craniofacial abnormalities or Eustachian tube dysfunction, selected uncontrolled systemic diseases, sensorineural hearing loss, and previous tympanoplasty. The calculated sample size was 11 ears per group, as described in the original study protocol. The operational definitions and measurement instruments are presented in Table 2.

$$n1 = n2 = 2\,(Z\alpha/2 + Z\beta)^2\,\sigma 2 / \Delta 2 = 2\,(0.82 + 0.84)\,6.42 / 3.52 = (2 \times 1.66 \times 40.96) / 12.25 \approx 11.1 \approx 11$$

Table 2. Operational definition of research variables

Variable	Definition	Measuring instruments	How to measure	Measurement results	Scale
Type 1 tympanoplasty with tragus cartilage graft	Perendoscopic tympanic membrane reconstruction using grafts from ipsilateral tragus cartilage by underlay method	Senses	View	1. Granted; 2. Not granted	Nominal
Type 1 tympanoplasty with fascia temporalis graft	Perendoscopic tympanic membrane reconstruction using grafts from the ipsilateral profunda temporal fascia using the underlay method	Senses	View	1. Granted; 2. Not granted	Nominal
Closure of tympanic membrane perforations	Closure of perforations after type 1 tympanoplasty with tragus cartilage and temporal fascia	Otoendoscopy	Evaluation of the tympanic membrane by otoendoscopy	1. Closing; 2. Not closing	Nominal
Air-bone gap closure	The difference in audiogram results between air delivery and bone delivery before and after the action	Audiometry	Average air-to-bone throughput differences at 500, 1000, 2000, and 4000 Hz before and after action	Number (dB)	Ratio

Source: Operational protocol and instruments described in the original study manuscript (2025–2026).

Preoperative evaluation included medical history taking, otorhinolaryngologic examination, otoendoscopy, tuning fork testing, pure-tone audiometry, tympanometry, Eustachian tube function assessment, and mastoid imaging when clinically indicated. Pure-tone audiometry was performed using a calibrated Interacoustics AC40 audiometer in a sound-attenuated room. The air–bone gap (ABG) was calculated from air- and bone-conduction thresholds at the designated test frequencies. Under general anesthesia, either ipsilateral tragal cartilage or temporalis fascia was harvested for grafting. The cartilage was thinned to approximately 0.5 mm when necessary. A tympanomeatal flap was elevated, and the graft was positioned using an underlay technique, followed by the application of platelet-rich plasma (PRP) and supporting material. Postoperative evaluation included otoscopic examination and pure-tone audiometry at eight weeks. The surgical procedure is illustrated in Figure 6. Written informed consent was obtained from all participants or their legal guardians, as applicable.

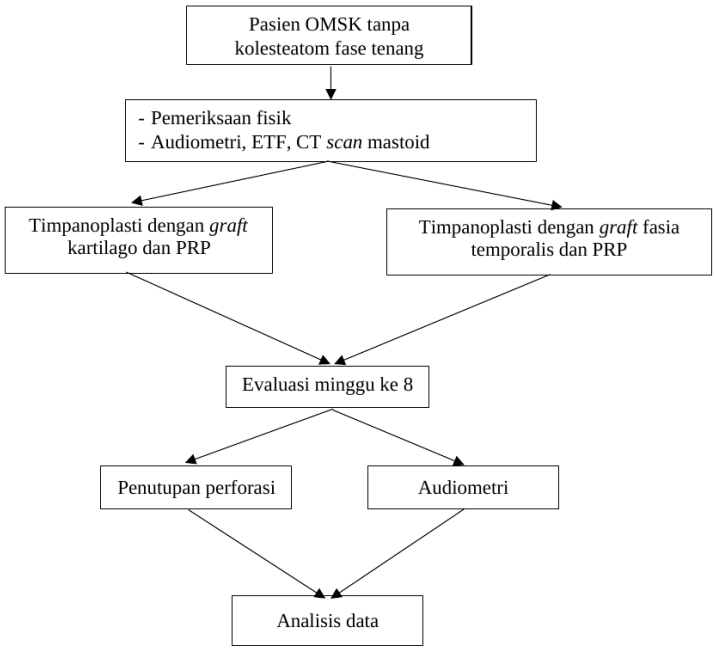

Figure 6. Research flow

Source: Flow diagram included in the original study manuscript; graphic provenance requires author confirmation.

Data were checked, coded, and analyzed using IBM SPSS Statistics, version 23. Categorical variables were summarized as frequencies and percentages, while continuous variables were expressed as means and standard deviations. Preoperative and postoperative air–bone gap (ABG) measurements were compared within each group, and differences in ABG improvement between the cartilage and temporalis fascia groups were evaluated using an independent-samples t test. Alternative statistical tests were considered when the assumptions of parametric testing were not met. Tympanic membrane perforation closure was assessed descriptively using otoendoscopy, while postoperative hearing outcomes were evaluated through pure-tone audiometry at eight weeks. Both groups received platelet-rich plasma (PRP); therefore, the analysis focused on differences in anatomical and hearing outcomes between the two graft materials rather than the independent effectiveness of PRP.

RESULT AND DISCUSSION

This study was conducted at the Department of ENT-KL of Dr. M. Djamil Padang Hospital from October 2025 to April 2026 in 22 ears. Respondents were patients with a calm phase safe type of OMSK who carried out anamnesis, physical examination, audiometry, ETF, and mastoid CT scans, then performed type 1 perendoscopic tympanoplasty under general anesthesia. Patients were divided into two groups, namely the cartilage graft group and the temporal fascia graft group, and both were given PRP.

Respondent Characteristics

Table 3. Characteristics of respondents

Characteristics of respondents	Cartilage graft f (%)	Fascia graft f (%)
Gender		
Male	4 (36,4%)	8 (72,7%)
Women	7 (63,6%)	3 (27,3%)
Age group (years)		
15-25	4 (36,4%)	4 (36,4%)
26-35	3 (27,3%)	3 (27,3%)
36-45	1 (9,1%)	1 (9,1%)
46-55	3 (27,3%)	3 (27,3%)
Education		
SD	0	0
Junior High School	0	0
High School	6 (54,55%)	7 (63,6%)
Colleges	5 (45,45%)	4 (36,4%)
Jobs		
Students	0	1 (9,1%)
Students	3 (27,3%)	2 (18,18%)
PNS	0	4 (36,4%)
Private	8 (72,7%)	4 (36,4%)

Source: Clinical study results reported in the original manuscript (n = 22 ears; 2025–2026).

Based on Table 3, female respondents were more in the tragus cartilage graft group (63.6%), while in the temporal fascia graft group there were more male respondents (72.7%). The largest age group was 15-25 years old in both groups (36.4%). The last highest level of education was high school and the most jobs were private in both groups.

Main Complaints and Perforation Sizes

Table 4. Distribution of the frequency of the main complaints

Respondents' complaints	Cartilage graft f (%)	Fascia graft f (%)
Hearing loss	7 (63,6%)	9 (81,82%)
Ears feel full	0	1 (9,1%)
Ringing in the ears	4 (36,4%)	1 (9,1%)

Source: Clinical study results reported in the original manuscript (n = 22 ears; 2025–2026).

Based on Table 4, the most common complaints in both groups were hearing loss, followed by ringing in the ears and full ears.

Table 5. Frequency distribution of perforation size

Perforation size	Cartilage graft f (%)	Fascia graft f (%)
1 mm	0	0
2 mm	2 (18,18%)	3 (27,3%)
3 mm	0	0

Perforation size	Cartilage graft f (%)	Fascia graft f (%)
4 mm	8 (72,7%)	5 (45,45%)
>4 mm	1 (9,1%)	3 (27,3%)

Source: Clinical study results reported in the original manuscript (n = 22 ears; 2025–2026).

Based on Table 5, the most perforated size is 4 mm (59.1%).

Perforation Closure after Type 1 Tympanoplasty

Table 6. Closure of perforation after type 1 tympanoplasty with grafts of tragus cartilage and temporal fascia

Perforation closure	Cartilage graft f (%)	Fascia graft f (%)
Close	11 (100%)	11 (100%)
Not closing	0 (0%)	0 (0%)

Source: Clinical study results reported in the original manuscript (n = 22 ears; 2025–2026).

Based on Table 6, the success rate of perforation closure in type 1 tympanoplasty with tragus cartilage graft and temporal fascia graft is 100%, respectively, so no statistical test can be performed on perforation closure.

Air-Bone Gap Before and After Type 1 Tympanoplasty

Table 7. Air-bone gap before and after type 1 tympanoplasty with tragus cartilage graft

Sample	Before (dB)	After (dB)	Air-bone gap closure (dB)
Ear 1	44,75	13,75	31
Ear 2	13,75	8,75	5
Ear 3	25	8,75	16,25
Ear 4	12,5	11,25	1,25
Ear 5	25	12,5	12,5
Ear 6	18,75	5	13,75
Ear 7	37,5	18,75	18,75
Ear 8	15	7,5	7,5
Ear 9	15	7,5	7,5
Ears 10	28,75	5	23,75
Ear 11	21,25	15	6,25
Average	23,39	10,34	13,05

Source: Clinical study results reported in the original manuscript (n = 22 ears; 2025–2026).

Based on Table 7, the mean air-bone gap before type 1 tympanoplasty with tragus cartilage graft was 23.39 dB, after the action of 10.34 dB, with an average air-bone gap closure of 13.05 dB.

Table 8. Air-bone gap before and after type 1 tympanoplasty with fascia temporalis graft

Sample	Before (dB)	After (dB)	Air-bone gap closure (dB)
Ear 12	33,75	1,25	32,5
Ear 13	25	23,75	1,25
Ear 14	43,75	13,75	30
Ear 15	20	17,5	2,5

Sample	Before (dB)	After (dB)	Air-bone gap closure (dB)
Ear 16	17,5	6,25	11,25
Ear 17	12,5	12,5	0
Ear 18	35	22,5	12,5
Ear 19	35	10	25
Ear 20	22,5	15	7,5
Ear 21	13,75	10	3,75
Ear 22	26,25	10	16,25
Average	25,90	12,95	12,95

Source: Clinical study results reported in the original manuscript (n = 22 ears; 2025–2026).

Based on Table 8, the mean air-bone gap before type 1 tympanoplasty with fascia temporalis graft was 25.90 dB, after the action of 12.95 dB, with an average air-bone gap closure of 12.95 dB.

Difference in Average Air-Bone Gap Closure between the Two Groups

Table 9. Differences in air-bone gap closure after type 1 tympanoplasty with tragus cartilage grafts and temporal fascia

Variable	Tragus cartilage (Red ± SD) n=11	Fascia temporalis (Red ± SD) n=11	t	p
Average ABG closure (dB)	13.05 ± 7.12	12.95 ± 11.66	-0,221	0,828

Source: Clinical study results reported in the original manuscript (n = 22 ears; 2025–2026).

Based on Table 9, the results of the Independent Sample T-Test showed that the average air-bone gap closure in the tragus cartilage graft group (13.05 ± 7.12) was not significantly different from that of the fascia temporalis graft group (12.95 ± 11.66), with a value of $p = 0.828$ ($p > 0.05$). Thus, there is no statistically significant difference between the two types of grafts.

Respondent Characteristics

Overall, the respondents of this study consisted of 12 males (55%) and 10 females (45%). Based on age group, respondents aged 15-25 years were 8 people (36.4%), 26-35 years 6 people (27.3%), 36-45 years 2 people (9%), and 46-55 years 6 people (27.3%). The level of education consisted of 13 high school students (59%) and 9 universities (41%). Globally, CSOs occur in 65 to 330 million people and the majority are in developing countries (Khairkar et al., 2023). Onifade et al. (2025) estimated that from 2005 to 2023 about 1 in 26 global population or more than 297 million people have CSOM. As many as 60% of people with OCD come with complaints of hearing loss, higher in men (56%) than women (44%), and the majority are over 20 years old (Suryani & Widuri, 2022). Men suffer more from OCD because they do more activities outside the home so they are often exposed to risk factors (Husni et al., 2021).

The results of this study are in line with previous research that OMSK is often found in young adults. Shrestha et al. (2022) obtained the average age of OMSK patients without cholesteatoms of 28.20 years with a range of 12–50 years. Mooy (2023) found the highest incidence in adults (26-45 years) as many as 30 respondents. Abas et al. (2025) obtained the most OMSK at the age of 17-25 years; young adults are a vulnerable group due to exposure to

upper respiratory tract infections, a tendency to delay treatment, and recurrent ear infections that are not treated since childhood. Education level is one of the factors for the health information known to the respondents. This study found that 59% of respondents had a high school education, while Suryani and Widuri (2022) obtained 47% of patients with a college education and 36% with a high school education.

Complaints of OMSK Without Cholesterol

The most common complaints in this study were hearing loss in 16 respondents (72.7%), ringing in 5 respondents (22.7%), and full ears in 1 respondent (4.6%), without complaints of dizziness. Globally, around 184 million people with OMSK (62%) complained of hearing loss with a hearing threshold of >25–30 dB (Onifade et al., 2025). Tenty et al. (2023) reported hearing complaints in 81.1% of patients. Hearing loss causes communication problems and obstacles in daily life, which underlie patients seeking treatment (Suryani & Widuri, 2022).

Perforation Closure After Type 1 Tympanoplasty

Shrestha et al. (2022), in 50 respondents, obtained a significant difference in perforation closure between the temporal fascia graft and cartilage at the 4th week postoperatively, with better cartilage grafts (92%). Gupta et al. (2021) reported that perforation closure in the first month was higher in the temporal fascia (97.5%) than in cartilage (92.5%), but in the 6th month there was a failure of the fascial graft so that it decreased to 80%, while the cartilage graft remained 92.5%. In the meta-analysis by Lajdam et al. (2023) of 17 studies, there was no significant difference at 6 weeks, 3 months and 6 months, but at 12 and 24 months cartilage grafts were superior because fascial grafts could atrophy; cartilage was able to maintain its matrix because it received nutrients by diffusion without the need for its own blood supply. Xing et al. (2020) obtained a successful perforation closure of 75-85% in the temporal fascia and 91.1-95.2% in cartilage without significant differences. In accordance with this, this study obtained a 100% perforation closure success in both groups.

The use of PRP in tympanoplasty has shown significant results in accelerating the growth of the tympanic membrane. Extracellular vesicles in PRP play a role in stimulating collagen production, reducing perforation size, accelerating epithelialization, and increasing angiogenesis (Steiner et al., 2025). Prashanth (2025) reported graft success at week 6 of 94.1% with PRP and 67.6% without PRP, as well as significantly improved air-bone gap closure in the PRP group after 3 months. Accordingly, the administration of PRP during tympanoplasty in this study was thought to help accelerate the closure of the perforation, so that all respondents in both groups gave the same closure results.

Difference in Average Air-Bone Gap Closure

Aziz and Hamad (2025) obtained insignificant results for mean air-bone gap closure between grafts of the temporal fascia (10.82 ± 2.86) and cartilage (9.48 ± 2.54) after 9 months. Nithya et al. (2022) obtained a $p < 0.05$ which showed better air-bone gap closure in the temporal fascia than in cartilage. Shinde et al. (2021), in 50 respondents, obtained significant results ($p = 0.042$) with better results in cartilage grafts after 12 weeks. A meta-analysis of 44 studies stated that there was no significant difference in functional success between the two types of grafts (Chen & Zhao, 2025). Lajdam et al. (2023) also found no significant difference, although the temporal fascia tended to provide better hearing improvement after 6 months; cartilage graft results were influenced by thickness, with better results at partial thickness (0.5

mm) than at full thickness (0.8–1 mm). This study used a cartilage thickness of 0.5 mm and obtained a slightly higher average air-bone gap closure than fascia temporalis at 8 weeks postoperatively, although it was not statistically significant.

Xing et al. (2020) obtained improved hearing in the temporal fascia and partial-thickness cartilage groups better than full-thickness cartilage, which was related to graft elasticity. Swuro et al. (2023) obtained an ABG mean that did not differ significantly between temporal fascia grafts (16.17 ± 6.26 dB) and partial cartilage (16.56 ± 5.25 dB). This suggests that partial cartilage with a thickness of 0.5 mm provides comparable audiological results, according to this study.

The Role of Platelet Rich Plasma in Type 1 Tympanoplasty

Biologically, PRP is used as an adjuvant because it carries growth factors that support angiogenesis, epithelialization, collagen synthesis, and functions as a sealant that helps graft stability (Huang et al., 2022). Randomized Controlled Trial (RCT) trials in 72 patients showed complete tympanic membrane closure with PRP administration in temporal fascia grafts compared to controls (Steiner et al., 2025). Youssef (2022) obtained graft uptake success in perendoscopic meningoplasty with cartilage by 100% with PRP and 72% without PRP. PRP administration also increased uptake at week 6 (94.1% versus 67.6%), demonstrating its role in early healing of the tympanic membrane (Prashanth, 2025). The systematic review by Bayounos et al. (2026) summarized that PRP is associated with accelerated wound healing and epithelialization of the tympanic membrane, but there is no uniform definition of time in its use. The meta-analysis by Huang et al. (2021) found no significant difference in hearing outcomes between PRP and controls. The limitation of this study is that the evaluation was only conducted for 8 weeks, so it was not possible to assess the possibility of reperforation and repair of the air-bone gap at 3 and 6 months postoperatively.

CONCLUSION

At eight weeks postoperatively, complete tympanic membrane perforation closure was observed in all 22 treated ears, including 11 in the tragal cartilage group and 11 in the temporalis fascia group, with platelet-rich plasma (PRP) administered in both groups. The mean air–bone gap (ABG) improvement was 13.05 ± 7.12 dB in the cartilage group and 12.95 ± 11.66 dB in the temporalis fascia group. The difference between groups was not statistically significant ($p = 0.828$). These findings suggested comparable short-term anatomical and audiometric outcomes following type I endoscopic tympanoplasty using either graft material. However, because PRP was administered to all participants, its independent therapeutic contribution could not be determined.

Graft selection should be guided by tympanic membrane characteristics, middle ear conditions, surgical considerations, and individual patient needs rather than an assumption of superiority based on this limited sample. The small sample size of 11 ears per group and the eight-week follow-up period restricted the assessment of long-term graft integrity, recurrent perforation, and sustained hearing improvement. Future studies should include larger sample sizes, standardized anatomical and audiometric outcome measures, and extended follow-up periods of at least three to six months. Additionally, controlled comparative studies

incorporating groups without PRP are recommended to determine its independent contribution to tympanic membrane healing and postoperative hearing outcomes.

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