Sarcouncil Journal of Medical Series

ISSN(Online): 2945-3550

Volume- 05| Issue- 11| 2026

Research Article **Received:** 10-10-2026 | **Accepted:** 05-11-2026 | **Published:** 19-11-2026

Hearing Gain after Cartilage Myringoplasty

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Abstract: Background: The use of endoscopy in ear procedures is expanding day by day, gradually replacing binocular microscopes, starting with myringotomy and Gromet surgeries. The endoscope provides a wider panoramic view that is closer and more accurate, making it easier to handle small ear instruments inside middle ear. With the availability of precise ear instruments, most ear surgeries can now be performed with an endoscope, and tympanic membrane repair is one of these procedures. **OBJECTIVE:** The objective of this study is to evaluate the hearing gain in myringoplasty with endoscopic ear surgery. **Patients & Methods:** This prospective case series study was carried out I …… between March 2019 and February 2025. All the patients were thoroughly assessed preoperatively by detailed clinical and audiological Patients underwent myringoplasty underlay technique with endoscopic ear surgery approach complete healing of perforation settled with binocular microscopic examination. **Results:** Age group of the selected patients are 7-51 years means and standard deviations 26.03 ± 7.95. Male to female ratio 1:1.33, the results of operations all the small perforations 23 are healed (100%), medium size perforations healed 92 (96.68%), subtotal perforations healed 37 (90.24%), total perforations healed 4 (80%) mean and standard deviations **92.19 ± 6.3**. Left sided perforations healed 65 (94.2%) right side healed 87 (91.57%). Results of hearing assessment's post-operatively Post-operatively was 16.47 at 500Hz, 15.35 at 1000Hz & 15.17 at 2000Hz.mean & standard deviation of hearing gain was 20.83 **± 2.87** at 500Hz, 20.94 **± 2.72** at 1000 Hz & 20,61 **± 3.60** at 2000Hz and its mean 19.7 dB the improvement were 17.6dB hearing gain at 500,1000 & 2000 Hz. **Conclusions:** The results of the tragal cartilage graft with endoscopic ear approach with regard to hearing improvement are good and encouraging.

Keywords: Hearing gain, Tympanoplasty, Endoscopic ear surgery.

INTRODUCTION

Myringoplasty is an ear surgery performed to repair a hole in the ear drum. Tympanoplasty is a surgical operation in which surgery is done to repair a hole in the ear drum with or without reconstruction of the hearing bones. There are many different ways to repair a perforation in the tympanic membrane. Most often a small piece of temporalis fascia, fat, or cartilage from the tragus is used to fill the hole. This is called a graft. The graft acts like a scaffold, allowing the ear drum to regrow. Sometimes dissolving artificial material is used instead, such as a paper-patch or gel foam.

Both myringoplasty and tympanoplasty may be done with rigid Hopkins scope for visualization, firstly refreshing the edge of perforation by removing part of edge of perforation, making an incision in external auditory canal at the bony part of external auditory canal, elevation of tympanomeatal flap, tympanic membrane from anulus, enter the middle ear cavity checking the mobility and integrity of ossicles, harvesting tragal cartilage and prepare it to fit the size of perforation, gelfoam arranged inside the cavity of middle ear, tragal cartilage inserted under the perforation, tympanic membrane and tympanomeatal wall return it to its original position, packing external auditory canal with gelfoam, remove the pack after two weeks, hearing assessment with pure tone audiometry after 6 months. (Marchioni, D. *et al*., 2010)

Objective

The objective of this study is to evaluate the hearing gain in myringoplasty with endoscopic ear surgery.

PATIENTS & METHODS

This prospective case series study was carried out In Al-Imam Al-Hussain Medical City/holy Karbala Health Directorate between March 2019 and February 2025.

Patient

164 patients of both sex, 164 ears 159 patients (5bilateral ears), female= 91 (57.23%), male= 68 (42.77%), age (7-51) years. Patient parameters including age, gender, size, number, tympanic membrane perforation catogerised as:

Small: Area involving one quadrant or <10% of pars tensa.

Medium: Area involving 2-3 quadrants or 10-40% of pars tensa.

Subtotal: Area involving the pars tensa >75% and does not involve the annulus.

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DOI- https://doi.org/10.5281/zenodo.24361675

Inclusion Criteria

A total perforation is present in the tympanic membrane. Unilateral, bilateral and site of the perforation.

Patients having chronic otitis media with conductive hearing loss of >20 dB.

Exclusion Criteria

1. Patients with sensorineural hearing loss.
2. Complicated COM.
3. Revision surgery.
4. Ossicular erosion & otosclerosis.
5. Small external auditory canal diameter < 3mm.

All the patients were thoroughly assessed preoperatively by detailed clinical and audiological examination, each patient radiologically assessed with CT-scan of the temporal bone, preoperative and postoperative pure tone audiometry at 6 months was done for all the patients for comparing. Hearing levels were assessed as the mean air conduction (AC), and air-bone gap (ABG) at 500, 1000, and 2000 Hz.

Surgical Procedure

Patients underwent myringoplasty underlay technique with endoscopic ear surgery approach using Hopkins Telescope 0 degree, diameter 2.7mm length 11cm, tragal cartilage harvested for grafting.

Post Operative

Patient discharged on day 2 post-operative.

Antibiotic was given as ceftriaxone vial 1*2 for 5days, on week1 the pack was removed, 2week the silicon sheet removed complete healing of perforation settled with binocular microscopic examination.

Statistical Analysis

Means and standard deviations using statistical software package by EXCEL window 2010 (STDEV).

Questionare Tympanoplasty

1- Perforation: Site, size, single, multiple, unilateral, bilateral, left, right, marginal, peripheral, attic, pars tensa, ant., post.
2- Ossicle: Eroded, intact.
3- Middle ear & mastoid at time of operation: Dry, discharging, Clear, Cholesteatoma, granulation tissue, polyp.
4- Ct-scan of temporal bone: Clear middle ear, haziness of middle ear.
5- Pure tone audiometry: Three-frequency ABG pre- and post-surgery.
6- Type of surgery: Onlay, underlay, interlay.
7- Type of graft: Cartilage, temporalis facia.
8- Result of operation: Heald perforation 151, persistent perforation 13, 164 ears (5 bilateral), 159pt female=91, male=68, age=7-51years between March 2019 and November 2023.

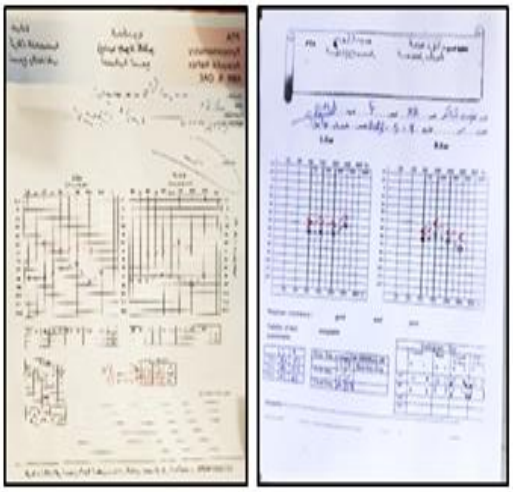


FIG 1

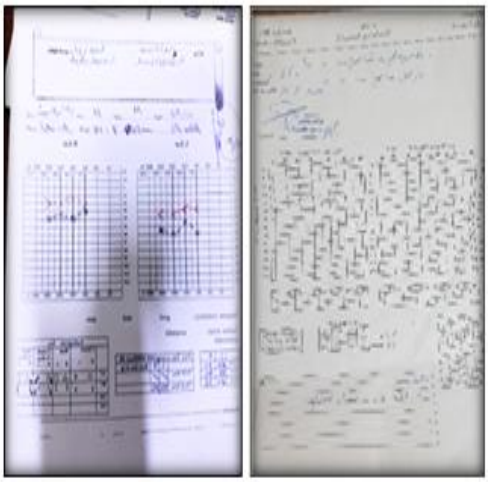
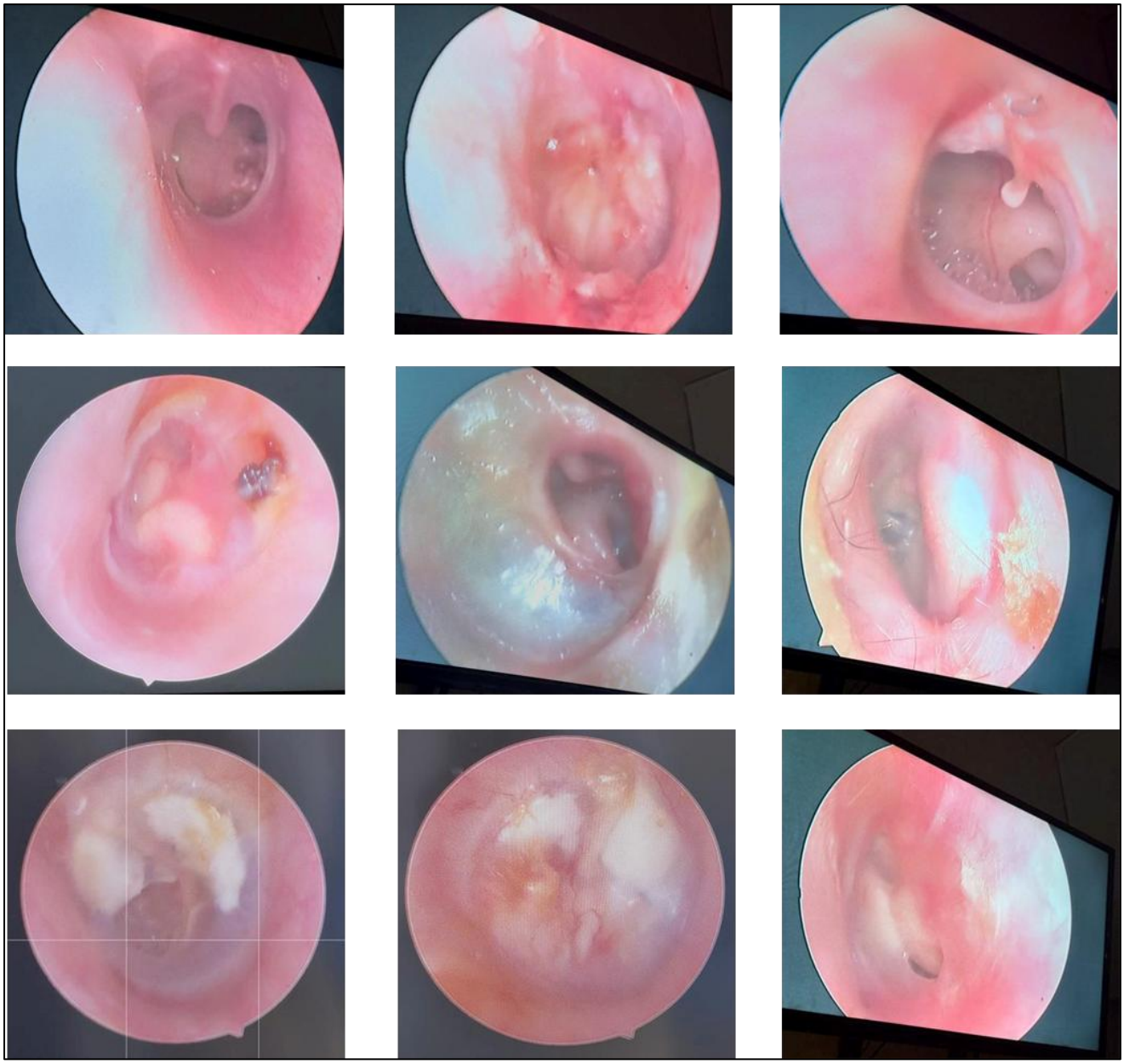


FIG 2

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RESULTS

1- Age group of the selected patients are 7-51years means and standard deviations 26.03 ± 7.95. Male to female ratio 1:1.33. 159 total patients, 154 patients with unilateral (93.90%) COM and 5patients with bilateral ears (6.09%) affected. Size of perforation as follow small (one quadrant) 23 (14%) medium size (2-3 quadrants) 95 (57.9%) subtotal perforation >3 quadrants were 41 (25%). Total perforation 5 (3%). Numbers of perforation as the following single in 151 ear (92.07%) and multiple in 13 (7.92%). Laterality of perforations 154 (93.90%) in single ear, 10 (6.09%) in both ears. 69 ears (42.07%) in the left side, 95 ears (57.92%) in right ear side.

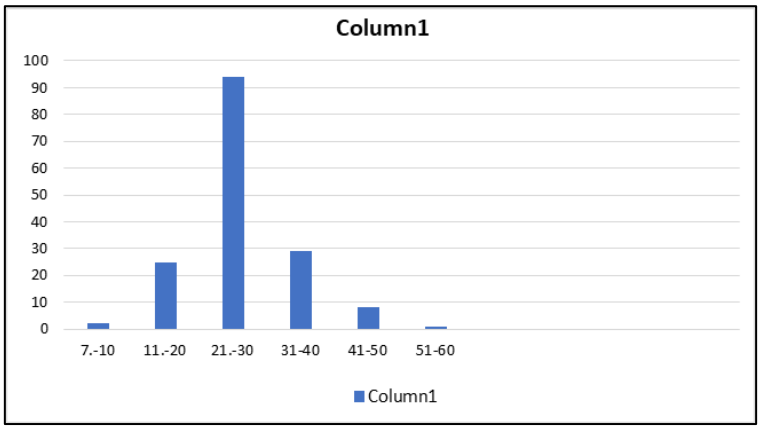
Table 1: Baseline Characteristics of the Study Subjects

Sex	Male	68	42.77%
	Female	91	57.23%
Size	Small (one quadrant)	23	14%
	Medium (2-3 quadrants)	95	57.9%
	Subtotal > 3 quadrants	41	25%
	Total involve all T M	5	3%
No.	Single	151	92.07%

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	Multiple	13	7.92%
Laterality	Unilateral	154	93.90%
	Bilateral	10	6.09%
Side	Left	69	42.07%
	Right	95	57.92%



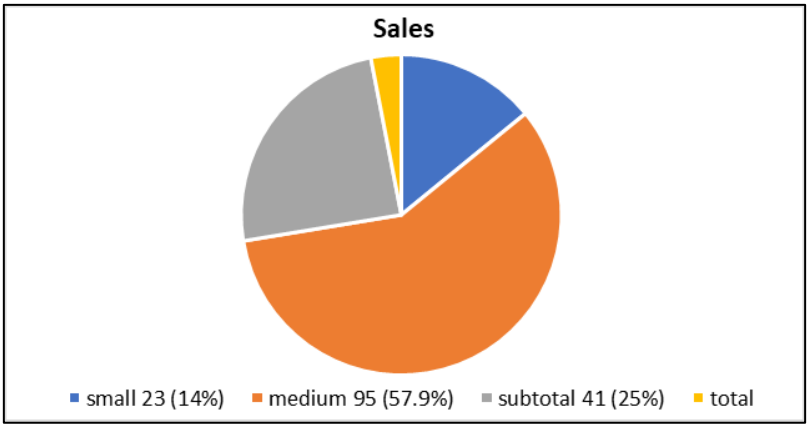
Distribution of no. of patients with age groups.

RESULTS OF OPERATIONS

The results of operations all the small perforations 23 are healed (100%), medium size perforations healed 92 (96.68%), subtotal perforations healed 37 (90.24%), total perforations healed 4 (80%) mean and standard deviations **92.19 ± 6.3**. Left sided perforations healed 65 (94.2%) right side healed 87 (91.57%).

Table 2: Size of perforation

	No.	**Healed**	**Residual perforation**	**% of healing**
Small (one quadrant)	23	23	0	100%
Medium (2-3 quadrants)	95	92	3	96.68%
Subtotal > 3 quadrants	41	37	4	90.24%
Total involve all T M	5	4	1	80%
Left	69	65	4	94.2%
Right	95	87	8	91.57%
Total	164	152	12	92.68%



Size of perforation.

Results of hearing assessment's post-operatively, all the patients did P.T.A. Pure tone audiometry was done to all the patients pre-operatively and the mean of air bone gap were 37.3dB at 500Hz, 36.29 at 1000Hz &35.78 at 2000 Hz.

Post-operatively was 16.47 at 500Hz ,15.35 at 1000Hz & 15.17 at 2000Hz.mean & standard deviation of hearing gain was 20.83 ± **2.87** at 500Hz, 20.94 ± **2.72** at 1000 Hz & 20,61 ± **3.60** at 2000Hz and its mean 19.7 dB the improvement were 17.6dB hearing gain at 500,1000 & 2000 Hz.

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Table 3: Pure tone audiometry

Three-frequency ABG pre- surgery	37.3 dB
Three-frequency ABG post-surgery	19.7dB
Hearing gain	17.6dB

3. Ct-scan of the temporal bone display clear middle ear in 113 ear (68.9%) and haziness in 51 ears (31.1%).

Table 3: Ct-scan of temporal bone

Clear middle ear	113	68.9%
haziness of middle ear	51	31.1%

DISCUSSION

Endoscopic ear surgery (EES) provides several advantages compared with traditional surgical microscopy. Rigid endoscopy allows for wide-field view of the surgical field, improved resolution with high magnification, and the ability to "look around corners.(5)

This study Age group of the selected patients are 7-51 years means and standard deviations 26.03 ± 7.95. Male to female ratio is 1:1.33.
Other studies showed similar result found in Ashish, H.S. *et al*., (3).
In our study. The results of operations was Left sided perforations healed 65 (94.2%) right side healed 87 (91.57%). Similar result was found in Daniel, C.F. *et al*., (4)
In our study hearing assessment's post-operatively the improvement were 17.6dB hearing gain at 500, 1000 & 2000 Hz. similar result was found in Daniel, C.F. *et al.,* (4)

Conclusions: The results of the tragal cartilage graft with endoscopic ear approach with regard to hearing improvement are good and encouraging.

Standard deviation = 26.03 ± 7.95 by EXCEL (2010 STDEV)

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Source of support: Nil; **Conflict of interest:** Nil.

Cite this article as:
Khashan, K. M., Hussein, H. A. & Hussein, I. A. "Hearing Gain after Cartilage Myringoplasty" *Sarcouncil Journal of Medical Series* 5.11 (2026): pp 1-5.

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