International Journal of Scientific Reports
Rayamajhi P et al. Int J Sci Rep. 2020 Aug;6(8):292-296
http://www.sci-rep.com
pISSN 2454-2156 | eISSN 2454-2164

DOI: http://dx.doi.org/10.18203/issn.2454-2156.IntJSciRep20203111

Original Research Article

Graft uptake and hearing assessment in revision myringoplasty in a tertiary centre

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Received: 12 April 2020
Accepted: 07 May 2020

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ABSTRACT

Background: The revision myringoplasty surgery is done for the graft failure after myringoplasty. The surgeons' make use of the temporalis fascia or cartilage as the graft material. Some surgeons opt for the revision myringoplasty with cortical mastoidectomy as well.
Methods: This study is a retrospective, observational study done in the Department of ENT and Head and Neck Surgery, Tribhuvan University Teaching Hospital from December 2015 to 2019. Data of all the patients undergoing revision myringoplasty with or without cortical mastoidectomy were collected from the record section and included in the study. Post-operatively, the patients were assessed for graft uptake and hearing assessment after six weeks of surgery. Total uptake of the graft was taken as the successful graft uptake. The hearing was assessed by air conduction threshold (AC threshold) and air-bone gap status postoperatively.
Results: Total of 42 patients were analysed with the graft uptake of 86%. There was no significant difference in the graft uptake on using the temporalis fascia or tragal cartilage. Regarding the hearing assessment, the average pre-operative and post-operative AC threshold was 37.95±5.68 dB and 29.36±6.28 dB. The average pre and postoperative AB gap was 29.97±8.16 dB and 21.85±6.68 dB. The improvement in the hearing threshold was significant (p value <0.05).
Conclusions: The graft uptake rate for revision surgery in our centre was comparable to other studies in the literature. There was significant hearing improvement pre and postoperatively after revision myringoplasty.

Keywords: Air conduction threshold, Air bone gap, Graft uptake, Cortical mastoidectomy, Revision myringoplasty

INTRODUCTION

The aim of myringoplasty done for chronic otitis media mucosal type is the dry ear and hearing improvement after surgery. The primary success of myringoplasty is assessed by the successful graft uptake. The graft uptake rate of myringoplasty varies from various studies and is commonly over 80% in various studies.[1,2] But after primary surgery there are patients who have graft uptake failure once or more. There are various factors postulated as the high-risk perforation for the failure of graft uptake after myringoplasty like eustachian tube dysfunction, middle ear infection, atelectasis, subtotal perforation of tympanic membrane etc.[3-5]

The patients with revision surgery have had single or multiple failures in the past and they are still high-risk patients for graft uptake. During revision surgery, surgeons opt for various graft materials, some for temporalis fascia again in the revision cases and others opt for cartilage graft.[6] Some surgeons support the addition of cortical mastoidectomy in addition to myringoplasty for the revision cases or other high-risk patients to improve the graft uptake rate.[7,8]

The limited availability of the literatures reporting on the graft uptake result after revision myringoplasty point out on the lesser graft uptake after revision surgery.[9] The present study is undertaken to study the graft uptake and

hearing status after revision myringoplasty in a tertiary center.

METHODS

The study was undertaken in the Department of ENT and Head and Neck Surgery, Tribhuvan University teaching hospital from December 2015 to 2019. Ethical approval was taken from the Institutional Review Committee of the institution. The retrospective data was collected of all the patients who had undergone revision surgery in the department done by multiple surgeons.

All the patients above 15 years, who had graft uptake failure once or more than once, needing revision myringoplasty were included in the study. The pure tone audiogram done within the last one month before the surgery were included for the preoperative hearing evaluation. The revision surgeries were done by multiple surgeons. Choice of the graft material, approach and the type of surgery depended on the choice of the surgeon. The various materials used for the graft was temporalis fascia and tragal cartilage. Most of the surgery was by permeatal approach followed by postaural approach. Technique of graft placement was Underlay in all the cases thus allowing the assessment of the middle ear and the ossicles in all.

The patients were kept on oral ciprofloxacin for seven days postoperatively and the ear pack kept was removed on suture removal day usually on the sixth postoperative day. Betamethasone-neomycin ear drops was given for two weeks and the patients were called for follow-up after a minimum period of six weeks for graft take-up status and hearing assessment. Total graft take without any residual perforation was regarded as successful graft uptake. For hearing assessment average of four frequency (500, 1000, 2000, and 4000 Hz) air bone gap and air conduction threshold were used to compare the results between pre- and post-operatively. The air bone gap taken was the difference in the preoperative bone conduction and postoperative air conduction threshold.

Statistical analysis was performed using SPSS 22 version. The graft uptake difference in the temporalis fascia and tragal cartilage graft group was calculated using chi-square test. The AC threshold and AB gap was analysed using student t-test. The p value less than 0.05 was taken as statistically significant difference.

RESULTS

Total of forty-two patients above fifteen years who had undergone revision myringoplasty were analysed in the study. All the operations were done under local anesthesia. The male to female distribution in the study was as shown in (Figure 1) with male predominance and ratio of 1.47:1. The maximum number of the patients were in the age group of 15-30 years age group pointing towards the most active age group. Rarely the patients above 45 years of age had the surgery as shown in (Figure 2).

Twenty-eight of the patients had the revision surgery by permeatal approach and remaining fourteen of them had post-aural approach. This was strictly the surgeons' choice. Generally, the department follows the permeatal route in maximum number of patients and post-aural approach is done where the anterior rim of the perforation is not visualized easily.

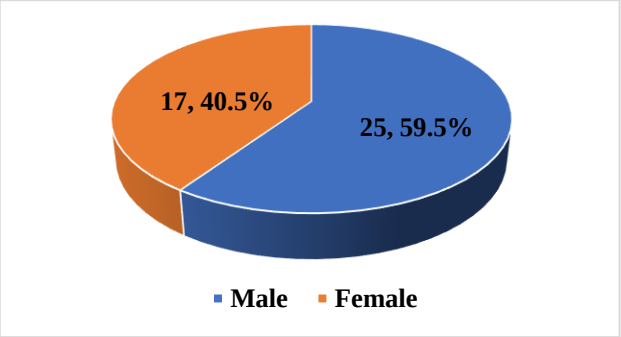

Figure 1: Gender distribution (n=42).

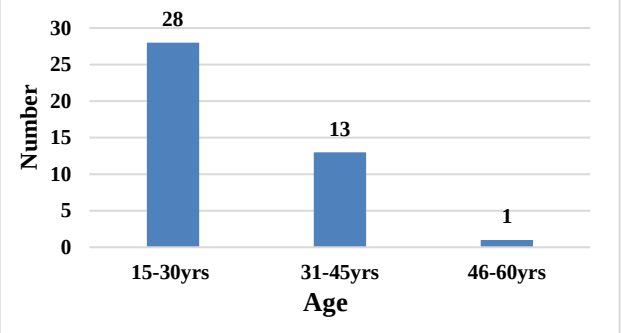

Figure 2: Age distribution of the patients (n=42).

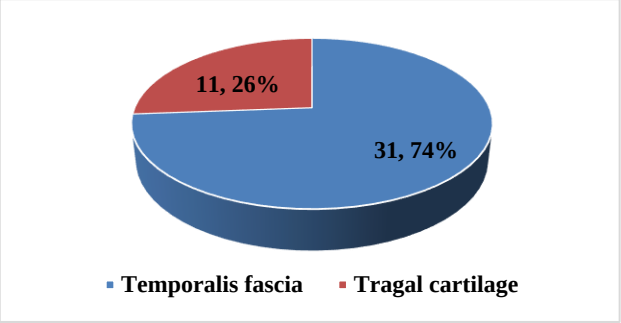

Figure 3: Graft material for revision surgery (n=42).

Table 1: Ossicular chain status (n=42).

Ossicular status	N (%)
Intact and mobile	34 (81)
Fixed and restricted	4 (9.6)
Dislocated/necrosed	2 (4.7)
Not assessed	2 (4.7)

Table 2: Graft uptake according to the graft material.

Graft material	Total	Uptake	Residual perforation	Graft uptake (%)	P value by Chi-square test
Temporalis fascia	31	26	5	84	0.43 (not significant)
Tragal cartilage	11	10	1	91	
Total	42	36	6	86	

Table 3: Mean post-operative hearing assessment by AC threshold (n=42).

Frequency (Hz)	Mean pre-operative AC	Mean post-operative AC	P value by student t-test
500	42.34±5.78 dB	34.67±4.76 dB	0.029
1000	40.47±4.52 dB	32.56±5.88 dB	
2000	30.58±6.99 dB	22.78±7.66 dB	
3000	38.42±5.44dB	27.42±6.84 dB	

Table 4: Mean post-operative hearing assessment by AB gap (n=42).

Frequency (Hz)	Mean pre-operative AB gap	Mean post-operative AB gap	P value by student t-test
500	36.58±6.78 dB	28.76±6.82 dB	0.034
1000	30.47±7.54 dB	22.67±7.46 dB	
2000	24.34±8.78 dB	16.28±8.92 dB	
3000	28.51±9.56 dB	19.69±3.54 dB	

Thirty-nine patient underwent revision myringoplasty only and the remaining three patients had revision myringoplasty with cortical mastoidectomy. Maximum number of the patients had temporalis fascia as the graft material and the rest had tragal cartilage myringoplasty as shown in (Figure 3).

Graft placement in all the patients were by underlay approach, thus middle ear was assessed in all. The ossicular chain was assessed in forty patients and remaining two patients it was not assessed due to the posterior canal wall bony overhang. The ossicular chain finding in the middle ear is as shown in (Table 1). For the fixed and restricted ossicular chain, mostly due to tympanosclerosis, nothing was done surgically. For the cases with dislocated/ necrosed case; both of them had eroded long and lenticular process of the incus. Thus, one of them had partial ossicular replacement prosthesis with conchal cartilage augmentation ossiculoplasty and the other patient had interposition cartilage ossiculoplasty.

Post-operatively, the graft uptake rate of the patients was 86%. One among the three revision myringoplasty with cortical mastoidectomy had graft uptake failure. Among the graft material used the uptake was better in the cartilage myringoplasty as shown in (Table 2) though not statistically significant.

Regarding the post-operative hearing assessment, the evaluation was done by improvement of AC threshold and AB gap improvement postoperatively as shown in table III and IV. In comparison of the pre and postoperative threshold the mean difference was significant in both AC threshold and AB gap improvement. Thus, by audiological reports all the patients had hearing improvement and there was no patient with complication of postoperative sensorineural hearing loss.

DISCUSSION

This retrospective, observational study was conducted in a single institute for a period of four years. The surgeries were performed by multiple surgeons with the mean follow-up period of eight weeks. Short term follow-up period was one of the drawbacks of the study. Various studies stress on the importance of the long-term follow-up indicating the true graft uptake picture.[9] Mokhtarinejad et al in their study had a long-term follow-up of 1.6 to 2.4 years period after his primary myringoplasty surgery.[10]

The commonest age group operated in our study was 15-30 years age group stressing on the fact of the active age group concerned with the ear discharge and hearing loss. The approach of revision surgery in our case was permeatal followed by the post-aural approach. This was strictly the surgeons' choice and moreover the post-aural approach was done when the anterior margin of the perforation was not visualized easily on otoscopy. Aviles et al mentioned the significant difference in the graft uptake according to the approach of the surgery whereas other authors like Dangol et al and Niazi et al found no significant difference in the uptake with relation to the approach of the surgery.[11-13]

Primary myringoplasty is relatively a safe surgery with variable success rate usually above 80% as mentioned by

Westerberg in their long-term series of ten years.[1] Some authors also quote very high success rate as 94-97% in their series.[10,14] Compared to the primary surgery, the revision surgery holds a lesser graft uptake rate. The patients have also experienced failure of graft uptake once or twice and thus making it a challenge for the surgeons. Various studies have mentioned graft uptake rate comparable to our present study. Altuna et al in their study have mentioned 67% graft uptake in their sample of sixty patients.[2] Prinsley et al had 92% graft uptake in their large series of patients followed up after three months of surgery.[9] These is less graft uptake rate as compared to primary surgery using cartilage as mentioned in the study by Veeranjaneyulu et al.[15]

Our studies mention the use of either tragal cartilage or temporalis fascia as the graft material with no statistically significant difference in the graft uptake rate though the cartilage myringoplasty showed a relatively better uptake rate. Since its advent many surgeons have been following cartilage myringoplasty in difficult perforations and high-risk perforations cases. Many authors have mentioned in their studies the use of cartilage in revision surgeries. They have mentioned the advantage of cartilage being more robust and stiffer increasing its likelihood of successful uptake in high risk perforations.[16,17] Authors have mentioned the ability of the cartilage to derive its nutrition by diffusion thus making it able to survive better in lack of vascularization and infection.[2]

Our institution routinely follows fascia myringoplasty in majority. Cartilage myringoplasty is usually done in revision patients or high-risk perforations. Though our present study mentions the slightly better uptake in cartilage graft but we don't have the case control study in higher number of patients to significantly study the difference of fascia versus cartilage myringoplasty.

Three patients in our study had undergone myringoplasty with cortical mastoidectomy in our study. It was the surgeons' choice to include the cortical mastoidectomy for the revision myringoplasty. The rationale given for this was the suspicion of the aditus blockage to be opened by performing cortical mastoidectomy. Swamy et al[8] mentioned the higher graft uptake of myringoplasty with cortical mastoidectomy only in wet cases but similar result compared to myringoplasty only in dry cases. Albu et al and Ramakrishnan et al also mentioned that addition of cortical mastoidectomy had no extra advantage in graft uptake rate.[18,19] Sample in our present study is very low to compare the significant difference in patients undergoing myringoplasty with or without cortical mastoidectomy.

The patients undergoing revision surgery in our study showed significant hearing improvement after revision surgery. The hearing improvement after surgery was irrespective of the type of surgery and the graft material. Our study had assessed the hearing by improvement in AC threshold and AB gap improvement. Different literature mentions the assessment of hearing by AC threshold, AB gap improvement and also by AB gap closure. Altuna et al, Moore and Kirazli et al have shown similar improvement in hearing postoperatively in their cartilage revision myringoplasty.[2,20,21]

Thus, our study further stresses its graft uptake of revision myringoplasty to be comparable to the other literatures. There are limitations like multiple surgeons, lesser number of sample size, short term follow-up period in our study. Randomized control trial comparing the cartilage and fascia revision myringoplasty and larger sample size can provide us with more consistent results.

CONCLUSION

The graft uptake rate after revision myringoplasty in our tertiary centre is 86%. The short term hearing assessment by AC threshold and AB gap improvement showed significant hearing improvement after revision myringoplasty.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: The study was approved by the institutional ethics committee

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Cite this article as: Rayamajhi P, Dutta HD, Dangol K, Kharel B. Graft uptake and hearing assessment in revision myringoplasty in a tertiary centre. Int J Sci Rep 2020;6(8):292-6.