International Journal of Otorhinolaryngology and Head and Neck Surgery
Gowrishankar M et al. Int J Otorhinolaryngol Head Neck Surg. 2020 Sep;6(9):1612-1616
http://www.ijorl.com
pISSN 2454-5929 | eISSN 2454-5937

DOI: http://dx.doi.org/10.18203/issn.2454-5929.ijohns20203559

Original Research Article

A comparative study of temporalis fascia grafting techniques in cortical mastoidectomy with type 1 tympanoplasty patients in tertiary care hospital

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Received: 24 June 2020
Revised: 09 August 2020
Accepted: 10 August 2020

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ABSTRACT

Background: Chronic otitis media is a highly prevalent middle ear disease in the developing countries which causes various pathological changes in the tympanic membrane and middle ear. Treatment of chronic otitis media involve medical and surgical methods. There are many surgical techniques followed regarding the grafts used, temporalis fascia remains the most commonly used. There are some studies debating the usefulness of dry grafts and wet grafts. Our study is aimed at comparing the both and evaluating the outcome.
Methods: A prospective comparative study conducted in the department of Otorhinolaryngology and Head and Neck surgery, Government Stanley Medical College, Chennai, with 64 patients for the period of 1 year from July 2017 to June 2018.
Results: Graft uptake of temporalis fascia in dry group is 93.8% and wet group has graft uptake of 87.5%, failure rate is low in dry group when compared with wet group. And also, this study showed higher graft uptake in small and medium sized perforation (95%) than the larger perforation (87.5%) and also there is no relationship between the duration of inactive stage and the graft uptake has been observed in our study.
Conclusion: Temporalis fascia is a reliable graft material for reconstruction of tympanic membrane perforations. In our study dry graft has shown more success rate than the wet graft. Hearing improvement was the same in dry and wet group in which the grafts have been up taken well.

Keywords: Temporalis fascia, Chronic otitis media, Tympanoplasty, Graft uptake

INTRODUCTION

Chronic otitis media is a highly prevalent middle ear disease particularly in the developing countries like India.[1,2] It is defined as a persistent disease affecting the mucoperiosteal lining of the middle ear cleft more than 3 months which is insidious in onset, and capable of causing the destruction and some irreversible sequalae and also clinically it manifests with ear discharge and deafness. It causes numerous pathological changes in the tympanic membrane and middle ear such as perforation, ossicular erosion, myringosclerosis, tympanosclerosis, granulation, effusion, polyp, cholesteatoma, etc. It causes significant conductive hearing loss. The surgical treatment of chronic otitis media primarily aims at complete removal of disease process and reconstruction of hearing mechanism.

Cortical mastoidectomy is a surgical procedure in which complete exenteration of all accessible mastoid air cells while maintaining the integrity of posterior canal wall. Tympanoplasty is a surgical procedure to reconstruct sound conducting tympanoossicular system with or without grafting.

For reconstructing the tympanic membrane various graft materials are used. The most common used are temporalis fascia, cartilage, fascia lata, vein graft etc.[3] Temporalis fascia is the most frequently used graft material with closure of the tympanic membrane perforation. It has low metabolic rate, good survival rate, readily available, close to operating site when taken at high level it will be thin and high quality.[4]

Aim of our study was to compare the success rate of graft uptake in patients with chronic otitis media of mucosal type – inactive stage between dry and wet temporalis fascia auto graft and to study the hearing improvement in these patients.

METHODS

This prospective comparative study was conducted in the Department of Otorhinolaryngology and Head and Neck surgery, Government Stanley Medical College, Chennai for a period of 1 year from July 2017 to June 2018. 64 patients were enrolled in our study where they have been grouped into 2. Group A comprised of 32 patients with cortical mastoidectomy with type 1 tympanoplasty by using dry temporalis fascia graft and group B comprised of 32 patients with cortical mastoidectomy with type 1 tympanoplasty by using wet temporalis fascia graft.

Inclusion criteria for our study were those patients aged between 15 to 65 years and patients with chronic otitis media with inactive mucosal type of pathology.

All patients with chronic otitis media with mucosal type of disease fitting within our inclusion criteria and willing to give informed consent were included in our study. Informed consent was obtained from all the enrolled patients preoperatively after explaining the procedure. Ethical committee approval was obtained from the institutional ethical committee of Stanley Medical College, Chennai.

From all 64 patients detailed history was taken by using our study proforma and detailed otological and clinical examinations of nose and throat were done. Tuning fork tests were done by using standard Gardiner brown tuning forks 256 Hz, 512 Hz, 1024 Hz. Oto endoscopic examination and pure tone audiometry were done and air bone gap was measured. Radiological confirmation was done by using X ray mastoids- law's view. Since these patients were belong to mucosal type, and in the view of cost factor and risk of radiation exposure, computed tomography (CT) was not done as a preferred investigation. Preoperative investigations such as complete blood count, random blood sugar, renal function test, bleeding time and clotting time, chest X ray, electrocardiography (ECG), viral markers such as Human immunodeficiency virus (HIV) testing and hepatitis B surface antigen test were done in all enrolled patients.

All patients underwent pre anaesthetic workup in our anaesthesia department. Patients were admitted and divided randomly into two groups. Group A- dry temporalis fascia graft type, group B- wet temporalis fascia graft type. After obtaining anaesthetic fitness patients were posted for cortical mastoidectomy with type 1 tympanoplasty either with dry or wet temporalis fascia graft under general anaesthesia.

Following assessments were done in two groups: pre-operative otoscopy, pre-operative oto-endoscopy, pre-operative culture and sensitivity, pre-operative audiological evaluation, pre-operative grafting technique, post-operative follow up at 1 week, 4 weeks, 12 weeks, post-operative otoscopy, post-operative otoendoscopy and post-operative audiological assessment at 12 weeks.

The collected data were analysed with IBM, Statistical package for the social sciences (SPSS) statistics software 23.0 version. The level of statistical significance was set at $p<0.05$.

RESULTS

In our study, mean age group in group A is 36 years and in group B it is 28 years (Figure 1). In group A there were 6 males (18.75%) and 26 females (81.25%). In group B there were 17 males (53.12%) and 15 females (46.8%). In total study population had 23 males (35.93%) and 41 female (64.06%) patients (Figure 2).

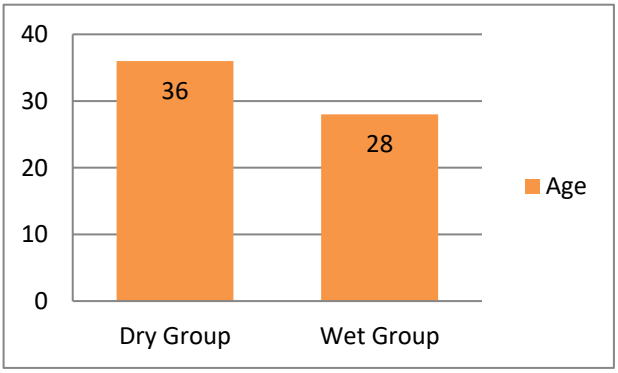

Figure 1: Age distribution in group A and group B.

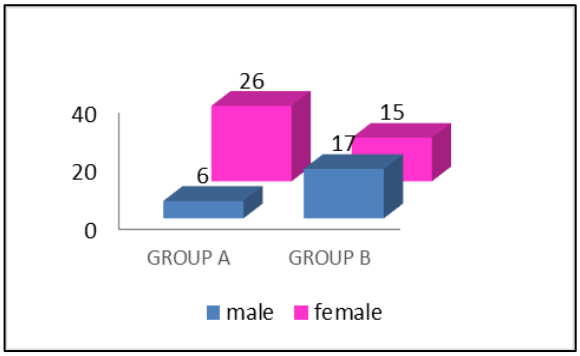

Figure 2: Gender distribution.

Out of 32 patients in wet group 9 (28%) patients had small sized perforation, medium sized perforation seen in 13 (40%) patients and 10 (31.2%) patients had large perforation. In dry group out of 32 patients 9 (28%) patients had small perforation, 9 (28%) patients had medium perforation and 14 (43%) had large sized perforation (Figure 3).

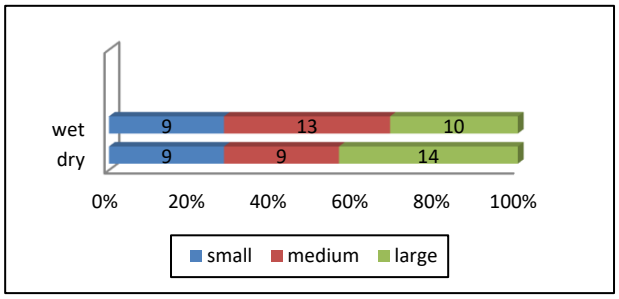

Figure 3: Distribution based on size perforation.

In dry group pre-operative PTA and post-operative PTA mean difference was 20.344 with the standard deviation of 4.790 and in wet group pre-operative PTA and post-operative PTA mean difference was 15 with the standard error of 4.392 which is statistically significant (Figure 4).

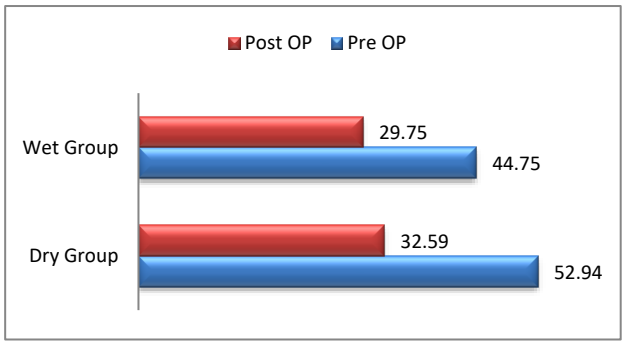

Figure 4: Pre and post-operative PTA in two groups.

Patients were regularly followed up postoperatively at 1, 4 and 8 weeks and after 4 months. Graft uptake was assessed 4 months post-operatively. Graft uptake of temporalis fascia dry group is 30 out of 32 (93.8%) and in wet group graft uptake was 87.5%, 29 out of 32 patients. Failure rate was low in dry group than wet group (Figure 5).

Post-operative hearing results- audiological assessment were done at 8 weeks and 4 months postoperatively and the Air Bone gap was measured at 4 months postoperatively. In the dry temporalis fascia group 46.6% of patients had 11-20 dB gain, 46.6% had 0-10 dB and 6.6% had 21-30 dB gain in AB gap. In the wet temporalis fascia group 56.66% of patients had 11-20 dB gain, 33.3% had 0-10 dB and 10% had 21-30 dB gain in AB gap (Figure 6,7) (Table 1).

We compare the audiological gain between two group show statistically significance (p=0.005). So, it is statistically proved that there is no significant difference in the gain in AB gap attained by using either temporalis fascia dry or wet as graft material in tympanoplasty.5 (Table 2 and 3)

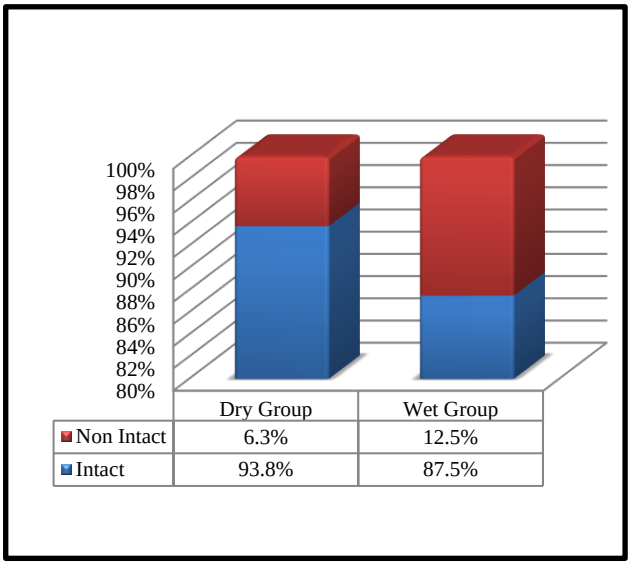

Figure 5: Post-operative gain AB gap in dry groups.

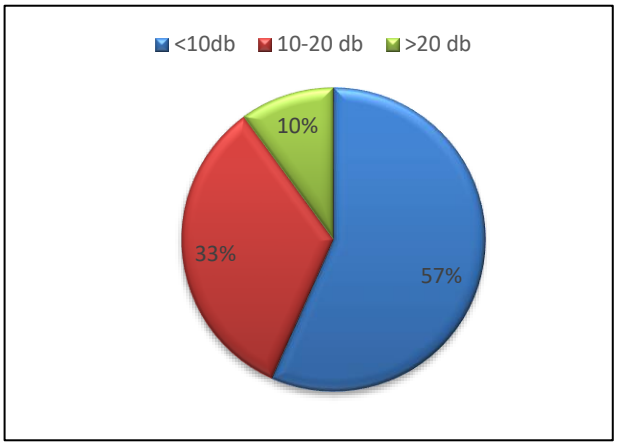

Figure 6: Postoperative gain AB gap in dry groups.

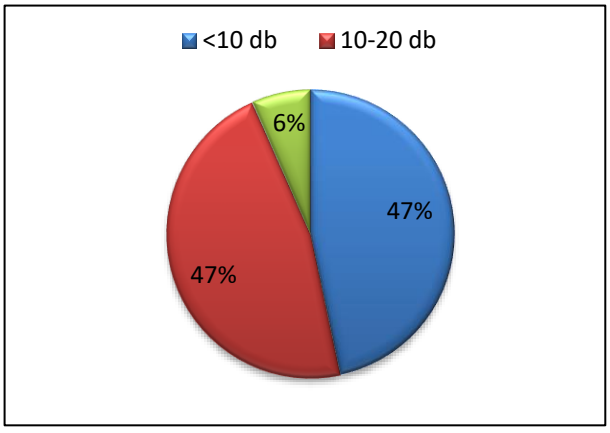

Figure 7: Postoperative gain AB gap in wet groups.

Table 1: Paired samples test –dry group.

		Paired Differences					t	Df	Sig. (2-tailed)
		Mean	SD	SE Mean	95% CI of the difference				
					Lower	Upper			
Pair 1	Pre-operative PTA – post-operative PTA	20.344	4.790	0.847	18.617	22.071	24.026	31	0.0005

Table 2: Paired samples test -wet group.

		Paired differences					t	Df	Sig. (2-tailed)
		Mean	SD	SE Mean	95% CI of the difference				
					Lower	Upper			
Pair 1	Pre-operative PTA – post-operative PTA	15.000	4.392	0.776	13.416	16.584	19.320	31	0.0005

Table 3: Post-operative gain in AB gap.

Gain in AB (db)	Group A	Group B
1-10	56.6	46.6
10-20	33.3	46.6
>20	10	6.6

DISCUSSION

In our study graft uptake for different age group was the same, which suggests that age did not make any difference in this age range. This finding matches with the study of Michael et al in the study of 1556 tympanic membrane grafting that there was no difference graft up take depending upon age of the patients.[4]

In the study by Alkans et al in 2009, prospective study to compare temporalis fascia dry and wet tympanoplasty technique, the success rate was 91.4% (159 of 174) in the wet graft group and 88.6% (186 of 210) in the dry graft group. There were no differences between groups regarding recurrent disease, residual disease, and postoperative hearing results (p>0.05).6 In our study dry graft uptake is 93.8% and 87.5% in wet group.

Singh GB conducted a study in 2016 on dry and wet temporalis fascia graft. Total of 112 patients were studied. The patient's age ranged from 11 to 57 years. On four year follow up anatomic closure of perforation was 82% in dry group and 90% in wet fascia group.[7] In Our study dry graft uptake is 93.8% and 87.5% in wet group. A dry or wet temporalis fascia graft does not influence the outcome of type 1 tympanoplasty statistically.

Tan HE et al were conducted the study on type I tympanoplasty meta-Analysis on 2014, as per there study success rate of small and medium size tympanic membrane perforations (85.56%) were higher graft uptake rate than the large perforations (79.44%).[8] In our study also had higher graft uptake rate small and medium size perforations (95%) than the large perforations (87.5%).

In Alkan et al study, regarding acoustic gain, they were found no statistical difference between the dry and wet groups same as our study. In our study temporalis fascia dry group 46.6% of patients had 11-20 dB gain, 46.6% had 0-10 dB and 6.6% had 21-30 dB gain in AB gap. In the wet group 56.66% of patients had 11-20 dB gain, 33.3% had 0-10 dB and 10% had 21-30 dB gain in AB gap. We compare the audiological gain between two groups were statistically significance (p=0.005). So it is statistically proved that there is no significant difference in the gain in AB gap attained by using either temporalis fascia dry or wet as graft material in tympanoplasty.[6]

CONCLUSION

Temporalis fascia is a reliable graft material for reconstruction of tympanic membrane perforations. Both dry and wet graft gives better anatomic and hearing functional results. But in our study dry graft has shown more success rate than the wet graft. In small and medium size perforations graft uptake is equal in both groups, but in large size perforations graft failure rate is high in wet group than dry group. Age does not have any influence on graft failure rate if all the other comorbid conditions are eliminated. Hearing improvement was same in dry and wet group in which the grafts have been up taken well. Duration of inactive stage does not have any influence on graft uptake. Both dry and wet temporalis fascia can be used to close the small and medium size tympanic membrane perforation, for the large perforation dry graft is preferred over the wet graft.

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: Gowrishankar M, Athiyaman K, Suresh V, Gayathiri R, Natarajan S. A comparative study of temporalis fascia grafting techniques in cortical mastoidectomy with type 1 tympanoplasty patients in tertiary care hospital. Int J Otorhinolaryngol Head Neck Surg 2020;6:1612-6.