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Methelene blue stained temporalis fascia graft in myringoplasty: a clinical study

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ABSTRACT

Background: The objective of the study were to know advantages of using methelene blue stained graft in tympanoplasty and to compare results between tympanoplasty with or without methelene blue stained graft.

Methods: This is a prospective study involving 60 patiens diagnosed with of chronic suppurative otitis media (CSOM) of mucosal type. Selected patients were aged between 20 years to 45 years. Those patients with active discharge, treated initially with antibiotics, to contro infection, and once dry ears maintained for minimum 6 weeks were planned for surgery. Among 60 cases, 30 patients underwent tympanoplasty (I) with methelene blue stained graft and other 30 patients underwent tympanoplasty (I) using unstained graft. Patients were followed up for 6 months.

Results: Patients outcomes were compared in terms of graft uptake and hearing improvement. Among all patients graft uptake was better in cases where methelene blue stained graft was used, but the results were not statistically significant. Hearing improvement in terms of air bone gap closure was assessed, study showed there was better air bone gap closure in cases where methelene blue stained graft is used and results were statistically significant.

Conclusions: Advantages of methelene blue staining allows better identification and proper placement of the graft, gives good results in terms of improved graft uptake, as it has antimicrobial properties. Hearing improvement results in terms of closure of air-bone are good.

Keywords: Methelene blue, Temporalis fascia graft, Myringoplasty

INTRODUCTION

Chronic suppurative otitis media is an inflammatory process involving mucoperiostial lining of middle ear cleft. It is of two types mainly mucosal and squamosal, in mucosal type along with inflammation there are permanent changes in the middle ear mucosa and permanent perforation involving pars tensa. In mucosal type depending on the presence of inflammation it can be categorized into active and inactive varieties. Myringoplasty is most commonly performed surgery for inactive mucosal type, which involves repair of tympanic membrane using graft, most commonly temporalis fascia

is used as graft material.² Success of the surgery depends on graft uptake, which requires proper placement of the graft making sure adequate contact between graft and tympanic membrane remnant.

Graft failure chances are more with less experienced surgeons, due to problem with identification of the graft while placement, more anterior perforation and in larger sized perforation. In endoscopic myringoplasty identification of the graft and its placement is difficult.

Identification of the graft is made better by staining with materials like methelene blue, which allows better visualisation of the graft surfaces and it can be better differentiated with edges of the perforation, of the remant tympanic membrane. As methelene blue has antimicrobial and antioxidant properties which help in better graft uptake, by reducing chances of infection.

This study was conducted to know the advantages of using methelene blue stained graft over unstained graft in terms of graft uptake and improvement in hearing.

METHODS

The study was conducted in department of otolaryngology, Venkateshwara ENT Institute, Bangalore medical college and research institute, Bangalore for a period of one year between November 2016 to October 2017.

It was a prospective study, involving 60 patients diagnosed with chronic suppurative otitis media of mucosal type, diagnosed after complete examination including history, otoscopy, audiology. Those with active infection given a course of antibiotics, and surgery was planned for those patients with dry ears atleast for 6 weeks. Patients were grouped into two categories.

Group (I) Includes 30 patients underwent myringoplasty using methelene blue stained graft.

Group (II) includes 30 patients who underwent myringoplasty using unstained graft.

Inclusion criteria

Inclusion criteria were patients with inactive, mucosal type of CSOM; aged between 20 to 50 years; ear should be dry for at least 6 weeks; cases with pars tensa perforation; air bone gap > 25 dB.

Exclusion criteria

Exclusion criteria were Squamosal type of CSOM; active discharging ears; marginal perforation; age group <20 years and >50 years; conductive hearing loss > 60 dB; cases with symptomatic deviated nasal septum and active sinus disease.

After taking written informed consent, all the patients were subjected to complete history taking, including history of comorbidities, any medication history, history of previous surgery. Then full otological examination to see details of tympanic membrane perforation and condition of the middle ear, tuning fork tests, and also nose and oral cavity and oropharynx examination to look for any septal deviation, sinusitis, tonsillitis.

Patients with active discharge treated with antibiotics and were taken for surgery once the ear was dry for atleast 6 weeks. Preoperative pure tone audiometry done for all the patients.

All patients underwent myringoplasty using postauricular approach, After draping the parts, local infilteration using 2% xylocaine with 1:100000 adrenaline is given in postauricular region, then willium wildes incision is placed, then temporalis fascia is harvested by hydro dissection, posterior canal wall incision placed, margins of the tympanic membrane perforation were freshened and then vascular strip incisions placed in canal wall, tympanomeatal flap elevated and middle ear is assessed any adhesions in middle ear released, ossicular continuity was assessed.

In group (I) Graft was stained with 1 ml of 1% methelene blue on one side, and then washed with saline and dried, stained then graft is placed facing medially, using underlay technique i.e medial to annulus and handle of malleus.²



Figure 1: Methelene blue stained graft placed by underlay technique.

In group (II) graft is placed by underlay technique without staining with methelene blue. After placing the graft, gelfoam is placed in middle ear then tympanomeatal flap is replaced, then gelfaom and medicated wicks are placed in external auditory canal. Then postaural incision is closed in layers.

All patients were put on IV antibiotics for 3 days, then chaned to oral antibiotics for 5 days at the time of discharge. Sutures were removed on 10th postoperative day, meatal pack was removed on 3rd week, looked for graft uptake and any residual perforation. All patients were followed for 3months and audiometry was repeated at 3 months.

RESULTS

In this study chronic suppurative otitis media, is more common in females compare to male population.

In both groups ear discharge and hearing loss were the most common clinical features. In group (I) among 30 patients 13 patients had ear discharge for 0 to 3 years, 10 patients had for discharge for duration of 4 to 6 years and 7 had for 7 to 9 years.

Table 1: Age distribution patients aged between 20 to 50 years most of the cases belong to middle age group from second and third decade.

Age in years	No of patients
20-30	29
31-40	20
41-50	11

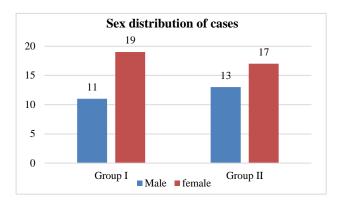


Figure 2: Sex distribution among 60 cases 24 were males and 36 were females, more common in females.

Table 2: Duration of discharge showing no significant difference in duration of discharge in both groups.

Duration of discharge in years	Group I	Group II
0-3	13	12
4-6	10	10
7-9	7	8

In group II ear discharge for 12 patients for 0 to 3 years and 10 had for 4 to 6 years and 8 patients had for duration ranging from 7 to 9 years (Table 2).

Based on the pure tone audiometry, hearing loss is divided into 4 categories mild (25-40 dB), moderate (41-55 dB), moderately severe (56-70 dB), severe (71-90 dB) and profound (>90 dB).

Table 3: Degree of hearing loss in patients preoperatively, most of the cases in both groups had mild to moderate conductive hearing loss.

Degree of hearing loss (dB)	Group I (%)	Group II (%)
25-40	16 (53)	18 (60)
41-55	13 (43)	12 (40)
56-70	1 (3)	0
71-90	0	0
>90	0	0

In group (I) among 30 patients 16 patients had mild (25-40 dB) conductive hearing loss, 13 patients had moderate (41-55 dB) hearing loss and 1 patient had moderately severe (56-70 dB) hearing loss.

In group (II) among 30 patients 18 patients had mild (25-40 dB) hearing loss, and 12 patients had moderate (41-55 dB) hearing loss.

In Group (I) among 30 patients medium sized perforation in 10 patients, 15 patients had large central perforation and 5 patients had subtotal perforation.

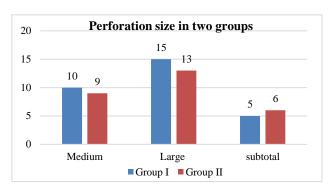


Figure 3: Size of perforation in patients most of the patients in both groups had large perforation.

In Group (II) among 30 patients medium sized perforation in 11 patients, 13 patients had large central perforation and 6 cases had subtotal perforation (Figure 3).

All the patients followed up for 3 weeks, suture removal was done on 10th day, on 3rd week external canal pack was removed, and looked for discharge and graft uptake, residual perforation. In group (I) two patients showed discharge and in group (II) three showed discharge but all resolved with change of antibiotics.

Group (I) graft uptake was 100% in group II graft uptake was 96%. All patients followed up at 3 months.

Table 4: Follow up results in group (I) patients showing minimal complications, maximum graft uptake at the end of 3 months.

Otoscopic findings	3 weeks (%)	3 months (%)
Intact graft	23 (76)	25 (83)
Discharge	2 (6)	0
Residual perforation	0	0
Anterior sulcus blunting	0	0
Graft lateralisation	0	0

Table 5: Follow-up results in group (II) patients graft uptake was less compared to group (I) patients.

Otoscopic findings	3 weeks (%)	3 months (%)
Intact graft	22 (73)	23 (76)
Discharge	3 (10)	0
Residual perforation	0	0
Anterior sulcus bluntin	0	0
Graft lateralisation	0	0

Hearing improvement was assessed at 3 months postoperatively assessed In terms of air-bone gap closure.

Group (I) average preoperative hearing loss among 30 patients is 47.6 dB and postoperative average hearing threshold is 26.4 dB then average gain in hearing threshold is 21.2 dB and average preoperative air-bone gap is 36.44 dB and postoperative air-bone gap is 16.24 dB and average gain is 20.2 dB.

Table 6: Postoperative hearing gain in group (I) patients in terms of closure of air bone gap.

Hearing level (dB)	No of patients
0-5	0
6-10	4
11-15	13
16-20	6
>20	7

In Group (II) patients preoperative average hearing loss is 42.9 dB and average postoperative hearing threshold is 26.6 dB and average gain is 16.3 dB. Preoperative airbone gap is 34.23 dB and postoperative air-bone gap is 17.93 dB and average gain is 16.3 dB.

Table 7: Postoperative hearing gain in group (II) patients.

Hearing gain (dB)	No. of patients
0-5	1
6-10	7
11-15	8
16-20	8
>20	6

Air-Bone gap in dB in preoperative and postoperatively at 3 months, Table 8 shows statistically significant difference.

Table 8: Comparative average hearing gain in both the groups with significant difference is seen as shown by p value.

Airbone gap	Group (I)	Group (II)	P value
Preoperative	36.44	34.23	-
Postoperative	16.24	17.93	-
Difference	20.2	16.3	0.0567

DISCUSSION

Myringoplasty is a surgical procedure performed to repair the tympanic membrane perforation, prerequisite for this procedures are mobile and intact ossicular chain and dry middle ear.

Success of the procedure depends on factors as site and size of the perforation, surgical technique used, experience of the surgeon. Failure rates are more in cases of subtotal perforation as it is difficult to repair due to

less vascularity, in anterior perforation due to improper visualization as the view is obscured by bony overhang.³

Proper positioning of the graft is important for graft uptake, which needs clear visualization of the surgical field and identification of the graft specially for trainees, residents, and during endoscopic myringoplasty. For this various methods are proposed as willium's microclip, sandwich graft tympanoplasty, loop overlay, overunderlay, mediolateral myringoplasty techniques.⁴⁻⁷

Use of gentian violet in overlay technique in which handle of malleus is brought out through a hole created in fascia stained with gentian violet. This is helpful in inexperienced surgeons for proper handling of the graft. It reduces the time of graft placement and associated with less failure rates.

Talas et al used methelene blue for staining the graft, fascia is stained on one side and then washed so one side it is lighter than the other. It helps for surgeon to see any folding of the graft. It helps in proper placement of the graft and reduces failure rates. In this study 100% graft uptake is seen at 2 months period.⁸

Vaiman et al had done the similar study, using methelene blue stained temporalis fascia for myringoplasty, and he observed 100% graft uptake and significant improvement in hearing compared to group where he used unstained graft.⁹

Wong noted that use of methelene blue stained graft allows surgeon to better visualize the graft and perforation margins will be completely covered by the graft, specially in anterior perforations.¹⁰

Since methelene blue has antibacterial and antioxidant properties which help in preventing wound infection. It also absorbs the bacterial exudates from the wound and do not inhibit fibroblast growth factors, platelet derived growth factors which are necessary for wound healing. No patients had adverse effects due to the use of intravital stains.

Methelene blue is used in other diagnostic and therapeutic procedures such as preauricular sinus, bronchial sinus or fistula, parotid fistula for tracing the sinus tract during excision it is helpful. It is also used for staging nodal metastasis in rectal and breast carcinoma. ¹¹

Advantages of using stained graft is that graft can be visualized better, placement is improved in relation to margins of perforation, it is placed in such a way that stained side faces laterally which helps to prevent folding of the graft. This method is helpful for the trainees and junior residents to improve the results.

CONCLUSION

Study shows that there is improvement of graft uptake and overall significant improvement of hearing outcome in terms of air bone gap closure. This method is helpful for the junior residents and trainees for better results. While endoscopic myringoplasty graft placement is made easier with methelene blue stained temporalis fascia graft than the unstained graft. Since methelene blue has antibacterial properties which further improves graft uptake by reducing infections.

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Ethical approval: The study was approved by the

Institutional Ethics Committee

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