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A Study on Comparison of Graft Uptake Rate and Hearing Improvement Between Dry and Wet Type of Mucosal Chronic Otitis Media

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Abstract
Chronic otitis media (COM), is a common condition in otorhinolaryngology, is characterized by chronic, intermittent or persistent discharge through a perforated tympanic membrane(TM). Poor living conditions, overcrowding, poor hygiene and nutrition have been suggested as the basis for the widespread prevalence of COM in developing countries. The study included 60 patients of age 16 years and above and of either sex, presenting with mucosal type of chronic suppurative otitis media, who underwent type1 tympanoplasty and cortical mastoidectomy at Department of otorhinolaryngology. Among 21 patients with bilateral disease, graft uptake was seen in 76.2% and failure was noted in 5 patients, 23.8%. Out 37 patients with unilateral disease, uptake was seen in 94.9% and failure was noted in 2 patients, 5%. But it was not statistically significant. After 6 months, hearing gain of > 10db was recorded in 37 patients, 18 (69%) in dry ear and 19 (70%) in wet ear. Hearing gain of less than 10db was seen in 16 patients, 8 (30.8%) in dry ear and 8 (29.6%) in wet ear.

INTRODUCTION

The ability to hear is an important sensory function for communication and better quality of life. The sense of hearing is important, not only to understand the expression of people around, but also for proper development of speech and language.

Disorders affecting hearing can be congenital or acquired. Yet, it is the preventable and correctable conditions in the above mentioned categories, which demand attention. The leading cause of hearing loss in acquired disorders being chronic otitis media (COM), is both preventable and correctable to certain extent as well.

Chronic otitis media (COM) is defined as the chronic infection of the middle ear cleft including the middle ear, mastoid air cell system and the Eustachian tube, in the presence of persistent tympanic membrane perforation (World Health Organisation, 1998).

Chronic otitis media (COM), is a common condition in otorhinolaryngology, is characterized by chronic, intermittent or persistent discharge through a perforated tympanic membrane (TM). Poor living conditions, overcrowding, poor hygiene and nutrition have been suggested as the basis for the widespread prevalence of COM in developing countries[1,2]. Research with respect to COM gains importance because of the sheer number of people in the population it affects and the measures available to prevent complications and also measures that can be taken to restore the hearing mechanism.

Repair of TM perforation was attempted since as early as in the seventeenth Century[3]. Several techniques and different graft materials like split thickness skin graft, fascia lata, temporalis fascia, duramater, vein graft and tragal perichondrium were used with varying success[4].

When surgically treating chronic ear disease (COM) eventually all surgical procedure for chronic ear disease are designed to attain some general goals like achieve a safe ear, eradicate disease, stabilize or improve hearing by reconstructing the tympanic membrane and ossicular chain and to prevent further development of disease.

Repairing the TM perforation by performing tympanoplasty provides considerable benefits to the patient including prevention of ear infection, improvement in hearing and elimination of need to take water precautions. Type 1 Tympanoplasty is one of the most common procedures among various surgeries for COM.

MATERIALS AND METHODS

Source of the Data: The study included 60 patients of age 16 years and above and of either sex, presenting with mucosal type of chronic suppurative otitis media, who underwent type1 tympanoplasty and cortical mastoidectomy at Department of otorhinolaryngology.

Sampling Technique: The patients were selected by random sampling. The sample of 60 patients included two groups of 30 patients each:

Dry Group: Patients with dry central perforation Tubotympanic COM with no active discharge for a period of at least 3 months. (Fig 1)

Wet Group: Any patients with COM Tubotympanic disease with mild mucoid discharge, at the time of surgery. (Fig 2)

Criteria for Selection of Sample
Inclusion Criteria:

- Patients of age 15 years and above and of either sex.
- Patients with chronic otitis media with small/large/subtotal central perforation.
- Patients with conductive hearing loss.
- Patients with dry ear for a minimum period of 3 months prior to surgery were included in DRY group.
- Patients with mucoid discharge at the time of surgery were included in the WET group.

Exclusion Criteria:

- Patients with Marginal and Attic perforation/ cholesteatoma.
- Patients of age less than 15 years.
- Patients with sensorineural hearing loss.
- Patients with intracranial complications.
- Patients with only hearing ear.
- Patients undergoing revision tympanoplasty.
- Patients with ossicular chain erosion confirmed at the time of surgery.

Methods of Collection of Data: Patients who satisfied the above mentioned criteria for selection were taken as subjects for the study, after taking an informed and written consent. The selected patients are subjected to clinical, audiological and laboratory investigation.

- Detailed history of patient, General and systemic examination of patient.
- Socioeconomic status of patients was assessed.
- Examination of tympanic membrane under microscope was done and hearing evaluation using tuning fork tests.
- PTA and Relevant Laboratory investigation including Hb, Rbs, S.creat, S.urea, X-ray mastoids. Chest x-ray and ECG for patients above 40 years.

- All patients underwent cortical mastoidectomy with tympanoplasty with tympanic membrane grafting using temporalis fascia graft placed underlay technique under local anesthesia
- Postoperatively all patients were put on oral antibiotic and antihistaminics for a period of 2 weeks. Mastoid dressings changed on 1st post-operative day, sutures were removed on 7th postoperative day after suture removal patients were asked to instill topical antibiotics+steroid drops (Ofloxacin+clotrimazole+beclomethasone) for period of 3-4 weeks. All patients are followed up in OPD every 2 week for period of 3 months. Otoscopy was done to assess the graft status and presence of any discharge at every follow-up. Postoperative appearance of tympanic membrane is shown in the (Fig.3). Intactness of drum and graft uptake was accessed after 1 month.

At the end of 3rd and 6th months an audiogram was done on all the patients with intact drum. The presence of any complication was noted and treated simultaneously.

RESULTS AND DISCUSSIONS

In our study, postoperative follow up by otoscopic examination after 1 month showed intact graft in 26 patients in Dry group (86.7%) and 27 patients in Wet group (90%). 4 patients in Dry group and 3 patients in Wet group showed residual perforation. Graft uptake rate was slightly better in wet group compared to dry, but not statistically significant.

Patients with graft failure were excluded from follow up PTA test.

Mean PTA pre operatively in dry ear was 36.6db and 36.4db in wet ear. Mean PTA at 3rd month was 28.6db in dry ear and 28.2db in wet ear, at 6th month it was 25.2db in dry ear and 24.8db in wet ear. Hearing improvement was recorded in both groups at 3rd and 6th month.

In present study, Socio economic status of patient had a significant role in the success of Type 1 Tympanoplasty and cortical mastoidectomy. There was 94.7% of graft take-up rates in APL group, only one graft failure was noted, while there were totally 6 graft failure in BPL group with uptake rate being 85.4%.

Among 21 patients with bilateral disease, graft uptake was seen in 76.2% and failure was noted in 5 patients, 23.8%. Out 37 patients with unilateral disease, uptake was seen in 94.9% and failure was noted in 2 patients, 5%. But it was not statistically significant.

Higher failure rates were noticed with increasing size of perforation, there were 4 failure cases in large central perforation and 3 failures in subtotal perforation but Statistically not significant.

During the procedure any pathology in the antrum was assessed. We found that 47 patients had normal antrum (78%), 22 cases in dry and 25 in wet ear. 11 patients had granulation in antrum, 2 cases had polypoidal mucosa. There was no statistical significant difference between two groups.

In our series, postoperative follow up showed complete control of otorrhea in 29 patients in dry group and 28 patients in wet group. 1 in dry and 2 in wet ear group showed persistent ear discharge.

Patients with graft failure were excluded from postoperative follow up PTA test at 3rd month follow up, PTA was done for all cases. Hearing gain of more than 10db was recorded in 41 patients, 19 (73%) in dry ear and 22 (81.5%) in wet ear. Hearing gain of less than 10db was seen in 12 patients, 7 (26.9%) in dry ear and 5 (18.5%) in wet ear.

Mean gain after 3months was 7.74±2.77 in dry ear and 7.48±2.76 in wet ear.

After 6 months, hearing gain of > 10db was recorded in 37 patients, 18 (69%) in dry ear and 19 (70%) in wet ear. Hearing gain of less than 10db was seen in 16 patients, 8 (30.8%) in dry ear and 8 (29.6%) in wet ear

Mean gain after 6 months was 11.15± 2.01 in dry ear and 10.96±2.02 in dry ear.

Out of 60 patients, postoperative complications were noted in 5 patients. 2 (6.3%) in dry ear and 3 (10%) in wet ear.

In our study, postoperative follow up by otoscopic examination after 1 month showed intact graft in 26 patients in Dry group (86.7%) and 27 patients in Wet group (90%). 4 patients in Dry group and 3 patients in Wet group showed residual perforation. Graft uptake rate was slightly better in wet group compared to dry, but was not statistically significant.

Despite the high success rate and routine nature of the procedure, the effect of many influencing factors still remains unresolved. It is often advocated by few authors to render the ear absolutely dry before attempting tympanic membrane repair to obtain more favorable results Raj A, Vidit T[5], in their study on wet myringoplasty, concluded that myringoplasty in wet ears was as successful as in dry ears and had no increased incidence of complications. The study also showed poorer results in patients with bilateral disease.

Adkins WY[6] in their study, reported an overall success rate of 89%. They concluded that age of the patient, duration of dry ear had no bearing on the success, although bilateral tympanic membrane perforation indicated poor prognosis.

Vartiainen E and his colleagues, in their study on 404 primary myringoplasty procedures found an overall success rate of 88% with a mean period of follow up of 5.5 yrs[7]. In another study, Vartiainen E analysed failure cases in 417 myringoplasties. He concluded that necrosis of the graft and anterior blunting were the main causes in early failures, whereas infection was the most common cause of

Table 1: Comparison of graft uptake rate in two groups

Distribution of patients based on Status of Graft among the two groups					
Status of graft	**Dry ear**		**Wet ear**		
	Frequency	**Percent**	**Frequency**	**Percent**	**p-value**
Graft failure	4	13.3	3	10.0	0.688
Graft intact	26	86.7	27	90.0	
Total	30	100.0	30	100.0	

Table 2: Mean PTA at different intervals

	Mean PTA at different intervals of intervention		
Type of ear	**Before opn**	**3 months post opn**	**6 months post opn**
Dry ear	36.6	28.6	25.2
Wet ear	36.4	28.3	24.8

Table 3: Graft uptake rates in relation with socioeconomic status

	Socio-economic factor in success of tympanoplasty				
	Graft Intact		**Graft failure**		
SES	**Frequency**	**Percent**	**Frequency**	**Percent**	**p-value**
BPL (n=41)	35	85.4	6	14.6	0.558*
APL (n=19)	18	94.7	1	5.3	
Total (n=60)	53	88.3	7	11.7	

*Fisher exact test

Table 4: Graft uptake rates in Bilateral and unilateral COM

	Laterality as a factor in success of tympanoplasty				
Laterality	**Graft Intact**		**Graft failure**		
	Frequency	**Percent**	**Frequency**	**Percent**	**p-value**
Bilateral (n = 21)	16	76.2	5	23.8	0.089*
Unilateral (n = 39)	37	94.9	2	5.1	
	53	88.3	7	11.7	

Table 5: Size of perforation with regard to Graft up –Take

	Size of perforation as a factor in success of tympanoplasty				
Size of perforation	**Graft Intact**		**Graft failure**		
	Frequency	**Percent**	**Frequency**	**Percent**	**p-value**
Small (n = 11)	11	100.0	0	0.0	0.356
Large (n = 32)	28	87.5	4	12.5	
Subtotal (n = 17)	14	82.4	3	17.6	
Total (n = 60)	53	88.3	7	11.7	

Table 6: Status of Antrum

	Distribution of patients based on Antrum mucosa among the two groups				
Antrum	**Dry ear**		**Wet ear**		
	Frequency	**Percent**	**Frequency**	**Percent**	**p-value**
Granulation	7	23.3	4	13.3	0.604
Normal	22	73.3	25	83.3	
Polypoid	1	3.3	1	3.3	
Total	30	100.0	30	100.0	

Table 7: Postoperative control of ear discharge

	Distribution of patients based on Status of ear among the two groups				
Status of ear	**Dry ear**		**Wet ear**		
	Frequency	**Percent**	**Frequency**	**Percent**	**p-value**
No discharge	29	96.6	28	93.3	0.688
Persistent discharge	1	3.3	2	6.6	
Total	30	100.0	30	100.0	

Table 8: Hearing gain after 3 months

Comparison of Hearing gain in decibel between the groups after 3 months					
Hearing gain	**Dry ear**		**Wet ear**		
	Frequency	**Percent**	**Frequency**	**Percent**	**p-value**
>10db gain	19	73.1	22	81.5	0.464
<10db gain	7	26.9	5	18.5	
Total	26	100.0	27	100.0	
Mean±SD	7.74±2.77	7.48±2.76	0.736*		

*t test is applied

Table 9: Hearing gain after 6 months

Hearing gain	Comparison of Hearing gain in decibel between the groups after 6 months				
	Dry ear		Wet ear		
	Frequency	Percent	Frequency	Percent	p-value
>10 db gain	18	69.2	19	70.4	0.928
<10 db gain	8	30.8	8	29.6	
Total	26	100.0	27	100.0	
Mean±SD	11.15±2.01	10.96±2.02	0.7329*		

Table 10: Complication among the two groups

Complications	Distribution of patients based on complications among the two groups				
	Dry ear		Wet ear		
	Frequency	Percent	Frequency	Percent	p-value
Present	2	6.3	3	10.0	0.488
Absent	28	93.7	27	90.0	
Total	30	100.0	30	100.0	

reperforation in later failures. Reperforation was more frequent in larger perforations than small ones. Other preoperative factors like dry or wet ear, site of perforation or the grafting technique did not affect the graft take rate.

In our series, postoperative follow up showed complete control of otorrhea in 29 patients in dry group and 28 patients in wet group. 2 in wet and 1 dry ears showed persistent ear discharge. Out of 7 patients of residual perforation only 3 patients had persistent ear discharge.

It's still a point of controversy whether tympanic membrane perforation should be repaired by type 1 tympanoplasty or in association with cortical mastoidectomy. Infections represent the single most important cause of graft failure and result from a hidden mastoid disease. Even a well pneumatized mastoid may be rendered ineffective by inflammatory disease which blocks the aditus and antrum, thereby disconnecting the middle ear and mastoid cavities.

A simple mastoidectomy is an effective means of repneumatizing the mastoid air cell systems, as well as eradicating the mastoid source of infections. Our study proves that cortical mastoidectomy along with type 1 tympanoplasty gives better results compared to type 1 tympanoplasty alone, even among failed cases post-operatively only 3 cases complained of persistent ear discharge out of 7 cases.

48 patients with chronic otitis media with tympanic membrane perforations who underwent type I tympanoplasty with cortical mastoidectomy was studied by Jackler and Schindler. Cortical mastoidectomy was found to be an effective means of repneumatizing the sclerotic mastoid and eradicating mastoid sources of infection. They found that severe Eustachian tube dysfunction to a degree not remediable by enlargement of the mastoid air reservoir is the most common cause of failure. The study concluded that cortical mastoidectomy is a safe and useful adjunct to type I tympanoplasty in selected cases of chronic otitis media with perforation.

Krishnan and colleagues[9] studied a sample consisting of one hundred and twenty ears with chronic suppurative otitis media without cholesteatoma subjected to surgical treatment. They concluded that it is good practice to open the mastoid antrum and air cells if the middle ear mucosa is unhealthy. If the middle ear mucosa is healthy, tympanoplasty alone seems sufficient for a successful surgical outcome, irrespective of the fact whether the ear was dry or quiescent prior to surgery. Meticulous and complete removal of disease from the middle ear cleft, with a stable assembly with ossicular chain, will surely give a dry ear with good hearing. Mastoidectomy did not seem to play a significant beneficial role as regards the post-operative hearing gain.

Audiological Assessment: Hearing improvement was assessed by repeat pure tone audiometry at 3rd and 6th months. Preoperatively, mean pure tone threshold in Wet group was 36.4db and 36.6 db in Dry group. At 3rd month, mean PTA was 28.3db in Wet group and 28.6 db in Dry group. PTA after 6 months of follow up showed mean PTA of 24.8 dB in Wet group and 25.2db in Dry group. There was no significant difference between the hearing improvements in two groups.

In our study of 60 patients there was an average hearing improvement of 11 db in speech frequencies in 88.3% patients. 7 patients were not taken in to account as there was failure of graft take up. There was no worsening of hearing in graft taken up patients during follow up post-operatively. Hearing improvement was seen in 86% cases in dry ear and 90% in wet ear.

Ceylan[10] study on influencing factors in type 1 tympanoplasty reported the graft success rate to be 88% in dry ears and 88.6% in discharging ears, which was not statistically significant. Postoperative air-bone gap of less than 25 dB and hearing gain of >10dB was taken as physiological success. Hearing improvement was seen in 77.7% cases in dry ears and 78.4% in discharging ears.

Thus, the success rate of tympanoplasty in terms of graft take up rate and hearing improvement, as found in our study, was consistent with the results of most studies in the literature.

Complications post-operatively was seen in 5 patients, 3 patients in wet group and 2 patients in dry group. Two patients had perichondritis in dry group, one patient had postauricular haematoma and two patients had postaural wound infection in wet group, there was no significant difference between the two groups

CONCLUSIONS

In dry group, complete graft uptake was seen in 86.7% patients. In Wet group, graft uptake rate of 90% was achieved. Hearing improvement, assessed by mean gain of PTA at the end of 6th month postoperatively, was achieved in 90% patients in Wet group and 86% patients in Dry group. There was an average hearing improvement of 11db in speech frequencies in 88.3% patients.

REFERENCES

1. Slattery, W.H., 2003. Pathology and clinical course of inflammatory diseases of the middle ear. In: Glasscock-Shambaugh Surgery of the Ear,, Glasscock, M.E. and A.J. Gulya, (Eds.)., Reed Elsevier India Pvt. Ltd., New Delhi, India, pp: 428-429.
2. Mills, R.P., 1997. Management of chronic suppurative otitis media. In: Scott-Brown's Otolaryngology,, Booth, J.B. and A.G. Kerr, (Eds.)., Reed Educational and Professional Publishing Limited, London, UK., pp: 1-1.
3. Manolidis, S., 2003. Closure of tympanic membrane perforations. In: Glasscock and Shambaugh's Surgery of the Ear,, Glasscock, M.E. and A.J. Gulya, (Eds.)., BC Decker, Hamilton, Ontario, Canada.
4. Perkins, R., 1975. Grafting materials and methods in reconstructive ear surgery. Ann. Otology, Rhinol. Laryngolo., 84: 518-526.
5. Raj, A. and T. Vidit, 1999. Review of patients undergoing wet myringoplasty. Indian J. Otol., 5: 134-136.
6. Austin, D.F., 1994. Acoustic mechanisms in middle ear sound transfer. Otolaryngol. Clin. North Am., 27: 641-654.
7. Vartiainen, E., 1998. The results of chronic ear surgery in a training programme. Clin. Otolaryngol. Allied Sci., 23: 177-180.
8. Saha, A.K., D.M. Munsi and S.N. Ghosh, 2006. Evaluation of improvement of hearing in type i tympanoplasty and its influencing factors. Indian J. Otolaryngol. Head Neck Surg., 58: 253-257.
9. Krishnan, A., E.K. Reddy, C. Chandrakiran, K.M. Nalinesha and P.M. Jagannath, 2002. Tympanoplasty with and without cortical mastoidectomy-a comparative study. Indian. J. Otolaryngol. Head. Neck. Surg., 54: 195-198.
10. Emir, H., K. Ceylan, Z. Kizilkaya, H. Gocmen, H. Uzunkulaoglu and E. Samim, 2007. Success is a matter of experience: Type 1 tympanoplasty. Eur. Arch. Oto. Rhino. Laryngol., 264: 595-599.