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Outcome of ear surgeries in dry and wet ear

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ABSTRACT

Background: Chronic suppurative otitis media (CSOM) can present with dry and wet ear (discharging ear). It's an accepted fact that an actively draining central perforation is not a contraindication for ear surgery. The discharging ear presents the otologists with the dilemma of operating on it or not, this is due to widespread belief that the success rate while doing ear surgeries on wet ears is decidedly inferior. Hence the present dissertation is intended to find the outcome of ear surgeries in dry and wet ear.
Methods: The present study comprises of 60 patients who have undergone type 1 tympanoplasty with cortical mastoidectomy, at Fr Muller's Medical College, Mangalore. These patients were divided into two groups- Wet and Dry, based on the presence or absence of ear discharge at the time of surgery respectively. Inclusion Criteria: Patients of age group 16-60 years and both sexes, with mucosal type of chronic otitis media who underwent type 1 tympanoplasty with cortical mastoidectomy. Exclusion criteria: Patients with squamosal type of chronic otitis media or with ossicular chain erosion. A comparative analysis was done on the hearing improvement and incidence of the graft uptake postoperatively between the two groups.
Results: In dry group, complete graft uptake was seen in 90% cases, whereas in wet group, a graft uptake rate of 86.7% was achieved. The graft take up rate is better in high x socio-economic status. Higher take up rates were seen in small and medium perforation compared to subtotal perforations. Hearing improvement, assessed by mean gain of PTA at the end of 6th month postoperatively, was achieved in 86% cases in Wet group and 90% cases in Dry group. There was an average hearing improvement of 13.08 db in speech frequencies in 88.3% cases. The difference between the two groups was statistically insignificant.
Conclusions: In our study, we found no statistically significant differences between the success rates of Wet and Dry group, either in terms of graft uptake or the hearing improvement. Thus, from our study, we conclude that the presence of ear discharge at the time of surgery does not affect the success rate of type 1 tympanoplasty.

Keywords: Type 1 tympanoplasty, Cortical mastoidectomy, Dry ear, Wet ear, Chronic otitis media

INTRODUCTION

Chronic suppurative otitis media (CSOM) or chronic otitis media 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. Chronic otitis media still remains a major health problem in our country. Incidence of CSOM is higher in developing countries because of poor socioeconomic standards and poor nutrition. Repair of TM perforation was attempted since as early as in the seventeenth century.[1] 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.[2]

When surgically treating chronic ear disease (CSOM) 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 CSOM.[3]

The use of mastoidectomy as a rule to reestablish drainage of mastoid antrum in safe or non cholesteatomatous chronic suppurative otitis media is still controversial. The opinion regarding importance of mastoidectomy along with tympanoplasty is still remains divided even among the most experienced surgeons. This is an issue of debate. CSOM can present with dry and wet ear (discharging ear). It's an accepted fact that an actively draining central perforation is not a contraindication for ear surgery. The discharging ear presents the otologists with the dilemma of operating on it or not, this is due to widespread belief that the success rate while doing ear surgeries on wet ears is decidedly inferior. Hence the present dissertation is intended to find the outcome of ear surgeries in dry and wet ear in terms of restoration of anatomy, elimination of infection as well as hearing improvement.[4]

METHODS

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 type 1 tympanoplasty and cortical mastoidectomy at Department of otorhinolaryngology. This study carried out at Department of otorhinolaryngology, Fr. Muller's Medical College, Mangalore during the study period from September 2010 to March 2012.

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 CSOM with no active discharge for a period of at least 3 months).

Wet group

Any patients with CSOM Tubotympanic disease with discharge (mucoid or mucopurulent) irrespective of amount of discharge, at the time of surgery.

Inclusion criteria

The patients for study were selected on following criteria: Age in between 16-60 years in both sexes; patients with small, moderate, subtotal central perforation Tubotympanic disease (safe CSOM); CSOM Tubotympanic type with conductive or mixed hearing loss with good air bone gap >20db; patients with dry ear for a minimum period of 3 months prior to surgery were included in dry group; patients with, mucoid or mucopurulent discharge at the time of surgery were included in the WET group; patients having good general physical condition, not having any evidence of any infection in upper respiratory tract, chronic sinusitis, adenoids or any other pathology in nasal cavity or nasopharynx which is confirmed by nasal endoscopy.

Exclusion criteria

Exclusion criteria were patients of age less than 16 years, patients with attic perforation/ cholesteatoma, 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 by Modified Kuppuswamy classification.
- Nasal endoscopy was done to rule out chronic sinusitis or any nasal pathology.
- 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 general anesthesia.

Postoperatively all patients were put on oral antibiotic (amoxicillin 250 mg + cloxacillin 250 mg) and antihista-minics 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 are asked to instill topical antibiotics + steroid drops (ofloxacin + clotrimazole + beclomethasone) for period of 3 to 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. Intactness of drum and graft uptake was accessed after 1month. 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

Patients between the age group of 16 years to 60 years were included in this study. Maximum numbers of patients were seen in the age group of 21-30 years of age group (40%). In Dry group 13 patients were between age group of 21-30 years (43%) and 10 patients in 31-40 years age group (33%). In Wet group, 8 patients were between the age group of 16-20 years (26%), 11 patients in 21-30 years (36%). Mean age in wet ears group was 30.47 years, whereas in dry ears group it was 29.20 years. Thus both groups were matched in age distribution.

In present series only eight patients were above aged over 40 years. There was only one graft failure above 40yr patients. Maximum number of graft failures were 3 patients between 21-30 year age group, but statistically not significant.

Table 1: Age distribution of patients.

			Group		Total
			Dry	Wet	
Age	20 and below	Count	5	8	13
		% within Age	38.50%	61.50%	100.00%
		% within Group	16.70%	26.70%	21.70%
	21 - 30	Count	13	11	24
		% within Age	54.20%	45.80%	100.00%
		% within Group	43.30%	36.70%	40.00%
	31 - 40	Count	10	4	14
		% within Age	71.40%	28.60%	100.00%
		% within Group	33.30%	13.30%	23.30%
	41 - 50	Count	1	5	6
		% within Age	16.70%	83.30%	100.00%
		% within Group	3.30%	16.70%	10.00%
	Above 50	Count	1	2	3
		% within Age	33.30%	66.70%	100.00%
		% within Group	3.30%	6.70%	5.00%
Total		Count	30	30	60
		% within Age	50.00%	50.00%	100.00%
		% within Group	100.00%	100.00%	100.00%

Table 2: Socioeconomic status.

			Group		Total
			Dry	Wet	
SES	Lo	Count	4	8	12
		% within SES	33.3%	66.7%	100.0%
		% within Group	13.3%	26.7%	20.0%
	Mi	Count	20	16	36
		% within SES	55.6%	44.4%	100.0%
		% within Group	66.7%	53.3%	60.0%
	Hi	Count	6	6	12
		% within SES	50.0%	50.0%	100.0%
		% within Group	20.0%	20.0%	20.0%
Total		Count	30	30	60
		% within SES	50.0%	50.0%	100.0%
		% within Group	100.0%	100.0%	100.0%

In our study, out of 60 patients, 24 were male and 36 were females. Wet group included 11 male and 19 female patients. In dry group, there were 13 males and 17 females. The sex distribution was statistically similar. All the patients included in study were classified based on socioeconomic status, as per Kuppuswamy classification. Maximum number of patients (60%) belonged to lower middle class, including 20 patients (66%) in dry group

and 16 patients (53%) in Wet group. The SES distribution was comparable between both the groups and statistically not significant.

Bilateral perforations were seen in 18 patients. In Wet group, 8 patients were seen and 10 patients were seen in dry group. The chosen side for operation among the bilateral ear cases was the worse ear. The operated ear was more common on right side (55%), including 17 in dry and 16 in wet group. Whereas on left side, it was 45%, in dry ear being 13 and wet ear being 14.

In our study of 60 cases 18 patients (30%) had Bilateral COM. In dry group 10 patients had bilateral disease and in wet group 8 patients had bilateral COM. statistically not significant. Presence of bilateral CSOM at the time of surgery did not seem to have any influence on graft take up rates. Out of 60 patients, 39 cases had large central perforation (65%) out of which 20 patients in dry ear(51%) and 19 patients in wet ear (49%). 14 patients had medium central perforation (23%), 2 patients had small central perforation and 5 patients had subtotal perforation. No significant difference was found between the groups.

Table 3: Side of perforation.

			Group		Total
			Dry	Wet	
R/L	L	Count	13	14	27
		% within R/L	48.1%	51.9%	100.0%
		% within Group	43.3%	46.7%	45.0%
	R	Count	17	16	33
		% within R/L	51.5%	48.5%	100.0%
		% within Group	56.7%	53.3%	55.0%
Total		Count	30	30	60
		% within R/L	50.0%	50.0%	100.0%
		% within Group	100.0%	100.0%	100.0%

Table 4: Status of contralateral ear.

			Group		Total
			Dry	Wet	
U/B U		Count	20	22	42
		%	66.7%	73.3%	70.0%
	B	Count	10	8	18
		%	33.3%	26.7%	30.0%
Total		Count	30	30	60
		%	100.0%	100.0%	100.0%

Table 5: Size of perforation.

			Group		Total
			Dry	Wet	
SZ	LC	Count	20	19	39
		% within SZ	51.3%	48.7%	100.0%
		% within Group	66.7%	63.3%	65.0%
	MC	Count	5	9	14
		% within SZ	35.7%	64.3%	100.0%
		% within Group	16.7%	30.0%	23.3%
	SC	Count	2	0	2
		% within SZ	100.0%	.0%	100.0%
		% within Group	6.7%	.0%	3.3%
	ST	Count	3	2	5
		% within SZ	60.0%	40.0%	100.0%
		% within Group	10.0%	6.7%	8.3%
Total		Count	30	30	60
		% within SZ	50.0%	50.0%	100.0%
		% within Group	100.0%	100.0%	100.0%

Table 6: Comparison of PTA (dB) within dry and wet ear at different time intervals.

								ANOVA F	
Group		N	Minimum	Maximum	Mean	SD	Median	Value	p value
Dry	PRE	30	26	62	43.27	9.180	43.00	79.805	0.000
	3rd M	27	20	48	32.19	7.616	30.00		HS
	6th M	27	20	52	30.22	7.057	29.00		
Wet	PRE	30	25	60	40.97	8.767	40.00	116.689	0.000
	3rd M	26	20	45	29.12	6.127	30.00		HS
	6th M	26	22	42	27.88	5.480	26.00		

Table 7: Audiological assessment.

Hearing	No. of cases	Percentage
Improvement	53	88.3%
No change	7	11.7%
Worsened	0	0%
Total	60	100%

Higher failure rates were noticed with increasing size of perforation, there were 4 failure cases in large central perforation and 2 failures in subtotal perforation but Statistically not significant.

Higher mean PTA (dB) was recorded in dry ear (43.27 db) compared to wet ear (40.97), but the difference between them was not statistically significant (p >0.05). Depending on the cellularity of mastoid, mastoid cavity was divided in to three groups - cellular, sclerotic and partially sclerotic during the procedure. In our study 40 patients had sclerotic type of mastoid (66%) 19 cases in dry ear and 23 cases in wet ear. 16 patients had cellular mastoid, 11 in dry and 5 in wet ear. Rest 9 had partially sclerotic type of mastoid. There was no statistical significant difference between two groups. Also there was no significant difference between graft take-up rates and type of mastoid (Fishers exact test p=0.395).

During the procedure any canal overhang was noted and if present canalplasty was done. In 33 patients there was no canal overhang (55%), 22 patients had anterio inferior canal overhang, 9 in dry ear and 13 in wet ear. There was no statistically significant difference between two groups. There was no statistically significant difference between graft up-take rates and canal overhang (Fishers exact test p=0.395, NS).

In our study, postoperative follow up by otoscopic examination after 1 month showed intact graft in 27 patients in dry group (90%) and 26 patients in wet group (86.7%). 3 patients in dry group and 4 patients in Wet group showed residual perforation. Graft uptake rate was slightly better in dry group compared to wet, but not statistically significant. Mean PTA in dry group at preoperative assessment was 43.27 dB, at 3rd month it was 32.19 dB and at 6th month, 30.22 dB was recorded. Mean hearing gain of 11.66 was recorded at 3rd month and 13.63 at 6th month, which was found to be statistically significant.

Mean PTA in wet group at preoperative assessment was 40.97 dB, at 3rd month it was 29.12 dB and at 6th month, 27.88 dB was recorded. Mean hearing gain of 11.38 was recorded at 3rd month and 12.61 at 6th month, which was found to be statistically significant.

In our study of 60 patients there was an average hearing improvement of 13.08 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 90% cases in dry ear and 86% in wet ear.

DISCUSSION

Type 1 tympanoplasty is one of the most commonly performed procedures in Otolaryngology. With advanced microsurgical techniques and equipments, the state of the art facility has now developed to the extent that graft success rates of 90% to 97% are to be expected. 59 several studies done in past have reported good results with type 1 tympanoplasty with regard to hearing improvement, graft uptake and achieving dry ear.

Various factors influencing the success rate of this procedure have been discussed in the literature. The presence of active ear discharge at the time of surgery presents the surgeon with the dilemma of whether to operate or not.

In our study, we have compared two groups of patients with dry and wet ear, including 30 cases in each group. Both the groups were matched by the distribution of age, sex, socioeconomic status and duration of ear discharge. Age factors in the success of type 1 tympanoplasty, age is an important non mastoid factor influencing the outcome of type 1 tympanoplasty. Failure of type 1 tympanoplasty

in children attributed to adenoid, eustachian tube dysfunction.

In our study, patients below age of 16 years were excluded. Mean age in wet ears group was 30.47 years whereas, in dry ears group it was 29.20 years. Maximum number of patients were seen in the age group of 21-30 years (43%).

In a study of 87 cases ortergren, maximum numbers of patients were in the age group of >40 years, also they divided the patients in to two groups based on their age.[5]

The first group was below 40 years and second group above 40 years and the success rates in terms of grafts take up were found to be 90% and 75.7%. Similarly in our study success rates were 88.46% and 87.5%, below and above 40 years age group respectively.

In our study, out of 60 cases, 24 were male and 36 were females. Wet group included 11 male and 19 female patients. In dry group, there were 13 males and 17 females.

In our study slightly female predominance is observed in the ratio of 1.5:1. Although Booth reported higher failure rates in females compared to males.[6] Our study also showed similar results, out of 7 graft failure patients 6 were female and 1 male.so higher failure rates in females 16% compared to females i.e., about 4.1%. It may be a coincidence as no particular reason for this detected.

It has proven that socioeconomic factors such as poor living conditions, overcrowding, poor hygiene and poor nutrition are predisposing factors for CSOM. The influence of socioeconomic factors in graft up take has not been studied in detail.

Maximum number of patients (60%) belonged to lower middle class, including 20 patients (66%) in dry group and 16 patients (53%) in wet group. There was a 100% take up rates in the higher socioeconomic group, compared to 66.7% take-up rates in lower socio economic group. The same factors may have been responsible for higher failure rates in lower socio economic group.

Graft take up rates in CSOM of the contralateral ear. In our study of 60 patients, 18 cases (30%) had Bilateral CSOM. In dry group 10 patients had bilateral disease and in wet group 8 Patients had bilateral COM. The 57 operated ear was more common on right side (55%), including 17 in dry and 16 in wet groups. Whereas on left side, it was 45%, in dry ear being 13 and wet ear being 14. In our study the success rates were 92.9% and 72.8% for unilateral and bilateral ear disease respectively. Jackler and schindler[7] who also reported the success rates of graft take up rates for unilateral and bilateral disease were 86% and 83.3% respectively.

In the study by Adkins et al graft take up with regard to condition of opposite ear was found to be significant.[8] There was a 93.4% success rates in unilateral perforation compared to 60% success rates in bilateral perforations of the ear drum. They postulated that the higher failure rate in bilateral ear perforations might be due to more severe or prolonged aetiology of the otitis media in these cases.

Out of 60 patients 39 patients had large central perforation (65%), 14 patients had medium central perforation (23%), 2 cases had small central perforation and 5 cases had subtotal perforation.

The results of tympanoplasty with regard to size of perforation were found to vary in different studies. Jackler and schindler 49 the graft take up rates were found to be 86.7% for subtotal perforations and 76.5% for medium perforation.

In contrast to above, a study by Adkin' et al.[8] showed only 61% take up rates with subtotal perforations compared to 98% in medium sized perforations. Our study also showed similar results, graft uptake rates in medium central perforation was 92.9%, 89% for large central perforation and 60% for subtotal perforation. The higher failure rates in subtotal perforations have been attributes to a larger area, which has to be vascularized and epithelialized and also due to technical difficulty in surgery.

Hearing improvement was assessed by repeat pure tone audiometry at 3rd and 6th months. Preoperatively, mean pure tone threshold in wet group was 40.97 dB and 43.27 dB in dry group. At 3rd month, mean PTT was 29.12 dB in wet and 32.19 dB in dry groups. PTA after 6 months of follow up showed mean PTT of 27.88 dB in Wet and 30.22 dB in dry group. The hearing improvement within each group between pre op, 3rd and 6th month follow-up was statistically significant. But 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 13.08 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 62 patients during follow up post operatively. Hearing improvement was seen in 90% cases in dry ear and 86% in wet ear.

Ceylan et al 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.[9] Postoperative air-bone gap of less than 25 dB and hearing gain of >10 dB 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.[10-15]

CONCLUSION

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 13.08 db in speech frequencies in 88.3% patients.

The difference between the two groups was statistically insignificant. In our study, we found no statistically significant differences between the success rates of wet and dry group, either in terms of graft uptake or the hearing improvement. Thus, from our study, we conclude that the presence of ear discharge at the time of surgery does not affect the success rate of type 1 tympanoplasty.

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REFERENCES

1. Manolidis S. Closure of Tympanic Membrane Perforations. In: Gulya AJ (editor). Glasscock & Shambaugh's Surgery of the ear. 5th ed. BC Decker; 2003: 400.
2. Perkins R. Grafting materials and methods in reconstructive ear surgery. Ann Otol Rhinol Laryngol. 1975; 84(4 Pt1):518-26.
3. Wright T. Anatomy and development of the ear and hearing. In Ludman H, Wright T (editor). Diseases of the ear. 6th ed. Amlod, London; 1998: 3-5.
4. Austin DF. Acoustic mechanisms in middle ear sound transfer. Otolaryngol Clin North Am. 1994;27(4):641-53.
5. Bluestone CD, Gates GA, Klein JO, Lim DJ, Mogi G, Ogra PL, et al. Panel report of Definitions, terminology, and classification of otitis media. Ann Otol Rhinol Laryngol. 2002;111:8-18.
6. Booth JB. Myringoplasty-The lessons of failure. J Laryngol Otol.1974;88:1223-36.
7. Jackler RK, Schindler RA. Role of the mastoid in tympanic membrane reinstruction. Laryngoscope. 1984;94:495-500.
8. Yasuo M, Masafumi S, Yoshifumi, Takayashi, Kitahara T, Kajikawa H, Kubo T. Tympanoplasty with and without mastoidectomy for non-cholestatomatous chronic suppurative otitis media. Eur Arch Otorhinolaryngol. 2001;258(1):13-5.
9. Emir H, Ceylan K, Kizilkaya Z, Gocmen H, Uzunkulaoglu, Samim E. Success is a matter of experience: type 1 tympanoplasty. Eur Arch Otorhinolaryngol. 2007;264:595-9.
10. Krishnan A, Reddy EK, Chandrakiran C, Nalinesha KM, Jagannath PM. Tympanoplasty with and without cortical mastoidectomy-a comparative study. Indian J Otolaryngol Head Neck Surg. 2002;54(3):195-8.
11. Ashok KS, Munsi DM, Ghosh SN. Evaluation of improvement of hearing in type 1 tympanoplasty and its influencing factors. Indian J Otolaryngol and Head Neck Surg. 2006;58(3):253-7.
12. Nayak DR, Balakrishnan R, Hazarika P, Mathew PT. Role of cortical mastoidectomy in the results of myringoplasty for Dry tubotymphanicdisease. Indian J Otol. 2003;9:11-5.
13. Mcgrew BM, Jackson CG, Glassocck ME. Impact of mastoidectomy in simple tympanic membrane perforation repair. Laryngoscope. 2004;114(3):506-11.
14. Gersdorff M, Gerard JM, Thill MP. Overlay versus underlay Tympanoplasty: A comparative study of 122 cases. Rev Laryngol Otol Rhinol. 2003;124(1):15-22.
15. Kumar N, Shekhar C, Kumar P, Kundu AS. Kuppuswamy's socioeconomic status scale-updating for 2007. Indian J Pediatr. 2007:l 74:1132-3.

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