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ORIGINAL ARTICLE

Outcome of Tympanoplasty in Wet Ear Versus Dry Ear in Zagazig University Hospital Patients

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ABSTRACT

Background: Patients with chronic otitis media form a large percentage of the patients at ENT clinics. Tympanoplasty used to eradicate diseases of middle ear cleft and to restore the hearing mechanism. The aim of this work is to compare the rate of graft uptake after tympanoplasty in wet and dry ear and to compare the post-operative hearing improvement after tympanoplasty in wet and dry ear. **Methods:** This study included thirty patients selected from the outpatient clinic of ENT Department, Faculty of Medicine, Zagazig University along the period from February to July. All the patients had perforated tympanic membrane divided into two groups, group I (15 patients) of tympanic membrane perforation with dry ear for at least 6 months and group II (15 patients) of tympanic membrane perforation with wet ear (mucoid discharge with sterile culture and sensitivity). **Results:** There was insignificant difference between the studied groups regarding Graft uptake at one month where 93.3% of wet ear group had successful uptake versus 86.7% of dry ear group **Conclusion:** In our study, tympanoplasty surgery results of both wet and dry groups were quite similar and satisfying in terms of both hearing improvement and graft uptake

Key Words: Tympanoplasty, Wet, Dry, Ear.

INTRODUCTION

Tympanoplasty used to eradicate diseases of middle ear cleft and to restore the hearing mechanism. Creation of intact tympanic membrane and restoration of functional hearing are the principal aims of tympanoplasty [1].

There are risk factors of re-perforation after tympanoplasty surgery such as sex, age, status of the opposite ear, ear discharge and surgical approach [2].

Patients with chronic otitis media form a large percentage of the patients at ENT clinics. Usually, tympanoplasty is performed on ears after drying if there is active drainage, but this is practically impossible as the discharge from the ear continues inspite of receiving medical treatment [3].

Healing of tympanic membrane after tympanoplasty in a discharging ear has better results than dry ear due to increasing vascularity of middle ear Perforation [4].

Histopathological study of tympanic membrane remnant has been done. The conclusion of this study was that all layers of epithelium were present in wet perforation and inflammatory cells and blood vessels have been found in a raised number. Also, the fibrous layer was present, contrary to dry ears. these anatomical and histological conditions promote the graft take up [5].

METHODS

Patients:

This study included thirty patients selected from the outpatient clinic of ENT Department, Faculty of Medicine, Zagazig University along the period from February to July (6 months) .All the patients had perforated tympanic membrane divided into two groups, group I (15 patients)of tympanic membrane perforation with dry ear for at least 6 months and Group II (15 patients) of tympanic membrane perforation with wet ear (mucoid discharge with sterile culture and sensitivity).

Written informed consent was obtained from all participants and the study was approved by the research ethical committee of Faculty of Medicine, Zagazig University. The work has been carried out in accordance with The Code of Ethics of the World Medical Association (Declaration of Helsinki) for studies involving humans.

Inclusion criteria:

Central Perforation, Dry ear for minimum period of six weeks, Wet ear with mucoid discharge which on culture and sensitivity showed no microorganisms, Primary ear, Above 12 years, Pure conductive hearing loss with air bone gap 20-35 dl.

Exclusion criteria: Active infection, Mixed hearing loss, Atticoantral type of CSOM, Systemic diseases (DM, Renal Failure).

All patients were subjected to the following:

- History taking of past ventilation tube, allergic and asthmatic tendencies, history of noise exposure and the duration of such exposure, if the patient undergone tympanic membrane surgery on the same ear previously history of a bleeding tendency.
- Otoscopic assessment of the ear for infection; granulation tissue and TM perforation.
- Endoscopic examination of the ear. Figure 1.
- Investigation:

1-Routine pre-operative lab.

2-Pure tone audiometry has been done before surgery and after operation by 3 months.

3-CT temporal bone.

Technique:

1) The operation was performed under general anaesthesia.
2) Patients were poisoned in a supine position with head up and turned to other side then sterilization and draping were performed.
3) Infiltration of the skin using adrenaline dissolved in saline in a concentration of 1:200000 into the incision area and the bony external canal to induce local vasoconstriction and dissection in the field, then microscopic re-evaluation were done.
4) Post-auricular approach was used and the concheal perichondrium with or without concheal cartilage were harvested for all cases.
5) Anterior canal wall retractor was placed for reflecting the lateral posterior meatal wall.
6) margins of tympanic membrane perforation were freshened.
7) Tow lateral radial incisions given at 6 and 12 clock positions along tympanomastoid and tympanosquamous suture lines.
8) Tympanomeatal flap was elevated and along with the annulus, taking care not to injure chorda tympani, long process of incus, handle of malleus.
9) Conchal perichondrial graft was placed lateral to the handle of malleus covering the perforation. This requires support of graft by pieces of dry gel foam.

10) Tympanomeatal flap was replaced on the graft. Gel foam was packed in deep meatus.; Lateral posterior meatal wall flap was replaced,canal was then packed with gel foam and medicated ribbon gauge.
11) Post auricular wound was closed in layers and mastoid bandage was applied.

Follow up

Patients were followed up by endoscopic examination 1 month and 3 months post operatively. At the last follow up postoperative PTA was done for all patients after 3 months. **Figure 2. Figure 3.**

Statistical Analysis:

All data were collected, tabulated and statistically analyzed using SPSS 22.0 for windows (SPSS Inc., Chicago, IL, USA), MedCalc 13 for windows (MedCalc Software bvba, Ostend, Belgium) and Microsoft Office Excel 2010 for windows (Microsoft Cor., Redmond, WA, USA).

RESULTS

There was insignificant difference between the studied groups regarding site of perforation where 40% of wet ear group had AS perforation versus 26.7% of dry ear group (p-value=0.717).

There was insignificant difference between the studied groups regarding size of perforation where 40% of wet ear group had medium size perforation versus 40% of dry ear group (p-value=0.890).

There was insignificant difference between the studied groups regarding preoperative ABG where 73.3% of wet ear group had 20-25 dB ABG versus 46.7% of dry ear group (p-value=0.329). Mean preoperative ABG was significantly higher among dry ear group than wet ear group (Mean: 28 dB verus 23.66 dB respectively, p-value=0.034). **Table (1)**

There was insignificant difference between the studied groups regarding Graft uptake at one month where 93.3% of wet ear group had successful uptake versus 86.7% of dry ear group (p-value=1.000). There was insignificant difference between the studied groups regarding Graft uptake at three months where 93.3% of wet ear group had successful uptake versus 86.7% of dry ear group (p-value=1.000).

There was insignificant difference between the studied groups regarding postoperative ABG where 60% of wet ear group had 0-5 dB ABG versus 80% of dry ear group (p-value=0.151).

There was insignificant difference between the studied groups regarding postoperative ABG where mean ABG was 7.66 dB versus 9.33 dB respectively (p-value=0.439). **Table (2)**

Mean preoperative ABG was significantly higher among dry ear group than wet ear group (Mean: 28 dB verus 23.66 dB respectively, p-value=0.034). There was insignificant difference between the studied groups regarding postoperative ABG where mean ABG was 7.66 dB versus 9.33 dB respectively (p-value=0.439). A significant decrease of ABG among wet ear group where mean preoperative ABG was 23.66 dB and postoperative ABG was 7.66 dB (p-value=0.001). A significant decrease of ABG among dry ear group where mean preoperative ABG was 28 dB and postoperative ABG was 9.33 dB (p-value=0.001).

There was insignificant difference between the studied groups regarding hearing gain where 26.7% of wet ear group had 11-15 dB hearing gain versus 13.3% of dry ear group (p-value=0.394). There was insignificant difference between the studied groups regarding hearing gain where mean hearing gain was 16 dB versus 18.66 dB respectively (p-value=0.284). **Table (3)**

There was insignificant difference between the studied groups regarding hearing improvement where 93.3% of wet ear group had improved hearing versus 87.6% of dry ear group (p-value=1.000).

There was insignificant difference between the studied groups regarding complications where 6.7% of both groups had complicated by hematoma (p-value=1.000).

Table 1. Comparison between wet ear and dry ear regarding preoperative clinical and endoscopic assessment.

Preoperative clinical data	Wet ear (N=15)		Dry ear (N=15)		Test‡	p-value (Sig.)
	No.	%	No.	%		
Disease						
Unilateral disease	12	80%	14	93.3%	1.154	0.598 (NS)
Bilateral disease	3	20%	1	6.7%		
Operated ear						
Right ear	6	40%	8	53.3%	0.536	0.464 (NS)
Left ear	9	60%	7	46.7%		
Site of perforation						
AI	2	13.3%	4	26.7%	1.352	0.717 (NS)
AS	6	40%	4	26.7%		
PS	3	20%	4	26.7%		
PI	4	26.7%	3	20%		
Size of perforation						
Small	5	33.3%	6	40%	0.234	0.890 (NS)
Medium	6	40%	6	40%		
Large	4	26.7%	3	20%		

‡ Chi-square test, p< 0.05 is significant, Sig.: significance.

Table 2. Comparison between wet ear and dry ear regarding postoperative endoscopic assessment.

Postoperative endoscopic assessment	Wet ear (N=15)		Dry ear (N=15)		Test‡	p-value (Sig.)
	No.	%	No.	%		
Graft uptake at one month						
Failed	1	6.7%	2	13.3%	0.370	1.000 (NS)
Success	14	93.3%	13	86.7%		
Graft uptake at three months						
Failed	1	6.7%	2	13.3%	0.370	1.000 (NS)
Success	14	93.3%	13	86.7%		

‡ Chi-square test, p< 0.05 is significant, Sig.: significance.

Table 3. Comparison between wet ear and dry ear regarding 3 months postoperative audiological assessment.

Postoperative ABG	Wet ear (N=15)		Dry ear (N=15)		Test	p-value (Sig.)
	No.	%	No.	%		
0-5 dB	9	60%	12	80%	9.429‡	0.151 (NS)
6-10 dB	4	26.7%	0	0%		
11-15 dB	1	6.7%	0	0%		
16-20 dB	1	6.7%	0	0%		
21-25 dB	0	0%	1	6.7%		
26-30 dB	0	0%	1	6.7%		
31-35 dB	0	0%	1	6.7%		
Mean ± SD	7.66 ± 4.95		9.33 ± 10.99		-0.774•	0.439 (NS)
Median (Range)	5 (0 – 20)		5 (0 – 35)			

‡ Chi-square test, • Mann Whitney U test, p< 0.05 is significant, Sig.: significance.

Figure 1. Showing Pre -operative endoscopic view of Right ear showing wet non-purulent middle ear mucosa.

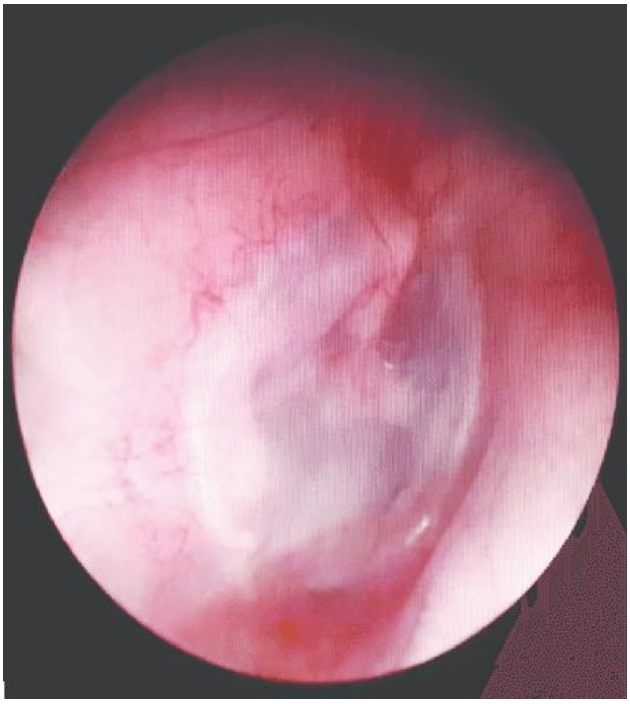

Figure 2. showing Right ear graft uptake and complete healing of tympanic membrane 3 months postoperatively.

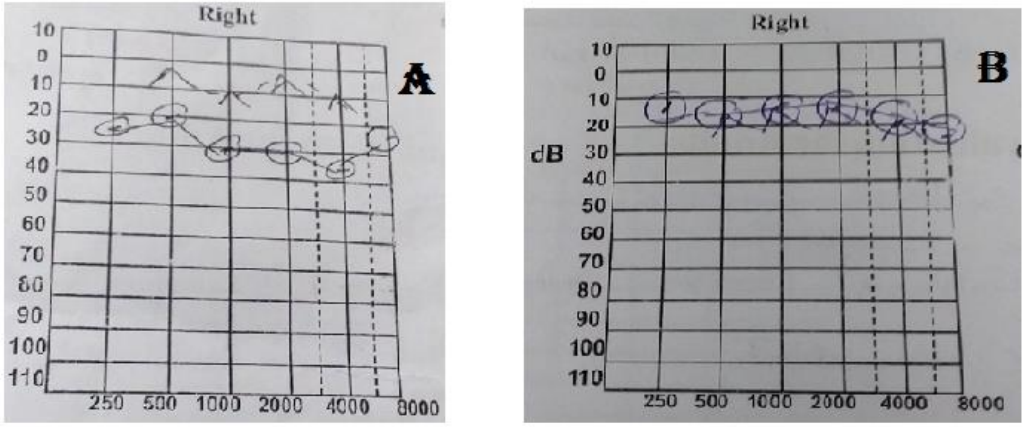

Figure 3. Showing Pre-operative PTA of right ear [A] and 3 months post operative PTA of the same ear showing marvelous improvement of Air-bone gap[B].

DISCUSSION

In our study, there was insignificant difference between the studied groups regarding site of perforation where 40% of wet ear group had AS perforation versus 26.7% of dry ear group, 26.7% of wet ear group had PI perforation versus 20% of dry ear group, 20% of wet ear group had PS perforation versus 26.7% of dry ear group, and 13.3% of wet ear group had AI peroration versus 26.7% of dry ear group (p-value=0.717). **Naderpour et al.** [6] had reported that amongst the 60 patients involved in the study, 34 (56%) had a central perforation of tympanic membranes and 26 (43%) had subtotal perforation. Furthermore, there was no case with total or marginal perforation of tympanic membranes. From the 30 people with wet ears, 16 (53%) had central

perforation and 14 (46%) had medium to subtotal perforation. In contrast, among the patients with dry ears 18 (60%) had central perforation and 12 (40%) had medium to subtotal perforation.

In the current, there was insignificant difference between the studied groups regarding size of perforation where 40% of wet ear group had medium size perforation versus 40% of dry ear group, 33.3% of wet ear group had small size perforation versus 40% of dry ear group, and 26.7% of wet ear group had large size perforation versus 20% of dry ear group (p-value=0.890). **Deosthale et al.** [7] had reported that out of 86 patients, majority of patients i.e. 43 cases had medium sized central perforation (22 in dry ear and 21 in wet ears) followed by large, small and subtotal perforation respectively in both the groups, the difference in two groups in relation to size of perforation was statistically insignificant (p value = 0.909).

In our study, there was insignificant difference between the studied groups regarding preoperative ABG where 73.3% of wet ear group had 20-25 dB ABG versus 46.7% of dry ear group, 13.3% of wet ear group had 26-30 dB ABG versus 26.7% of dry ears and 13.3% of wet ear group had31-35 dB ABG versus 26.7% of dry ear group (p-value=0.329). **Deosthale et al.** [7] had reported preoperative hearing assessment among studied patients, 12 patients (seven patients (15.21%)—dry group, five patients (12.5%)—wet group) had hearing threshold of less than 25 dB i.e. normal hearing. Maximum patients (65 patients) had hearing threshold between 26 and 40 dB (Mild Hearing Loss) of which 35 (76%) were in dry ear group and 30 (75%) in wet ear group. While nine patients [four patients (8.69%)—dry ear group and five patients (12.5%) of wet ear group] had hearing loss between 41 and 55 dB i.e. moderate hearing loss. None had hearing loss more than 55 dB.

In our study, mean preoperative ABG was significantly higher among dry ear group than wet ear group (Mean: 28 dB verus 23.66 dB and SD: 5.81 dB versus 5.60 dB respectively, p-value=0.034), this was in disagree with **Naderpour et al.** [6] where mean preoperative ABG was 41.5 dB (SD=10.09) in wet ears versus 40.36 dB (SD=8.91) in dry ears.

In current study, there was insignificant difference between the studied groups regarding graft uptake at one month where 93.3% of wet ear group had successful uptake versus 86.7% of dry ear group and failed uptake had occurred in 6.7% of wet ear groups versus 13.3% of dry ear group (p-value=1.000). There was insignificant difference between the studied groups regarding graft uptake at three months where 93.3% of wet ear group had successful uptake versus 86.7% of dry ear group and failed uptake had occurred in 6.7% of wet ear groups versus 13.3% of dry ear group (p-value=1.000).

Deosthale et al. [7] had founded there was statistically insignificant difference between two groups in terms of success rate of graft where 80% of wet ears had successful uptake versus 86.95% of dry ears and failed uptake had occurred in 20% of wet ear groups versus 13.05% of dry ear group (p value = 0.562), this was also quit different than us as in our result, wet ear group had a numerically higher success rate than dry ear group while in **Deosthale et al.** [7]**,** dry ears had a numerically higher success rate than wet ears.

In our study, there was insignificant difference between the studied groups regarding postoperative ABG where 60% of wet ear group had 0-5 dB ABG versus 80% of dry ear group (p-value=0.151). **Deosthale et al.** [7] had reported postoperative hearing assessment at the end of 12 weeks revealed that, 59 patients achieved normal hearing threshold i.e. less than 25 dB (33 patients (71.74%) of dry ear group and 26 (65%) in wet ear group). 27 patients had hearing threshold between 26 and 40 dB i.e. mild Hearing loss (13 patients (28.26%) in dry ear group and 14 patients (35%) in wet ear group). None had hearing loss more than 40 dB postoperatively.

In current study, there was insignificant difference between the studied groups regarding postoperative ABG where mean

ABG was 7.66 dB in wet ear group versus 9.33 dB in dry ear group (p-value=0.439).

In our study, there was a significant decrease of ABG among wet ear group where mean preoperative ABG was 23.66 dB and postoperative ABG was 7.66 dB (p-value=0.001), this was in agree with **Naderpour et al.** [6] where there was a significant decrease of mean preoperative ABG (41.5 dB) to postoperative ABG (16.33 dB) (p-value=0.001). This was also in agree with **Naderpour et al.** [6] where there was a significant decrease of mean preoperative ABG (34.80 dB) to postoperative ABG (24.21 dB) (p-value<0.0001).

In current study, there was insignificant difference between the studied groups regarding postoperative ABG where mean ABG was 7.66 dB in wet ear group versus 9.33 dB in dry ear group (p-value=0.439), this was in disagree with **Naderpour et al.** [6] where mean postoperative ABG was 16.33 dB (SD=10.90) in wet ears versus 13 dB (SD=8.51) in dry ears. This was also in disagree with**. Deosthale et al.** [7] where mean postoperative ABG was 24.21 dB (SD=3.95) in wet ears versus 23.92 dB (SD=4.38) in dry ears.

In our study, there was a significant decrease of ABG among wet ear group where mean preoperative ABG was 23.66 dB and postoperative ABG was 7.66 dB (p-value=0.001), this was in agree with **Naderpour et al.** [6] where there was a significant decrease of mean preoperative ABG (41.5 dB) to postoperative ABG (16.33 dB) (p-value=0.001). This was also in agree with **Naderpour et al.** [6] where there was a significant decrease of mean preoperative ABG (34.80 dB) to postoperative ABG (24.21 dB) (p-value<0.0001).

In our study, there was a significant decrease of ABG among dry ear group where mean preoperative ABG was 28 dB and postoperative ABG was 9.33 dB (p-value=0.001), this was in agree with **Naderpour et al.** [6] where there was a significant decrease of mean preoperative ABG (40.36 dB) to postoperative ABG (13 dB) (p-value=0.002). This was also in agree with **Naderpour** [6] where there was a significant decrease of mean preoperative ABG (35.04 dB) to postoperative ABG (23.92 dB) (p-value<0.0001).

In our study, 33.3% of wet ear group had 20-25dB ABG preoperatively that decrease to 0-5dB ABG postoperatively. 26.7% of wet ear group had 20-25dB ABG preoperatively that decrease to 6-11dB ABG postoperatively. 46.7% of dry ear group had 20-25dB ABG preoperatively that decrease to 0-5dB ABG postoperatively. 20% of dry ear group had 26-30dB ABG preoperatively that decrease to 0-5dB ABG postoperatively.

In current study, 26.7% of wet ear group had over 20 dB hearing gain versus 40% of dry ear group and 73.3% of wet ear group had less than 20 dB hearing gain versus 60% of dry ear group. **Naderpour et al.** [6] had reported different findings where hearing gain over 20 dB in 5 cases (16.7%) in patients with wet ears and 3 patients (10%) with dry ears and 3.3% of wet ears had less than 20 dB hearing gain versus 60% of dry ear group.

In current study, there was insignificant difference between the studied groups regarding hearing gain where mean hearing gain was 16 dB (SD=9.48) in wet ear group versus 18.66 (SD=9.34) dB in dry ear group (p-value=0.284), this was in disagree with **Naderpour et al.** [6] where the average hearing gain in all wet ears patients before and after the surgery was 25.16 dB (SD=9.86) while this number was 26.2 dB (SD=8.31), for those with dry ears. There was no statistically significant difference between hearing gain in dry and wet ears (P=0.583). This also was in disagree with **Deosthale et al.** [7] where mean ABG closure in all wet ears was 10.61 dB (SD=2.47) while this number was 11.16 dB (SD=4.06), for those with dry ears.

In current study, there was insignificant difference between the studied groups regarding hearing improvement where 93.3% of wet ear group had improved hearing versus 87.6% of dry ear group (p-value=1.000). **Deosthale et al.** [7] had reported that hearing

improvement had occurred in 67.5% of wet ears and 80% of dry ears, with insignificant difference between both groups (p=0.999).

In our study, there was insignificant difference between the studied groups regarding complications where 6.7% of both groups had complicated by hematoma (p-value=1.000). **Hosny et al.** [8] had reported complication in wet ears only where 2.17% had perichondiritis and another 2.17% had postauricular hematoma. The rates of our study in both wet and dry ear was worse than those of **Hosny et al.** [8] study.

Conflict of Interest: Nothing to declare.
Financial Disclosures: Nothing to declare.

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