ORIGINAL ARTICLE

Treatment of Subtotal and Anterior Tympanic Membrane Perforation with Two Different Methods: Bucket Handle Tympanoplasty and Cartilage Tympanoplasty

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ABSTRACT

Aim: To compare the outcomes of bucket handle procedure and cartilage tympanoplasty method in treatment of tympanic membrane perforation.
Study Design: Cross sectional/observational.
Place of Study and Duration: This study was conducted at Department of ENT, Shalamar Medical & Dental College from 1st January 2017 to 30th September 2018.
Methods: Total 80 patients of both genders whom had suffered with chronic otitis media with anterior tympanic membrane perforation were included in this study. Patient's ages were ranging from 10 to 50 years. Patients detailed medical history including age, sex, socio-economic status and education were noted after taking informed consent from all the patients. All patients were undergone surgical treatment with two different techniques bucket handle and cartilage tympanoplasty. All patients were equally divided into two group, Group A (Bucket handle) and Group B (Cartilage).
Results: Out of all 80 patients, 46(57.50%) were male while rest 42.50% were females. 22(27.50%) patients were ages between 10 to 20 years, 35(43.75%) patients were ages between 21 to 30 years, 15(18.75%) patients had ages 31 to 40 years and 8(10%) patients were ages more than 40 years. 50(62.50%) patients had rural residency while 30(37.50%) patients had urban residency. 32(40%) patients were literate. 40 patients were treated with bucket handle tympanoplasty in which 23 57.50%) were male and 17(42.50%) patients were female and 40 patients with cartilage tympanoplasty with same ratio as bucket handle. Mean PTA was lower in bucket handle as compared to cartilage (P-value 0.025), there is no significant difference found in time identified in term of PTA outcome (p-value 0.458) and SRT (P-value 0.357) in bucket handle and cartilage tympanoplasty. Total postoperative tympanic membrane perforation was found in 11(13.75%) patients in cartilage typanoplasty group and 13(16.25%) patients in bucket handle group.
Conclusion: The reconstruction of subtotal or anterior tympanic membrane perforation with bucket handle and cartilage tympanoplasty methods had similar outcomes. There is no major difference was found in hearing improvements in both methods
Keywords: Outcome, Procedure, Bucket handle, Cartilage tympanoplasty

INTRODUCTION

Worldwide, chronic otitis media (tympanic membrane perforation) is most commonly found disorder in health care centers. It causes serious cost and resources implications for healthcare systems around the world particularly in developing countries. In Southeast Asia and Western Pacific countries the frequency of this malignant and painful disorder is 2 to 4% and in North America and in European countries its prevalence is less than 2%[1]. Chronic otitis media may lead to tympanic membrane perforation and it is considered as one of the most important cause of tympanic membrane perforation (TMP) which in effect leads to hearing loss and chronic ear infections. Tympanic membrane perforation can cause the permanent hear loss and many other painful infection, however, in order to get quick recovery and to prevent the infective complication, surgical methods are applied for reconstruction of tympanic membrane perforations[2,3]. Many of surgical techniques may used for the treatment of this malignant disorder. Tympanoplasty surgical technique is used to dry the inner ear and helps to reduce the infection rate in the middle ear. The tympanoplasty procedure is very difficult for the expertise in order to applying on patients for quick relief and to reduce the complications because of its sensitiveness and aggression of the patients[4]. Tympanoplasty surgical treatment is applied in two methods, underlay and overlay[5]. Till 1970s overlay method was usually used in tympanoplasty but due to procedural complications such as delay in wound healing, lateralization of grafts and grafts to repair, Surgeons move towards the underlay methods because this method resulted less complications and procedural cost as compared to the overlay way[6]. In underlay method, Bucket handle tympanoplasty is one of the most important and frequently performing technique for reconstruction of tympanin membrane perforations.

Several techniques have been applied for the treatment of TMP in which bucket handle, cartilage, tamporalis fascia and fat or vein techniques[7]. According to the surgeons remarks the main problem for reconstruct the tympanic membrane is to maintain the anterior part after reconstruction. This is because of the absence of proper vascular support in the anterior part of the canal which causes graft necrosis in that region[8,9]. In start of tympanoplasties the temporalis fascia technique was used

frequently and the success rate was resulted as 94 to 97%[10,11]. Now from the last ten years, Cartilage tympanoplasty technique is frequently used for the repairing of tympanic membrane perforations with success rate ranged from 96.5% to 98.5% respectively[12,13]. Overall, the choice of graph material is affected by different factors that include, amongst many, the size of the perforation, surgeon's experience, and the tympanic membrane status[14,15].

Recent study was conducted to evaluate the clinical outcomes of cartilage tympanoplasty and Bucket handle tympanoplasty techniques applied for the reconstruction of tympanic membrane perforations.

MATERIALS AND METHODS

This cross-sectional/observational study was conducted at Department of ENT, Shalamar Medical & Dental College from 1st January 2017 to 30th September 2018. Eighty patients of both genders whom had suffered with chronic otitis media with anterior tympanic membrane perforation were included. Patient's ages were ranging from 10 to 50 years. Patients detailed medical history including age, sex, socio-economic status and education were noted after taking informed consent from all the patients. Those patients having history of previous ear operations, cleft palate, having nasal allergy and nasal infections and those who were not interested for inclusion were excluded from this study.

All patients were undergone surgical treatment with two different techniques bucket handle and cartilage tympanoplasty. All patients were equally divided into two group, Group A (Bucket Handle) and Group B (Cartilage). Follow-up was taken strongly from all the patients at 3 months and 6 months and at 12 months respectively. Audiometery was performed according to the ASL (American speech language). Pure tone threshold was measured at frequencies 250 to 8000 Hz. PTA was taken as ascending descending order in 5db steps. SRT (speech reception threshold was obtained as same to PTA method. All the statistical data was analyzed by SPSS 19.

RESULTS

Out of all 80 patients, 46 (57.50%) were male while rest 34 (42.50%) were females. 22 (27.50%) patients were ages between 10 to 20 years, 35(43.75%) patients were ages between 21 to 30 years, 15(18.75%) patients had ages 31 to 40 years and 8(10%) patients were ages more than 40years. 50(62.50%) patients had rural residency while 30 (37.50%) patients had urban residency. 32(40%) patients were literate (Table 1). 40 patients were treated with bucket handle tympanoplast in which 23(57.50%) were male and 17(42.50%) patients were female and 25(62.50%) had left ear undergone surgery and 15(37.50%) were right ear. 40 patients with cartilage tympanoplasty 28(70%) left ear and 12 (30%) had right ear with same ratio male to female . In cartilage tympanoplasty, site of membrane perforation as anterior in 30(75%) and subtotal in 10(25%) patients and same in bucket handle (Table 2).

Mean PTA was lower in bucket handle as compared to cartilage (P-value 0.025), there is no significant difference found in time identified in term of PTA outcome (p-value 0.458) and SRT (P-value 0.357) in bucket handle and cartilage tympanoplasty (Table 3). Total postoperative tympanic membrane perforation was found in 4(10%) patients in cartilage typanoplasty group and 6(15%) patients in bucket handle group (Table 4).

Table 1: Demographical information of the patients

Characteristics	No.	%
Gender		
Male	46	57.5
Females	34	42.5
Age (years)		
10 – 20	22	27.5
21 -30	35	43.75
31 – 40	15	18.75
> 40	8	10
Residency		
Rural	50	62.5
Urban	30	37.5
Education		
Literate	32	40
Illiterate	48	60

Table 2: Surgical technique wise distribution of the patients

Variable	Bucket Handle Tympanoplasty (n=40)	Cartilage Tympanoplasty (n=40)
Gender		
Male	23 (57.50%)	23 (57.50%)
Females	17 (42.50%)	17 (42.50%)
Operated ears		
Left Ear	25 (62.50%)	28 (70%)
Right Ear	15 (37.50%)	12 (30%)
Site of membrane perforation		
Anterior	30 (75%)	30 (75%)
Subtotal	10 (25%)	10 (25%)

Table 3: Mean PTA, SRT and SDS findings in both groups with respect to follow-up

Characteristics	Bucket Handle Tympanoplast	Cartilage Tympanoplasty
Pure Tone Threshold (PTA)		
Before treatment (dB HL)	32.07±8.58	30.82±8.57
At 3 months after treatment (dB HL)	19.27±5.68	21.26±6.56
At 6 months after treatment (dB HL)	18.82±7.37	20.73±4.77
At 12 months after treatment (dB HL)	19.32±5.56	20.56±4.800
Speech reception Threshold (SRT)		
Before treatment (dB HL)	33.57±8.70	32.44±6.40
At 3 months after treatment (dB HL)	22.44±5.72	24.77±5.07
At 6 months after treatment (dB HL)	22.00±6.83	24.44±4.66
At 12 months after treatment (dB HL)	22.00±6.83	24.44±4.66
Speech Discrimination Score		
Before treatment	97.37±1.80	97.64±2.30
At 3 months after treatment	97.70±2.87	98.46±1.33
At 6 months after treatment	97.70±2.87	98.46±1.33
At 12 months after treatment	97.70±2.87	98.46±1.33

Table 4: Prevalence of postoperative Tymapanic membrane perforations

Characteristics	Bucket Handle Tympanoplast n=40	Cartilage Tympanoplasty n=40
Found	6 (15%)	4 (10%)
Not Found	34 (85%)	36 (90%)

DISCUSSION

Chronic otitis media is one the most common cause of tympanic membrane perforations. The procedures used for reconstruction of anterior or subtotal tympanic membrane perforation have a high rate of treatment failure. A study conducted by Hosamani et al[16] in which the success rate for reconstruction of tympanic membrane with temporalis fascia was significantly higher as compared to other treatment methods 95%. Another study conducted by Hay and Blanshard in which they treated 150 anterior perforation and used anterior pocket to support the anterior portion and the success rate was resulted as 91%[17]. In our study, out of all 80 patients, 46(57.50%) were male while rest 34(42.50%) were females, these results shows similarity to the study conducted by Ali Muhammad et al[18] in which the ratio of male patient was high as compared to females. In this study, 40 patients were treated with Bucket handle tympanoplast in which 23(57.50%) were male and 17(42.50%) patients were female and 25 (62.50%) had left ear undergone surgery and 15 (37.50%) were right ear. 40 patients with cartilage tympanoplasty 28(70%) left ear and 12(30%) had right ear with same ratio male to female. In cartilage tympanoplasty, site of membrane perforation as anterior in 30(75%) and subtotal in 10(25%) patients and same in bucket handle. The ratio of left ear was high as compared to right ear and these results shows similarity to the study conducted by Jeffrey et al in which most suffered ears was left and treated with cartilage tympanoplasty method for repairing of anterior perforations[18].

A study conducted by Kumar et al[19], in which they used Bucket Handle technique for treatment of tympanic membrane perforation and resulted 80% success rate. The most common and one of the successful procedures for reconstruction the anterior or subtotal perforation is cartilage tympanoplasty and this technique resulted success rate 98.4% to 96.9%. A study conducted by Ozbek et al[20], in which the success rate of cartilage tympanoplasty was 91% and other study conducted by Glasscock et al[21] in which they reported success rate of cartilage tympanoplasty technique was 96%. In our study mean PTA was lower in bucket handle as compared to cartilage (P-value 0.025), there is no significant difference found in time identified in term of PTA outcome (p-value 0.458) and SRT (P-value 0.357) in bucket handle and cartilage tympanoplasty. We observed no significant difference in improvement of hearing at 3months and six months after surgery by using both techniques bucket handle and cartilage tympanoplasty, this may be due to the perfect and accurate use of technique by the expertise. These results shows similarity to the other studies conducted regarding repairing of anterior perforations and reported improvement of hearing at 3 and 6 months after surgical treatment[21-23].

In our study, use of cartilage tympanoplasty method for reconstruction of tympanic membrane perforations provides better clinical outcomes as compared to Bucket Handle, but we found no major difference in comparing success rate of both techniques. Moreover, this study was not sufficient for obtaining targeted outcomes because number of patients was small. We have to do more work for better treatment and to provide quick relief to the patients affected by this malignant and painful disorder.

CONCLUSION

Tympanic membrane perforation is one of the most common painful disorders found in health care centers. In our study, we concluded that there is no major difference found for improvement of hearing loss with bucket handle and cartilage tympanoplasty. Moreover, Cartilage tympanoplasty is more reliable and safe procedure as compare to bucket handle tympanoplasty for repairing of perforations.

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