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A STUDY ON OUTCOME OF OSSICULOPLASTIES IN SURGERIES OF CHRONIC SUPPURATIVE OTITIS MEDIA WITH OSSICULAR EROSION

Otolaryngology

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ABSTRACT

Introduction: Ossicular disruption is the most common cause of hearing impairment in CSOM patients. This is managed commonly with surgeries in two sittings earlier, but in our study with single sitting surgery both the disease clearance and good hearing improvement was achieved . The aim of the study is to evaluate hearing outcome in patients of chronic otitis media with ossicular erosion intervened by surgeries with use of autologous materials or synthetic prosthesis (partial ossicular replacement prosthesis/total ossicular replacement prosthesis). Thus to bring back near normal hearing in our patients treated with single stage procedure, also making this procedure both cost effective and disability reduction.
Method of study: The study is conducted on 50 patients presenting with signs and symptoms of chronic suppurative otitis media satisfying the inclusion and exclusion criteria attending ENT OPD in Government Rajaji Hospital, Madurai. Approval of the institutional ethical committee obtained . After taking detailed history and clinical examination, high resolution computed tomography temporal bone taken. Patients were taken for surgery under local or general anaesthesia after proper preoperative assessment. Intraoperative ossicular status was assessed using Austin kartush classification. Usage of autologous or synthetic ossicular prosthesis was decided based on the disease condition of the patients operated. Post operatively patients were followed up for 1 year. All were screened in the postoperative period clinically with audiograms on 1st, 3rd , 6th ,12th month , last audiogram was considered to be the reliable marker in this study. Gain in the air bone gap is effectively analyzed.
Results: This analytical study was made in 50 cases which includes 13 cases who underwent placement of remodeled incus among postoperative air bone gain was 11.7db. 9 cases who were managed with tragal cartilage placement had gain in ABG value of 10.1db. 13 cases were selected for management with PORP had Gain in ABG of 15db. 15 cases managed with TORP who had gain in ABG of 13.3db. On analysis of this study further proved with significant difference between pre and postoperative ABG in air conduction but not in bone conduction in PTA. Preoperative mean air bone gap was 38.4 dBhl and postoperative mean air bone gap was 26.6 dBhl. Gain in ABG was 11.8 dBhl.
Conclusion: This study showed significant p value on comparing preoperative and postoperative ABG in which there is a gain postoperative ABG . To conclude, there is a gain in ABG for both autologous and synthetic materials post operatively. To make this analytical study still definitive, further long term follow up of cases is necessary.

KEYWORDS

Ossiculoplasty, Otologic surgical procedure, Chronic suppurative otitis media: Hearing

INTRODUCTION

Most of middle ear disease occurs due to chronic otitis media in developing countries. Improperly treated chronic otitis media affects the quality of life. In developing countries the most common cause of hearing impairment is chronic otitis media.(1) Ossicular disruption is the most common cause of hearing impairment in CSOM patients.(2)This is managed commonly with surgeries in two sittings earlier, but in our study with single sitting surgery both the disease clearance and good hearing improvement is achieved .

Previously most popular treatment was radical mastoidectomy which give good disease eradication but hearing function was sacrificed.(3) Initially in surgeries of CSOM whether it is safe or unsafe ear, most widely used procedure was Intact canal wall tympanoplasty. But recently it was partially replaced by Canal wall down procedure with tympanoplasty in unsafe ear. Ossicular reconstruction and its long term stability will give good hearing outcome but it is a challenging one. Numerous new materials are available to reconstruct the ossicles. Of these, remodelled ossicles, cartilage and cortical bone are autologous materials. First choice in ossiculoplasty was autologous materials. Various synthetic prosthesis can be used in the absence of autologous material. Those synthetic prosthesis could be Teflon, plastipore, hydroxyapatite, gold, titanium.(4)

The aim of the study is to evaluate hearing outcome in patients of chronic otitis media with ossicular erosion intervened by surgeries with use of autologous materials or synthetic prosthesis (partial ossicular replacement prosthesis/total ossicular replacement prosthesis). Thus to bring back near normal hearing in our patients treated with single stage procedure, also making this procedure both cost effective and disability reduction.

MATERIALS AND METHODS

The study is conducted on 50 patients who under went surgeries for CSOM in ENT department, government rajaji hospital, Madurai, all patients with CSOM were examined in detail which includes detailed clinical history, ENT examination, Otoscopic examination, Otomicroscopic examination, Tuning fork test.

All cases of Chronic suppurative otitis media (safe and unsafe) requiring surgery and with an air bone gap of 40 dB or more (in pure tone audiometry) at the time of presentation, ossicular damage as diagnosed by HRCT Temporal bone and otomicroscopy between age 16 to 50 years were included in the study. Patients with Sensory neural hearing loss, Revision cases, Stapes fixation, Congenital atresia, Uncontrolled metabolic conditions like diabetes mellitus, hypertension, CSOM with active intra and extra cranial complications were excluded from the study.

Patients who came with Chronic suppurative otitis media, were first tested with pure tone audiogram. HRCT temporal bone done to know about the extension of the disease, position of sigmoid sinus, tegmen plate, facial nerve course and ossicular status. The surgical procedure was completely explained and consent was obtained from patient before taking into surgery. All case were operated under local/ general anaesthesia depending upon the patients age and general condition .

Preoperative operatively we did routine basic investigation done and fitness was obtained from anesthetist.

SURGICAL PROCEDURE

Under Strict aseptic precaution, patient in semi Fowler's position, using operating microscope, infiltrated locally (2% lignocaine + bupivacaine + adrenaline). Then modified Williams Wilde's incision made, temporalis fascia graft harvested. Periosteum elevated and mastoid cortex exposed. In CSOM mucosal type we did canal wall up procedure, In CSOM squamous type we did canal wall down procedure. Depending upon the intra operative ossicular status we have planned for ossiculoplasty.

Among the 50 patients, remodeled incus were used in 13 patients with CSOM mucosal type when remnant incus is available to reconstruct ossicular chain. In 9 patients we used tragal cartilage. Patient with cholesteatoma or postero superior retraction pocket we used synthetic material PORP or TORP made up of Teflon (cost effective). PORP were used when malleus was preoperativesent and stapes supra structure was preoperativesent, TORP were used when malleus was preoperativesent,

stapes supra structure was absent. Cartilage was placed between the PORP/TORP and Tympanic membrane to stabilize PORP/TORP. Temporalis facia was used to reconstruct the tympanic membrane by using underlay technique. Then medicated ear wick kept in the EAC.

PORP were used in 13 patients, TORP were used in 15 patients. Meatoplasty was performed finally in needed case and cartilage was excised along with meatoplasty.

On discharge of selected cases, oral antibiotic was covered for 2 weeks and advised for regular follow up at 1st month, 6th month, 12th month after surgery. Pure tone average was calculated from mean threshold of 0.5,1,2 and 4 kHz. From the air conduction PTA and bone conduction PTA air bone gap was calculated. PTA done 1 year after surgery was used to calculate the gain in air bone gap.

OBSERVATIONS AND RESULTS

Totally 50 patients were taken for this study who is a case of CSOM with pure conductive hearing loss. The ages of the patients ranged from 16 to 50 years with mean age of 29.5 years. The minimum age in this study was 17 and the maximum age was 50. In this study, age group less than 20 was 18% (n=9), 21 to 30 was 40% (n=20), 31 to 40 was 40%(n=13), more than 40 was 16%(n=8).

Among 50 patients, 27 patients (54%) were males, 23 patients (44%) were females.

Most common ossicle eroded was incus in our study. Among the 50 patients almost all the patients were having eroded incus (100%). Our study also showed Second most common eroded ossicle as stapes (30%), malleus as the least eroded one (6%).

This analytical study was made in 50 cases which inferred with 13 cases who underwent placement of remodelled incus. Among them preoperative mean ABG found to be 38.3dB and postoperative mean ABG found to be with 26.6 dB ABG. Air bone gain is 11.7dB.[Table 1]

Table 1. Gain in ABG in remodelled Incus

	Modified Ossicle (N=13)		
	Preoperative	Postoperative	p-value
	Median (IQR)	Median (IQR)	
AC-PTA (db)	45.0 (42.4,47.4)	33.3 (30.0,39.1)	0.001
BC-PTA (db)	8.3 (5.8, 11.6)	10.0 (5.8,10.8)	0.890
ABG (db)	38.3 (31.6,40.0)	26.6 (20.8,30.0)	0.001

This study also showed results of 9 cases managed with tragal cartilage placement among 50 selected cases with preoperative mean ABG value of 36.7db and postoperative mean ABG value of 26.6db with gain in ABG value of 10.1db .[Table 2]

Table 2. Gain in ABG in tragal cartilage placement

	Cartilage (N=9)		
	Preoperative	Postoperative	p-value
	Median (IQR)	Median (IQR)	
AC-PTA (db)	45.0 (42.4,46.6)	36.6 (29.1,36.6)	0.008
BC-PTA (db)	8.3 (5.8,11.6)	6.6 (5.8,10.0)	0.109
ABG (db)	36.7 (34.2,38.3)	26.6 (22.5,30.0)	0.008

Also on analysis of this study with 50 selected cases 13 cases was selected for management with PORP which inferred with preoperative mean ABG with 40db and postoperative mean ABG with 25db and Gain in ABG was 15db.[Table 3]

Table 3. Gain in ABG in PORP Placement

	PORP (N=13)	
	Preoperative	Postoperative
	Median (IQR)	Median (IQR)
ABG (db)	40.0 (36.7, 40.8)	25.0 (22.5, 33.3)
P – value	0.001	

15 cases were managed with TORP with inference showing preoperative mean ABG of 40db and postoperative mean ABG of 26.7db and finally Gain in ABG was13.3db.[Table 4]

Table 4. Gain in ABG in TOPR placement

	TORP (N=15)	
	Preoperative	Postoperative
	Median (IQR)	Median (IQR)
ABG (db)	40.0 (36.7, 41.7)	26.7 (23.3, 33.3)
P– value	0.001	

On analysis of this study further proved with significant difference between preoperative and postoperative ABG in air conduction PTA but not in bone conduction PTA.

DISCUSSION

Among the special 5 senses in human being hearing plays a major role. If this hearing is impaired its considered as one of major disability. Although Hearing disability causes are multiple, the most common cause of hearing disability is by chronic suppurative otitis media. Even in CSOM patients the hearing disability is majorly due to ossicular disruption. This mandates surgical correction which was earlier studied and practiced in two sittings with first sitting done for disease clearance and later second surgery made for reconstruction for hearing. So this study was done for correction of hearing and disease clearance both in single surgical sitting which further reduces the patients stress and thus helps in maintaining the compliance and improving the quality of life and in large scale consideration decreasing the burden of disability in society.

This study also concentrates on usage of autologous grafts or else synthetic material made of Teflon which is both cost effective and further satisfying results in patients thus increasing the compliance of patients and further reduction in disability in toto .

The material which was used in our study is Polytetrafluoroethylene which is known commonly as Teflon. This material is basically biologically inert substance which is non biodegradable, non toxic and also hydrophobic making this material as a most suitable implantable material where rejection is very rare and allergy to this substance is rarest of rare. And so Teflon used in various ENT surgeries which are thus made as important material in my study of ossicular reconstruction in middle ear surgery.

In our preoperative study functional outcome of the patients of CSOM whether safe or unsafe was evaluated who underwent canal wall up or canal wall down mastoidectomy procedure with ossiculoplasty. As an end result of this procedure acceptable hearing results are tried to make out. On analysis, this study proved significant difference between preoperative and postoperative ABG with value 36.7db & 21.7 respectively .

A study was conducted by E De Corso's and B serge on role of ossiculoplasty in canal wall down tympanoplasty for middle ear cholesteatoma(5); hearing results showed significant improvement of ABG of preoperative and postoperative value 28.83 db to 13.94 db respectively .And also their surgery showed result of ABG between 0-10db improved from 2.42% to 32.53% and 11-20 db improved from 16.86% to 37.34% thus 2/3rd of patient showed improvement in ABG in PTA with <20db.

In our study, materials used with autologous cartilage and synthetic Teflon (PORP, TORP)showed significant results with Gain in ABG postoperative compared to preoperative .

A study on ossiculoplasty in chronic otitis media using different types of prostheses by kumar et. al showed his result as faster Air bone gap closure in patients treated with prostheses compared to autologous graft placement in improving hearing mechanics.(4)

In our study 50 selected patients 13 cases who underwent placement of remodelled incus showed preoperative mean ABG 38.3db and postoperative mean ABG 26.6 db and Air bone gain is 11.7db. And 9 cases managed with tragal cartilage placement among 50 selected cases with preoperative mean ABG value of 36.7db and postoperative mean ABG value of 26.6db with gain in ABG value of 10.1db .

With 50 selected cases 13 cases was selected for management with PORP which inferred with preoperative mean ABG with 40db and postoperative mean ABG with 25db and Gain in ABG was 15db. And 15 cases managed with TORP with inference showing preoperative mean ABG of 40db and postoperative mean ABG of 26.7db and finally Gain in ABG was13.3db.

A study conducted on post operative and functional outcome of hearing of PORP &TORP by Mohammed Siddique S, Meenaxi Mehta Rosmi romid with total selected cases of 32 and intervening in that 24 cases with PORP and 8 with TORP, among that 24 cases treated with PORP showed improvement in preoperative PTA average from 44.17db to 32.54db in post operative. And in 8 cases treated with TORP showed increase in PTA average 64.0db to 42.27db in preoperative and postoperative respectively.(6)

On analysis ossiculoplasty success rate is majorly constituted by case selections and technical skills of surgeon .And the analysis also proved the major factor for prognosis of cases with ossiculoplasty is viable healthy ossicles that is not affected by disease.

This study also showed equal results on both cases treated with autologous ossiculoplasty and usage of synthetic materials like Teflon (PORP & TORP). Teflon treated patients in our study showed acceptable hearing improvement and the study is further about to be followed up for long term results.

CONCLUSION

This study was conducted mainly to analyse the outcome of ossiculoplasty in chronic suppurative otitis media with ossicular erosion. Final analysis of this study showed significant p value on comparing preoperative and postoperative ABG in which there is a gain postoperative ABG. Our study was based on usage of different materials such as autologous grafts (tragal cartilage and remodelled ossicles), synthetic materials (teflon - PORP & TORP) which doesn't show variation in results significantly. Both results were successful and equal.

In our study, we used different materials for ossiculoplasty which showed near equal results at preoperativesent. To conclude, there is a gain in ABG for both autologous and synthetic materials post operatively. To make this analytical study still definitive, further long term follow up of cases is necessary to analysis longevity, effectiveness of persistence of gained hearing, disease recurrence and resurgence. Since our study has not included aetiology chronic suppurative otitis media i.e. Eustachian tube dysfunction.

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