# EFFECTS OF A FOCUS OF INFECTION IN THE UPPER RESPIRATORY TRACT ON THE OUTCOME OF MYRINGOPLASTIES

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## ABSTRACT

**Objective:** To determine whether performing myringoplasty in patients having anatomical or physiological dysfunction in the upper respiratory tract (URT) has any effect on the postoperative results of myringoplasty.

**Methodology:** This quasi-experimental study was conducted at PNS Shifa and CMH Okara, from August 2005 to July 2009. A total of 250 patients, 56% males and 44% females who underwent myringoplasty were included in the study. Medium to small sized central perforations were operated. Patients were separated into two groups. Group A (n-150) had dry central perforations with no deflected nasal septum (DNS), sinusitis, tonsillitis or nasal polyp. Group B (n100) had dry central perforations with mild to moderate DNS, history of tonsillitis, nasal allergy and sinusitis. Both groups were operated and followed up for 01 year. Data collected was analyzed by SPSS windows version 14.

**Results:** Out of 250 operated cases 56% were males and 44% were females with male to female ratio of1.2:1. Age ranged from 12-35 years with mean age of 22.4$\pm$5 years. After one year of follow up, 128/150 (85.33%) patients in group A had intact graft with improved hearing standards up to 25dbs as compared to 60/100 (60%) patients in group B ($p<0.001$). Forty patients with graft failure had a history of an attack of upper respiratory tract infection resulting in ear discharge and graft failure.

**Conclusion:** Anatomical or physiological dysfunction in the URT due to DNS, tonsillitis, nasal allergy and sinusitis adversely affect the outcome of myringoplasty and should be addressed first before performing myringoplasty.


**Key Words:** Chronic Otitis Media (CSOM), Deflected Nasal Septum (DNS), Tympanoplasty, Myringoplasty.

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## INTRODUCTION

Chronic otitis media is a common disorder around the world, especially in developing countries including Pakistan[1-4]. Patients keeps on reporting to otolaryngologists for advice regarding ear discharge and decreased hearing[5]. As access of the patients to tertiary care hospitals from remote areas is difficult so mobile surgical teams are organized to take care of these patients in some countries[6]. A large amount of money is being spent on the surgery of these patients so surgeries should be planned and one should be prepared for a self audit[7]. Repair of the tympanic membrane (Myringoplasty) also known as Tympanoplasty Type I (Wolleston classification 1956[8]), is a widely performed procedure. It reduces the discharge from the ear, improves hearing and quality of life[9]. Most of the surgeries (70%-90%), depending on the setup, end up with well formed tympanic membranes but some result in failed procedures causing loss to the patient and state. In his 1992 Toynbee Memorial Lecture, Gordon Smyth of Belfast stated that any hope for cost-effective health care reform required urgent self-audit and the provision of more realistic advice to patients[10]. It is important to look for the causes of these failed procedures and ways and means to improve our results. The success and failure depends on many factors like age of patient, technique of surgery, graft material used and diseases of the upper respiratory tract like deflected nasal septum (DNS), nasal allergy, tonsillitis or sinusitis[11,12]. These diseases have their effect on Eustachian tube functions. The Eustachian tube, or pharyngotympanic tube, originates in the middle ear and extends into the nasopharynx. It is normally closed, but opens for 0.1 to 0.2 second during swallowing to allow air to move between the nasopharynx and middle ear to equalize the pressure across the tympanic membrane[13]. Patients with failed myringoplasty have been still reported in various ENT's OPDs and the main cause of this failure was found to be having upper respiratory tract infection at the time of operation.

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**TABLE 1: OUTCOME OF MYRINGOPLASTIES IN PATIENTS WITH AND WITHOUT A FOCUS OF INFECTION IN THE UPPER RESPIRATORY TRACT**

| | | Group A | Group B | P value[$] |
|---|---|---|---|---|
| Outcome of Myringoplasty | Dry Ear (n=188) | 128 (85.3%) | 60(60%) | <0.001 |
| | Wet Ear (n=62) | 22(14.7%) | 40(40%) | |
| | Total (n=250) | 150 | 100 | |

Group A having no focus in upper respiratory tract.

Group B having a focus in upper respiratory tract.

[$:] Chi square Test

This study was carried out to determine whether performing myringoplasty in patients having anatomical or physiological dysfunction in the upper respiratory tract has any effect on the postoperative results of myringoplasty.

## METHODOLOGY

A four year quasi-experimental study from August 2005 to July 2009 was carried out in PNS Shifa and CMH Okara, Patients having chronic suppurative otitis media (CSOM) of tubotympanic type with medium to small central perforations, having dry ear for more than 4 weeks ), with age limit from 12 years to 35 years and reporting to ENT OPD were included in the study. Exclusion criteria included patients having total or subtotal tympanic membrane perforations, sensory-neural hearing loss, malformation of tympanic tube gross DNS, old age, any systemic illness like diabetes or hypertension. Sample size was 250 and technique was convenient sampling. The study was duly approved by the institutional review board of respective hospitals. Written consent was taken from the patients.

All the patients were admitted one day before surgery, worked up by through ENT examination and microscopic examination of the ear under anesthesia and relevant investigations including pure tone audiogram and x-rays of mastoid and paranasal sinuses. All the patients were operated the next day as elective cases. All the clinically diagnosed cases were randomized by card method irrespective of gender and age in two groups on the basis of presence or absences of focus of infection in upper respiratory tract and for convenience of comparison of outcomes of operation. Group A (n-150) included patients with dry central perforations having no history of recurrent Tonsillitis, DNS, nasal allergy, chronic Sinusitis or those who had a focus of infection like DNS or tonsillitis which was treated by surgery. Group B (n-100) included patients having dry central perforations who had mild to moderate DNS or a history of nasal allergy or chronic sinusitis and a history of recurrent tonsillitis. All the patients were subjected to standard myringoplasty operation under local anesthesia using temporalis fascia graft using underlay technique with endaural, post-aural and per-meatal approaches by single surgeon. All patients were kept on I/V antibiotic cover for 04 days minimum post operatively. On 7$^{th}$ post op day, patients ears underwent examination under microscope (EUM) for graft take and on 6$^{th}$ week day pure tone audiometery (PTA) was done to asses improvement in hearing. Patients were then regularly followed up for one year in OPD for whether graft was taken or not by EUM and assessment of quality of hearing was done through PTA.

Data was collected from the patients on a structured proforma including patients demographics, presence or absence of focus of infection preoperatively due to any pathology of URT, outcome of operation including graft acceptance or rejection and quality of hearing. All the findings were subjected to statistical analysis by using software SPSS version 14.0 and the outcomes of myringoplasty in both the groups were compared and p value of $< 0.05$ was considered significant.

## RESULTS

A total of 250 patients were included in the study, 56% were males and 44% were females with male to female ratio of 1:1.2. Age ranged from 12-35 years with mean age of 22.4$\pm$5 years.

Table 1 is showing the outcome of myringoplasties in patients having a focus of infection in the upper respiratory tract (URT) compared to those having no focus of infection in URT.

After one year of follow up, 128/150 (85.33%) patients in group A had intact graft with improved hearing standards up to 25dbs as compared to 60/100 (60%) patients in group B ($p<0.001$). Forty patients with graft failure had a history of an attack of upper respiratory tract infection resulting in ear discharge and graft failure.

Twenty two (14.67%) patients in group A had a graft failure. Out of these 22 patients, 10 (45.4%) were unable to keep the ear dry and developed infection, 08 (36.4%) patients had barotraumas, in 04 (18.2%) patients the cause could not be ascertained and were placed under the heading failure of graft take.

In group B, out of 40 (40%) patients with graft failure, 20(50%) patients reported within first three months

of surgery complaining of upper respiratory tract infection and ear discharge, 12(30%) patients reported in the next three months with infection in the respiratory tract and ear discharge while the rest of 08 (20%) reported in the next two months. So in this group ear grafts couldn't last for eight months resulting in ear discharge and graft failure.

## DISCUSSION

Horst Wullstein (1956) said, "The tympanic membrane has two functions, sound pressure transformation for the oval window and sound protection of the round window"[8]. The indications for surgery are conductive hearing loss due to TM perforation, chronic or recurrent otitis media, recurrent otitis media due to contamination through a perforated tympanic membrane, progressive hearing loss due to chronic middle ear pathology, perforation or hearing loss persistent for more than three months due to trauma, infection or surgery and the inability to bathe or participate in water sports safely due to perforation of the tympanic membrane. In our study all patients had central tympanic membrane perforations due to most of the causes mentioned above. If a ruptured eardrum hasn't healed in 3 to 6 months, a patient may need surgery (myringoplasty or tympanoplasty) to close the hole. Timing of repair in the pediatric population is very controversial, so we did not include children in our study. Glasscock gave young age as a relative contraindication to tympanoplasty because children under three or four are prone to upper respiratory infections and otitis media[14]. Koch reported an 81% success rate for children age 8 and older, but only a 30% success rate in younger patients[15]. They concluded that tympanoplasty before age 8 results in a high rate of failure because of poor Eustachian tube function and frequent upper respiratory tract infections. Smyth GDL[10] agreed that patients less than 10 years old had a higher failure rate for myringoplasty than older children. This was independent of secretion type, perforation site, and graft material. In our study older children and adults were selected as in these patients the rate of success is high as compared to children[16]. The surgery in children may be delayed until the child of 6 to 8 years to allow time for Eustachian tube function to improve. At this age, there is a better chance that surgeries will work, but in our setup it has been shown that tympanoplasty is a useful intervention in children age 8 to 14 years of age[17].

To say that a tympanoplasty failed or succeeded in a given case is meaningless if our criteria are different. 1) Post-operative sensorineural hearing level rather than the pre-operative level to calculate closure of the "air-bone gap should be used. 2) When reporting pure tone average, "air-bone gaps," these results should be tabulated in increments of 5 dB. 3) We should agree to report effusions or retractions as numbers without lumping them into surgical failures[18]. In our study postoperative air bone gap and intactness of the graft were considered to measure the success or failure of the surgery.

A study done at Lady Reading Hospital on myringoplasties shows a success rate of 60% in adults having central dry perforations.[4] This low success rate may be due to selection of patients or not fulfilling the criteria of excluding patients with anatomical or physiological abnormalities in the upper respiratory tract. In our study we are stressing on the same point that abnormalities in the upper respiratory tract do affect the function of Eustachian tube, thereby affecting the results of tympanoplasty[19]. Poor eustachian tube function as evidenced by contralateral effusion or atelectasis predicts poorer results (60% success). In our study the patients in Group B who had a focus of infection in the upper respiratory tract also had a success rate of 60%.

Technique used in tympanic membrane grafting also affects the results of myringoplasty, grafting can be accomplished by medial or lateral grafting. Medial grafting, also known as the underlay technique, involves creating a tympanomeatal flap via a canal incision and elevation of the annulus and tympanic membrane. Graft material is then secured between the tympanic membrane and a bed of Gel foam placed in the middle ear. Lateral grafting can be performed with a variety of materials. Materials used for grafting can be temporalis fascia, cartilages and even allograft materials can be used[20,21]. We used Temporalis fascia in all the cases as it is readily available and success rate is good[22,23]. Technique used in our study was underlay and only Temporalis fascia was used as graft material. This was done deliberately to ensure uniformity in the study and to emphasize the importance of excluding/treating patients having anatomical or physiological focus of infection in the upper respiratory tract that could affect the Eustachian tube functions. Adult patients who have recurrent upper respiratory tract infections due to some focus in the nose and throat do have affect on the success of surgery as is seen in our study.

## CONCLUSION

Anatomical and physiological dysfunctions in the upper respiratory tract, caused by diseases like DNS, tonsillitis, nasal allergy and sinusitis adversely affect the outcome of myringoplasty and should be addressed first before performing myringoplasty.

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## AUTHOR'S CONTRIBUTION

Following authors have made substantial contributions to the manuscript as under

**SAN**: Conception and design, acquisition of data

**AA**: Analysis and interpretation of data

**UR**: Drafting the manuscript

**MA**: Critical revision, Final Approval of the manuscript

## CONFLICT OF INTEREST

Authors declare no conflict of interest

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NONE DECLARED