Comparative study between post-aural and per-meatal approach type-1 tympanoplasty.

Tahir Hussain Khan¹, Ashfaq Hussain Rana², Sohail A. Malik³

ABSTRACT... Objective: To compare the results after tympanoplasty between post-aural and per-meatal approach. Study Design: Comparative study. Setting: Social Security Landhi Hospital, Karachi. Al-Tibri Medical College & Hospital (Isra University Karachi Campus), old thana Malir, Karachi. Period: July 2017 till June 2018. Material & Methods: In this study, 76 Patients of both genders with dry tympanic membrane perforations were included. They were aged between 18 to 40 years. Period of research was one year, study was started since July 2017 till June 2018. Patients were distributed into two groups, group-1 and group-2. 38 patients were included in every group. In group-1, post-aural approach tympanoplasty was done. In group-2, per-meatal approach tympanoplasty was performed. Observed results of both procedures after 1st post-operated day, after 1st post-operated week, after 1st month and after 2nd month post operatively. Variables were intensity of pain, bleeding, PTA (AC, BC and AB-gap measured by tympanometer) and duration (time period) of surgical procedure. Result: In group-1(post-aural approach tympanoplasty), out of 38 patients, 36 patients had intact grafted tympanic membrane while in group-2 (per-meatal approach tympanoplasty), 37 patients had intact grafted tympanic membrane and 1 patient had residual perforation. Smaller amount of bleeding was noted during surgery and post-operative in group-2, in comparison with group-1. All the dressing gauze were dry in per-meatal approach tympanoplasty group (group-2). Mean time period of surgery was less in per-meatal tympanoplasty (group-2) 65.1 ± 3.7 mins and mean time period of post-aural tympanoplasty (group-1) was 82.0 ± 5.6 mins. P value was found to be significant i.e. < 0.001. Consumed time period of surgery was also decreased in per-meatal tympanoplasty (group-2). After tympanoplasty, hearing status was also enhanced on PTA in both groups. Post-operatively, it was observed that AB gap was reduced in both groups. On 1st post-operated day, Weber test was done, vibrating sound was heard (lateralized) in post-operated ears which ensured the safety of inner ear apparatus. Conclusion: Results of post-aural and per-meatal tympanoplasty were approximately same but per-meatal approach tympanoplasty is superior as it took shorter amount of time period, minimum post-operative pain and minimum post-operative bleeding.

Key words: Air Bone Gap, Air Conduction, Bone Conduction, Post-Aural Approach, Per-Meatal Approach, Type-1 Tympanoplasty.
Incidence of CSOM is increasing day by day in developing countries due to poor hygiene, malnutrition and lack of awareness of health education. According to WHO, disease burden is more than 2 million. When proper treatment is not provided at right time, it may lead to irreversible changes with destruction of middle ear structures and causing complications such as labyrinthitis, facial nerve palsy, mastoiditis, lateral sinus thrombosis, meningitis and intra cranial abscess.

For repair of tympanic membrane, underlay and overlay techniques used with temporalis facia or perichondrium. Tragal cartilage is also used as a graft material. Now a day’s endoscope is used instead of microscope for per-meatal type 1 tympanoplasty.

Adequate area required between graft and remnant of contact tympanic membrane for successful repair of perforation of tympanic membrane. Same day, bilateral tympanoplasty is quick, safe and more easy method. Conventionally, otologists avoid doing bilateral tympanoplasty due to complications.

In developing countries, CSOM is the most common reason for hearing impairment. Burden of CSOM involved 65-330 million patients with ear discharge. Various graft materials have been used for tympanoplasty such as temporalis fascia, tragal cartilage, perichondrium, dura mater, vein, fat and skin. After tympanoplasty, intact graft is the surety of anatomical and functional achievement depends on decreased air-bone gap.

**MATERIAL & METHODS**

Seventy six (76) patients were included in the research. Two different hospitals. 1- Social Security Landhi Hospital Karachi. 2-Al-Tibri Medical College & Hospital (Isra University, Karachi Campus), old Thana, Malir, Karachi after approval by ethical board (BASR-31/2017/1160). Study design was comparative and sampling technique was non probable, purposive. The research was one year since July 2017 till June 2018. All patients were distributed in group-1 and group-2 with 38 patients in each group.

Post-aural approach Type 1 tympanoplasty were performed in Social Security Landhi Hospital and per-meatal Type 1 tympanoplasty in Al-Tibri Medical College & Hospital, Karachi. In group-1 (post-aural approach tympanoplasty), temporalis muscle fascia was utilized as a graft material and tragal cartilage was utilized as graft material in group-2 (per-meatal approach tympanoplasty). Before surgery, PTA test were recommended for hearing assessment to each patient in which air conduction (AC), bone conduction (BC) and air-bone gap (AB-gap) were noted by tympanometer. On 1st post-operated day, weber test was performed with tuning fork and it was lateralized towards post-operated ear which ensured the safety of inner ear.

Pain and bleeding noted on 1st post-operated day, after 1st week, after 1st and 2nd month. Integrity of grafted tympanic membrane and reduction of air-bone gap was observed after 2 months by otor-endoscopic examination and PTA.

**RESULT**

Various variables like Pain, Bleeding, PTA, weber test, examination of grafted tympanic membrane and time period of surgery in both approaches of tympanoplasty were observed. Table-I showing comparison of pain after tympanoplasty between post-aural approach tympanoplasty (group-1) and per-meatal approach tympanoplasty (group-2). It denotes mild, moderate, severe and no pain on 1st post-operative day, after 1st week of tympanoplasty, after 1st month and after 2nd month post-operatively. On 1st post-operative day, 18 patients had no pain (pain free), mild pain in 19 patients and only 1 patient complaint moderate pain in per-meatal tympanoplasty (group-2) while in post-aural approach tympanoplasty (group-1), 8 patients pain free, mild pain in 26 patients and moderate pain in 4 patients. After 1st week, in per-meatal tympanoplasty (group-2), 34 patients were pain free, 4 patients had mild pain while moderate and severe pain were not noted. In post-aural approach tympanoplasty (group-1), 12 patients free of pain, 22 patients had mild pain, 2 patients had moderate pain and 2 patients had severe pain. Only 1 patient complaint mild pain after one month in both groups. After 2 months
all patients were pain free in group-2 while only 1 patients complaint mild pain in group-1.

Figure-1 demonstrates the graphical depiction of bleeding pattern after tympanoplasty in both groups. Blood soaked dressing found in 5 patients in per-meatal tympanoplasty while in post-aural tympanoplasty it was in 37 patients. Bleeding was smaller in amount in group-2(per-meatal approach tympanoplasty) in comparison with group-1 (post-aural) because of small incision.

Figure-2 demonstrates integrity of grafted tympanic membrane in group-1 (post-aural tympanoplasty) and in group-2(per-meatal tympanoplasty).37 patients out of 38 had intact grafted tympanic membrane in per-meatal tympanoplasty (group-2) while 36 out of 38 had intact grafted tympanic membrane in post-aural tympanoplasty in group-1. In group-1, success percentage was 94.73 % while in group-2, graft success percentage was 97.73 %.

Figure-3 demonstrates graphical depiction of (AB-gap) air bone gap reduction in both groups. AB-gap reduction seen in 37 patients in per-meatal tympanoplasty while in post-aural tympanoplasty it was not reduced in 2 patients due to lateralization of graft.

Table-II Showing PTA results, mean air conduction, bone conduction, AB-gap, standard deviation and p-value in both group’s pre and post-tympanoplasty procedures. Air conduction was reduced from 42.68dB to 27.18dB in per-meatal approach tympanoplasty and in post-aural approach tympanoplasty it was reduced from 42.0dB to 26.74dB. No change seen in bone conduction post-operatively in both groups which ensured the safety of vestibule-o-cochlear system. AB-gap reduced from 29.42dB to 15.47dB in per-meatal approach tympanoplasty (group-2) while in group-1, it was reduced from 29.37dB to 15.42dB. P-value was found significant i.e. less than 0.001 in both groups after tympanoplasty.

Table-III Shows comparison of duration of tympanoplasty in post-aural (group-1) and per-meatal approach tympanoplasty (group-2). In group-1, time period of surgery was 82.0 + 5.6 min while in group-2, it was 65.1 + 3.7 min. Less amount of time taken in per-meatal approach tympanoplasty in comparison with post-aural approach tympanoplasty. P-value was found significant i.e. < 0.001. Weber test was performed on very next day with tuning fork and vibrating sound was heard (lateralized) in post-operated ears in all patient in both of groups which ensured that there were no damage of middle ear’s ossicles and vestibulo-cochlear apparatus after tympanoplasty.

<table>
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<tr>
<th>Tympanoplasty</th>
<th>Pain (VAS)</th>
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<th>After 1st post-op. week</th>
<th>After 1st Month(post-operated)</th>
<th>After 2nd months (post-operated)</th>
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<td>22</td>
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<td>1</td>
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<tr>
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<td>2</td>
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<tr>
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<td>Severe</td>
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<tr>
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<td></td>
<td>Severe</td>
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Table-I. Comparison of pain after tympanoplasty between post-aural and per-meatal approach.
DISCUSSION

In a study, pain was measured on the 1st post-operated day, pain score in per-meatal (endoscopic) tympanoplasty was 3.5 while pain score in post-aural (microscopic) tympanoplasty was 5.4. This study revealed that pain score was more in post-aural tympanoplasty as compared with per-meatal tympanoplasty.11

Pain was felt in 1 patient out of 52 in per-meatal (endoscopic) tympanoplasty while it was in 10 patients out of 48 patients in post-aural (microscopic tympanoplasty). This study co-
relating with our study.\textsuperscript{12}

According to a study the average time required for surgery in endoscopic permeatal approach tympanoplasty group was 78.13 minutes while in microscopic post-aural approach tympanoplasty group was 94.38 minutes. This is correlating with our study.\textsuperscript{13}

In the same study graft uptake rate in per-meatal approach tympanoplasty group was 92.9\% whereas in post-aural tympanoplasty group, it was 85.5\%.\textsuperscript{13}

In accordance with the study findings that success of graft uptake rate was 95\% in post-aural approach tympanoplasty group and in per-meatal approach tympanoplasty group was 91\%. Air Bone gap (AB-gap) decline was 23.68dB in post-aural approach tympanoplasty group and in per-meatal approach tympanoplasty group, it was 16.13dB.\textsuperscript{14}

Aftab et al., (2016) reported in his study that time period consumed in trans-canal approach tympanoplasty was 62.37 minutes and in post-aural approach tympanoplasty, it was 72.15 minutes. P-value was <0.001 which is significant. Time duration of per-meatal approach tympanoplasty was a lesser amount as compared to post-aural approach tympanoplasty. This study is also correlating with our study.\textsuperscript{11}

A study showed that average time period of surgery was 75.5 minutes in post-aural approach tympanoplasty while average time period was 50.4 minutes in per-meatal approach tympanoplasty. This study showed that time period was lesser in per-meatal approach tympanoplasty group as compared with post-aural approach tympanoplasty.\textsuperscript{15} This is also similar with our study.

In a study air-bone gap (AB-gap) decline was found 20.47dB in post-aural approach tympanoplasty while in per-meatal approach tympanoplasty, air-bone gap (AB-gap) reduction was 17.4dB.\textsuperscript{16}

In a study it is reported that mean pre-operative air conduction was 35dB and post-operative mean air conduction changed into 20dB, hearing gain was 15dB.\textsuperscript{17}

This study is also co-relating with our study.

It has also been reported that average hearing level before tympanoplasty was 59dB and after per-meatal tympanoplasty average hearing level of 27dB with average AB-gap gain 11dB.\textsuperscript{18}

In a study it is reported that the success of graft uptake rate in per-meatal approach tympanoplasty group was 92\% and in post-aural approach tympanoplasty, it was 95\%. AB-gap gain 18.9dB to 9.2dB with p value <0.001 showed significant.\textsuperscript{18}

**CONCLUSION**

Per-meatal approach type-1 tympanoplasty is considered to be better than post-aural approach type-1 tympanoplasty as it consumed less amount of time, lesser amount of bleeding during and after surgery because of small area of incision and less pain. Although graft uptake rate and hearing enhancement (improvement) were also same in both groups.

**REFERENCES**


AUTHORSHIP AND CONTRIBUTION DECLARATION

<table>
<thead>
<tr>
<th>Sr. #</th>
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<th>Contribution to the paper</th>
<th>Author(s) Signature</th>
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<tbody>
<tr>
<td>1</td>
<td>Tahir Hussain Khan</td>
<td>Performed surgical procedures under supervision of Professor Sohail A Malik. Thesis writing and did research. Formatting and editing article and helped in data analysis. Supervised the research.</td>
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2 | Ashfaq Hussain Rana | |
3 | Sohail A. Malik | |