

Surgical management of sinus tympani cholesteatoma

KC Toran,¹ Shrestha S,² Kafle P², Deyasi SK³

¹Asst. Professor, ²Lecturer, ³Prof. & HoD, Dept of ENT-HNS, Kathmandu Medical College Teaching Hospital

Abstract

Objective: the aim of this study is to describe the extension of unsafe middle ear disease in the sinus tympani and to review the methods of surgical access to remove the disease from this area. **Methods:** Of the 164 operated ears with unsafe chronic suppurative otitis media 64(39%) ears had variable disease extension into the sinus tympani and were included in the study. Sixty-two ears underwent canal wall down (CWD) procedure while remaining two underwent tympanoplasty with bone work. **Result:** Five operated ears had deeper extension of the disease into the sinus tympani. And despite of different maneuver the complete removal of the disease could not be confirmed. Six ears (9.4%) had recidivism. **Conclusion:** The study emphasizes on the greater incidence of this disease extension into this difficult anatomical area and their complete removal may not be always possible. But one should require thorough knowledge and surgical expertise to work in this difficult area of posterior mesotympanum.

Keywords: Cholesteatoma, sinus tympani

The sinus tympani (recessus tympanicus subcanalis fallopi) is a posterior mesotympanic space of the middle ear, medial to the annulus and bordered by the ponticulus superiorly and subiculum inferiorly.¹ It extends posteriorly, medial to the facial nerve and lateral to the jugular bulb.² The degree of the posterior extension is highly variable and may be related to the overall status of the pneumatization of the temporal bone.³ The complex anatomy of the sinus tympani has important clinical significance with respect to the management of cholesteatoma in this location.⁴ Failure to recognize posterior invagination of the cholesteatoma into the sinus tympani may lead to cholesteatoma recurrence. The surgical management of the challenging lesions include external meatal bone removal postero-medial to the tympanic annulus and anterior to the vertical portion of the facial nerve along with the canal wall down procedure or canal wall up procedure with facial recess approach. The aim of this study is to identify the extension of the cholesteatoma into the sinus tympani and to describe their management.

Material and Methods

Of the 164 operated ears with unsafe Chronic Suppurative Otitis Media (CSOM), 64(39%) ears had sinus tympani extension of the cholesteatoma or granulations or both and were included in the study. All these surgeries were performed between January 2001 to September 2004 at Kathmandu Medical College Hospital, Kathmandu.

Surgical methods: All the patients in our series underwent surgery under general anesthesia. A post aural incision was made with either inside out or outside in technique depending upon the location of the disease in the middle ear. Sixty-two ears underwent canal wall down technique while two underwent tympanoplasty procedure with exenteration of the bony ledge lateral to the sinus tympani and behind the pyramid to expose the sinus tympani. Both these ears had normal ossicular integrity and did not require ossiculoplasty procedure. To expose the sinus tympani to the maximum we flush the facial ridge completely or until the pinkish hue of the facial nerve is seen. Then the head is slightly rotated towards the surgeon to get the good view of the medial portion of the descending facial ridge which is then drilled off. In many instances the pyramid also requires drilling to get a better exposure of the sinus tympani. Deeper sinus tympani with the disease extension often required gentle scraping with 1 or 2mm circular knife. Following complete exenteration of the disease from the middle ear cleft tympanoplasty was performed in the required ears. Middle ear bowl was palisaded with gelfoam and medicated packing was done.

Correspondence

Dr. Toran KC
Dept. of ENT-HNS, Kathmandu Medical College,
Sinamangal, Kathmandu, Nepal
E-mail: torankc@yahoo.com

Following the meatoplasty, in Canal Wall Down cases, the post aural incision was closed in two layers. In all the cases suture and ear packs were removed on the 10th post operative day. Cavity cleaning was done as required and subsequent follow up were done between 6th and 10th post operative day. The maximum follow up time is 3.5 years. Fourteen of the operated cases never attended the OPD after 2nd or 3rd week of follow up.

Results

Of the 64 ears, 6 patients underwent surgery for both the ears. There were 42 males and 22 females. Their ages ranged from 7 years to 73 years with mean age 23 years.

Twenty-one ears had cholesteatoma only while cholesteatoma along with granulation disease was present in 34 ears. Nine cases had only granulation with more extensive destruction of the ossicles. All the ears, except two had some forms of ossicular discontinuity Table I. We did not analyze or compare the relation of the hearing loss to the disease in this study.

Table 1. Ossicular status of the diseased ears (n=64).

S.No	Damaged Ossicular Status	Number of ears	Percentage %
1.	incus & stapes	26	40.6
2.	incus only	14	21.9
3.	malleus, incus & stapes	16	25
4.	malleus & incus	6	9.3
5.	Intact ossicles	2	3.12

Of the 64 ears 2 ears underwent tympanoplasty procedure with exenteration of the bony ledge anterior to the middle of the vertical portion of the facial nerve, while rest of the cases had undergone canal wall down procedure. Despite of various maneuvers, complete exenteration of the disease could not be confirmed in 5 ears in which no middle ear grafting or ossiculoplasty were performed. There were no serious complications in any patients.

The average follow-up was 21 months (4 months to 47 months). Of the 64 ears 6 ears (9.4%) never became dry (follow-up time 6months to 2years). Three of these ears had cholesteatoma along with extensive granulation tissue mastoid bowl. Fourteen patients were lost in follow-up, most of them after

third week postoperatively and considered dry cavity in them.

Discussion

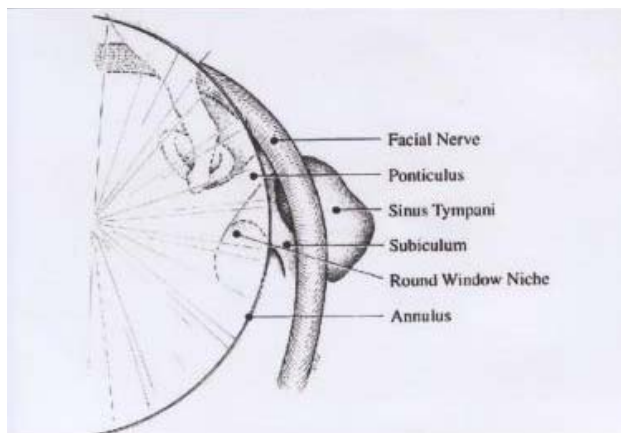
Sinus tympani (ST) was first described by Meckel in 1820, who actually considered only that portion that is anterior to the pyramidal eminence.⁵ In 1889, Steinbrugge noted that the sinus could extend beneath the facial nerve.⁵ Little attention was paid to the ST thereafter until Dworacek⁶ studied the middle ear with operating microscope in 1960. Additional surgical anatomic studies of the ST using temporal bone cuttings and dissection were performed by Procter⁷ and Donaldson et al.⁵ In a series by Ozturan et al⁸ of 327 temporal bones, the depth of the ST ranged from 0.2 to 9.9mm (average 2.06mm) and the width range from 0.49 to 3.87mm (average 1.49mm).

Unsatisfactory visualization of this difficult area has led to the consideration of alternative approach. Goodhill⁴ emphasized that adequate exposure of the ST may be obtained by the circumferential access, where changes in position of the surgeon and the patients degree of head rotation would allow 270^o of access into the middle ear. But visualization with this modification is still limited by the height of the external auditory canal anteriorly, and this problem persists even if the posterior canal wall is removed or temporarily displaced as an osteoplastic flap.⁹ We also tried 270^o visual access in couple of patients but found more cumbersome and visual obstruction by the anterior canal wall and post-aural soft tissue.

The facial recess approach, as suggested by Jansen¹⁰ provides access to some of the problem area in the posterior tympanum. However, complete access to an unusually large ST is not possible from this approach. Moreover, this procedure is not applicable to most of our cases in which the cholesteatoma are more extensive and so the surgeries are of canal wall down type. More radical procedures, such as canal wall down technique with removal of the posterior canal wall, may still not adequately expose the ST.¹¹ Fathi et al¹² studied ST in thirty temporal bone under the microscope aided by wide angle telescopes. They stressed on the presence of constant ledge of the bone anterior to the facial nerve forming the lateral wall of the ST which needs complete flushing. We also not only exenterate this lateral ledge but also drill away the pyramidal eminence to get a wider exposure under high power magnification. The constant presence of this ledge of bone anterior to the facial nerve strongly supports that concept previously advocated by Farrior¹³ and Donaldson et al⁵ that the safest approach to remove diseased tissue in the ST

was the anterior to posterior approach. They suggested that whether or not the canal wall left intact, removal of this lateral lip of the opening into ST afforded a more direct view into the sinus, so that disease tissue posterior to the round and oval windows could be removed.¹³ Numerous techniques have been suggested to facilitate cholesteatoma removal from the ST, such as use of intratympanic mirrors¹⁴ or retrofacial approach.^{6, 8, 15} These methods have not been widely accepted. Although endoscopes may improve visualization of these areas, they do not solve the problem of removing the diseased tissue.

Fig 1. Diagrammatic representation of sinus tympani



Conclusion

The study emphasizes the higher incidence (39%) of sinus tympani disease. If not considered seriously there will be definitely the higher incidence of residual disease. Though the depth of the extension may be variable and may not always be deep but an otologic surgeon has to be more aware of this difficult problem. And in attempt to remove the disease successfully one should not only lower the facial ridge completely but also requires complete flushing of the ledge of the bone anterior to the facial nerve and the pyramid in required cases. The future of otology still lies in finding new ways to eradicate this disease and to avoid recidivism.

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