

Proposed Clinical Classification of Cholesteatoma

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Abstract

This study presents a preliminary trial for a new classification of cholesteatoma that allow comparison of cases and standardization of management. All previous attempts failed to gain acceptance because of the lack of clinical relevance.

Objective: Trial of a new simple practical system to stage cholesteatoma based only on the extent of the lesion, utilizing microscopic and endoscopic examination with thin cuts CT scan.

Study design: A prospective study, from September 2007 to September 2008. All patients with cholesteatoma (32 ears) admitted during this period were graded according to our new grading system preoperatively and intra-operatively. The surgeon was blind as regards the preoperative grading. Comparison of the preoperative with the intra-operative grading was done.

Results: The preoperative grading was correct compared to the intra-operative grading in 75% of cases. This demonstrates the potential value of this grading system.

Conclusion: Classification of cholesteatoma depending only on the clinical and radiological extension of the disease is practical and can be easily applied in order to be able to standardize management and compare published data. This grading could be applied mainly in comparing non-functional results (i.e. recurrence of the cholesteatoma).

Key words: cholesteatoma grading system, atelectasis, attic, tympanic sinuses.

Introduction:

Manuscripts reporting results of surgery for cholesteatoma would be more meaningful if standardized nomenclature were used in describing the type of surgery performed and if standardized classifications were used for the disease process. Standardized nomenclature for surgery type and classifications for chronic otitis media does not exist⁽¹⁾.

Reviewing the literature showed only one trial to classify cholesteatoma by Saleh and Mills in 1999. In this classification they presented data from 119 patients classified depending on several factors as extent of the disease, ossicular condition and preoperative complications.⁽²⁾

Although many trials to stage external canal cholesteatoma, congenital cholesteatoma and atelectasis

of the middle ear were published, and most of them gain acceptance^(3, 4 & 5), no middle ear cholesteatoma staging system is accepted up till now.

Affection of the posterior tympanic sinuses has been claimed as one of the commonest sites for recurrence⁽⁶⁾. For this reason and also due to the fact that it can change the approach of surgery, affection of the posterior tympanic sinuses was also evaluated and included in this study.

We here try to implement a simple and practical staging system for middle ear cholesteatoma that depend only on one factor which is the extent of the disease. This is in order to be able to standardize management protocols and to compare published data and results.

Materials and Methods:

In this prospective study, all cases of cholesteatoma admitted to King Fahd Hospital of the University between September 2007 & January 2009, were examined by the microscope and zero degree telescopes if needed to decide the location and extent of cholesteatoma.

All patients had thin cuts (2mm) axial and coronal CT scans. Revision cases were excluded from the study. Cholesteatoma was diagnosed clinically if matrix or keratin or both were seen using microscopic or/and endoscopic examination. The extent of the cholesteatoma was assessed and documented photographically.

Radiologically, the following was assessed;

- Areas of opacity in the attic and tympanum.
- Opacity of the posterior tympanic sinuses. (Facial recess and/or Sinus tympani).
- Erosion of the scutum.
- Cavity and opacification of the mastoid (assess mastoid involvement).

Clinical and radiological findings were used to grade the cholesteatoma preoperatively according to the following system;

A = Attic

- A0 = No attic affection with cholesteatoma
- A1 = Cholesteatoma restricted to the posterior attic (posterior to the head of malleus).
- A2 = Cholesteatoma only in the anterior attic.
- A3 = Cholesteatoma affecting anterior or posterior attic and extends in the opposite direction beyond the head of malleus.

T = Tympanum

- T0 = No affection of the mesotympanum
- T1 = Posterior mesotympanum is only affected
- T2 = Anterior mesotympanum (anterior to malleus handle) is only affected.
- T3 = Cholesteatoma anterior and posterior to the malleus handle.

M = Mastoid

- M0 = No mastoid affection
 - M1 = Cholesteatoma only reaching the antrum
 - M2 = Cholesteatoma that extend beyond the antrum
 - M3 = Cholesteatoma affects the whole mastoid cavity
- Mastoid affection was staged using the CT scan.

Accordingly, patients were classified as for example A1T1M2

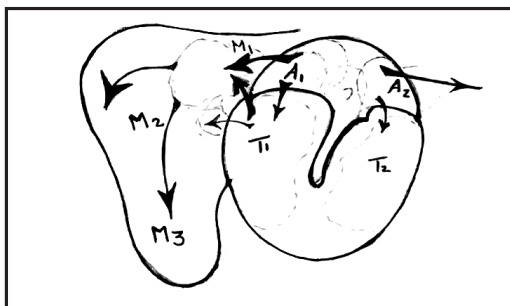


Figure (1) Diagrammatic representation for the proposed staging of cholesteatoma

Affection of the facial recess and/or sinus tympani were evaluated radiologically and given the letter S if one or both areas were found involved. For example: A1, T1s, M1.

Senior author only graded the patients preoperatively. Surgery was done for all patients and the surgeon was asked to grade patients postoperatively using the same classification system depending on the intra-operative findings. Preoperative classification was compared with the intraoperative one to verify how much this classification is proper and hence its potential value.

Serial	Pre-op. Grading	Post-op. Grading	Remarks
1	A3,T1s,M1	Same	
2	A1,T0,M0	Same	
3	A2,T3s,M0	A3,T3s,M1	
4	A0,T1s,M0	Same	
5	A0,T1,M0	Same	
6	A1,T0,M0	same	
7	A1,T0,M0	Same	
8	A3,T1s,M2	Same	
9	A3,T1,M2	Same	
10	A3,T1,M1	A3,T1s,M2	
11	A3,T1,M1	Same	
12	A2,T3s,M2	A3,T3s,M1	
13	A3,T2,M0	Same	
14	A3,T3s,M1	Same	
15	A0,T1,M0	A1,T1,M0	
16	A1,T0,M0	Same	
17	A1,T3s,M0	Same	
18	A1,T1s,M1	Same	
19	A1,T1s,M0	Same	
20	A3,T3s,M1	Same	
21	A1,T1,M1	Same	
22	A1,T3s,M2	Same	
23	A3,T3s,M1	Same	
24	A3,T3s,M2	Same	
25	A1,T1s,M1	A3,T1,M1	Aural polyp
26	A1,T3,M2	A3,T1s,M2	Large aural polyp
27	A3,T3s,M1	Same	
28	A1,T0,M1	Same	No affection of posterior tympanum
29	A0,T1s,M1	A1,T1,M1	Polyp
30	A2,T3s,M0	A3,T3,M1	
31	A1,T3s,M1	Same	
32	A3,T1s,M2	Same	

Table (1) Showing the results of the 32 cases and the differences between pre- and intra-operative findings

Results:

Total number after exclusion of revision cases was 32 patients (32 ears). Their age ranged from 9 to 55 years (mean = 29 years). Females were 14 and males were 18 patients.

Results of preoperative and intraoperative grading are summarized in Table 1.

The number of ears with preoperative grading matched the intra-operative one was 24 ears (75%). In the remaining 8 (25%) ears there was a difference between preoperative and intra-operative grading. In 7 ears, attic disease was missing in the preoperative grading (87.5% of cases of wrong staging), 4 for mastoid (50%) and one for tympanum (12.5%). Some ears showed wrong staging in more than one site (cases no. 3, 10, 12 & 30). Three of these ears were having polyps; these are cases No. 25, 26 and 29. Case (25) was graded preoperatively as A1, T1s, M1 and intra-operatively proved to be A3, T1, M1. Case (26) was graded preoperatively as A1, T3, M2 and proved to be A3, T1s, M2. Case (29) graded preoperatively as A0, T1s, M1 and operatively as A1, T1, and M1.

Three of the remaining 5 ears were preoperatively staged as A2 (only anterior attic is affected), which proved intraoperatively to be A3. No case showed only anterior attic involvement in our series. Mastoid wrong preoperative staging was seen in cases 3, 10, 12 and 30. Three of them were upgraded and 1 was downgraded. As for tympanum only one case was wrongly staged (No. 26), this case showed the presence of a large aural polyp.

The most common site affected was the posterior attic (A1 & A3) in 30 ears (93.75%). The preoperative assessment showed attic involvement only in 28 (87.5%) ears, no intra-operative downgrading occurred but 2 (6.25%) more ears were found to be involved, one of them was having an aural polyp which preclude the preoperative grading even with CT scan. The other case was a small cholesteatoma that extended clinically mainly in the postero-superior segment and was not obvious radiologically. Only 3 ears were assessed preoperative as A2 (only anterior attic) and proved intraoperatively as A3, this means that affection of the anterior attic alone was not seen in our series.

The next most common affected site was the posterior tympanum (T1 & T3) in 26 cases (81.2%). Preoperative involvement matched the intra-operative involvement. Only one ear was graded as T3 appeared to be T1 (case No. 26). Again, this ear showed the presence of a large aural polyp.

Affection of the facial recess or/and sinus tympani was found preoperatively in 19 ears (59.3%). Intra-operative facial and tympanic sinuses were found free in cases number 25, 29 & 30. On the other hand cases number 10 & 26 were found involved, this leads to the final involvement of 18 ears (56.2%). In all cases of affection of the facial and/or tympanic sinuses, there was posterior tympanic involvement, on the other hand their involvement in ears with posterior tympanic (T1 & T3) affection was found in 26 ears (69.2%), this means that approximately in 69% of cases with posterior tympanic affection the facial recess or/and sinus tympani are most probably involved.

The commonest site that shows highest incidence of wrong preoperative diagnosis was the attic where 7 cases (21.8%) were upgraded operatively, 3 cases changed from A2 preoperatively to A3 intra-operative, 2 ears from A0 to A1 and 2 ears from A1 to A3. The next common site was the mastoid as in 4 cases (12.5%) the grading was changed, 3 cases showed downgrading and one case was upgraded. For the tympanic affection only one case was downgraded from T3 to T1 (case No. 26).

Discussion:

Staging system for cholesteatoma would be potentially useful when considering the type of surgery required and when comparing published data reporting results of tympanomastoid surgery⁽²⁾. In 1986, Meyerhoff et al, proposed a classification for cholesteatoma, based on pathophysiology, location, Eustachian tube function, ossicular defects and presence or absence of complications. Their aim was to standardize classification and nomenclature for surgery⁽¹⁾. However, this trial has not been universally adopted due to the lack of clinical relevance as they considered several factors some of them are very difficult to be evaluated clinically preoperatively.

In 1999, Saleh and Milles, propose another classification depending on the extent of the lesion, ossicular condition and preoperative complication⁽²⁾. Again this did not gain acceptance as it include a lot of factors that makes classification difficult to be applicable.

Up to our knowledge, no further or more recent trials for classification of this disease were attempted. Our proposed staging depend on one factor which is the extent of the disease that is usually assessed clinically and radiologically. It does not take into consideration other factors that are difficult to be evaluated preoperatively as ossicular chain damage. Also it is obvious that considering

only one parameter for staging the disease makes the classification easily applicable.

In this classification we did not consider pathological changes that can't be evaluated preoperatively as damage of the ossicular chain and facial nerve exposure. On the other hand we only considered site and extent of cholesteatoma, that can be evaluated clinically and/or radiologically, which are also the main criteria in decision making for management.

The potential accuracy of this proposed grading or staging was 75% as only 8 cases were proved different from preoperative staging. The presence of aural polyp could be an important factor that does not allow proper clinical grading and also it leads to miss interpretation of the CT scan as both the polyp and cholesteatoma will appear in the CT as opacity in the middle ear. 75% correct preoperative grading might be a good point to start evaluating this classification.

The most common site for affection with cholesteatoma was the posterior attic (A1 & A3) in 93.75% (30 ears). The second most common involved site was the posterior tympanum (T1 & T3) 81.2% (26 ears). No one case showed only anterior attic involvement (A2). The commonest sites for origin of cholesteatoma are posterior attic followed by posterior tympanum and lastly anterior attic. So our results are almost in agreement with Jackler, 1989⁽⁷⁾.

The commonest site to have wrong preoperative staging is the attic region followed by the mastoid and this can be easily explained by the fact that these areas are more difficult to be assessed clinically.

The incidence of affection of the facial and tympanic sinus was 69.2% of all cases of posterior tympanic affection. Although we did not differentiate between affection of the facial recess and sinus tympani, as for our center management of cases with posterior tympanic sinuses affection is the same and differentiation through the CT scan is sometimes difficult. It would be beneficial if affection of both sites can be separated in the classification.

One of the important factors that should be involved in cholesteatoma grading, and we did not include, is the spread of the disease and whether it is medial or lateral to the ossicular chain.

In conclusion, the need for an easy and practical staging for cholesteatoma is definitely great in order to be able to standardize management protocols and compare published data. We hereby present a trial to stage cholesteatoma only depending on the extent of the disease which is the major factor in planning management. The classification is easy and can be simply applied. We think that this system for classification of cholesteatoma needs to be applied on larger number of cases. Refinement may be done as for example separation of affection of the facial recess and sinus tympani, and inclusion of the relation of the spread to the ossicular chain. Also it needs to be tried in different centers in order to validate its potential value.

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