

Original article:

Study of intraoperative complications in cases undergoing mastoidectomy

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Abstract:

Introduction: Chronic otitis media (COM) is a long standing inflammation of the middle ear cleft irrespective of its etiology or pathogenesis. It also implies concomitant inflammation, to a greater or lesser extent, of the mastoid air cell system, which is an integral part of the middle ear cleft.

Material and methods: The present study carried out in the department of otorhinolaryngology, Kamineni academy of medical sciences and research centre Hyderabad during the period of january 2018 to december 2019. which correlates the preoperative HRCT imaging findings to those found intra-operatively in the patients who underwent mastoidectomy . Institutional ethics committee approval was taken for this study.

Results : In this study, all the patients presented with otorrhoea, 82.35% with hearing impairment, 44.11% with tinnitus, 38.23% with headache, 29.41% with otalgia, 14.7% with vertigo, 5.88% with fever, nausea and vomiting. None of the cases in the study group presented with facial weakness or post auricular swelling.

Conclusion: In conclusion, the use of CT in case of COM and before the determination of any complications does provide valuable information. Pre-operative CT imaging can provide the treating surgeon the knowledge regarding the extent of complications and can be further used in planning the surgery, which will substantially influence the outcome.

Keywords: Computed tomography , COM

Introduction:

Chronic otitis media (COM) is a long standing inflammation of the middle ear cleft irrespective of its etiology or pathogenesis. It also implies concomitant inflammation, to a greater or lesser extent, of the mastoid air cell system,

which is an integral part of the middle ear cleft. ¹The diagnosis of chronic otitis media (COM) implies a permanent abnormality of the pars tensa or flaccida, most likely a result of earlier acute otitis media, negative middle ear pressure or otitis media with effusion and production of inflammatory exudates from the adjacent mucosa. ²

Due to the strategic location of the tympanomastoid compartment, separated from the middle and posterior cranial fossa by the thinnest of bony partitions, otitis media has the potential for intracranial extension. Hence it becomes very important to know the location and extent of the disease before proceeding to surgical treatment. Radiological examination of the temporal bone helps us to achieve this objective. Multi-slice helical CT scans are widely used in temporal bone disease for its diagnostic ability as well as surgical planning and postoperative follow-up. ¹

Material and methods

The present study carried out in the department of otorhinolaryngology, Kamineni academy of medical sciences and research centre Hyderabad during the period of January 2018 to December 2019. which correlates the preoperative HRCT imaging findings to those found intra-operatively in the patients who underwent mastoidectomy .

Institutional ethics committee approval was taken for this study.

In this study it was found that majority of the patients (41.17%) were aged between 21-30 years. 29.41% of the study population aged between 31-40 years. 14.70% were between 11-20 years. 8.82% were between 41-50 years and 2.94% were between 0-10 years and 51-60 years. In this study the mean age was 30.02 years; the youngest patient being 10 years and the eldest being 60 years.

Results:

In this study, a total of 12 male patients were involved accounting to 35.29% of the study population and a total of 22 females accounting to 64.70% of the study population is observed. The male to female ratio of the study was 0.545. In this study, all the patients presented with otorrhoea, 82.35% with hearing impairment, 44.11% with tinnitus, 38.23% with headache, 29.41% with otalgia, 14.7% with vertigo, 5.88% with fever, nausea and vomiting. None of the cases in the study group presented with facial weakness or post auricular swelling.

In this study, right ear disease was observed in 38.23% of the patients, left ear disease in 44.11% of the patients and bilateral ear pathology observed in 17.64% of the study population. In this study, 64.70% had central perforation, 17.64% had marginal perforation, 11.76% had attic perforation and the tympanic membrane was not visualized in two patients which accounted for 5.88% of the study population due to granulations in the EAC. In this study, 11.7% of the study population had mastoid tenderness, 5.88% had post-auricular scar. None of the patients had post-auricular swelling, facial palsy or nystagmus. None were observed with a positive fistula test.

Discussion:

A total of 29 patients involved in the study underwent CWU procedure and 5 patients underwent CWD procedure. In this study, well pneumatized mastoid was seen in 52.94%, sclerotic in 44.11% and diploic in 2.94% both on pre-operative CT and intra-operatively. In this study, non-dependent soft tissue was seen in 97.05% and 100% on CT and intra-operatively respectively. In this study, ossicle erosion was observed on CT in 32.35% of the study sample and intra-operatively in 38.2%.

None of the cases were detected with labyrinthine fistula on pre-operative CT, but was observed intra-operatively in 2 cases, which accounted for 5.88% of the study sample. In the case of sigmoid sinus plate erosion, 5.88% of the cases were detected on CT and intra-operatively.

None of the cases were observed with mastoid cortex erosion on CT or intra-operatively in this study. Tegmen tympani were found eroded on CT as well as intra-operatively in 2.94% of the cases. Tegmen mastoideum was found eroded in 2.94% of the cases on CT and 5.88% intra-operatively. Mastoiditis was observed to be present in 94.11% of the cases on pre-operative CT and in 97.05% intra-operatively.

In this study, Incus erosion was observed in 29.41% of the cases, the incidence less than what was observed by Chintan Shah et al (2014)³, who observed it to be 85.7% in their study. The sensitivity was observed as 83.33% and specificity as 100%, which correlates well with those observations made by Zhang X et al (2004)⁴ and Chee NW et al (2001)⁵

In this study, the sensitivity of CT for stapes erosion was observed to be 25%, which does not correlate well with the observations of Rogha M et al (2014)⁶ and Chintan Shah et al (2014)³ which were 40%, 61.9% and 80% respectively. However, the specificity of 100% as observed in this study is in absolute accordance with those made by Zhang X et al (2004)⁶ and Chee NW et al (2001)⁴⁸. Many otologists emphasize the difficulty of evaluating stapes destruction, especially Mafee et al (1988)⁷, Banerjee et al (2003)⁸, and O'Reilly et al (1991)⁹. The erosion of stapes is not very well demonstrated by CT, especially in the presence of soft tissue changes associated with middle ear disease. The soft tissue covers the stapes due to partial volume averaging phenomenon present in CT images.

Overall incidence of ossicular erosion was observed to be 32.35% in this study. The sensitivity of 76.92% as observed in this study shows decent correlation to that observed by Yildirim – Baylan et al (2012)¹⁰. The PPV and NPV of 90.91% and 86.96% respectively show good accordance to those observed by Tatlipinar et al (2012)⁴⁹ and Yildirim – Baylan et al (2012)¹⁰.

The fine structures of the auditory ossicles could be delineated clearly in the images reconstructed using the multi-slice scan CT, which allows the slice thickness of 0.5mm.¹¹ High resolution computed tomography is most valuable for detection of early erosive changes in the ossicles, particularly the smaller parts such as the insudo-stapedial junction.¹¹ The sensitivity of overall ossicle erosion observed in this study could be because of slightly thicker sections. In the present study, none of the cases were reported to have cochlea erosion (erosion of the promontory) on pre-operative CT imaging and the same was observed intra-operatively. Hence the specificity of CT imaging for cochlea erosion in this study was observed to be 100% and the NPV as 100%. None of the cases in this study were reported with mastoid cortex erosion on pre-operative CT imaging. The same was observed intra-operatively. The specificity and the NPV for CT for mastoid cortex erosion were observed to be 100%. None of the cases were reported with posterior fossa dural plate erosion on pre-operative CT and the same was observed intra-operatively. In this regard, CT was 100% specific and the NPV of CT imaging for posterior fossa dural plate erosion was 100%. However, no significant remark could be made about the sensitivity of CT in this aspect from this study as none of the cases were encountered with posterior fossa dural plate erosion. In this study, none of the cases were reported having intracranial complications (potentially detectable on CT imaging) pre-operatively and the same was

confirmed intra-operatively. The specificity and NPV of CT for intracranial complications was observed to be 100%. In case of epitympanum, 91.17% of the cases were reported of having a non-dependent soft tissue mass on pre-operative CT imaging, but intra-operatively, cholesteatoma was found in only 23.52% of the cases. In case of hypotympanum, 14.70% of the cases were reported of having soft tissue mass on pre-operative CT imaging, but intra-operatively none of these cases had cholesteatoma. Non-dependent soft tissue mass was found in 5.88% of the cases in peri-labyrinthine cells on CT, but intra-operatively, none of the cases were observed to have cholesteatoma. 79.41% of the cases were reported to have non-dependent soft tissue in the aditus region on pre-operative CT imaging, whereas cholesteatoma was observed in only 23.52% of the cases. In case of antrum, soft tissue was reported in 88.23% of the cases on CT but cholesteatoma was observed intra-operatively in only 23.52% of the cases. Non-dependent soft tissue was reported in 73.52% of the cases in the mastoid air cell system, but cholesteatoma was present in only 17.61% of the cases intra-operatively.

Conclusion:

In conclusion, the use of CT in case of COM and before the determination of any complications does provide valuable information. Pre-operative CT imaging can provide the treating surgeon the knowledge regarding the extent of complications and can be further used in planning the surgery, which will substantially influence the outcome.

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