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Current Treatment Option of Osteoma in the Mastoid of the Temporal Bone

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Abstract

Osteomas are osteoblastic mesenchymal tumour composed of well-differentiated mature osseous tissue with a laminar structure. Osteoma is a benign slow growing bone tumour with predominance in long bones, and is rare in the skull. They are a very rare present in the mastoid temporal bone, being usually asymptomatic for long time and treated mainly for cosmetic reasons. This is a retrospective study of the clinical presentation, management and complications of temporal bone osteoma done from April 2015 to may 2019. The study population is twelve patients, all who has been radiologically and histopathologically proven to be entire case of osteoma. Out of the 12 patients, 7 were females and the rest 5 were males. All cases had swelling behind the ear, impairment of hearing in 1 case and 6 cases had pain over swelling. The duration of symptoms ranged from 8 months to 6 years. Out of total 12 patients 1 case had mastoid region involvement along with extension to external auditory canal. The surgical excisions depend on the symptoms, size of tumor, and its complication All Patient underwent complete excision of the tumour and then the bone at margin and base was drilled with a diamond burr to remove the mass completely without any significant complication. The entire specimen was sent for histopathological examination and diagnosis of osteoma was confirmed. The clinical presentation and radiological features of osteoma are characteristic but differential diagnosis should include eosinophilic granuloma, giant cell tumour, monostotic fibrous dysplasia, solitary variant of multiple osteoma, and osteoblastic metastasis. Osteomas present on the mastoid or squamous portion of the temporal bone need to be dealt for cosmetic purposes or if they are causing symptoms, while surgery should include careful removal of periosteal cover and safe margin of the mastoid cortex around it.

Keywords: Mastoid temporal bone; Postaural swelling Temporal bone tumours; Osteoma.

Introduction

Osteomas are osteoblastic mesenchymal tumour composed of well-differentiated mature osseous tissue with a laminar structure. Osteoma of the temporal bone is a very rare entity with occurrence of 0.1% to 1% of all benign tumors of the head. They have been reported in all portions of the temporal bone, including mastoid, squama, middle ear, internal and external auditory meatus, Eustachian tube, petrous apex, styloid process and glenoid cavity. Computer tomography is the gold standard for diagnosis. Surgical excision is the treatment of choice depending on its extension in the temporal bone and related structures.

Materials and Methods

This is a retrospective study was conducted from April 2015 to May 2019 after informed consent was obtained from all 12 patients in tertiary rural referral center between the age from 14 years to 46 years. The complete Clinical examination, Otoscopic, tuning forks test, and radiological evaluation were done in all patients. Hearing assessments were done by manual pure tone audiometry for all patients. After the complete evaluation, all the patients underwent complete surgical excision without complications. All patients were regularly followed up from 4 months to 05 years and no recurrences were observed. Natures of diseases pathology were explained to all patients.

Observation and Results

Out of the 12 patients, 7 were females and the rest 5 were males. 07 patients were involved on right side post auricular swelling and 05 patients were involved left side. All cases had swelling behind the ear, impairment of hearing in 1 case and 6 cases had pain over swelling. The duration of symptoms ranged from 08 months to 6 years. All patients had mastoid region involvement but one had extension to external auditory canal which is developed mild conductive type hearing loss (Table 1).

Table 1:

Sl. No.	Age in years	Sex	Swelling behind Ear	Pain over Swelling	Hearing of Impairement	Duration of Symptoms	Site of Lesions
1.	15	M	Yes	No	No	08 months	Left
2.	20	F	Yes	Yes	No	02 years	Right
3.	14	F	Yes	No	No	11 months	Right
4.	21	F	Yes	No	No	03 years	Right
5.	32	F	Yes	Yes	No	02 years and 6 months	Left
6.	22	M	Yes	Yes	No	03 years	Right
7.	34	M	Yes	No	No	04 years and 08 months	Left
8.	46	M	Yes	Yes	Yes	06 years	Right
9.	21	F	Yes	No	No	01 years	Right
10.	28	F	Yes	Yes	No	04 years	Right
11.	37	M	Yes	No	No	05 years and 04 months	Left
12.	16	F	Yes	Yes	No	01 years and 06 Months	Left

All the post auricular Swelling was gradually increasing in size and shape. There was no history of trauma, headache, dizziness, ear discharge and facial nerve palsy. Clinical examination of all the patient revealed a solitary immobile spherical to oval shape swelling, which was non tender, smooth surfaced, with well-defined margins. Swelling was bony hard in consistency; skin over swelling was normal and no sign of inflammation. One patient has developed external auditory canal obstruction and mild conductive type hearing loss, rest of the otologic examination, audiometric evaluation and routine laboratory investigations were normal. Some picture show in pre operative, interaoperative and post operative of osteoma of temporal bone (Figs. 1-4).

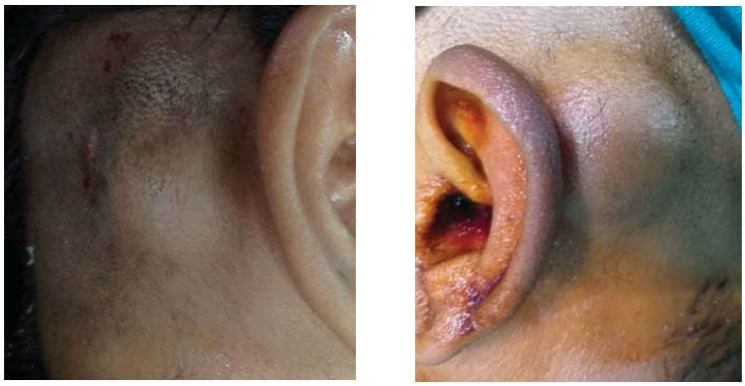

Fig. 1: Preoperative Pictures Picture 1 Picture 2

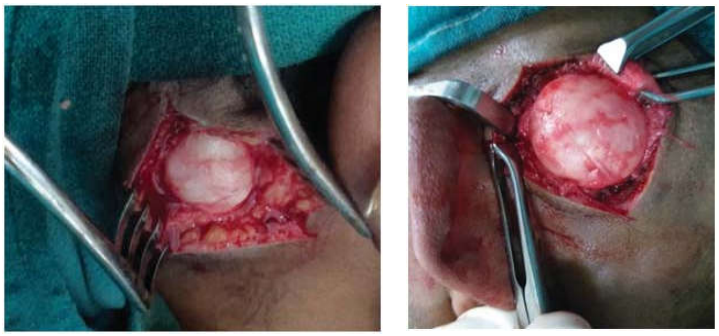

Fig. 2: Interaoperative Pictures Picture 1 Picture 2

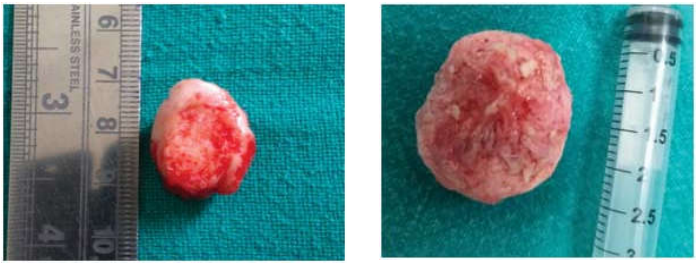

Fig. 3: Postoperative specimens Specimen 1 Specimen 2

Fig. 4: Postoperative Picture

All high resolution computed tomography (HRCT) temporal bone show a well demarcated sclerotic mass in mastoid part of temporal bone which were originating from outer table of the skull with no evidence of destruction of the inner table or intracranial extension. The surgical excisions depend on the symptoms, size of tumor, and its complication. All Patient underwent complete excision of the tumours and then the bone margin and base was drilled with a diamond burr to remove the mass completely without any significant complication. There was no recurrence on regular follow up from 04 months to 04 years. All the patients had been proven by radio logically and histopathologically and confirmed as osteoma. (Fig. 5).

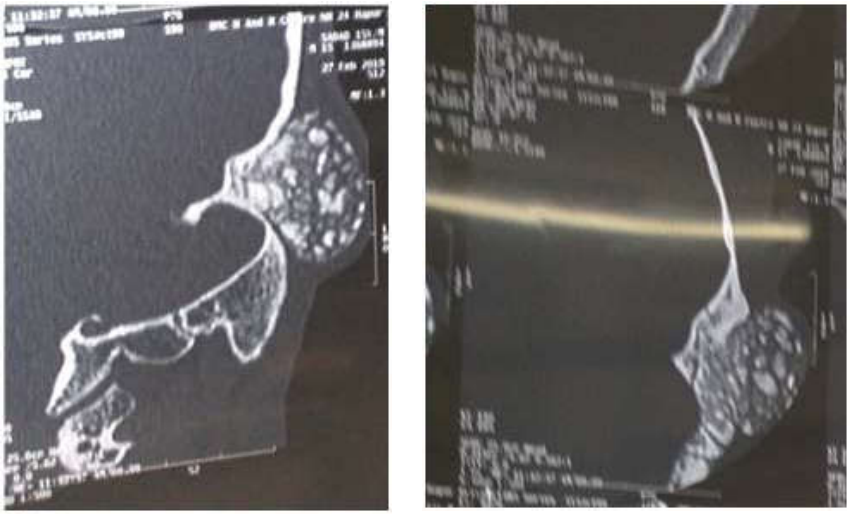

Fig. 5: High Resolution Computed Tomography (HRCT) Temporal Bone

Discussion

Osteoid osteoma being a primary bone tumor accounting for 10% of all primary bone tumors mostly occurs in long bones. Osteomas are essentially benign osteoblastic tumours of mesenchymal origin. Osteomas of the skull base are commonly found in the frontal and ethmoidal sinuses. Other occurrences include the sphenoid and maxillary sinuses, area of the mandible and rarely the temporal bone. Temporal bone osteomas are very rare that only 137 cases have been reported in the literature.[12] Within the temporal bone, osteomas are most commonly reported in the mastoid bone, external auditory meatus, middle ear, along the auditory canal, styloid process, temporomandibular joint, apex of the petrous temporal bone, internal auditory canal and rarely in the mastoid.[11,12,18,20,22] Mastoid osteoma as discussed in this literature has the incidence of 0.1–1% of all head and neck benign tumours.[8] As in our research study of the 12 patients, mastoid osteoma of temporal bone has a higher incidence in females between the ages 20 to 30 years old.

The exact origin of osteoid osteoma has not been identified as yet. According to Haymann, osteomas were a result of alteration in the growth of the cranial bones. Freidberg postulated, it occurred as a result of trauma which induced periostitis.[25] Its occurrence may be divided into syndromic and nonsyndromic. Gardener's syndrome for example comprises of multiple intestinal polyps, mesentery and skin fibromas, epidermoid inclusion cysts and osteomas with a predilection for membranous bones such as maxilla and mandible.[8] Osteomas which are of nonsyndromic origin have several possible contributing factors to its pathogenesis which include trauma, inflammation, metaplasia, surgery, irradiation, chronic infection, pituitary dysfunction and genetics.[5]

Histologically three types of mastoid osteomas have been described, based on structural characteristics.[16,21]

Compact: The most common type. It consists of dense, compact and lamellar bone, with few vessels and Haversian canal systems within. Those with dense sclerotic bone are called ivory osteoma.

Compact osteomas are slow growing with a wide base as opposed to cancellous osteomas which grow rapidly in peduncles.[5]

Cartilaginous: Comprising bony and cartilaginous elements

Spongy:

Rare type. Comprised of spongy bone and fibrous cell tissue, with tendency to expand to the diploe and involving the internal and external lamina of the affected bone. These have bone marrow and are also known as cancellous osteomas. They are more likely to be pedunculated and grow relatively faster.

Mixed: Mixture of spongy and compact types.[21]

Osteomas are chiefly mature bone. Macroscopically, it can be seen as a zone of distinct homogenous hyperostosis with features of dense lamellar bone growing centrifugally without any mass effect. Microscopically, a sclerotic, dense lamellar bone with organized Harvesian canals can be seen.[19] Osteoblasts, fibroblasts and giant cells with no hematopoietic cells make up the intratrabecular stroma.

Mastoid osteomas are usually asymptomatic and stable over many years.[13] Their size when diagnosed is usually less than 3 cm. Generally, their growth progresses extra cranially which can be seen as a smooth swelling, bony hard in consistency. Large swellings are unsightly and may sometimes irregular in shape. skin over swelling are mostly appears to be normal and no sign of inflammation. Rarely osteoma may cause pain or inflammation.[14] Pain occurs when the osteoma breaches the inner table of the temporal bone and maybe confined to the ear, tympanic membrane or neck. Pain may be due to irritation of great auricular or small occipital nerves in the neck region. Conducting type of hearing loss develops due to the obstruction of external ear canal wall by the osteoma. Occlusions of the external ear canal may cause the hearing loss.[7,10] In our study, one patient show mild conductive hearing loss other has normal hearing. All The types are difficult to distinguish on clinical grounds due to parallel symptoms and objective signs

These tumours are usually asymptomatic and are unsuspected X-ray findings, except for cortical lesions that are seen initially as cosmetic deformities.[9] The main presenting complaint is headache, and is usually out of proportion to the size of the tumor. Pain is the other main presenting symptom of osteoid osteoma, which increases in the night and is relieved by salicylates and other NSAID. The lack of pain in osteoid osteoma has been reported in only 1.6% in a large review and was attributed to the lack of a hard shell or nerve endings around the lesion

Non contrast computer tomography is superior to magnetic resonance imaging and is considered as the modality of choice. On the computed tomography, osteoid osteoma typically demonstrates fusiform sclerotic cortical thickening in the mastoid temporal bone.[4] A characteristic radiolucent area measuring <1 cm in diameter and representing the lesion itself is usually within the centre of the area of sclerosis and harbors central calcification in approximately 50% cases.[17]

Osteoma can be seen as a rounded to oval shape bone lesion on the mastoid outer cortex, distinctive margins with sessile or pedunculated base. Mastoid air cells remain aerated in superficial lesions. Rarely, osteomas may extend into the petrous part of the temporal bone adjacent to the horizontal semicircular canal, ossicles and facial nerve.[4,11] In such cases, imaging is indispensable to define relations to these structures prior to resection.

Differential diagnosis of mastoid osteoma includes ossifying fibroma, osteoid osteoma, osteoblastic metastasis, osteosarcoma, isolated eosinophilic granuloma, Paget's disease, giant cell tumour, calcified meningioma, hemangioma, and monostotic fibrous dysplasia.[5] These lesions however are less demarcated in comparison to mastoid osteoma and usually distinguished by radiological and anatomical pathology study. Heterogeneous, poorly delineated lesions with rapid growth suggest malignancy.

Asymptomatic patients can be regular followed up with observation and monitored with regular imaging. When symptoms such as conductive hearing loss, recurrent ear infection due to auditory canal occlusion or intolerable disfigurement are present, surgical resection is the treatment of choice.[15,24] According to Guerin and colleagues, the early surgical intervention has been indicated to prevent voluminous growth and possible risk of complications in the surgical procedure.[19] Mastoid and squamous superficial lesions are excised and drilled until normal underlying bone is exposed. During this excision, periosteal covering and safe margin of the mastoid cortex are removed. If it is close to important structures such as the facial nerve canal or bony labyrinth, a subtotal excision is adopted to preserve function. Complete excision of mass and diamond drilled of surrounding mastoids

results in excellent outcome and rare recurrence.[1,2] Malignant transformation is not yet to be reported in literature.[23]

Surgical complications of osteoma are very rare. However patients with extensive tumour or one with middle ear extensions may develop sensorineural hearing loss due to the drilling of the temporal bone. Patient is also at risk of ophthalmologic complications such as reduced vision and papilloedema due to sigmoid sinus damage when removing a tumour which has extended towards the posterior cranial fossa. In such cases, aggressive postoperative medical therapy including steroids and intravenous antibiotics can achieve good recovery. In our study, the surgery was uneventful, devoid of postoperative complications and the patient achieved good cosmetic outcome.

Conclusion

Mastoid osteoma is a rare slow growing benign tumour of the head and neck. Usually asymptomatic with unsightly disfigurement, it may also present with symptoms of ear occlusion. Computer tomography is the investigation of choice of osteoma. Surgical excision of the tumours and the bone margin and base was drilled with a diamond burr to remove the mass completely without any significant complication. Overall, in our study show complete resection, no recurrence after regular follow up and patient achieves good cosmetic results.

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