

## A Case of Mushroom Shape Temporal Bone Osteoma

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A cranial vault Osteoma is relatively common benign tumor. Mushroom shaped skull osteoma is, however, extremely rare. Twenty seven years old female developed slow growing hard mass growing posterior to the ear. CT scan revealed a mushroom shaped osseous mass approximately 2.5 cm in diameter protruding from the temporal bone at the site of asterion. And the tumor was located over the right sigmoid sinus. The sigmoid sinus engraved approximately 4mm to the tumor and had a branching to one emissaries' vein. Operation was performed under general anesthesia. The tumor was excised first by cutting the base of the tumor, and then residual tumor was grinded using a round head cutting bar. A chisel dissection was not recommended because of underlining sinus. Histological findings were consistent with a benign osteoma. The postoperative course was uneventful. CT examination immediately done after operation revealed no evidence of intracranial hemorrhage, or injury of vessels. Osteoma was excised, and the surface of cranial bone at the operation site was smooth and cosmetically acceptable. At 6-months follow up, patient remains asymptomatic and recurrence free. CT examination with Multi Planer Reconstruction imaging or 3D reconstruction is highly recommended for the operational planning of cranial osteoma.

**Key words:** osteoma, mushroom, sigmoid sinus, temporal bone

### INTRODUCTION

Osteoma developed at the temporal bone is a relatively common benign tumor. Patient usually visits clinic with no complaint except for aesthetic disfigurement. There are two different surgical procedures which were considerable for removal of the tumor. One is the direct open surgery and another is the endoscope assisted surgery. A Chisel excision is often used for tumor removal in both methods. Endoscope assisted surgery obtains better results regarding aesthetics because of small skin incision. The procedure is relatively simple when the tumor is localized in outer cortex of cranium. However, in the case that tumor invades through the whole bone layer, surgeon's skill and experience is required because important blood vessels such as the brain venous sinus are underlying. We experienced the case of the skull osteoma which penetrated to the inner surface of the right Asterion. Computer tomography (CT) examination with multi planer reconstruction (MPR) imaging and three dimensional (3-D) volume rendering method were very useful for understanding the anatomical relationship for the tumor and underlining transverse sinus. The location and the morphological appearance of the osteoma decided the surgical risk.

### PATIENT AND METHOD

The investigation conforms with the principles outlined in the Declaration of Helsinki.

Twenty seven years old female visited our clinic

because of approximately 2.5 cm subcutaneous mass posterior to the right ear. The tumor grew very slowly since she was 14 years old when she first noticed. She visited our clinic for tumor removal.

#### Examinations

She had a round shape hard immobilized approximately 2.5 cm mass posterior to her right ear. The skin covers tumor was intact without any signs of inflammation. No skin adhesion was found to the tumor (Fig. 1).

No abnormal finding was found in her blood serum examination.

CT scan revealed a homogenous osseous mass approximately 2.5 cm protruding from the temporal bone at the site of Asterion. The tumor head was hemispheroidal with very short pedicle which resembles to a mushroom (Fig. 2). The tumor was located over the right sigmoid sinus and the sigmoid sinus engraved approximately 4 mm to the tumor and had a branching to one emissaries' vein (Fig. 3a, b, c). The bone adjacent to the tumor remains intact.

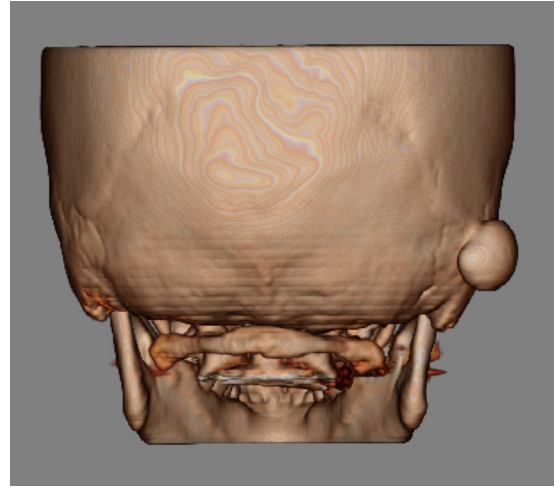
### RESULT

#### Operative Findings:

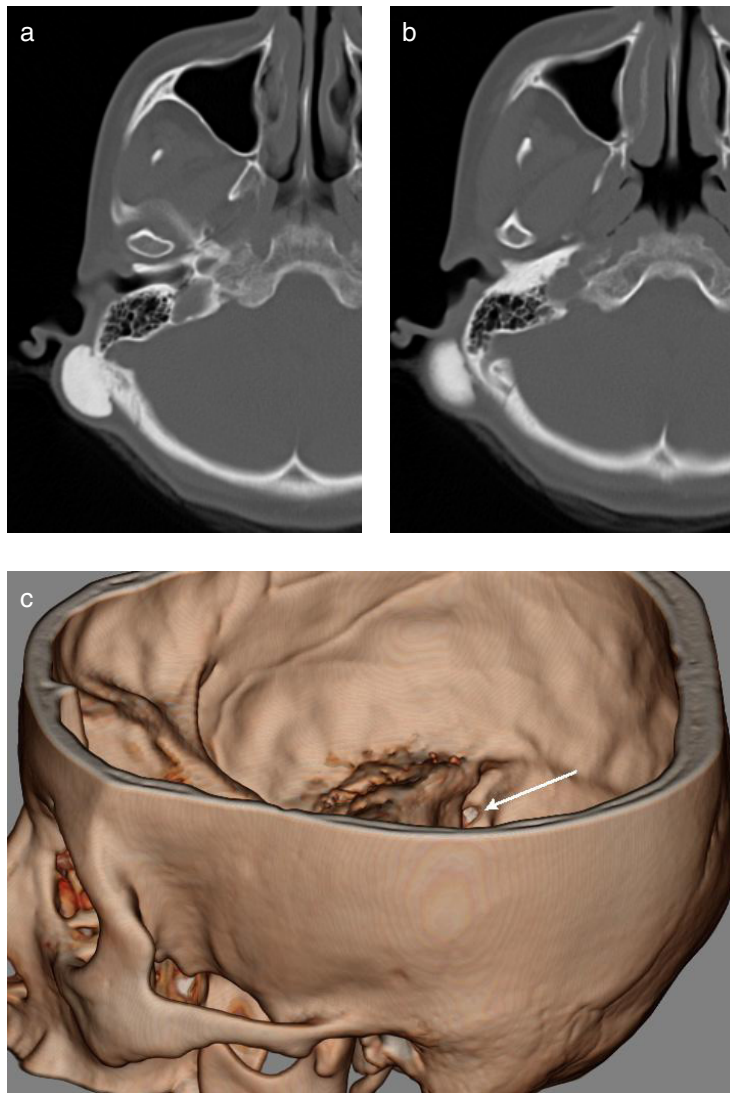
Tumor excision was performed under general anesthesia. We have chosen the direct open approach to the tumor because the sigmoid sinus was engraved in the mass in CT scan. A linear skin incision was made over the tumor. A mushroom shaped solid tumor originated from the cranium was exposed after separating the



**Fig. 1** Twenty seven years old female developed round shape hard immobilized mass posterior to her right ear. The diameter of the mass was approximately 2.5 cm. The skin covers tumor was intact without any signs of inflammation. No skin adhesion was found to the tumor.



**Fig. 2** CT scan revealed a homogenous osseous mass approximately 1.5 cm protruding from the temporal bone at site of the asterion. The tumor head was hemispheroidal with very short pedicle which resembles to a mushroom.

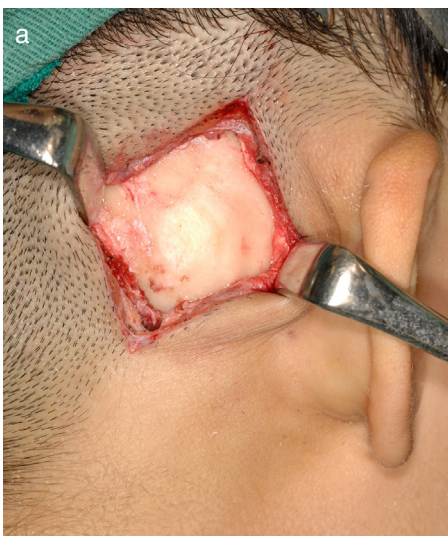


**Fig. 3a, b, c**

The tumor was located over the right sigmoid sinus and the sigmoid sinus engraved approximately 4 mm into the tumor and had a branching emissaries' vein. The bone adjacent to the tumor remains intact.



**Fig. 4** We have chosen the direct open approach to the tumor because the sigmoid sinus was engraved to the mass in CT scan. A mushroom shaped solid tumor was exposed after separation of the periosteum. The size of the tumor measured 2.5 cm in width and 1.5 cm in height, respectively. The surface of the tumor was tuberositas with web like structure after removing the periosteum, resembling a cauliflower shape in macroscopic finding.



**Fig. 5a, b** The tumor was excised by cutting the base of the tumor with Lindeman bar and leaving some of its to the attachment site followed by smoothing and removal of the residual tumor using a round head cutting bar. A Chisel dissection was not recommended because the sigmoid sinus in the tumor.

periosteum. The tumor protruded outward from the surface of the temporal bone. The size of the tumor measured 2.5 cm in width and 1.5 cm in height, respectively. The surface of the tumor was tuberositas with web like structure after removing the periosteum, resembling a cauliflower shape in macroscopic finding (Fig. 4). The tumor was excised by cutting the base of the tumor with Lindeman bar and leaving some of its to the attachment site followed by smoothing and removal of the residual tumor using a round head cutting bar (Fig. 5a, b). A Chisel dissection was not recommended because the sigmoid sinus near to the tumor.

#### *Pathological findings:*

Sections of the cranial bone showed a solid tumor composed of compact osteoid lamina without marrow components. The tumor consisted with homogeneous bony structures with the cortical substance. There was no abnormal finding in the surrounding bone and the soft tissue. The nuclear atypia was absent. Histological

findings were consistent with a benign osteoma (Fig. 6a, b).

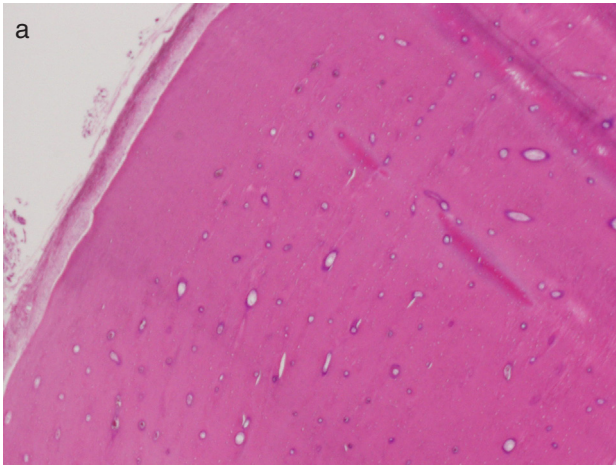
#### *Post operative course:*

The patient recovered from anesthesia without any complication. CT examination immediately after operation revealed no evidence of intracranial complication. Osteoma was totally removed with esthetically acceptable appearance. No residual hump or recurrent tumor was palpated during the 6-months follow up period (Fig. 7a, b, c).

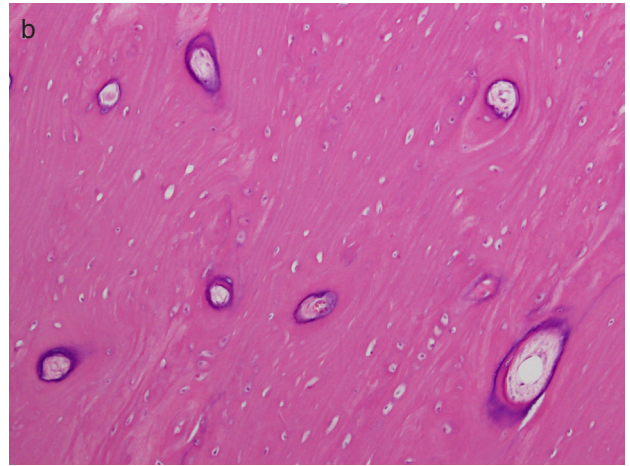
### **DISCUSSION**

#### *Considering the surgical procedure:*

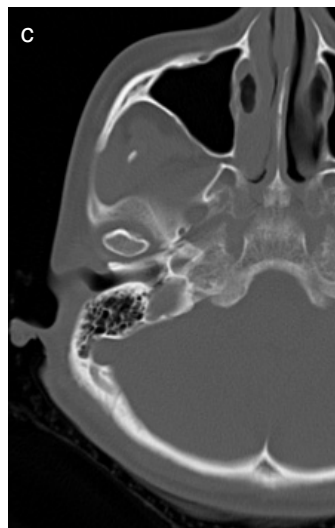
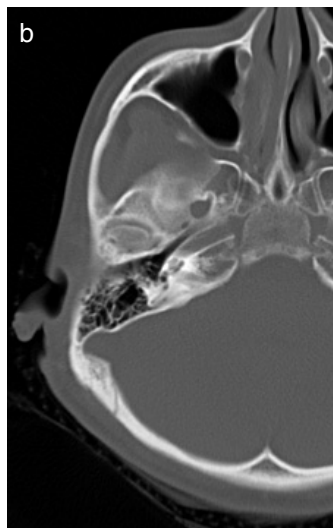
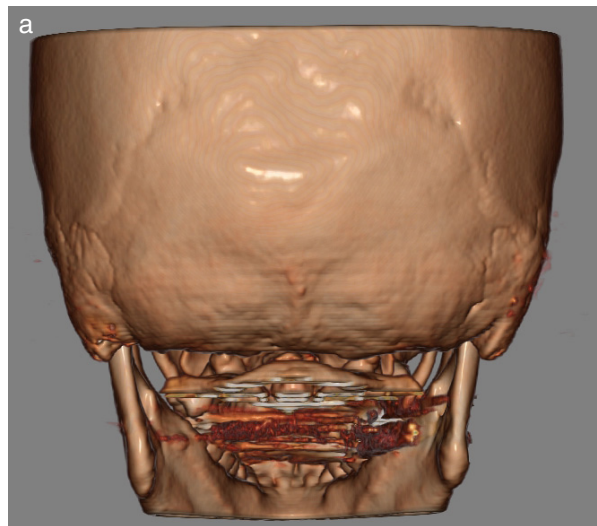
Advantage of the endoscope assisted procedure is that it requires a smaller skin incision compared to open direct surgery [1, 2] consequently obtain a better aesthetic result. Osteoma in the forehead region, is favorable indication of endoscope assisted surgery [3]. Lai CH *et al.* reported 6 cases of osteoma operated by the endoscopic procedure. The sizes of the tumors



**Fig. 6a** The tumor consisted with homogeneous bony structures with the cortical substance. (Hematoxylin and eosin; original magnification, x10)



**Fig. 6b** Compact osteoid lamina without marrow components was shown. The nuclear atypia was absent. Histological findings were consistent with a benign osteoma. (Hematoxylin and eosin; original magnification, x20)



**Fig. 7a, b, c**

Osteoma was totally removed with cosmetically acceptable appearance. No residual hump or recurrent tumor was palpated during the 6-months follow up period.

were approximately 8 to 14 mm and the skin incisions were made within the hairline for a better aesthetic result. Endoscopic surgery becomes more popular in general because it is less invasive. However, indication for endoscope assisted surgery should be considered carefully for the operation planning. Lai CH *et al.* reported no complication such as post operative bleeding or adjacent nerve damages. They did not concern regarding damaging of important intracranial major vessels as a complication of the tumor excision using a chisel in endoscopic surgery. A high speed cutting bar is complicated to use and a very small chisel workable for osteoma removal under endoscope assisted surgery. We chose direct open surgery for this case to avoid major vessels injury during the surgery. Computer tomography with MPR imaging and 3-D volume rendering were very useful to understanding anatomical relationship between the tumor and adjacent important normal structures. Three-dimensional reconstruction CT examination revealed that sigmoid sinus was engraved to the tumor and one well developed emissary vein was found very close to the tumor in this case. These findings let us not to use endoscope assisted surgery with a chisel osteotomy. CT examination with MPR imaging or 3-D volume rendering is highly recommended for the operational planning of cranial osteoma.

#### *The cause of osteoma:*

The cause of osteoma is uncertain. There are two theories regarding osteoma formation. The first one is the developmental theory. Conheim originally proposed the developmental theory that tumor usually occurs at the site of contact of two bone tissues from different embryonic origins [4]. Temporal, occipital, and sphenoid bones are formed equally from both membranous and endochondral elements [5]. The tumor was developed near to the cranial suture between temporal and occipital bone in this case.

The second theory is infectious induced osteoma. Dowling, J, R, stated that sinusitis is thought to be the stimulus to proliferation of osteoblasts within the muco-periosteal lining of sinuses [6]. There are several reports state that osteoma were seen in the mastoid antrum, frontal sinus, and ethmoid sinus [7]. They concluded that chronic inflammation such as sinusitis or otitis media may induce osteoma. The tumor located adjacent to mastoid bone in this case. There is no sign of suggesting mastoiditis on CT examination.

#### *Considering the shape of osteoma*

N, R, Miller *et al.* reported a case with intra-orbital

giant mushroom shaped osteoma developed in 53 years old female [7]. This was the only an article in the literature describes a mushroom shape cranium osteoma. They reported a giant mushroom shaped compact bone osteoma originated from the right maxillary sinus extended to the right orbit. They left the mechanism behinds that how osteoma became mushroom shape.

Kuzu *et al.* reported another distinguishing shape osteoma, a horn shape osteoma, at the right parietal bone in 79 years old male [8]. The tumor showed spherical shape when it was first found. The tumor gradually grew over three years to become horn shape that caused skin ulceration over the tumor. Histological examination showed compact bone non-malignant osteoma.

A mechanism of the forming mushroom shape in this case was also uncertain. However presence of sigmoid sinus strongly engraved into the tumor and an adjacent well developed emissary vein suggesting chronic stimulation of the tumor may cause this rare shape osteoma.

## CONCLUSION

We reported very rare mushroom shaped osteoma at the right asterion associated with atypical anatomical structure adjacent to the tumor. An engraved sigmoid sinus and one emissary vein may be playing an important role for growth of a mushroom shape osteoma. Limitation of endoscopic surgery was also discussed in this lesion.

## REFERENCES

- 1) Ramirez OM. Endoscopic techniques in facial rejuvenation: an overview. Part I. *Aesthetic Plast Surg* 1994; 18: 141.
- 2) Papay FA, Stein JM, Dietz JR, Luciano M, Morales L Jr, Zins J. Endoscopic approach for benign tumor ablation of the forehead and brow. *J Craniomaxillofac Surg* 1997; 8: 176-180.
- 3) Lai CH, Sun IF, Huang SH, Lai CS, Lin SD. Forehead osteoma excision by endoscopic approach. *Ann Plast Surg* 2008; 61(5): 533-536.
- 4) Pool JL, Potanos JN, Krueger EG. Osteomas and mucoceles of the frontal paranasal sinuses. *J Neurosurg* 1962; 19: 130-134.
- 5) Frazer JE. *Anatomy of the Human skeleton* 5<sup>th</sup> ed. London: J and A Churchill, Ltd., 1958.
- 6) Dowling JR. Osteoma of the frontal sinus: report of five cases. *Arch Otolaryngol* 1945; 41: 99-108.
- 7) Miller NR, James G, Snip R. Giant, mushroom-shaped osteoma of the orbit originating from the maxillary sinus. *Am J Ophthalmol* 1977; 83(4): 587-91.
- 8) Kuzu Y, Shibanai K, Kuwata N. Case of a horn-shaped osteoma. *No Shinkei Geka*. 2008; 36(9): 795-798.