

## Cranial Intraosseous Meningioma

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### Abstract

Intraosseous meningiomas are rare cranial lesions. A case of 50 year-old woman with complaining of subcutaneous mass right forehead and head ache. The mass is axial views of the preoperative CT scans showing hyperostosis of the right temporal bone. The lesion was treated with wide surgical excision and cranioplasty. Histological examination of tumor specimen revealed transitional meningioma invading the skull bone. There were no postoperative complications. Patient was discharged on the third postoperative day.

This article reviews the radiographic and clinical findings of patients with primary intraosseous meningiomas.

**Keywords:** Intraosseous; Meningioma; Cranial; Transitional

**Abbreviations:** CT = computed tomography; MR = magnetic resonance

### Introduction

Meningioma constitutes 14% to 20% of intracranial neoplasms. Sites of predilection directly correlate with abundant arachnoid granulations and less than 1% are extradural intraosseous [1]. Extradural meningiomas that arise in the skull have been referred to as calvarial, intradiploic, and intraosseous [2]. The intraosseous tissue refers to the diploe of the cranial bones. Common locations include the periorbital region and frontoparietal region [3]. The tumours are usually observed near or at the suture lines (most commonly at the coronal or pterion suture) or at previous fracture sites [1]. These are typically firm and painless, with normal overlying skin, and may be detected incidentally [4]. The male to female ratio is 1:1.1. The age of the patients ranged from 7 months to 82 years [1,2,4,5,7,9-12,14,15,17,18]. Neurological signs and symptoms in patients are usually absent; however, presenting symptoms such as neurological deficit, palpable mass, seizures, vomiting, dizziness, orbital proptosis, blurred vision, hearing loss, tinnitus, headache, and vague sensations in the head are also reported [3,5].

The tumors are typically either the osteoblastic or osteolytic subtype, although may be mixed versions. Imaging studies can also be variable. Primary intraosseous meningioma on plain x-ray films of the skull may be hyperostotic, osteolytic, or mixed. Computed tomography (CT) with bone windows shows a focally thickened, hyperdense lesion expanding the calvaria [1,3]. Magnetic resonance imaging findings; The tumors are typically hypointense on T1-weighted images and hyperintense on T2-weighted images [4,6].

Wide surgical excision of an intraosseous meningioma is the first treatment of choice [3]. Therapy, depending on clinical circumstances. Adjuvant therapy may be considered in cases in with patients unresectable tumors causing neurological deficit or demonstrating malignant. This adjuvant therapy may include radiation therapy or gamma knife surgery, chemotherapy, and bisphosphonate therapy [3,6-8].

We discuss the radiological and clinical presentation, review the literature on cases of intraosseous meningiomas reported.

### Case Report

A case of 50 year-old woman with complaining of subcutaneous mass right forehead and head ache. The patient was treated conservatively with oral analgesic medications for 1 year but not improvement. The mass had increased its size in last few years. Physical examination disclosed a bony swelling in the right forehead measuring about 12x7.5x1.5 cm. The patient had no prior medical problems or no history of head trauma and surgery. Neurological examination showed no significant abnormalities. Laboratory studies were normal. Anterior-posterior skull x-ray film showing area of hypoostosis in the right temporal bone (Figure 1). CT scan; The mass (10.2x6.5x3.4) is hyperintense and based in the right temporal bone. Axial views of the preoperative CT scans showing hyperostosis of the right temporal bone (Figure 2). Magnetic



**Figure 1:** Anterior-posterior skull x-ray film showing area of hypoostosis in the right temporal bone.

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resonance imaging findings; The mass is hyperintense on T1-weighted images of the right temporal bone (Figure 3). The patient underwent elective craniotomy for resection via a right frontotemporal incision and exposure. After total tumor removed cranioplasty was performed (Figure 4). Dura was not infiltrated into tumours. Her postoperative course was uneventful. There were no postoperative complications. Patient was discharged on the third postoperative day. Postoperative CT imaging also showed total resection of the lesion (Figure 5).

The transitional meningioma combines meningothelial and spindle cells. Tumor consisting of sheets and whorls of the meningothelial cells with vesicular nuclei and, fibrous areas are apparent at the periphery of tumor lobule. There was no mitotic activity or foci of necrosis (Figure 6).

## Discussion

Most meningiomas are considered primary intradural lesions and located in the subdural space. Primary intraosseous meningioma is a term used to describe a subset of extradural meningiomas that arise in bone. Constitutes approximately two-thirds of all extradural meningiomas of this tumor is one of the ectopic meningiomas [7,9,10,15,18]. Ectopic meningiomas represent a well-described entity. The location of these

lesions is varied; they can occur within the subcutaneous tissues of the skin, the paranasal sinuses, the orbit, neck, salivary glands, calvaria, and along the perineural sheath of cranial nerves. A second explanation is



Figure 4: The tumor was total excised.



Figure 2: Preoperative CT Scan; The mass (10.2x6.5x3.4) is hyperintense and based in the right temporal bone.



Figure 5: Postoperative CT Scan also showed total resection of the lesion.

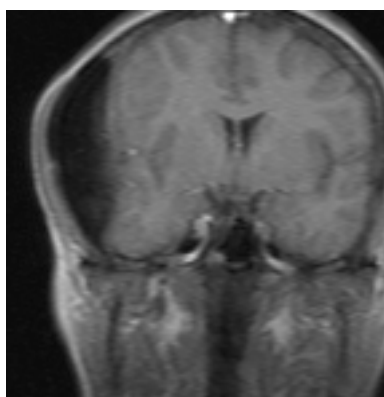


Figure 3: Magnetic resonance imaging findings; The mass is hyperintense on T1-weighted images of the right temporal bone.

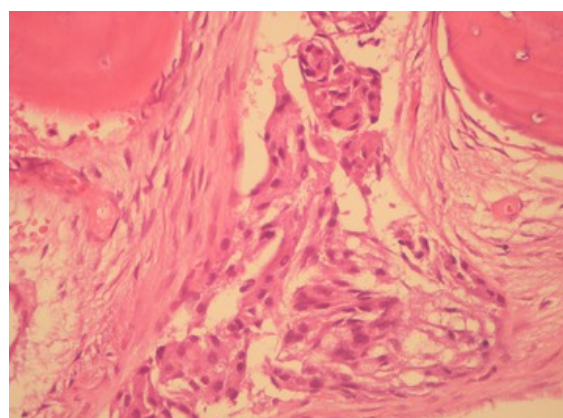


Figure 6: The combination of whorling and fascicular patterns. (HEX400).

that these lesions are secondary to previous trauma. Third explanation for the origin of primary intraosseous meningioma; that the meninges are mesenchymal in origin. Multipotential mesenchymal cells have the ability to differentiate into fibrous, mucoid, adipose, synovial, meningeal, cartilaginous, osseous, hematopoietic, vascular, and reticuloendothelial tissues [7,11]. In our case, there was no relationship to prior trauma.

Changhong et al. reported that the diagnostic criteria of intraosseous meningioma should include [12]: the tumor has pathological features of meningioma [9]; the location of the lesion is epidural and intraosseous and [1] the brain, the arachnoid and the dura are not involved [1].

Review of the literature reveals 61 cases of so-called intraosseous meningiomas [1-3,6-10,13-16]. Patients were aged from 7 months to 82 years. The male to female ratio was 27:30. The most common location was the parietal region, followed by the frontal region [2,4,5,7,9-12,14,15,17,18].

Neurological signs and symptoms in patients are usually absent. However, these symptoms may be present for months or years prior to diagnosis [3,5,7,9,11,12,14,15,17,18]. The clinical presentation and resulting differential diagnosis depend largely on the size and location of the lesion.

The radiographic appearance of intraosseous meningiomas depends largely on their location and the effects of the tumor on the surrounding bone [1,3]. The usual reported sites for primary intraosseous meningioma are frontotemporal, orbita and anterior cranial fossa [1,3,6-8,12,14,15]. Skull X-rays generally show an osteoblastic or hyperostotic reaction when involving the skull base. The radiological differential diagnosis would include osteoma, fibrous dysplasia, Paget's disease of the bone [6]. Plain skull radiographs can detect abnormalities in 30% to 60% of cases, including hyperostosis, thinning of bone, speckled or granular calcification and prominent vascular markings [1]. The majority of intraosseous meningiomas are of this osteoblastic subtype. More rarely, primary intraosseous meningioma may present as an osteolytic skull lesion [4,12]. Intraosseous meningiomas may appear osteoblastic, osteolytic, or mixed on CT scans and plain radiographs of the skull, and generating a differential diagnosis depends initially on distinguishing among these subtypes. Of the literature, 23(64%) of the 36 cases of primary intraosseous meningiomas were associated with a cranial suture [3].

Although most intraosseous meningiomas are histologically benign and slow-growing, malignant cases do occur [5,13,16,19]. Histological examination showed most of the cases (62.5%) were meningotheliomatous and 25% were transitional meningioma [5].

Primary intraosseous meningioma when detected on investigation in a symptomatic case, should be treated. Early surgical decompression is recommended to lessen avoidable morbidity [6]. The treatment of choice is wide surgical resection followed by placement of high density polyethylene cranial reconstruction.

## Conclusion

Intraosseous meningiomas are rare lesions that originate in the skull and represent the most common type of extradural meningioma.

Primary intraosseous meningiomas are generally benign lesions, with surgical resection recommended when symptomatic. The lesions are often asymptomatic and neurological symptoms depending on their size and location. Intraosseous meningioma should be considered in the differential diagnosis for patients presenting with osteoblastic or osteolytic skull lesions. Tumor resection and cranioplasty can be performed. Tumors that cannot be completely resected may require adjuvant therapy, which may include radiation therapy, chemotherapy.

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