In this case report, we describe a primary osteoblastic intradiploic meningioma with a clinical and radiological appearance simulating osteoma or fibrous dysplasia.

Introduction

This paper discusses how best to manage a patient with primary intraosseous meningioma, with particular consideration given to the merits of cranioplasty and dural biopsy. Rarely, meningiomas may arise from arachnoid cells within the diploe of the skull. The latter are usually destroyed in the process and there is increased vascularity of the tumour. Bony destruction results in the tumour lying subcutaneously with or without an intracranial component. These patients usually present with symptoms and signs of a painless gradually expanding mass. If associated with a significant intracranial component, they may present with headache, seizures and focal neurological signs, such as limb weakness or dysphasia depending on the location of the lesion. Under the microscope, the characteristic appearance is that of a spindle cell tumour composed of lobules and whorls of bland cells often with scattered psammoma bodies; there are, however, rarer subtypes showing different morphological features. Meningiomas account for 15–20% of primary intracranial neoplasms with the incidence peaking in the fourth and fifth decades and a female: male ratio of almost 2:1.

Osteomas of the skull typically present as a slowly growing, expansile mass. Often this is a painless process. However, there may be headaches or localized pain over the swelling. The pain is classically worse at night and relieved by administration of salicylates. They are the most common primary tumours of the calvaria. The outer table is the most frequently involved with a well-demarcated homogenous and dense projection. Unlike in meningiomas, the diploe are preserved and the vascular channels not increased. Osteomas present as hot lesions on nuclear bone scans. Histologically, they are composed of dense, mature and predominantly lamellar bone.

Fibrous dysplasia involving the skull high on the calvaria is of the cystic type with a higher incidence below 30 years of age. It may present as an incidental finding or with local pain, swelling and cranial nerve involvement if it affects the cranial nerve foramina. Widening of the diploe with thinning of the outer and inner tables and a ground glass appearance on X-ray is typical but not characteristic. Microscopically, the typical appearance is of narrow, curved and misshaped bony trabeculae, so called ‘Chinese letters’, which are interspersed with fibrous tissue of variable cellularity.

Other pathologies causing focal or localized increase in bone density include the en-plaque variety of meningiomas which often involve the sphenoid bone and are associated with hyperostosis. Osteoblastic metastases such as those originating from prostatic carcinoma are also recognized. Rarer causes include the early stages of Paget’s disease, hyperostosis frontalis interna, osteosarcomas and ossifying fibromas.

The symptoms, signs and radiological appearances may be of little help in distinguishing one...
diagnosis from another. Radiologically, intracra-
near meningiomas, osteomas and fibrous dyspla-
sia may have similar appearances on CT scan.5
Primary intracranial meningiomas are heteroge-
nous in appearance. Osteomas appear as hyper-
dense, smooth and well-demarcated lesions.
Fibrous dysplasia may demonstrate a ground
glass appearance with thinning of the inner and
outer tables of the skull.6

Case report
A 64-year-old woman presented to her general
practitioner (GP) with a three-year history of a
right frontal skull swelling. Over the past year
this swelling had increased in size. The patient
was referred to the neurosurgery clinic where
examination revealed a sessile non-tender mass
(approximately 4.3 x 1.6 cm). The overlying skin
was intact with normal hair growth. There was
no headache and there were no focal neurological
signs or symptoms.

The initial skull X-ray was suggestive of an
osteoma. Bone scintigraphy was normal. A CT
scan of the head showed a sclerotic thickened area
of the right frontal bone with no significant mass
effect on the underlying cerebrum (Figure 1). No
brain or meningeal enhancement was noted on
the scans. The findings were suggestive of an
osteoma, with fibrous dysplasia as another possi-
bility. Review of the scans by a second radiologist
confirmed an area of sclerosis and non-destructive
expansion of the right frontal bone. However,
this was thought to represent an intraosseous
meningioma.

The patient was treated surgically and under-
went a small skin incision overlying the lesion.
The latter was chiselled off and sent for pathologi-
cal examination in order to obtain a tissue diagno-
sis. The contour of the skull was restored.

Histologically the sample contained fragments
of mature bone, whereby some of the bone
marrow spaces were replaced by a spindle cell
tumour forming lobules and whorls (Figure 2).
It was composed of cells with oval nuclei, some
nuclear pseudo-inclusions, eosinophilic cytoplasm
and indistinct cytoplasmic borders. Mitotic
figures were not present. The features were con-
sistent with an intraosseous meningioma of
meningothelial subtype (WHO Grade I).

The patient was subsequently readmitted and
underwent a total excision of the tumour and cra-
nioplasty. The involved right frontal bone was
excised and replaced with a titanium mesh.

Discussion
Given the uncertainty of diagnosis in this case, a
partial resection of the lesion was carried out in
the first place in order to obtain a tissue diagnosis

![Figure 1](image-url)
and simultaneously achieve a good cosmetic result by remodelling the contour of the involved area of skull. The alternative option involving total excision of the involved bone and cranioplasty at first presentation carries a slightly increased risk of bleeding, infection and seizures. On the other hand, such an approach would have avoided a second procedure.

It is clear from this case that excision followed by cranioplasty is necessary when a primary intradiploic tumour is suspected. Furthermore, given the existence of cases where there has been dural involvement subsequent to initial treatment, dural biopsy for histological analysis should be considered at the time of the initial treatment.7

Given the absence of dural involvement on radiology in this case, a biopsy was not taken; however, this would be important in cases of uncertain aetiology involving convexity regions. A surgical plan for total excision including dural biopsy would need to be considered from the start.

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