



## Meningioma With Unusual Features

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### Abstract

**Background:** Meningiomas are frequently encountered benign slow growing tumors that originate from meningotheial cells of the Arachnoid layer of meninges of the brain and sometimes of spinal cord.

They present as intracranial extra axial lesions with dural attachment, which are primarily managed surgically. However, high grade meningiomas with rapid growth has a tendency to reccur despite treatment. Sometimes benign meningioma tumor invades the adjacent skull bone which needs removal of both tumor and involved bone.

**Case report:** We are reporting a case of a benign meningioma wih invasion to skulbone. The tumor was removed along with the part of bone. Afterwards the bone was reconstructed.

**Conclusion:** In case of low grade meningiomas sometimes part of skull bone needs to be removed followed by reconstruction of the bone.

**Keywords:** brain, dura, meninges, meningioma, reconstruction

### INTRODUCTION

Meningiomas are frequently occurring brain tumors. The dura mater, arachnoid mater and pia mater are the three protective membranes that surround the brain and spinal cord, together forming the meninges.<sup>1</sup>The tumors arise from arachnoid cell lining and constitute 20%-25% tumors of central nervous system.<sup>2</sup> Tumors arising from this tissue, called Meningiomas, are most common primary intracranial tumors of the central nervous system.<sup>3</sup> They are most frequently seen in intracranial, intraspinal or orbital locations. Intraventricular and epidural meningiomas are less frequent. The extradural meningiomas are uncommon.<sup>3</sup> Though a definite cause has yet to be determined, exposure to radiation and inherited Neurofibromatosis syndrome can predispose affected individuals to meningioma. Approximately 80% of these are benign, WHO grade I tumors, for which surgical resection is often curative and 10years-overall survival is estimated to be 80-90%.<sup>4</sup>

Among Grade I Meningiomas the most common include Meningoethelial, Fibrous and Transitional.<sup>4</sup> The preponderance of low-grade meningioma in women and uncommon occurrence before puberty and after menopause points to the hormonal influence on tumor development. The incidence of female to male ratio is 3:1 in brain and 6:1 in the spine.<sup>5</sup> It has been seen that the growth of meningioma is rapid during pregnancy.<sup>6</sup>

Grade II meningiomas are diagnosed based upon a mitotic count of 4-19 per 10 HPFs with presence of brain invasion, or by the presence of at least three morphological criteria- high cellularity, small cells with a high nucleus to cytoplasmic ratio, sheeting, necrosis or prominent nucleoli. Within these criteria, tumors are classified as Clear cell, Chordoid or Atypical Meningioma. Tumors with more than 20 mitotic events per 10 HPFs, brain invasion, necrosis and loss of typical architecture are diagnosed as either

Anaplastic, Rhabdoid or Papillary Grade III meningiomas.<sup>7</sup>

However, Grade II and Grade III Meningiomas, which represent 15-18% & 2-4% of all meningiomas respectively are difficult to treat due to aggressive growth and frequent recurrence, often within 5 years.<sup>3</sup> Indeed Grade III malignant meningiomas harbour a poor prognosis, with 10 years overall survival average is 14-34% . In contrast to low grade meningiomas, these high grade meningiomas are more common in men than in women.<sup>5</sup>

Clinically Meningiomas are revealed by various symptoms including neurological deficits and epileptic seizures.<sup>5</sup> Surgery still remains the principal form of the treatment and must be preceded by appropriate preoperative diagnostics.<sup>7</sup> The extent of resection depends on various factors including local bony invasion by the tumor. The recurrence of Meningiomas that have been treated surgically is a concern during follow up period. We are reporting a case of meningioma with hyperostosis of adjacent parietal bone.

#### CASE REPORT

A 55-year-old woman who previously healthy without any complaints was admitted to the neurosurgical department with complaints of loss of consciousness and two episodes of convulsions. Initially patient was admitted in ICU. Later when the condition improved patient was shifted to the ward and relevant investigations were done.

The CT scan brain report revealed an extra axial hyperdense lesion measuring 4.7x3.6cms in the left parietal region with erosion and hyperostosis of the overlying parietal bone, midline shift of 4mm towards the right side suggestive of neoplastic etiology.

MRI findings of the brain revealed an extra axial mass lesion measuring 4.7x4.7x4.5cms in the left parietal region with dural tail sign, mild midline shift of 4mm towards right side, mild adjacent brain parenchyma edema and regional pressure effect. (Fig.1) The lesion appears hypointense on T1W, iso to hyperintense on T2W images. There are discrete T2W/FLAIR hyperintensities scattered in deep periventricular and subcortical white matter predominantly in bilateral frontoparietal regions- findings suggestive of Meningioma. MR spectroscopy is showing marked increase in choline/ creatinine ratio with decrease in

NAA/choline peaks, suggestive of marked cellular activity with neuronal loss.

Surgical excision was done via midline incision. The tumor was completely excised together with all infiltrated extracranial tissue and hyperostotic bony fragment followed by reconstruction.

The excised left parietal mass along with involved bone & excised dura was sent to the pathology department. The histology report revealed presence of spindle cells arranged in whorls with the presence of psammoma bodies consistent with Fibrous Meningioma WHO grade I. The sections from the different areas of bone shows involvement by the tumor. The sections from the dura shows fibrocollagenous tissue, spindle cells and presence of fibrovascular tissue.

#### Discussion

The meningioma occurs usually in aged people. As a result some complications occur in the post-operative period. Problems occur due to tissue deficit and huge amount of tissue excision. Difficulty occurs during remodelling of the lost tissue.<sup>4</sup> Adverse events during post-operative period of Meningioma varies from 1% to 18% depending on the site and extent of resection.<sup>8</sup> In our case also the patient was elderly and a portion of parietal bone was excised during operation. Afterwards reconstruction was done. But no remarkable adverse reaction happened in this case. Though the tumor was benign in our case (WHO grade I), the tumor was expansive and local invasion in dura and bone occurred. So resection of part of parietal bone done and then it was reconstructed. The technique of repair and type of repair always depends on the surgeon.<sup>4</sup>

Bone invasion by meningioma usually seen by malignant meningioma (WHO grade IV) ; besides that benign meningiomas (grade I) sometimes may cause bony invasion and these tumors are treated by bony excision and followed by bony

reconstruction.<sup>9</sup> In the present case also grade I tumor invades the dura and parietal bone. Tomaz Velner et al. described a case of fibrous meningioma with bone invasion.<sup>4</sup> Here also we got Fibrous Meningioma (WHO grade I) with bony involvement. Ultimately bone resection was followed by bone restoration.

Carlos et al conducted a retrospective study on 17 cases of recurrent meningiomas in 16 patients. Among them four cases had bone involvement at the time of first surgery. At the time of initial surgery, the involved bone resection was not done and as a result recurrence of meningioma occurred.<sup>10</sup> Their cases also showed female predominance. We are also describing regarding a female patient. In this case the hyperostotic bone was removed during surgical procedure. Six months have passed following surgery and the patient is doing well.

Jean Michell et al had a study on 1469 patients with meningioma and 1352(92.3%) had WHO grade I tumor. Among them 18.7% (274 patients) had bone invasion. They described that bone involvement is one of the important factor for assessment of extent of surgery in case of meningioma.<sup>11</sup> So for management of meningioma the bone invasion should be kept in mind.

### Conclusion

Most of the meningiomas are low grade benign tumors (WHO grade I). Some of these benign tumors also show bone involvement. During management extent of surgery should be determined by identifying the hyperostotic bone. The involved bone and dura should be excised to prevent recurrence.

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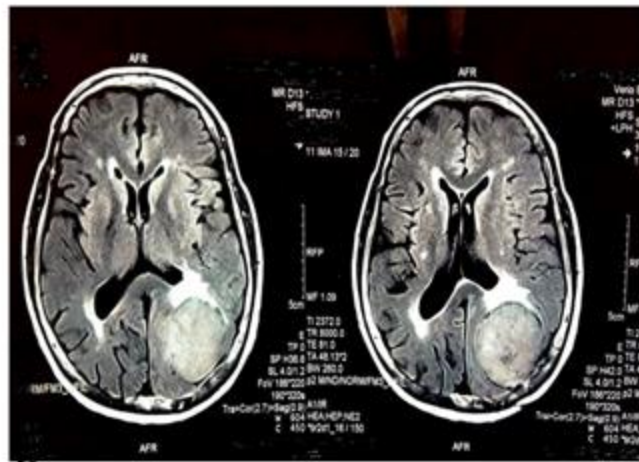


Fig 1 – MRI scan shows extra axial mass in the left parietal region.



Fig 2- Gross specimen showing resected bone, tumor tissue and dura

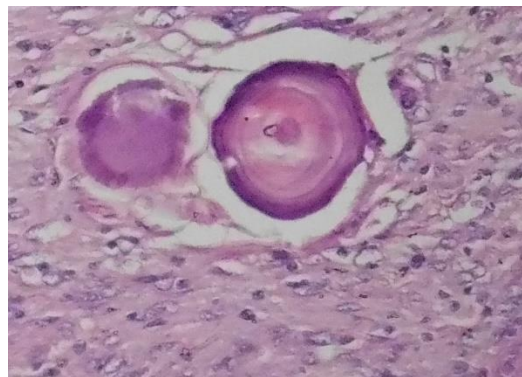


Fig 3 - Psammoma body and spindle cells H&E – 400X.