Case Report

Primary Intraosseus Meningioma Diagnosed by Fine Needle Aspiration Cytology

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Abstract

Primary extradural meningiomas presenting as scalp swelling is uncommon. Their diagnosis by fine needle aspiration is rare as majority of the lesions are hyperostotic. Primary intraosseus meningiomas involving the skull constitute only about 2% of meningiomas and are often mistaken for other primary or secondary bone tumors. The authors report a case of primary calvarial meningioma involving the parietal bone of a 52-year-old male diagnosed by fine needle aspiration cytology.

Keywords meningioma; cytology; extradural; intraosseus; skull; MIB-1

1 Introduction

Primary intraosseus meningiomas are uncommon lesions constituting around 2% of meningiomas. They constitute around two-thirds of extradural examples [5]. The clinical and radiological features may be in favor of primary or secondary tumors of bone. Meningiomas are usually not subjected to fine needle aspiration unless they extend extracranially by eroding the skull or when they are present at extracranial sites [3]. Here, the authors present a case of primary intraosseus meningioma diagnosed by fine needle aspiration cytology.

2 Case report

A 52-year-old man presented to the neurosurgical services with complaints of a swelling in the left parietooccipital region which he had noticed three years back. The swelling was slow growing and painless. He was a known hypertensive and diabetic. On examination, his higher mental functions were normal and there were no sensory or motor deficits. There was a scalp swelling in the left parieto occipital region measuring 5 × 5 cm which was firm and non tender. His blood investigations were within normal limits except for a raised ESR of 55 mm in the first hour. Serum electrophoresis and Urine Bence Jones protein was negative. CT scan of brain showed a 6.5 × 6 × 4 cm osteolytic expansile lesion mainly involving the posterior part of left parietal bone with marked contrast enhancing soft tissue component (Figures 1(A) and 1(B)). There was no perilesional oedema in the adjacent parenchyma. The radiological differential diagnosis was plasmacytoma and metastasis. Ultrasound scan of the abdomen showed bilateral renal cortical cyst and calculus in the right kidney. Fine needle aspiration cytology of the scalp swelling was performed. The smears were cellular and showed clusters and groups of cells with moderate amount of eosinophilic cytoplasm and round to oval vesicular nuclei showing minimal pleomorphism (Figure 2(A)). Some of the clusters showed a whorled pattern of arrangement of cells. Occasional cells had intranuclear inclusions. A diagnosis of meningioma was made. The patient was taken up for surgery. Per operatively an extradural, large, grayish white and moderately vascular tumor was seen in the left parieto occipital convexity with extensive bony erosion. There was no dural attachment and the tumor was involving only the bone. The tumor was excised totally. Post operative period was uneventful. Microscopic examination showed a cellular tumor composed of cells arranged in syncytial pattern and whorls and focally in patternless sheets (Figures 2(B)).
Figure 2: (A) Fine needle aspiration cytology showing clusters and whors of cells with uniform round to oval nuclei. Occasional cells show intranuclear inclusions (arrow) (Pap stain X400). (B) Histopathology sections showing syncytial arrangement and patternless foci with an area of necrosis (arrow) (H&E X100). (C) High power view showing the cells with round to oval nuclei and intranuclear inclusions (arrow) (H&E X400). (D) High MIB-1 labeling.

and 2(C)). There was minimal cellular pleomorphism and mitotic count was < 4/10 HPF. A focus of necrosis was seen in the patternless area (Figure 2(B) arrow). MIB-1 labeling index was focally high reaching up to 7% (Figure 2(D)). A final diagnosis of primary intraosseus meningioma was made and it was advised to keep the patient under close follow-up because of some features of atypical meningioma and the focal increase in MIB-1 labeling. The patient was advised radiotherapy but was lost for follow-up for a period of two years after which he presented with a recurrence of the scalp swelling. The histopathological features of the recurrent tumor were similar to those of the primary tumor.

3 Discussion

Primary extradural meningiomas are rare lesions. About two-thirds of these involve the skull, the frontoparietal and orbital regions being the most common locations [5,10]. Other locations include subcutaneous tissue of skin, the paranasal sinuses, the nasal and oral cavities, parapharyngeal space, neck, salivary glands, and so on [10]. There are different theories as to the origin of primary calvarial meningiomas. They are thought to arise from ectopic meningocytes or arachnoid cap cells trapped in the cranial sutures during molding of the head at birth. Misplacement and entrapment of meningotheelial cells into suture or fracture lines as a result of trauma has also been speculated as the probable cause of calvarial meningioma [10]. There was no history of trauma in the present case. A study by Lang et al. classified these tumors as purely extracalvarial (Type I), purely calvarial (Type II), and calvarial with extracalvarial extension (Type III) [6]. Type II and Type III tumors were further categorized as convexity (C) or skull base (B) lesions. More than two-thirds of these tumors involve the skull. The present case could be classified as a Type III C lesion. Fine needle aspiration diagnosis of meningiomas is not very difficult if the diagnosis is suspected clinically. In this case, meningioma was not in the differential diagnosis as purely intraosseus meningiomas are rare tumors. Majority of these tumors are hyperostotic lesions only one-third being osteolytic as in this case [4]. But the typical appearance on cytology of moderately cellular smears with groups and occasional whors of uniform cells with regular round to oval nuclei and occasional pseudo-inclusions led us to the diagnosis of meningioma. There were no psammoma bodies in our aspirate. Primary intraosseus meningiomas are known to be more aggressive tumors though there is no systematic study in this area. They tend to recur more frequently than their dural counterparts. And those tumors presenting as osteolytic lesions with soft tissue extension are considered to be more aggressive [8]. In our case, the MIB-1 labeling index was on the higher side than that for usual grade I meningiomas and there were also features like patternless areas and focal necrosis. So the patient was advised radiotherapy though there is not much literature on adjuvant therapy in primary intraosseus meningiomas [5].

Immunohistochemically majority of benign meningiomas express epithelial membrane antigen (EMA) while atypical and malignant examples express the marker less consistently [9]. Cytokeratin expression in meningiomas is limited to some cases including the secretory variant and some malignant examples [2,7]. Hormone receptors—estrogen, progesterone, and androgen are known to be expressed by meningiomas. Protein S-100 staining in meningiomas has been found to be variable [9]. HNK-1 staining has been documented more often in malignant meningiomas [1].

Primary intraosseus meningioma should be considered in the differential diagnosis of osteolytic lesions which present as slow growing scalp swellings and fine needle aspiration can be a tool to differentiate these tumors from primary bone tumors or metastasis.

References