Primary Spinal PNET: A Rare Case with Aggressive Progression

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Abstract

PNET of spine are extremely rare, it represent less than 1% of spinal tumors. They are highly invasive and malignant , rapidly growing with grave prognosis. In this case report a 34 yrs lady presented clinically as back ache, urinary symptoms and progressive weakness & spasticity of both lower limbs.

After workup patient underwent laminectomy & microscopic gross total excision of tumor, following surgery she improved symptomatically. After confirmation of HPE and IHC she underwent radiotherapy, but she did not tolerate chemotherapy and later on tumor recurred and patient succumbed to the disease.

Key words: PNET, Thoracic Spine, Malignant tumor.

Introduction

According to WHO (World Health Organization), PNETs are a group of embryonal tumors composed of undifferentiated/poorly differentiated neuroepithelial cells which can differentiate into neuronal cells, astrocytes, ependymal cells, myocytes and melanoma cell lines.[1]They are highly malignant and present mainly in the central nervous system. However they can present in the chest wall, lower extremities, trunk, kidney, and orbit and very rarely in the spine. The earliest recognized case report of a spinal PNET is by Smith et al, published in 19692however, because the nomenclature and criteria for diagnosing PNET were introduced only in 1973 by Hart and Earle3that particular tumour is not included in PNET.

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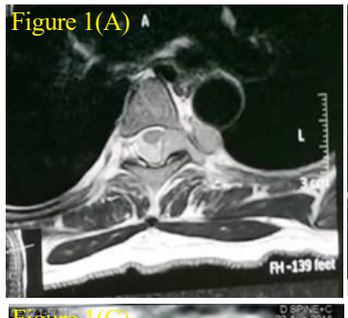
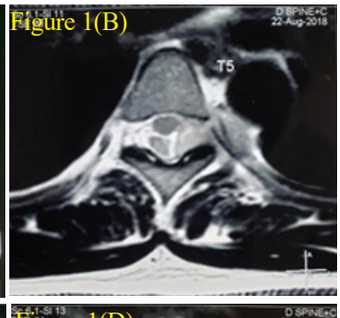
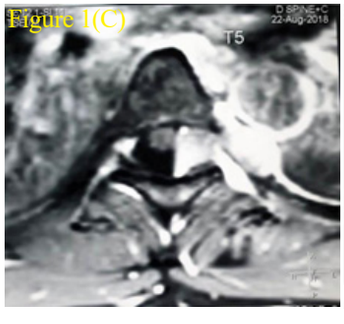
Case Report

A 34 years old lady presented in neurosurgery OPD with history of mid dorsal axial backache and increase urinary frequency and urgency since 4 months. Neurologically –spastic paraparasis (Power B/L LL MRC grade 4/5).

Contrast enhanced Magnetic resonance imaging showed a contrast enhancing intraduralextramedullary dumbbell shaped lesion measuring 10x23x17 mm and appearing isointense on T1WI image and hyperintense on T2WI and STIR at DV5 level, predominantly on left side extending into left neural foramina, s/o likely neural sheath tumor most probably, Schwanoma.(Fig 1(A),(B),(C),(D),(E),(F))







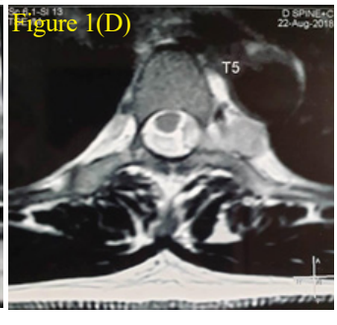


Fig 1 (A),(B),(C) and (D):T2 weighted axial MRI image showing mild hyperintense intra dural extra medullary dumb bell shaped lesion on left side at T5 level showing left paravertebral extension through adjoining left neural foramen. Intense homogenous enhancement of the lesion is seen on post contrast axial image the same level.

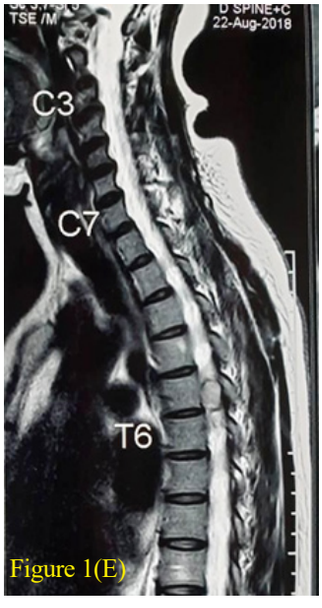


Figure 1(E)

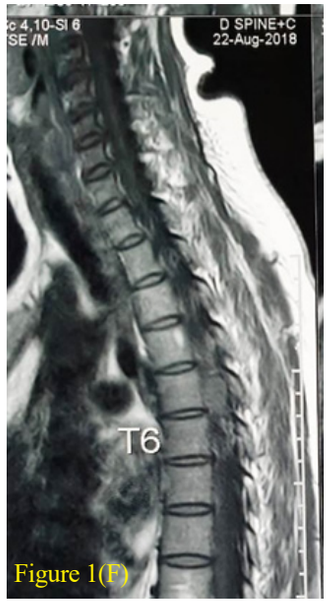
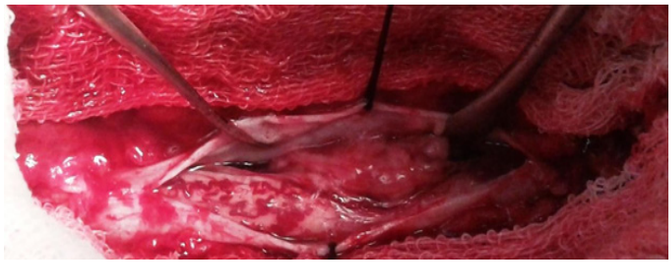


Figure 1(F)

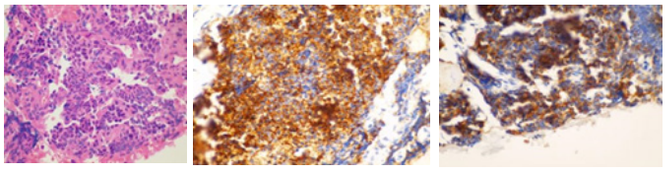
Fig 1 (E) & (F): On Sagittal T2 weighted images the lesion at T5 level appears mild hyperintense with peripheral hypointense rim and appears iso-intense on saggital T1 weighted images.

The patient underwent Laminectomy D4-D6 and & excision of tumor on 27/08/18. Intraop image (Fig 2). Pt. was discharged 5th post op day uneventfully without fresh neurological deficit. She relived her back pain on discharge.



Intreaop image:Fig2

Histopathology revealed Neuroectodermal tumor. (Fig 3)



The Hematoxylin and Eosin stained tissue section from D5 spinal mass shows islands and occasional nests of uniform small to medium sized round cells with fine chromatin, inconspicous nucleoli and scanty eosinophilc cytoplasm arranged in a fibrous hemorrhagic background .Mitotic activity seen. The section shows crushing artefact.

HPE suggestive of Malignant round cell neoplasm - Undifferentiated.

IHC markers : shows MIC2 positivity while Cytokeratin, Synaptophysin, Desmin,Tdt and LCA are negative.Diagnosis of PNET suggested.

PET Scan s/o Hypermetabolic soft tissue mass along D4-D6 vertebra on left side S/O mitotic/recurrence.

The patient was referred to medical and radiation oncologist for adjuvant therapy. Patient received total 11 cycles of radiotherapy uneventfully.however during the course of the chemo therapy the patients general condition deteriorated, she developed difficulty in breathing and distension abdomen and evaluation revealed Subacute intestinal obstruction and pleural effusion. CECT(Whole abdomen) s/o Pelvic congestion syndrome with left pleural metastasis with pleural effusion. Her adjuvant therapy had to be abandoned due to the poor general condition of the patient, a tumour board decision was taken and she was placed on palliative care. Two months later she died at home.

Discussion

PNETs in general are seen both in children and adults, but are more common in children. Mean age is between 5 and 77 years, 80% occur in patients less than 15 years. There is a 1.4 to 4.8 times male predominance [4, 5, 6, 7] .

PNETs of spine are extremely rare, it represent less than 1% of primary spinal tumors8.It can arise at all levels of the spine and can be intramedullary, intra and extramedullary, extramedullary or extradural. It is believed to arise from neoplastic transformation of primitive neuroepithelial cells in subependymal zones9Intracranial PNET has a tendency to metastasize through the CSF to subarachnoid spaces. Therefore spinal PNET could be commonly a drop metastasis from an intracranial primary than a primary PNET of spinal origin.[10] Craniospinal imaging will rule this out.

However recent studies especially those done by reviewing case reports suggest that the incidence of primary intraspinal PNET in lumbar region is twice as much as in thoracic and cervical regions and it is also found to present more commonly in young adults contrary to Cranial PNET which presents more commonly among children and also there is a male preponderance[11] This has also been corroborated by Virani and Jain in their analysis of reported cases. [12, 13]

Clinical presentation may be indistinguishable from other spinal tumors. However some of the reported cases had metastasis outside neuraxis with the most frequent sites being lung, bones, lymphnodes, which is also commonly seen in cranial PNETs as well.[14,15]

Imaging should include computerized tomography (CT) and contrast enhanced magnetic resonance imaging (CEMRI), but findings vary and are not helpful in differentiating PNET from other primary spinal tumours[16] Differential diagnosis includes eosinophilic granuloma, meningioma, rhabdomyosarcoma, neuroblastoma, and lymphoma [17,18,19]

Primary spinal PNETs are histologically indistinguishable from other neural axis PNETs. Both Histopathologyand IHC (immunohistochemistry) are required to diagnose20Onmicroscopy, these tumors show mainly small round undifferentiated cells with hyperchromatic nuclei. The tumors display high mitotic activity and necrosis.21 in IHC, the tumor cells are usually positive for neuron-specific enolase (NSE), S-100, nestin, vimentin, or microfilaments. Syn or glial fibrillary acidic protein (GFAP) may be positive with the tumor cell differentiation[22] .

Conclusion

Management Protocols:

There are no widely accepted standards for the management of spinal PNETs, It is best to advocate complete resection. Some studies suggest 80% or more resection gives a 5-year event free survival rate higher than 70%. This should be followed by an individualized combination of chemotherapy and/or radiation.20The utility of chemotherapy in the management of PNET remains unclear. The usual agents used include Ifosfamide, Vincristine,Methotrexate, Cisplatin and Lomustine. This combination supposedly gives 49.3% 3-year progression-free survival rate[23]. But despite treatment most patients do not do well. Adoptive immunotherapy by Lymphokine - activated killer cells is currently being investigated as a possible therapy[24]

key findings and lessons learned from this case:

The case highlights the diagnostic challenges of identifying malignant round cell neoplasms like PNET in the spinal region, emphasized by the MIC2 positivity and negative IHC markers. Despite receiving 11 cycles of radiotherapy, the patient's condition deteriorated due to metastasis, leading to the initiation of palliative care and eventual demise, underscoring the aggressive nature and poor prognosis associated with this condition

Prognosis:

Short history of symptoms suggests aggressive nature and rapid growth of the tumour, aggressive nature causes rapid recurrence. The cause of death in these patients includes pneumonia[25], metastasis[26], aggressive local spread, and progressive spinal cord involvement[27]. The average survival is less than 2 years, less than 40% of patients live for 02 years and less than 10% live for 3years after diagnosis.

Declaration of patient consent:

All authors certify that they have obtained all appropriate patient consent form.Patient consent was obtained for purpose of the study with due care to maintain her privacy.All procedures performed in the study were conducted in accordance with the ethics standards given in 1964 declaration of Helsinki, as revised in 2013.

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