DOI: 10.7860/JCDR/2022/51329.15835

Case Report

Pathology Section

Intramedullary Spinal Ependymoma with Signet Ring Cell/Adipocytic Morphology- A Rare Case Report

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ABSTRACT

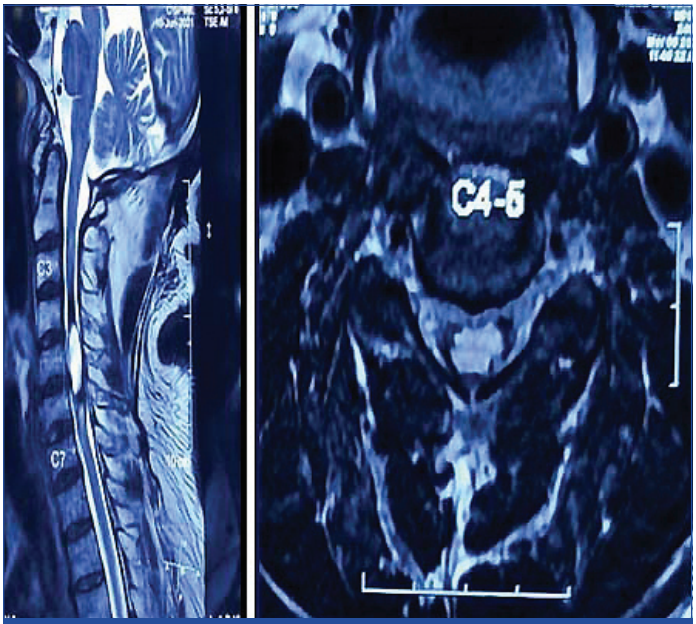
Ependymoma is neuroepithelial tumour with ependymal differentiation that most commonly has ventricular involvement and arises in the cerebrum and spinal cord. It has bimodal age distribution. Incidence rate highest in infant less than one year and second peak is in the 4th decade. Ependymoma with signet ring type of morphology is rare variant. A 57-year-old male patient came with complaints of tingling sensation over bilateral upper limbs. Magnetic Resonance Imaging (MRI) showed cervical intramedullary well defined short segment solid-cystic lesion. Microscopy showed perivascular pseudorosettes and some ependymal rosette focally, in a fibrillary background. Cell forming pseudorosettes have clear vacuolated cytoplasm with eccentrically placed nucleus giving signet ring/mature adipocytic morphology. Thick walled hyalinised blood vessels, occasional mitosis were seen. On histomorphology differential diagnosis were ependymoma with signet ring/adipocytic morphology grade II and metastatic adenocarcinoma with signet ring cell morphology. The cells were positive for Glial Fibrillary Acidic Protein (GFAP), perinuclear dot like positivity for Epithelial Membrane Antigen (EMA). Cell show focal nuclear positivity for Cyclin-D1. MIB-1 (cell proliferation marker) index was 1-2% in highest proliferating. Final impression was ependymoma WHO grade II with signet ring/Adipocytic morphology. Clinically the prognosis of this histological type remains same as conventional ependymoma. These patterns are not decisive for clinical prognosis and treatment. It is necessary to differentiate it from metastasis of signet ring cell adenocarcinoma as the management of such cases is completely different from ependymoma.

Keywords: Adenocarcinoma, Epithelial membrane antigen, Metastasis, Pseudorosettes

CASE REPORT

A 57-year-old male patient came with the complaint of tingling sensation in bilateral upper limb and difficulty in doing skillful movements with both hands for two years.

Magnetic Resonance Imaging (MRI) spine revealed a well-defined short segment solid cystic lesion seen at cervical spinal cord level C3-C5 vertebral level measuring 8×17×25 mm AP (Anteroposterior), ML (mediolateral) and SI (superior-inferior), [Table/Fig-1]. It appeared T2 hyperintense and T1 isointense and involves cervical spinal cord from lower border C4 to upper border of C6 vertebral level causing cord expansion and near complete effacement of the sub-arachnoid space at these levels. Radiological impression was intramedullary spinal cord tumour like ependymoma or spinal cavernoma with haemorrhage.



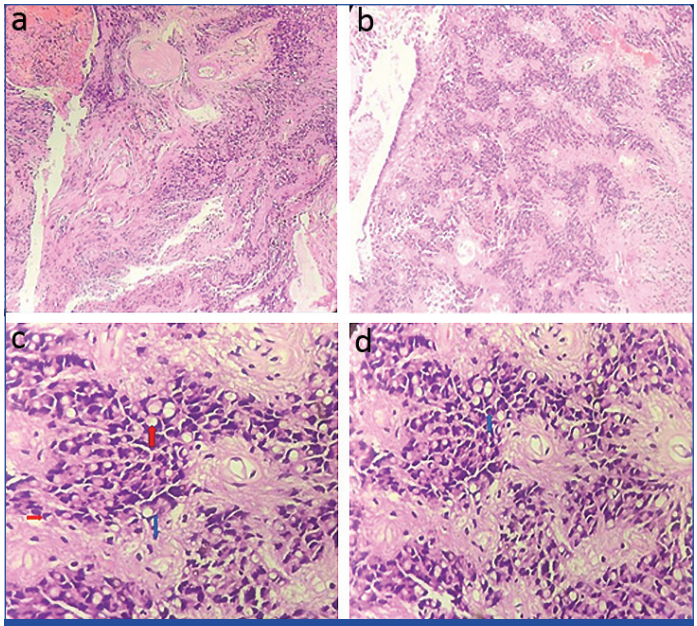
[Table/Fig-1]: Sagittal and Axial Plane T2 wieighted image show well defined mass 8×17×25 mm AP, ML, SI short segment lesion involves cervical spinal cord from lower border C4 to upper border of C6 vertebral level with T2 hyperintense.

Histological examination showed a cellular glial tumour composed of neuroepithelial cells with perivascular pseudorosettes architecture in a fibrillary background. On further examination, there were some regions displayed the morphology featuring cells with signet ring cell morphology with intracytoplasmic vacuoles with a large optically clear vacuole pushing the nucleus to the periphery. It mimicked signet-ring cells and mature adipocytic morphology. Thick walled hyalinised blood vessels also noted. Occasional mitosis was seen. No necrosis or microvascular proliferation noted [Table/Fig-2a-d].

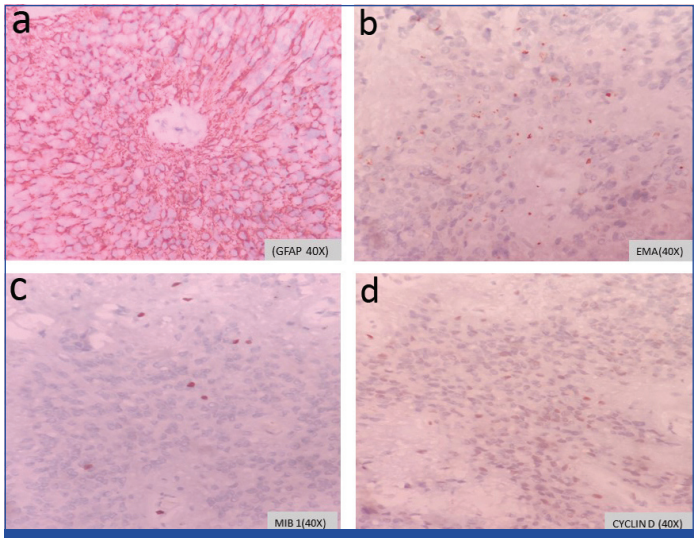
Differential diagnosis considered on histological examination was ependymoma with signet ring cell/adipocytic appearance grade II and metastatic adenocarcinoma with signet ring cell morphology.

On performing immunohistochemical studies, the tumour cells were positive for Glial Fibrillary Acidic Protein (GFAP) and showed perinuclear dot like positivity for Epithelial Membrane Antigen (EMA). Very occasional tumour cells were positive for P53 and focally for Cyclin-D1. MIB-1 (cell proliferation marker) labelling index was 1-2% in highest proliferating areas. Tumour was negative for cytokeratin 7 (CK7), CK20 and CDX2 thus metastasis was ruled out [Table/Fig-3a-d].

Final impression was ependymoma grade II with signet-ring cell-like appearance. Patient was treated with complete surgical resection of tumour without adjuvant radiotherapy. He is being followed-up and is clinically asymptomatic till his last visit.



[Table/Fig-2]: a) Low magnification photograph of H&E showing hyalinised blood vessels; b) Low magnification photograph of H&E showing resettes; c) High magnification photograph of adipocytes (blue arrow) and signet ring cells (red arrow); d) High magnification photograph of H&E showing ependymal signet ring cells (blue arrow).



[Table/Fig-3]: Immunohistochemistry panel; a) Tumour cell positive for Glial Fibrillary Acidic Protein (GFAP) (membranous positivity); b) EMA show perinuclear dot like positivity; c) MIB-1 index 1-2%; d) Cyclin D-1 show focal nuclear positivity.

DISCUSSION

Accordingly, nearly 30 cases with such traits have been reported worldwide [1-6]. Another case of ependymoma having signet ring cell morphology was documented here. Primary spinal intradural tumours have extremely rare incidence i.e., 0.97/100,000 patients per year [7]. Intramedullary neoplasms even have less occurrence and represent only 5-10% of all spinal tumours and only 2-4% of all CNS tumours [8].

Peak incidence is in the fourth decade, with mean age of 39 year at presentation. Males are more commonly affected than females [1]. According to World Health Organisation (WHO) ependymal tumours are graded as grade I, II and III. The WHO grade I tumours include myxopapillary ependymoma and subependymomas. Myxopapillary ependymomas are almost exclusively located in the lower portion of the spinal cord/cauda equina, while subependymomas are often found in the ventricular wall. The WHO grade II tumours include cellular ependymoma, clear cell ependymoma, tanycytic ependymoma and papillary ependymoma subtypes. Anaplastic ependymomas are classified as WHO grade III and are commonly intracranial while WHO grade II ependymomas are found mostly in the upper spinal cord and/or are intracranial [9-11].

The tumours of spinal cord, meninges and cauda equina, ependymomas accounted for 20.5% of all tumours diagnosed in adults above second decade [12]. Lipomatous and signet ring cell change is a very rare phenomenon. It is seldom seen in ependymal neoplasms. A study of 193 patients of ependymomas by Sharma MC et al., stated only five examples in duration of 19 years, which was approximate 2.59% [1]. Likewise, Gessi M et al., had an overall incidence of 0.23% of such morphology [2].

Ruchoux MM et al., analysed three cases of ependymoma bearing signet-ring cell-like morphology [4]. Likewise, Takahashi H et al., independently portrayed a lipidized variant of ependymoma by demonstrating lipid droplets through ultrastructural examination [5].

On dealing with the cases of spinal cord tumour in a middle age patient having signet ring cell morphology leads to the differential diagnosis of metastasis from gastrointestinal tract, intracranial lipomatous hamartoma, and liponeurocytoma which have signet ring cell/ lipomatous morphology. To rule out metastasis, a pannel of immunohistochemistry was performed. Pan-Cytokeratin (CK), CK-7, CK20 ruled out the possibility of metastasis from gastrointestinal tract, intracranial lipomatous hamartoma, and liponeurocytoma. Immunohistochemistry for GFAP and cyclin D-1 were positive.

It was interesting to note the presence of thick hyalinised vessels where there were signet-ring like cells [Table/Fig-2a,b]. Similar finding has also been described by some other authors too [3]. This possibly points towards a true degenerative event that can be seen in any kind of ependymoma. The possible explanation is advocated to the following pathway to link both variants, lipomatous and extensively vacuolated as: hypoxia → organelle vacuolation (ribosomes, rough endoplasmic reticulum) → protein synthesis impairment → defective lipid transportation with storing of fat droplets.

Likewise, another postulate is: organelle vacuolation → disaggregation of structural membrane lipids → accumulation of glycerophospholipids in the cell's cytoplasm [13]. It is stated that clinically point of view, none of these above described histomorphology of ependymoma appears to be related to prognosis or treatment. It is a speculation that ependymomas having these signet-ring-like/adipocyticl lipmatous traits behave in a similar way as conventional ones [1].

CONCLUSION(S)

To conclude, signet ring like/adipocytic are unconventional histological patterns seen in ependymomas probably as a common degenerative phenomenon secondary to a hypoxic insult as few hypothesis are postulated. However, these patterns are not decisive for clinical prognosis and treatment. But, it is necessary to differentiate it from metastasis of signet ring cell adenocarcinoma as the management of such cases is completely different from ependymoma.

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PLAGIARISM CHECKING METHODS: [Jain H et al.]
- Plagiarism X-checker: Jul 21, 2021
- Manual Googling: Dec 01, 2021
- iThenticate Software: Dec 03, 2021 (22%)

ETYMOLOGY: Author Origin

AUTHOR DECLARATION:
- Financial or Other Competing Interests: None
- Was informed consent obtained from the subjects involved in the study? Yes
- For any images presented appropriate consent has been obtained from the subjects. Yes

Date of Submission: **Jul 15, 2021**
Date of Peer Review: **Nov 06 , 2021**
Date of Acceptance: **Dec 04, 2021**
Date of Publishing: **Jan 01, 2022**