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Case Report

Primary spinal dorsal extramedullary germ cell tumor: A rare case report and literature review

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ABSTRACT

Background: Primary spinal extramedullary germ cell tumor are very rare. Germ cell tumor are similar histologically to germ cells of genital organs and may arise rarely from central and peripheral nervous system.

Case Description: We report a case of 20-year-old male who presented with progressive lower extremity weakness, spasticity, and numbness of legs. Patient was evaluated with magnetic resonance imaging dorsal spine which revealed extramedullary mass in dorsal (D2-D3) level with severe cord compression. Tumor was found to be extramedullary with histopathology consistent with germ cell tumor. Patient was given radiotherapy and chemotherapy postoperatively.

Conclusion: Primary spinal extramedullary germ cell tumors are very rare and are very sensitive to radiation and chemotherapy. Various management and treatment protocols are available across institutions in the world. We recommend adequate decompression of cord with biopsy followed by local radiation and chemotherapy. As these are rare tumors, presenting with significant neurological deficits should always be kept in the differential diagnosis.

Keywords: Dorsal mass, Extramedullary mass, Germ cell tumor

INTRODUCTION

Primary germ cell tumors may arise aberrantly may arise in the central nervous system (CNS) which are mostly similar to germinal tumors of genital organs. They may account for only 1% of all CNS tumors.[3] These tumors usually occur in the suprasellar or pineal region and less frequently in thalamus, ventricles, or capsule-ganglionic region. Spinal involvement can occur in form of drop mets.[7,14] Primary germ cell tumors involving the spinal cord are very rare and that too extramedullary. We report an extramedullary germ cell tumor in the dorsal spinal cord which is extremely rare. We present previous published case reports of extramedullary spinal germ cell tumors [Table 1].

CASE REPORT

A 20-year-old male presented with difficulty in walking, weakness, and numbness in the lower extremities for the past 3 months. These symptoms slowly progressed over a period of 3 months

Table 1: Reported cases of primary extramedullary germ cell tumor.

S. No.	Series	Country	Age 9(Y)/sex	Spinal Level	Medullary	Operation	Craniospinal radiation	Local radiation	Chemotherapy	HCG	STGC	Follow-up	Recurrence
1	Hiba *et al.*	Japan	5 /M	T 11-L3	IM,EM	PR	Not recieved	Received	Received	+	+	6 months	R, NR after amputation of spinal cord
2	Slagel *et al.*	Japan	16 /F	T11- L4	IM,EM	PR	Not recieved	Received	Not recieved	-	-	28 months	NR
3	Kiyuna *et al.*	Japan	20 /F	T11-L3	EM	TR	Received	Received	Not received	-	-	2 Year	NR
4	Takahashi *et al.*	Japan	22 /F	L1-L2	IM,EM	PR	Received	Received	Not recieved	+	-	1.5 Year	NR
5	Kawano and Tsujimura	Japan	24 /M	L1-L3	IM,EM	PR	Received	Received	Not received	-	-	Not known	NR
6	Miyauchi *et al.*	Japan	24 /M	T12- L3	IM,EM	PR	Received	Received	Not recieved	-	-	13 months	NR
7	Biswas *et al.*	India	28 /M	L2-L4	EM	TR	Not received	Received	Received	+	+	11 months	R
8	Tekkok and Sav	Turkey	28 /M	L1-S2	EM	TR	Received	Received	Received	-	-	22 months	R, NR after chemotherapy and resection
9	Present series	India	20 /M	D2- D4	EM	TR	Not received	Received	Received	+	-	10 months	NR

Y: Years, M: Male, F: Female, HCG: Beta human chorionic gonadotrophin, STGC: Syncytiotrophoblastic giant cells, IM: Intramedullary, EM: Extramedullary, PR: Partial resection, TR: Total resection, (–): Present, (+): Present, R: Recurrence, NR: No recurrence

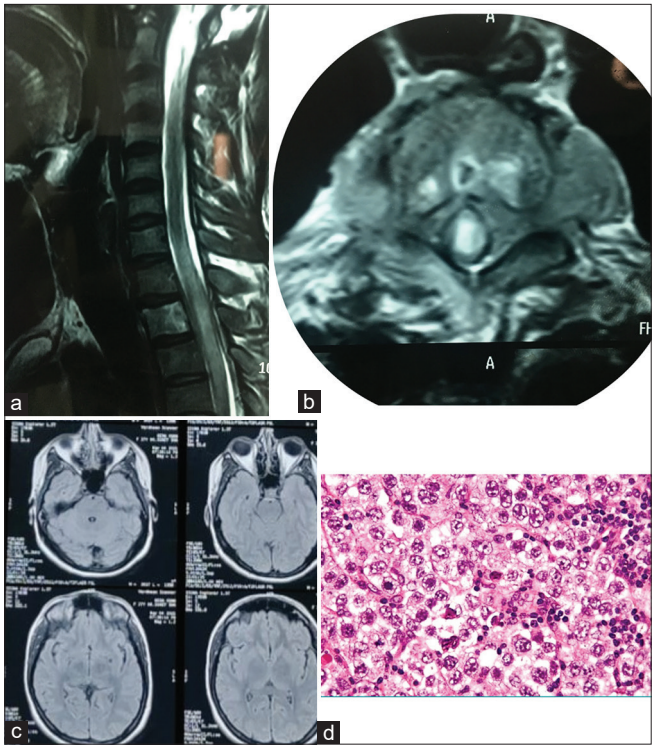

Figure 1: (a) Magnetic resonance imaging (MRI) cervical spine (Saggital) image demonstrated extramedullary mass at D2-D3 level with diffuse cord involvement with cord compression (b) MRI cervical spine (Axial) image demonstrated extramedullary mass with involvement of D2 vertebrae involvement. (c) MRI brain was groosly normal. (d) Histopathology (two cell pattern) demonstrated that cells with large nuclei, with clear cytoplasm and defined borders. There were few lymphocytes in stroma.

during which he became almost bedridden. These symptoms progressed to involve bowel and bladder and lost urinary control with constipation. On examination, patient had power of 3/5 both lower limbs with loss of light touch, proprioception with bilateral clonus. Patient was evaluated with magnetic resonance imaging (MRI) dorsal spine with screening of the whole spine [Figures 1 and 2]. MRI demonstrated extramedullary mass at D2-D3 level with diffuse involvement with cord compression [Figures 1 and 2]. Rest of screening of the spine was normal. CECT chest and abdomen were within normal limits. MRI brain was also within normal limits. Serum and CSF levels of beta-HCG and AFP were also within normal values.

Patient was operated with D2-D3 laminectomy with excision of mass. Mass was extramedullary, grayish in color, and severely compressing cord. Gross total excision of mass was done. Histopathology demonstrated typical two-cell pattern of germinoma. There were cells with large nuclei, with clear cytoplasm, and defined borders. There were few lymphocytes in the stroma. Immunostaining demonstrated positivity for placental alkaline phosphatase (PLAP) along

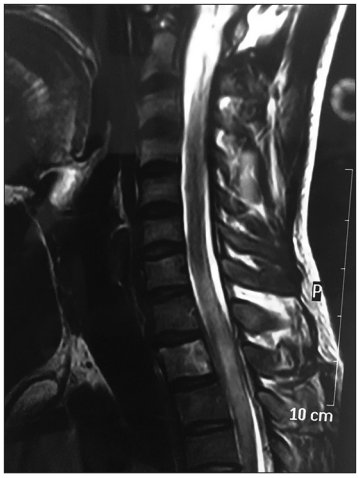

Figure 2: Magnetic resonance imaging cervical spine (Saggital) demonstrated extramedullary mass at D3-D4 level with diffuse cord involvement with cord compression.

with positivity for cytokeratin AE1. Histopathology along with immunostaining was in favor of germ cell tumor. Post-operatively patient received local radiation of 45Gy and improved neurologically. Patient was able to walk with support after 3 months and is improving gradually.

DISCUSSION

Primary spinal extramedullary germ cell tumors are very rare. Germ cell tumors account for 1% CNS tumors in Europe and US with 12.5% in East Asia.[3] Germ cell tumors can be primary or metastatic, former involving the thoracolumbar spine and later involve cervical spine usually. Spinal germ cell tumors are usually sporadic, but certain associations with congenital malformations and X-linked syndromes have been reported. Association of Klinefelter's syndrome with intracranial and intraspinal germinoma, has been reported by Nakata *et al.*[13]

Backache, weakness of limbs, sensory loss, involvement of bowel and bladder are the most common presentations of spinal germ cell tumors. Other symptoms such as precocious puberty, due to high Beta-HCG production can occur.[8] Beta-HCG and Alfa-fetoprotein in serum and CSF are very useful markers in preoperative diagnosis of these tumors. Moreover, isoform of C-KIT in CSF is very useful marker for diagnosing germ cell tumors.[10] Clinical features, biopsy, and immunohistochemistry are very useful for diagnosing germ cell tumors. Germinomas exhibit two cell patterns with diffusely arranged large cells with well-defined borders, clear cytoplasm prominent nucleolus with small round lymphocytes infiltrating stroma.[12]

On immunohistochemistry, germinomas stain positive for PLAP, c-kit, and OCT4. CNS germinomas secreting serum Beta-HCG have now been termed as germinomas with

syncytio-trophoblastic giant cell (STGC). These tumors usually recur and are poor prognostic.[9,16] On further analysis of various extramedullary spinal germ cell tumors [Table 1], most cases have been reported in Japanese (6/9) population. These spinal extramedullary germ cell tumors have been found in males than in females (6/9). We found that median age was 22, ranging from 5 to 28 years. Spinal germinomas occur mostly in the dorsal cord (47%), followed by dorsolumbar (27%), lumbar (20%), and least in the cervical region. Spinal germinomas are intramedullary in 70%, intra and extramedullary in 17%, and purely extramedullary in 13% of cases. As these are rare tumors, there are no defined protocols for their management. These tumors are usually managed by combined approach of surgery, radiotherapy, and chemotherapy.

Surgery

Total resection, partial resection or tumor decompression, and operative biopsy are various surgical options. In the total of nine patients, five underwent partial resection and four patients achieved complete resection [Table 1]. However, valve of total resection is unproven in CNS germ cell tumors as they are very responsive to radio-chemotherapy and in view of difficulty in differentiating from normal cord tissue.[15] Our patient underwent almost complete excision.

Radiotherapy

Spinal germ cell tumors are highly radiosensitive.[1,3,4] Cranio-spinal irradiation (CSI), and local irradiation are various radiotherapy options. 70–100% cure rates have been reported with radiotherapy alone.[2,6] Out of 9 patients, 5 patients received CSI and local radiation was given in all patients. Total dose of local radiation should be 40–50 Gy and for CSI should be 24–36 Gy. In our patient, almost complete excision was achieved and histopathology was in favor of germ cell tumor, so local radiation was given in dose of 40 Gy and adjuvant chemotherapy was given.

Chemotherapy

Spinal germ cell tumors are also highly chemo-sensitive tumors.[1,4] Although it is not acceptable to replace radiotherapy, it can only be given adjunct to radiotherapy as chemotherapy alone has acute toxicity in long-term results. It is observed that limited radiotherapy with low dose can lead to long-term survival with less side effects. Induction chemotherapy followed by myeloablative chemotherapy and stem cell rescue can be tried in high serum/CSF HCG elevations and those with slow biochemical response.[1,11] In previous published cases [Table 1], 4/9 patients received chemotherapy. BEP (Bleomycin+ etoposide+ cisplatin) and ICE (Ifosfamide + cisplatin/carboplatin + etoposide) are most commonly used chemotherapeutic regimes. There are various other regimes, but none have been more effective than these regimes. In our patient, we gave adjuvant chemotherapy with four cycles of BEP given 3 weekly.

The most common cause of recurrence in spinal germ cell tumors is local recurrence or neuraxial spread.[1,3,5]

CONCLUSION

Primary spinal germ cell tumors are rare, but a very high index of suspicion is required to diagnose these tumors. As these tumors are highly sensitive to radiation and chemotherapy, radical surgery can be avoided in these tumors. Recurrence of these tumors is very rare, which are usually associated with STGC positivity. We recommend safe surgical decompression followed by radiotherapy and chemotherapy. Craniospinal radiation should be used as last resort in recurrence in view of its cognitive and endocrine effects.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent.

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Conflicts of interest

There are no conflicts of interest.

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