

A Rare Mediastinal Tumour with Spinal Cord Involvement in an Adult

A 21-year-old man came with complaints of backache of 6 months duration, with weakness in both the lower limbs of 15 days duration which was rapidly progressive leading to complete paraplegia. He gave recent history of loss of bladder control of 6 days duration. There was no other remarkable clinical and past medical history.

Local examination revealed tenderness of the thoracic spine at T4-T10 level, and the adjacent paraspinal muscles. There was complete flaccid paralysis of both lower limbs at T10 level. Urinary incontinence was present. The rest of the systemic examination was unremarkable. Routine laboratory investigations were within normal limits.

A chest radiograph revealed a large globular mass involving the upper half of the right mediastinum (Fig. 1). On magnetic resonance imaging (MRI), a neoplastic, large, well demarcated, round, solid signal intensity mass with focal cystic degeneration and necrosis was seen in the posterior mediastinum to the right side of the upper dorsal spine, measuring 10.3 x 8.8 x 7.8 cm. The mass was seen extending intraspinally via right sided D3-4 and D4-5 neural foramen, with significant cord compression. The lesion was eroding the right fourth rib posteriorly, and was abutting the right main bronchus, the right main pulmonary artery and the esophagus (Fig. 2).

Urgent spinal cord decompression was done by posterior

approach. Pedicle screw fixation was done from D3-5 with posterolateral fusion. A biopsy was taken from the lesion during the procedure and sent for histopathological examination. Postsurgically, the patient regained sensations in the lower limbs but there was no improvement of the motor power.

Histopathological examination revealed a tumour that comprised round cells with hyperchromatic round to oval nuclei, with distinct nuclear membrane and nucleoli and indistinct cytoplasmic borders. The tumour cells were arranged in sheets, lobules, cords and ribbons with pseudorosetting around blood vessels. The stroma was highly vascular with extensive areas of haemorrhage and necrosis (Fig. 3). Special staining with periodic acid-Schiff (PAS) with and without diastase predigestion demonstrated intracytoplasmic glycogen in the tumour cells.

Immunohistochemistry was performed on paraffin sections of the tumour using manual polymer detection system with heat induced epitope retrieval. The neoplastic cells showed strong membrane reactivity for CD99, and cytoplasmic reactivity for vimentin, with focal cytoplasmic reactivity for synaptophysin. They were negative for neuron specific enolase (NSE), cytokeratin (CK), desmin, myogenin, leukocyte common antigen (LCA), CD20, CD79a and TdT.

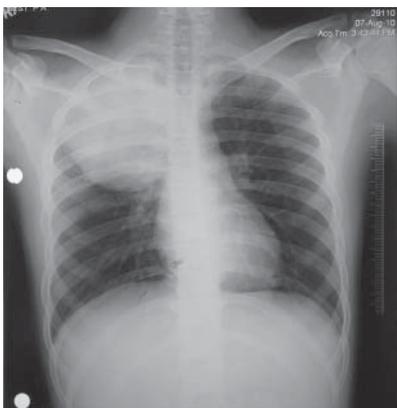


Fig. 1. Chest X-ray showing a well defined opacity involving the right upper hemithorax.



Fig. 2. MRI coronal view, T2WI showing "dumbbell-shaped" lesion in the posterior mediastinum compressing the upper zone of the right lung; and extending intraspinally via right sided D3-4/4-5 neural foramen.

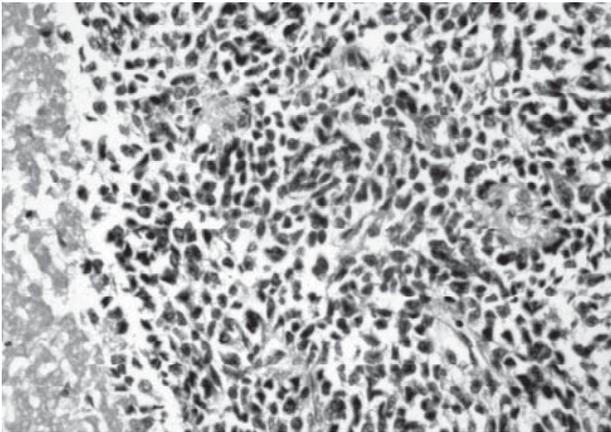


Fig. 3. Microscopy of the tumor showing uniform cells with high nucleocytoplasmic ratio, hyperchromatic nuclei, perivascular and pseudorosettes along with a focus of necrosis (H&E, 400X).

What is the diagnosis?

- A. Rhabdomyosarcoma
- B. Desmoplastic small round cell tumor
- C. Primitive neuroectodermal tumor
- D. Neuroblastoma
- E. Lymphoma

Discussion

Peripheral primitive neuroectodermal tumors (PNET) are rare, malignant small round cell tumors of presumed neural crest origin that arise outside the central and sympathetic nervous system, and account for 1% of all sarcomas. This tumour can occur at any age, although the peak age incidence is adolescence and young adulthood.¹

The most common locations of peripheral PNETs have been the thoracopulmonary region, the retroperitoneal paravertebral soft tissues, the soft tissues of the head and neck, intra-abdominal and intrapelvic soft tissues and the extremities.¹ Involvement of mediastinum by PNET in an adult, as reported in our case, is rare. Classically, the most common neoplasms that arise in the posterior mediastinum include neurogenic tumours like schwannoma, neurofibroma, ganglioneuroma, ganglioneuroblastoma, neuroblastoma and paragangliomas.²

PNET typically expresses high amounts of the MIC2 antigen (CD99) and exhibits highly characteristic chromosomal translocation between chromosome 11 and 22 $t(11, 22)(q24;q12)$ that results in the fusion of the 3' end of the Friend leukemia integration 1 (FLI1) gene on 11q24 with the 5' end of Ewing's sarcoma (EWS) gene on 22q12.^{1,3}

The classic histological pattern of PNET consists of small, uniform primitive cells with round nuclei and scanty cytoplasm that lack significant differentiation. In more differentiated cases, Homer-Wright rosettes may be identified. Due to the lack of characteristic morphologic features, PNET is difficult to distinguish from histologically similar small round cell tumours including rhabdomyosarcoma, desmoplastic small round cell tumour, mesenchymal chondrosarcoma, poorly differentiated synovial sarcoma, neuroblastoma and lymphoma.² Alveolar rhabdomyosarcoma may display solid round cell areas, which are nearly always associated with areas showing loss of cellular cohesion and a distinct alveolar pattern, multinucleated giant cells; and in about 20% to 30% cases, eosinophilic cells characteristic of rhabdomyoblasts with or without cross striations.³ Rhabdomyosarcoma would express desmin and myogenin, which were negative in the present case. Detection of $t(2;13)(q35;q14)$ is characteristic of alveolar rhabdomyosarcoma. Synovial sarcoma is composed of small round cells often arranged around a hemangiopericytoma-like vasculature. Sixty percent to 70% of these tumours show reactivity for cytokeratins, which is usually not seen in PNET. Detection of $t(X;18)$ by conventional cytogenetics or the resultant *SSX1/SYT* or *SSX2/SYT* fusion by molecular techniques, confirms the diagnosis of synovial sarcoma.³ The lack of NSE expression and strong CD99 positivity favoured the diagnosis of PNET over neuroblastoma. Because CD99 is found in most T-cell lymphoblastic lymphomas, and some lymphoblastic lymphomas do not express LCA, a panel of antibodies that include B- and T-cell markers (CD20, CD79a, TdT) should be done to rule out lymphoma.³ The possibility of desmoplastic small round cell tumour (DSRCT) was ruled out by the lack of expression of cytokeratin, NSE and desmin. DSRCT has a unique cytogenetic abnormality: $t(11;22)(p13;q22)$. The breakpoint on chromosome 22 is the same as PNET, but the locus on chromosome 11 involves Wilms tumor gene (*WT1*).³

Treatment of mediastinal PNET consists of resection, augmented by chemotherapy and radiation therapy. In patients with primary chemotherapy after biopsy-proven diagnosis, responsiveness to anthracyclines and alkylating agents has been documented.^{1,3} In general, PNET is a very aggressive neoplasm with a poor prognosis and 5-year disease-free survival rate of 45% to 55%.¹ Our patient was in advanced stage and succumbed to the disease within a span of 6 months inspite of aggressive chemotherapy and radiotherapy.

Answer: C

REFERENCES

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