



Primitive Neuroectodermal Tumor in a Cirrhotic Liver: An Autopsy Finding

Authors

**Sumiti Gupta MD¹, Priyanka Rawat^{2*}, Shivani Malik MD³,
Nisha Marwah MD⁴, Sunita Singh MD⁵**

¹Professor, Department of Pathology, Pt BD Sharma PGIMS, Rohtak, Haryana, India

²MBBS, 2nd Year Post Graduate Student, Department Of Pathology, Pt BD Sharma PGIMS, Rohtak, Haryana, India

³Ex Demonstrator, Department of Pathology, Pt BD Sharma PGIMS, Rohtak, Haryana, India

^{4,5}Sr Professor, Department of Pathology, Pt BD Sharma PGIMS, Rohtak, Haryana, India

*Corresponding Author

Priyanka Rawat

Department of Pathology, Pt BD Sharma PGIMS, Rohtak, Haryana, India 124001

Abstract

Primitive neuroectodermal tumor is a rare neural crest tumor belonging to the Ewing's sarcoma group of tumors. It constitutes approximately 1% of all sarcomas. Visceral involvement has been increasingly described in pancreas, vagina, stomach, small bowel, ovaries, oesophagus and kidney. However, primary visceral PNET are extremely rare, two cases of small intestine and hepatic duct involvement have been reported in children. It is a rare presentation in a visceral organ like liver. To the best of our knowledge only one or two cases of primitive neuroectodermal tumor of liver have been reported. It is a rare presentation in a visceral organ like liver. Here we present a case report of 56 year old deceased male whose viscera including heart, liver and kidneys were received for histopathological examination. The histopathological examined of liver revealed primary primitive neuroectodermal tumor along with cirrhosis.

Keywords: Primitive neuroectodermal tumor, Liver.

Introduction

Liver masses include many primary benign and malignant neoplastic lesions along with high rate of metastatic events. Primary tumors can be solid or cystic and can arise from hepatocyte, bile duct epithelium, neuroendocrine cells, mesenchymal cells, and, rarely, from heterotopic tissues. Primary hepatic sarcomas are rare, accounting for only 1% to 2% of all malignant tumors arising in the liver with angiosarcoma and undifferentiated sarcoma being the most common histologic types.

PNET or primitive neuroectodermal tumor, a small round cell tumor belonging to the Ewing's sarcoma family is a rare presentation in a visceral organ like liver. Furthermore, to the best of our knowledge, a case of PNET liver associated with cirrhosis has never been reported in the literature so far.

Case Report

Viscera including heart, lung, liver and kidney of a 56 years old deceased male were received for

histopathological examination. On gross examination, the external surface of the liver was multinodular with multiple nodules varying in size from 0.2 to 0.8 cm. The cut surface was also multinodular along with a solid grey white area of 4x3 cm. Microscopic sections from the grey white area revealed a neoplastic process composed of sheets or lobules of small round cells, with little cytoplasm and darkly staining round or oval nuclei (Figure 2&3). Along with the above findings, areas of cirrhosis consisting of lobules of liver parenchyma separated by broad fibrous septa were observed (Figure 1). On immunohistochemical examination, the small round blue tumor cells were positive for CD 99 (Figure 4) and negative for LCA, cytokeratin, smooth muscle actin, desmin, vimentin, S-100, HMB-45 and synaptophysin. Further, other investigations like CT scan of chest, MRI of brain and whole body scan were looked for and found to be normal. Based on the morphological and immunohistochemical profile diagnosis of primary primitive neuroectodermal tumor with cirrhosis was given. Microsections from heart, lung and kidney revealed no significant pathological change.

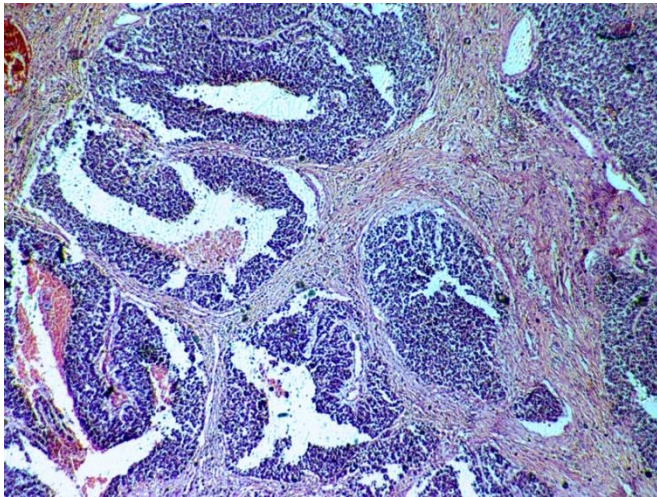


Figure 1 (HPE) – Areas of cirrhosis showing lobules of liver parenchyma separated by broad fibrous septa (100x)

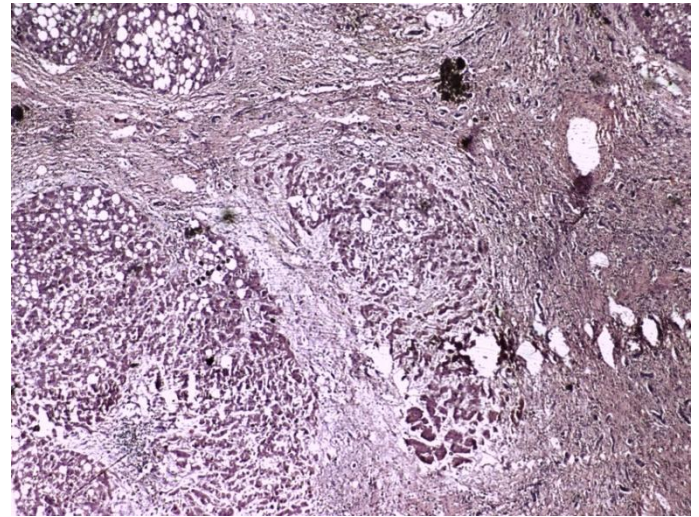


Figure 2 (HPE)-- Sheets and lobules of neoplastic small round blue cells with little cytoplasm (100x)

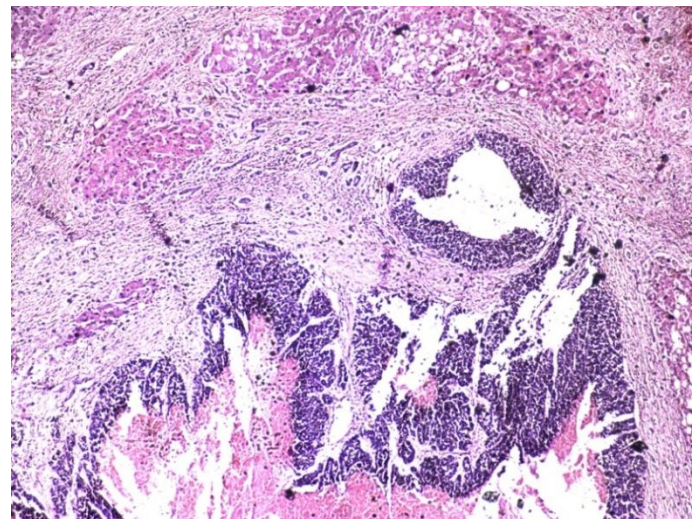


Figure 3 (HPE) – Sheets and lobules of neoplastic small round blue cells with little cytoplasm (400x)

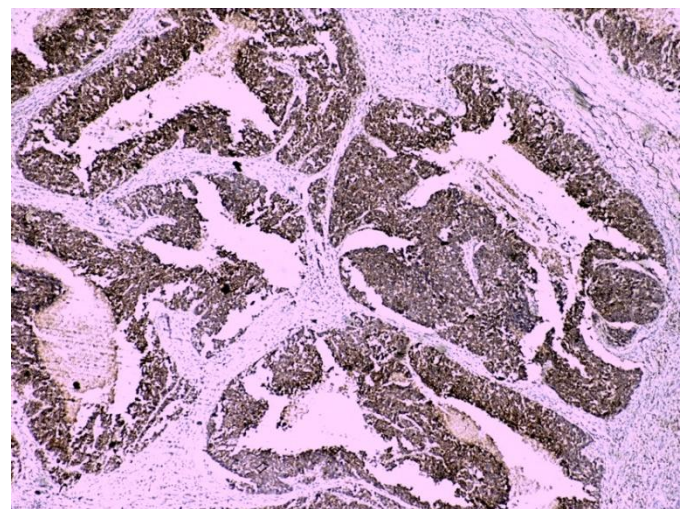


Figure 4 – Immunohistochemistry for CD99 (positive) (100x)

Discussion

Primitive neuroectodermal tumor is a rare neural crest tumor belonging to the Ewing's sarcoma group of tumors. It was first described by Arthur Purdy Stout in 1918 and is one of the members of small blue round cell tumor family. PNET constitutes approximately 1% of all sarcomas.¹ On the basis of site of origin, it is categorised into central and peripheral type.² Central tumors are derived from neural tube. Peripheral primitive neuroectodermal tumor occurs outside the central nervous system and has considerable overlap with Ewing's sarcoma, both sharing a common and unique translocation [t(11;22) (q24;q12): fusion gene designated *EWS/ FLI-1*]. Because of the undifferentiated appearance of tumor cells it is thought to arise from undifferentiated mesenchymal cell. PNET predominantly affects bones and deeper soft tissues. These tumors can be found in abdomen and pelvis, thorax, extremities and head and neck areas.³ Visceral involvement has been increasingly described in pancreas, vagina, stomach, small bowel, ovaries, oesophagus and kidney.⁴ However, primary visceral PNET are extremely rare, two cases of small intestine and hepatic duct involvement have been reported in children.⁵

To the best of our knowledge only one or two cases of primitive neuroectodermal tumor liver have been reported. These tumors are described at or before the age of 35 years with slight male preponderance however in the present case age of our patient was 56 years. The chief presenting complaints of the tumor include pain, heaviness, dragging sensation in the upper abdomen. The patients usually reveal mild derangement in liver function tests. The gross appearance of the tumor varies. Usually it is multilobulated, soft, friable with areas of haemorrhage, necrosis and cyst formation, however in our case tumor was identified chiefly as a grey white solid area. Microscopic examination of tumor reveals a predominantly lobular growth pattern with poorly differentiated small round or oval blue cells with dark staining nuclei and scanty amount of pale

eosinophilic cytoplasm. Some tumors may be composed of cords or trabeculae of small round cells and may be mistaken for a small cell undifferentiated carcinoma or a carcinoid tumor. Some areas can resemble a fibrosarcoma or a malignant schwannoma.⁶ Other differentials include neuroblastoma, desmoplastic small round cell tumor, mesenchymal chondrosarcoma, alveolar rhabdomyosarcoma, Non-Hodgkin's lymphoma, metastatic pulmonary small cell carcinoma, neuroendocrine tumor, small cell osteosarcoma or poorly differentiated synovial sarcoma.⁷ The immunohistochemical markers play a major role in reaching a specific diagnosis. The tumor cells usually reveal strong CD99 expression and may also show positivity for Leu-7, non-specific enolase and S- 100. They show negativity for desmin, myogenin/MyoD1. PNET characteristically exhibits a neural phenotype, expressing the MIC2 protein (CD99), and display that (11; 22) (q24; q12) chromosomal translocation in about 85%–95% of the cases.⁸ Prognostic factors that adversely influence the outcome are the presence of metastatic disease at the time of the initial diagnosis, large tumor size, extensive necrosis, central axis tumors, and poor response to initial chemotherapy. For extra skeletal PNET, multimodal approach including surgery, radiotherapy and chemotherapy is the preferred treatment.

Conclusion

Primitive neuroectodermal tumor is a rare liver neoplasm but should be considered in the differential diagnosis of liver masses. Furthermore, the coexistence of cirrhosis with primitive neuroectodermal tumor constitutes a domain that should be brought into focus and needs research.

References

1. Saeid ML, Hruban R, Westra W, et al. Primitive neuroectodermal tumors of the pancreas: a report of seven cases of a rare

- neoplasm. *Am J Surg Pathol*. 2002; 26(8): 1040–1047.
2. O’Sullivan MJ, Perlman EJ, Furman J, et al. Visceral primitive peripheral neuroectodermal tumors: A clinicopathologic and molecular study. *Human Pathology*. 2001;32(10):1109–1115.
 3. Ousadden A, Mazaz A, Amraoui A, et al. Primary hepatic localization of the PPNET (primitive peripheral neuroectodermal tumors): Case report. *Annales de Chirurgie*. 2005;130 (4):254–256.
 4. Doi H, Ichikawa S, Hiraoka A, et al. Primitive neuroectodermal tumor of the pancreas. *Internal Medicine*. 2009;48(5):329–333.
 5. Sarangarajan R, Hill DA, Humphrey PA, et al.: Primitive neuroectodermal tumors of the biliary and gastrointestinal tracts: clinicopathologic and molecular diagnostic study of two cases. *Pediatr Dev Pathol*. 2001;4(2):185–191.
 6. Vakar-Lopez F, Ayala AG, Raymond AK, et al. Epithelial phenotype in Ewing’s sarcoma/primitive neuroectodermal tumor. *International Journal of Surgical Pathology*. 2000;8(1);59–65.
 7. Mani S, Dutta D, De BK. Primitive neuroectodermal tumor of the liver: a case report. *Japanese Journal of Clinical Oncology* 2010;40(3);258–262.
 8. Le Deley MC, Delattre O, Schaefer KL, et al. Impact of EWS-ETS fusion type on disease progression in Ewing’s sarcoma/ peripheral primitive neuroectodermal tumor: prospective results from the cooperative Euro-E.W.I.N.G. 99 trial. *Journal of Clinical Oncology*. 2010; 28(12);1982–1988.