Ewing's Sarcoma of the Adrenal Gland; A Rare Extraosseous Presentation

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Abstract

Ewing sarcoma also known as peripheral primitive neuroectodermal tumors (ES/PPNETs) usually produce in the chest wall, extraosseous soft tissues, and long or flat bones, however only rarely in solid organs. Although they can develop in any part of the body, development in the adrenal glands is very uncommon. We present a case of Ewing sarcoma (PNET) of the adrenal gland and the extraordinary diagnostic and therapeutic challenges faced during its diagnosis. Early detection of extraosseous disease with radiological imaging and the multimodality treatment strategy lowers morbidity and death in Ewing's sarcoma of the adrenal gland.

Keywords: *Ewing's Sarcoma, adrenal gland, extraosseous, primitive, neuroectodermal tumor, small blue cell.*

INTRODUCTION

James Ewing originally characterised the tumours that belong to the Ewing's sarcoma family in 1921. They may be divided into four categories: a) soft tissue-based primitive neuroectodermal tumours (PNET),b) extraskeletal ES (EES),c) malignant small cell tumours of the chest wall (Askin tumour), and d) ES of the bone. Combined, these small round blue cell tumours with identical molecular and histological characteristics are called primitive peripheral neuroectodermal tumours (ES/PNETs), and they are identified by the immunopositivity of CD99 and FLI-1 as well as the translocation of t (2011) [Q12; Q24]. These most frequently develop in flat and long bones. Uncommonly, in soft tissues and solid organs primary have been observed in a variety of surrounding vertebral locales, along the genitourinary system involving kidneys, urinary bladder, and vagina. There have been very few reports of the adrenal gland emerging as the primary site of origin. We address the unexpected diagnostic challenges presented by an additional instance of Ewing's Sarcoma that developed in the adrenal gland.

CASE REPORT

We describe the instance of a 28-year-old girl, afebrile and has no known co-morbidities, who presented to the hospital's emergency department with a complaint of generalized abdominal pain for one day, which was intermittent and accompanied by nausea. Her previous medical and surgical records were uneventful. Tenderness was discovered on physical examination in the right lumber area. An abdominal ultrasound was done which indicated a large ill-defined solid cum cystic mass in the right hypochondrium, raising the possibility of a hydated cyst or an abscess. Her baseline lab workup was later completed, and her echinococcus titers also came back negative. She denies any symptoms of hormonal inconsistencies, and her workup for hormones was nonsignificant. A CT scan was performed, and the lesion was further characterized as a 5.2*9.8 cm mass with a solid cum cystic appearance emanating from the adrenal gland of the right side causing compression effects on the liver and with features associated with

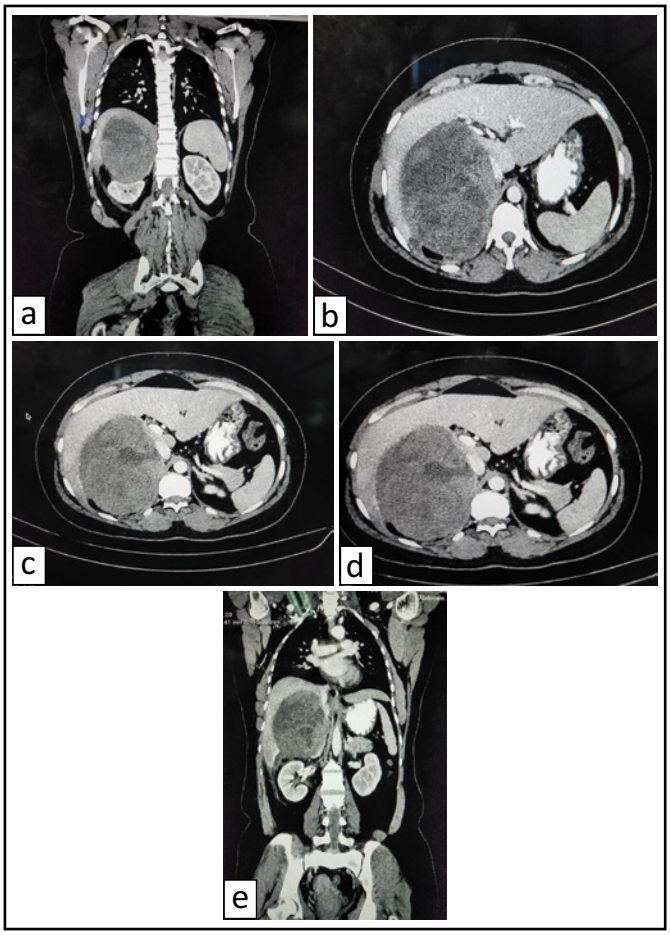

Fig. 1(a-e): A large well-defined heterogenous lesion is seen in the retroperitoneum causing compression over the right kidney **(a)** right adrenal gland is not separately visualized. The mass is also compressing and displacing the liver, IVC **(c)** portal vein.

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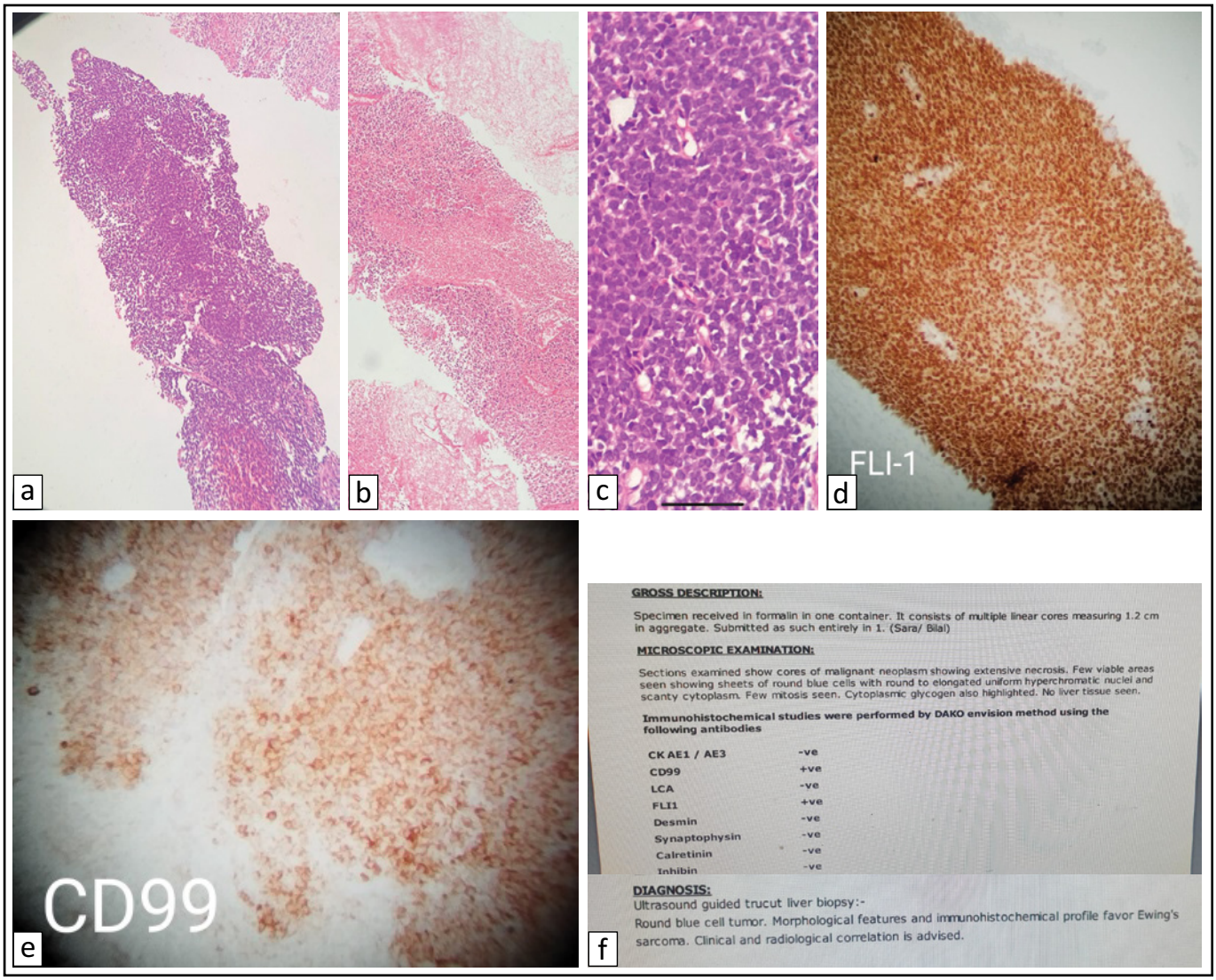

Fig. 2(A & B): Shows sheets of round blue cells with areas of necrosis, **(C, D & E)** rounded hyperchromatic nuclei with scanty cytoplasm, **(F)** histopathology report of the patient.

a tumor or an additional likelihood of liver abscess. Following the findings of the CT scan, a biopsy of the lesion was performed, revealing a small blue cell tumor suggestive of Ewing's sarcoma of the adrenal gland on histopathology which showed. However, she was not eager to get the surgical resection done immediately hence left against medical advice (**Figs. 1 and 2**).

DISCUSSION

The primitive neuroectodermal tumors (PNET), Askin's tumors involving thorax, Extraosseous Ewing sarcoma, with Ewing sarcoma are all a part of the ES/PNET cancer spectrum/family. Variable neuronal growth, increased levels of the glycoprotein CD99 of cell surface [1, 2], and a palisaded and rosette-forming primary indeterminate small round blue cell tumour are typical histological and immunohistochemical characteristics of ES/PNET. The EWSR1 gene has undergone a common nonrandom chromosomal translocation on the 22q12 chromosome, which unites the Ewings Sarcoma/PNET spectrum of cancers irrespective of their anatomic place of genesis or stage of neuronal development [2]. This shifting results in a chimeric transcription protein that fosters unrestrained proliferation of cells and malignancy. As is common with ES/PNET instances [3].

These most frequently develop in flat and long bones. uncommonly, in soft tissues and solid organs primary have been observed in a variety of surrounding vertebral locales, along the genitourinary system involving kidneys, urinary bladder, and vagina. There aren't many cases of the adrenal gland appearing as the major site of genesis [3, 4].

Extraskeletal Ewing sarcoma is diagnosed using the suggested criteria listed below: (a) absence of osseous involvement on MR imaging; (b) non-existence of enhanced uptake in the periosteum or bone next to the tumour in bone scintigraphy static pictures; (c) presence of cytoplasmic glycogen in a lesion made up histologically of small, round, blue tumor cells with no

distinguishing features on light or electron microscope; and (d) absence of osseous involvement [3, 4].

It is widely agreed that the occurrence of Ewing sarcoma outside of the skeleton is between 15% and 20% that of Ewing sarcoma of skeletal [8]. With >90% of cases beginning between the ages of 4 to 25, the majority of cases include children, adolescents, and young adults. With slight male predominance [5].

During X-ray imaging, Ewing sarcoma of extraskeletal location can emerge like a sizable soft-tissue tumor in 50% of cases or as a common-appearing mass. Additionally, severe periosteal response, thickened cortex, bony extension, or adjacent bone degradation can be observed in 25%-42% of cases. The same is true for lesion calcification, which can be seen in up to 25% of instances [6].

The most prevalent clinical symptoms of this tumor are gastrointestinal discomfort and generalized weakness [6]. Unspecific symptoms like a lump, localized pain, and an elevated temperature of that site can be a sign of localized disease. Generalized complaints such as drowsiness, weakness, pyrexia, low Hb, and decreased weight may appear in more severe cases [7]. Our current case's initial presentation is similar to the majority of instances with primary ES of the adrenal, which often begins with flank and abdominal discomfort. Because it shows how primary ES may be detected in the adrenal gland, an unusual location for it, this case report is especially noteworthy [7, 8].

Membranous CD99 immunostaining is a great indicator of ES/PNET and is frequently utilized in mimicking it, however, this does not add as completely specific [8]. Even with the disparity in their age difference for occurrence, it is important to differentiate this from neuroblastoma, particularly the undifferentiated variant, due to histological similarities [8]. Other adrenal tumors including adrenocortical tumors or pheochromocytoma should be distinguished *i.e.*, the lymphoblastic lymphoma, rhabdomyosarcoma, Wilms tumour, synovial sarcoma, and desmoplastic small round-cell tumours are among the CD99-positive small round-cell malignancies that need to be distinguished [9].

The origin of ES is a topic of significant discussion, however it was originally believed to be produced from primitive neuroectodermal cells. Regarding this, various cell types have been proposed as origins, including endothelial, mesodermal, epithelial, neural, and mesenchymal cells. However, a large body of research suggests that mesenchymal stem cells (MSC) could be the initial source of Ewing tumour proliferation [9]. Additionally, nonrandom balanced chromosomal translocations of the EWS gene on chromosome 22 and any number of ETS family genes are frequently found in Ewing tumours. The translocation involving the FLI1 gene on chromosome 11 is the most frequent instance [9]. However, a reciprocal inversion-insertion-translocation pathway that leads to an EWS-ERG fusion gene has also been reported [10]. Given that the most common translocation is t(11;22)(q24;12) [9, 11].

The majority of EES are isolated, superficially, or deeper soft tissue tumours that develop quickly, with an initial presentation size of 5 to 10 cm [11]. The imaging appearance of an adrenal gland ES is that of a massive, well-limited mass that is heterogeneously intensified and has regions of necrosis and haemorrhage [1]. Any small round cell tumor might be taken in the histologic differentials of ES. Based on morphologic and immunochemical investigation alone, a typical ES might be identified however cytogenetic confirmation is required for a definitive diagnosis [10, 11].

The tumor is frequently big and endocrinologically deficient, with the likelihood of again developing or metastasis. Recent therapy consists mostly of either a; Targeted therapy "surgery, radiotherapy, or a combination" and b; Systemic chemotherapy [10].

CONCLUSION

Despite being extremely rare, primary Ewing sarcoma/PNET that develops in the adrenal gland typically manifests as a massive, destructive neoplasm that is challenging to accurately identify by radiological imaging. Their symptoms are frequently imprecise, they should be taken into consideration when making a differential diagnosis for a retroperitoneal mass. Primary diagnosis requires imaging investigations, although histology is still necessary for a definitive diagnosis. EES is a kind of retroperitoneal malignancy that is distinguished by small blue round cells. To determine the best treatment plan for this uncommon tumor, specialized immunohistochemistry labeling and gene tests are also necessary.

CONSENT FOR PUBLICATION

Written informed consent was taken from the participant.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

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Declared none.

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