CASE REPORT

PRIMARY FEMUR NEUROBLASTOMA IN A 16-YEAR-OLD: A CASE REPORT

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ABSTRACT

The incidence of neuroblastomas in individuals aged 10 and above is less than 10%. It is also associated with poor prognosis in older children and adults. This is a case report of a 16-year-old lady with pain and swelling in the left knee. The definitive diagnosis was neuroblastoma in the left distal femur after immunohistochemistry. The patient underwent surgery and chemotherapy. Extremity neuroblastoma, although rare, can occur even in long bones. High index of suspicion, early detection, appropriate surgical intervention, and chemotherapy can improve the prognosis. This report boosts the currently sparse literature on neuroblastomas in adolescents, especially with skeletal tissues as a primary site of lesion.

Keywords: Neuroblastoma, adolescent, femur, treatment

INTRODUCTION

Neuroblastoma is a malignancy that develops mainly from the neural crest of the peripheral sympathetic nervous system.[1] Neuroblastoma has been reported in various locations within the sympathetic nervous system; it commonly affects the sympathetic ganglia or adrenal gland.[1,2] It is the most common form of malignancy in childhood, and the average age at diagnosis is 1 – 2 years.[2] Neuroblastoma constitutes 8-10% of all diagnosed childhood tumours.[3] It seldom affects adolescents or adults, with only 1 in 10,000,000 cases reported worldwide.[3] While extremely rare,

adolescent or adult neuroblastoma of femoral origin has been reported. This report described a case of a 16-year-old with a review of the literature.

CASE PRESENTATION

A 16-year-old presented to the hospital in July 2020 with a complaint of pain and swelling in the left knee. The pain was gradual in onset, with a dull ache, non-radiating, and worse at night. Within a month after the pain began, there was an associated swelling of the distal thigh. Clinical examination revealed a diffuse swelling over the left knee, which was tender to touch and attached to the underlying structures. The left inguinal lymph nodes were palpable, but not tender. She had a restriction of movement of the affected knee.

Figure 1: Picture of the Limb at first presentation

A provisional diagnosis of chondroblastoma with suspicion of osteomyelitis was made after the initial radiological examination. She had an image-guided core needle biopsy, and the initial histology revealed fibrocollagenous tissue with dense infiltration by acute and chronic inflammatory cells. The pathology team advised a repeat biopsy to obtain more tissue for definitive diagnosis.

Unfortunately, the patient defaulted from clinic attendance for 2 months before presenting again with a bigger swelling measuring 15 x 20 cm over the left knee (see Figure 1). X-ray showed lytic lesions over the left patella and left distal femur. An incisional biopsy was done in November 2020, and the histology report showed cellular lesions composed of relatively uniform small and medium-sized oval-shaped cells with hyperchromatic nuclei and scant cytoplasm. The cells appeared in sheets and nests, with a focal presence of osteoid. The immunohistochemistry showed that there was a strong, uniform expression of synaptophysin with weak variable expression of chromogranin. The tumour cells were completely negative for CD99, S-100 protein,

desmin, myogenin, TDT, and broad-spectrum cytokeratins (AE1/3). All these histological features were consistent with neuroblastoma (Figure 2)

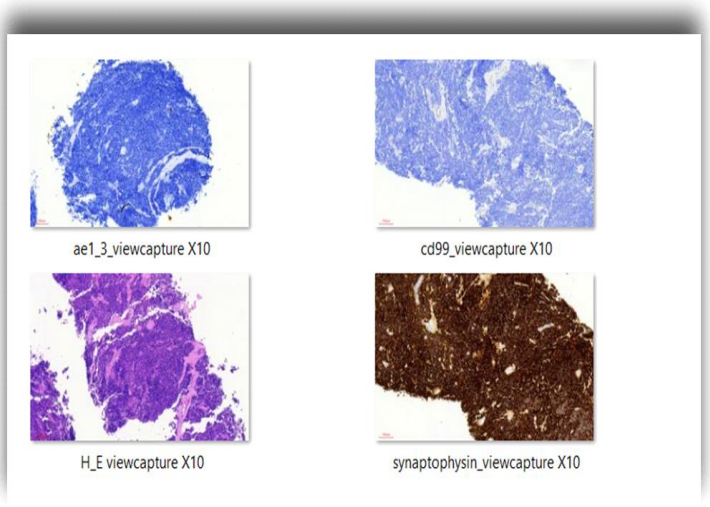

Figure 2: Sections reveal cytoplasmic positivity for Synaptophysin with weak variable expression of Chromogranin A. (10x)

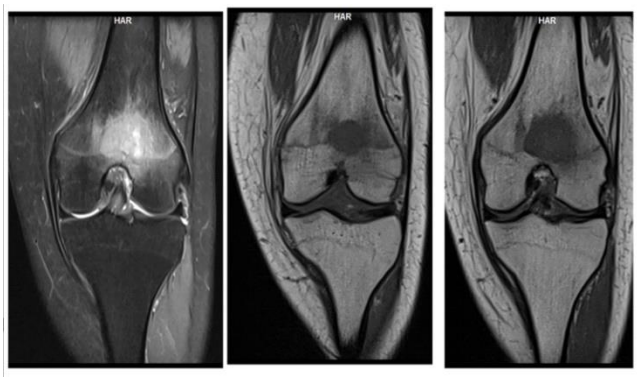

Figure 3: MRI Knee revealing a lytic lesion in the left patella and distal femur, pre-surgery

MANAGEMENT AND OUTCOME

The patient was offered six courses of chemotherapy with intravenous Cisplatin and Etoposide. There was a good clinical response as evidenced by a reduction in the size of the mass clinically and on Magnetic resonance imaging (see Figure 3). The patient had distal femoral resection and reconstruction with plate/cement spacer (see Figures 4, 5, and 6).

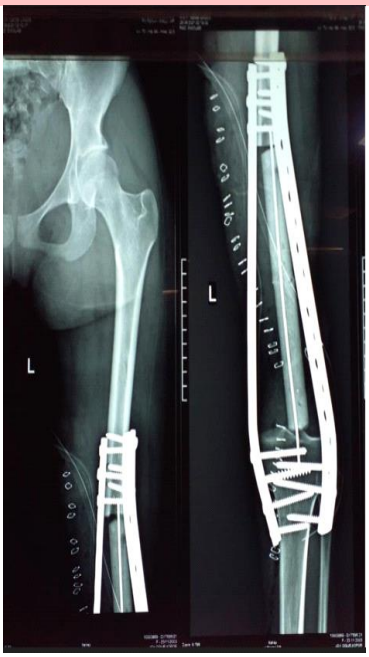

Figure 4: Distal femoral resection and reconstruction with plate/cement spacer

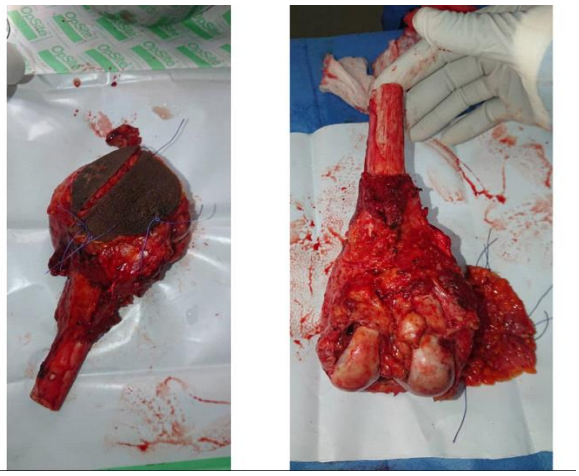

Figure 5: Resected tissue of the distal femur and patella

Following surgery, the patient developed a large pelvic mass, which indicated disease progression. Computed tomography angiography showed a heterogeneously enhancing lesion in the left upper thigh with associated left superficial inguinal, external iliac, and common iliac lymphadenopathy. The left thigh was oedematous. Lower urinary tract symptoms and urinary incontinence were also observed 5 months after surgery. Second-line chemotherapy consisting of intravenous vincristine, Adriamycin, and cisplatin was commenced; she had 2 cycles before succumbing to the disease 2 months later.

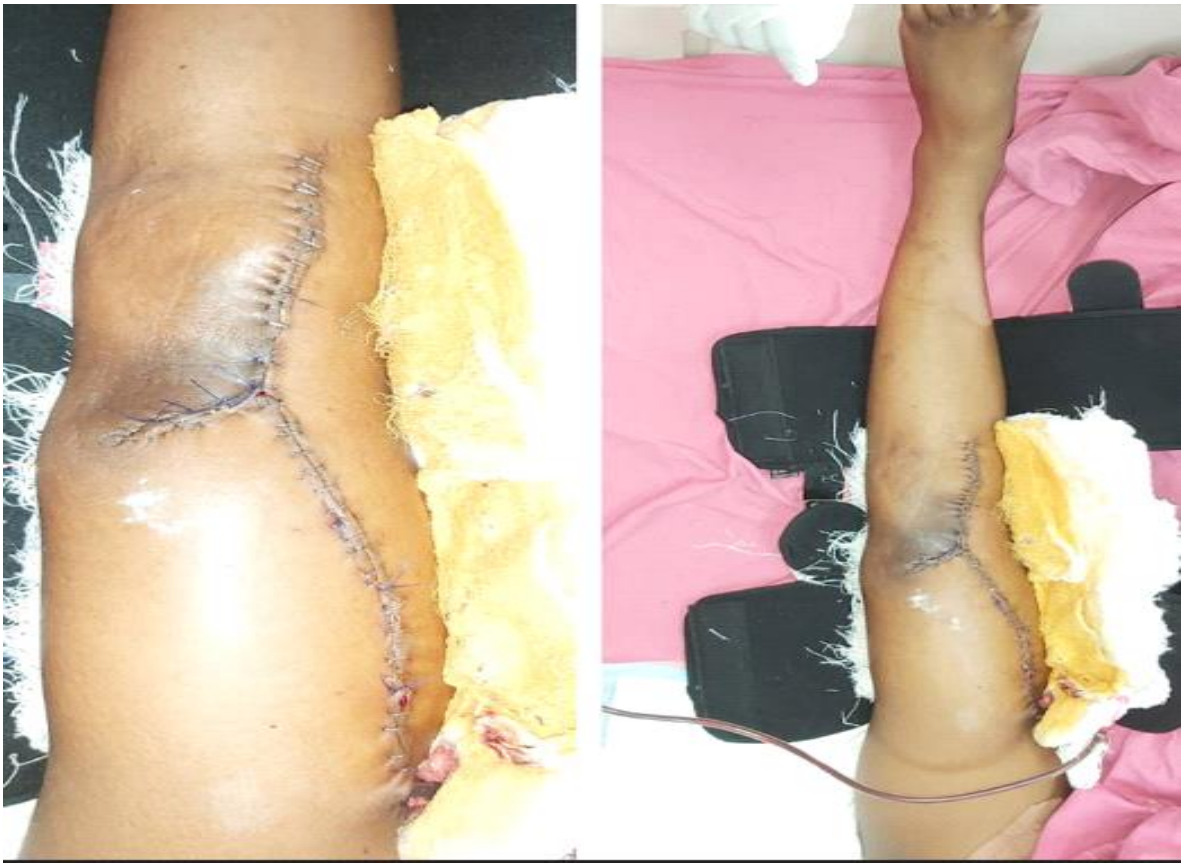

Figure 6: Surgical Scar of Left Limb

DISCUSSION

Developing from primitive sympathetic neural cells in the adrenal medulla or the paraspinal sympathetic ganglia, Neuroblastoma is a sympathetic nervous system tumour with embryonal origins.[5] Although common in children, the incidence of neuroblastoma in adults is very rare, with less than 10% of the total cases occurring in individuals aged 10 and above.[6] The incidence of the disease in the extremities is even rarer. Conter et al studied the incidence of neuroblastoma in 118 patients between 1994 and 2012; there was only one case of extremity neuroblastoma identified in the study.[8]

Generally, the prognosis of neuroblastoma depends on the site and stage at presentation. The most common site is the central nervous system. Bone metastases are seen in over half of neuroblastoma cases, and long bones are among the more common skeletal sites involved.[9] The patient had no previous medical history data and no evidence of a tumor mass present in any other part of the body, thereby complicating the determination of whether this represents a metastasis.

The staging of neuroblastoma utilizes the International Neuroblastoma Risk Group

(INRG) Classification System, which was developed to give a framework for pretreatment risk classification. The absence or presence of image-defined risk variables determines the extent of loco-regional illness (L1 and L2, respectively). Metastatic disease is classified as stage M. The International Neuroblastoma Staging System (INSS) is also used as a post-surgical staging system.[10]

Based on the INRG, this patient was classified in stage L1 of the INRG staging system since no significant findings were found in the imaging modality at presentation. It is recommended that treatment be based on the initial staging. Hence, surgical resection was deemed enough for patients in stage L1. Late-stage presentation in cancer is a major hurdle to effective treatment and survival, especially in low- and middle-income countries.[11] The patient defaulted and returned when the tumour had increased in size, necessitating neoadjuvant therapy with chemotherapy. Patients presenting with other stages often need multimodal therapy—surgery, chemotherapy, and radiotherapy. Radiotherapy can be considered for localised tumours in the primary tumour bed.[12] Previous reports have shown an improvement in event-free and overall survival in high-risk patients using vincristine, etoposide, cyclophosphamide, cisplatin, and doxorubicin combinations.[11] The question regarding induction therapy continues to be discussed, the phase of treatment designed to maximally reduce the burden of disease before subsequent therapy. In previous cooperative group studies, approximately 7-15% of patients experienced early disease progression[3], highlighting the importance of identifying the most effective initial treatment for high-risk patients. Furthermore, it has been shown that subsequent survival outcomes are superior in patients who experience a partial response or better during induction therapy compared with those who have stable or progressive disease initially.[8]

Generally, a better prognosis has been reported for neuroblastoma in the pediatric age group compared to the adult population. According to Conter et al.'s study, stage L1, adult patients had an overall survival of 18.1 years, stage L2a patients had an overall survival of 9.8 years, and stage M patients had an overall survival of 1.6 years.[7] Another study showed that adult patients had the lowest documented 3- and 5-year survival rates (45.9% and 36.3%, respectively), but newborns fared the best, with 86.0% 3-year and 84.6% 5-year overall survival.[4]

CONCLUSION

Extremity neuroblastoma, while rare in adolescents and adults, tends to present differently and often more aggressively than in younger children when it does occur. High index of suspicion, early detection, appropriate surgical intervention, and chemotherapy can improve the prognosis.

DECLARATION OF PATIENT CONSENT

The authors certify that they have obtained all appropriate ethical approval. They understand that her name and initials will not be published, and due efforts will be made to conceal her identity, but anonymity cannot be guaranteed.

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