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Case Report

Pathology Section

A Rare Presentation of Extraskeletal Osteosarcoma in the Arm

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ABSTRACT

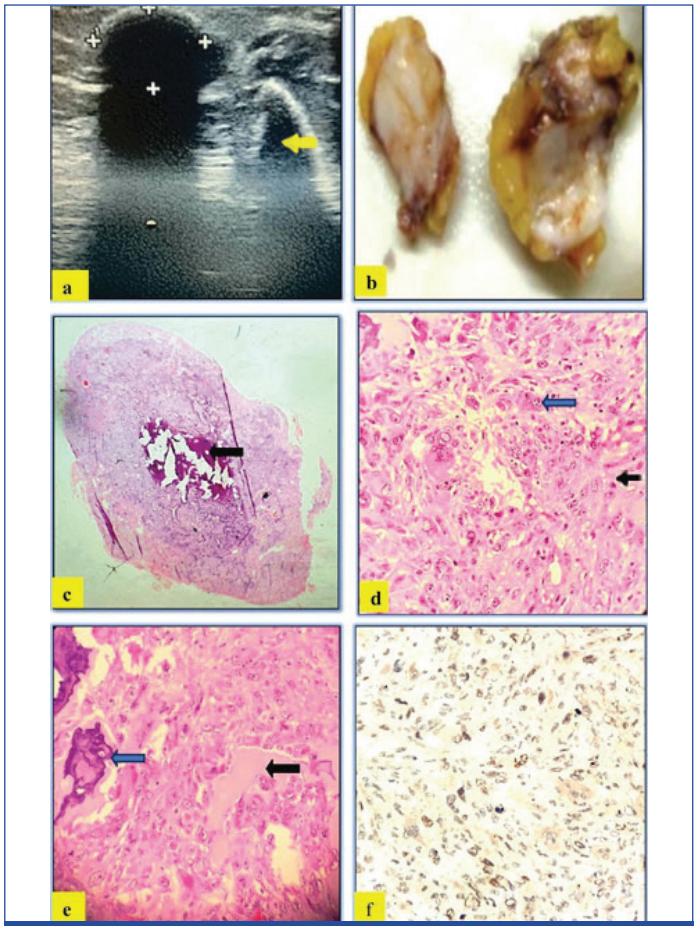
Extraskeletal Osteosarcoma (ESOS) is a rare mesenchymal malignancy that commonly manifests in the fifth to seventh decade of life. It occurs frequently in the deep soft tissues of the lower extremities, in particular the thigh. These are aggressive tumours, showing local recurrence, and almost 90% show a distant metastasis in particular to the lung at the time of diagnosis, so it becomes crucial to diagnose these lesions at an early stage. Here, authors report a case of 56-year-old female, who presented with painless swelling of size 2×2 cm in the lateral aspect of the right arm. There was no history of prior trauma. On imaging studies, it was found to be a subcutaneous swelling with calcification and not attached to the nearby bone. Excision biopsy showed a malignant neoplastic lesion with osteoid surrounded by atypical cells with frequent mitosis, and with heterologous bone and cartilage formation. The diagnosis of ESOS was confirmed using special AT-rich sequence-Binding protein 2 (SAT-B2) immunohistochemistry. The case is presented here because of its rarity of occurrence in the arm, size and utilisation of SAT-B2 in confirming the diagnosis.

Keywords: Calcification, Local recurrence, Metastasis, Osteoid

CASE REPORT

A 56-year-old female presented with painless swelling over the arm for six months. There was no significant previous history of trauma/irradiation. Patient was a known case of diabetes mellitus for 10 years and was on medication. On clinical examination, swelling of size 2×2 cm was present over the lateral aspect of right arm which was hard in consistency with restricted mobility. Ultrasonography of the right arm revealed a well-defined heteroechoic lesion with a focus of calcification suggesting a possibility of myositis ossificans [Table/Fig-1a]. Gross examination of the excision biopsy specimen showed a single globular greyish white tissue mass measuring 2×1.5×0.5 cm. Cut surface showed an apparently circumscribed lesion with central hard grey-white areas surrounded by yellow fibrofatty tissue [Table/Fig-1b]. Microscopically, the scanner view showed a partially circumscribed, encapsulated tumour with atypical cells arranged predominantly in sheets and arranged as hypocellular and hypercellular areas. The hypocellular areas show collagenisation. The center of the tumour showed a heterologous bones and cartilage formation [Table/Fig-1c]. Hypercellular areas showed sheets of atypical cells with moderate to severe pleomorphism, round to oval to spindled vesicular nucleus, prominent eosinophilic nucleoli, and moderate cytoplasm. Many tumour giant cells and bizarre tumour cells were seen. Frequent atypical mitosis was seen about 20 per 10 high power fields [Table/Fig-1d]. Few foci showed osteoid material [Table/Fig-1e].

From the clinical features, gross and the microscopic appearance, the differential diagnosis ranges between benign conditions like myositis ossificans to malignant tumours like ESOS, pleomorphic sarcoma, synovial sarcoma, epithelioid sarcoma, malignant melanoma. The Immunohistochemistry (IHC) markers used to prove ESOS include osteocalcin, osteonectin and SAT-B2. Among these SAT-B2 was used, which showed a nuclear positivity in >80% of the tumour cells [Table/Fig-1f]. From the above histological, radiological and immunohistochemical findings, it was confirmed as ESOS of the arm with well-differentiated subtype. The patient remains disease free now for one year after the surgical management. This case is reported for its rarest clinical presentation and to emphasise the importance of immunohistochemistry.



[Table/Fig-1]: a) Ultrasound picture of the right arm shows the heteroechoic swelling near the bone with no connection to bone (arrow); b) Cut surface of the specimen showing circumscribed lesion with central hard greyish white areas surrounded by fibrofatty tissue; c) Shows a partially circumscribed encapsulated tumour with atypical cells arranged predominantly in sheets as hypocellular and hypercellular areas. The hypocellular areas show collagenisation. The center of the tumour shows a heterologous bone formation (black arrow) and cartilage. (4X, H&E); d) Shows atypical cells with moderate to severe pleomorphism, round to oval to spindled vesicular nucleus, prominent eosinophilic nucleoli, and moderate cytoplasm. Many tumour giant cells and bizarre tumour cells are seen (blue arrow). Frequent atypical mitosis (black arrow) is seen about 20 per 10 high power fields (40X, H&E); e) Shows the lace-like osteoid (black arrow) lined by atypical cells and foci showing heterologous bone formation (blue arrow); f) Shows immunohistochemistry SAT-B2 which is showing nuclear positivity in >80% of the tumour cells.

Author name and year of study	Age (Years)	Gender	Clinical features	Final diagnosis	Treatment given	Outcome
Nakamura T et al., 2010 [2]	79	Male	Complaints of (C/o) painful mass in the left upper arm in the subcutaneous plane measuring about 4 cm across	ESOS	Surgery-wide local excision	Disease free for 12 months
Inoue T et al., 2020 [4]	53	Male	C/o swelling in the right hand measuring about 60×60×40 mm associated with neuralgia. Previous history of trauma present.	ESOS	Surgery-wide local excision, chemotherapy and radiotherapy	Disease free for 46 months
Hoch M et al., (2013) [10]	63	Male	C/o painless swelling in the thigh measures about 7×8×7.5 cm, history of trauma present.	ESOS	Surgery-wide local excision and chemotherapy	Developed metastasis to lung (typically bilateral cannonball appearance) Death within two years of diagnosis
Zhang J et al., (2018) [5]	81	Male	C/o painful mass in the neck measures about 4×3 cm. Dysphagia present.	ESOS	Surgery-wide local excision and radiotherapy	Patient developed multiple local recurrences, followed by several times excision biopsies and radiotherapy.
Current case	56	Female	C/o swelling over the right arm measuring 2×1.5×0.5 cm	ESOS	Excision biopsy	Disease free since one year

[Table/Fig-2]: Similar cases published in the literature [2,4,10,5].
ESOS: Extraskeletal osteosarcoma

DISCUSSION

Extra skeletal osteosarcoma is a rare malignant mesenchymal neoplasm. It accounts for about 1-2% of all soft tissue sarcoma and approximately 2-5% of all osteosarcomas [1]. It is composed of atypical cells producing osteoid, heterologous bone and/or chondroid material, without involving adjacent bone or periosteum [1]. The ESOS was first described by William in 1941 [2]. It is more common in the fifth and sixth decade of life, at an average age of 47.5 to 61 years [3]. Majority of these tumours occur in the extremities in particular lower (46%), upper (20.5%), rarely seen in the retroperitoneum (17%) [4]. Most of the patients will have a previous history of trauma (12.5%) or radiation therapy (4-13%) [4]. In a previously irradiated area it will take approximately 2 to 40 years for the development of tumour [4,5]. Histologically the tumour shows neoplastic lace-like osteoid lined by malignant cells most of them are osteoclast type. Few bony fragments and cartilage were also seen with many atypical mitosis. Almost all the major subtypes of OS seen in bones are seen in ESOS the most common one being an osteoblastic variant, followed by fibroblastic variant, chondroblastic variant, telengectatic variant, small cell and well-differentiated. The current case belongs to the extremely rare well-differentiated subtype which is composed of abundant bone deposited in well formed trabeculae surrounded by atypical spindle cell components [6].

The common differential diagnosis includes myositis ossificans and malignant tumours like ESOS, pleomorphic sarcoma, synovial sarcoma, epithelioid sarcoma, and malignant melanoma. There were no zonal phenomena, and the tumour is composed of sheets of atypical cells and atypical mitosis, these features rule out myositis ossificans. In most of the above mentioned malignant neoplasms, the osteoid or bone formation is just a part of the tumour and is relatively well-differentiated. These tumours are not associated with the disorderly pattern and the neoplastic osteoid/bone lined by the pleomorphic cells of osteosarcoma [1]. For confirming osteosarcoma, the commonly used immunohistochemistry markers include osteocalcin, osteonectin and SAT-B2. Authors used SAT-B2, which showed nuclear positivity in the tumour cells [7]. In the elderly, the prognosis of ESOS is better than OS [8]. The poor prognostic indicators for ESOS include larger tumour size (>5 cm), older age, axial tumour site, and metastasis.

Nakamura T et al., suggest that tumour size less than five cm and subcutaneous location of the tumour are some of the good prognostic factors and these patients have a better survival even with wide local excision without subsequent chemotherapy [2]. For lesions less than 5 cm the chance of survival is increased to 30 months [9].

Five year survival rates of ESOS are about 66% to 77% with multiagent chemotherapy and wide resection which is higher when compared with surgery alone (<25 to 50%) [4,5]. In the present case, the tumour size is about 2×1.5×0.5 cm, and the patient showed a very good prognosis even with just an excision biopsy, still the patient is under follow-up for further metastasis. So, early diagnosis and treatment are most important for management of ESOS [Table/Fig-2] [2,4,5,10].

With a PubMed search of ESOS in arms, we found only 14 cases that have been reported till now. With a search of subcutaneous ESOS in arms, only two published cases were there in the literature and the third is our case and, it is the smallest of all these tumours.

CONCLUSION(S)

Extra skeletal osteosarcoma is a rare malignant neoplasm and its presentation as a small swelling in the arm is extremely rare. Since the early identification and treatment of this tumour plays a great role in the prognosis of the patients, differentiating it from other neoplasms is very important. Microscopic features of osteoid matrix lined by pleomorphic tumour cells with frequent atypical mitosis and heterologous bone formation are the hallmark feature of extraskeletal osteosarcoma. Immunohistochemistry, mainly osteocalcin and SAT-B2 helps us to differentiate from the other neoplasms that produce heterologous bone formation.

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