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PRIMARY LEIOMYOSARCOMA OF BONE OF SACRUM: A RARE CASE REPORT

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ABSTRACT **Introduction:** Primary leiomyosarcoma of the bone (PLB) is an extremely rare, invasive, and shows highly aggressive behaviour with limited treatment options and without appropriate treatment has poor prognosis. PLB most commonly affects bones around the knee joint, usually originating from smooth muscle tissue, though its exact origin within bones remains unclear. The molecular entity and biological properties of LMS have not yet been clarified. We are hereby reporting a rare case of PLB in women. **Case Summary:** A 51-year-old female bounded to wheel chair presented to Radiation Oncology out-patient department (OPD) with lower back pain. On radiological evaluation with MRI, it showed expansile mass lesion involving right sacrum and ilium. After evaluating her symptoms, she underwent biopsy of sacral lesion it was diagnosed primary leiomyosarcoma of bone. After thorough evaluation she received palliative radiation therapy followed by combination chemotherapy of 6 courses. **Conclusion:** PLBs are rare in nature and dedicated clinical trials must undertake with integration of chemotherapy, radiation and surgery. The multi-disciplinary approach should be enforced to give maximum benefit to patient diagnosed with PLB.

KEYWORDS : Primary leiomyosarcoma of bone, chemotherapy, radiation therapy

INTRODUCTION:

Primary leiomyosarcoma of the bone (PLB) is a rare malignant spindle cell tumor, with an incidence of less than 0.7%.[1] The presence of this tumor primarily in the sacral bone is even rarer. PLB most commonly affects bones around the knee joint, usually originating from smooth muscle tissue, though its exact origin within bones remains unclear. [2] This tumor is generally aggressive and associated with poor outcomes. The lesion on imaging's is easily confused with those of osteolytic osteosarcoma and metastatic leiomyosarcoma, and diagnosing PLB depends on expert pathological methods. [3] Most published studies on PLB report a poor prognosis, with an overall survival (OS) rate of only 35-50%. [4] Here, we report a case of PLB in an uncommon location.

CASE SUMMARY:

A 51-year-old female, wheelchair-bound, presented to the Radiation Oncology outpatient department (OPD) with complaints of lower back pain radiating to the right lower leg. The pain was described as sharp and present throughout the day, with partial relief from conventional analgesics. The patient reported significant impairment in her ability to perform daily activities independently. Neurological examination revealed weakness and reduced power in the right lower limb. General physical examination and other systemic examinations were unremarkable. On radiological evaluation using Magnetic resonance imaging (MRI) of lumbosacral spine showed a lytic expansile mass lesion in right sacral ala and right iliac bone which was T1 hypointense and T2 hyperintense with adjacent soft tissue component (figure 1 [A]). Contrast enhanced computed tomography (CECT) of abdomen a lytic lesion measuring 5.5 × 3.3 cm was seen in right sacral ala, right iliac bone, ischial tuberosity involving right sacro-iliac joint with significant soft tissue component extending into neural foramen (figure 1 [B,C]).The patient underwent a tru-cut biopsy of the right sacral ala under aseptic conditions, and the specimen was sent for histopathological evaluation. The evaluation revealed Hematoxylin and eosin (H & E) with pleomorphic hyperchromatic nucleus with round to spindle cells, on IHC (immune-histochemistry) vimentin positivity and focal smooth muscle actin (SMA) positivity (figure [D,E,F], while cytokeratin, Myogenic differentiation antigen 1 and S100 was negative. After a thorough examination of the specimen, the histopathological team diagnosed leiomyosarcoma of bone. Orthopedic surgery opinion was taken and due to unresectability of the tumor, patient was found unfit for surgery. After thorough consideration involving the patient and multi-disciplinary team, palliative radiation therapy (RT) by antero-posterior field of 20 Gy/ 5 fractions over five days to involved site was administered and patient tolerated well without developing any reactions to RT. It was followed by 6-cycles of 3-weekly intravenous combination chemotherapy with VAC (vincristine 1.4 mg/m^2, doxorubicin 40 mg/m^2 and cyclophosphamide 750 mg/m^2) regimen. After completion of chemotherapy, patient was kept on follow-up and on first visit after one month patient did not have symptomatic relief and was scheduled for CECT to assess the response to the tumor. Later on, patient was lost to follow-up.

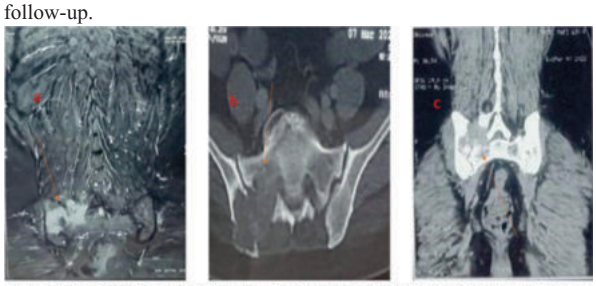

Figure 1: [A]Coronal MRI of sarco-iliac region showing expansile T2-hyperintense lesion involving right sacro-iliac joint and adjacent sacrum and ilium. [B] Axial CT of sacro-iliac joint showing expansile lytic lesion involving involving right sacro-iliac joint and adjacent sacrum and ilium. [C] Coronal reformatted CECT of sacro-iliac joint showing expansile enhancing soft tissue attenuation lytic lesion involving right sacro-iliac joint and adjacent to sacrum and ilium.

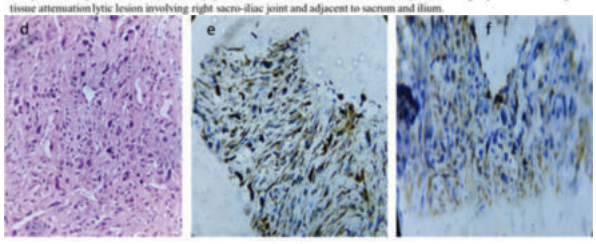

Figure 2: [D] H & E stain (40 x) demonstrating pleomorphic, hyperchromatic nucleus, round to spindle cells. [E] IHC: Vimentin stain positive . [F] IHC –Smooth muscle actin positive

DISCUSSION:

According to published literature the first case of Primary leiomyosarcoma of bone was firstly reported by Evans and Sanerkin in 1965. [5] The mean age of presentation PLB was at 44 years with men being slightly more affected than women. [6,7]

Given the rarity of PLB, occurrences in the sacrum are even rarer. [7-9]. Isolated reported cases of PLB also indicate the predilection towards femur. [10-17]

Clinical presentation includes mainly pain, immobility, weakness, and neurological deficits according to involved site. Sometimes patient may present as asymptomatic pathological fracture due to the osteolytic nature of the tumor causing cortical destruction, this symptom is reported in at least 15% of patients. [18]

The diagnosis of PLB is a complex task and requiring centres to be equipped with experienced pathological team. PLB is identified by presence of morphologically typical spindle cell, arranged in fascicles. The absence of osteoid or chondroid matrix and the presence of extensive trabecular bone are highly specific indicators of PLB. [19]

The immunohistochemistry consists of presence of desmin, actin and h-caldesmon represents most vital element of the smooth muscle differentiation. Although presence of at least 2 is sufficient the for diagnosis. [20]

Identifying these lesions radiologically is challenging because multiple other pathologies, such as Ewing's sarcoma, osteosarcoma, septic arthritis, and metastasis, can mimic lytic lesions with indistinct margins causing cortical destruction and a moth-eaten appearance on Computed tomography (CT) scans involving the ilium and sacrum. This can lead to false diagnosis of the condition. [21] Although radiological examinations do not provide a specific diagnosis, they reveal the precise extent of the disease process. This information complements clinical and pathological findings, aiding the clinician in reaching at appropriate therapeutic intervention. [15]

The primary prognostic factors contributing to decreased survival of patients were age >40 years, size >8 cm, the presence of a pathological fracture, amputation, positive margins, and a poor response to preoperative chemotherapy. [22] patients with high grade sarcoma, nodal metastasis, distant metastasis at presentation also had negative impact on survival and increased risks of local recurrence as well. [22-24]

The only prospective study was conducted by Palmerini et al consisting of 20 patient and proved that certain drugs namely cisplatin, ifosfamide, doxorubicin and methotrexate have huge role to play in PLB. Furthermore, he concluded that PLB can be treated like osteosarcoma only in patients aged above 40 years. [25] Historically the treatment for PLB is en bloc resection of tumor with wide margins and amputation incase tumor involves neurovascular bundles or presented with untreatable fractures. [9]

In the event of unresectability or metastasis radiation therapy has given some benefit to patients. Boyce-Fappiano et al. discovered that hypo-fractionated radiation therapy significantly relieved patients, with a median dose of 45 Gy delivered over 15 fractions in 3 weeks targeting the tumor. Their study concluded that RT for unresectable or metastatic sarcoma could provide durable local control, symptom relief, and breaks in systemic therapy with limited toxic effects. [26] However, controversy exists regarding the role of radiotherapy in PLB due to the lack of dedicated trials. The rarity of PLB results in a paucity of data, forcing clinicians to rely on selected case reports and case series to understand the disease better. [27]

In our case patient presented with unresectable disease, due to poor performance status she was offered palliative radiotherapy 20Gy/5 fractions over five days, followed by combination chemotherapy which did not offer her any symptomatic relief and did not relieve any of her symptoms.

Overall, our patient did not benefit from conventional therapy adopted similar to leiomyosarcoma of soft tissue, did not also respond to external beam radiation therapy, probably due to insufficient dose or resistant behaviour towards sarcoma remains questionable.

CONCLUSION:

Early detection and treatment are vital; in rare disease it allows clinician to formulate the personalised treatment plan that could probably prolong survival of patient. Role of radiation in event of unresectability and metastasis remains unexplored area. Strategic clinical trials must take place including all the stages of PLB integrating the active role of surgery, chemotherapy, radiation to get the desirable outcome of patients.

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REFERENCES

1. Kumar P, Singh P, Parida GK, Singhal T, Ayyanar P, Pavithra R, et al. Rare case of primary leiomyosarcoma of bone – Findings on 18F-fluorodeoxyglucose positron emission tomography/computed tomography. Indian J Nucl Med. 2024;39:52-4.
2. Mori T, Nakayama R, Endo M, Hiraga H, Tomita M, Fukase N, et al. Forty-eight cases of leiomyosarcoma of bone in Japan: A multicenter study from the Japanese musculoskeletal oncology group. J Surg Oncol. 2016;114(4):495–500. doi:10.1002/jso.24322.
3. Wang GY, Lucas DR. Primary Leiomyosarcoma of Bone: Review and Update. Arch Pathol Lab Med. 2019;143(11):1332-1337. doi:10.5858/arpa.2019-0375-RA.
4. Stramare R, Orsatti G, Attar S, et al. Imaging features, differential diagnosis and management of leiomyosarcomas: case series and review of the literature. J Canc Sci Ther. 2016;8:84–91.
5. Evans DM, Sanerkin NG. Primary leiomyosarcoma of bone. J Pathol Bacteriol. 1965;90:348–50.
6. Fletcher CDM, Bridge JA, Hogendoorn PCW, Mertens F, editors. WHO Classification of Tumours of Soft Tissue and Bone. 4th ed. Lyon: IARC Press; 2013. 244–392 p. (World Health Organization classification of tumours; vol. 5).
7. Antonescu CR, Erlandson RA, Huvos AG. Primary leiomyosarcoma of bone: A clinicopathologic, immunohistochemical, and ultrastructural study of 33 patients and a literature review. Am J Surg Pathol. 1997;21:1281-94.
8. Wu Z, Cheng L, Cao Q, Ye S, Yu S, Sun M, et al. Case report and literature review: Primary leiomyosarcoma of the bone in the trochanteric region of the femur. Front Surg. 2023;9:1045307. doi:10.3389/fsurg.2022.1045307.
9. Brewer P, Sumathi V, Grimer RJ, et al. Primary leiomyosarcoma of bone: analysis of prognosis. Sarcoma. 2012;2012:636849. doi:10.1155/2012/636849.
10. Recine F, Bongiovanni A, Casadei R, Pieri F, Riva N, De Vita A, et al. Primary leiomyosarcoma of the bone: a case report and a review of the literature. Medicine (Baltimore). 2017;96(45)doi:10.1097/MD.0000000000008545.
11. Ngo AV, Bartolotta R, Chew F, Linnau K. Primary skeletal leiomyosarcoma. Radiology Case Reports. 2012;7:743.
12. Wang B, Han Y, Liu J, Zhang X, Zhuo H, Jiang Y, Deng Y. Case report: the dissociated response and clinical benefit of primary leiomyosarcoma of the bone treated with penpulimab plus lenvatinib after failed multi-line therapy. Front Pharmacol. 2023;14:1239699. doi:10.3389/fphar.2023.1239699.
13. Frings A, Leithner A, Liegl-Atzwanger B. Leiomyosarcoma of Bone: A Case Report. Case Rep Med. 2011;2011:1-4.
14. Georgeanu VA, Pletosu RI, Vlădescu TC, Bondari S, Crăciunescu A, Russu OM. Primary bone leiomyosarcoma of distal femur: case report and literature review. Rom J Morphol Embryol. 2022 Dec 28;63(3):569–74.
15. Shetty KJ, Kishan Prasad HL, Kotian S, Joshi D, Mathias L, Bhat S. Leiomyosarcoma of the bone: Unveiling the mystery of a spindly ossein. J Cancer Res Ther. 2024;20(3):1100-1102. doi:10.4103/jcrt.jcrt_265_22.
16. Yang Y, Ma L, Li L, Liu H. Primary leiomyosarcoma of the spine: A case report and literature review. Medicine (Baltimore).2017;96(9). doi:10.1097/MD.0000000000006227.
17. Jin X, Chen AL, Liu W. A rare case report of primary leiomyosarcoma of distal femur bone in a patient with multiple myeloma and review of literature. N A J Med Sci. 2020;1(1):024-027. doi:10.7156/najms.2020.1301024.
18. Khoddami M, Bedard YC, Bell RS, Kandel RA. Primary leiomyosarcoma of bone: report of seven cases and review of the literature. Arch Pathol Lab Med. 1996;120(7):671-675.
19. Adelani MA, Schultenover SJ, Holt GE, Cates JM. Primary leiomyosarcoma of extragnathic bone: clinicopathologic features and reevaluation of prognosis. Arch Pathol Lab Med. 2009;133(9):1448-1456. doi:10.5858/133.9.1448.
20. Weiss SW, Goldblum JR. Enzinger FM, Weiss SW. Leiomyosarcoma. Soft Tissue Tumors 4th ed. The CV Mosby Co, St Louis, MO:2001; 727–48.
21. Abdeljelil NB, Mabrouk AB, Bellalah A, Njima M, Hadhri R, Zakhama A. Primary leiomyosarcoma of femur: A rare entity-Case report and review of literature. J Clin Images Med Case Rep. 2021; 2(2): 1054.
22. Pakos EE, Grimer RJ, Peake D, Spooner D, Carter SR, Tillman RM, et al. The 'other' bone sarcomas: prognostic factors and outcomes of spindle cell sarcomas of bone. J Bone Joint Surg Br. 2011;93:1271–8.
23. Bathan AJ, Constantinidou A, Pollack SM, Jones RL. Diagnosis, prognosis, and management of leiomyosarcoma: recognition of anatomic variants. Curr Opin Oncol. 2013;25(4):384-389. doi:10.1097/CCO.0b013e3283622c77
24. Abraham JA, Weaver MJ, Hornick JL, Zurakowski D, Ready JE. Outcomes and prognostic factors for a consecutive case series of 115 patients with somatic leiomyosarcoma. J Bone Joint Surg Am. 2012;94(8):736-744. doi:10.2106/JBJS.K.00460.
25. Palmerini E, Reichardt P, Sundby Hall K, Bertulli R, Bielack SS, Comandone A, et al. Outcome of rare primary malignant bone sarcoma treated with multimodal therapy: Results from the EUROpean Bone Over 40 Sarcoma Study (EURO-B.O.S.S.). Cancer. 2023;129(22):3564-3573. doi:10.1002/cncr.34964.
26. Boyce-Fappiano D, Damron EP, Farooqi A, Mitra D, Conley AP, Somaiah N, et al. Hypofractionated Radiation Therapy for Unresectable or Metastatic Sarcoma Lesions. Adv Radiat Oncol. 2022;7(3):100913. Published 2022 Feb 5. doi:10.1016/j.adro.2022.100913.
27. Gusho CA, Blank AT, Gitelis S. Comparison of clinicopathological features and outcomes in patients with primary leiomyosarcoma of bone and soft tissue. J Surg Oncol. 2021;123(5):1274-1283. doi:10.1002/jso.26404