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Case Report

Pathology Section

Recurrent High-grade Spindle Cell Sarcoma of the Thigh Mimicking Dermatofibrosarcoma Protuberans and Malignant Melanoma: A Case Report

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ABSTRACT

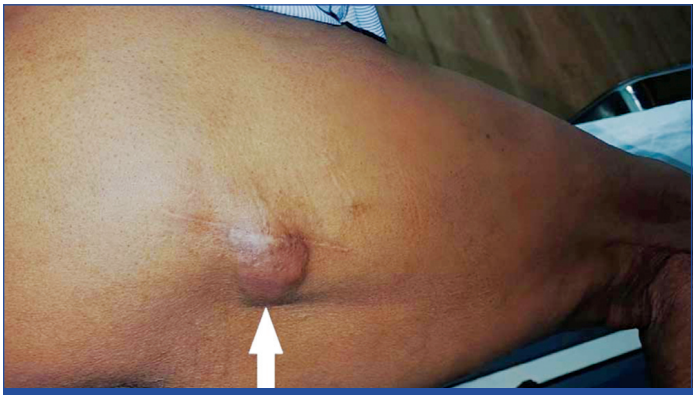
High-grade Spindle Cell Sarcomas (SCS) are rare, aggressive soft-tissue tumours that can be extremely challenging to diagnose, particularly when recurrent or when they morphologically overlap with other spindle-cell neoplasms. This case involves a 76-year-old Indian female who presented with a recurrent right posterolateral thigh swelling six months after surgical excision of a poorly differentiated liposarcoma. The swelling was firm, non tender, and subcutaneous, with no associated systemic symptoms. Primary Fine-Needle Aspiration Cytology (FNAC) revealed polygonal and spindle-shaped cells with hyperchromatic nuclei, mild pleomorphism, and prominent nucleoli, leading to an impression suggestive of malignant melanoma. Ultrasonography (USG) showed a heterogeneous hypoechoic lesion, while Magnetic Resonance Imaging (MRI) demonstrated a 3.5×2.6×1.6 cm subcutaneous mass with mild septal thickening, scarring, and postcontrast enhancement—findings suggestive of recurrent liposarcoma. Intraoperative frozen-section analysis shifted the differential diagnosis to Dermatofibrosarcoma Protuberans (DFSP) versus liposarcoma due to the spindle-cell morphology. Gross examination of the total specimen (measuring 6.5×5×4 cm) revealed a 2.8×1.8×1.5 cm protuberant, greyish-white, firm, lobulated nodular mass arising from the skin. Histopathological evaluation showed a storiform and fascicular pattern of spindle-cell proliferation infiltrating the dermis and subcutis, with pleomorphism and frequent mitoses, confirming a diagnosis of high-grade SCS. This case highlights the limitations of FNAC and frozen-section analysis in the evaluation of recurrent soft-tissue tumours and underscores the importance of integrating histopathology, imaging findings, and prior clinical history for accurate diagnosis.

Keywords: Dermis, Liposarcoma, Magnetic resonance imaging, Soft-tissue tumour, Storiform pattern

CASE REPORT

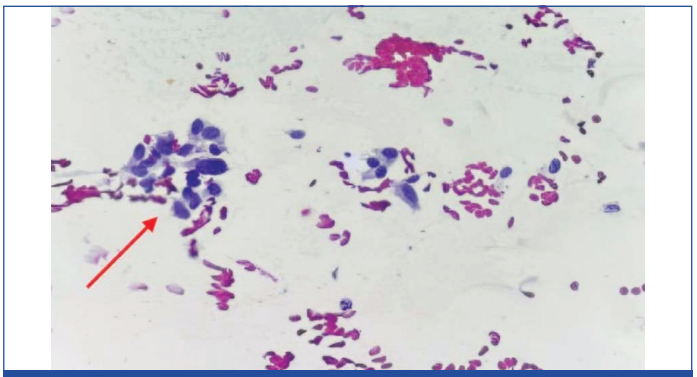
A 76-year-old Indian female presented to the surgical outpatient department of a tertiary care hospital with a recurrent swelling in the right posterolateral thigh. She had previously undergone surgical excision of a soft-tissue lesion at the same site, which was histopathologically confirmed as poorly differentiated liposarcoma six months earlier. The patient remained asymptomatic initially, but within a few months, she noticed a progressively enlarging swelling at the same operative site. There was no history of pain, discharge, trauma, fever, or other systemic complaints.

On examination, a well-healed surgical scar was noted over the right posterolateral thigh. Beneath the scar, a palpable, firm, non tender, non mobile swelling measuring approximately 2×3 cm was detected, as shown in [Table/Fig-1]. There was no local rise in temperature or regional lymphadenopathy.



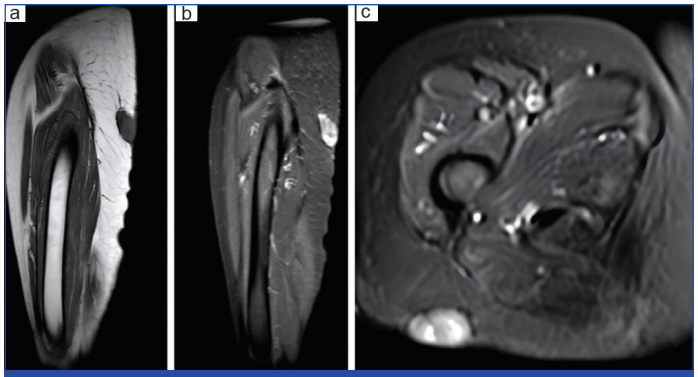
[Table/Fig-1]: Posterolateral aspect of right thigh showing recurrent swelling of size 2 x 3 cm, with healed surgical scar.

FNAC of the lesion yielded cellular material consisting of polygonal and spindle-shaped cells arranged singly and in loose clusters. The cells exhibited enlarged, hyperchromatic nuclei with coarse chromatin, mild pleomorphism, prominent nucleoli, and infrequent mitoses, as shown in [Table/Fig-2]. The background contained lipocytes, lipid vacuoles, and areas of haemorrhage. Based on these cytological features, a provisional diagnosis of recurrent malignant melanoma was made.



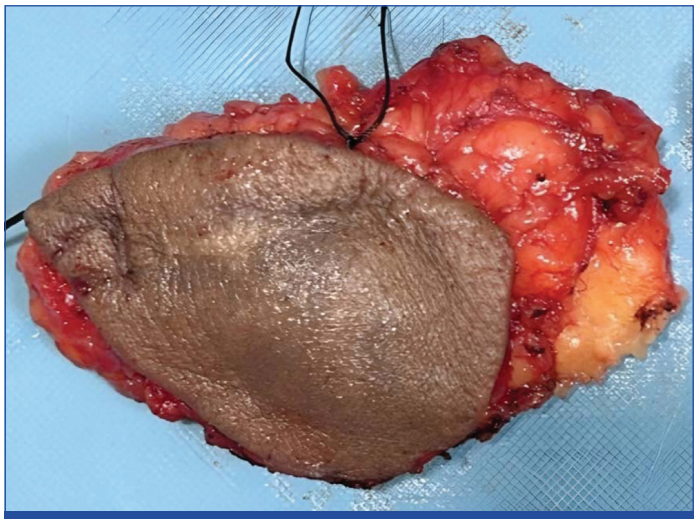
[Table/Fig-2]: Spindle and polygonal cells in cluster as well as isolated cells showing mild pleomorphism and prominent nuclei with granular uneven chromatin and frequent nucleoli. (H&E, X400).

USG demonstrated a 3×1.1 cm heterogeneous hypoechoic lesion in the subcutaneous plane. MRI revealed a 3.5×2.6×1.6 cm lesion located in the posterolateral subcutaneous plane, isointense on both T1- and T2-weighted sequences, with mild septal thickening, linear scarring, and diffuse postcontrast enhancement. Imaging features, combined with the patient's prior histology, were compatible with recurrent liposarcoma, as shown in [Table/Fig-3].

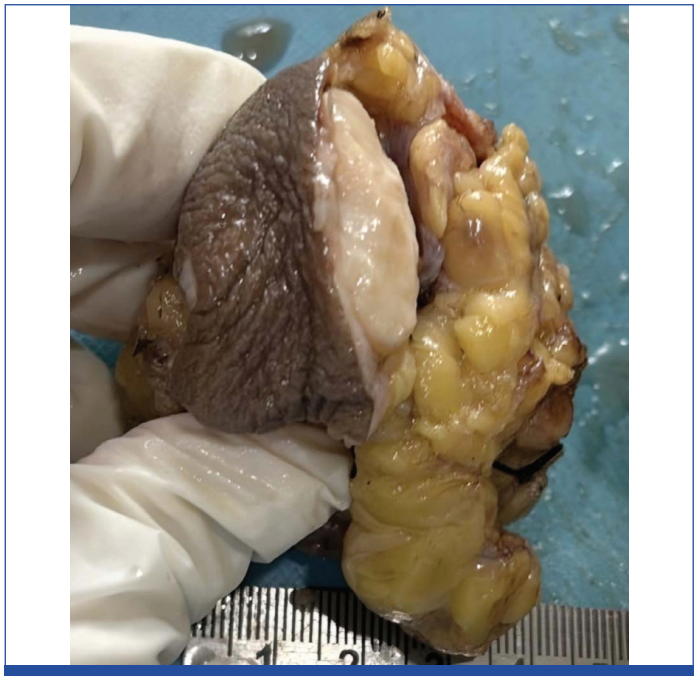


[Table/Fig-3]: MRI of the right thigh showing a subcutaneous lesion consistent with recurrent liposarcoma: a) Sagittal T1-weighted image showing the 3.5×2.6×1.6 cm lesion in the posterolateral subcutaneous plane; b) Postcontrast T1-weighted fat-suppressed image showing diffuse enhancement of the lesion; c) Axial T2-weighted image demonstrating mild septal thickening and scarring.

The frozen-section specimen consisted of irregular greyish-yellow fibrofatty tissue measuring 9.5×5.5×2.5 cm, with an attached skin flap measuring 7×5×0.5 cm, as shown in [Table/Fig-4]. The histopathology specimen measured 6.5×5×4 cm in total, and a protuberant nodular mass measuring 2.8×1.8×1.5 cm was identified arising from the skin, as shown in [Table/Fig-5]. The cut surface of the mass was greyish-white, firm, and lobulated.

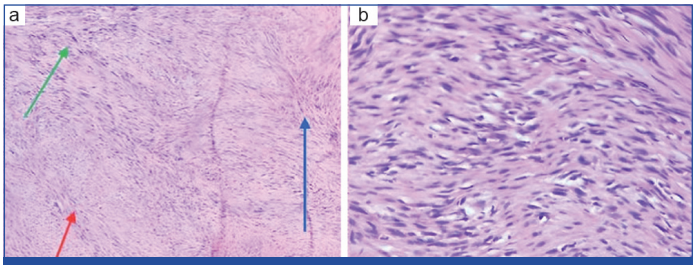


[Table/Fig-4]: Frozen section specimen showing irregular, greyish-yellow fibrofatty tissue measuring 9.5×5.5×2.5 cm, with attached skin flap of 7×5×0.5 cm.



[Table/Fig-5]: Gross histopathology specimen showing a protuberant, greyish-white, firm, lobulated mass arising from the skin.

Microscopic examination demonstrated a storiform and fascicular pattern of spindle-cell proliferation infiltrating the dermis and subcutis. The spindle cells exhibited elongated, hyperchromatic nuclei with pleomorphism and frequent mitotic figures, as shown in [Table/Fig-6].



[Table/Fig-6]: Storiform and fascicular spindle-cell proliferation with nuclear pleomorphism and frequent mitotic figures infiltrating dermis and subcutis a-blue arrow- storiform (cart wheel) pattern; red arrow- fascicular pattern; green arrow-hyperchromatic nuclei with pleomorphism (H&E 100x); b- densely packed spindle cells with nuclear pleomorphism and mitotic activity (H&E 400x).

The frozen-section diagnosis suggested Dermatofibrosarcoma Protuberans (DFSP) versus liposarcoma, as both entities share overlapping features. DFSP typically shows uniform spindle cells with minimal atypia and diffuse CD34 membranous positivity, whereas liposarcoma demonstrates pleomorphism with variable fat differentiation. However, the morphology on frozen section was insufficient to establish a definitive diagnosis.

In this case, diagnostic findings varied across modalities. FNAC indicated malignant melanoma, frozen section suggested DFSP, while radiology suggested recurrent liposarcoma. No Immunohistochemistry (IHC) or molecular tests were performed; therefore, the final diagnosis relied on histopathological features in correlation with the previous diagnosis and imaging. The final diagnosis was established as recurrent high-grade SCC of the right posterolateral thigh, morphologically resembling DFSP but lacking confirmatory IHC support.

The patient was placed under general anaesthesia after obtaining preanaesthetic clearance, and wide local excision of the sarcoma over the posterolateral aspect of the right thigh was performed. The postoperative period was uneventful. On the second postoperative day, dressing inspection under aseptic precautions showed a healthy suture line without soakage or gaping. The patient remained haemodynamically and vitally stable throughout the hospital stay.

She was administered intravenous antibiotics (Inj. Augmentin 1.2 g TDS), a proton-pump inhibitor (Inj. Pantoprazole 40 mg once daily), an antiemetic (Inj. Emset 4 mg every 8 hours), analgesics, and supportive oral medications including Pantoprazole, Neurobion Forte, Limcee, and Supradyn during hospitalisation. On discharge, vital parameters were stable (BP 138/78 mmHg, PR 82 bpm), and the surgical wound was healthy with no discharge or gaping.

The patient was advised regular monitoring and long-term follow-up in the surgical oncology outpatient department to detect any evidence of local recurrence.

DISCUSSION

High-grade SCS, which encompass undifferentiated pleomorphic sarcoma, fibrosarcoma, and leiomyosarcoma, are rare and aggressive soft-tissue malignancies characterised by the proliferation of spindle-shaped cells [1]. Historically, the term SCS represented a broad category of soft-tissue tumours; however, advances in histopathology and molecular profiling have narrowed the classification and helped distinguish SCS from other spindle-cell neoplasms [2,3]. These tumours most commonly affect the extremities of elderly individuals and typically present as painless, slowly growing masses that are difficult to diagnose at an early stage [3]. Epidemiological data indicate that SCS constitutes a small yet significant proportion of soft-tissue sarcomas, with high-grade

lesions accounting for the majority (92%) and a male-to-female ratio of 1.6:1 [4]. Due to their aggressive nature and the need for early diagnosis and treatment, the reported five-year survival rate ranges between 37% and 67% [4].

Histologically, SCS is characterised by fascicular or storiform arrangements of spindle cells with nuclear pleomorphism and variable mitotic activity. Immunohistochemistry (IHC) is often essential to distinguish SCS from other spindle-cell tumours. Management generally includes wide surgical excision, with chemotherapy and radiotherapy recommended for improved outcomes [5]. High-grade SCS is of significant diagnostic and therapeutic importance due to its rarity, histological similarity to other spindle-cell neoplasms, and aggressive clinical course [2,5]. The absence of melanin and overlapping cytological features between spindle-cell melanoma and sarcoma highlight the diagnostic limitations of FNAC, particularly in recurrent soft-tissue lesions [5].

In a case reported by Sharma M and Patel H, a 45-year-old previously healthy American woman sustained a mechanical fall resulting in left thigh pain and ecchymosis around the left eye Two weeks later, she noticed a small bump on her left thigh. Initial USG suggested a fluid collection, and MRI demonstrated a large lateral thigh collection consistent with a haematoma, though a neoplasm could not be excluded. The mass continued to enlarge over the next several months. CT angiography showed a moderate-sized anterior hip fluid collection. A core needle biopsy revealed only necrotic cells without identifiable tumour cells. Five days later, she returned with increased pain and erythema, and MRI showed interval enlargement of the complex mass. Surgical excision yielded a 17×17 cm mass encapsulated by serous mucinous fluid. The final diagnosis was unclassified high-grade SCS mimicking an intramuscular haematoma [6].

In another case reported by Khan AJJ and Khan NAJ, a 68-year-old Pakistani male with hypertension presented with difficulty passing urine for two days. Initial evaluation suggested benign prostatic enlargement, and tamsulosin was initiated. However, he subsequently developed severe lower abdominal pain, incontinence, and bloody diarrhoea. Bladder scan revealed approximately 800 mL of retained urine; catheterisation drained 900 mL and relieved his symptoms [7]. Laboratory investigations—including renal function tests, electrolytes, complete blood count, lactic acid, stool studies, and urine culture—were unremarkable. Stool cytology revealed numerous malignant spindle cells. CT imaging showed a 14×9.1 cm heterogeneous pelvic mass with fistulisation into the rectum, small bowel distension, and bilateral moderate hydronephrosis. MRI confirmed these findings. Core needle biopsy revealed a high-grade malignant spindle and epithelioid neoplasm with necrosis. IHC showed vimentin positivity; weak actin and caldesmon positivity; rare PAX-8 positivity; and negativity for cytokeratin, desmin, S100, PSA, PSAP, CD34, CD117, myogenin, and tyrosinase. The patient underwent radiation therapy to decrease tumour burden followed by pelvic exenteration, with postoperative planning for systemic chemotherapy. This case illustrates an uncommon presentation of high-grade SCS manifesting as acute urinary retention and bloody diarrhoea [7].

In a case reported by Tharwani ZH et al., a 15-year-old Pakistani female presented with a rapidly progressive lesion on the upper left breast, associated with purulent discharge, bleeding, and fever. CT and HRCT imaging showed a large heterogeneous multilobulated mass involving almost the entire left breast, inseparable from the overlying skin and underlying pectoralis muscle, with enlarged left axillary lymph nodes. Needle biopsy and histopathological examination revealed a malignant neoplasm arranged in fascicles with intervening epithelial elements, areas of stromal overgrowth, and increased cellularity. The tumour cells showed epithelioid to spindle-cell morphology, moderate to severe nuclear pleomorphism, hyperchromasia, scant cytoplasm, irregular nuclear membranes, brisk atypical mitoses (up to 12/10 HPF), and necrosis, consistent with high-grade SCS. The overlying skin was ulcerated, and benign ducts were entrapped within the tumour. All resection margins and the nipple-areola complex were tumour-free. IHC showed focal weak positivity for CD99 and p63, and negativity for WT-1, myogenin, desmin, cytokeratin, synaptophysin, and CD34, supporting the diagnosis of high-grade SCS. The patient underwent modified radical mastectomy and was monitored postoperatively for recovery and complications [8].

In a case reported by Muturi A et al., a 28-year-old Kenyan male presented with a six-week history of shortness of breath, cough, chest pain, abdominal pain, bilateral leg swelling, unexplained weight loss, fever, and night sweats. Physical examination revealed significant bilateral pedal oedema, distended neck veins, and tender hepatomegaly. Laboratory results showed markedly elevated liver enzymes (AST 664 IU/L, ALT 224 IU/L), while other parameters were within normal limits. Imaging, including echocardiography and contrast-enhanced chest CT, revealed a right ventricular mass extending into the main pulmonary artery, along with pericardial and right-sided pleural effusion. Intraoperatively, a whitish-yellow lobulated friable mass was discovered arising from the septal leaflet of the tricuspid valve, infiltrating the right ventricular walls, and nearly occluding the pulmonary artery. Complete resection, including margins, was not feasible due to diffuse infiltration. Histopathological examination confirmed a high-grade SCS, and IHC demonstrated patchy AE1/AE3 positivity with negative staining for SMA, desmin, CD34, S100, EMA, and CD99. The patient received six cycles of adjuvant chemotherapy with the VAC regimen (Vincristine, Adriamycin, Cyclophosphamide) at 21-day intervals, along with tricuspid valve repair and postoperative diuretics [9].

In another case reported by Ozturk H and Sivrikoz ON, a 41-year-old Turkish man presented with an eight-month history of progressively worsening lower urinary tract symptoms. Percutaneous cystostomy was required as transurethral catheterisation was unsuccessful. Laboratory studies showed normal hepatic function and alkaline phosphatase levels, urea 51 mg/dL, creatinine 1.48 mg/dL, numerous erythrocytes and 3-4 leukocytes per field in sterile urine culture, and a PSA level of 0.7 ng/mL. Digital rectal examination revealed a diffusely hard prostate . A palliative transurethral resection of the prostate was performed, revealing irregular anatomy of the prostatic urethra, crista urethralis, and verumontanum, with approximately 25 cc of tissue resected. Histopathology suggested a high-grade SCS (leiomyosarcoma) with widespread mitoses and necrosis. Immunohistochemistry showed positivity for actin, vimentin, and desmin, and negative staining for CD34, S100, and PR, confirming high-grade spindle-cell leiomyosarcoma. PET/CT imaging revealed widespread pulmonary metastases, and adjuvant chemotherapy was planned [10]. A comparative summary of reported high-grade SCS cases and the present case is shown in [Table/Fig-7] [6-10].

Author/Year	Patient demographics	Presentation	Imaging findings	Biopsy/histopathology	IHC/molecular findings	Treatment
Sharma M and Patel H [6] (2022)	45-year-old American female	Left thigh swelling after trauma; progressive mass	USG: fluid collection; MRI: large lateral thigh collection, suspicious for hematoma	Core needle biopsy: necrotic cells only	Not specified	Surgical excision
Khan AJJ and Khan NAJ [7] (2020)	68-year-old Pakistani male	Acute urinary retention, bloody diarrhoea	CT: 14×9.1 cm heterogeneous pelvic mass; MRI: pelvic mass with rectal fistula	Core needle biopsy: high-grade spindle and epithelioid neoplasm, necrosis	Vimentin+, weak actin+, caldesmon+, rare PAX-8+, CK-, desmin-, S100-, PSA-, CD34-, CD117-, myogenin-, tyrosinase-	Radiation, pelvic exenteration, planned systemic chemotherapy

Tharwani Z et al., [8] (2024)	15-year-old Pakistani female	Rapidly progressive breast lesion with purulent discharge, bleeding, fever	CT/HRCT: large heterogeneous multilobulated mass involving left breast, inseparable from skin and pectoralis	Needle biopsy: malignant neoplasm with fascicles, epithelioid-spindled cells, pleomorphism, necrosis	CD99 focal weak+, p63 weak+; WT-1-, myogenin-, desmin-, cytokeratin-, synaptophysin-, CD34-	Modified radical mastectomy
Muturi A et al., [9] (2015)	28-year-old Kenyan male	Shortness of breath, chest pain, leg swelling, fever, night sweats	Echocardiography and CT: right ventricle mass extending into pulmonary artery; pericardial and pleural effusion	Intraoperative: friable lobulated mass from tricuspid valve	AE1/AE3 patchy+; SMA-, desmin-, CD34-, S100-, EMA-, CD99-	Partial resection; adjuvant VAC chemotherapy
Ozturk H et al., [10] (2013)	41-year-old Turkish male	Progressive lower urinary tract symptoms; difficult catheterisation	PET/CT: widespread pulmonary metastases	TURP specimen: high-grade spindle cell leiomyosarcoma, widespread mitoses, necrosis	Actin+, vimentin+, desmin+; CD34-, S100-, PR-	Planned adjuvant chemotherapy
Soni K et al., (2026)	76-year-old Indian female	Recurrent swelling at right posterolateral thigh post-liposarcoma excision	USG: 3×1.1 cm heterogeneous hypoechoic lesion; MRI: 3.5 × 2.6×1.6 cm lesion, post-contrast enhancement, septal thickening	FNAC: polygonal and spindle-shaped cells, mild pleomorphism, infrequent mitoses; Frozen section: storiform/fascicular spindle cells, pleomorphism, mitoses	No IHC; diagnosis based on histopathology and prior liposarcoma	Surgical excision

[Table/Fig-7]: Comparative summary of reported high-grade spindle-cell sarcoma cases and the present case [6-10].

CONCLUSION(S)

In the present case, a female patient presented with a recurrent thigh swelling, which posed a significant diagnostic challenge due to discordant findings across multiple diagnostic modalities. FNAC suggested malignant melanoma, frozen section favoured DFSP, while imaging findings were more consistent with recurrent liposarcoma. Histopathology, however, revealed storiform and fascicular spindle-cell proliferation with pleomorphism and frequent mitoses, characteristic of high-grade SCS. This case highlights the limitations of cytology and frozen section in recurrent soft-tissue lesions and emphasises the essential role of comprehensive histopathological evaluation, along with prior clinical history and imaging, for accurate diagnosis and appropriate management of such cases.

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