RESEARCH PAPER

Limb-Sparing Wide Excision and Split-Thickness Skin Grafting for a Malignant Spindle Cell Sarcoma of the Foot: A Case Report

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Abstract
Soft tissue sarcomas of the foot are rare malignant tumors that often present diagnostic and reconstructive challenges due to limited soft tissue coverage and proximity to critical structures. An 84-year-old male presented with a chronic ulcerative lesion over the right heel which was histologically confirmed as a malignant spindle cell neoplasm. Imaging demonstrated a lobulated soft-tissue mass confined to the subcutaneous plane without bone invasion, and staging work-up revealed no distant metastasis. The patient underwent limb-sparing surgery consisting of wide local excision of the heel lesion with right superficial inguinal lymphadenectomy followed by reconstruction using a reverse sural artery flap and split-thickness skin grafting. Histopathology confirmed malignant spindle cell sarcoma with negative margins and absence of nodal metastasis. This case highlights the feasibility of limb-salvage surgery with appropriate oncologic resection and reconstructive techniques in elderly patients with foot sarcomas.

Keywords: Soft tissue sarcoma, spindle cell tumor, heel tumor, limb salvage surgery, reverse sural flap
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Introduction

Soft tissue sarcomas (STS) are rare malignant tumors arising from mesenchymal tissues and account for less than 1% of adult malignancies [1]. The foot and ankle region represents an uncommon site, comprising only approximately 4–7% of all soft tissue sarcomas [2]. Because of the complex anatomy and limited soft tissue coverage in this region, management of malignant tumors poses significant challenges in achieving oncologically adequate margins while preserving limb function [3].

Historically, amputation was frequently performed for sarcomas of the distal extremity. However, advances in imaging, surgical oncology, and reconstructive techniques have enabled limb-sparing procedures without compromising oncologic outcomes [4]. Wide local excision with negative margins is considered the cornerstone of treatment for localized soft tissue sarcoma [5].

Spindle cell sarcomas represent a heterogeneous group of malignant mesenchymal tumors characterized histologically by elongated spindle-shaped cells arranged in fascicles. These tumors may exhibit aggressive behavior and a significant risk of local recurrence if margins are inadequate [6].

Reconstruction following tumor excision in the foot and heel region is particularly challenging due to weight-bearing requirements and limited tissue availability. The reverse sural artery flap has become a reliable option for coverage of defects in the distal leg, ankle, and heel because of its consistent vascular anatomy and relative technical simplicity [7].

We present a case of **malignant spindle cell sarcoma of the right heel in an elderly patient managed successfully with limb-sparing wide excision, superficial inguinal lymphadenectomy, reverse sural artery flap reconstruction, and split-thickness skin grafting.**

Case Presentation

An 84-year-old male presented with a non-healing ulcer over the right heel of approximately three months duration. The lesion was gradually increasing in size and associated with intermittent bleeding. There was no history of trauma, constitutional symptoms, or prior malignancy.

Clinical examination revealed an **ulcerative lesion measuring approximately 5 × 6 cm over the lateral aspect of the right heel**, located approximately 2 cm distal to the lateral malleolus. The ulcer demonstrated everted edges with granulation tissue at the base and serosanguinous discharge. Surrounding skin appeared normal without evidence of satellite lesions. Palpation confirmed induration around the ulcer margins.

A smaller secondary ulcer measuring approximately 4 × 3 cm was noted adjacent to the primary lesion. There was no clinically significant regional lymphadenopathy.

Baseline laboratory investigations were within acceptable limits except for mild anemia.

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Imaging Findings

MRI of the right foot demonstrated a **well-defined lobulated heterogeneous lesion measuring approximately 5.7 × 2.2 × 4.0 cm located in the subcutaneous plane of the lateral aspect of the right hind foot**. The lesion appeared T1 isointense and T2 hyperintense with diffusion restriction, suggestive of a malignant soft tissue tumor. Importantly, **no invasion into underlying bones or tendons was identified**.

CT scan of the chest revealed **a small sub-pleural pulmonary nodule in the right upper lobe and ground glass opacities**, but no definite metastatic lesions.

CT abdomen showed **no evidence of intra-abdominal metastasis or significant lymphadenopathy**.

Histopathology

Core biopsy of the lesion demonstrated a **malignant spindle cell neoplasm composed of fascicles of atypical spindle cells with nuclear pleomorphism and increased mitotic activity**.

Immunohistochemistry revealed:

- **SMA: Positive**
- **Pan-cytokeratin: Negative**
- **HMB45: Negative**
- **CD34: Negative**

The findings were consistent with a **malignant spindle cell sarcoma**.

Surgical Management

Considering the localized nature of the tumor and absence of distant metastasis, the patient was planned for limb-sparing surgery.

The patient underwent:

- **Wide local excision of the ulcerative tumor over the right heel**
- **Right superficial inguinal lymphadenectomy**
- **Reconstruction with reverse sural artery flap**
- **Split-thickness skin grafting**

Intraoperative Findings

A wide excision was performed with approximately **3 cm surgical margins around the lesion**. The tumor was confined to the subcutaneous plane and did not infiltrate the underlying bones or tendons.

Figure 1: Ulcerated tumor over the right heel prior to excision.

Figure 2: Wide local excision defect following tumor removal.

Figure 3: Dissection during superficial inguinal lymphadenectomy.

Figure 4: Harvesting of reverse sural artery flap for reconstruction.

Figure 5: Post-reconstruction appearance after flap inset and skin grafting.

Superficial inguinal lymph nodes were dissected and submitted for histopathological evaluation.

Histopathological Examination of Resected Specimen

The excised specimen measured approximately **8 × 8 × 4 cm**, containing a solid tumor measuring **5.5 × 5 × 1.5 cm**.

Microscopic examination showed:

- Malignant spindle cell proliferation arranged in fascicles
- Moderate nuclear pleomorphism
- High mitotic activity (approximately 30 mitoses per 10 high-power fields)
- Areas of collagen production
- Tumor infiltration into skeletal muscle

Margins of resection were negative for tumor.

Nine inguinal lymph nodes were examined and **all were negative for metastasis**.

The tumor was staged as:

pT2N0 according to AJCC 8th edition.

Postoperative Course

The postoperative period was uneventful. The reverse sural flap remained viable, and the skin graft demonstrated satisfactory take. The patient was mobilized gradually with protected weight bearing.

He was discharged in stable condition with regular follow-up planned for surveillance of recurrence or metastasis.

Discussion

Soft tissue sarcomas are uncommon tumors that account for a small fraction of adult cancers but are associated with significant morbidity and mortality due to local recurrence and distant metastasis [1]. Tumors arising in the foot and ankle region are particularly rare and frequently present diagnostic and therapeutic challenges. The heel region poses a unique reconstructive challenge because it is a weight-bearing area with limited soft tissue coverage. Achieving oncologically safe margins while maintaining functional integrity of the foot requires careful planning and multidisciplinary management.

Spindle cell sarcomas represent a heterogeneous group of malignant tumors characterized by spindle-shaped tumor cells arranged in fascicles. These tumors may include leiomyosarcoma, fibrosarcoma, and undifferentiated pleomorphic sarcoma [6]. Histopathological examination and immunohistochemical staining play a crucial role in establishing the diagnosis.

Magnetic resonance imaging remains the modality of choice for local staging of soft tissue sarcomas. MRI provides excellent soft tissue contrast and allows assessment of tumor extent, involvement of adjacent structures, and surgical planning [8].

The standard treatment for localized soft tissue sarcoma is **wide surgical excision with negative margins**. Multiple studies have demonstrated that limb-sparing surgery combined with appropriate reconstruction achieves comparable survival outcomes to amputation while preserving limb function [4,5].

In our case, the tumor was confined to the subcutaneous plane without involvement of bone or tendon, allowing successful limb preservation.

Reconstruction following tumor excision in the heel is challenging due to the requirement for durable coverage capable of withstanding weight bearing. The **reverse sural artery flap** is widely used for reconstruction of defects in the distal third of the leg, ankle, and heel [7]. It offers several advantages including reliable vascularity, relatively straightforward dissection, and avoidance of microsurgical techniques.

Superficial inguinal lymphadenectomy was performed in this case because regional lymphatic spread can occur in certain soft tissue sarcomas, although the overall incidence remains low [9].

The absence of lymph node metastasis and negative surgical margins in our patient are favorable prognostic indicators. However, long-term follow-up is essential as soft tissue sarcomas carry a risk of both local recurrence and distant metastasis, particularly to the lungs [10].

This case demonstrates that **limb-sparing oncologic resection combined with appropriate reconstructive techniques can achieve satisfactory functional and oncologic outcomes even in elderly patients.**

Conclusion

Malignant spindle cell sarcomas of the foot are rare tumors requiring careful multidisciplinary management. Limb-sparing wide excision with adequate margins combined with reconstructive procedures such as reverse sural artery flap and split-thickness skin grafting provides effective oncologic control while preserving limb function. Early diagnosis and meticulous surgical planning remain crucial for optimal outcomes.

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