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ABSTRACT

Radical resection for recurrent posterior thigh sarcomas often results in complete loss of knee flexor function with limited reconstructive options. We highlight the combined use of free functional latissimus dorsi (LD) transfer for knee flexion and sciatic nerve reconstruction for distal limb reinnervation after high grade sarcoma resection, a rarely reported approach to complex limb salvage.

A 65-year-old man with a painful posterior thigh mass with inability to flex the knee presented eight months after an unplanned excision ("Whoops" procedure) of a presumed benign tumour, later confirmed to be a sarcoma, examination showed a posterior right thigh wound. Our work up MRI revealed involvement of the hamstring muscles and sciatic nerve and histology confirmed pleomorphic sarcoma. We offered neoadjuvant chemotherapy followed by posterior compartmentectomy with a 21cm sciatic nerve resection and delayed soft tissue reconstruction using a functional LD innervated by posterior division of obturator nerve to restore knee flexion and nerve reconstruction using a cabled sural nerve grafts for sciatic nerve reconstruction.

Key words: **Sarcoma recurrence, Compartmentectomy, Functional Latissimus dorsi flap, Knee flexion restoration, Case report**

INTRODUCTION

Reconstruction of knee flexor function after posterior compartmentectomy for recurrent sarcoma often requires both robust soft-tissue cover and restoration of dynamic muscle activity. Large defects leave limited or no local options. Considering donor site morbidity, the LD flap remains a mainstay for larger defects. Most case series and cohort studies have demonstrated LD flap as conventional, providing reliable coverage, and enable restoration of knee flexion, and supports limb salvage in the setting of oncologic resection(1,2).

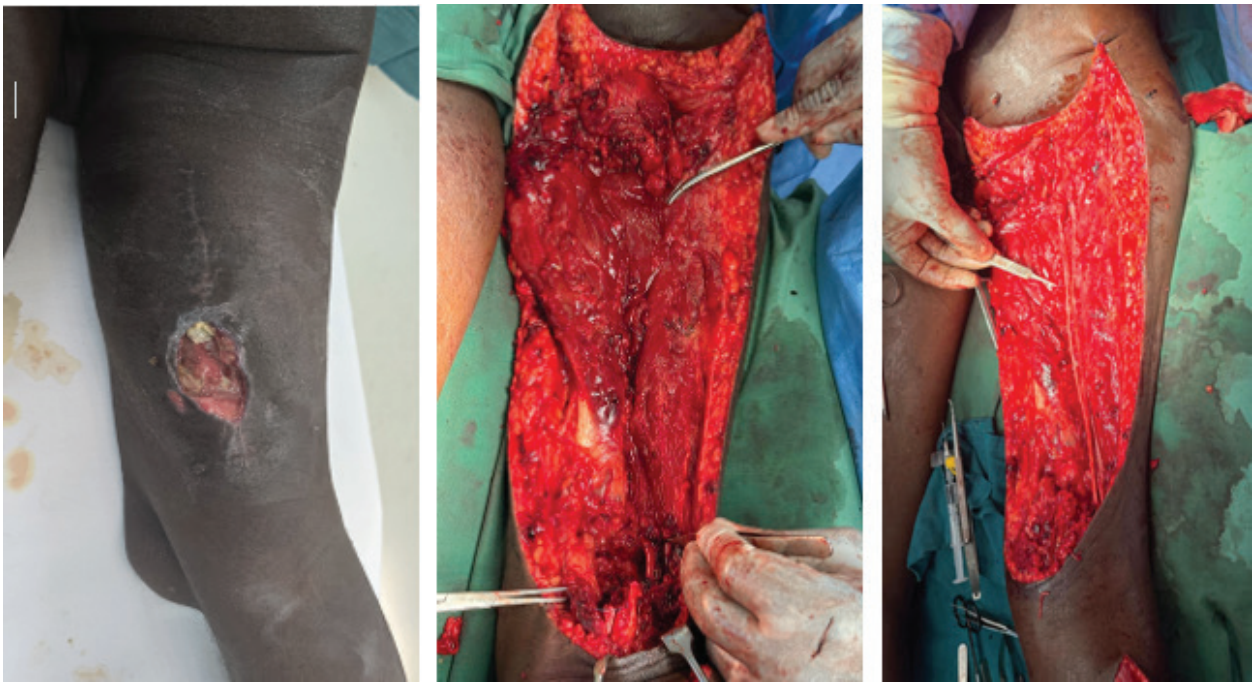
Functional outcomes are generally favourable; most patients regain meaningful range of motion (ROM) and ambulation. Donor-site morbidity is reported but typically does not cause significant restrictions in daily activities(1,2). This case was managed in tertiary centre by multidisciplinary coordination and comprehensive perioperative care to optimise local clearance and reconstruction.

CASE PRESENTATION

A 65-year-old right-hand dominant male, a professional driver with no known chronic illnesses, body mass index (BMI) of 24 kg/m². Presented to us as a referral from a peripheral facility. He reported an eight-month history of a progressively enlarging, painful mass in the posterior right thigh, with pain on knee motion. He had had an initial excision of lesion a month prior, subsequently, developing a full-thickness, non-healing wound approximately 40cm² on the posterior right thigh (Figure 1-Left).

Figure 1: Left: -Posterior thigh ulcer following unplanned excision, Center: - Post re-excision posterior thigh compartmentectomy defect with isolation of the common peroneal and tibial sciatic nerve stamp components, indicated. Allis forceps holding part of gastrocnemius muscle leftward.

Right: - Sciatic nerve cabled reconstruction using sural nerve grafts bridging the tibial and common peroneal components.



His medical history was unremarkable; no chronic illness or prior malignancies and was not on any long-term medication, no allergies, no family history of malignancies and is a non-smoker.

Our examination revealed a full-thickness posterior right thigh ulcer with induration, absent knee flexion, ipsilateral leg and foot hypoesthesia and paraesthesia.

Of the investigations, Histopathology revealed pleomorphic sarcoma. MRI demonstrated a 17.1 × 6.7 × 6.8cm mass involving biceps femoris, semitendinosus and sciatic nerve. Normal chest and abdominal CT scan. With these, we graded the sarcoma as per AJCC 8th edition, to be Stage IIIB — high grade, deep, >5 cm.

As part of interim preparation, the patient was nutritionally optimized, physiotherapy for joint mobility was instituted, and counselling was done, he also received neoadjuvant chemotherapy which consisted of (Doxorubicin-Ifosfamide-Mesna) to reduce tumour burden prior to the planned definitive re-excision. We performed radical resection of the posterior thigh compartment, and 21cm sciatic nerve segment, a month after completing chemotherapy(Figure1Middle) and the specimen for histopathology confirmed negative margins, after which reconstruction was planned.

Functional reconstruction using neurotised free LD (FFLD) flap to restore knee flexion, bilateral sural nerve cable graft for sciatic nerve reconstruction for potential distal reinnervation.

SURGICAL TECHNIQUE

Under general anaesthesia, patient positioned prone on a padded couch. The entire back, lower limbs were prepared. The proximal and distal hamstring tendinous stumps, descending branch of the inferior gluteal artery (IGA), the posterior division of the obturator nerve, and the stamps of the sciatic nerve (Nerve gap of 21cm) were prepared (Figure 1-Middle). The donor myo-cutaneous FFLD with a 21 × 8cm skin paddle with entire right LD muscle was dissected. The thoracodorsal (TD) artery and nerve traced to their origins at the subscapular artery, and the serratus branches ligated. The tendinous insertion of the LD was included to facilitate secure fixation to the recipient residual knee flexor tendons. Bilateral sural nerve grafts, each 42cm, were harvested (Figure 1-Right).

Reconstruction

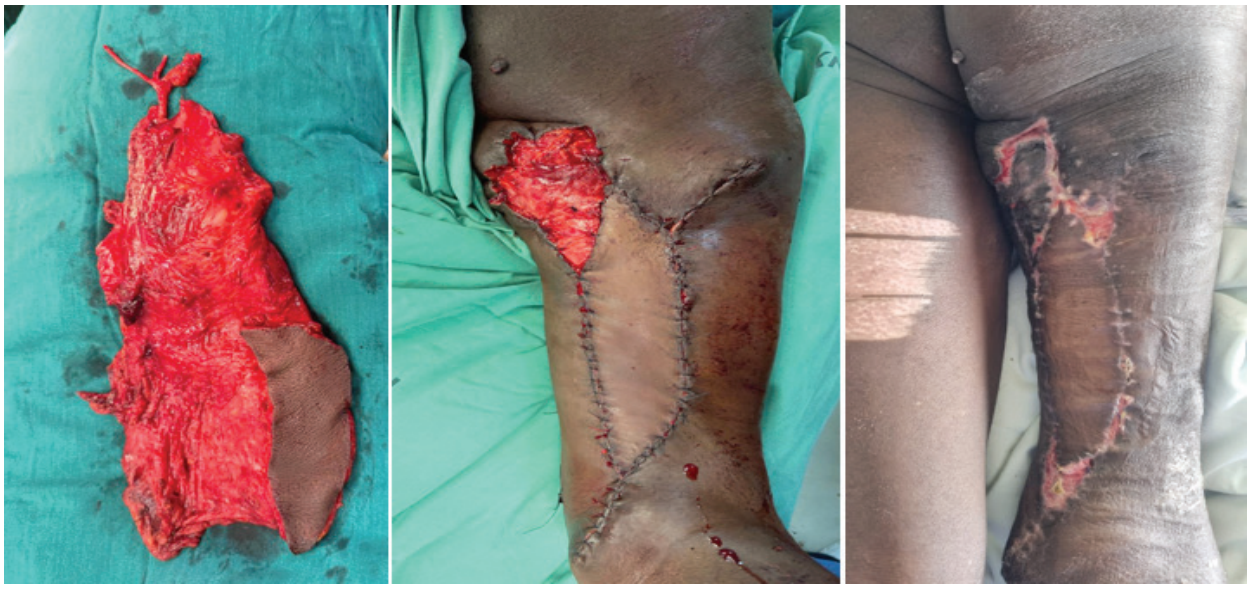
Microvascular anastomoses were performed under loupe ×6 magnification.

Sciatic nerve reconstructed with four sural nerve cable grafts, two for tibial and for common peroneal components, epineural coaptation using 9-0 nylon (Figure 1Right).

The LD thoracodorsal vessels were anastomosed to the descending branch of the IGA; the TD nerve to the posterior division of the obturator nerve. The proximal Muscle tendon was secured to the ischial stump of the hamstrings and the distal tendon to the hamstring muscle stamps. Muscle tensioning done at 45° knee flexion. The skin paddle was inset to surrounding skin (Figure 2Right). The limb was immobilized in 45° flexion with an extension-blocking splint

Figure 2: Left - Harvested LD flap – Entire muscle with skin paddle and thoracodorsal neurovascular bundle (yellow arroe) prepared for transfer.

Centre: - Defect closed – Functional LD flap inset to restore knee flexion and provide durable soft-tissue coverage. Right: -One-month Post operative, with flap survival, still limited range of motion.



No intraoperative complications, patient was admitted to High dependence unit for monitoring. Flap monitored clinically, IV antibiotics given for 5–7 days. Passive and active ROM exercises began at 6 weeks; strengthening planned from 3–6 months.

Follow-up

Three months postoperatively, active rehabilitation exercise, with gradual improvement in ROM.

Functional assessments with Medical Research Council Scale for Muscle Strength, Lower Extremity Functional Scale and the Musculoskeletal Tissue Society score are planned at 12-month.

DISCUSSION

Soft tissue sarcomas are locally aggressive tumours, with local recurrence rates of 80% to 100% if simple resection with inadequate or positive margins is performed(5,6), Giuliano-Eilber coined it "Whoops" operation (6).

The cornerstone of the curative oncologic treatment of local STS is an optimal timely surgical resection with negative margins(6,9). However, in the event of recurrence, re-resection margins need to be more extensive compared to conventional wide-excision margins because of reactive changes and contamination of neighbouring compartments after the first surgery (7,10). This was the basis of our decision to do radical resection in this recurrent case and conserve the limb. Often, the decision whether to conserve or amputate the limb is made upon consideration of patient desire, support system and superiority of the residual limb over a prosthesis (11), and if limb salvage is appropriately indicated as was in this case, a well-executed, limb salvage offers the advantage of better function and psychological benefits with overall better quality of life(11).

Local disease status is reported to have limited impact on overall survival(12). However, because Compartmentectomy leaves no intracompartmental tissue, radical resection has the least potential for local recurrence of all local surgical procedures(13),

this fact informed our decision to perform Compartmentectomy in this case.

The size of the resultant soft tissue defect eliminated local reconstructive, limiting our autologous options to free flap reconstruction. With need for a functional reconstruction of the knee, we opted for an innervated LD to provide for bulk as well.

For sciatic nerve grafting, three cables grafts can closely approximate its diameter(15). However, outcomes of sciatic nerve repair are relatively poor and debilitating, 83% achieve MRC grade ≥ 3 following nerve grafts(14).

Innervated flaps are invaluable in numerous reconstructive procedures, offering reliable and reproducible results and should be considered in extensive and/or irradiated defects(3), as was in this case.

CONCLUSION

Sarcoma surgery is curative if performed early and appropriately by a trained sarcoma surgeon. Propper planning minimizes risk of recurrence, which is a common consequence of poor planning.

Extensive and or recurrent disease requires radical resection of a muscle compartment to promise adequate free margins, and this in turn often demands complex reconstruction technique to restore function. The absence of local or regional reconstructive options in these circumstances warrants microsurgical skill for reconstruction and the Free LD flap is a reliable functional reconstructive option for posterior thigh defects after tumour ablation.

Additional Information

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Ethical considerations: Ethical approval not required.

The written Consent for Pictures and to publish the case was obtained from the patient.

Conflict of interest: Authors have no conflict of interest to declare.

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