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A case report of metastatic melanoma in the popliteal fossa

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ABSTRACT

INTRODUCTION: Metastatic melanoma in the popliteal fossa is extremely rare with less than 5% of metastatic deposits from melanomas in the leg and foot draining into the popliteal region, while the majority drain to the inguinal region. If popliteal spread is clinically overlooked, it may lead to recurrence. Together with the accompanying literature review, this case report emphasises the need for thorough clinical and radiological assessment in the management of malignant melanomas of the lower extremity. **PRESENTATION OF CASE:** A 66-year-old gentleman presented with metastatic melanoma to the right popliteal fossa three years after the diagnosis of a primary lesion in the right mid-calf with ipsilateral inguinal lymph node metastasis for which he underwent a right wide local excision and complete groin lymph node dissection.

DISCUSSION: Studies show that a lesion anywhere below the knee can metastasize to the popliteal fossa. The groin can be the primary or secondary lymphatic drainage site in conjunction with the popliteal fossa. Concurrent popliteal and inguinal drainage may either reflect two separate lymphatic channels with popliteal nodes being the primary drainage site, or a single channel which drains to the popliteal basin as an interval node. Hence, popliteal lymph nodes should be carefully assessed in distal lower extremity lesions including melanomas. Modalities to delineate lymphatic flow and identify micrometastatic deposits should be used and when metastatic popliteal disease is identified, radical popliteal dissection is advised.

CONCLUSION: Proper clinical assessment, good surgical technique, a high index of suspicion, and active surveillance are all essential to ensure early detection of metastasis to the popliteal region.

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1. Introduction

Metastatic disease to regional lymph nodes is the most important outcome predictor in malignant melanoma [1]. The majority of metastatic deposits from melanomas in the leg and foot drain to the inguinal region. Although less than 5% drain to the popliteal fossa, this area deserves thorough examination and investigation when the lesion occurs below the knee and when inguinal node metastatic involvement is present [2,3].

This case addresses an uncommon phenomenon of metastatic melanoma involving the lower limbs. The lymphatic drainage of cancer cells can vary and if ignored it may contribute to recurrence. Emphasis is made on the need for thorough clinical and radiological assessment in the management of melanomas of the lower extremity keeping in mind lymphatic foci that are not in the immediate

vicinity which may be overlooked. Secondly, the included literature review provides better understanding and application of recommendations in similar clinical scenarios.

The revised UK guidelines for the management of cutaneous melanoma suggest a wide local excision (WLE) and sentinel lymph node biopsy (SLNB) as primary management for the lesion. The SLNB has both diagnostic and prognostic benefits. If it is positive, lymphadenectomy is advised. For locoregional recurrent melanoma the options available are surgical excision without the need for wide margins or regional chemotherapy with isolated limb infusion/perfusion may also be considered. Follow-up after excision of a primary melanoma aims to detect recurrence. Teaching self-examination to patients is an important adjunct to routine clinical monitoring by a qualified medical professional. Relapse commonly occurs within 5 years from initial diagnosis, but patients may also relapse at a later stage. Patients with stage IIB and IIC disease are at 40–70% risk of recurrence, with rates being higher in more advanced disease stages [4].

Abbreviations: MRI, magnetic resonance imaging; PET-CT, positron emission tomography – computed tomography; SLNB, sentinel lymph node biopsy; WLE, wide local excision.

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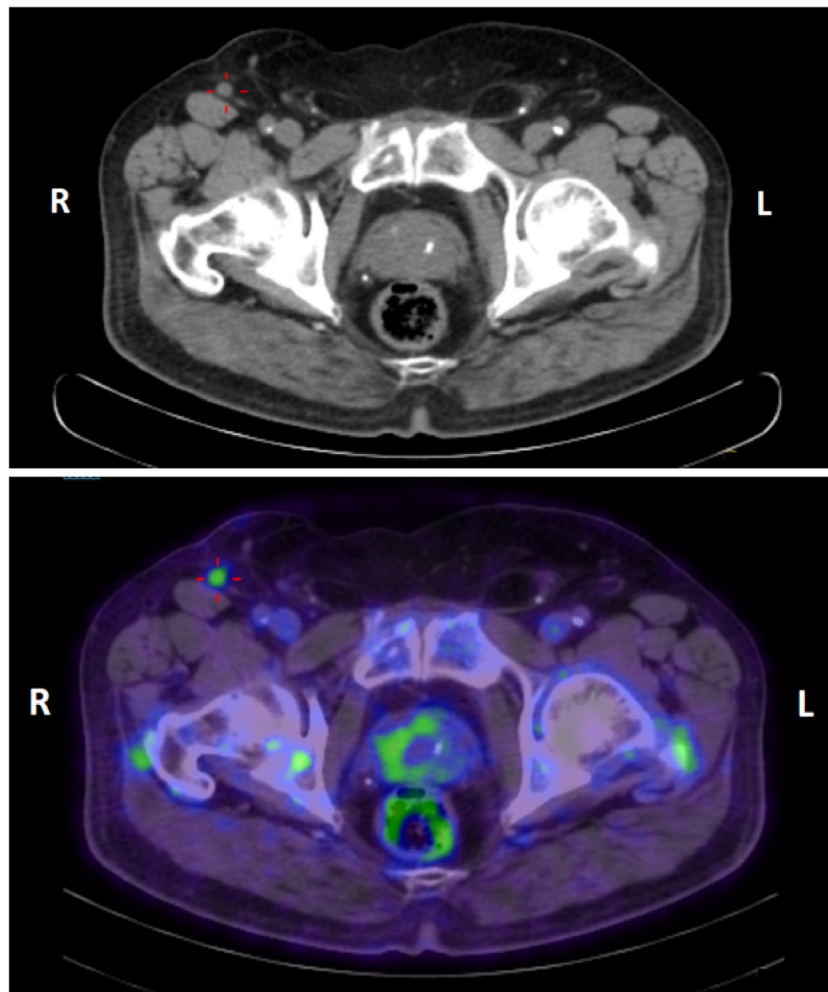


Fig. 1. Axial CT cross-section (top) and PET-CT (bottom) showing a well-demarcated right superficial inguinal lymph node anterior and proximal to the right sartorius muscle. It measures 10 mm in maximum diameter and exhibits a moderate increase in glucose metabolism.

2. Presentation of case

A 66-year-old Caucasian male was referred from primary care to the Plastic Surgery Department in 2016 with a central lesion over the skin of the right mid-calf. He is a type 1 diabetic, suffers from hypertension, ischaemic heart disease, gastro-oesophageal reflux disease, asthma and hypothyroidism. He stopped smoking over 35 years ago and drinks around 20 units of alcohol per week. He lives with his wife, is independent in all his activities of daily living and works as a paramedic.

On clinical examination this lesion was nodular and measured 10 mm in diameter. No palpable lymph nodes were present. Excision biopsy was performed with 1 mm peripheral and 3 mm basal margin. Histology confirmed a superficial ulcerated lesion with a Breslow thickness of 1.5 mm depth indicative of malignant melanoma (Melan-A positive and CD-45 negative on immunohistochemistry testing).

One month after initial diagnosis and a normal PET-CT, the patient underwent WLE with a 15 mm circumferential margin and SLNB. Intraoperative lymphoscintigraphy was performed with subcutaneous administration of ^{99m}Tc -nanocolloid around the scar in the right calf. An ipsilateral inguinal sentinel lymph node was excised. Histology revealed dermal scarring with underlying fat necrosis and no evidence of residual or metastatic melanoma (Melan-A negative).

Within 1 month of the surgery the gentleman presented with a palpable right lateral inguinal lymph node. PET-CT highlighted a right superficial inguinal lymph node measuring 10 mm in maximum diameter (Fig. 1). Ultrasound guided core biopsies showed neoplastic cells which were strongly positive to S-100, Vimentin and Melan-A, and negative for PanCK. This confirmed metastatic melanoma. Within 2 months, he underwent a right complete groin dissection. Further histological assessment of the excised lymph nodes supported the diagnosis of metastatic melanoma in 4 of 8 nodes including vascular invasion.

Follow-up CT-trunk performed at 3 months showed benign scarring in the right groin with no metastatic deposits. Surveillance PET-CT scans were performed at 2 and 3 years after the primary procedure. The most recent images identified a 20 mm soft tissue lesion located just above the right popliteal fossa, between the muscles in the deep posterior compartment and the distal shaft of the femur (Fig. 2). Magnetic resonance imaging (MRI) confirmed that the deep popliteal soft tissue lesion was in contact with the anteromedial aspect of the popliteal artery (Fig. 3).

The patient was optimised prior to the procedure, kept nil by mouth, and was started on a local diabetic protocol while his diabetic medication was omitted. Excision of the metastatic lesion was carried out by an experienced vascular consultant through a popliteal Z-shaped incision under general anaesthesia without the need for arterial reconstruction or blood transfusion in the periop-

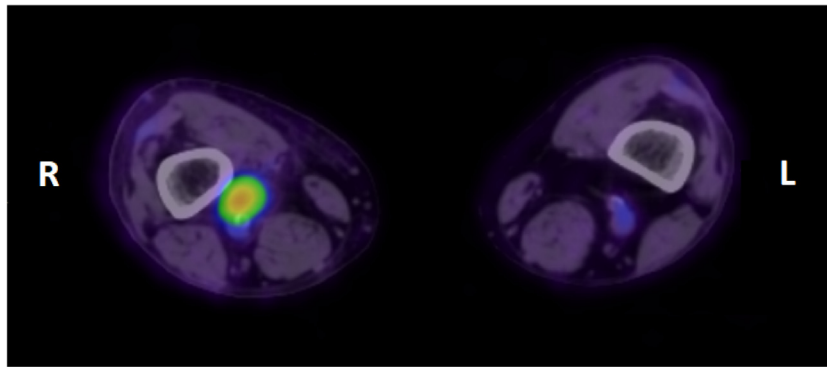


Fig. 2. PET CT showing a 20 mm soft tissue lesion located just above the right popliteal fossa, lying between the muscles in the deep posterior compartment and the distal shaft of the femur.

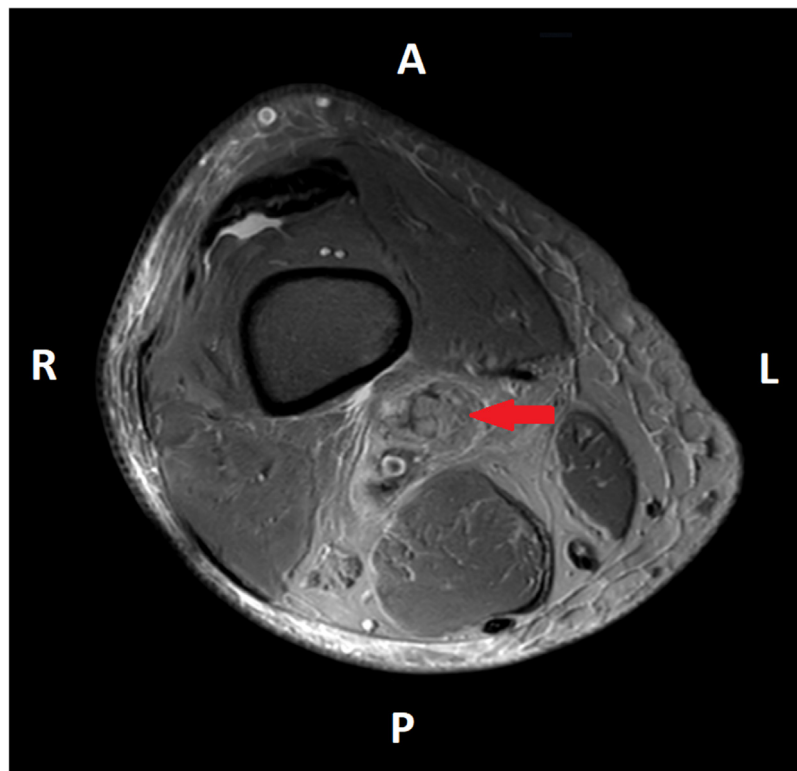


Fig. 3. Standard soft tissue tumour protocol MRI of the right knee showing a $16 \times 17 \times 19$ mm soft tissue lesion. It is of intermediate signal intensity on T1-weighted, mixed high signal intensity on fluid sensitive sequences and shows moderate enhancement post contrast administration. The lesion is marked in red and lies anteromedial to the popliteal artery.

erative period. The patient was positioned in the prone position for this procedure. Intravenous amoxicillin and 3000 units of unfractionated heparin were administered intra-operatively. Meticulous haemostasis was ensured throughout the procedure and nervous tissues and vascular branches were preserved where possible. The tumour deposit was palpable as a small lump (approximately 2 cm in diameter) on the medial aspect of the popliteal artery. It was located deeper than the artery and close to the posterior knee joint capsule. Dissection was performed along the medial border of the right popliteal artery, ligating small branches along the way with absorbable sutures. No immediate or delayed post-operative complications were reported during his short stay in a specialised vascular ward where 60 mg of prophylactic low molecular weight heparin and analgesia were given daily.

Histology reported a largely necrotic 7 mm deposit of metastatic melanoma and a 1 mm viable focus expressing Melan-A, without extracapsular spread. The patient was satisfied with the rapid

recovery and with the treatment he received when reviewed at the postoperative assessment clinic 1 month later. On inspection the incision site had healed well, distal pulses were palpable and there were no new clinically palpable lymph nodes. The oncology team prescribed a monthly intravenous adjuvant immunotherapy agent (nivolumab). PET-CT at 3 months postoperatively showed no evidence of recurrence.

3. Discussion

Popliteal metastasis of melanoma is extremely rare, averaging less than 5% and is mentioned in only a few case reports [2]. In four reviewed cases, all patients presented with below knee melanomas and underwent primary WLE and SLNB. When SLNB confirmed metastasis, radical dissection was performed [3,5–7]. This follows the British Association of Dermatologists' guidelines [4].

Lymphatic drainage from the area around the lateral malleolus usually takes a path along the lateral aspect of the lower limb and bypasses the popliteal fossa to the thigh. However, this is not the rule and a lesion anywhere below the knee can metastasize to the popliteal fossa [6]. Marone et al. documented that the medial and lateral aspects of the foot as well as the posterolateral heel below the lateral malleolus contribute to lymphatic drainage of the popliteal fossa. The groin can be the primary or secondary lymphatic drainage site in conjunction with the popliteal fossa [3]. Hence, popliteal lymph nodes should be carefully assessed in distal lower extremity lesions including melanomas [2].

In a study by Steen et al. looking at SLNB performed for primary infrapopliteal melanomas, 15 out of 461 patients (3.2%) had popliteal involvement in addition to inguinal lymph node tumour deposition. Consequently, they underwent both popliteal and inguinal SLNB in the same session. Eight of these had confirmed malignant deposits in the popliteal sentinel node, and 4 out of these 8 also had a positive inguinal SLNB. Concurrent popliteal and inguinal drainage may either reflect two separate lymphatic channels with popliteal nodes being the primary drainage site, or a single channel which drains to the popliteal basin as an interval node. This observation highlights the importance of a high index of suspicion for concurrent inguinal disease when there is evidence of popliteal metastasis. Patients who present with delayed recurrence in the inguinal basin may be candidates for elective radical inguinal dissection as primary treatment [2].

Steen et al. noted that patients with tumour positive popliteal sentinel nodes had a higher rate of locoregional recurrence compared to patients with metastasis confined to the inguinal basin (63% vs 42%). The incidence of popliteal involvement in recurrent melanomas is also higher compared to primary lesions (33% vs 3.2%) [2].

In a retrospective analysis by Menes et al. involving 106 patients with distal lower extremity melanomas, 9% drained primarily to the popliteal basin before continuing to the groin. Modalities to delineate lymphatic flow and identify micrometastatic deposits include lymphoscintigraphy, intraoperative lymphatic mapping and sentinel node biopsy. These can also pick up interval lymph node involvement in unusual locations [1]. When metastatic popliteal disease is diagnosed, radical popliteal dissection is advised [3,4]. However in practice this is not commonly performed possibly due to low clinical detection rate or more prominent distracting lymphadenopathy in other regions [5].

The surgical approach to the popliteal fossa was first described by Karakousis. A Z-plasty incision allows proper exposure of structures including the neurovascular bundle and minimizes post-operative joint contractures [3]. The first structure that should be identified and preserved is the common peroneal nerve which is then followed up to its origin from the sciatic nerve. At this level, the tibial nerve is identified and protected. The medial and lateral sural cutaneous nerves are also preserved unless infiltrated by tumour. Deeper dissection onto the gastrocnemius muscle allows access through the deep fascia. Between the medial and lateral heads of this muscle, the popliteal artery and vein are identified and preserved. The short saphenous vein is ligated close to the sapheno-popliteal junction. For popliteal lymph node excision, the fibro-fatty tissue around the deep vascular structures of the popliteal fossa is carefully excised in continuity. A closed suction drain is inserted, and the wound closed [7].

4. Conclusion

Proper clinical assessment, good surgical technique based on detailed anatomical knowledge of the lower limb as well as active surveillance are essential to ensure early detection of interval

and primary nodal metastasis to the popliteal region. A high index of suspicion should be maintained in melanomas presenting anywhere below the knee, with or without groin lymph node involvement.

Declaration of Competing Interest

The authors have no competing interests to declare. This research did not receive any funding from agencies in the public, commercial or not-for-profit sectors. The case report has been compiled in accordance with the SCARE and PROCESS guidelines [8,9].

Sources of funding

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Ethical approval

Consent obtained from patient.

Consent

Written informed consent was obtained from the patient for publication of this case report and accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal on request.

Author contribution

Sarah Catania: Investigation, Resources, Data Curation, Writing - Original Draft.

Anthony Pio Dimech: Conceptualization, Supervision, Writing - Review and Editing.

Kevin Cassar: Supervision, Revising the article.

Registration of research studies

Not applicable.

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Dr Sarah Catania, Mr Anthony Pio Dimech, Professor Kevin Cassar.

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