

## A rare cause of calf swelling: the Morel–Lavalée lesion

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### Abstract

**Introduction** Calf swelling is a common clinical presentation with a wide and varied differential diagnosis. The Morel–Lavalée is a rare cause of subcutaneous swelling, caused by post-traumatic shearing of the hypodermis from the underlying fascia. The potential space so created fills with blood, lymph and necrotic fat giving specific findings on MR evaluation.

**Materials and methods** A case of a 53-year-old man with calf swelling is presented, with clinical and MRI correlation. Treatment options and clinical course are discussed.

**Conclusion** The Morel–Lavalée lesion is a rare but important cause of calf swelling. MRI is the mainstay of diagnosis and treatment includes both surgical and minimally invasive modalities.

**Keywords** Morel–Lavalée lesion · MLL · MRI · Musculoskeletal

### Introduction

The Morel–Lavalée lesion (MLL) is a closed degloving injury most frequently occurring in the subcutaneous tissues overlying the greater trochanter, lower back, knee and scapula [1–6]. Its occurrence in the calf is rare and poorly described. Radiological investigation, particularly with

MRI, is essential for localization, characterization and diagnosis of the condition. Here, we illustrate the clinical and radiologic features of an MLL of the medial calf in a middle-aged man.

### Case report

A 53-year-old man with a past medical history of schizophrenia, type-2 diabetes mellitus, hypercholesterolemia, and hypertension presented with the acute onset of swelling and pain along the medial aspect of the left calf. The patient first noticed pain and swelling soon after riding a bicycle one mile and walking for approximately two miles. The patient could not recall any direct impact on the area while riding or walking. He denied the use of any anti-platelet or anticoagulant medications.

Physical examination revealed a small region of ecchymosis along the superomedial left lower extremity and a soft, fluctuant mass just inferior to the ecchymosis. No laceration or ulceration was present. The calf was diffusely tender on palpation, but especially along the medial border.

A sonogram of the lower extremity was initially ordered to exclude a deep venous thrombosis. After no DVT was found, the patient was diagnosed with a simple hematoma and he was discharged to home with a compressive bandage. As the lesion failed to decrease in size over the following week, the patient underwent pre- and post-contrast enhanced MR imaging 3 weeks following the initial presentation.

Magnetic resonance imaging revealed that a well-margined, T2 hyperintense, lentiform collection was present between the subcutaneous fat and fascia of the medial gastrocnemius muscle. It measured 12 cm in craniocaudal, 2 cm in anteroposterior, and 6 cm in transverse dimension.

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A smaller area of T1 hypertintense material was noted centrally and likely represented methemoglobin with a thin signal poor margin of hemosiderin. The gadolinium-enhanced images revealed a thin peripheral rim of enhancement around the fluid component. No enhancing soft tissue nodularity or surrounding muscular edema was present. The marrow signal of adjacent tibia was normal. No sinus tracts or cutaneous defect were present.

The diagnosis of a closed degloving injury was made based on the MRI findings. The referring clinical team elected to treat the patient conservatively with compression bandages and elevation of the lower extremity. Clinical follow-up documented a gradual, albeit slow decrease in size of the lesion over the course of 4 weeks.

## Discussion

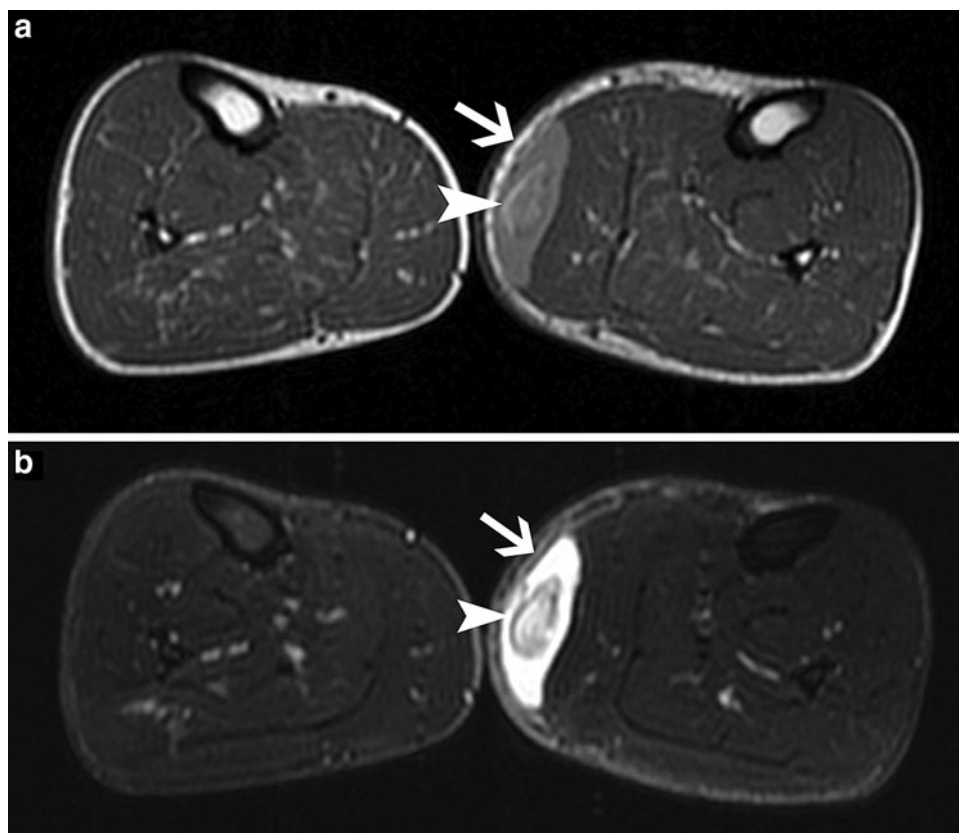
Initially described in 1853 by Maurice Morel-Lavallee, closed degloving injuries develop as a result of a blunt tangential force which separates the hypodermis from the underlying fascia [1–3, 7]. The sheared hemolymphatic supply of the tissue then fills the potential plane with blood, lymph and necrotic fat. A review of 24 cases by Hak et al. [1] noted the greater trochanteric, lumbosacral, and flank regions as the most common locations for this lesion.

Traditionally, the MLL has been described in the setting of pelvic fractures and low-velocity crush injuries [1, 2, 4]. More recently, Tejwani et al. [6] described 27 MLLs in the knees of professional American football players. Although a history of trauma is essential in making an accurate clinical assessment, patients may sometimes not recall any specific event and the diagnosis of MLL may initially be missed or the finding of a mass mistaken for a tumor. Hudson et al. [2] reviewed 16 MLL cases and found the diagnosis was missed in one-third of cases. Three of sixteen pediatric patients reviewed by Hak et al. failed to recall a traumatic event [1].

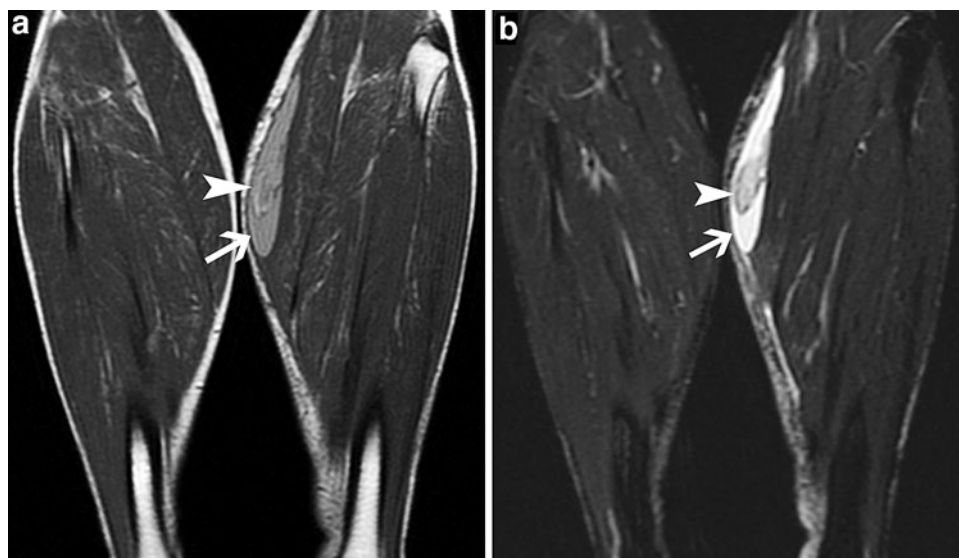
Because MLLs may occasionally go undiagnosed, the clinician and radiologist must be aware of both their acute and chronic appearances and implications for treatment [3]. Mellado et al. [4] reported a delay between the traumatic episode and the MRI study between 3 months and 34 years.

The appearance of the MLL essentially depends on the age of the blood within it. In the acute to subacute setting, blood clot and debris may be found within an ovoid cavity of T2 hyperintense fluid (Figs. 1b, 2b). Since the hematoma organizes deoxyhemoglobin is converted into methemoglobin which may appear increased or intermediate in intensity on T1-weighted images (Figs. 1a, 2a). As blood products are lysed, clot evolves into serosanguinous fluid

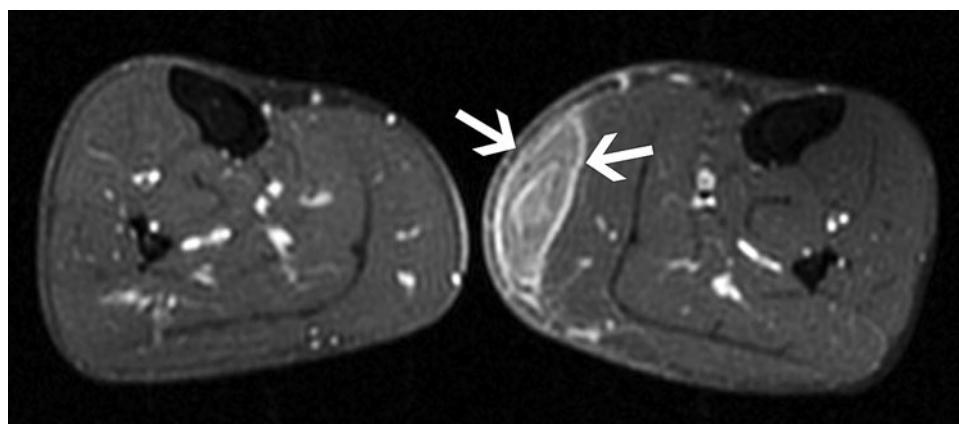
**Fig. 1** T1-weighted (a) and T2-fat saturated (b) axial images of both calves were obtained. They demonstrate an ovoid lesion located on the medial aspect of the left calf, between the subcutaneous fat and fascia overlying the medial gastrocnemius. The *arrowhead* points to a central area of T1 intermediate signal intensity consistent with an acute hematoma. The *arrow* points to an area of T2 hyperintense fluid



**Fig. 2** T1-weighted (a) and T2-fat saturated (b) coronal images demonstrate the well-marginated ovoid lesion in the space between the subcutaneous fat and the underlying gastrocnemius. The *arrow* points to T2 hyperintense fluid and the *arrow head* to a central subacute hematoma



**Fig. 3** Gadolinium-enhanced axial T1-fat saturated images subtle enhancement to the fibrous capsule surrounding the lesion (*arrows*) without nodular internal enhancement



and the lesion develops a fibrous pseudocapsule which is hypointense on all sequences and can enhance (Fig. 3).

Patchy internal enhancement in MLLs has been described and is thought to be related to the presence of capillaries (residual or new) in the potential space filled by the lesion [3, 4]. The variable enhancement occasionally seen in these lesions may lead the radiologist to diagnosing a soft tissue tumor. The ovoid margin from the peeling back of subcutaneous fat from fascia as well as the typical location may help the radiologist in avoiding a diagnosis of a soft tissue tumor and consider more benign entities such as MLL, fat necrosis and anticoagulant-related hematomas.

With prompt compression, many closed degloving injuries may resolve without intervention. As in the present case, however, many MLLs may persist despite the compressive therapy and require more aggressive management. Hak et al. suggested the fibrous capsule prevents reabsorption of serosanguinous fluid and may indicate percutaneous aspiration and/or debridement will be required for optimal treatment [1]. The surgical literature initially advocated open debridement of the lesion with subsequent

healing via secondary intention [6]. Aggressive management was rationalized by the documented risk of the lesion becoming a nidus for infection, pseudocyst formation, and causing adjacent tissue necrosis from local mass effect [1].

Non-invasive treatment methods have become increasingly popular and justified on the grounds that iatrogenic injury to the remaining subcutaneous vascular supply is minimized and overall cosmesis improved [2]. These treatment options include serial percutaneous aspirations and suction drainage. In refractory cases, talc or doxycycline sclerodesis has been successfully employed [6]. When MLLs are found over the greater trochanter in association with pelvic and acetabular fractures, Hak et al. [1] recommend surgical debridement over percutaneous drainage.

In conclusion, Morel–Lavallee lesions are rare causes of subcutaneous swelling. We have presented a case involving an atypical site, and demonstrated classical MRI features. Clinicians should be aware of the potential diagnosis, and of the role of both surgical and minimally invasive treatment options.

**Conflict of interest statement** None.

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