Case Report

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Posttraumatic bilateral thigh Morel–Lavallée lesions without an underlying bone fracture in the United Kingdom: a case report

Sarah Razaq, FCPS[1], James Geffner, MRCPsych[2], Asma Khan, MBBS[2], Harry Mee, MRCP[2], Cynthia Udensi, MRCP[2], Fahim Anwar, FRCP[2]

[1]Department of Rehabilitation Medicine, Combined Military Hospital (CMH), Quetta, Pakistan
[2]Department of Rehabilitation Medicine, Addenbrooke's Hospital, Cambridge University Hospital NHS Foundation Trust, Cambridge, UK

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Correspondence to
James Geffner, MRCPsych
Department of Rehabilitation Medicine, Addenbrooke's Hospital, Cambridge University Hospital NHS Foundation Trust, Hills Rd, Cambridge CB2 0QQ, UK
Tel: +44-1223-245-151
Email: jamie.geffner@nhs.net

A Morel-Lavallée lesion results from a degloving injury between the muscle fascia and the subcutaneous layer. It is most commonly found in the trochanteric area but can occur at other sites. The treatment of the condition varies according to the medical circumstances, as well as the size and chronicity of the condition. A case of large (18×6 and 10×5 cm) bilateral posttraumatic Morel-Lavallée lesions with no underlying bone fracture is presented; the case occurred in a 49-year-old male patient 4 weeks posttrauma. Ultrasound scans showed bilateral large collections of anechoic fluid, which were aspirated under ultrasound guidance and further managed by compression bandages. There were no further complications. The objective of this case report is to present this unique and educational case, as well as to provide an overview of the pathophysiology, diagnosis, and management of Morel-Lavallée lesions. We conclude by discussing the importance of having a high index of suspicion to ensure early detection and prompt treatment of such lesions to avoid complications.

Keywords: Morel-Lavallée lesion; Diagnostic imaging; Case reports

INTRODUCTION

A Morel-Lavallée lesion is a rarely diagnosed posttraumatic sequela resulting from closed degloving injuries. It is caused by the accumulation of blood, lymph, and debris in the subcutaneous plane. The diagnosis is based on a history and physical examination, as well as support by imaging modalities—including computed tomography (CT), magnetic resonance imaging (MRI), and ultrasound—to provide detailed information and differentiate the nature of the swelling. MRI is the diagnostic modality of choice, but increasingly many case reports are being published that support the utility of ultrasound in diagnosing such soft tissue lesions [1]. Various treatment options are available in the form of conservative and noninvasive procedures, including aspiration of the fluid, compression therapy, sclerosant injection, and pulse lavage. Surgical debridement may be required in delayed or complicated cases.

Posttraumatic thigh Morel-Lavallée lesions have been reported in the literature, but the simultaneous bilateral occurrence of these lesions in the thigh without an underlying fracture or open

wound has not been reported to date. We report the clinical and radiological features of a 49-year-old male patient with bilateral large anterolateral thigh closed Morel-Lavallée lesions, which were diagnosed and treated with a minimally invasive procedure without recurrence. We also reviewed the relevant literature to highlight the importance of musculoskeletal ultrasound for diagnosing soft tissue disorders with high accuracy and providing therapeutic interventions at the same time [2,3].

CASE REPORT

A 49-year-old male patient was involved in a road traffic injury (car vs. car). He lost control of his vehicle at high speed and was hit on the passenger side by a Range Rover. He was agitated at the scene, with an initial Glasgow Coma Scale of 6 out of 15. He was intubated and ventilated. He underwent a left thoracostomy for left pleural effusion with associated atelectasis prehospital by a doctor who was part of the air ambulance team. He was then transferred to a major trauma center after immobilization of his cervical spine and having Kendrick splints applied to both lower limbs according to the prevailing medical setup guideline for polytrauma patients.

His trauma CT showed brain injury (occipital contusions and intraventricular hemorrhages), chest trauma (multiple rib fractures, scapula fracture), and abdominal injuries (splenic laceration, adrenal hematoma, perihepatic hematoma). There was a full passive range of motion in the knee and hip joints, with good oxygen saturation (94%) from both great toes. The capillary refill time was less than 2 seconds. There was a superficial abrasion to the right inguinal region, without other swellings, wounds, or bony deformity/crepitus. Whilst no tenderness could be elicited in the lower limbs, a precise physical examination was limited in this respect due to the man's reduced level of consciousness.

He was initially treated in intensive care for 17 days before being transferred to the hyperacute rehabilitation unit for trauma rehabilitation, where he was treated for 12 weeks. He developed bilateral large anterolateral thigh swellings at 1 month posttrauma.

He was referred for an ultrasound scan to evaluate the nature and extent of the swellings. Using a low-frequency curvilinear transducer, simple fluid collections were detected in both anterolateral thighs, measuring 18×6 cm (left) and 10×5 cm (right).

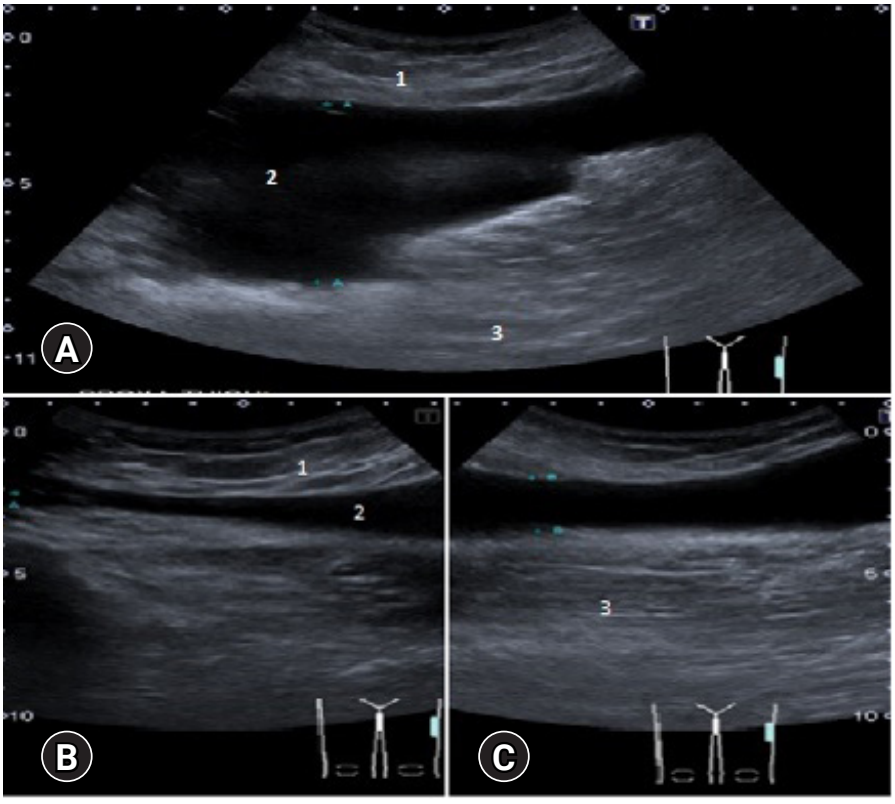

Fig. 1. Preaspiration ultrasound visualization of Morel-Lavallée lesion in the right thigh. (A–C) Different views of the right thigh collections.

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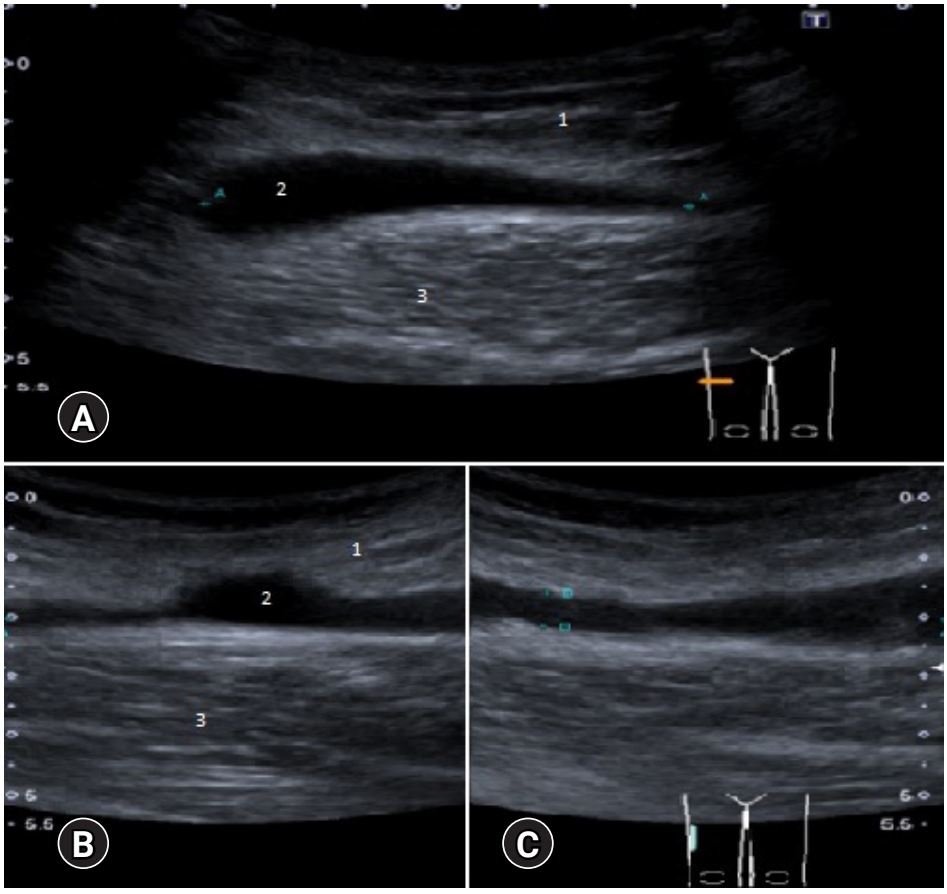

Fig. 2. Preaspiration ultrasound visualization of Morel-Lavallée lesion in the left thigh. (A–C) Different views of the left thigh collections.

These collections were present superficially to the muscle and deep to subcutaneous fat, appearing as anechoic collections of fluid with no signs of internal septations (Figs. 1, 2). The lesions were compressible without Doppler signals and were diagnosed as Morel-Lavallée lesions. They were differentiated from other soft tissue pathologies, including abscess or hematoma, by their typical appearance and location. Ultrasound-guided aspiration of both Morel-Lavallée lesion collections was performed under an aseptic technique, and serosanguineous fluid was aspirated to the point of dryness on the spot (approximately 550 mL of fluid from the left side and 150 mL from the right side), without any immediate complications. Compression dressings were applied bilaterally, and a sample was sent to the laboratory for routine analysis.

A postaspiration scan revealed bilateral reduced Morel-Lavallée effusions involving the anterolateral proximal thighs, particularly extensive on the left, where the collapsed collection extended into the left buttock and exceeded 30 cm in the craniocaudal extent. Despite the large size of the collections, the muscle and overlying fascia leaflets were closely located. The collapsed collections measured no more than 2 mm in total thickness on the right, and 3 mm on the left (Fig. 3). There was no significant fluid component amenable to drainage after the procedure.

It was difficult to explain to the patient the rationale of compression bandages as he had significant cognitive difficulties secondary to his traumatic brain injury and was inconsistently compliant with the compression bandages. Nevertheless, the swelling of his thighs subsided 6 weeks postaspiration. There have since been minor recurrences of the swelling, but the patient's condition has been gradually improving with further conservative management.

Despite some persistent swelling within the first few days after aspiration, the condition has remained painless; his physical and cognitive rehabilitation was never affected (Figs. 4, 5). His functional activity, measured using the Functional Independence Measure (FIM) and Functional Assessment Measure (FAM) scales, showed significant improvements in both physical and cognitive ability with multidisciplinary rehabilitation. The admission FIM was 29 (motor FIM, 24; cognitive FIM, 5), whereas the

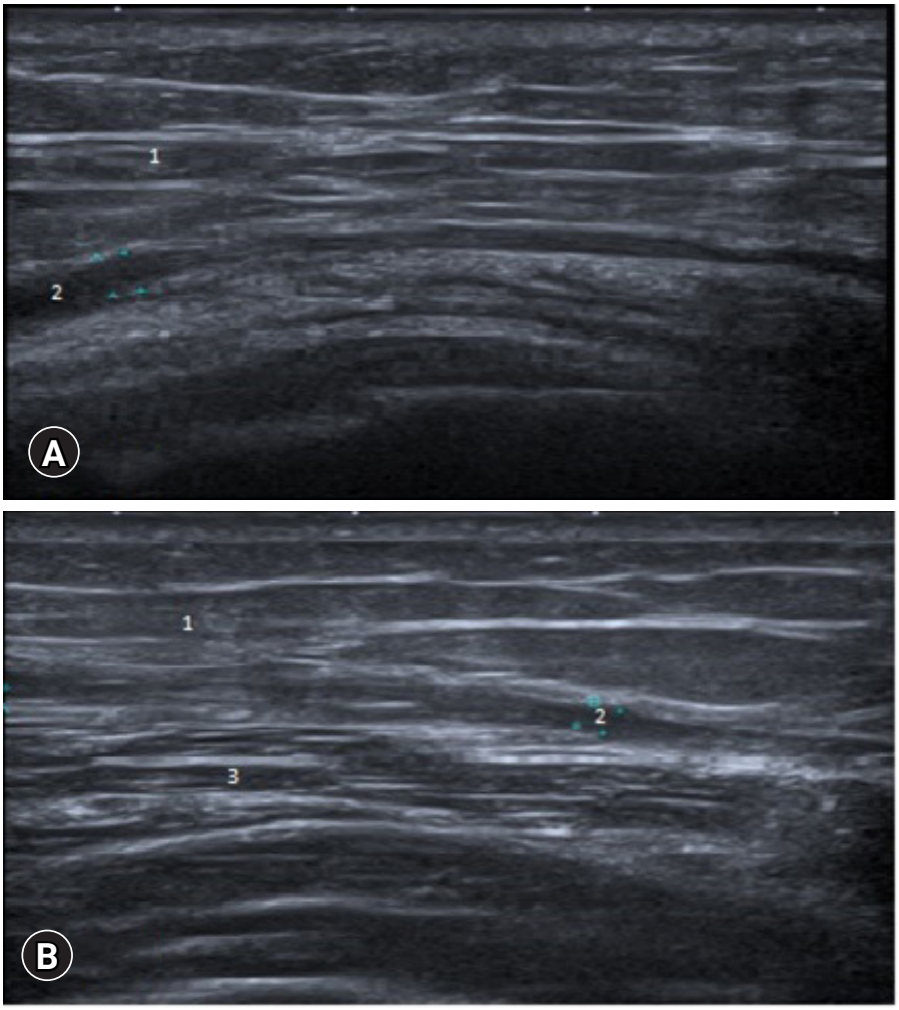

Fig. 3. Postaspiration ultrasound visualization of the (A) left thigh and (B) right thigh.

Fig. 4. The clinical photograph of the anterior view.

Fig. 5. The clinical photograph of the lateral view.

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Table 1. FIM and FAM scores on admission and discharge

Variable	Admission	Discharge
FIM score		
Motor	24	84
Cognitive	5	22
Total	29	106
FAM score		
Self-care item	10	45
Sphincter control	2	12
Mobility items	11	28
Locomotion	6	19
Communication items	5	30
Psychosocial adjustment	4	13
Thinking function	5	15
Motor subtotal	29	104
Cognitive subtotal	14	58
Total	43	162

FIM, Functional Independence Measure; FAM, Functional Assessment Measure.

discharge FIM was 106 (motor FIM, 84; cognitive FIM, 22). The FAM score increased from 43 on admission to 162 on discharge (Table 1).

Ethics statement

Informed consent for publication of the research details and clinical images was obtained from the patient.

DISCUSSION

A Morel-Lavallée lesion is a posttraumatic soft tissue degloving injury, which was first observed around 1863 by the French surgeon Victor Auguste Francois Morel-Lavallée in a patient who fell from a moving train. These lesions are mostly unilateral, but bilateral lesions have been described in association with underlying complex pelvic trauma or fracture of a distal extremity [4]. To the best of our knowledge, this is the only case of bilateral large Morel-Lavallée lesions after blunt trauma without an underlying fracture or open wound.

Morel-Lavallée lesions have been known to present as early as a few hours after the causative trauma. However, between one-third to two-thirds of Morel-Lavallée lesion patients are overlooked and present months or even years after the initial trauma, mainly requesting cosmetic surgery for an abnormal contour. These lesions may present with long-term morbidity with the presence of infection or sepsis, which can complicate the picture. Skin necrosis, chronic pain, or misdiagnosis as a soft tissue tumor can also occur [5].

The main causes are road traffic injuries (particularly motorcycle crashes) and sports injuries, but Morel-Lavallée lesions can occur in nontrauma settings such as postoperatively after liposuction and abdominoplasty [6]. The lesions can occur in isolation but often are associated with pelvic and/or acetabular fractures or polytrauma [7]. They may present as either open wounds or as closed degloving injuries with intact overlying skin. The most common sites of closed degloving injuries are usually adjacent to bony prominence, and have been described along the greater trochanter, thigh, hip, and flank. Less commonly, they have been reported at the knee, shin, calf, lumbar spine, abdomen, shoulder, elbow, and chest [2,8].

The commonly used Mellado-Bencardino classification of Morel-Lavallée lesions into six types is based on MRI features; this classification focuses on the shape, signal, and enhancement characteristics, as well as the presence or absence of a capsule [9]. Blunt trauma with a tangential impact is reported to be the most common form of injury, resulting in shearing of the subcutaneous fat and skin from the underlying firmly secured fascia, thus creating a potential space. The shearing forces cause damage to the perforating blood and lymphatic vessels, releasing their contents into the newly created cavity. With continuous spillage of the contents into the cavity, it is filled with blood, lymph, and necrotic fat. This process is followed by an inflammatory reaction that converts the newly created cavity into a cystic mass surrounded by a fibrous capsule—this is called a pseudocyst, which represents the chronicity of the lesion [7]. These lesions are frequently misdiagnosed, presenting late as contour deformities [6], and may mimic subcutaneous abscesses, lipomas, or soft tissue tumors.

The diagnosis is made through a combination of a history, a clinical examination keeping a high level of suspicion, and imaging studies. Pain and swelling are the most frequent complaints in patients with a history of trauma. On examination, the swelling may be compressible and fluctuant with overlying skin changes, such as dryness, cracks, discoloration, or necrosis. Cutaneous hypoesthesia or anesthesia may be present [10]. MRI is the diagnostic modality of choice [6]. MRI descriptions of these lesions are available in the literature, but relatively few case reports of Morel-Lavallée lesions have described their sonographic appearance. The use of musculoskeletal ultrasound has gained importance in the recent years and has assumed an important role in the assessment of soft tissues [11]. This is particularly true in rehabilitation settings, where it is used as both a diagnostic and interventional modality. Sonography is convenient, inexpensive,

noninvasive, repeatable, and does not require any exposure to radiation. Furthermore, ultrasound plays a growing role in the diagnostic algorithm for a wide spectrum of musculoskeletal disorders because it can provide dynamic imaging, comparisons, and therapeutic interventions all at the same time [1].

On ultrasound imaging, one can differentiate different layers from the skin to underlying bones. The uppermost layer is the epidermis, followed by the dermis, superficial adipose tissue, superficial fascia, deep adipose tissue, deep fascia, and finally muscle with the underlying bone [12]. The superficial fascia appears as a thin hyperechoic layer in the subcutaneous tissue, deep to the dermis and epidermis. The deep fascia is a thick hyperechoic layer separated from the superficial fascia by deep fat tissue, which is hypoechoic with thin horizontal hyperechoic striae inside it [12].

All Morel-Lavallée lesions are hypoechoic or anechoic, with or without internal echoes, compressible, and are located between the deep fat and overlying fascia [13]. They do not have internal vascularity on color or power Doppler. The shape may vary according to the location of the lesion and may range from fusiform, flat, to lobular, or may remain indeterminate [13].

These lesions tend to be heterogeneous and ill-defined initially as they contain blood, lymph, and fat. As the lesions age, they become more homogeneous and better defined with smooth margins, and they may include a fibrous pseudocapsule [10]. The lesions can have mixed echogenicity if there is repeat hemorrhage or if they contain nonabsorbed fat remnants.

There are no universally accepted international guidelines for the management of Morel-Lavallée lesions. The management depends upon the size of the lesion, chronicity, and the presence or absence of a capsule. It varies according to the individual surgeons' preference and expertise, as well as institutional treatment protocols. If the lesion is very small and the symptoms are mild, then conservative treatment with a compression bandage and close follow-up may suffice [3]. Serial scans by an expert in musculoskeletal ultrasound (either a clinician or radiologist) can help to monitor the progress of these lesions. If the lesion is mild to moderate, aspiration followed by compression bandage for 6 weeks can be helpful with incremental scans.

Other treatment options include percutaneous aspiration with suction drainage, which has been used successfully [14]. To prevent fluid reaccumulating after drainage, fluoroscopic percutaneous talc sclerodesis has been used [15].

For larger lesions, many orthopedic surgeons favor early surgical drainage and debridement [7]. Surgical resection is warranted if a fibrous capsule has developed.

We recommend ultrasound-guided aspiration followed by compression bandage for 6 to 8 weeks in acute lesions, as well as follow-up scans afterwards to visualize the regression and monitor accordingly.

In conclusion, Morel-Lavallée lesions are prone to being overlooked in around one-third to two-thirds of patients, especially in cases of polytrauma and with the presence of life-threatening injuries. Therefore, it is recommended that clinicians perform a detailed secondary survey to look for this pathology in all cases of trauma with a high index of suspicion. Ultrasound can be performed at the bedside to confirm the nature and extent of a swelling and also to aspirate the fluid.

ARTICLE INFORMATION

Author contributions

Conceptualization: SR, JG, HM, CU; Formal analysis: all authors; Methodology: SR, AK; Writing–original draft: SR; Writing–review & editing: JG, AK, HM, CU, FA. All authors read and approved the final manuscript.

Conflicts of interest

The authors have no conflicts of interest to declare.

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Data availability

Data sharing is not applicable as no new data were created or analyzed in this study.

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