

Unusual Distal Leg Presentation of Morel-Lavallée Lesion: Case Report with Review of Diagnostic and Management Strategies

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Abstract

Case Report

A Morel-Lavallée lesion is a rare post-traumatic closed degloving injury defined by chronic fluid collection between subcutaneous tissue and fascia. We report a case involving a 42-year-old immunocompromised man with persistent swelling of the right leg after a fall 18 months earlier. The lesion was fluctuant and mildly tender, with no skin changes. Ultrasound revealed a complex cystic mass ($6.6 \times 4.2 \times 1.0$ cm) in the deep subcutaneous plane, raising suspicion for a Morel-Lavallée lesion. MRI confirmed a fluid collection overlying the fascia near the ankle. Orthopedic evaluation recommended percutaneous aspiration and compressive bandaging for 4–6 weeks to close the dead space, with surgery reserved for refractory cases. This report highlights the need to recognize Morel-Lavallée lesions long after trauma, as early identification prevents mismanagement. We also review the prevalence, diagnostic challenges, and management options for this condition.

Keywords: Morel-Lavallée lesion, post-traumatic, fluid collection, diagnosis, management.

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INTRODUCTION

Morel-Lavallée lesion (MLL) is an uncommon post-traumatic soft-tissue injury caused by shearing forces that separate the skin and subcutaneous fat from the underlying fascia [1]. The resulting potential space fills with hemolymphatic fluid from disrupted blood vessels and lymphatics [1,2]. Over time, this fluid collection can trigger chronic inflammation and encapsulation by a fibrous capsule, forming a persistent cyst-like lesion [2,3]. Figure 1 summarizes the development progress of the MLL. First described by Maurice Morel-Lavallée in 1863, these lesions are classically associated with high-energy trauma such as road accidents and crush injuries [2,4]. They most commonly occur over the greater trochanter, proximal thigh, or pelvic region, due to the large mobile subcutaneous tissue over tough fascia (e.g. fascia lata) in these areas [2]. In fact, more than 60% of cases involve the greater trochanter/hip region [2]. Nevertheless,

Morel-Lavallée lesions can develop in various locations, including the knee, lumbosacral area, abdominal wall, and rarely the calf or lower leg [4].

Although the true incidence of MLL in the general trauma population is not well established, they are found in approximately 8% of patients with acetabular or pelvic fractures [2,5]. MLLs are often overlooked initially – up to one-third of cases present in a delayed fashion after the precipitating trauma [2]. Clinically, they may resemble contusions or hematomas and thus the diagnosis can be missed or delayed [4,5]. Unrecognized lesions pose a risk of complications such as infection, skin necrosis, or chronic pain [4,6]. It is therefore crucial for clinicians to consider MLL in patients with persistent post-traumatic swelling. Here, we present a case of a chronic Morel-Lavallée lesion of the lower leg, an unusual location, and discuss its diagnosis and management in light of current literature.

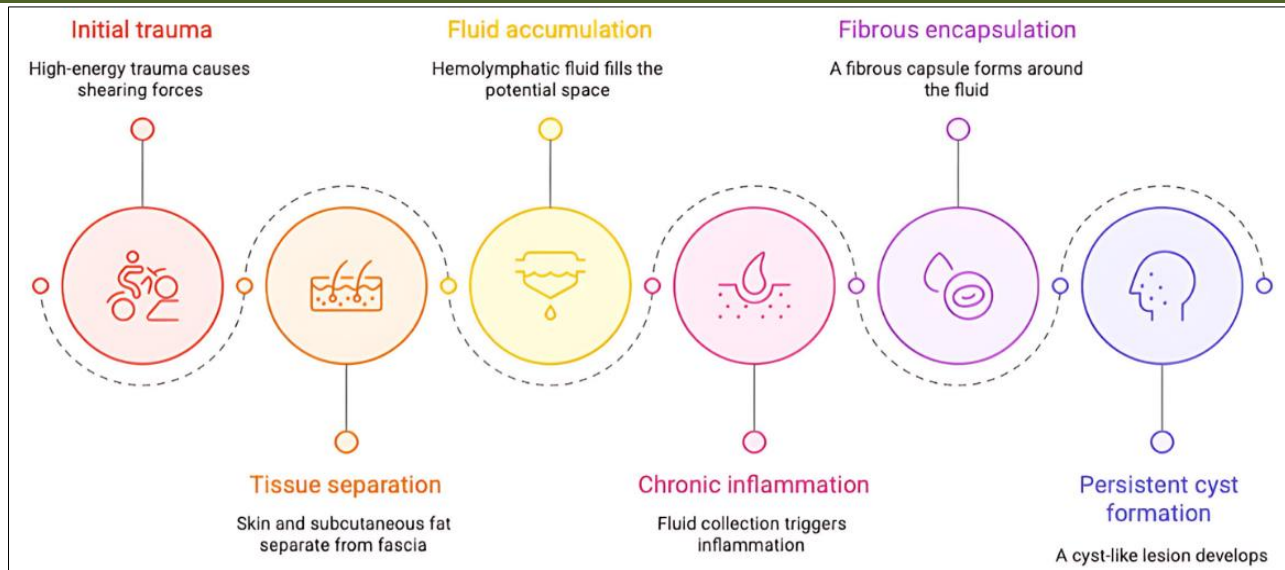


Figure 1: Morel-Lavallée lesion Development

CASE PRESENTATION

A 42-year-old man presented to the general practitioner (GP) with a persistent swelling on the lateral aspect of his right lower leg above the ankle. The swelling originated after a fall injury 18 months ago and had remained as a palpable lump since that time. Over the past few weeks, the lesion had become increasingly painful, prompting the patient to seek further evaluation. He denied any recent trauma to the area. The patient's medical history was notable for an immunocompromised state (the patient was on long-term immunosuppressive therapy for a separate condition), but he was otherwise healthy and functionally independent.

On examination, there was a soft, compressible mass over the lateral right leg above the ankle, approximately 5 cm in diameter and elevating about 1 cm above the surrounding skin. The overlying skin was intact with no discoloration, ulceration, or warmth. The mass was fluctuant on palpation and mild tenderness was elicited on compression. There was no erythema or visible bruising. The lesion was not adherent to underlying structures, and compressive pressure temporarily flattened the swelling, suggesting a fluid component. Distally, the patient had full range of motion at the ankle joint and normal neurovascular status in the foot. No other lesions were present on the leg.

An initial ultrasound (US) of the leg was obtained, which demonstrated a predominantly cystic, mildly complex structure measuring $6.6 \times 4.2 \times 1.0$ cm in the deep subcutaneous tissue overlying the underlying musculature. The fascia beneath the collection was intact. Internal echoes and septations were noted within the fluid. The ultrasound findings were consistent with a chronic fluid collection, and given the history of trauma, the radiologist reported it as a closed degloving injury, raising the possibility of a Morel-Lavallée lesion. There was no increased vascular flow within the mass on

Doppler imaging, and no solid components to suggest a tumor. The lesion's location was superficial to the muscle fascia, aligning with the expected plane of a Morel-Lavallée lesion.

The patient was counseled that the imaging characteristics did not indicate a malignancy, but rather a post-traumatic fluid collection. To further delineate the lesion and plan management, an MRI of the right leg was performed. MRI revealed a well-defined fluid collection in the subcutaneous plane of the lateral distal leg. The lesion was approximately 6 cm in length and had low signal intensity on T1-weighted sequences and high signal on T2/STIR sequences, consistent with fluid. A thin peripheral capsule was observed without evidence of significant enhancement. There were internal septations and layering within the fluid, suggesting blood products or fat globules. These MRI features confirmed the diagnosis of a Morel-Lavallée lesion in the chronic (encapsulated) phase. No adjacent bony fracture or osteomyelitis was present, and the ankle joint appeared normal.

The patient was referred to an orthopedic surgeon for management. In view of the lesion's chronic nature and the patient's symptoms, the orthopedic plan was to perform an ultrasound-guided aspiration of the fluid collection, followed by the application of a compressive bandage over the area. The compression would be maintained for about 4–6 weeks to encourage adhesion of the separated tissue layers and obliteration of the potential space. The patient was advised that this conservative approach might need to be repeated if fluid reaccumulates. Given the patient's immunosuppressed status, a conservative management was preferred to minimize surgical risks. The surgical team reserved open surgical intervention (excision of the lesion and capsule) as a last resort if less invasive measures failed. The patient gave informed consent for the aspiration

procedure and was scheduled for follow-up to monitor the lesion's resolution.

DISCUSSION

This case illustrates a Morel-Lavallée lesion in a relatively uncommon location – the distal lower leg above the ankle – and highlights the challenges in diagnosis and management of this condition. Morel-Lavallée lesions typically result from high-impact trauma that generates a shearing force, but they can also occur after seemingly minor injuries if there is sufficient separation between tissue planes [2,4]. In our patient, a fall from standing height led to a chronic fluid collection that persisted for 18 months. Such a delayed presentation is not unusual; approximately 33% of MLL cases are diagnosed long after the initial injury, often when patients seek care for a non-resolving “hematoma” or mass [2]. Early on, an acute Morel-Lavallée lesion may present as a swollen, bruised area with fluctuance, which can be mistaken for a simple contusion. Over time, as in this case, the lesion can evolve into a painless or mildly painful fluctuant mass with a fibrous capsule. Patients might experience altered sensation (cutaneous hypoesthesia) over the area due to disruption of cutaneous nerves during the degloving injury [4]. In our patient, the lesion was mostly asymptomatic aside from mild discomfort on compression, and there were no overlying skin changes such as ecchymosis or necrosis – the latter are seen more in acute, severe degloving injuries or if the lesion becomes infected [2].

Prevalence and anatomy:

Morel-Lavallée lesions are considered uncommon, but clinicians should maintain a high index of suspicion in post-traumatic swellings. The incidence is notably higher in the context of pelvic trauma; for

example, up to 8.3% of patients with acetabular fractures are reported to develop an MLL [5]. One review of 204 cases found the most frequent locations to be the hip and thigh (accounting together for about half of cases), followed by the pelvis and knee [4]. Lesions of the lower leg (calf) constitute only ~1.5% of cases [4], which explains the diagnostic uncertainty in our patient initially. Our case adds to the literature of these rare lower leg presentations [4]. Risk factors for developing MLL include high BMI (due to increased shearing of soft tissue)[2] and involvement in high-energy accidents – indeed, about a quarter of patients with MLL have sustained a road traffic accident as the mechanism[6]. There is a male predominance (approximately 2:1) in reported cases, likely reflecting the demographics of trauma patients [2].

Diagnostic approach:

Diagnosing a Morel-Lavallée lesion can be challenging because it can mimic various conditions, as illustrated in Table 1. The differential diagnosis for a chronic post-traumatic soft-tissue mass includes chronic hematoma or seroma, post-operative fluid collections, abscess (if signs of infection are present), bursitis, pseudolipoma (fat necrosis), and soft-tissue tumors such as lipoma or even low-grade sarcoma [2,5]. Careful history and physical exam are crucial. A history of antecedent trauma (even remote) that correlates with the location of swelling is an important clue. On exam, classic features of MLL are fluctuation, compressibility, and often a positive “swirl sign” on palpation (fluid motion). In our patient, compression made the lump temporarily flatten, strongly suggesting a fluid-filled space. The absence of internal solid components on imaging and lack of neovascularity also argued against a neoplasm or vascular malformation.

Table 1: Differential diagnoses of Morel-Lavallée lesion

Condition	Key Features	How It Differs from MLL
Chronic hematoma / seroma	Localised fluid collection following trauma or surgery; may persist or recur	Usually lacks compressibility and swirl sign; can calcify or organise over time
Post-operative fluid collection	Accumulates after surgery in the operative field	Strong correlation with surgical site; often resolves with drainage
Abscess	Painful swelling, erythema, warmth, systemic infection signs	Internal echoes with debris and thick rim enhancement; vascularity on imaging
Bursitis	Fluid in an anatomical bursa (e.g., prepatellar, trochanteric)	Localised to known bursal locations; not usually post-traumatic
Pseudolipoma (fat necrosis)	Firm, irregular, non-fluctuant mass; may follow trauma	Solid lesion, not compressible or fluctuant; different echogenicity pattern on imaging
Lipoma	Soft, mobile, benign adipose tumour	Homogeneous fatty signal on MRI; not fluid-filled
Low-grade sarcoma	Slow-growing, firm soft-tissue mass; may mimic benign lesion	Enhances internally on MRI, vascularity present; not compressible

Imaging studies confirm the diagnosis and help delineate the extent of the lesion, as illustrated in Table 2. Ultrasonography is a useful first-line modality for evaluating a suspected MLL. On ultrasound, a Morel-Lavallée lesion typically appears as an anechoic or

hypoechoic fluid collection in the subcutaneous plane above the fascia [1]. Internal echogenic debris or septations may be seen, representing clotted blood and fat lobules within the lesion [1]. In the acute phase, the content can be more echogenic (due to fresh clot),

becoming more anechoic as the hematoma liquefies [1]. Our patient's ultrasound showed a largely cystic structure with internal echoes, consistent with this pattern. Importantly, ultrasound can also demonstrate a lack of internal vascular flow, which helps distinguish an MLL from a vascular lesion or hypervascular tumor.

Magnetic resonance imaging is the gold standard for characterizing Morel-Lavallée lesions [4]. MRI provides excellent contrast for fluid and can identify the presence of a capsule and any internal septations. In chronic lesions, MRI often shows a well-defined, oval or fusiform collection that lies superficial to the muscle fascia [1]. The signal intensity of the fluid can vary depending on the age of blood products: acute hemorrhage may appear heterogeneous, whereas chronic

fluid is typically homogeneous and hyperintense on T2-weighted images [7]. A fluid-fluid level might be evident if there are layers of blood of different ages [1]. After contrast administration, pure Morel-Lavallée lesions generally do not enhance internally (since they are avascular fluid), though a peripheral rim enhancement can be seen if a fibrous capsule is present or if there is inflammation. In our case, MRI confirmed a subcutaneous fluid collection bounded by an intact fascia, with T1-hypointense, T2-hyperintense signal and a thin capsule – all hallmark features of a chronic MLL [5]. This helped exclude differential diagnoses such as soft-tissue sarcoma (which would usually show solid enhancing components) or chronic abscess (which might show a thick enhancing wall and surrounding edema).

Table 2: Radiological imaging modalities for Morel-Lavallée lesion

Modality	Findings	Diagnostic Value
Ultrasound	Anechoic/hypoechoic subcutaneous collection above fascia; internal echoes/septations (clot/fat); no internal vascularity	First-line tool; confirms cystic nature; rules out vascular lesion; identifies internal debris and septations
MRI	Oval/fusiform collection above fascia; T1-hypointense, T2-hyperintense; variable signal depending on blood age; capsule; no internal enhancement (possible rim enhancement if capsule/inflammation)	Gold standard; defines extent, chronicity, capsule presence; differentiates from neoplasm or abscess

DIAGNOSTIC CHALLENGES

The diagnosis of an MLL is frequently missed on initial evaluation, especially if the focus is on associated injuries (e.g., fractures) or if the lesion is in an atypical location [4,5]. In retrospect, our patient's lesion was likely an MLL from the beginning, but because it was not identified early, it progressed to a chronic encapsulated seroma. Missed or delayed diagnoses can lead to prolonged morbidity. One major concern with chronic MLLs is the risk of infection: the fibrous capsule and fluid can serve as a nidus for microbial growth. Case series have reported infection in a significant subset of chronic MLL cases, one series noted up to 46% of chronic MLL collections were infected [6]. Infected lesions may present with increasing pain, redness, or systemic signs, and require urgent intervention. Additionally, chronic MLLs can cause skin changes; prolonged pressure and motion of the fluid can induce skin thinning or even necrosis in severe cases [3]. It is also documented that presence of an MLL near a fracture site can independently increase the risk of surgical site infection if the fracture is internally fixed through the area [2]. These considerations highlight why recognizing an MLL is important for timely management. In our patient, the absence of infection signs allowed for a measured, elective approach to treatment.

MANAGEMENT

The optimal management of Morel-Lavallée lesions depends on the lesion's size, chronicity, and symptoms, as stated in Table 3. There are no universal

guidelines, and practices range from conservative management to surgical intervention [3,8]. Small acute lesions may resolve with conservative treatment, which includes compression dressings and observation, as compression can promote adhesion of the separated tissue planes and encourage reabsorption of fluid [1]. Early immobilization and compression of an acute MLL (for example, using an elastic bandage or binder) are thought to help limit the potential space and thus prevent persistent fluid accumulation [1]. However, once a lesion becomes chronic and encapsulated, simple compression alone is rarely successful [1]. Our patient's lesion, having persisted for 18 months, has a fibrous capsule that will likely not collapse without intervention.

Percutaneous aspiration of the fluid is a common first-line intervention for symptomatic MLLs. Aspiration not only confirms the diagnosis (fluid can be sent for analysis) but also can provide relief. The recurrence rate after simple aspiration is high if done in isolation, because the capsule often secretes fluid again. Therefore, adjunctive measures are usually employed. One strategy is sclerodesis: after draining the fluid, a sclerosing agent is injected into the cavity to induce fibrosis and obliterate the space [2]. Agents used include doxycycline, talc, alcohol, and others, which promote scar formation inside the lesion [2]. In published cases, percutaneous drainage combined with sclerosing therapy and compression has yielded good results in eliminating chronic Morel-Lavallée lesions [7]. In our patient's plan, aspiration followed by prolonged compression

essentially serves a similar purpose; compression alone might suffice for a lesion of this size, or a sclerosant could be considered if fluid reaccumulates. Indeed, a recent case series documented successful treatment of a chronic thigh MLL with ultrasound-guided drainage, sclerosing agent instillation, and a compression bandage, leading to complete resolution without surgery [7]. We anticipate a similar approach will benefit our patient, given the lesion's moderate size and accessible location.

If minimally invasive measures fail or if the lesion is very large, multiloculated, or chronically symptomatic, surgical intervention is indicated. The definitive surgical treatment is an open excision of the lesion *en masse* with removal of the fibrous capsule [2]. Excision ensures that the potential space is eliminated. Surgeons often debride any necrotic fat and secure the tissue layers together (sometimes with sutures or surgical adhesives) to prevent re-accumulation of fluid [1,2]. In some cases, especially in the trochanteric area, suction drains or negative pressure wound therapy are used postoperatively to obliterate dead space and manage

wound fluid. More extensive lesions that have caused skin compromise may even require plastic surgical techniques like skin grafts or local flaps after excision [9]. Surgery generally has a high success rate in resolving MLLs, but it comes with typical surgical risks and a longer recovery. In the orthopedic literature, early aggressive management (such as prompt aspiration or surgical drainage within a few days of injury) has been recommended by some to reduce the chance of chronic encapsulation and to lower infection risk [10]. However, each case must be individualized. Our patient, being immunocompromised, faces higher risk with surgery, so the threshold for proceeding to an operative solution is higher. The plan to attempt percutaneous treatment aligns with the principle of using the least invasive effective option first. We will monitor the patient's response; if the lesion reappears or persists despite aspiration and compression, surgical excision with capsule resection will be reconsidered, as ultimately an encapsulated lesion may not permanently resolve without removal of its lining [1].

Table 3: Management approaches for Morel-Lavallée lesion

Approach	Description	Indications	Limitations / Risks	Outcomes / Notes
Conservative (Compression & Observation)	Compression dressings, elastic bandages, binders; immobilisation to collapse potential space	Small, acute lesions without capsule; early cases post-trauma	Rarely effective once lesion becomes chronic or encapsulated; risk of recurrence	Can promote adhesion of tissue planes and fluid reabsorption; best for early, uncomplicated cases
Percutaneous Aspiration	Needle drainage of lesion fluid; fluid may be sent for analysis	Symptomatic lesions; diagnostic confirmation	High recurrence if performed alone (capsule continues fluid secretion)	Provides immediate relief; often combined with compression or sclerosant injection
Aspiration + Sclerodesis	After aspiration, injection of sclerosant (e.g., doxycycline, talc, alcohol) to induce fibrosis	Chronic or recurrent lesions with fluid reaccumulation	Possible pain, inflammation, local tissue reaction; variable efficacy depending on lesion size/complexity	Good reported success with reduced recurrence; especially effective when combined with compression bandaging
Surgical Excision (Capsulectomy)	Open en bloc removal of lesion with capsule; debridement of necrotic fat; closure of dead space	Large, chronic, encapsulated, multiloculated, or recurrent lesions; failed conservative/minimally invasive treatment	Surgical risks (infection, wound complications, prolonged recovery); higher threshold in immunocompromised patients	Definitive treatment; high success in resolving MLL; may require drains, negative pressure therapy, or skin grafts if extensive
Adjunctive Surgical Techniques	Use of suction drains, negative pressure wound therapy, tissue adhesives, or skin grafts/flaps if skin compromised	Very large or complicated lesions, especially with tissue loss	Requires specialised surgical expertise; longer rehabilitation	Helps prevent re-accumulation of fluid and promotes wound healing; plastic surgical input may be necessary

Take-Home Message

- **Closed Degloving Injury:** Morel-Lavallée lesion is a closed degloving injury where a shearing force separates subcutaneous tissue from fascia, creating a space that fills with blood, lymph, and debris. It often occurs in high-impact trauma and classically involves areas like the hip or thigh [2].
- **Clinical Clues:** Suspect an MLL when a patient presents with a persistent, fluctuant soft-tissue mass after trauma. Key exam findings include fluctuance, compressibility, and often diminished sensation over the area [4]. The lesion may initially masquerade as a simple bruise or hematoma, leading to delayed diagnosis in many cases (up to 33% present late) [2].
- **Imaging for Diagnosis:** Ultrasound and MRI are valuable for diagnosing MLL. Ultrasound shows an anechoic/hypoechoic fluid collection with possible internal septations [1]. MRI is the diagnostic gold standard, delineating the lesion's extent and showing characteristic fluid signals and any fibrous capsule [1]. These imaging modalities help distinguish MLL from differential diagnoses like abscess, seroma, or soft-tissue tumors.
- **Management Spectrum:** Treatment of Morel-Lavallée lesions ranges from conservative to surgical. Small or acute lesions can sometimes resolve with compression and rest. Chronic or larger lesions often need intervention. Percutaneous options include needle aspiration often combined with sclerosing agent injection and prolonged compression to prevent re-accumulation [2,7]. Definitive treatment for recurrent or encapsulated lesions is surgical excision of the lesion and its capsule to eliminate the dead space [1].
- **Preventing Complications:** Recognizing an MLL is crucial to avoid complications. Untreated lesions can become a nidus for infection (with significant infection rates reported in chronic cases) [6] and can cause skin necrosis or complicate orthopedic surgeries in the area [2]. Early diagnosis and appropriate management (e.g., timely drainage and compression) improve outcomes and reduce morbidity [1,3].

CONCLUSION

Morel-Lavallée lesions should be considered in patients with persistent soft-tissue swelling after trauma. This case shows that even long after injury, a fluid collection may indicate a chronic Morel-Lavallée lesion rather than a tumor. Early recognition is important to guide management and reduce risks such as infection or unnecessary procedures. MRI is particularly useful for diagnosis because it defines both the extent and content of the lesion. Treatment must be tailored to the patient. Many lesions respond to aspiration or compression, while some require surgical excision for full resolution.

Clinicians in family medicine, emergency care, orthopedics, and radiology should be alert to this subtle condition. Timely diagnosis and treatment can result in excellent outcomes and help prevent long-term complications, as demonstrated in this case.

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