RESEARCH PAPER

Road Traffic Accident – Different Approaches of Morel-Lavallée Lesion

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ABSTRACT

Background:
Morel-Lavallée lesions are closed internal degloving injuries caused by shearing forces that separate the subcutaneous tissue from the underlying fascia, resulting in hemolymphatic fluid accumulation. High-energy trauma may lead to significant haemorrhage, soft-tissue necrosis, and potentially life-threatening complications.

Case Presentation:

We present three cases of Morel-Lavallée lesions following road traffic accidents, demonstrating varied clinical presentations and management strategies. The first case involved a 40-year-old male who developed a large right thigh lesion associated with recurrent hypotension and haemorrhagic shock, requiring resuscitation, massive transfusion protocol activation, compression, and intensive care monitoring. The second case involved a 28-year-old male with a small, uncomplicated Type I lesion over the greater trochanter. Magnetic resonance imaging confirmed a simple seroma, which resolved satisfactorily with conservative management, including compression bandaging, analgesia, and activity modification. The third case involved a 32-year-old male with an extensive right thigh lesion complicated by acute compartment syndrome. Progressive pain, tense swelling, pain on passive stretch, and neurological deficits necessitated emergency fasciotomy, debridement, negative-pressure wound therapy, and planned delayed closure.

Conclusion:
These cases highlight the diverse severity of Morel-Lavallée lesions and the importance of early recognition, appropriate imaging, and individualized management. While selected small, acute lesions may respond to conservative treatment, extensive lesions with hemodynamic instability or compartment syndrome require urgent intervention. Timely diagnosis and multidisciplinary management are essential to minimize complications and improve outcomes.

Keywords: Morel-Lavallée lesion; internal degloving injury; road traffic accident; haemorrhagic shock; thigh compartment syndrome; fasciotomy; negative-pressure wound therapy.

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INTRODUCTION

Road traffic accidents (RTAs) are a major cause of traumatic injuries, frequently resulting in damage to the musculoskeletal system and surrounding soft tissues. Although fractures and solid-organ injuries are routinely evaluated during initial trauma assessment, certain closed soft-tissue injuries may remain unrecognized. Morel-Lavallée lesion (MLL), also known as an internal degloving injury, is an important but frequently overlooked consequence of blunt trauma. It occurs when shearing forces separate the subcutaneous tissue from the underlying deep fascia, disrupting perforating blood vessels and lymphatic channels and creating a potential space that fills with blood, lymph, necrotic fat, and serosanguineous fluid [1,2]. First described by the French physician Maurice Morel-Lavallée in 1863, this lesion is commonly associated with high-energy trauma, including road traffic accidents, crush injuries, and falls. The greater trochanter, lateral thigh, hip, pelvis, and lumbar region are frequently affected because of the anatomical relationship between the subcutaneous tissue and underlying fascia [1,3]. The severity of the lesion varies considerably, ranging from a small localized fluid collection to extensive soft-tissue separation associated with substantial blood loss, skin compromise, and hemodynamic instability [2,4].

The pathophysiology involves disruption of the normal tissue planes, resulting in accumulation of hemolymphatic fluid within the newly created cavity. Initially, the collection may contain blood and lymphatic fluid; subsequently, inflammatory changes and fat necrosis may contribute to its contents. Persistent collections may develop a fibrous pseudo capsule, which interferes with spontaneous resorption and increases the likelihood of recurrence. Delayed recognition may result in chronic swelling, infection, skin necrosis, impaired wound healing, and complications during the management of associated fractures [1,2,4].

The clinical presentation of MLL is variable and depends on the mechanism of injury, lesion size, anatomical location, and time elapsed since trauma. Common findings include localized swelling, fluctuance, tenderness, ecchymosis, skin hypermobility, and altered cutaneous sensation. In patients with high-energy trauma, the lesion may coexist with pelvic fractures, long-bone injuries, or other significant injuries. Extensive collections can contribute to considerable blood loss and may complicate the assessment of unexplained hypotension in trauma patients [2,4]. Therefore, careful examination of the entire injured limb and surrounding soft tissues is essential, even when initial investigations do not demonstrate intra-abdominal bleeding.

Diagnosis requires a combination of clinical assessment and appropriate imaging. Ultrasonography is a useful bedside investigation for identifying superficial fluid collections and assessing their extent. Computed tomography (CT), frequently performed during the evaluation of polytrauma patients, may demonstrate fluid accumulation within the subcutaneous tissues. However, magnetic resonance imaging (MRI) provides superior soft-tissue characterization and helps determine the extent, contents, chronicity, and presence of a pseudo capsule. Imaging findings should be interpreted alongside the clinical examination and the patient's hemodynamic status [1,2,5].

Management remains individualized because universally accepted treatment guidelines are lacking. The choice of treatment depends on lesion size, duration, location, skin viability, associated fractures, infection, and response to previous interventions [1,2]. Small, acute lesions without a fibrous capsule may be treated conservatively using compression bandaging, rest, activity modification, analgesics, and close clinical monitoring. However, recurrence is possible, and conservative management should not be considered universally effective. Larger, expanding, persistent, or recurrent lesions may require image-guided aspiration, catheter drainage, sclerodesis, minimally invasive debridement, or open surgical management. In patients presenting with hemorrhagic shock, immediate resuscitation and identification of potential bleeding sources take priority over definitive treatment of the soft-tissue lesion [2,4].

The present case series, titled “Road Traffic Accident—Different Approaches of Morel-Lavallée Lesion,” highlights the varied clinical presentations and management considerations of MLL following road traffic trauma. It contrasts a severe right thigh lesion associated with recurrent hypotension, haemorrhagic shock, and bilateral inferior pubic rami fractures with a small, acute, uncomplicated lesion successfully managed using compression therapy and close follow-up. These cases emphasize the importance of early recognition, appropriate imaging, assessment of hemodynamic stability, and individualized treatment based on lesion severity. Awareness of this injury may facilitate timely intervention, reduce complications, and improve patient outcomes.

CASE 1:

A 40-year-old male was brought to the Emergency Department following a road traffic accident in which a bus ran over the right side of his abdomen

and lower limb. On arrival, he was conscious and oriented, with a patent airway, SpO_2 of 99%, pulse rate of 108/min, and blood pressure of 80/50 mmHg. Peripheral pulses were feeble, and capillary refill time exceeded two seconds. FAST examination was negative for free fluid.

Examination revealed extensive abrasions and swelling extending from the right lumbar region to the distal thigh. After fluid resuscitation, blood pressure improved to 110/70 mmHg. A 20 × 10 cm tender, fluctuant swelling was noted over the right lateral thigh, restricting hip and knee movements. CECT showed a diffuse subcutaneous collection without abdominal organ injury, along with bilateral inferior pubic rami fractures.

One hour later, recurrent hypotension and increasing thigh swelling developed. Massive transfusion protocol was activated, and a pelvic binder, compression bandage, and noradrenaline infusion were initiated. The patient was transferred to the Surgical Intensive Care Unit for further management and underwent MRI of the right thigh.

Final diagnosis: Hemorrhagic shock with a right thigh Morel-Lavallée lesion (internal degloving injury) following road traffic trauma.

CASE 2:

Presentation: A 28-year-old male presented to the Emergency Room following a road traffic accident involving direct impact to the lateral aspect of his right thigh. He was conscious, hemodynamically stable, and had no other significant injuries.

Clinical Examination: An 8 × 5 cm fluctuant swelling was noted over the greater trochanter and lateral thigh, with mild tenderness and skin hypermobility. Distal pulses and neurological examination were normal.

Investigations: Pelvic and femoral X-rays showed no fractures, and FAST was negative. Ultrasonography revealed a small subcutaneous fluid collection. MRI demonstrated an approximately 30 mL Type I Morel-Lavallée lesion (simple seroma), without a capsule or evidence of infection.

Management: Given its small size, acute presentation, and uncomplicated nature, conservative treatment was initiated with compression bandaging, rest, activity modification, analgesics, and serial clinical examinations. The patient was monitored for increasing swelling, skin necrosis, and infection.

Follow-up: At two weeks, swelling had significantly decreased, pain had resolved, and no recurrence was observed.

Final Diagnosis: Small acute Morel-Lavallée lesion (Type I seroma), successfully managed conservatively.

CASE 3:

Presentation: A 32-year-old male presented following a high-energy road traffic accident in which a heavy vehicle ran over his right thigh, causing extensive swelling and abrasions**.**

Initial Assessment: Examination revealed a tense, tender thigh with severe disproportionate pain, tachycardia, and initially palpable distal pulses with intact sensation.

Investigations: X-ray showed no major femoral fracture. Bedside ultrasonography and CT/MRI revealed an extensive fluid collection between the subcutaneous tissue and underlying fascia, suggestive of a Morel-Lavallée lesion.

Clinical Deterioration: Progressive swelling, severe pain despite analgesia, pain on passive stretch, paraesthesia, and neurological deficits indicated acute compartment syndrome.

Emergency Management and Intraoperative Findings: Emergency fasciotomy was performed without delaying intervention for further imaging. Findings included blood and serosanguinous fluid accumulation, tissue separation, and soft-tissue necrosis**.**

Wound Management and Final Diagnosis: Extensive debridement was performed, followed by planned negative-pressure wound therapy, serial assessment, and delayed closure. The final diagnosis was an extensive Morel-Lavallée lesion complicated by acute right thigh compartment syndrome.

DISCUSSION

Morel-Lavallée lesion (MLL) is an uncommon but clinically important closed soft-tissue injury resulting from shearing forces that separate the subcutaneous tissue from the underlying fascia. This separation disrupts blood vessels and lymphatic channels, producing a cavity containing blood, lymph, and necrotic fat. Road traffic accidents are an important mechanism, particularly when the thigh, hip, or pelvis sustains direct impact or crush injury. Early recognition is essential because the clinical presentation ranges from localized swelling to extensive soft-tissue injury associated with significant blood loss and hemodynamic instability [6–9].

The present cases demonstrate the importance of individualized assessment and treatment according to lesion severity. The first patient, a 40-year-old male, presented following a high-energy road traffic accident with hypotension, tachycardia, extensive right thigh swelling, and bilateral inferior pubic rami fractures. Despite an initially negative focused assessment with sonography for trauma (FAST), he subsequently developed recurrent hypotension and increasing thigh swelling. In contrast, the second patient, a 28-year-old male, presented with a small, localized thigh collection, stable vital signs, no associated fracture, and no evidence of infection. These contrasting presentations illustrate the variable clinical spectrum of MLL and the need to avoid relying exclusively on the external appearance of the injury.

Pathophysiology and clinical presentation

The greater trochanter and lateral thigh are commonly affected because the mobile subcutaneous tissues can separate from the relatively fixed underlying fascia during tangential impact. The resulting dead space permits continued accumulation of blood and lymphatic fluid. In the acute phase, the collection may remain relatively simple; persistent lesions can develop a fibrous pseudo capsule that interferes with resorption and increases recurrence risk [7–10].

In the first case, the extensive swelling and recurrent hypotension raised concern for significant traumatic blood loss. A negative FAST examination and the absence of solid-organ injury on contrast-enhanced computed tomography (CECT) did not exclude haemorrhage from the injured soft tissues or other extra-abdominal sources. The association of pelvic fractures further emphasized the need for comprehensive trauma evaluation. Although the thigh lesion was clinically important, hemorrhagic shock should be regarded as potentially multifactorial until bleeding sources have been adequately assessed. This case highlights the importance of repeated hemodynamic assessment, examination of the entire injured limb, and prompt escalation of resuscitation when deterioration occurs [6,8,11].

The second case demonstrated a localized fluctuant swelling measuring 8 × 5 cm, with mild tenderness and skin hypermobility. These findings are characteristic of MLL. Preserved distal pulses and normal neurological findings were reassuring but did not independently exclude soft-tissue complications. The absence of fracture, infection, and a fibrous capsule, together with the small estimated collection volume of approximately 30 mL, supported consideration of nonoperative treatment [9,10,12].

Role of imaging in diagnosis

Imaging is essential for confirming the diagnosis, defining lesion extent, identifying associated injuries, and guiding treatment. Plain radiography is useful for detecting fractures but cannot reliably characterize an MLL. Ultrasonography provides a rapid, accessible bedside assessment of superficial fluid collections and is particularly valuable during initial evaluation. However, its findings may be nonspecific and should be interpreted alongside the clinical presentation [8,12,13].

CECT is frequently performed during polytrauma evaluation and may reveal subcutaneous fluid collections while assessing associated abdominal, pelvic, and skeletal injuries. In the first case, CECT demonstrated a diffuse collection along the lateral thigh and bilateral inferior pubic rami fractures, without intra-abdominal free fluid or solid-organ injury. Magnetic resonance imaging (MRI) provides superior soft-tissue characterization and helps evaluate lesion contents, extent, chronicity, and pseudo capsule formation. In the second case, MRI identified a small Type I seroma without a capsule or evidence of infection, supporting the decision to attempt conservative management [7,12–14].

Management according to lesion severity

There is no universally accepted treatment algorithm for MLL. Management depends on lesion size, chronicity, anatomical location, skin viability, infection, associated fractures, and response to previous treatment [9,10,14]. Treatment options include compression, percutaneous aspiration, drainage, sclerodesis, minimally invasive procedures, and open surgical debridement.

In the first case, recurrent hypotension and progressive thigh swelling required immediate reassessment and escalation of trauma care. Activation of the massive transfusion protocol, application of a pelvic binder and compression bandage, initiation of vasopressor support, and transfer to the Surgical Intensive Care Unit reflected the severity of the clinical deterioration described. In hemorrhagic shock, haemorrhage control and appropriate blood-product resuscitation are priorities; vasopressors should not substitute for adequate volume and blood replacement. A pelvic binder may be appropriate when an unstable pelvic injury is suspected, but its use must be guided by the overall trauma assessment. Definitive management of the MLL should follow stabilization and evaluation of ongoing bleeding [6,11,14].

In the second case, conservative management comprised compression bandaging, rest, activity modification, analgesics, and serial clinical examinations. The approximately 30 mL collection was small, acute, and uncomplicated, with no pseudo capsule or infection. At two weeks, swelling had significantly reduced, pain had resolved, and no recurrence was reported. This favourable outcome supports the feasibility of conservative treatment in selected patients. Nevertheless, lesion volume alone should not determine treatment, and compression may be difficult to maintain effectively over the greater trochanter. Published reviews emphasize the risk of recurrence and the need for further intervention when conservative treatment fails [9,10,14,15].

Alternative interventions and complications

Persistent, enlarging, or recurrent collections may require image-guided aspiration or catheter drainage, sometimes combined with sclerodesis. Aspiration alone has a substantial risk of recurrence, particularly in larger lesions and those with established pseudocapsules. Sclerodesis promotes adhesion of the cavity walls and may be considered for selected persistent lesions. Large collections, recurrent lesions, infected lesions, and those associated with compromised overlying skin may require operative debridement, dead-space closure, or reconstructive procedures [10,14–18].

Potential complications include recurrent fluid accumulation, infection, skin necrosis, delayed

wound healing, and difficulties associated with surgical approaches to underlying fractures. Accordingly, patients managed conservatively require clear instructions to return for increasing swelling, worsening pain, skin discoloration, fever, or other evidence of infection. Follow-up should confirm continued resolution rather than relying solely on early symptomatic improvement [11,14,16].

Clinical significance and limitations

The principal learning point from these cases is that MLL should be considered following blunt or crush trauma, particularly when swelling is disproportionate to the apparent injury or when unexplained hemodynamic deterioration occurs. Early recognition, appropriate imaging, repeated assessment, and individualized management can help reduce complications. Recent systematic evidence also suggests that smaller lesions may respond to nonoperative treatment, whereas larger lesions frequently require more invasive approaches; however, available evidence remains heterogeneous and is predominantly based on observational studies [19].

CONCLUSION

Morel-Lavallée lesions following road traffic accidents require prompt recognition and severity-based management. The cases demonstrate contrasting presentations, from an extensive thigh lesion associated with hemorrhagic shock to a small, uncomplicated collection successfully treated conservatively. Clinical examination and appropriate imaging, particularly MRI, help establish the diagnosis and guide treatment. Compression therapy, rest, and close follow-up may be sufficient for selected acute lesions without a fibrous capsule, whereas extensive or progressive lesions require urgent assessment and possible intervention. Monitoring for recurrence, infection, and skin compromise remains essential. Ultimately, treatment decisions should consider hemodynamic stability, lesion characteristics, associated injuries, and response to therapy rather than relying on size alone.

LIMITATIONS

The present report is limited by its small number of distinct clinical presentations and short follow-up for the conservatively managed patient. Therefore, it cannot establish the comparative effectiveness of conservative and invasive treatment. Nevertheless, it illustrates the importance of distinguishing a small, uncomplicated collection from an extensive lesion associated with physiological instability. Treatment decisions should be based on the complete clinical picture, with particular attention to hemodynamic status, lesion progression, skin viability, and the possibility of recurrence.

References

1. Yang Y, Tang TT. The Morel-Lavallée lesion: review and update on diagnosis and management. Orthop Surg. 2023;15(10):2485–2491. doi:10.1111/os.13826.

2. Molina BJ, Ghazoul EN, Janis JE. Practical review of the comprehensive management of Morel-Lavallée lesions. Plast Reconstr Surg Glob Open. 2021;9(10): e3850. doi:10.1097/GOX.0000000000003850.

3. Singh R, Rymer B, Youssef B, Lim J. The Morel-Lavallée lesion and its management: a review of the literature. J Orthop. 2018;15(4):917–921. doi: 10.1016/j.jor.2018.08.032.

4. Nguyen PD, Truong N, Jebbia M, Bagga A, Murphy LS, Nie J, et al. Clinical presentation, imaging features, and management of Morel-Lavallée lesions: a scoping review. Am Surg. 2026;92(3):999–1014. doi:10.1177/00031348251391852.

5. De Coninck T, Vanhoenacker F, Verstraete K. Imaging features of Morel-Lavallée lesions. J Belg Soc Radiol. 2017;101(Suppl 2):15. doi:10.5334/jbr-btr.1401.

6. Hak DJ, Olson SA, Matta JM. Diagnosis and management of closed internal degloving injuries associated with pelvic and acetabular fractures: the Morel-Lavallée lesion. J Trauma. 1997;42(6):1046–1051.

7. Mellado JM, Bencardino JT. Morel-Lavallée lesion: review with emphasis on MR imaging. Magn Reson Imaging Clin N Am. 2005;13(4):775–782.

8. Bonilla-Yoon I, Masih S, Patel DB, White EA, Levine BD, Chow K, et al. The Morel-Lavallée lesion: pathophysiology, clinical presentation, imaging features, and treatment options. Emerg Radiol. 2014;21(1):35–43.

9. Singh R, Rymer B, Youssef B, Lim J. The Morel-Lavallée lesion and its management: a review of the literature. J Orthop. 2018;15(4):917–921.

10. Nickerson TP, Zielinski MD, Jenkins DH, Schiller HJ. The Mayo Clinic experience with Morel-Lavallée lesions: establishment of a practice management guideline. J Trauma Acute Care Surg. 2014;76(2):493–497.

11. Molina BJ, Ghazoul EN, Janis JE. Practical review of the comprehensive management of Morel-Lavallée lesions. Plast Reconstr Surg Glob Open. 2021;9(10):e3850.

12. De Coninck T, Vanhoenacker F, Verstraete K. Imaging features of Morel-Lavallée lesions. J Belg Soc Radiol. 2017;101(Suppl 2):15.

13. Diviti S, Gupta N, Hooda K, Sharma K, Lo L. Morel-Lavallée lesions—review of pathophysiology, clinical findings, imaging findings and management. J Clin Diagn Res. 2017;11(4):TE01–TE04.

14. Yang Y, Tang TT. The Morel-Lavallée lesion: review and update on diagnosis and management. Orthop Surg. 2023;15(10):2485–2491.

15. Bansal A, Bhatia N, Singh A, Singh AK. Doxycycline sclerodesis as a treatment option for

persistent Morel-Lavallée lesions. Injury. 2013;44(1):66–69.
16. Hak DJ. Morel-Lavallée lesions. Orthop Clin North Am. 2004;35(1):87–93.
17. Tseng S, Tornetta P 3rd. Percutaneous management of Morel-Lavallée lesions. J Bone Joint Surg Am. 2006;88(1):92–96.
18. Kottmeier SA, Wilson SC, Born CT, et al. Surgical management of soft tissue lesions associated with pelvic ring injury. Clin Orthop Relat Res. 1996;(329):46–53.
19. Characteristics, patterns and optimal treatment strategies of Morel-Lavallée lesions: a systematic review. J Orthop Trauma. 2025. Available from: https://pubmed.ncbi.nlm.nih.gov/40333732/