



The Morel-Lavallée lesion and its management: A review of the literature[☆]

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ABSTRACT

Background: Morel-Lavallée lesions can occur in polytrauma patients. Post-operative seroma is more frequently encountered, holds many pathological similarities with MLLs and continues to challenge plastic surgeons. We aimed to provide a comprehensive overview of MLLs to increase awareness of optimum treatment options amongst plastic surgery teams, and to provide a management algorithm that may also be applied to post-operative seromas.

Methods: PubMed, Google Scholar and the Cochrane Library were searched using the terms “Morel-Lavallée”, “management” and “treatment”, which yielded 52 results. One reviewer screened titles and abstracts for relevance. Seventeen full text articles were retrieved. Review of reference lists provided a further three articles for inclusion.

Findings: Morel-Lavallée lesions (MLLs) represent closed injuries with internal degloving of superficial soft tissues from fascial layers. Main causes of MLLs include high-energy, blunt force trauma or crush injuries. They are commonly found overlying the greater trochanter. MLLs should be actively looked for when treating patients with pelvic trauma. MRI is the investigation of choice. Currently no guidelines for the management of MLLs exist. Compression bandaging, percutaneous aspiration, sclerodosis and mass resection have all been utilised.

Conclusions: Our algorithm recommends avoidance of conservative management. For chronic lesions, percutaneous aspiration should not be used in isolation. Sclerodosis using doxycycline is appropriate for lesions up to 400 ml, where evidence suggests high degrees of efficacy. Larger lesions should be treated with open surgery. Quilting sutures, curettage and low suction drains are useful adjuncts. We hypothesise this algorithm would also be effective for post-operative seromas.

1. Introduction

Morel-Lavallée lesions (MLLs) can occur in polytrauma patients alongside multiple and complex skeletal injuries. Plastic surgery teams often become involved in their management due to the complex nature of this soft tissue injury. They are rarely recognised early and delays in diagnosis can lead to increasing difficulty in management. Persistent lesions can lead to long-term morbidity in those affected.

Post-operative seroma is much more frequently encountered, holds many pathological similarities with Morel-Lavallée lesions and provides a continuing challenge to plastic surgeons. Here, we aimed to provide a comprehensive overview of MLLs in order to increase awareness of this little-known pathology amongst plastic surgery teams, who are likely to be involved in recalcitrant lesions, and also to provide an algorithm for their management that may also be suited to the management of post-operative seromas.

2. Methods

PubMed, Google Scholar and the Cochrane Library were searched using “Morel-Lavallée”, “management” and “treatment” as search terms. This initially yielded 52 results, of which those not in English were excluded, unless a translated version was available. One reviewer manually screened the remaining titles and abstracts for relevance. Individual case reports were excluded unless they discussed novel approaches for diagnosis or treatment. As a result, 17 full text articles were initially downloaded. Review of these articles' reference lists provided a further three articles for inclusion.

3. Findings and discussion

3.1. Background

Morel-Lavallée lesions (MLLs) were first described by Victor-

[☆] This work has not been presented at any meetings, whole or in part, at the time of submission.

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Auguste-Francois Morel-Lavallée in 1853 and represent closed injuries with internal degloving of superficial soft tissues from the deeper layers of fascia.^{1–4} Within the modern literature, these lesions are also referred to as post-traumatic extravasations, Morel-Lavallée seromas, post-traumatic soft tissue cysts or Morel-Lavallée effusions.^{1,2,5}

The main cause of MLLs is high-energy, blunt force trauma or crush injuries.^{1,2,4–6} Overall, approximately a quarter of all patients who develop MLLs have been involved in a road traffic accident, with up to 82% being related to trauma.^{7,8} They are often associated with underlying fractures, especially of the acetabulum and pelvis. A less severe subset of these injuries has been described following direct-blow sports injuries to the knee.^{6,9} One study reported 27 MLLs across 24 players of one team in the National Football League in the USA, hinting this lesion may be more common than often realised within sport.⁹ It has also been described following abdominoplasty, making it all the more relevant to plastic surgical teams.¹⁰

3.2. Epidemiology

In general, these lesions are uncommon.⁷ One busy American trauma centre reported 79 cases of MLL over eight years, with another paper quoting a prevalence of 8.3% in the context of pelvic trauma.^{7,11} A large review identified an approximate 2:1 male to female ratio, which likely represents the male predominance seen in polytrauma.¹²

3.3. Pathology

Morel-Lavallée lesions develop as a result of shearing of superficial subcutaneous tissues away from underlying fascial layers, creating a cavity in the pre-fascial plane.^{1,4,6} Areas where these lesions occur most frequently have mobile overlying skin and tough underlying fascia, such as the fascia lata in the proximal lateral thigh and the quadriceps fascia superior to the knee.^{6,9} As a result of the separation of these layers, transaponeurotic capillaries and lymphatic vessels become disrupted.^{2,4,5} These avulsed channels leak lymph and blood into the newly formed cavity and a haemolymphatic collection develops.^{1,2,4,6,9,13} The rate at which this collection forms depends on the number of vessels disrupted and the flow into the cavity.^{1,2,6,9,13}

Over time, blood within the cavity is reabsorbed to leave serosanguinous fluid surrounded by a haemosiderin layer.^{5,6,13} This layer induces inflammation in peripheral tissues and a fibrous capsule forms, preventing further fluid reabsorption and resulting in the establishment of a chronic MLL.^{5,6,11,13} This process can be likened to the establishment of a persistent post-operative seroma.

3.4. Signs and symptoms

Most commonly these lesions are found overlying the greater trochanter of the femur in the anterolateral thigh and are mostly unilateral.^{2,5} Cases of Morel-Lavallée lesions of the lumbar, prepatellar, scapular, buttock and trunk regions are also reported.^{2,5,9} They present as enlarging, tender lesions with associated pain and tightness.^{6,9} Patients usually seek attention within hours to days of the inciting injury but up to a third present later.^{5,6}

The key clinical feature to aid diagnosis, along with an accurate history, is the presence of fluctuance within the lesion.^{2,5,6,8} Patients may also experience decreased skin sensation and increased skin mobility^{6, 11}. Ecchymosis, road-rash and abrasions may give clues to the diagnosis.

Potential differential diagnoses include fat necrosis, haematoma, haemangioma, soft tissue sarcoma, early myositis ossificans or bursitis.^{2,8}

3.5. Investigations

The presence of a Morel-Lavallée lesion should be actively looked

for when treating patients with pelvic trauma.¹¹ They are often diagnosed incidentally during surgical intervention for fractures but can be retrospectively identified on admission imaging.¹¹

MRI is the investigation of choice should clinical suspicion arise. Appearances vary depending on the content and chronicity of the lesion but one study has suggested lesions appear homogenous and smooth if chronic, whereas acute lesions are heterogeneous and irregular.^{2,6} If the lesion is chronic, a capsule is often present and appears as fibrous tissue with a hypointense ring of haemosiderin.^{2,6} The edges of the lesion may be seen to taper and eventually fuse with surrounding fascial layers.⁵

Ultrasound is less useful but may strengthen clinical suspicion by confirming the lesion's location as superficial to the muscle fascia and deep to the hypodermis.^{2,5} Ultrasound can also demonstrate compressibility and exclude the presence of flow through Doppler imaging.⁶

Computed tomography has limited value, as aside from confirming the presence of a fluid collection, it adds little to refining the differential diagnosis.^{2,5}

3.6. Classification

The most comprehensive classification system proposed for MLLs comes from Mellado and Bercardino.¹⁴ It divides lesions into six types based on shape, MRI characteristics and whether a capsule is present.¹⁴ However, aside from providing a concise way of categorising lesions, this framework does not provide guidance on management or potential outcome of each class.¹²

Shen et al. have suggested the use of a simple acute versus chronic classification, becoming chronic once a capsule is present, which accurately divides lesions and forecasts which treatment strategies may be best employed and what potential outcome is to be expected.¹²

3.7. Complications

Complications associated with Morel-Lavallée lesions occur often as a result of delayed or incorrect diagnosis. Progressive expansion of untreated lesions can cause pressure necrosis of overlying skin.^{2,5,12} This can result in large areas of skin breakdown and leave underlying fractures exposed. Several cases report surgical site contamination with lesion contents, following inadvertent entry to the MLL cavity during fracture fixation.^{8,11}

Published data regarding whether bacterial colonisation occurs in these lesions is inconclusive. A large collated case series of 153 MLLs found 29 to be colonised (19%), with a wide range of organisms isolated on culture.¹² However, this is in contrast with several smaller case series, which report negative fluid cultures in all cases following aspiration.¹³ Current consensus among pelvic surgeons is that a higher risk of deep infection exists if the approach to fracture fixation traverses an MLL. Knowledge of this is useful to the plastic surgical team, as it should defer definitive management of MLLs until after fracture fixation is complete and the wound healed, in order to reduce the risk of infection of metalwork or osteomyelitis.

3.8. Management

There are currently no guidelines for the management of Morel-Lavallée lesions. Several small cohort studies have investigated the variable efficacy of conservative management, percutaneous aspiration, sclerodesis and open surgery but no high quality evidence exists for any one approach.

i. Conservative Management

Compression bandaging alone has been advocated in small, acute lesions, where no capsule is present, with good effect when used in lesions affecting the knee.^{2,9,12} However, effective compression bandaging is difficult to apply to areas affected by MLLs associated with

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