Morel-Lavallée Lesion with Intramuscular Extension: A Case Report

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Abstract

Morel-Lavallée lesions (MLLs) are closed degloving injuries that occur between subcutaneous tissue and underlying fascia, creating a potential space that fills with hemolymphatic fluid. By definition, MLLs are located in the pre-fascial space and generally do not extend into muscle. An 83-year-old male presented with two mass lesions, sized 14 and 8 cm respectively in diameter, on the right lateral thigh. The lesions had been asymptptomatically present for over 10 years but presented with recent inflammatory symptoms. Magnetic resonance imaging revealed two interconnected cystic masses under the subcutaneous fat layer, with an extension from the superior lesion into the tensor fasciae latae (TFL). Surgical exploration revealed a thick pseudocapsule filled with brown paste-like old hematoma and serosanguinous fluid. The interconnected upper lesion also had a pseudocapsule with sinus tract formation into an elongated fibrous cavity in the TFL. Serial debridement with removal of both capsules and most of the TFL supplemented by negative pressure wound therapy with continuous betadine instillation allowed delayed repair. This case demonstrates that intramuscular extension can occur in chronic MLL.

Keywords: Soft tissue injuries; Capsule; Hematoma; Seroma; Case reports

Introduction

Morel-Lavallée lesions (MLLs) are posttraumatic, closed degloving injuries where subcutaneous tissue and deep fascia become separated due to shearing forces, with subsequent collection of hemolymphatic fluid in this potential space [1]. Many terms have been given to this soft tissue injury, including “closed internal degloving injury,” “posttraumatic soft tissue cyst,” “Morel-Lavallée extravasation or effusion,” and “chronic expanding hematoma” [2-5]. Since MLLs are confined to the inter-fascial space, they generally do not extend into muscle.

MLLs are usually identified within days after the initiating trauma, but up to one-third of patients present with lesions months or years after the initial injury, which can make it difficult to recall the initiating event [6]. If not addressed at an early stage, the chronic lesions become encapsulated by a fibrous pseudocapsule containing old blood and necrotic tissue [7]. This delay can allow the necrotic debris to act as a nidus for infection, leading to cellulitis or abscess formation [8]. Because of this infectious complication risk, early diagnosis is the best way to ensure that patients receive appropriate treatment [1]. In this report, we present a rare case of complicated chronic MLL with intramuscular extension. The report protocol adhered to the ethical guidelines of the Declaration of Helsinki. The patient was informed that this case study would be submitted for publication and provided written informed consent.
Case

An 83-year-old male with a history of type 2 diabetes mellitus and hypertension presented with two adjacent mass lesions, sized 14 and 8 cm respectively in diameter, on the right lateral thigh. The lower mass first appeared over 10 years before, and after an ultrasound scan whose results were unrecallable, the patient was told to simply observe the lesion as long as it remained asymptomatic. The size of the mass gradually decreased until a new mass was discovered right above the original mass 3 years prior. Subsequently, both lesions increased in size, and 3 months before the patient presented to our institute, painful swelling with erythema and tenderness developed, prompting him to seek medical care.

T2-weighted magnetic resonance imaging (MRI) with fat suppression revealed two encapsulated interconnecting cystic masses under the subcutaneous fat layer with an extension from the superior lesion into the tensor fasciae latae (TFL), suggesting a chronic MLL (Fig. 1) with superimposed infection. Though surgical exploration under general anesthesia was planned, a day before the scheduled surgery the upper lesion spontaneously ruptured (Fig. 2), discharging a large amount of serosanguinous fluid. Serum C-reactive protein (CRP) levels, which were initially a normal 0.65 mg/dL when preoperative blood tests were taken, spiked to 11.89 mg/dL.

Surgical exploration through a 20 cm longitudinal incision encompassing both mass lesions revealed a thick pseudocapsule filled with brown paste-like old hematoma and serosanguinous fluid (Fig. 3A). The interconnected upper lesion also had a pseudocapsule with sinus tract formation extending into an elongated fibrous cavity in the TFL. Total removal of both capsules, the sinus tract, and a large portion of the affected TFL was performed with tissue samples obtained for bacterial cultures (Fig. 3B). Even after thorough debridement, superimposed infection of the MLL left the underlying tissue too inflamed for primary closure. Negative pressure wound therapy (NPWT) with continuous povidone-iodine solution instillation (50 mL of 10% povidone-iodine mixed with 3 L of normal saline, infused at a rate of 125 mL/hr through an intravenous extension line placed in the deep part of the wound under the NPWT sponge) was applied, and intravenous administration of vancomycin was started according to the intraoperative tissue culture results in which methicillin-resistant Staphylococcus aureus was identified. NPWT dressings were changed with simultaneous serial debridement at 3- to 4-day intervals (Fig. 4). Tissue cultures converted to negative after 1 week of NPWT with povidone-iodine instillation, and 12 days after the initial surgical exploration, the wound bed appeared sufficiently clean for delayed closure of the skin flaps (Fig. 5), with CRP levels also decreased to 2.23 mg/dL. Vancomycin was...
maintained for a total of 3 weeks, and the repaired wound healed uneventfully with a final CRP level of 0.33 mg/dL when stitches were removed. The patient was discharged without complications and, notwithstanding his advanced age, proceeded to regain normal gait function of the affected lower extremity (Fig. 6).

**Discussion**

In 1863, the French physician Maurice Morel-Lavallée first described a unique posttraumatic subcutaneous fluid collection in the hip area [9], though the actual MLL term was only first used more than a century later by Letournel and Judet [10] while referring to similar characteristic lesions over the greater trochanter in their classic textbook on acetabular fractures. In current literature, these lesions are usually the result of direct blunt trauma involving shearing forces to the pelvis, thigh, or knee, though cases can also occur in the trunk, upper extremity or scalp area [5,11]. While high-energy motor vehicle acci-

![Fig. 3. Intraoperative photographs. (A) Brown paste-like old hematoma and necrotic debris with serosanguinous fluid inside a thick pseudocapsule. (B) Sinus tract and fibrosis extension into the tensor fasciae latae necessitated a proximally extended incision and removal of most of the affected muscle.](image)

![Fig. 4. Continuous serial debridement and negative pressure wound therapy (NPWT). The post-debridement wound bed was too inflamed for direct closure and required additional biweekly debridement and NPWT with povidone-iodine instillation for wound bed preparation.](image)

![Fig. 5. Successful wound bed preparation. After three serial debridement sessions and 12 days of negative pressure wound therapy, the wound bed is cleared of infection and ready for delayed closure.](image)
Intramuscular Morel-Lavallée lesion

...dents are the most common cause, lesions due to sports-related injuries and low-velocity falls are also fairly common. These closed degloving injuries cause acute shearing of the subcutaneous tissues from deeper muscle fascia and disruption of microvascular and lymphatic channels. This leads to accumulation of lymphatic fluid, blood, and necrotic fat debris in the interfascial plane [7,8,12]. This accumulation may develop slowly or rapidly, depending on the involvement of lymphatics versus arterial beds. Patients may complain about pain, soft fluctuant swelling, skin hypermobility, and decreased cutaneous sensation. In chronic lesions where hemolymphatic fluid slowly undergoes absorption, hemosiderin is deposited adjacent to the unrecognized fluid collection which can result in the formation of an organized pseudocapsule [7,8]. The stagnant fluid can also become secondarily infected, resulting in abscess formation.

Various imaging modalities including ultrasonography, computed tomography and MRI can be used to characterize and diagnose MLL. Ultrasonography usually displays a heterogeneous compressible fluid collection between subcutaneous fat and deep fascia, which often becomes homogeneous later as liquefaction progresses. On contrast-enhancement computed tomography scans, lesions may appear as closed space extravasations in the acute phase, or fluid collections with density lower than simple hematoma due to lymphatic fluid in the subacute phase. MRI findings of acute lesions exhibit heterogeneous signal intensity with soft tissue edema. Chronic lesions may show intermediate T1 and heterogeneous T2 signals suggesting simple fluid collection due to complete resorption of internal hematoma with well-defined capsules [6,7,12]. Among these imaging modalities, MRI is the tool of choice in diagnosis with its greater strength in characterizing the location, composition and chronicity.

The treatment protocol is usually based on the timing of diagnosis, size and complexity of the lesion, and superimposed infection. For small acute (<1 month) lesions with no underlying fracture, the first line therapy to be suggested is compression dressing with or without sclerotherapy [7,8,12]. Larger or unresponsive lesions may require percutaneous aspiration. Surgical intervention is usually considered for chronic or recurrent lesions or those with soft tissue complications such as secondary infection. All devitalized tissue must be debrided; open total capsulectomy is recommended for chronic cases with pseudocapsule formation [8,12]. NPWT can be effectively used as bridging procedure for staged operations, maintaining a sterile environment while mechanically decreasing dead space and promoting tissue revascularization [13]. The efficacy of NPWT with instillation (NPWTi) in wound bed preparation of complex and infected wounds has been previously demonstrated, and in clinical settings where commercial NPWTi systems are not available (such as in Korea), continuous NPWTi systems utilizing existing equipment can be used as an adjunctive treatment modality [14].

By definition, MLLs are suprafascial lesions that generally do not extend into subfascial muscle. As the patient’s history implied that the lesion had been present for more than 10 years, a longstanding inflammatory process including subclinical infection or unrecalled secondary trauma event may have caused a small subcutaneous rupture of the initial MLL pseudocapsule [7,8]. The stagnant fluid can also become secondarily infected, resulting in abscess formation.

Fig. 6. Four-month postoperative photograph. No recurrence of mass lesion or fluid collection and no prominent functional impairment.
The chronicity and severely inflamed condition of the lesions precluded deducing the exact process of intramuscular extension from surgical and pathological findings. Regardless of how the MLL invaded the TFL, surgical management conforming to guidelines for conventional MLLs enabled successful treatment, with total excision of surrounding capsules and the involved muscle pocket. Culture-guided antibiotics and NPWT with instillation controlled the superimposed infection, finally allowing tertiary closure. Since the TFL is readily used as an expendable flap donor [15], excising a large portion of the muscle did not cause any noticeable functional disability.

To the best of our knowledge, this is the first report of MLL with intramuscular extension, demonstrating that although very rare, chronic MLL can extend into neighboring muscle. Standard management protocols including total capsulectomy and debridement of all devitalized tissues compounded with effective infection control can be applied to these unfortunate cases for successful treatment.

Conflict of interest

Hyonsurk Kim, Editor-in-Chief of the Journal, is the corresponding author of this article. However, he played no role whatsoever in the editorial evaluation of this article or the decision to publish it. No other potential conflict of interest relevant to this article was reported.

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