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Lower Leg Morel-Lavallée Lesion in a Female High School Athlete: A Case Report

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Abstract

A 17-year-old female athlete sustained a Morel-Lavallée Lesion while participating in soccer. Following diagnostic ultrasound and aspiration performed by a sports medicine physician, the patient slowly returned back to soccer and flag football with compression and protection over the site of the lesion. The patient was able to return to full athletic participation with no residual symptoms and no complications. The prompt identification, referral, and treatment of the Morel-Lavallée Lesion is encouraged by the existing literature to prevent complications such as necrosis, tissue damage, and infection. Communication between the sports medicine physician and the athletic trainer is important to enable patient monitoring and treatment adjustments, as well as patient follow-up throughout the course of healing.

Key Words: Soft tissue injury, Internal degloving
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Key Points

· Interprofessional practice is important for the identification and treatment of Morel-Lavallée Lesions.
· Athletic trainers should be aware of the differential diagnosis and the clinical presentation of a Morel-Lavallée Lesion when assessing direct contact injuries.

Introduction

A Morel-Lavallée Lesion (MLL) is a closed degloving injury caused by a shearing force that damages blood vessels and lymphatic structures.[1,2] The shearing force that causes this tissue damage is often associated with motor vehicle accidents, but also occurs during athletic competitions.[3] With this injury, the damage to blood vessels and lymphatic drainage present in the tissue causes blood, lymph and tissue debris to accumulate within the space between the fascia, forming a fluctuant lesion with a contour deformity of the soft tissue.[2-4] This type of lesion, which is considered fluctuant, is characterized by a wave-like motion when palpated and indicates a collection of fluid beneath the hypodermis.[1] The accumulation of fluid may occur hours to days after the initial injury, depending on the extent of damage and type of circulatory structures that were damaged.[3] The presence of this fluid can cause an inflammatory reaction in the surrounding tissue, leading to perpetuation of the lesion.[1] Consequences of missing or delaying the diagnosis can also result in pseudocyst formation, cosmetic deformity, and infection, which has been reported in up to 46% of sampled lesions.[2,4,5] Because of this, it is important for athletic trainers to be able to recognize signs and symptoms of a potential MLL in a patient.

The identification of a MLL through physical exam can expedite appropriate further assessments. Possible differential diagnoses for a MLL may include contusion, seroma, abscess, vascular injury, compartment syndrome, soft tissue tumor, or deep vein thrombosis.[4-6]. These

conditions can be ruled out using a detailed patient history, physical exam findings, and imaging.[2,5] The lesion more often occurs in regions of the body where overlying skin is more mobile than the underlying fascia, such as the hip or the pelvis, and less commonly the knee and lower leg.[7] MLL can present with gradually enlarging swelling, pain, and skin tautness.[7] Other signs and symptoms that may be noted upon physical examination are hypoesthesia or anesthesia due to damage to subdermal afferent nerves, ecchymosis, cracking skin, abrasions, and frank necrosis.[4] After identification of a suspected MLL through physical exam and referral to a sports medicine primary care physician, MRI or ultrasound imaging may be obtained. Although MRI imaging of lesions is the gold standard for identifying a MLL, ultrasound with a thorough patient history and suspicion from physical exam findings can be an effective alternative for a more rapid diagnosis of MLLs at a lower cost.[1,8] Imaging can assist in developing an appropriate treatment plan for the size, age and location of the specific MLL.

On imaging, acute MLLs will present as fluid filled ovoid cavities, with or without debris.[7] Smaller lesions (<50 mL) can be treated non-invasively, either with conservative measures of compression or aspiration of the lesion.[2,4,6,9] Conservative treatment using just continuous compression may take several weeks to fully resolve the lesion, however this may be appropriate based on the patient's medical history if they are at higher risk for infections.[6,10] A case study by Williams, et al also found that children may heal without minimally invasive interventions with prolonged rest and physical therapy.[11] Aspiration for smaller lesions (<50mL), in conjunction with continuous compression, has been described as superior, as it decreases the damage to the remaining subcutaneous structures. It also has a lower risk of infection compared to surgical intervention.[9] Early mobilization to preserve range of motion, as well as muscular strength maintenance and manual therapy may also promote positive outcomes.[10] If lesions fail to resolve and become chronic, more aggressive treatment such as serial aspiration or endoscopic debridement should be considered.[6,10] Recurrence rates are higher for chronic lesions, so it is important to promptly diagnose and appropriately treat the lesion.[5] The purpose of this clinical case report is to detail the account of a MLL in a 17-year-old female athlete, highlighting the key features that led to the diagnosis and intervention strategies for the effective resolution of this rare condition.

Case Presentation

Patient: The patient is a 17-year-old female flag football athlete who was participating in a soccer camp at the time of the injury. The patient reported that she was contesting a ball against an opponent when the bottom of the opponent's cleat made contact with her lower leg moving distally and posteriorly along her antero-medial tibia in a shearing motion. She reported to the athletic training facility 10 days post-injury with significant ecchymosis and swelling, minimal pain was described at the time of the evaluation. The patient reported that the pain was significant at the time of injury, with a "tearing" sensation described. The patient had a history of a grade 2 lateral ankle sprain on the affected side from fall 2023 that she had made a full recovery from. The patient was concerned about the extent of the ecchymosis and the length of time the injury was taking to resolve. The patient had been applying compression, ice, and using NSAIDs for pain modulation, but had seen little improvement.

The patient's distal pulse and sensation were intact and normal when compared to the unaffected side with no paresthesia or anesthesia noted but had some hypersensitivity over the

area of the lesion. The patient had a negative percussion test, negative squeeze test, and a negative tuning fork test. There was significant ecchymosis present around the entire distal lower leg and into the ankle and foot which showed signs of reabsorption further away from the site of the lesion. Upon further visual inspection, there was some swelling to the distal lower leg and ankle that was not able to be measured during the evaluation. The patient was tender to palpation along the medial tibia where direct contact was made, along with a small healing wound. The patient had range of motion within normal limits with knee flexion and extension, as well as ankle dorsiflexion, plantarflexion, inversion, and eversion. Manual muscle testing of the gastrocnemius, soleus, anterior tibialis, fibularis, and posterior tibialis were found to be 5/5 on the grading scale. This was equal to her unaffected side and did not elicit pain. Upon direct firm palpation of the lesion, it was found that the lesion was soft and fluctuant, which is not characteristic of a subacute hematoma.

Intervention: It was at this time that the patient was referred to a primary care sports medicine physician for further evaluation and imaging. An x-ray was obtained to rule out fracture, and an ultrasound of the area was performed in the physician's office. The ultrasound confirmed fluid beneath the dermis of the patient, indicating a hematoma or MLL. The patient was instructed to apply compression to the site throughout the day and was allowed to participate in flag football but not soccer. The physician reached out to the parent and the athletic trainer following the appointment and recommended that she follow up with him for aspiration of the lesion, as it had been two weeks of conservative treatment with no improvement. Between the initial appointment and the follow up, the patient engaged in rehabilitation exercises to maintain strength and mobility, massage therapy to promote lymphatic drainage, and used her compression wrap as instructed (see Table 1). The lesion did not improve during this time, and the patient followed up with the physician 19 days post-injury for ultrasound guided aspiration of the lesion. The physician drained approximately 24cc of fluid from the lesion. The patient was instructed to continue the use of her compression wrap over the next week and avoid contact activity with her lower leg (i.e. no soccer, no kicking in flag football, etc).

Comparative Outcome: The patient followed up one week later with the physician. The physician conducted a repeat ultrasound in the office, where a minimal amount of fluid was shown. There were no signs of infection, and the patient was instructed to keep the area padded and protected during athletic activity. The patient was scheduled to follow up 3 weeks later for re-evaluation. The patient continued lower extremity strengthening (see Table 2) and completed her flag football season. The patient was fully cleared 61 days post-injury and had no residual symptoms.

Discussion

Although MLLs are not frequently described in the athletic setting, it is important to be able to identify signs and symptoms to best address the condition effectively. These lesions occur with high velocity shearing forces to areas of the body with greater tissue mass, such as the thigh and even the lower leg.[1] These forces occur in many sports, such as wrestling, football, cycling and soccer, so awareness of the potential injury is important for members of the medical staff.[9]

While the lesion presents similarly to other benign conditions, there are objective and subjective findings to note on a physical exam that differentiate between a MLL and a contusion

or hematoma. The most obvious indication of a MLL is the presence of fluctuance at the site of the injury. This can feel similar to an abscess or water balloon. With similar conditions, the skin at the site of the injury may present as taut or resistant due to swelling deeper in the tissue, and the borders are less well defined than a MLL. This was the defining feature in this case that led to referral, as other symptoms aligned with differential diagnoses. Other symptoms noted by the healthcare team were decreased sensation, initial ecchymosis, and an abrasion. While other conditions have a somewhat linear healing process, a MLL can gradually worsen, or improve and worsen cyclically.[4] In this case, the patient plateaued in her progression, which warranted further investigation.

The preferred diagnostic imaging for a suspected MLL is an MRI, but it can be identified in some cases with the use of diagnostic ultrasound and high suspicion in the physical examination of the patient.[1,8] Ultrasound was utilized on this patient, following an x-ray, as the ultrasound was available in-office, and the patient was more than two weeks post injury. Waiting for an MRI may have increased the potential risk for more invasive treatment to treat the patient. Diagnostic ultrasound may be more accessible to athletic trainers and physicians, and a viable option when assessing a closed traumatic lesion.

Treatment of the lesion is patient-specific and dependent on the size and location of the lesion. MLL do not typically resolve on their own and are at risk for complications such as infection, necrosis, pseudocyst formation and cosmetic deformity.[7] Smaller lesions may respond well with conservative care of compression and protection over a span of a couple weeks, or aspiration followed by compression and protection of the area.[4,6] The patient responded well to aspiration and compression, and returned immediately to participation in sports. Other case studies have described noted time loss from sport for treatment.[10-12] This was not necessary in this case, as the area could be protected during play. It is important for athletic trainers to be able to identify and monitor suspected lesions and refer them to primary care sports medicine physicians when conservative measures fail. Athletic trainers can help monitor the recovery of the patient following identification of the lesion, communicate any changes or progress to the treating physician, and facilitate further care if indicated.

Clinical Bottom Line

Athletic trainers' responsibilities include the identification, treatment, and referral of orthopedic injuries. As healthcare providers who see patients frequently, we have the ability to identify more uncommon injuries or complications early and intervene to promote better patient outcomes. The knowledge of potential differential diagnoses is vital to adjusting the treatment process for a patient. By understanding the prevalence, mechanism, and clinical presentation of a MLL, athletic trainers also have the ability to advocate for their patients in an interprofessional setting. Interprofessional collaboration is important throughout the treatment process for a MLL, from identification of a potential lesion to diagnostics, treatment, and return to participation progression. Although MLLs are uncommon in sport, they have potential to occur based on the nature and biomechanics involved with athletic participation at any age. Prompt identification and appropriate treatment of a MLL can result in a better patient outcome overall, with less possibility of complications.

Tables:

Table 1: Post-Injury Rehabilitation Exercises

Performed 2-3x, daily
- Calf stretch *3x30 sec* - Soleus stretch *3x30 sec* - 4-way ankle, blue band *2x10* - Seated calf raises *3x10* - Toe curls *3x10* -Toe spreads *3x10* -Elevated Flushing Massage *3-5 min*

Table 2: Post-Aspiration Rehabilitation Exercises

Week 1	Week 2 *(applied new exercises every other day, d/c exercises that were too easy for the patient)*	Week 3 *(applied new exercises every other day, d/c exercises that were too easy for the patient)*
- Calf stretch *3x30 sec* - Soleus stretch *3x30 sec* - 4-way ankle, blue band *2x10* -Seated calf raises *3x10* - Toe curls *3x10* -Toe spreads *3x10* -Elevated Flushing Massage *3-5 min*	-Stationary Bike *10 min* - Calf stretch *3x30 sec* - Soleus stretch *3x30 sec* -BAPS Board (plantar flexion/ dorsiflexion) *3x20* -BAPS Board (inversion/eversion) *3x20* -Single leg balance *3x30 sec* -Elevated Flushing Massage *3-5 min*	-Stationary Bike *10 min* - Calf stretch *3x30 sec* - Soleus stretch *3x30 sec* -Single leg calf raises *3x15* - Toe curls with weighted towel *3x10* -Standing toe spreads *3x10* - Single leg balance with visual distraction *3x30sec* -Start reintroducing soccer specific skills

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Figure 1: Medial to lateral view of the lesion, 10 days post-injury.

Figure 2: Anterior view of lesion, 11 days post-injury.

Figure 3: Fluid removed from the lesion via ultrasound-guided aspiration, performed by the primary care sports medicine physician. 24cc of fluid.