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Morel Lavallee Lesion: A Shear Fascia-nating Soft Tissue Injury

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Morel Lavallee: A Shear Fascia-nating Soft Tissue Injury

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Abstract:

Morel-Lavallée lesions (MLLs), first described by their namesake, French physician Victor-Auguste-François Morel-Lavallée, in 1863, represent a distinct category of soft-tissue degloving injuries. These injuries occur when a shearing force disrupts the connection between subcutaneous tissue and fascia, severing lymphatic vessels and capillaries, and leading to an encapsulated collection of lymph, blood, and necrotic fat. Because this space is deep and enclosed, the fluid accumulation cannot easily drain or resolve spontaneously and often an inflammatory capsule develops, further inhibiting resorption. Undiagnosed, patients go on to develop chronic pain, infection, skin necrosis, progressive neurovascular deficits, and, in severe cases, potential loss of limb and even life . For emergency medicine physicians, the implications are significant: recognizing MLLs when a trauma patient first presents is crucial to avoiding long-term disability, morbidity, and mortality . We report a classic presentation of a MLL, highlighting how a thorough history, physical, and bedside POCUS allowed the diagnosis to be made after a delayed presentation to the ER, potentially sparing the patient significant morbidity and chronicity.

Case Presentation:

A 24-year-old morbidly obese female presented to Jefferson WT ER at midnight, unable to sleep due to a severe exacerbation of her ongoing right leg pain. The pain began over two weeks prior, following a traumatic mechanical fall. Initial X-rays at that time were negative for acute fracture, and a follow-up with orthopedics a week later did not yield a definitive diagnosis, with reassurances given for a severe bruise.

Vital signs at presentation were as follows: BP 122/70, HR 79, T 98F, RR 18, SpO2 98%. Physical examination revealed significant ecchymosis along the anterior right tibia, shin and posterior calf, with a sensory deficit in the dorsum of the right foot. Arterial flow was confirmed via Doppler tone and pulse ox plethysmography of the R first toe. Laboratory investigations showed mild anemia (Hb: 11.1 g/dL from 12.1 nine days prior) and a mildly elevated C-reactive protein level (2.9 mg/L).

XR of the right knee and tibia/fibula were negative, while an X-ray of the right foot showed findings of a healing fifth metatarsal fracture. Venous ultrasound was negative for DVT but bedside POCUS suggested the presence of a deep space post-traumatic seroma/hematoma concerning for MLL. Empiric treatment with vancomycin was initiated, and the patient was admitted to the medical floor for further evaluation with working diagnosis of Morel Lavallee lesion vs cellulitis.

Subsequent MRI tibia/fibula showed a well-circumscribed lentiform mildly heterogeneous fluid collection tracking along the fascia of the anterior compartment of the right lower leg, measuring approximately 9.1 x 1.3 x 20.3 cm, suggesting Morel-Lavallee lesion. Orthopedic consultation recommended initial conservative rather than surgical treatment. The patient's leg was wrapped in a continuous compressive dressing, instructed to weight-bear as tolerated, and given aspirin for DVT prophylaxis. The patient was discharged with instructions to follow up closely with General Surgery for possible surgical intervention if necessary and educated extensively on the potential morbidity of the lesion if patient was noncompliant with her discharge recommendations.

Discussion:

Incidence:

The most common causes of Morel-Lavallee lesions (MLL) are high-velocity trauma, crush injuries, and blunt trauma, with about 25% of all MLL patients' conditions resulting from motor vehicle accidents. Often associated with fractures of the femur, pelvis, or acetabulum, MLL predominantly occurs in the greater trochanter area in adults, accounting for more than 60% of cases. This is largely due to the anatomical configuration of the greater trochanter—namely, the superficial position of the femoral bone, a large surface area, the tensile strength of the tensor fascia lata, and the relative mobility of the subdermal soft tissue. There is a 2:1 male to female ratio in the occurrence of this lesion. MLL is most typical in adults aged 30 to 40 and is rare in children, with less than 20 documented pediatric cases. A body mass index (BMI) of 25 kg/m² or greater is a secondary predisposing factor.

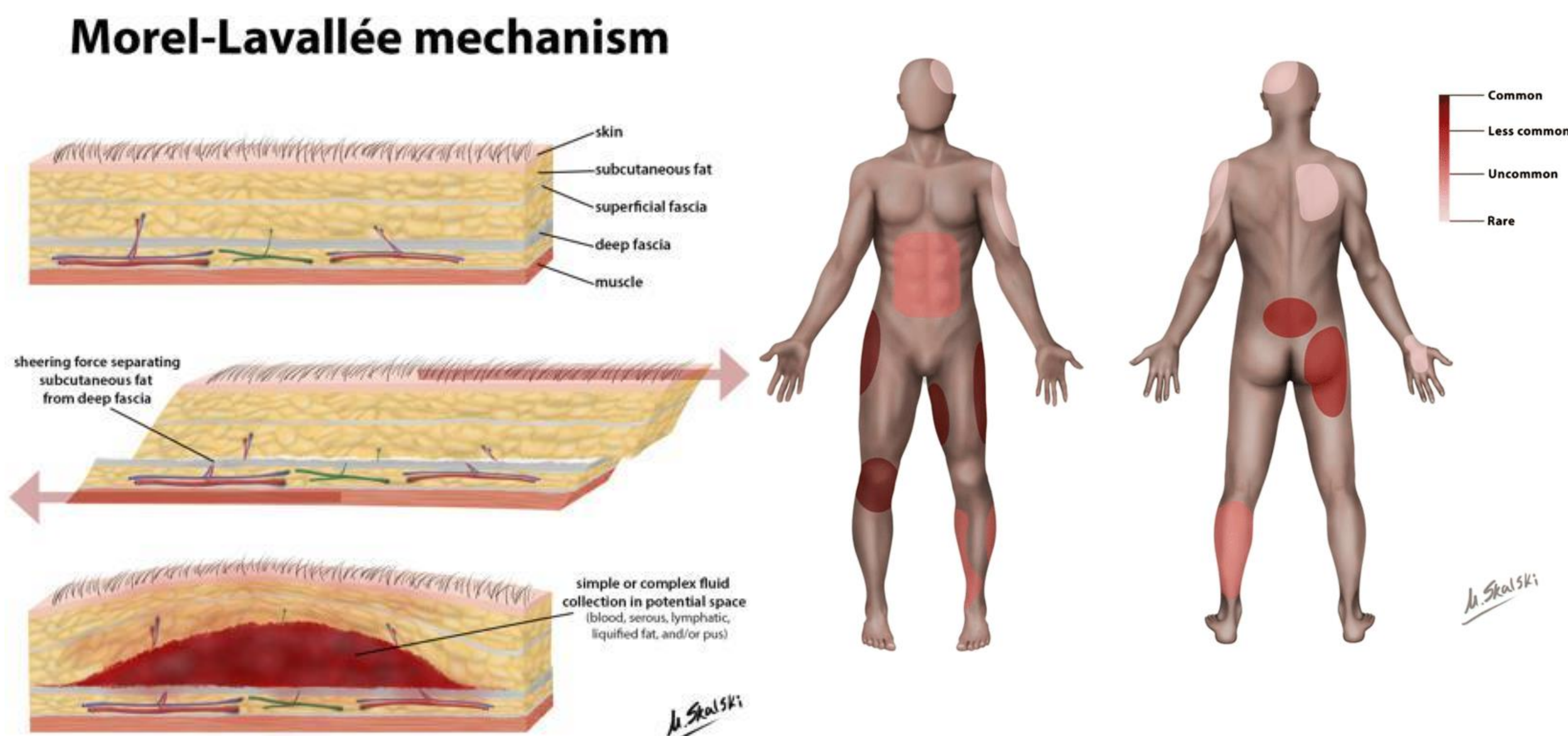


Figure 1: Morel Lavallee mechanism, Figure 2:most common locations of MLL



Figure 3: picture of anterior R leg



Figure 4: picture of posterior R leg

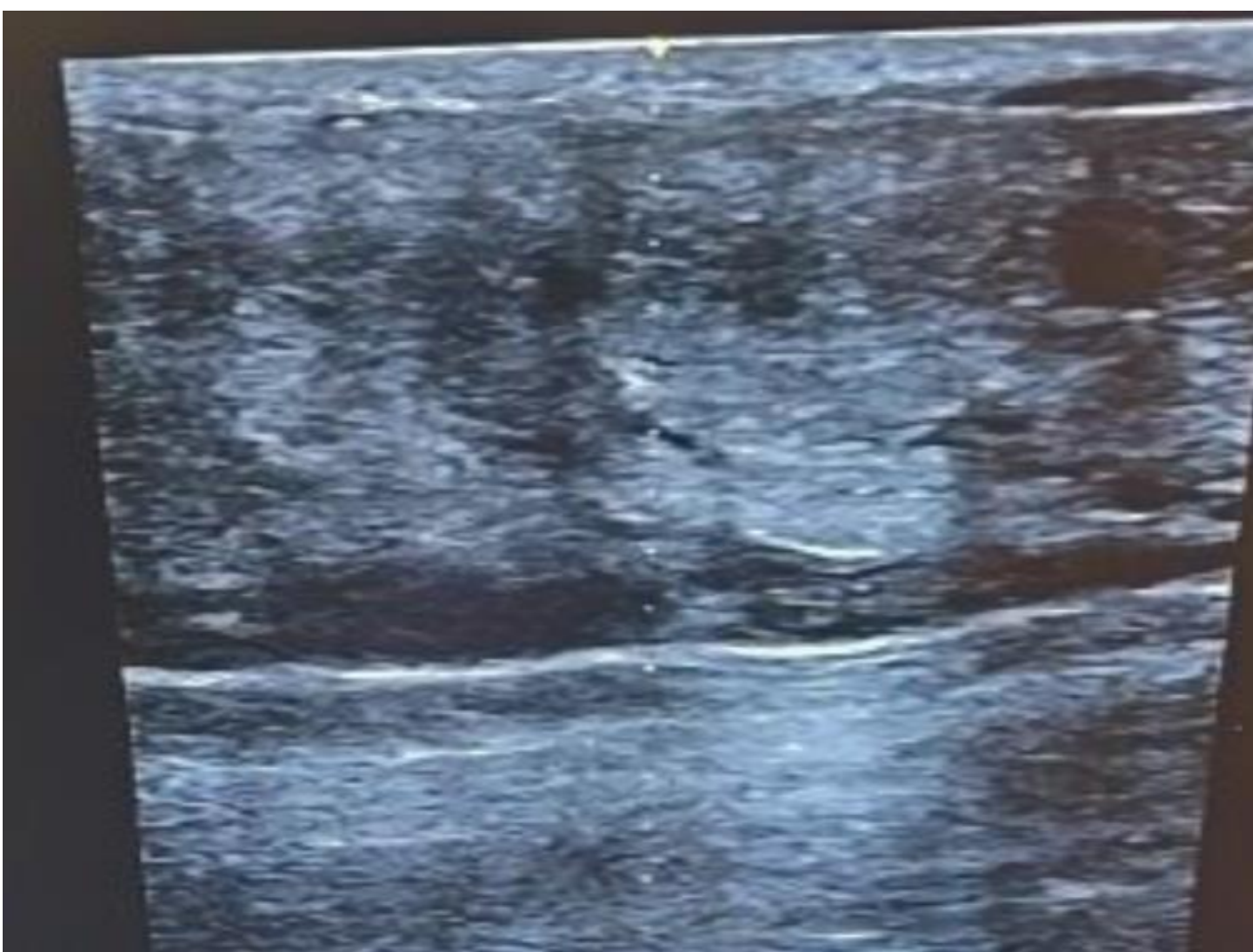


Figure 5: Location of ultrasound probe, Figure 6: Ultrasound image

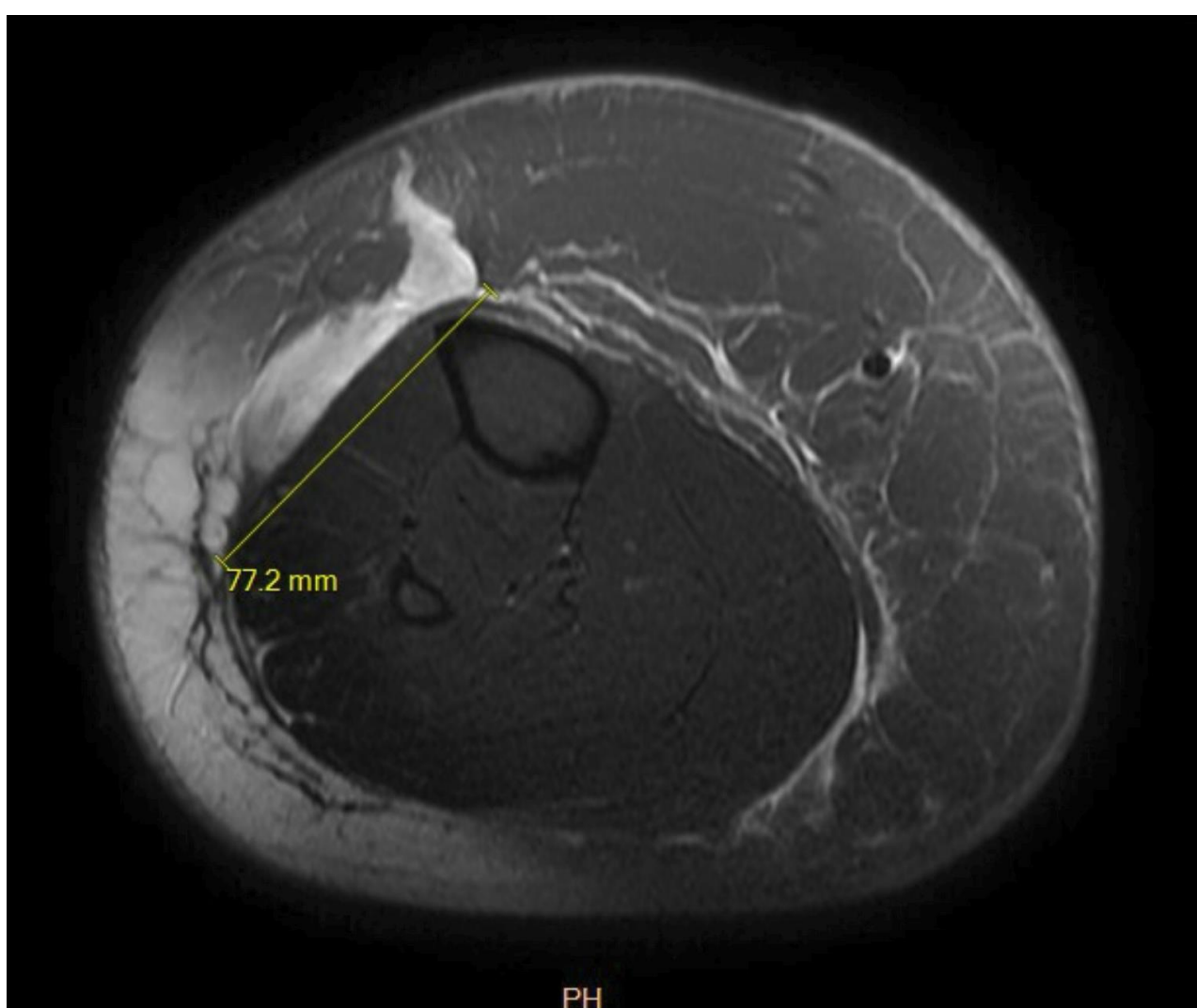


Figure 7, 8, 9: MRI T2W images of R leg in coronal, axial, and sagittal plane

Discussion:

Clinical Presentation:

Morel-Lavallée lesions (MLLs) present a diagnostic challenge as they can closely resemble a benign superficial bruise, even to the most experienced clinicians. Kottmeier et al. reviewed 16 MLL cases and reported that the diagnosis of MLL was initially missed in 44% (7 of 16) of the cases.

Several key features aid in the recognition and diagnosis of MLLs that can help distinguish them from a benign superficial soft tissue contusion:

- 1. Delayed Onset of Symptoms:** A hallmark characteristic of MLLs is the delayed onset of symptoms, often occurring days to weeks following the inciting traumatic event. In a retrospective study by Mellado et al. (2004), which evaluated 12 patients with MLLs, all patients exhibited a delayed onset of symptoms, with an average time to presentation of 7.5 days following trauma. In one extreme case, Cruz and Jimenez discuss a case report of a left thigh MLL that was diagnosed over 25 years after the initial blunt trauma.
- 2. Progressive Worsening:** Over time, MLLs typically demonstrate a progressive worsening of symptoms, including increasing pain, swelling, and ecchymosis at the site of injury. The disproportionate exacerbation of symptoms relative to the severity of the initial trauma serves as a red flag for underlying soft tissue pathology. In our patient, it is important to note that she described her pain as virtually non-existent at the time of injury but had escalated to a level of excruciation over two weeks later, underscoring a significant change in her pain history that demanded medical reassessment and further diagnostic exploration.
- 3. Late-Onset Neurological Deficits:** In some cases, patients with MLLs may develop late-onset neurological deficits, such as paresthesias, numbness, or weakness, in the affected extremity which arise due to compression or stretching of adjacent nerves by the expanding fluid collection. A case series by Tejawani et al. (2004) described three patients with MLLs. Two of the patients developed late-onset neurological deficits, highlighting the potential for serious neurological complications associated with MLLs.

Imaging:

- 1. MRI** stands out as the preferred imaging modality for Morel-Lavallée lesions due to its capability to accurately delineate the chronicity of the lesion and discern the presence of a fibrous capsule. Acute lesions typically exhibit a heterogeneous and irregular appearance on MRI, reflecting the amalgamation of fluid, lymph, and blood within the lesion. Conversely, chronic lesions tend to appear smoother and more homogeneous, often accompanied by a fibrous capsule displaying a ring of hemosiderin. Additionally, the appearance of blood evolves with time; in the acute phase, blood demonstrates high T2 signal and low T1 signal, while as the hematoma matures and deoxyhemoglobin converts into methemoglobin, it becomes hyperintense on T1-weighted images.
- 2. Ultrasound** is a quick and simple way to evaluate for MLL and uniquely well-suited for the ER setting as an imaging modality -- findings of Morel-Lavallée lesions commonly reveal hypoechoic fluid collections situated deep to the hypodermis and superficial to the muscular plane, often with internal debris lacking vascularity. During the diagnostic process, it's crucial to evaluate the compressibility of the lesion using ultrasound and to verify the absence of flow on Doppler imaging, which helps distinguish a Morel-Lavallée lesion from deep vein thrombosis (DVT) or a vascular structure.
- 3. Computed tomography (CT)** has limited utility in improving the differential diagnosis of Morel-Lavallée lesions, primarily serving to confirm the presence of a fluid collection. Despite its limitations, CT may be employed in emergent situations or when MRI is unavailable, particularly in cases of multiple injuries. Contrast-enhanced CT may reveal extravasation of blood in the closed space during the acute phase or a fluid collection with lower density than a simple hematoma in the subacute phase.

Conclusion:

Emergency medicine physicians should maintain a high index of suspicion for Morel-Lavallée lesions, particularly in patients presenting with a history of trauma or blunt force injuries. Early recognition and diagnosis of these lesions are crucial to prevent complications such as infection, necrosis, and chronicity. Utilizing bedside ultrasound as a rapid diagnostic tool can aid in the timely identification of Morel-Lavallée lesions, as was the case here. By remaining vigilant and proactive in their approach, emergency medicine physicians can significantly contribute to improved patient outcomes and prevent potential long-term sequelae associated with untreated Morel-Lavallée lesions.

References:

available on request