

# Morel-Lavallee lesion: case report of a rare extensive degloving soft tissue injury

Krishna Mohan Gummalla, FRCR, Mathew George, M.D., Rupak Dutta, M.D.

Department of Diagnostic and Interventional Radiology, Tan Tock Seng Hospital, Jalan Tan Tock, Singapore

## ABSTRACT

Morel-Lavallee syndrome (MLS) is a significant post-traumatic soft tissue injury in which the subcutaneous tissue is torn away from the underlying fascia (closed degloving), creating a cavity filled with hematoma and liquefied fat. It commonly occurs over the greater trochanter, but may also occur in the flank, buttocks and lumbodorsal regions. MLS is a rarely reported entity. The trauma surgeon and radiologist must be aware of this condition, as early diagnosis can lead to conservative management, while a delay can lead to surgical exploration. We report a case of extensive Morel-Lavallee lesion involving the left flank and thigh in a young adult. We discuss the magnetic resonance imaging findings and also describe the differential diagnoses and management options for MLS.

**Key words:** Closed degloving injury; Morel-Lavallee lesion; post-traumatic extravasation.

## INTRODUCTION

Morel-Lavallee syndrome (MLS) is a significant post-traumatic soft tissue injury in which the subcutaneous tissue is torn away from the underlying fascia, creating a cavity filled with hematoma and liquefied fat. We report a case of extensive Morel-Lavallee lesion involving the left flank and thigh in a young adult. We discuss the magnetic resonance imaging findings and also describe the differential diagnoses and management options for MLS.

## CASE REPORT

We present a case of extensive degloving injury to the left flank and thigh in a young man together with the computed tomography (CT) and magnetic resonance imaging (MRI) findings.

A 19-year-old male was admitted to the hospital for progressive soft swelling over the left flank and thigh regions. He had a history of a previous admission in the same hospital for road traffic accident two weeks before, with left wrist

fracture and abrasion over the left thigh and left flank. On examination, there was tenderness over the left flank and a fluctuant swelling on the lateral side of the left thigh, and a superficial abrasion was seen on the hip (Figure 1). Blood investigations were unremarkable with no evidence of infection. Pelvic and left femur radiographs revealed no underlying fractures.

With a clinical suspicion of Morel-Lavallee lesion (MLL), MRI study of the left flank and upper thigh was requested by the clinician. The CT taken during the first admission two weeks before was also reviewed retrospectively.

The CT images showed an irregular soft tissue density lesion in the subcutaneous plane extending from the left flank to the upper thigh on the lateral aspect (Figure 2a). No contrast extravasation was seen. There was no mass effect with indentation of the underlying muscles. No underlying bone fracture was seen.

The MRI showed a large subcutaneous collection that was slightly hyperintense on T1-weighted (W) and hyperintense on T2W sequences (Figure 2b), and which was seen to extend from the left flank to the upper thigh on the lateral aspect. Non-enhancing fat lobules and debris were seen within the collection (Figure 2c). There was no post-contrast enhancement in the periphery of the collection, and fat globules were seen as non-enhancing areas within the collection (Figure 2d). The collection had increased in size when compared to the CT done two weeks before, and was seen to indent the lateral thigh muscle. These findings were compatible with MLL.

Address for correspondence: Krishna Mohan Gummalla, FRCR  
Associate consultant in Vascular and Interventional Radiology,  
11, Jalan Tan Tock 308433 Singapore - Singapore  
Tel: 006581263432 E-mail: krishna777@gmail.com

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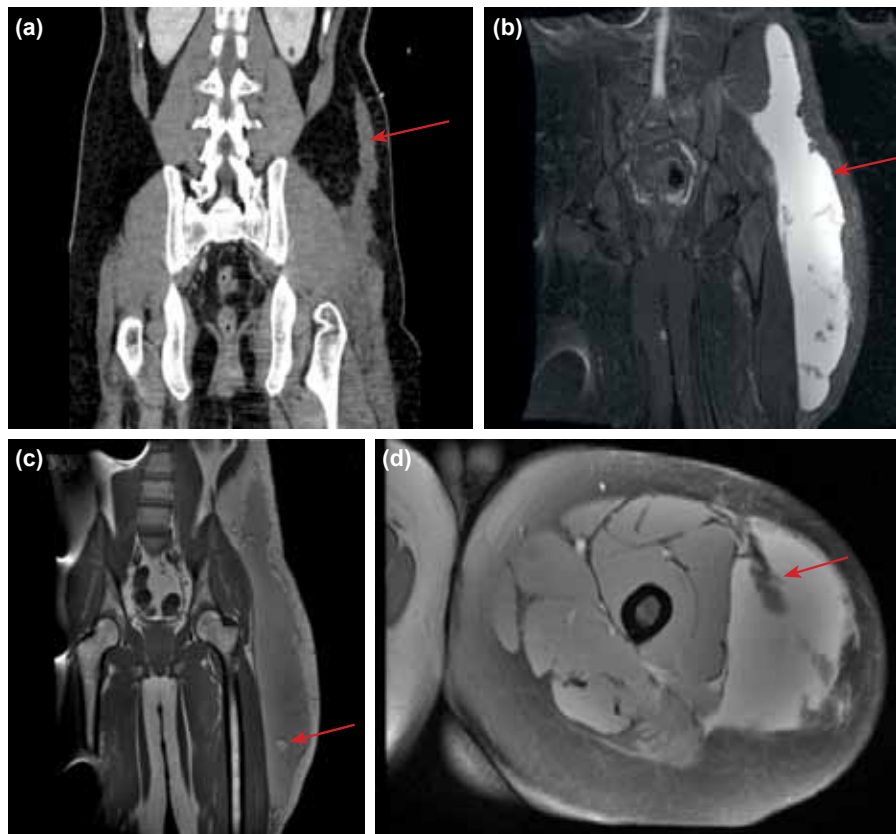
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**Figure 1.** Patient presenting with extensive swelling over the left flank and thigh regions (Photo courtesy of Dr. Kwek Ernest, Department of Orthopaedics, TTSH).

In view of the progressive increasing collection and absence of capsule formation, percutaneous drainage was done. Two liters of darkish brown fluid was drained from the subcutaneous fat plane above the muscle fascia. Areas of necrotic fat were also seen. The underlying soft tissue was not infected. No bacterial organism or growth was cultured from the fluid. Compression dressing was applied, and the patient was discharged without any complication after a few days.



**Figure 2.** (a) Coronal CT image showing an irregular soft tissue density lesion in the subcutaneous plane extending from the left flank to the upper thigh on the lateral aspect. (b) Coronal T2 fat-saturated MRI showing subcutaneous collection that was hyperintense on T2-weighted sequences. (c) Coronal T1-weighted MRI showing small fat lobule within the subcutaneous collection. (d) Post-contrast axial MRI showing no enhancement in the periphery of the collection and non-enhancing fat lobules within the collection.

## DISCUSSION

Morel-Lavallee syndrome or lesion was first described by a French surgeon, Victor Morel Lavallée, in 1863.<sup>[1]</sup> It is also known as Morel-Lavallee seroma, post-traumatic soft tissue cyst, post-traumatic extravasation, or Morel-Lavallee effusion.<sup>[2]</sup>

The MLL is a closed degloving injury of an extremity after a crush injury, resulting in the skin and subcutaneous fatty tissue abruptly separating from the underlying fascia, creating a cavity filled with bloody serous fluid. The initial injury represents a shearing of subcutaneous tissues away from the underlying fascia. The disrupted capillaries may continuously drain into the perifascial plane, filling up the virtual cavity with blood, lymph, and debris. Subsequent inflammatory reaction may lead to a peripheral capsule formation, which may account for the self-perpetuation and occasional slow growth of the process.<sup>[2]</sup> The collection may then spontaneously resolve, or become persistent with encapsulation.

Morel-Lavallee lesions usually present within a few hours to days post-trauma. However, some of the patients may present

months or years post initial trauma. They are frequently associated with underlying fractures, but can be isolated without fractures. These lesions are most often unilateral. Patients usually present with complaints of pain, swelling, and stiffness. On clinical examination, patients often have a soft fluctuant area of contour deformity, with or without skin discoloration. Skin sensation is frequently decreased. Skin necrosis may occur acutely or in a delayed fashion.

Closed degloving injuries are most commonly found adjacent to osseous protuberances, with the classical location being over the greater trochanter of the femur. They are also described along the flank, buttocks, lumbar spine, scapula, knee, and calf,<sup>[3]</sup> and along the abdominal wall post-liposuction.<sup>[1,4]</sup>

The size of these lesions is variable, ranging from small thin slivers of fluid to thickly encapsulated lesions several centimeters in diameter. When chronic, they are typically oval or fusiform in shape adherent to the underlying fascia. Plain radiography may reveal a noncalcified

soft tissue mass and associated fractures.<sup>[4]</sup> On ultrasound, these lesions are anechoic or hypoechoic; however, internal debris, including fat globules, can give rise to echogenic foci or even fluid-fluid levels. A capsule of variable thickness may be seen.<sup>[5]</sup> CT can show fluid-fluid levels related to sedimentation of the hemolymphatic fluid and varying amounts of internal debris including internal fat lobules, and may show a peripheral capsule.

Magnetic resonance imaging (MRI) is the diagnostic imaging modality of choice and is able to clearly determine the relationship of the collection with the underlying fascia. MLLs are well-defined oval, fusiform, or crescentic lesions, and may have tapering margins that fuse with adjacent fascial planes. The fluid is of variable signal intensity depending on its make-up, and may even show a fluid-fluid level.<sup>[1-3,6]</sup>

Initially the space between the subcutaneous fat and the underlying deep fascia is filled with blood or lymph. Later, the blood is largely resorbed and replaced by a serosanguineous fluid and becomes lined by a fibrous capsule. The fluid then shows homogeneous hyperintensity on both T1W and T2W sequences, with the appearance of a hypointense peripheral ring on T1, in keeping with sub-acute hematoma.

Chronic MLL may also show variable signal intensity on T1W, heterogeneous hyperintensity on T2W sequences, and a hypointense peripheral ring. Patchy internal enhancement and peripheral enhancement may also be present. The heterogeneous hyperintensity on T2W is characteristic of chronic organizing hematoma. Water-like MRI features may be seen in long-standing lesions, homogeneously hypointense on T1W and hyperintense on T2W images, with a peripheral hypointense ring on all sequences.

The differential diagnosis for MLL includes subcutaneous hematoma, hemangioma, fat necrosis, and soft tissue sarcoma. The history of trauma, characteristic location, and MRI features may contribute to a correct diagnosis.

The treatment depends on the duration, size, and presence of a capsule in the lesion. Small acute lesions that have not developed a capsule can be treated conservatively by application of compression bandage. However, those that persist and have capsule formation may require more aggressive treatment. These lesions can be managed with early percutaneous drainage, debridement, irrigation, and suction drainage.<sup>[7]</sup> These lesions can be complicated by infection, necessitating the use of antibiotics. In rollover trauma with pelvic fractures, urgent surgery with debridement is necessary.

In conclusion, though the MLL lesion in our case was quite extensive, extending from the left flank to the upper thigh, there was no capsule formation, and it could be treated by simple percutaneous drainage and compression bandage. The trauma surgeon and radiologist must be aware of the clinical and radiological features of MLL and the implications for its treatment. MRI is the diagnostic imaging modality of choice for MLL, with size, location and signal characteristics determining the appropriate therapy.

Conflict of interest: None declared.

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## OLGU SUNUMU - ÖZET

### Morel-Lavallee lezyonu: Seyrek görülen, yaygın, yumuşak dokunun eldiven soyulması gibi yaralanması

Krishna Mohan Gummalla (FRCR), Dr. Mathew George, Dr. Rupak Dutta

Tan Tock Seng Hastanesi, Tanısal ve Girişimsel Radyoloji Bölümü, Jalan Tan Tock, Singapur

Morel-Lavallee sendromu (MLS) deri altı dokunun alttaki fasyadan yırtılarak eldiven parmağı gibi (kapalı tip) soyulduğu, ardında hematoma ve sıvılaşmış yağla dolu bir kavitenin kaldığı önemli bir posttravmatik yumuşak doku yaralanmasıdır. Genellikle büyük trokanter üzerinde meydana gelmesine rağmen, bögürde, kaba etlerde ve lumbodorsal bölgede de oluşabilmektedir. MLS, nadiren rapor edilen bir olgudur. Erken tanı konservatif tedaviye yol açabildiği ve gecikince cerrahi eksplorasyon gerektiği için travma cerrahları ve radyologlar bu olgunun farkında olmalıdır. Bu yazıda, genç bir erişkinde sol hipokondriyum ve uyluğu ilgilendiren yaygın bir Morel-Lavallee lezyonunu sunuldu, MRG bulguları tartışıldı ve yine MLS'nin ayırıcı tanıları ve tedavi seçeneklerini tanımlandı.

**Anahtar sözcükler:** Eldiven parmağı gibi soyulma (kapalı tip); Morel-Lavallee lezyonu; posttravmatik ekstremitasyon.

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