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Role of Imaging in the Diagnosis and Management of Morel Lavallée Lesion: A Case Report and Literature Review

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Abstract **Case Report**

Morel-Lavallée lesion is a closed soft-tissue degloving injury that remains rare and whose management is not yet standardized. It is a closed delamination between the fascia superficialis and the cutaneous-subcutaneous tissue. This empty space is filled with fluid and may be complicated by surinfection and tissue necrosis. Regularly described in heavy traumatology, but can also be seen in post-surgical situations, it should not be ignored in routine practice. We present the case of post-surgical Morel-Lavallée lesion and we discuss the clinical presentation, pathophysiology, imaging features of Morel-Lavallée lesions. Role of imaging in guiding prompt and appropriate treatment has also been discussed.

Keywords: Morel-Lavallée, soft-tissue, degloving injury, fascia superficialis, cutaneous-subcutaneous tissue.

INTRODUCTION

The Morel-Lavallée lesion (MLL) initially described by the French physician, Victor-Auguste-François Morel-Lavallée in 1848 as a closed traumatic soft-tissue degloving injury [1]. The injury is characterized by the separation of the hypodermis from the underlying fascia and commonly occurs when a shearing force is applied to the soft tissue [2, 3]. Injury to rich vascular and lymphatic supply leads to accumulation of blood and lymph in this potential space generated by separation of the superficial and deep fascia. Blood products and necrotic material inturn invokes chronic inflammatory reaction. As the time progress, a capsulated lesion lined by fibrous capsule develops, which is filled with blood products, necrotic fatty tissue, debris and fibrin [4, 5].

Often initially unrecognised, the delay in diagnosis and treatment is a source of chronicisation and complications [6, 7]. There are multiple locations [7, 8]. The therapeutic choices are varied. New options are regularly published. No consensus has yet been reached.

We present the case of a young woman with Morel Lavallée lesion after pelvic surgery with review of the literature.

CASE REPORT

A 35-year-old patient with a history of two pregnancies, two births. No history of any comorbid illness was present, referred to the gynecological department for a suspicion of gossypiboma in view of the appearance of pelvic pain and a skin swelling opposite the caesarean scar.

Physical examination found a soft abdomen, with a skin swelling 2 cm above the caesarean scar, the biological check-up was normal. The patient was referred to our radiology department for an abdominopelvic ultrasound, which showed a well-limited subcutaneous collection with a well-defined wall. We completed the exploration by an abdominopelvic CT scan that confirmed the subcutaneous, supra-aponeurotic, well-limited, liquid-liquid collection surrounded by a poorly enhanced fibrous capsule after injection of contrast product. We concluded that it was a Morel-Lavallée lesion in its chronic phase (figure 1).

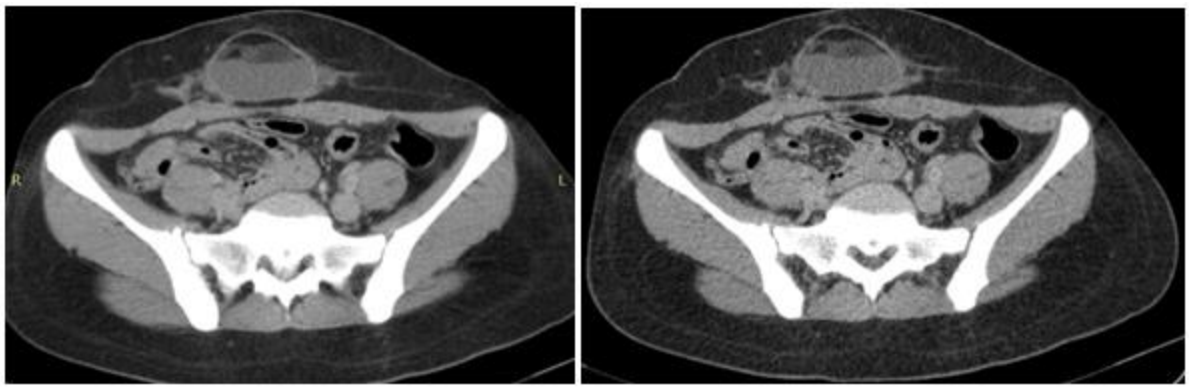

Fig-1: Abdominal CT scan in axial slices without and after injection of contrast product showing a subcutaneous collection above the aponeurosis with a liquid level and well limited by a peripheral capsule

Given the chronic nature of the lesion on imaging, open surgery was the therapeutic choice to avoid any risk of recurrence with evacuation of the lesion and resection of the peripheral capsule.

DISCUSSION

The most common etiology of Morel Lavallée lesion are motor vehicle accidents, but low grade blunt force trauma including falls and sport related injuries account for a significant minority of cases [4, 5]. Postoperative cases have also been reported, especially following liposuction [4, 5]. The greater trochanter is the most commonly involved region, accounting for over 60% of the cases. Predisposing factors include the superficial position of the femoral cortex, relative mobility of the subdermal soft tissues and strength of the underlying tensor fascia lata [5-9]. Secondary risk factors include female gender and a body mass index of 25 or greater. With disruption of the subdermal capillaries and lymphatics, haemorrhage, lymphatic fluid and locules of subdermal fat pool in the suprafascial tissue plane. Over time, there is resorption of the haemorrhagic elements, increasing serosanguinous fluid and progressive fibrous encapsulation, hindering resorption and thus leading to slow continued expansion.

The MLL may present acutely or may appear days following injury, and presentation depends on multiple factors. The extent and rate of hemolymphatic accumulation within the cavity, as well as the patient's body habitus, frequently determine the clinical identification of an MLL. Clinically, the injured area may demonstrate areas of ecchymosis, soft tissue swelling, fluctuance, or skin hypermobility. Superficial discoloration of the skin may be delayed for several days, so the diagnosis initially may go unrecognized. Hudson9 estimated that as many as one-third of MLLs go undiagnosed at the time of acute trauma. As time elapses, the area may become painful and firm, indicating capsule formation. Chronic lesions may mimic other soft-tissue diagnoses, including neoplasm. If improper management occurs, late evolution of the lesion also can lead to infection or necrosis of the soft-tissue envelope [2-5].

Diagnosis of a Morel-Lavallée lesion can be assisted by computed tomography or ultrasound; however, magnetic resonance imaging is the modality of choice [10, 11]. USG is a rapid, readily available, inexpensive modality which allows real time evaluation, including dynamic imaging. However, it is non specific, operator dependent and cannot be performed optimally in the areas with open wounds and dressings. USG demonstrates a variable appearance of Morel-Lavallée lesions with diagnosis being in part, both history and location driven. Acute lesions are usually ill defined and demonstrate heterogeneous echogenicity. They can mimic abscesses, simple haematomas, fat necrosis and neoplasms. Chronic lesions are better defined, homogeneous and smoothly marginated, which is due to tendency of these lesions to form pseudocapsules. Chronic collections may demonstrate variable flow within the surrounding fibrous capsule on colour Doppler imaging [4-5]. Ultrasound also plays an important role in guiding percutaneous drainage of the lesion.

CT scan is readily available and fast in image acquisition; it poses significant radiation risk and does not readily allow soft tissue characterization**.** CT has been the initial modality of choice, especially in acute trauma cases [5-12]. CT imaging findings include internal complexity and a fluid/fluid layer reflecting of internal settling of serosanguinous elements admixed with lymphatic fluid. CT density is usually lower than simple haematomas due to mixing of low-density lymphatic fluid and averages from 15-40 Hounsfield units. Presence of classical subdermal location and the detection of fat globules help characterization. Acute Morel-Lavallée lesions are usually ill defined with surrounding fat stranding, while subacute or chronic lesions are well defined. Detection of a well-defined capsule has prognostic implications reflecting the necessity for percutaneous drainage with sclerotherapy or surgical excision [12].

MRI is considered the preferred method of imaging to determine lesion characteristics and chronicity [4]. Findings correlate with classic hemorrhage and magnetic properties of blood breakdown products. Within hours of injury, oxygen-rich hemoglobin yields a homogeneous collection that is hypointense on T1-weighted (T1W) images and hyperintense on T2-weighted (T2W) images. Days to weeks after injury, oxidation of iron within heme to its ferric state results in lesions appearing hyperintense on both T1W and T2W images. In more chronic lesions, a peripheral capsule containing hemosiderin appears hypointense on T1W and T2W images [13, 14]. Furthermore, fibrous septations and calcified fat nodules may be present within the lesion.

In 2005, Mellado JM and Bencardino JT proposed an extensive six stage imaging based classification based on the shape of lesion, signal intensity on T1 and T2 weighted images, presence of fibrous capsule, contrast enhancement and sinus tract formation capsule [5-10].

Type I: Morel-Lavallée lesion-Seroma appearing as a homogeneously hypointense on T1 Weighted Image (T1WI) and hyperintense collection on T2 Weighted Images (T2W2), without evidence of outer capsule formation.

Type II: Morel-Lavallée lesion-Subacute haematoma appearing as homogeneously hyperintense on both T1WI and T2WI due to the presence of methaemoglobin, a characteristic of subacute haematomas.

Type III: Morel-Lavallée lesion-Chronic organizing haematomas demonstrating hypointensity on T1WI and heterogeneous hypointensity/isointensity on T2WI with capsular formation. On post contrast sequences, Type III lesions may show capsular and internal enhancement secondary to neovascularization and granulation tissue in the organizing haematoma. This can even lead to growth over time.

Type IV: Morel-Lavallée lesion-Represents a closed laceration, with the absence of a capsule. It shows T1 hypointense and T2 hyperintense signal.

Type V: Morel-Lavallée lesion-Demonstrates a small, rounded, pseudo nodular appearance and have variable T1 and T2 signal intensity.

Type VI: Morel-Lavallée lesion-Represents superimposed infection, with a thick enhancing capsule and can be associated with sinus tract.

On the other hand, a simple classification is used to differentiate between an acute and a chronic lesion based on the presence or absence of a capsule and to orientate the therapeutic management. Capsule formation warrants surgical treatment for complete cure and to avoid risk of infection. Diffusion weighted MRI is especially helpful in differentiating Morel-Lavallée lesions and necrotic tumors from the abscesses as well as infected Morel-Lavallée lesions by showing central restriction in the central portion in the later [15-16].

Treatment strategies are based on the stage of Morel-Lavallée lesion as per above classification pattern [4]. Many strategies for the treatment of Morel-Lavallée lesions have been reported and there are no established treatment modalities for patients with Morel-Lavallée lesions. First line therapies, in patients with acute, small lesions without underlying fractures usually include compression bandage application, NSAID medications, physiotherapy and absolute bed rest [5-17].

USG or CT guided percutaneous drainage can be used for larger acute lesions. It may also be attempted along with sclerotherapy in patients with chronic lesions [5-18]. Talc sclerotherapy and the use of alcohol and doxycycline, have also been reported [19-20]. Surgical intervention is also indicated in patients with longstanding Morel-Lavallée lesions with pseudo capsule because they are unresponsive to percutaneous drainage and therefore vulnerable to recurrence [5-21]. MRI is thus helpful in characterizing the lesions stage and presence of pseudo capsule to decide surgical vs non-surgical treatment.

CONCLUSION

Morel-Lavallée syndrome remains a rare entity, often initially unrecognized. He should keep in mind this assumption diagnostic in clinical practice, even if minor trauma. A delay in diagnosis interferes with its management and exposes the patient complications (chronicization, infection, tissue necrosis). The initial diagnosis is clinical. MRI allows an exhaustive lesion assessment and orientation of the therapeutic choice. Provided appropriate management is given from the initial phase, conservative treatment can be instituted, especially in the case of an uncomplicated lesion of small size. In the event of failure of conservative treatment or in the case of a complicated form, surgery is the preferred option. Puncture-evacuation and sclerotherapy are therapeutic options proposed in acute and/or chronic cases. Their place remains to be defined. For the time being, no consensus on management has been established. The only validated prognostic factor is the early diagnosis, and therefore the speed with which the first therapeutic measures are implemented.

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