Poor Outcome of Bilateral Lower Extremity Morel-Lavallee Lesions: A Case Report

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Abstract

Keywords

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- internal degloving injury
- skin necrosis
- skin graft
- amputation
- trauma

The Morel-Lavallee lesion is a closed, internal degloving injury that results when a strong, shearing force is applied parallel to the plane of injury, as is common in vehicular trauma. It is an underdiagnosed entity that is often missed during the initial trauma workup as symptoms can be subtle. There are few reports of lesions occurring below the knee. Most cases affect the proximal thigh and trochanter, as these tend to be dependent areas in high velocity trauma. To the best of our knowledge, this is the first literature report of bilateral lower extremity Morel-Lavallee lesions.

The Morel-Lavallee lesion was first described in 1853 by the French physician, Maurice Morel-Lavallee. It is characterized by the separation of subcutaneous fat from the underlying fascia that is caused by a tangential, shearing force and often results in seroma or hematoma of the newly formed space. It is an uncommon sequela of posttraumatic closed degloving injury, often a pedestrian–motor vehicle collision, and is often underdiagnosed because the initial symptoms may consist of tenderness and ecchymosis, mimicking contusion. During the acute resuscitation phase of a polytrauma, this occult injury can be missed. Patients commonly present after the injury in the outpatient setting with complaints of a contour deformity or unresolving mass.

We present the case of a woman who sustained bilateral Morel-Lavallee lesions of the lower extremities after being dragged by a bus.

Case Report

A 77-year-old female with no significant past medical history presented to our Level I trauma center with tenderness and open wounds on both lower extremities after being caught in the doors of a bus and dragged for several hundred feet. She sustained a 5-cm wound on the left lateral ankle and a 3-cm

wound on the lateral side of the dorsum of the left foot. There was significant edema bilaterally distal to the mid-lower extremities, over which the skin was paler and cooler; however, she was neurovascularly intact. She suffered bilateral fibular, bilateral medial malleolar, and multiple toe fractures bilaterally. She was admitted to the trauma service and underwent washout of her wounds and fixation of the fractures with orthopedic surgery. On hospital day 5, during fixation of the right lower extremity, skin necrosis was noted over both lower extremities. While awaiting further demarcation, skin necrosis developed on the left lower extremity as well. The patient required serial debridements managed by vacuum-assisted closure (VAC) dressings followed by split-thickness skin grafts. She was discharged to subacute rehabilitation on hospital day 52 in stable condition.

The patient returned to the emergency room 38 days after discharge with open wounds of the split-thickness skin grafts. She had developed pressure ulcers on the grafts while at rehabilitation. The patient was admitted and underwent debridement of both legs. The extremities were debrided down to the bone, then packed and splinted with intent to offload the heels and prevent pressure ulcers. She underwent daily dressing changes and local wound care and was discharged to rehabilitation in stable condition. However, the

Fig. 1 Following percutaneous toe fixation.

wounds failed to heal, and she ultimately returned for bilateral below the knee amputations (→Figs. 1–8).

Discussion

The lesion most commonly occurs on the hips, thighs (particularly over the greater trochanter), flank, and lumbar regions. It has been described in American football players on the knees, due to the shearing forces incurred in the game.¹ The lesion has also occurred after abdominoplasty or liposuction in which the same mechanism is in play – separation of subcutaneous fat from the underlying fascia. There is a distinction between patient populations requiring immediate treatment versus outpatient treatment. Patients who present much later after the injury often complain of a contour deformity in the outpatient setting in which the issue is mainly cosmetic, whereas other patients may suffer skin necrosis and require excision and subsequent wound coverage. Tissue viability is dependent on whether the dermal arterial plexus is compromised.

Diagnosis involves a high index of suspicion and a thorough physical exam. The clinical appearance of the lesion depends on the amount of fluid within the cavity and time elapsed since trauma. Physical exam findings can include soft tissue swelling, contour deformity, bruising, skin hypermo-

Fig. 3 Nonviable skin of right lower leg.

Fig. 4 Degloved skin overlying digits of right foot.

bility, hypoesthesia, or a palpable mass.² The gold standard for diagnosis is MRI, which shows various features depending on the chronicity of the lesion. In the acute setting, a hyperintense collection will appear on T2-weighted images, representing blood clots and debris. Organized hematoma will appear iso- to hyperintense on T1-weighted images. Shortly after the injury, the presence of hemosiderin is reflected in the hypointense outline on both T1 and T2 images. More chronic lesions will appear as a hyperintense

Fig. 2 Hospital day 8, demarcation of necrosis of right lower leg.

Fig. 5 Debridement of right lower leg.

Fig. 6 Necrosis of left lower leg.

Fig. 7 Debridement of left lower leg.

seroma on T2 images with a hypointense pseudocapsule made up of fibrotic fat that shows up on T1 and T2.²

Needle aspiration of the collections reveals necrotic fat, blood, and lymph. Plain radiographs are of little help. Ultrasound will show a mass between the subcutaneous fat and fascia that is anechoic or mildly hyperechoic. Fluid collections present for less than 1 month usually appear lobular, whereas chronic lesions (longer than 18 months) appear homogenous

Fig. 8 Bilateral lower extremity VAC dressings.

with smooth margins.² Computed tomography will show a well-defined encapsulated fluid collection that may or may not have air-fluid levels. The superficial layer is a compact network whose thickness is constant regardless of location. The deep layer is looser, less structured, and of variable thickness. This deep layer is more developed in the abdomen, buttocks, thighs, and hips – areas most likely to sustain Morel-Lavallee lesions.³

Treatment aims to evacuate the seroma or hematoma with the goal of obliterating the free space between the superficial and deep fasciae. Options include incision and drainage with or without compression, aspiration, sclerodesis, liposuction, open excision with primary closure, open excision with healing by secondary intention, compression alone in mild cases, and excision with ligation of lymphatic vessels that drain into the lesion. Incision and drainage with or without the use of pressure garments has been utilized successfully in lesions that are not very large.^{4,5} In a study of 24 National Football League players with 27 knee lesions, 52% of knees required only compression bandaging, cryotherapy, and mobility exercises; 70% of knees were successfully treated with aspiration alone and 11% with recurrence after aspiration received sclerodesis using doxycycline.¹

Sclerodesis with numerous agents has been described for the management of lymphoceles and malignant pleural effusions. The makeup of Morel-Lavallee lesions is similar to that of lymphoceles (necrotic fat, blood, lymph), and many feel sclerodesis to be a logical treatment option. It has been used successfully to close the free space of Morel-Lavallee lesions.^{1,2} Another technique utilizes lymphatic mapping to visualize vessels that drain into the lesion to ligate them and prevent lymphatic filling of the space. The cavity is then filled with fibrin sealant and the space closed with quilting sutures.⁴

Percutaneous drainage can be effective for draining seromas or hematomas that accumulate in the free space of Morel-Lavallee lesions. One study looked at the effects in 19 patients with Morel-Lavallee lesion (MLL) of the acetabular region, many of whom had concomitant acetabular, pelvic, and/or femur fractures. The lesions were treated within 3 days of injury via small incisions over the lesion, debridement through the incisions, pulse lavage, and placement of suction drains. The authors argue that the less-invasive nature of percutaneous drainage and debridement results in preservation of the subdermal plexus.^{5,6}

A study looking at open circumferential degloving injuries showed that the worst outcomes occurred in patients who underwent reduction and closure of the degloved skin as well as those whose wounds were packed and loosely approximated. These patients had necrosis of 50% or more of the skin flap. The successes occurred in patients in whom the degloved skin was used as a skin graft (full-thickness and split-thickness). This is an important finding as patients with Morel-Lavallee lesions can similarly utilize the involved skin for coverage if the dermal vasculature is compromised and the need for excision arises.⁷ Perhaps in our patient, if there was a higher index of suspicion for the injury, the overlying skin could have been used for a skin graft before the necrosis began.

The difficulty in management of Morel-Lavallee lesion is in predicting skin viability. Fluorescein is a fluorescent dye used in flow cytometry, which has been used experimentally to assess tissue viability. It is administered intravenously upon flap elevation, and the fluorescence is subjectively measured with the aid of ultraviolet light approximately 10 to 15 minutes postadministration. Viable skin appears bright yellowish green; flaps that are blue and nonfluorescent are not viable. Skin with spotty areas of fluorescence lies somewhere in between. In one study, the fluorescein test was extremely reliable even when it contradicted traditional clinical signs of viability such as capillary refill and flap color. Fluorescein is relatively safe; side effects include nausea and vomiting. The manufacturers have found no reports of death related to its use. Despite the study's success, fluorescein has not been widely studied for this application. With further investigation, this may be a valuable asset to the physician faced with assessing skin viability of a Morel-Lavallee lesion.^{8,9}

Morel-Lavallee lesions are underdiagnosed, posttraumatic, soft tissue injuries that require a high index of suspicion. They can be confirmed by imaging when there is evidence of a closed degloving injury. It is easy to understand the difficulty in diagnosis at the initial injury. As always, the primary trauma survey takes precedence in the patient's management, but Morel-Lavallee lesions should be included in the secondary assessment. Factors that indicate a more severe injury include underlying fractures as this may further com-

promise the dermal vasculature. It is important for these cases to be reported so that they are more prevalent in the literature and therefore bring awareness to this type of injury that can be associated with significant morbidity.

References

- 1 Tejwani SG, Cohen SB, Bradley JP. Management of Morel-Lavallee lesion of the knee: Twenty-seven cases in the National Football League. *Am J Sports Med* 2007;35(7):1162-1167
- 2 Dawre S, Lamba S, Sreekar H, Gupta S, Gupta AK. The Morel-Lavallee lesion: A review and a proposed algorithmic approach. *Eur J Plast Surg* 2012;35(7):489-494
- 3 Vico PG. Morel-Lavallee syndrome. *Eur J Plast Surg* 2000;23(1):45-48
- 4 Jones RM, Hart AM. Surgical treatment of a Morel-Lavallee lesion of the distal thigh with the use of lymphatic mapping and fibrin sealant. *J Plast Reconstr Aesthet Surg* 2012;65(11):1589-1591
- 5 Jones RM, Hart AM. Surgical treatment of a Morel-Lavallee lesion of the distal thigh with the use of lymphatic mapping and fibrin sealant. *J Plast Reconstr Aesthet Surg* 2012;65(11):1589-1591
- 6 Tseng S, Tornetta P III. Percutaneous management of Morel-Lavallee lesions. *J Bone Joint Surg Am* 2006;88(1):92-96
- 7 Hudson DA, Knottenbelt JD, Krige JE. Closed degloving injuries: Results following conservative surgery. *Plast Reconstr Surg* 1992;89(5):853-855
- 8 Kudsk KA, Sheldon GF, Walton RL. Degloving injuries of the extremities and torso. *J Trauma* 1981;21(10):835-839
- 9 McCraw JB, Myers B, Shanklin KD. The value of fluorescein in predicting the viability of arterialized flaps. *Plast Reconstr Surg* 1977;60(5):710-719