Percutaneous Debridement of and Fibrin Glue Injection Into a Pretibial Morel-Lavallée Lesion

A Case Report and Literature Review

Chih-Hao Pan, MD, Chih-Peng Tu, MD, Shuan-Yuan Ou, MD, Kwang-Yi Tung, MD, Wen-Chen Huang, MD, Chia-Meng Yu, MD, Ming-Feng Tsai, MD, Wen-Teng Yao, MD, and Yu-Fan Chen, MD

Abstract: The Morel-Lavallée lesion (MLL) is a posttraumatic close degloving injury, which is often underdiagnosed at first. Patients with MLLs usually present with tender and enlarging soft tissue swelling with fluctuation, decreased skin sensation, ecchymosis, or even skin necrosis hours to days after the inciting injury. The lesion can lead to intractable morbidity if it remains untreated. There is no consensus regarding the treatment for MLL at present. Here, we report an MLL in the pretibial region of a 43-year-old woman who experienced a low-energy contusion in a motorbike accident. The pretibial lesion was diagnosed using sonography and fine-needle aspiration. We successfully treated the patient by performing percutaneous debridement via a small incision and injections of fibrin after conservative treatment failed. The method we herein propose achieved the goal of open surgical debridement, providing faster recovery and a high degree of patient comfort. We reviewed the available pertinent literature and propose our own treatment protocol with the aim to establish common therapies of MLL.

Key Words: Morel-Lavallée lesion, closed degloving injury, seroma, pretibial, fibrin glue

(*Ann Plast Surg* 2021;86: S123–S126)

The Morel-Lavallée lesion (MLL), first described in 1853 by a French surgeon, Maurice Morel-Lavallée, features an uncommon, closed, posttraumatic degloving injury.[1] This injury results when high-energy blunt trauma precipitates a tangential force between the subcutaneous superficial fascia and deep fascia, leading to the disruption of perforating vessels and lymphatics between the interfascial planes. The formation of a potential space with hemolymphatic fluid accumulation results in a hematoma or an encapsulated seroma, depending on the degree of injury and chronicity of the lesion.[2,3] Patients with MLL usually present with a tender and enlarging soft tissue swelling with fluctuation, decreased skin sensation, ecchymosis, and, surprisingly, skin necrosis of the overlying skin hours to days after the inciting injury.

A large trauma center collected 79 MLL patients, establishing an MLL incidence of 0.7% with 25% of MLL caused by motor vehicle accidents.[4] Morel-Lavallée lesion was also found in contact sport players, such as American football athletes.[5] The sites of predilection were most commonly found to be the great trochanter, thigh, and pelvis, concomitant with pelvic and acetabular fractures.[6] For polytrauma patients, the lesion can easily be underdiagnosed as more conspicuous injuries distract the physician's attention. Early diagnosis and treatment of MLL are crucial to avoid further complications, including infection, skin necrosis, and contour deformity.

Nevertheless, consensus for a treatment of MLL has not yet been established. In this study, we describe an MLL in left lower leg successfully treated with a small incision debridement and fibrin sealant injection. Furthermore, we herein review previous literature to provide an algorithm for MLL treatment according to size and severity.

CASE REPORT

A 43-year-old woman was referred to our outpatient clinic with a 2-month history of pain and swelling of the left anterior lower leg. She had recently experienced a contusion in the left crural region with a huge mass formation after a motorbike accident 1 month before the onset of symptoms. No open wound or bone fractures were identified at the scene of the accident, and the patient denied history of diabetes mellitus, immunosuppression disorder, or anticoagulation drug use. Hence, fine-needle aspiration of the mass lesion with drainage of a black discharge was performed at another clinic where the patient received a diagnosis of hematoma. Nevertheless, the mass lesion relapsed a few days later and continued enlarging. A physical examination revealed the locoregional swelling measuring approximately 5×13 cm, with fluctuation and partial necrosis of the overlying skin on the crural area. Sonography revealed an anechoic cystic mass with a thin wall between the tibia shaft and subcutaneous fat. We incised the necrotic skin under local anesthesia; approximately 60 mL of serous fluid was drained (Fig. 1). Subsequently, her wounds were dressed with silver hydrofiber, and the elastic bandage compression was left for 3 months, yet her wound did not heal, showing persistent effusion of the clear serous fluid. Thus, a diagnosis of pretibial MLL was made. As conservative therapy was ineffective and the incision wound was becoming locally infected, the patient underwent percutaneous debridement via a small incision and fibrin glue injection.

We made a 2-cm incision on the upper pole of the lesion, in addition to the chronic wound near the lower pole of the lesion, to reach the entire volume of the dead space. Via the opening between the 2 poles, we curetted and debrided the fibrous capsule and nonviable tissue. Using an irrigator bottle, an adequate saline solution was poured via the upper pole incision to flush the debris away from the lower pole wound. We subsequently sprayed fibrin glue (Artiss, Baxter) into the potential space of MLL and closed the incision wound and chronic ulcer (Fig. 2). A compression bandage was applied immediately and sustained for 2 weeks after the surgery. No drain was placed. During the 13 months of follow-up, the patient did not experience any complications except for a subtle tightness sensation, which did not interfere with her range of motion (Fig. 3). The patient had no complaints about pain or swelling due to the MLL.

DISCUSSION

Our case was of a patient with an MLL in the pretibial region, diagnosed using sonography and fine-needle aspiration. We successfully

Received November 15, 2020, and accepted for publication, after revision November 28, 2020.

From the Division of Plastic and Reconstructive Surgery, Department of Surgery, Mackay Memorial Hospital, Taipei City, Taiwan, ROC.

Conflicts of interest and sources of funding: This work was supported by the Mackay Memorial Hospital Research Grant 2020.

Reprints: Chih-Peng Tu, MD, Division of Plastic and Reconstructive Surgery, Department of Surgery, Mackay Memorial Hospital, No. 92, Section 2, Zhongshan N Rd, Zhongshan District, Taipei City 10449, Taiwan, ROC. E-mail: zaizen.medic@gmail.com.

ISSN: 0148-7043/21/8601–S123
DOI: 10.1097/SAP.0000000000002718

FIGURE 1. Left, left pretibial MLL after open drainage with persistent serous discharge effusion; right, the cystic lesion measuring 13×5 cm^2. full color online

treated the lesion by performing percutaneous debridement via a small incision and injections of fibrin glue, thus proposing an effective treatment method for MLLs.

The MLL is a rare consequence of shearing force between the subcutaneous interfascial planes resulting from high-energy blunt trauma. In general, the lesion is uncommon, and its predisposing factors have not been well documented. Whereas a systemic review demonstrates that the incidence of MLL in males is twice the incidence in females,[7] a large retrospective study found no statistically significant differences in gender, body mass index, or Injury Severity Score.[4]

Morel-Lavallée lesion has been described to occur most commonly at the great trochanter; however, according to previous studies, it can also occur on the thigh, pelvis, knee, gluteal region, abdomen, and lumbosacral areas as well as the head.[5,6,8,9] An MLL of pretibial region has hardly been reported in previous literature. Molnar et al[10] reported a middle-aged woman with pretibial MLL conjoined with close tibiofibular fracture. The lesion was debrided with suction drain placement during surgical treatment of the intramedullary nailing.[10] Correspondingly, Hogerzeil and Jansen[11] presented a 59-year-old overweight man (body mass index of 40.1) placed on dual antiplatelet therapy because of cardiac stenting with proximal tibial MLL but without fractures, which subsided after repeated needle aspirations and knee brace compressions over a period of 18 months. In contrast to previous reports, our patient had an average body weight, reported no anticoagulant use, and experienced no concomitant fractures. The crural region was a possible location of MLL because of the superficial position of the tibia cortex and the relative mobility of the subdermal soft tissue overlying the firm periosteum of the tibia, which enhances the shearing force.

Morel-Lavallée lesion can hardly be detected in the beginning because of its unspecific and obscure clinical symptoms. Therefore, diagnosing MLL should depend on a combination of history, physical examination, and imaging. Magnetic resonance imaging is considered the ideal imaging technique for analyzing the content and chronicity of MLL because of its high-contrast resolution and ability to illustrate greater anatomic detail, especially for soft tissue.[3,12] Mellado and Bencardino[13] classified MLL into 6 types according to its morphology as well as T1 and T2 character of the content in an magnetic resonance imaging. Nevertheless, the classification is only available for anatomical depiction and is irrelevant to treatment. Because our patient's lesion was complicated with skin necrosis presenting at her initial visit to our clinic, she received a definite diagnosis based on recent trauma history, sonography, and direct excision of the skin necrosis.

Numerous strategies have been proposed for the treatment of MLL depending on the lesion's size, morbidities, chronicity, and coexisting injury, including conservative management, percutaneous aspiration, sclerosis, and open debridement.[4,14] Conservative treatment with cryotherapy, compression bandage, and analgesics is only amenable for small acute lesions within a 50% chance of recurrence and is thus not recommended as the sole treatment.[5,15]

In this study, we eased the patient's discomfort from tension and tightness due to the cyst while evaluating the content and volume of her lesion directly using fine-needle aspiration. Nickerson et al[4] pointed to a higher likelihood of MLL recurrence after percutaneous aspiration compared with operative treatment, especially in the presence of a cyst with a volume greater than 50 mL. Nonetheless, we consider fine-needle aspiration an amenable strategy for initial symptom relief

FIGURE 2. A small 2-cm incision made on the upper pole of lesion in addition to the chronic wound at the lower pole as access to curettage, irrigation, and fibrin glue injection. full color online

and a diagnostic tool that can assist in recognizing the contents and volume of the MLL. Thereafter, further combination therapy can be determined depending to the nature of the lesion.

With its less-invasive nature, accessible conjoined treatment with percutaneous aspiration, and commendable results, sclerotherapy is a well-advocated treatment for MLL.[14,16] Whereas doxycycline is a widely used sclerosing agent with cure rate of over 95% for average volumes of 400 mL,[17] bleomycin, tetracycline, and ethanol have all been reported to be viable for inducing intralesion inflammation, fibrosis, and further adhesion.[7,16,17] However, some physicians are reluctant to administer sclerotherapy because of common patient complaints of severe pain and contour deformity. Although rare, an inability to run long distances after an anterior thigh MLL has also been reported.[17]

Finally, surgical intervention is considered when the coexisting fracture or other trauma is apt for operation, infection, skin necrosis, or failed conservative treatment. The traditional surgical treatment is open debridement or en bloc resection of the encapsulated lesion.[3,4,9,14,18] Novel surgical techniques with adjuvants have been reported over time, including endoscopy, quilting suture, negative pressure wound therapy, vacuum drainage, and fibrin glue.[9,19–21]

Because of its coagulative qualities and similarity to human plasma with properties of hemostasis and adhesion, fibrin glue is commonly used for facelift surgery and skin grafting at burn debridement wound to effectively decrease blood loss, reduce postoperative wound pain, and decrease the number of staples necessary for skin graft fixation.[22,23] Jones and Hart[21] used fibrin sealant on the lesion after open resection of a large chronic MLL over the distal thigh. Furthermore, Demirel et al[24] described 7 thigh MLLs successfully treated by debridement and fibrin sealant spray with postoperative suction drain and compression bandage use. In this study, we used 2 percutaneous small wounds for curettage, debridement, and irrigation. We then sprayed fibrin glue (Artiss) onto the lesion to reattach the separated interfacial plane and prevent hemolymphatic leakage from disrupting the subcutaneous plexus. The method proposed herein achieves the goal of

FIGURE 3. No recurrence within 13 months after the operation. full color online

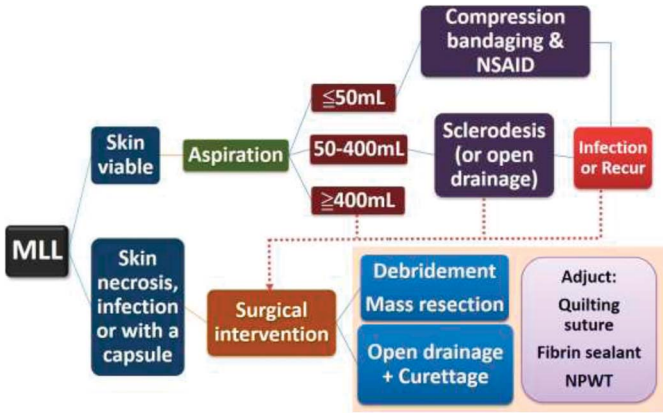

FIGURE 4. The proposed algorithm for the management of MLL. full color online

traditional open surgical debridement. Furthermore, incising smaller surgical wound using this method ensures faster recovery without exposing the patient to increased morbidity. The patient retained the compression bandage for 2 weeks without drain placement and was satisfied with the surgical outcome after 13 months of follow-up.

Regardless of the MLL treatment strategies discussed previously, no specific guidelines or standard treatment has been established to date. Hence, we propose an algorithm in the light of the available literature for the management of MLL and postoperative seroma (Fig. 4). Postoperative seroma is a recalcitrant and more common problem than MLL; it frequently occurs after abdominoplasty, liposuction, and lymph node dissection. Previous studies note a similar pathogenesis between the postoperative seroma and MLL.[4,8,14] Kim et al[25] reported a rare case of 2 massive abdominal MLLs after 8000 mL of liposuction in a patient of morbid obesity.

In conclusion, the MLL is an easily underdiagnosed injury, which can be a substantial source of morbidity in blunt trauma patients. We propose a treatment algorithm to establish common therapies of MLL. Furthermore, in the case that surgical intervention is inevitable, we recommend small incisions for drainage, curettage, and fibrin sealant injection as an applicable treatment for chronic MLL to achieve the goal of open surgical debridement with faster recovery and a high degree of patient comfort.

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