CASE REPORT

Unusual Morel-Lavallee lesion of the knee region in an elderly patient

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SUMMARY

The Morel-Lavallee lesion (MLL) of the knee region has been described in the Orthopaedic literature, and all of those were fit and healthy young participants sustaining sports-related trauma to the knee. We describe a case of an elderly woman, on aspirin and prophylactic clexane, who sustained a low-energy injury to the right knee and developed an MLL of the knee region. A delayed recognition, led to the persistence of the MLL as a diffuse haematoma, which subsequently became colonised with methicillin-resistant *Staphylococcus aureus*. We discuss the management of a case and highlight the importance of early identification and management of MLL of the knee region. Further evidence needs to be collected about MLL lesions in elderly, frail patients who are anticoagulated, and have increased risk of falls. This cohort of patients is more vulnerable to bleeding and infection than a fit, young adult population.

BACKGROUND

The Morel-Lavallee lesion (MLL) is a closed degloving injury that was first described by Victor Auguste Francois Morel Lavallee—a French physician, in 1853. It was first described overlying the hip. The lesion describes the separation of the skin and subcutaneous tissue from the underlying fascia as a result of a shearing force. Vessels that perfuse the skin are disrupted as they come through the underlying fascia. This disruption of the bridging blood and lymphatic vessels leads to a fluid collection in a plane between the underlying fascia below and skin/subcutaneous tissue above, the plane created as a result of the injury.¹ As a result of this closed degloving injury, infection and sepsis in addition to ischaemia and necrosis to skin are potential sequelae. The risk of ischaemic skin necrosis is increased, as the skin's dermal and subcutaneous vascular plexus blood supply is compromised.²

Radiological diagnosis of MLL lesions is typically by MRI, currently considered the standard diagnostic modality due to its soft tissue imaging capabilities.³ However, ultrasound has become an increasingly used tool in the regular evaluation of the dynamic nature of MLL lesions, especially after their diagnosis and during their treatments.³ They may also be beneficial in the initial diagnosis, especially when compared with plain radiographs but do lack the soft tissue definition when compared with MRI.³

MLL most frequently occurs at the greater trochanter as well as the flank and buttocks.¹ Closed internal degloving can be significant if occurs in the

acetabulum and pelvic soft tissues whereby the subcutaneous tissue is torn away from the underlying fascia, creating a large cavity filled with haematoma and liquefied fat.¹ Pelvic MLL can be life-threatening and has been widely described in the literature.^{1,2}

MLL of the knee is not as common nor as widely reported.⁴ It is known that knee MLLs are commonly associated with sports players who sustain a shearing blow injury to the knee on a playing surface (81%).⁴ To the best of our knowledge, there are no reports in the literature that recorded such cases in the elderly age group, who are on aspirin or other forms of anticoagulation, and are at increased risk of falls. MLL of the knee has not previously been described in this patient population.

Here, we describe the potentially devastating consequence of a resistant infection of an MLL of the knee region with a delayed diagnosis. A woman on anticoagulation sustained a low-energy trauma which resulted in a knee MLL and also a methicillin-resistant *Staphylococcus aureus* (MRSA) colonisation of the lesion as a result of delayed diagnosis.

CASE PRESENTATION

A woman aged 73 years was admitted under the Physicians for treatment of a community-acquired pneumonia along with exacerbation of her pre-existing congestive cardiac failure. She has a background history of atrial fibrillation, hypertension and recurrent lower respiratory tract infections. She was noted to be allergic to penicillin, was on aspirin and prophylactic clexane for deep venous thrombosis (DVT) prophylaxis. During her inpatient stay, she sustained a mechanical fall while in a hospital bathroom, and injured her nose and right knee.

She fractured her nasal bones, which was treated conservatively. A clinical diagnosis of soft tissue injury of the knee region was initially considered as she was able to weight bear comfortably and radiographs did not demonstrate any bony injury. Over the next few days, the patient's right knee became grossly swollen and painful. It quickly developed erythema and the patient's inflammatory markers began rising.

Ten days postinjury, a CT of the right knee was obtained to out-rule an occult fracture. No fracture was shown but a large prepatellar haematoma in addition to a suprapatellar collection were noted (figure 1). A haemarthrosis was considered as a differential. A working diagnosis of prepatellar bursitis

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Figure 1 CT scan 10 days postinjury. The white arrow shows a tense fluid collection in the prepatellar region.

was made and intravenous antibiotics, as recommended by microbiology, were initiated by the junior members of the Medical team.

However, over the course of the next 2 weeks, the patient's knee failed to improve. Erythema persisted and the patient became pyrexia. Three weeks post injury, the skin on the antero-medial aspect of the knee began forming an eschar and oozing, with a persisting swelling in the knee region. An ultrasound was performed (figure 2), which out-ruled DVT, but noted an extensive extra-articular haematoma extending to the mid thigh. The patient was referred to the Orthopaedic team on-call, when an aspiration of the haematoma was performed and 200 ml of sanguinous fluid was aspirated. The aspirate had Gram-positive Cocci on Gram's staining and grew bacteria + + +, which subsequently transpired to be MRSA on the cultures.

DIFFERENTIAL DIAGNOSIS

1. Morel-Lavallee lesion of the knee
2. Prepatellar bursitis
3. Haematoma with/without coagulopathy
4. Fat necrosis
5. Post-traumatic lipoma

TREATMENT

A diagnosis of MLL of her knee, complicated by MRSA colonisation, was confirmed. The patient was subsequently transferred to the acute trauma centre, under the care of the Orthopaedic Surgeons. Incision, drainage and debridement were performed in theatre under general anaesthetic, using a 2 cm long incision. Three hundred millilitres of infected haematoma were drained. A negative suction therapy (VAC dressing) was applied. The patient was placed on vancomycin, doxycycline, sodium fucidate and rifampicin as per sensitivities of the aspirate over the course of 1 month. She needed a further surgical wash out, once more

in addition to needing a new antimicrobial—linezolid for a subsequent 10 days.

OUTCOME AND FOLLOW-UP

The patient finally recovered, with culture results from the latest vac fluid showing no growth. The Vac dressing was removed, the wound left to heal by secondary intention and the patient discharged successfully back to the Medical team who were her primary clinicians.

DISCUSSION

MLLs historically have been widely described as occurring in the greater trochanter, buttocks and flanks.¹ However, reports of MLLs of the knee in the form of prepatellar closed degloving injuries were first described formally in 2007.⁴ Most of these related to sporting injuries of the knees of young, fit participants.^{4 5} No cases were reported in the elderly, especially those on aspirin or other forms of anticoagulation, as in our current case. In addition, infectious sequelae of missed MLLs of the knee, despite being a real risk, is sparsely described in the literature. Specifically, MRSA infection of MLLs has never been described previously.

It is known that MLLs are difficult to diagnose initially. Kottmeier *et al*⁶ reported that they could be missed up to 44% of the time. In spite of the evidence in the history and clinical examination, the rarity of the diagnosis makes it an uncommon detection initially. This has been documented as a primary reason for the failure of early detection in the literature.⁷ The other reason these lesions are commonly missed is that these lesions can often be slow to progress and declare themselves, again making the diagnosis difficult in the initial stages.¹

Early indicators of MLL from the history in our case include a history of shearing trauma to the soft tissues of the affected knee in addition to a progressively increasing swelling of the knee with skin erythema and eventual eschar formation and ooze, indicating the onset of skin necrosis. This progressive series of events should have highlighted the likelihood of an MLL affecting the underlying fascia and the skin vasculature.

A bursitis around the knee region would not behave in this manner. The diffuse nature and rapid development of ecchymosis and effusion meant that the fluid collection was not just localised to the prepatellar bursa. The fluctuance of the swelling and the absence of the positive patellar tap should have served as indicators that this was more of an anteromedial collection, that was indeed involving more than just the anterior prepatellar bursa and not confined to being an intra-articular effusion.

Radiologically, the initial CT scan performed day 10 post-trauma did highlight that there is a possibility of a haematoma which appeared more anteromedial rather than purely anterior, better supporting a diagnosis of MLL. Larger fluid collections on

Figure 2 Ultrasound showing extensive—9 by 3 cm extra-articular collection in the right knee.

imaging in craniocaudal and mediolateral dimensions have been proposed to signify MLL as opposed to prepatellar bursitis.^{8 9}

A haematoma seen on imaging would correlate with a type 2 Mellado classification of MRI features of MLL.¹⁰ Mellado and Bencardino proposed a classification system based on the signal characteristics, enhancement, the shape of the lesion and the presence or not of a capsule on MRI imaging. Type 2 describes a haematoma-like lesion that can progress if left untreated.¹⁰ This along with the history of a patient who is on aspirin and prophylactic clexane should have warranted consideration that a more diffuse bleed can occur potentially leading to an eventual diagnosis of MLL. An ultrasound performed 3 weeks after the initial injury identified a complex extra-articular collection, extending into the thigh, was what helped make a definitive diagnosis of MLL.

As soon as a fluid collection is diagnosed as a closed degloving MLL, research demonstrates that prompt drainage plus or minus debridement is essential in order to avoid potential complications.¹¹ This unfortunately was not followed in our case and the superinfection of the lesion was a complication that led to the MLL becoming a type 6 as per the Mellado classification where a type 6 is described as an infected MLL with or without a sinus tract.¹⁰

In a 2013 retrospective study of 87 MLLs, Nickerson *et al* demonstrated that collections in excess of 50 mL on aspiration were likely to reaccumulate, even after percutaneous aspiration. Eighty-three per cent of lesions in Nickerson *et al*'s study with an aspirate of more than 50 mL recurred. The study concluded that lesions with >50 mL aspirated should be operatively drained via incision with negative suction drainage.¹¹

In another study, Tseng and Tornetta used operative percutaneous drainage, irrigation and debridement with drain placement in the treatment of large lesions averaging 30 by 12 cm. Tseng

and Tornetta¹² were successful in preventing recurrence and arrived at the conclusion that early drainage within 3 days, if possible, would likely prevent recurrence.

Overall, it would appear that from the literature, the two most important factors in the effective management of MLLs generally are early detection and prompt drainage, so as to prevent complications and recurrence.

In relation to knee-specific MLLs, the current literature is lacking, and it is imperative that this is ameliorated with larger evidence base on knee-associated MLLs in general, and lesions complicated by infection specifically.

Additionally, further research should assess whether such cases could also happen as a result of low-energy trauma in the elderly who are on aspirin or other forms of anticoagulation. We would like to highlight that this potential patient cohort may indeed be at increased risk of such lesions. With increasing life expectancy, and more elderly patients being prescribed various forms of anticoagulation, it would be imperative for physicians, to be aware of this potentially serious condition and be aware of the early signs and symptoms so as to allow early diagnosis and prompt treatment before the onset of devastating sequelae.

Contributors WELK is the doctor who initially assessed the patient and subsequently the chief editor of article in liaison with consultant trainer. SD assisted in collating data (literature review) and assessing radiological images through a background in radiology. MS is the consultant trauma and orthopaedics with overall care of the patient and has overall responsibility over case report.

Competing interests None declared.

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Learning points

- Morel-Lavallee lesions (MLLs) are rare, trauma-related, closed degloving injuries that could impact the knee region. Early signs and symptoms include rapid or slow onset of a progressive swelling, erythema of the overlying skin and pain. Later symptoms of sepsis or fever could indicate that the collection has become infected. Eventually, the skin may necrose due to ischaemia.
- Failure to identify MLL of the knee region early may result in infection, skin necrosis and recurrence even if adequately treated. Prompt diagnosis and adequate drainage provide the best chances of recurrence-free success.
- It is important to note that this lesion may not be restricted to only fit and well participants secondary to sports-related injuries. Elderly patients on anticoagulants are at risk, especially if at risk of falls. The authors would like to highlight the importance of further evidence base into MLL of the knee.

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