

Case 7 Management of a Morel-Lavallee lesion in a Professional rugby player Rajiv Subbu

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Introduction

A 30-year-old male professional rugby player was reviewed after sustaining an injury to his right knee while playing in a Premiership league match. The initial mechanism of injury was unseen, a thorough immediate pitch-side assessment was performed. The player denied any contact, stating he landed awkwardly and felt his knee joint 'jar'. On initial assessment of the right knee, there was no effusion and no focal pain on palpation. Ligament testing was stable with good range of movement, he was able to weight bear, single leg hop and squat. With five minutes left of the first half, the decision was made to continue and monitor until half time.

The player was able to complete the first half and was then re-assessed. At this point there was increased pain over the lateral aspect of the knee joint. There was increased swelling with reduced range of movement. Ligament testing remained stable with firm end-points, however, there was increasing pain on varus stress testing. He was initially treated using ice and compression using a lower limb GameReady appliance. He was able to weight bear with increasing discomfort. The decision was made to off-load the knee joint using crutches with a knee brace for further protection.

Video analysis was used to assess the mechanism of injury at this point. This confirmed a non-contact injury. The player appeared to catch the ball from height landing with the knee joint in varus with femoral rotation and directly colliding with the advertising boards, with the knee in a flexed position. No other player made contact or was involved.

At 24-hours post-match a further clinical assessment was performed; the swelling had increased and appeared superficial, particularly in the lateral gutter. There was increased pain on palpation over the lateral joint line. The range of movement was reduced with flexion to 90 degrees and he was unable to reach terminal extension. Examination of the anterior, posterior cruciate ligaments, medial and lateral collateral ligaments were all intact and stable. McMurray's testing was difficult to perform and was negative. Interestingly, over the lateral aspect of the right knee there was altered sensation to light and sharp touch when compared to the left side, raising the suspicion of a de-gloving injury. Given the mechanism of injury and clinical assessment, the decision was made to perform an initial diagnostic ultrasound using a LOGIQ e R7 system.

The player was supine, with the right knee flexed to 15 degrees to comfort. There was hypoechoicency throughout the subcutaneous tissues which appeared more prominent on the lateral aspect, which was compressible throughout. A collection was seen more clearly on the lateral aspect in transverse view, which appeared to have irregular and random scattered areas of hyperechogenicity. This was seen in the per fascial space between the superficial and deep layers. This is shown in Figure 1. There was no associated change in

power doppler. All anterior, medial and lateral structures were identified and appeared intact.

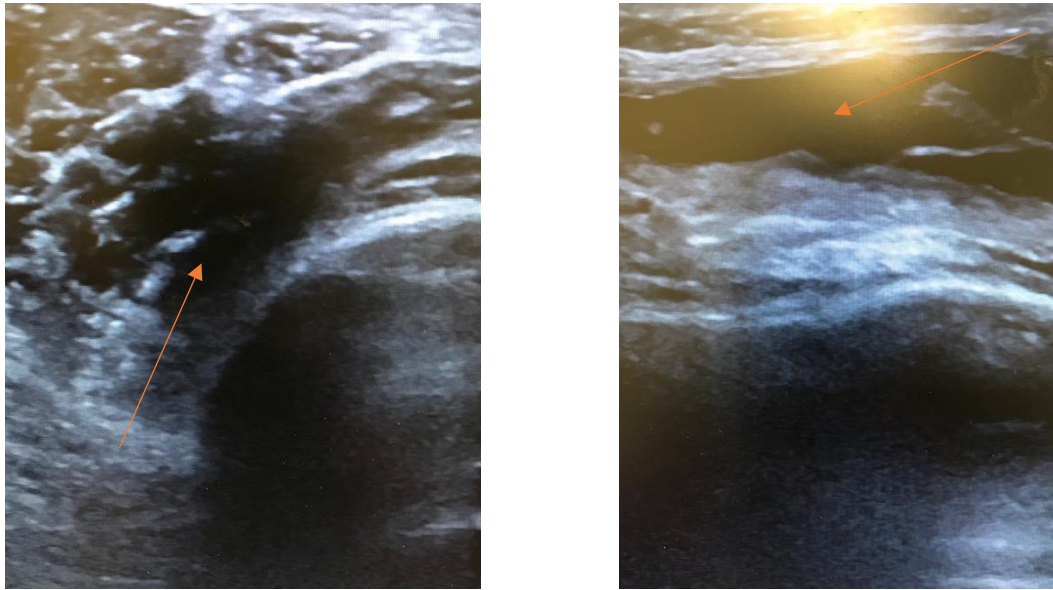


Fig 1: Increased hypoechoic appearance in the subcutaneous tissues on the lateral aspect of the knee joint with a fluid collection, arrows. Left image in transverse, right image longitudinal.

Given the extent of fluid seen on initial ultrasound images and the evolving clinical picture, the decision was made to request an MRI scan in order to get further information and assessment of underlying injury.

The MRI reported no structural injury with the quadriceps and patellar tendon intact. There was no injury to the anterior or posterior cruciate ligaments. The medial and lateral collateral ligaments were intact. There were no osteochondral lesions reported. A subtle tear in the under surface of the medial meniscus in the posterior 3rd was reported. This was reviewed with pre-signing MRI which was also present and did not correlate with clinical findings.

Furthermore, diffuse oedema in the subcutaneous tissues in the region of the infra patellar tendon extending medially but more laterally was reported, shown in Figure 2. Fluid collection was reported and within this showed numerous small synechiae. The findings were consistent with a Morel Lavallee lesion.

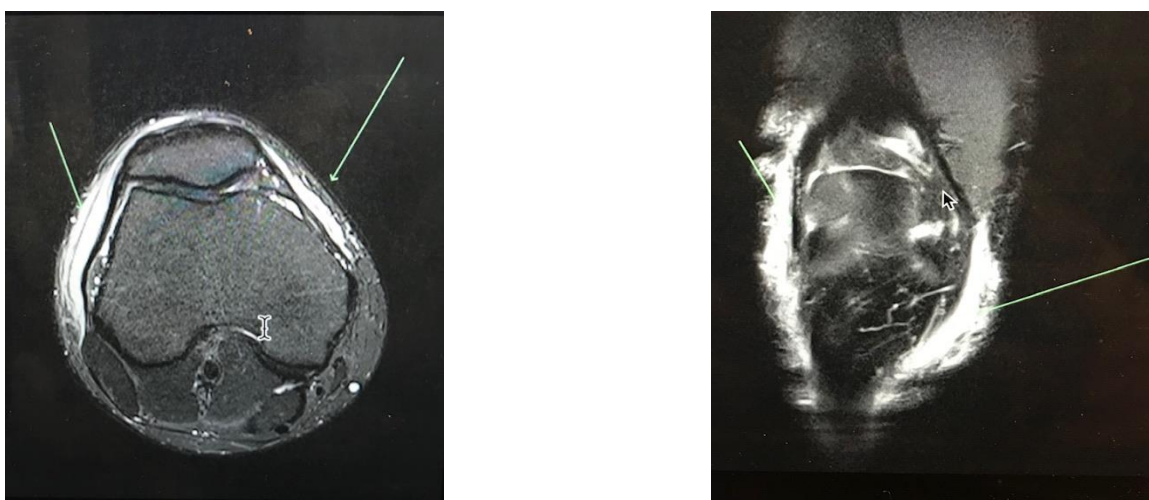


Fig 2. T2W MRI images illustrating diffuse subcutaneous oedema in medial and laterally. Left image, left arrow indicating fluid collection appearing hyperdense.

Given the clinical presentation, ultrasound and MRI images. The diagnosis of a Morel-Lavellee lesion was made and the decision to perform an aspiration was taken. The diagnosis was discussed with the player and performance staff with a view to review the player regularly after the aspiration. The information of the procedure was discussed with the player as well as the risks of not aspirating the fluid. The player understood the diagnosis and consented for the aspiration. He declined this procedure to be recorded, which is why no images of the procedure are included in this report.

The player was given the time to read through the diagnosis as well as the risks of the procedure and the risks associated from not performing an aspiration, including skin infection and skin necrosis. The player understood all aspects of the procedure and was made aware that repeat aspirations are generally required. A written consent form was signed and added to the player's medical records.

The procedure was performed in a clean medical room with the player's lead physiotherapist present. The right knee was washed thoroughly with chlorhexidine solution. The collection on the lateral side of the knee was identified in both long and short axis. The approach was with the probe transverse and needle in plane. A green, 21 gauge needle was used. This was attached to a 20ml syringe with 2mls 1% Lidocaine. The needle was inserted into the collection under direct vision with the needle visible at all times. The lidocaine was initially infiltrated to confirm position. 50mls straw coloured fluid was aspirated. The knee joint was washed further and compression applied above and below the needle entry point. The player was off-loaded for a further 48-hours. The player had immediate relief of discomfort with improved range of movement, this was now comparable to the un-injured side.

At 48-hours the player reported improvements. On clinical assessment there was a small amount of swelling which remained superficial. There was minimal pain on palpation with no reduction in his range of movement. A further USS assessment was performed with showed a small recollection laterally shown in Fig 3 below

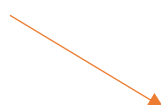
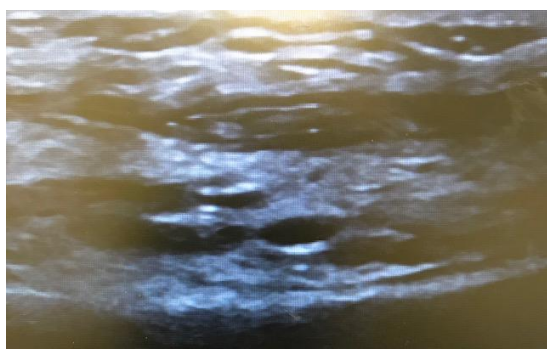


Fig 3: USS of lateral aspect in longitudinal plane, smaller hypoechoic collection visualised with appearances similar to previous MRI reported

Given the clinical examination and ultrasound assessment, the decision was made to repeat the aspiration procedure. The same consent process was followed and documented. This procedure was repeated four times over a period of 2-weeks with a reduced amount of aspirate recorded each time and a continuous improvement in symptoms. He returned to full training within 7-days of the first aspiration, following a modified loading program and returned to competitive play in 14-days from initial assessment and diagnosis. He completed the season as a first team player with no complications or recurrence of this injury.

Discussion

A Morel-Lavallee lesion, MLL, is a closed degloving soft tissue injury, which is a result of an abrupt separation of skin and subcutaneous tissue from the underlying fascia. This condition was first described by the French physician Maurice Morel-Lavallee in the year 1853 (Nair, 2014). The shear mechanism of injury leads to a disruption of perforating vessels and lymphatics which can create a potential space filled with serosanguinous fluid, blood and necrotic fat. An inflammatory reaction results in the formation of a peripheral capsule, which may account for the perpetuation slow growth of the lesion (Hak, 1997). They commonly occur after high energy trauma, low grade blunt trauma, falls and collision sports (Opdam, 2017).

These lesions have been reported over the greater trochanter of the femur but from the original definition described, the lesions were seen predominantly in the thigh. However due to similar biomechanics and shearing forces these have been described in the lumbar region, scapula and less commonly, the knee joint (Gilbert, 2004). Other risk factors for an MLL also include female gender and BMI greater than 25 (Hudson, 1996).

The differential diagnosis of an MLL should include fat necrosis, coagulopathy haematoma, and post traumatic myositis ossificans within subcutaneous oedema. In chronic cases where the diagnosis has been delayed, lesions can enlarge becoming increasingly painful and misdiagnosed as soft tissue tumours (Parra 1997). It is therefore essential to understand the mechanism, clinical and medical history of the patient in order to correctly diagnose these lesions early and accurately.

Imaging modalities used to facilitate diagnosis and treatment are ultrasound and MRI. As seen in this case report, USS lesions appear as focal hypoechoic complex collections located superficial to the muscle plane and deep to the hypodermis. In a retrospective study of 21 MLLs of the hip and thigh all demonstrated hypoechoic or anechoic echogenicity, were compressible and were located in between the deep subcutaneous fat and the fascia (Neal, 2008). The lesion itself may contain fat globules which will appear as hyperechoic nodules (Parra 1997), which is what was described in our findings and consistent with the current literature.

MRI in the elite sport environment is easily accessible with reports received within 4-hours. From the literature this is regarded as the modality of choice, signal characteristics of the lesion depend on chronicity and internal contents. The lesions are often homogeneously hypointense on T1W sequences and hyperintense on T2W sequences, and may resemble a simple fluid collection. The MRI is also able to clearly determine the relationship with the underlying fascia (Gilbert 2014).

The Mellado-Bencardino classification of Morel-Lavallée lesions is based on shape, signal and enhancement characteristics, and the presence or absence of a capsule. (Mellado, 2005):

- Type I: laminar-shaped and seroma-like with increased T2 signal
- Type II: oval-shape that resembles a subacute haematoma with increased T1 and T2 signal; thick capsule and variable enhancement
Type III: oval shaped resembling a chronic organising haematoma; thick capsule and internal/peripheral enhancement
- Type IV: linear; looks like a closed laceration with hypointense T1 signal and hyperintense T2 signal; no capsule and variable enhancement
- Type V: pseudonodular with a round shape, variable T1 and T2 signal, a thin or thick capsule, internal/peripheral enhancement
- Type VI: infected with variable T1 and T2 signal; variable sinus tract formation, a thick capsule, and internal/peripheral enhancement

CT scans are not routinely recommended however this should be taken into clinical context and extent of the injury. If the MLL is secondary to further internal injury e.g. a dislocation of the knee joint, a CT angiogram would be important to rule out any associated vascular injury.

Once the diagnosis has been made treatment options should be reviewed and discussed with the patient. The general consensus from the literature is that these lesions should be evacuated and the necrotic material removed as early as possible. It has been shown that delaying this process can lead to lesions becoming infected with progression to extensive skin necrosis (Mellado, 2005).

Historically these lesions were treated with open serial debridement with further healing by secondary intention. More recently there has been a shift towards more less invasive techniques with reduction in recurrence and in the elite sports environment a quicker return to play. In a 2007 retrospective review of 27 knees from the NFL, Tejwani et al reported 14 knees treated with compression wrap, cryotherapy and range of movement exercises, 13 knees requiring 1 or more aspiration in addition to this. 3 cases failed to resolve after 3 aspirations, following this, the lesion was treated with doxycycline sclerodesis. The mean return to play was 16.3 days with modified loading and graduated training return to training recorded (Tejwani, 2007). In a more recent study in 2013, a retrospective study of 87 MLLs Nickerson et al. demonstrated that lesions with volumes exceeding 50mls on aspiration were especially prone to reoccur, even after percutaneous aspiration. Specifically, 83% of lesions that drained more than 50mls recurred. This study recommends that lesions with >50ml aspirated require operative drainage via incision and insertion of suction drain (Nickerson, 2014). These studies particularly in the elite environment advocate the importance of early detection with aspiration to minimise complications. These lesions are rare and the reported to be missed up to 44% on the time (Weiss, 2015). In a series where the diagnosis had been delayed in 19 patients with a greater trochanter lesion, Tseng et al reported an operative percutaneous drainage, debridement, catheter placement and suction technique which prevented further recurrence and open surgical debridement (Tseng, 2006).

Reflections

When working within in the elite sports environment there is always the pressure to deal with injuries quickly. The emphasis is placed on accurate and early diagnosis of injuries and treatment to enable the athlete to compete at their expected and desired level. Pressures to get this right at all times comes from the player, performance staff and the medical team. There are never any situations where player welfare should be compromised to achieve this but in uncommon presentations getting the correct diagnosis and management can be challenging. The most common question asked by the technical staff is 'When can he play?'

Currently there are no known or recognised guidelines for the treatment of Morel-Lavallee lesions in elite sport and as the literature has shown these can be missed or diagnosis delayed. Having an understanding of the injury mechanism, a thorough clinical assessment and understanding of the clinical applications of the ultrasound when assessing players/patients is essential in providing an early diagnosis and appropriate management plan.

From the case reported, identifying the initial ultrasound images and recognising the pattern of placement of fluid in addition to clinical assessment and provided an early diagnosis and therefore allowed for early recognition and aspiration. The player was treated efficiently in accordance to current literature preventing any further serious complications which may have had a direct impact on his career. The decision to treat with repeat aspirations, measuring aspirate volume and conservative approaches was based on clinical assessment, radiology and current evidence based medicine.

Whilst preparing this case report, we have had another case with very similar presentation in the rugby development academy squad. USS and MRI was initially used which indicated a large MLL in the distal lateral thigh. Initial aspirations were performed but recurrence was daily and volumes of aspirate not reducing, after day 5 of aspiration a repeat MRI was performed immediately after the aspiration which showed a fascial tear in the distal vastus lateralis. An Orthopaedic review was obtained and the diagnosis confirmed in during surgery with the fascia repaired with no further recurrence or complications.

I believe this illustrates a good understanding of this injury and early identification for initial management. It further shows limitations for conservative treatments and awareness of potential complications requiring further investigations and a multidisciplinary approach to management.

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