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Morel-Lavallée lesion in a 12-month-old child: A case report and literature review

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ABSTRACT

INTRODUCTION: The Morel-Lavallée lesion is an infrequently described, post-traumatic closed de-gloving wound that results from separation of the skin and subcutaneous tissues from the underlying deep fascia as a result of shearing forces that tear perforating vessels and lymphatics. This condition is rare in children and to our knowledge it represents the youngest case of Morel-Lavallée lesion yet reported.

PRESENTATION OF CASE: We report on a twelve-month-old girl who presented after a motor vehicle accident with a tender fluctuant mass of the back and buttocks. Computed tomography revealed a large but discrete fluid collection between the subcutaneous fat and the deep fascial planes, extending from the posterior thoracic paraspinal soft tissues to the right gluteal region. A diagnosis of Morel-Lavallée lesion was made. This patient was managed with serial ultrasound-guided percutaneous drainage and compression bandages. The patient did well and was subsequently discharged. There was no recurrence of the lesion on follow-up.

DISCUSSION: The Morel-Lavallée lesion is a rare consequence of abrupt high impact trauma. There is no accepted management approach and a variety of conservative as well as surgical options exist. Goals of management include drainage, debridement and meticulous dead space management to prevent recurrence.

CONCLUSION: The Morel-Lavallée lesion is a rare finding in children involved in high impact trauma and prompt intervention is crucial to prevent complications. Image-guided drainage is a rational management approach with excellent outcomes.

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1. Introduction

This case has been reported in accordance with the surgical case report guidelines (SCARE) criteria [1]. The Morel-Lavallée lesion is a rare post-traumatic closed degloving soft tissue injury that is characterised by separation of the skin and subcutaneous tissue from the underlying deep fascia creating a localised potential space [2]. This results in bleeding, and subsequently a serosanguinous effusion into the potential space whose drainage is impaired because of the underlying impenetrable fascia.

In the presence of an appropriate history of blunt trauma, the clinical finding of a skin abrasion with an associated subcutaneous boggy collection readily clinches the diagnosis, with imaging used to confirm the diagnosis in equivocal cases.

There are numerous management options, but no standard treatment approach exists [2]. Image-guided drainage is increas-

ingly used as it is minimally invasive but highly effective with reduced patient morbidity [3].

We present a case of Morel-Lavallée lesion in a twelve-month-old child following a motor vehicle accident whom we managed at an academic hospital in Zimbabwe. To our knowledge, this case represents the youngest patient yet reported to be diagnosed with a Morel-Lavallée lesion.

2. Case report

A 12-month-old girl presented to the surgical emergency unit at our hospital following a road traffic accident 24 h prior to presentation. The patient had been sitting unrestrained on her mother's lap in the back passenger seat of a multi-purpose vehicle (MPV) travelling in excess of 100 km per hour, when a tyre burst causing the car to veer towards the right and roll over three times, before coming to a stop in the upright position. The child's mother was ejected from the vehicle and the child was trapped beneath a seat, requiring rescue from the car. There was no contributory medical or surgical history. She had no relevant drug, family, psychosocial or genetic history. On examination, the child was irritable, pale and

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Fig. 1. Clinical picture showing the appearance of the lesion on presentation with asymmetrical swelling, fluctuance and skin colour changes.

tachypnoeic (190 bpm), with a normal blood pressure for age of 93/51 mmHg. Capillary refill was slightly delayed. There was an abrasion on the lower back and an accompanying large fluctuant mass in the lower back and upper right gluteal region with tenderness and erythema (Fig. 1). No other associated injuries were found (Figs. 2 and 3).

Complete blood count revealed normocytic anaemia of 6.2 g/dL (11.5–14.5) with a normal white cell count of 10,700/mm³ (4000–11,000). Coagulation profile was normal. Computed tomography revealed a large but discrete fluid collection between the subcutaneous fat and the deep fascial planes, extending from the posterior thoracic paraspinal soft tissues to the right gluteal region, (Figs. 2 and 3). A diagnosis of Morel-Lavallée lesion was made based on characteristic clinical findings.

The patient was initially managed as per standard ATLS trauma protocol. She was given supplemental oxygen per nasal prongs, fluid resuscitation through two large bore cannulae, and subsequently transfused packed red cells. Opioid analgesia was administered for pain relief and a prophylactic antibiotic regime was commenced.

Serial image-guided percutaneous drainage of the haematoma was performed on day 2, day 4, day 6 and day 9 post-trauma with a 21 gauge needle using the Vscan™ Pocket Ultrasound (GE Healthcare, USA) (Fig. 4). The volume of the aspirate was 95mls, 43mls and 27mls and 12mls respectively and the aspirate changed in colour with each successive procedure (Fig. 5). A pressure bandage was applied to the area in between aspirations. These procedures

Table 1
Timeline of events in patient's history.

Date	Event
5-Jan-18	motor vehicle accident occurs
6-Jan-18	presentation at the emergency department 1st aspiration
7-Jan-18	
8-Jan-18	2nd aspiration
9-Jan-18	
10-Jan-18	
11-Jan-18	3rd aspiration
12-Jan-18	
13-Jan-18	4th aspiration
14-Jan-18	
15-Jan-18	patient discharged
23-Apr-18	follow-up visit

were performed by a surgical trainee. During the admission pain scores on the visual analogue scale consistently decreased every day and requirement for opioid analgesia diminished with time. The swelling reduced in size and eventually disappeared. There was no skin necrosis nor other complications.

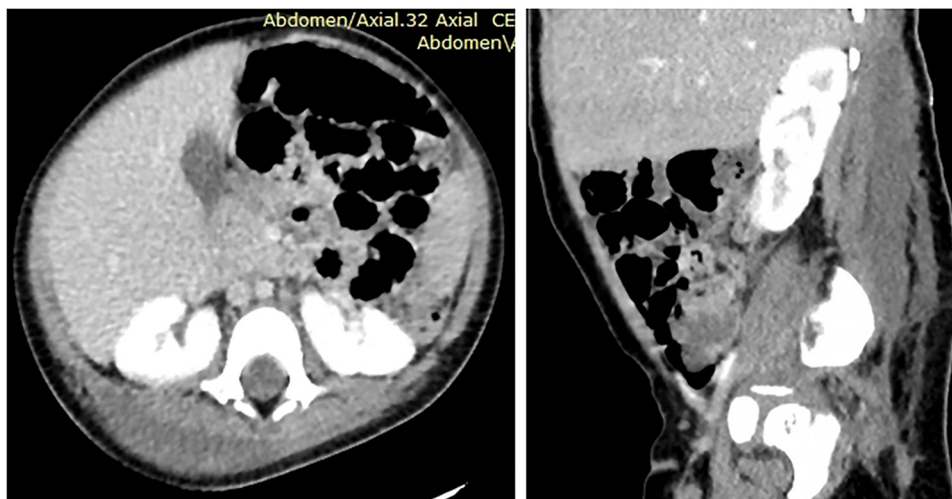
The child was discharged on day 11 post-trauma with plans for continued monitoring as an outpatient. There was no recurrence of the lesion after three months. The parents were relieved that surgery had been avoided. A timeline of events is provided in Table 1.

3. Discussion

The Morel-Lavallée lesion was first reported by the French surgeon Maurice Morel-Lavallée in 1863 in a patient who fell from a moving train [4]. It acquired its name in 1993 when Letournel and Judet named the condition after him in deference to Morel-Lavallée [2]. In contemporary times the term has come to be used to describe lesions in any part of the body that share the same injury mechanism.

Morel Lavallée lesions are most commonly a result of high energy trauma, as is often the case in motor vehicle accidents [5]. There is, however a subset that occurs as a result of low energy trauma from sports injuries such as in American football and wrestling [6]. A specific type of iatrogenic Morel-Lavallée lesion may occur after abdominoplasty with or without liposuction [7].

The formation of these lesions is facilitated by the relative mobility of skin in comparison to the underlying deep fascial layer [2].



Figs. 2 and 3. Axial (2) and sagittal reformat (3) post contrast CT images of the abdomen show a well - defined fluid collection in right posterior abdominal wall, which lies between the subcutaneous fat and deep fascial layers (Arrows).



Fig. 4. Image guided drainage of the lesion.

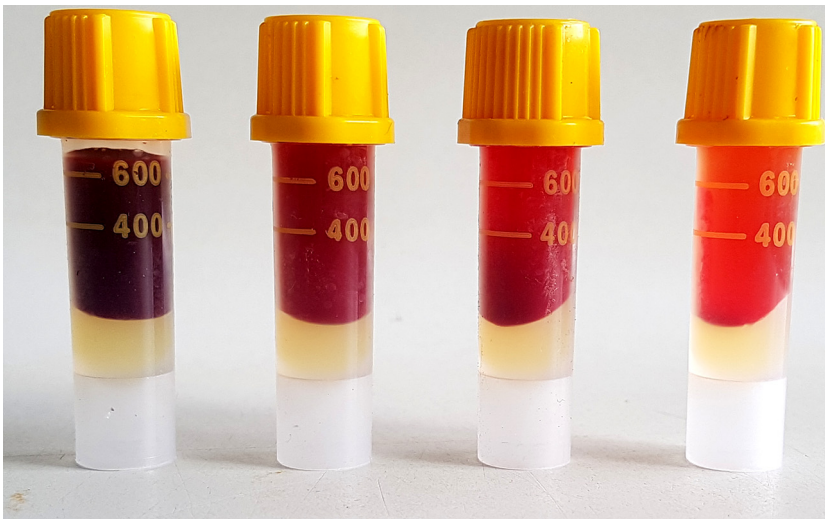


Fig. 5. Appearance of the aspirate from the lesion on successive days.

They are most common (in 60% of cases) near the greater trochanter where the underlying tensor fascia lata is very strong and immobile and the overlying skin is thick and very mobile [8]. This is also the case at the knee, proximal thigh and lower back and pelvic region and may explain why female sex [9] and high body mass index greater than 25 [10] are risk factors for the development of this lesion.

The haemorrhagic fluid collections that form these lesions arise from disruption of cutaneous perforators, defined as any vessel that perforates the outer layer of the deep fascia to supply the overlying subcutaneous fat and the skin [11].

The perforators are oriented in a particular axis depending on the direction of the source vessels [11]. When shear forces are oriented in a direction perpendicular to this axis this may lead to more disruption than when they are oriented in the same direction. The direction of shear forces may be surmised by the direction of an associated abrasion on the skin.

The perforators ultimately derive from source or segmental vessels that can be divided into discrete “composite blocks” known as angiosomes [11]. In our patient, perforators of the lumbar, posterior intercostal and superior gluteal angiosomes appear to have been involved.

When cutaneous perforators have been disrupted, it is only the anastomotic connections between adjacent angiosomes and the

subdermal plexus that maintain viability of the skin. In areas where these anastomoses are tenuous, skin viability becomes threatened. Lesions appear to evolve over time clinically and radiologically with absorption of haemorrhagic elements and development of a fibrous capsule that further impairs absorption and leads to a chronic cystic mass.

Morel Lavallée lesions occur mostly in young adults in their 30 s to 40 s probably reflecting the age distribution of trauma [12]. The condition is infrequently described in children and in 2013, Rha et al published a case report of Morel-Lavallée lesion in a 28-month-old child and reviewed the paediatric cases up to that time [12]. In 2013 their case was the youngest reported [12]. Since then more cases have been added to the medical literature including in a 20-month-old child [13]. The case that we present, at an age of 12 months becomes the youngest case yet reported.

The hallmark of Morel Lavallée lesions is a fluctuant soft area indicating a fluid collection in the subcutaneous plane and this may become evident within hours to days of the inciting trauma. Up to 1/3 of cases become manifest only after months to years later and may be missed by all but the most diligent observer [9]. A fresh or healed abrasion over the area can often be a tell-tale sign.

The lesions may be staged based on MRI findings according to the Mellado and Bencardino staging system [14].

Table 2
Treatment options described for Morel Lavallée lesions.

Management Goal & Options	References
<i>Drainage</i>	
Percutaneous drainage	Lin [16]
Open surgical drainage	
Aponeurotic fenestration	Ronceray
<i>Debridement</i>	
Capsule excision (partial or total)	Read [17], George [18], Kim [19], Hak [8]
Radical debridement with delayed closure	Hudson [9], Tseng [20]
Limited incision, irrigation and debridement	Rha [12]
Debridement of necrotic skin	Kim
Endoscopic	Gardner, Liu
Liposuction (suction-assisted lipectomy)	Mettu
Arthroscopic shaver system	Zhong
Plastic brush debridement	Greenhill [2]
Electrocautery scratch pad debridement	
<i>Dead space management</i>	
Compression bandages	Harma
Closed suction drains	Zhong, Mettu
Drainage tubes and topical negative pressure	Malagelada
Negative pressure wound therapy	Haydon
Barbed sutures	Boudreault
Quilting suture apposition	Carlson, Read
Sclerodosis	
• Talc slurry	Luria
• Doxycycline	Bansal
• Alcohol	Penaud
• Oxytetracycline	George
• Fibrin glue	Wokes, Koc
• Cyanoacrylate based glue	Demirel
Skin graft post excision	Rha [12]
Myocutaneous flap post excision	Palacio

There is no accepted management approach for Morel-Lavallée lesions. Management options depend on the clinical context and patient factors. Some authors advocate a stage-based management approach [15], whereas others individualise treatment. Recently a new treatment algorithm was proposed that appears to be a rational approach [2]. It advocates for distinguishing lesions into acute and chronic. Absolute indications for surgical exploration include an acute lesion with an open fracture in association with the lesion, skin necrosis and infection. Surgical intervention may also be considered after failed non-surgical management, in chronic symptomatic lesions and when the lesion is in association with a closed fracture requiring open fixation [2]. Minimally invasive techniques avoid the morbidity of surgery and anaesthesia. Management goals include drainage, debridement and dead space management as well as definitive management of associated injuries (Table 2). Drainage of the effusion eliminates the contour deformity and allows for apposition of lesion walls. Debridement removes necrotic tissue or mature capsule in chronic lesions and dead space management aims to prevent recurrence by facilitating long-term adhesion of lesion walls either by fibrosis or using surgical apposition techniques.

4. Conclusion

The Morel-Lavallée lesion is a rare finding after trauma that can lead to local infective complications or skin necrosis and chronic encapsulated fluid effusion. Knowledge of the condition can facilitate early recognition by the surgeon which allows for prompt intervention to avert complications. There is no current standard of care and prospective trials are needed to clearly define

treatment algorithms that are evidence-based. While conventional surgical teaching mandated early debridement to prevent skin necrosis and infective complications, contemporary management of these lesions is increasingly favouring a minimally invasive, non-operative approach.

Conflicts of interest

There is no conflict of interest.

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Ethical approval

Ethical approval for this publication has been exempted by our institution.

Consent

Written informed consent was obtained from the patient’s parent for publication of this case report and accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal on request.

Author contribution

Dennis Mazingi – case report design, subject research, consent and writing.
George C. Jakanani – case report design, writing, research and editing.
Prudence Mushayavanhu – case report design and editing.

Registration of research studies

N/A.

Guarantor

Dr. Dennis Mazingi.

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