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The First Reported Case of Morel-Lavallée Lesion and Traumatic Abdominal Wall Hernia: A Case Report and Review of the Literature

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Conflict of interest: None declared

Patient: Female, 60
Final Diagnosis: Large abdominal Morel-Lavallée lesion (MLL) along with a traumatic abdominal wall hernia (TAWH)
Symptoms: Abdominal discomfort
Medication: —
Clinical Procedure: —
Specialty: Surgery

Objective: Rare disease
Background: First described in 1863 by French surgeon Victor-Auguste-François Morel-Lavallée, the Morel-Lavallée lesion (MLL) is a closed traumatic soft-tissue degloving injury. These lesions most commonly occur following motor vehicle collisions (MVCs). The pathophysiology stems from a shearing force that causes separation of the soft tissue from the fascia underneath, which disrupts the vasculature and lymphatic vessels that perforate between the tissue layers. Timely diagnosis and treatment are imperative, as a delayed diagnosis can lead to complications. However, at present there is no universally accepted treatment algorithm.

Case Report: A 60-year-old morbidly obese woman presented after being involved in an MVC. She complained of abdominal tenderness in the right lower quadrant, with no evidence of peritonitis. Cross-sectional imaging revealed hemoperitoneum and a traumatic posterior abdominal wall/lumbar hernia on the right, with multiple contusions in the subcutaneous abdomen. The patient was taken to the operating room and underwent an exploratory laparotomy that revealed a large abdominal Morel-Lavallée lesion (MLL) along with a traumatic abdominal wall hernia (TAWH). There was also a mesenteric avulsion injury with an associated ileocecal injury. The patient underwent resection of the involved bowel, with primary anastomosis, debridement of the abdominal wall degloving injury, and expectant management for the hernia defect. She recovered from the injuries and was doing well when followed up in the clinic, with follow-up to repair the hernia in the near future.

Conclusions: More research is needed to provide surgeons with evidence-based standardized therapies for dealing with these rare pathologies to ensure optimal patient outcomes.

MeSH Keywords: Case Reports • Hernia, Abdominal • Soft Tissue Injuries

Abbreviations: MLL – Morel-Lavallée lesion; TAWH – traumatic abdominal wall hernia

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Background

First described in 1863 by French surgeon Victor-Auguste-François Morel-Lavallée, the Morel-Lavallée lesion (MLL) is a closed traumatic soft-tissue degloving injury [1]. Other terms used to describe this in the literature include “closed internal degloving injury” or “post-traumatic soft tissue cyst” [2]. The pathophysiology stems from a shearing force that causes separation of the soft tissue from the fascia underneath, which disrupts the vasculature and lymphatic vessels that perforate between the tissue layers [1,3]. Timely diagnosis and treatment are imperative, as a delayed diagnosis can lead to infection, pseudocyst formation, or unnecessary and expensive workup due to the fluid collection being detected in an area remote from the site of the traumatic injury and being misinterpreted later as a soft-tissue neoplasm [1,3]. However, at present there is no universally accepted treatment algorithm. These lesions most commonly occur following motor vehicle collisions (MVCs), and the most common anatomic location, as described in a meta-analysis by Vanhegan et al. [4], is the greater trochanter and hip (30.4%), followed by the thigh, and, less commonly, the lumbosacral region or abdominal wall.

Recent studies have shown an increased prevalence of MLLs in obese female subjects [3]. Maneer et al. found the body mass index (BMI) of the majority of 580 MLL patients was ≥ 30 [5].

Case Report

A 60-year-old morbidly obese woman presented to our Level 1 Trauma Center after being involved in an MVC. She was hemodynamically stable with a Glasgow Coma Scale of 15, complaining of abdominal pain. The pain and bruising were in the right lower quadrant, with no evidence of peritonitis. Focused assessment with sonography for trauma (FAST) was positive for fluid in the pelvis; however, she remained hemodynamically stable and was taken emergently for computed tomography (CT) imaging.

CT imaging revealed a moderate amount of hemoperitoneum centered around the ascending colon posteriorly, with increasing minimal hyperdensity on delayed phase representing active venous bleeding. In addition, the CT revealed a traumatic posterior abdominal wall–lumbar hernia on the right, with multiple contusions in the subcutaneous abdomen (Figures 1, 2).

The patient suffered several other significant traumatic injuries, including multiple bilateral rib fractures, bilateral hemothoraces, right pneumothorax, Chance fracture of the 8th thoracic vertebrae, multiple spinous process fractures, and multiple facial fractures.

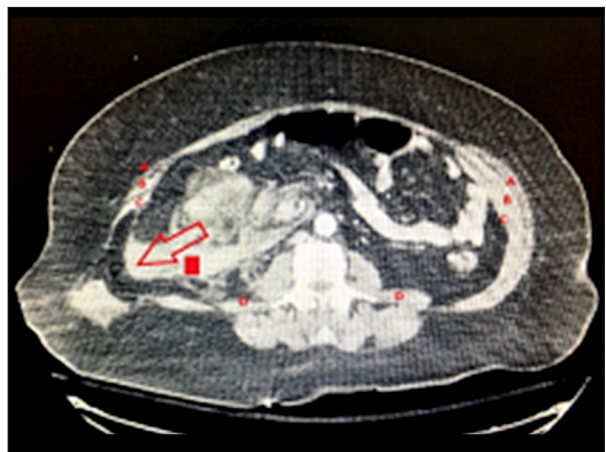


Figure 1. Axial CT image of the abdomen. This CT image depicts the right posterior traumatic abdominal–lumbar hernia defect with hemoperitoneum centered around the ascending colon (Arrow: right posterior traumatic abdominal–lumbar hernia defect. Square: hemoperitoneum. A: external oblique muscles. B: internal oblique muscles. C: transversus abdominis muscles. D: quadratus lumborum muscles).

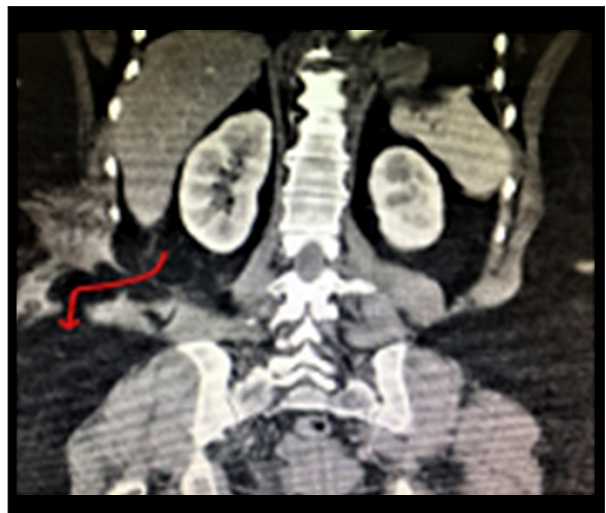


Figure 2. Coronal CT image of the abdomen. This CT image of the abdomen shows the right traumatic abdominal wall hernia (Arrow: depicting the path of the hernia defect).

Because of the active extravasation of blood, she was taken emergently to the operating room and underwent an exploratory laparotomy with a midline incision. This revealed a large right abdominal wall Morel-Lavallée lesion, just lateral to the semilunar line, with bleeding in the subcutaneous tissues separating it from the musculature beneath it, with extension towards the flank (Figures 3, 4) and a traumatic abdominal wall hernia (TAWH) with no hollow viscus organ herniation. Hemostasis was achieved with local measures, and the

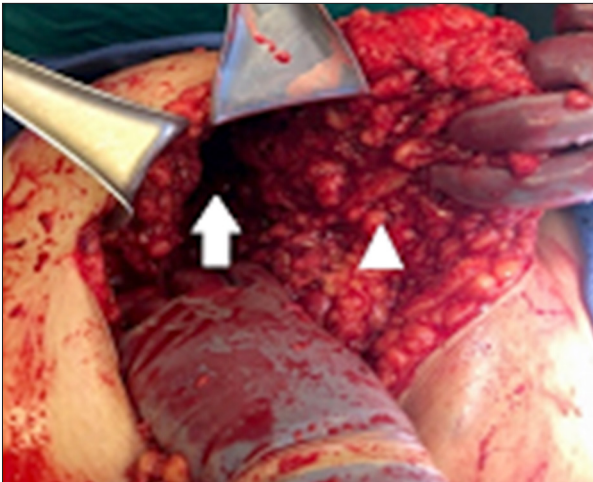


Figure 3. Intraoperative image of the large right abdominal Morel-Lavallée lesion (MLL). This image depicts the large right abdominal Morel-Lavallée lesion extending to the right flank with subcutaneous adipose tissue detached from the underlying fascia (Arrow: right abdominal Morel-Lavallée lesion extending to the right flank. Arrow head: subcutaneous adipose tissue detached from the underlying fascia).



Figure 4. Intraoperative image of the large right abdominal Morel-Lavallée lesion (MLL). This image depicts the surgeon assessing the extent and amount of tunneling of the large right abdominal Morel-Lavallée lesion (Arrow: the surgeon assessing the extent and tunneling of the large right abdominal Morel-Lavallée lesion. Arrow head: subcutaneous adipose hypodermis separated from the underlying fascia).

damaged tissues of the MLL were debrided and irrigated, and 2 Jackson-Pratt (JP) drains were placed.

Upon exploring the abdomen, there was a significant mesenteric avulsion injury (Figure 5) with an associated ileocecal injury. The patient underwent resection and primary anastomosis.



Figure 5. Intraoperative image of the mesenteric injury. This image depicts the mesenteric injury with hemoperitoneum along with the associated injured bowel compared to healthy small bowel just proximal to the injury (Arrow: mesenteric avulsion with hemoperitoneum. Arrow head: healthy-appearing small bowel proximal to the injury).

Because of the myriad of other injuries, bowel contamination, and defect size, the hernia was not repaired, instead opting for mesh repair at a later date.

Once stable, the patient underwent a posterior fixation for the Chance fracture. Her postoperative course was complicated by respiratory insufficiency secondary to the lung and chest wall injuries. She recovered from her injuries, and after 30 days she was discharged to a rehabilitation center. She then followed up in our clinic 3 weeks later and was doing well, with plans to repair the traumatic hernia in the near future.

Discussion

First described in 1863 by French surgeon Victor-Auguste-François Morel-Lavallée, the Morel-Lavallée lesion (MLL) is a closed traumatic soft-tissue degloving injury [1]. The pathophysiology of this injury stems from a shearing force that causes separation of the soft tissue from the fascia underneath, which disrupts the vasculature and lymphatic vessels that perforate between the tissue layers [1,3]. These lesions most commonly occur following blunt trauma in MVCs [4].

Another rare pathology that arises from trauma, as first described in 1906 by Dr. Clarence D. Selby, is a traumatic abdominal wall hernia (TAWH) [6]. Usually following blunt trauma from MVCs, less than 1% of patients presenting to the Emergency Department have this injury. It is described as a defect of the abdominal wall musculature and fascia. From 1906 to 2013, only 62 published articles were identified in a PubMed search of the English literature using the key word

“Traumatic Abdominal wall hernia”, with a total of about 140 cases of TAWH [7].

One type of TAWH is a lumbar hernia, which has been described as an extrusion of intraperitoneal contents through a defect in the posterolateral abdominal wall, usually associated with Petit’s or Grynfeltt-Lesshaft triangles [3,8,9]. Hernias in this location are congenital (20%), primary acquired (55%), or secondary acquired (25%), with traumatic lumbar hernias being in this last category. Traumatic lumbar hernias are one of the rarest of hernias a clinician will have the opportunity of managing, but its rarity frequently leads to misdiagnosis and delay of treatment [8].

Both Morel-Lavallée lesion (MLL) and lumbar hernias are rare trauma-related pathologies that are lacking evidence-based standardized diagnosis and management algorithms. A PubMed search of the English literature using the key words “traumatic abdominal wall hernia” or “traumatic lumbar hernia” and “Morel-Lavallée lesion” or “degloving injury” found 1 published article that describes these terms, but no previously reported case with these 2 simultaneous rare pathologies [3]. These injuries happen too infrequently to undertake randomized controlled trials to develop level one evidence. Most of the data published are case reports, surgeon experience, and retrospective analysis of hospital-specific outcomes dealing with either MLL or TAWH.

Regarding MLL, no single treatment algorithm is universally accepted. However, as discussed by Sclaro et al. [1], treatment can be based on the lesion size, severity, and proximity to an intended surgical incision for coexisting injury. While smaller lesions may be amenable to nonsurgical management or focused aspiration, larger lesions, especially when located in the vicinity of the intended surgery, should be addressed with debridement and control of bleeding.

Surgical management is generally agreed upon if the condition is diagnosed early, as the combination of fat necrosis, lymphatic leakage, and hematoma have the potential to develop into a superinfection, particularly in patients who have sustained poly-trauma [1]. Other options mentioned include close observation, compression banding, percutaneous drainage, and sclerotherapy [1,3].

Shen et al. performed a systematic review of English abstract articles, mostly level IV studies, which identified 21 articles detailing 153 patients with peri-pelvic MLLs. The investigators found superior outcomes with surgical treatment compared with conservative non-operative management [10].

The Mayo Clinic presented their experience with 87 Morel-Lavallée lesions in the setting of trauma. The majority of these

were caused by MVCs. The investigators compared surgical, percutaneous drainage, and non-operative management. They concluded the open surgical approach was least likely to have recurrence of the exudate compared to non-operative and percutaneous aspiration (15%, 19%, and 56%, respectively). However, patients with more than 50 mL of fluid aspirated were more likely to recur (83% vs. 33%, $p=0.02$), suggesting open debridement may be superior for larger lesions [11].

Traumatic abdominal wall hernias are strongly associated with intra-abdominal injuries. Our patient suffered a right traumatic abdominal–lumbar hernia with an associated mesenteric and bowel injury requiring operative intervention. In the largest series to date, analyzing 80 patients, Coleman et al., found TAWHs were associated with a high percentage (44%, 35 patients) of intra-abdominal injuries requiring urgent operative management. Interestingly, the investigators concluded hernias that were repaired acutely were associated with the majority of the recurrences. In the study, 23 patients underwent hernia repair with 6 recurrences, 4 of which were repaired within 1 week of injury, with an overall first-time hernia recurrence rate of 26% [13].

Mellnick et al., found a significant ($p<0.001$) difference in comparing hernia defects greater than 4.0 cm, with 100% having intra-abdominal injuries compared to 17% in defects less than 4 cm [9].

In analyzing 66 patients with traumatic lumbar hernias, Burt et al. found a 61% incidence of associated intra-abdominal injuries. The top 3 injuries were mesenteric (36%), solid organ (32%) and intestinal injury (27%) [8].

These studies suggest that the clinician must have a high index of suspicion for concurrent abdominal injuries when treating patients with traumatic abdominal–lumbar hernias. However, the literature lacks evidence-based management algorithms for traumatic abdominal wall hernias. There is ongoing debate regarding the timing and type of repair, which depend on several factors, including patient’s clinical status and associated injuries [3]. In our case, due to her multiple injuries, large defect size, and morbid obesity, we elected for a more conservative approach with expectant management and repair at a later date when the patient would be more stable. Other options include tension-free primary closure for small defects, reinforced mesh repair (which is contraindicated in bowel injury cases due to the increased risk of infection), and the use of biologic mesh, which has recently become more commonly used [3]. As the only reported case that includes both MLL and TAWH, the authors recommend treating these pathologies based on the size, extent, and clinical status of the patient. If the patient requires an immediate operation, as in our case, the MLL should be addressed surgically with debridement,

irrigation, and placement of drains. TAWH should be addressed as soon as possible if the patient is stable; however, if the patient has other multiple injuries, large defect size, and morbid obesity, as in our case, a conservative approach with expectant management and planned repair at a later date when the patient can be expected to be more stable should be considered, as most of the recurrences mentioned in the literature were from the acutely repaired hernias. More research is needed to provide surgeons with evidence-based standardized therapies for dealing with these rare pathologies to ensure optimal patient outcomes.

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Conclusions

We present a rare case of an abdominal Morel-Lavallée lesion and traumatic abdominal–lumbar hernia following a motor vehicle collision. This case highlights the importance of maintaining a high index of suspicion for other intra-abdominal injuries when encountering these rare pathologies. Controversy exists regarding the timing and type of treatment. More research is needed to provide surgeons with evidence-based standardized methods for dealing with these rare pathologies to ensure optimal patient outcomes.

Conflicts of interests

None.