

Degloving in Disguise: Managing a Delayed Spinal Morel-Lavallée Lesion after Thoracic Fracture-Dislocation

Henry Morar¹, Funiba Ngwa¹, Dhara Patel², Theresa Pazonis²

Learning Point of the Article:

Closed Morel-Lavallée lesions can develop over spinal instrumentation in polytrauma patients and, if not recognized early, may precipitate hardware infection, wound breakdown, and prolonged multistage reconstruction.

Abstract

Introduction: Back-degloving injuries are rare but severe consequences of high-energy blunt trauma. These injuries involve the separation of skin and subcutaneous tissue from the underlying fascia, muscle, or bone, and may present as open or closed lesions. Closed injuries, or Morel-Lavallée lesions, can be particularly insidious due to intact dermis concealing deep fluid accumulation, necrosis, and infection.

Case Report: We present the case of a 61-year-old male who sustained extensive polytrauma following a motorcycle-versus-car collision, with emphasis on his spinal injuries and delayed-onset closed thoracolumbar degloving lesion. Spinal injuries consisted of a T11-T12 fracture-dislocation. Initial management of the spinal lesion included debridement of the wound and posterior spinal fusion. In the post-operative period, he developed increasing dorsal soft-tissue swelling, wound dehiscence, and purulent discharge. The lesion was managed with serial incision and drainage procedures, negative pressure wound therapy, and broad-spectrum intravenous antibiotics. He was later discharged with negative wound and blood cultures and a closed wound, though he was later readmitted.

Conclusion: This case underscores the complexity of managing spinal trauma complicated by closed degloving injuries and highlights the critical need for early recognition, advanced imaging, and a multidisciplinary approach to optimize outcomes in polytrauma patients. Clinicians should maintain a high index of suspicion for closed infections or degloving injuries in patients with persistent or evolving tissue swelling overlying spinal instrumentation. A delayed diagnosis may precipitate wound breakdown, hardware compromise, and chronic infection. Prompt imaging and more frequent physical examinations, as well as coordinated management by different surgical teams, are essential to mitigate the morbidity from these injuries.

Keywords: Degloving injury, Morel-Lavallée lesion, negative pressure wound therapy, polytrauma, spinal trauma.

Introduction

Back degloving injuries are a rare but severe form of trauma characterized by the separation of skin and subcutaneous tissue from the underlying fascia, muscle, or bone. These injuries typically result from high-energy mechanisms, such as motor vehicle accidents or industrial accidents, in which shear forces cause avulsion of the skin from deeper structures. Based on

severity and mechanism of injury, these wounds may present as either open or closed, each carrying distinct risk profiles [1]. Closed back degloving injuries, also known as Morel-Lavallée lesions, are more difficult to identify, as the overlying dermis remains intact. Delayed diagnosis precludes early intervention and fluid drainage, permitting the accumulation of blood and necrotic fat within the degloved potential space [2,3].

Author's Photo Gallery



Dr. Henry Morar



Dr. Funiba Ngwa



Dr. Dhara Patel



Dr. Theresa Pazonis

Access this article online

Website:
www.jocr.co.in

DOI:
<https://doi.org/10.13107/jocr.2026.v16.i10.8198>

¹Department of Orthopaedics and Sports Medicine, Lewis Katz School of Medicine at Temple University, Philadelphia, Pennsylvania, USA,
²Department of Orthopaedics and Sports Medicine, Temple University Hospital, Philadelphia, Pennsylvania, USA.

Address of Correspondence:

Dr. Funiba Ngwa,
Department of Orthopaedics and Sports Medicine, Temple University Hospital, Philadelphia, Pennsylvania, USA.
E-mail: funibangwa@gmail.com

Submitted: 27/07/2026; Review: 13/08/2026; Accepted: September 2026; Published: October 2026

DOI: <https://doi.org/10.13107/jocr.2026.v16.i10.8198>

© The Author(s). 2026 Open Access. This article is distributed under the terms of the Creative Commons Attribution 4.0 International License (<https://creativecommons.org/licenses/by-nc/4.0/>), which permits unrestricted use, distribution, and non-commercial reproduction in any medium, provided you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons license, and indicate if changes were made. The Creative Commons Public Domain Dedication waiver (<http://creativecommons.org/publicdomain/zero/1.0/>) applies to the data made available in this article, unless otherwise stated.



Figure 1: Initial anteroposterior radiograph of the thoracic and lumbar spine. Demonstrates moderate degenerative joint disease.

Conversely, open degloving injuries present with visible wounds, facilitating prompt diagnosis and necessitating more aggressive management, including operative intervention. The



Figure 3: Sagittal cut of initial thoracolumbar magnetic resonance imaging (MRI) scan. Demonstrates fracture and distraction of the spinal column at T11-T12, with retrolisthesis which had progressed to 1.5 cm in the time between the initial computed tomography and initial MRI scan. There is also posterior stripping of the Dura and an associated collection of blood products.

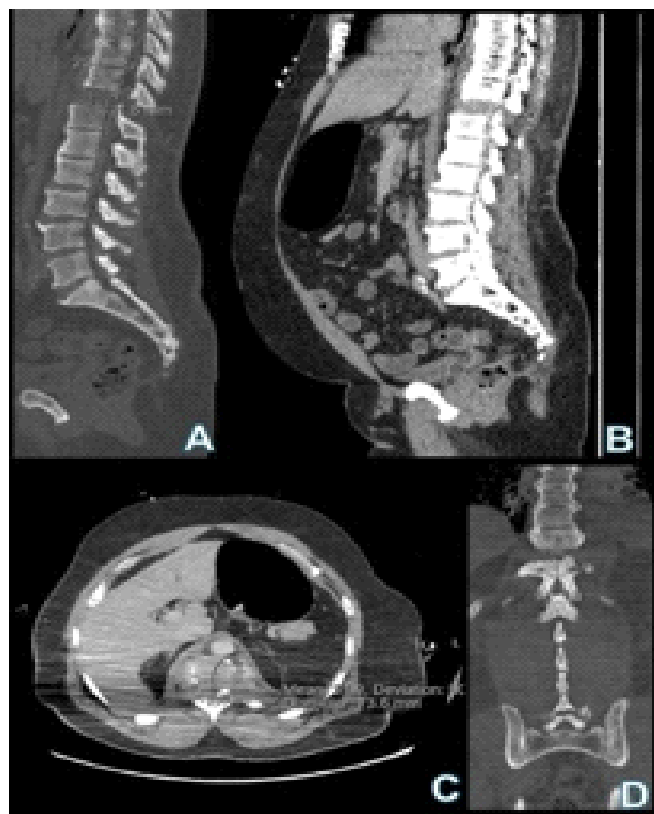


Figure 2: (a) (top left) and (b) (top right) are sagittal cuts of the initial thoracolumbar spine computed tomography (CT) scans. (c) (bottom left) is an axial cut of the initial thoracic spine CT scan at level T11-T12, and (d) (bottom right) is a coronal cut of the initial lumbar CT scan. Demonstrates fracture through a bridging T11-T12 syndesmophyte with 2 cm superior-inferior distraction and 8 mm retrolisthesis. There is also widening of facet joints indicating ligamentous injury.

primary concern with open injuries is the risk of infection leading to sepsis and impaired wound healing [4].

Due to the high morbidity and mortality associated with these injuries, multidisciplinary surgical intervention is essential to optimize outcomes. Initial management of open degloving wounds consists of surgical debridement and excision of non-viable tissue to reduce infectious risk [1,5]. When a sufficient area of dermis remains intact and viable, it may be utilized immediately as an autograft in conjunction with the avulsed skin [6]. This is followed by advanced wound care, such as negative pressure wound therapy (NPWT), to promote granulation tissue formation and prepare the wound bed for definitive closure [2]. In most cases, anatomic reconstruction involves the use of dermal regeneration templates and split-thickness autografts once an adequate baseline of wound healing has been established [6,7].

Case Report

Initial presentation

We present a 61-year-old male – with a medical history of



Figure 4: (a) (top left) is a sagittal cut and (b) (top right) is a coronal cut of the patient's post-operative computed tomography scans. (c) (bottom) is a clinical photograph of the incision closure. S/p T9-L3 posterior fusion.

diabetes mellitus, hypercholesterolemia, hypertension, venous stasis, iron deficiency anemia, and prior cerebral infarction – who presented after a motorcycle-versus-car collision. He was unresponsive at the scene with a Glasgow Coma Scale of 9. He presented with an absent left lower extremity pulse. The patient sustained extensive polytraumatic injuries across multiple organ systems. Neurological and spinal injuries included bilateral subarachnoid hemorrhages, C7–T1 widening, a T11–T12 distraction injury (2 cm) with associated retrolisthesis (8 mm), a closed burst fracture of T12, and right



Figure 5: (a) (left) is a clinical photograph showing incisions on admission day 27. (b) (right) is a clinical photograph showing incisions on admission day 34.



Figure 6: (a) (left) and (b) (right) are clinical photographs showing the intra-operative and post-operative incision and drainage wounds from admission day 47.

vertebral artery dissection. Orthopedic injuries consisted of an open comminuted bicondylar distal femur fracture of the left lower extremity, a lateral patellar facet fracture, a right distal radius fracture, and a left posterior T12 rib fracture. Vascular injury included left popliteal artery occlusion. Additional injuries consisted of right pneumothorax, left hemothorax, a nasal bone fracture, and open back wounds. Clostridioides difficile colitis was acquired during the hospitalization. Workup included computed tomography of the thoracic and lumbar spine, magnetic resonance imaging (MRI), and serial radiographs, which collectively confirmed complex vertebral injuries and progressive soft-tissue involvement (Fig. 1, 2, 3).

Hospital course

Following admission, the patient underwent an extensive series of multidisciplinary operative interventions spanning several months. On August 21, 2024, the vascular surgery team performed an above-knee arterial bypass from the popliteal to posterior tibial artery, along with a four-quadrant fasciotomy of the left lower extremity to address vascular compromise. Concurrently, the orthopedic surgery team applied a left knee spanning external fixator for provisional stabilization.

On admission day 8, the orthopedic spine team performed open reduction of the T11–T12 fracture-dislocation with percutaneous instrumented fusion from T9 to L3 (Fig. 4). Fasciotomy wounds of the left lower extremity were subsequently closed by the general surgery team on admission day 21. Two days later, the

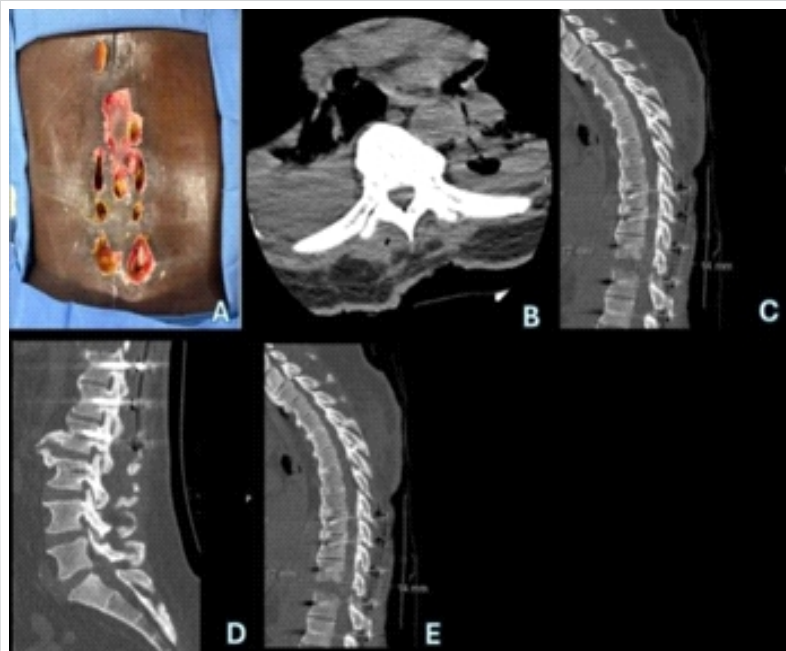


Figure 7: (a) (top left) is a clinical photograph showing wound breakdown from admission day 54. (b) (top middle) shows an axial cut of the pre-op thoracic computed tomography (CT) scan. (c) (top right), (d) (bottom left), and (e) (bottom middle) show sagittal cuts of the pre-op thoracolumbar CT scans. These demonstrate no failure of hardware but progressive wound breakdown, subcutaneous gas, and associated osteomyelitis.



Figure 8: (a) (left) is a clinical photograph showing the wound pre-debridement on admission day 56. (b) (middle) and (c) (right) are clinical photographs showing pre- and post-debridement images of the wound on admission day 58.

orthopedic trauma team removed the external fixator and performed open reduction and internal fixation of the left open intra-articular bicondylar distal femur fracture.

The patient's course was complicated by progressive wound breakdown and purulence along the thoracolumbar spine, necessitating the first irrigation and debridement (I&D) on admission day 27 by the orthopedic spine team (Fig. 5). The patient eventually required NPWT due to the infection of his thoracolumbar incisions. Wound smear and cultures tested positive for *Pseudomonas aeruginosa* and *Enterobacter cloacae* complex, as well as returning *Candida auris*. He was started on meropenem, levofloxacin, and micafungin. Repeat I&D procedures were performed on admission days 44 and 47, the latter including a wound vacuum-assisted closure (VAC)

exchange (Fig. 6). Due to persistent infection, the orthopedic spine and plastic surgery teams jointly performed removal of the infected spinal instrumentation with re-instrumentation from T9 to L2 on admission day 54, along with an additional wound VAC exchange (Fig. 7). Spinal debridement and wound VAC changes were continued on admission days 56 and 58, the latter including paraspinal muscle debridement performed by the orthopedic surgery team (Fig. 8). A final I&D with wound VAC change was performed on admission day 63 (Fig. 9). Concurrent to these serial I&D procedures, the tissue/fluid cultures also began to grow *Candida Auris*. Blood culture and cerebrospinal fluid cultures were negative at this point.

On admission day 65, the plastic and reconstructive surgery team performed complex primary closure of the posterior spinal wound (Fig. 10). This was complicated by a post-operative hematoma requiring surgical evacuation on admission day 69.

Throughout the hospitalization, the patient received broad-spectrum antibiotic and antifungal therapy, serial NPWT therapy, tracheostomy placement, and comprehensive supportive care. The overall hospital course was prolonged by recurrent wound breakdown, infection, and sepsis, ultimately requiring hardware removal, spinal re-instrumentation, and multistage wound reconstruction involving orthopedic spine, plastic surgery, trauma surgery, and vascular surgery teams. As of admission day 143, the patient's wound is shown as imaged (Fig. 11). Blood and skin cultures were negative post-closure.

Readmission and follow-up period

Following discharge, the patient was readmitted in



Figure 9: Patient pre-operative clinical photographs on admission day 63, which show wound vacuum-assisted closure and forming hematoma.



Figure 10: Intra-operative wound clinical photographs on admission day 65.

March 2025 with sacrococcygeal osteomyelitis and a spinal epidural abscess, underscoring the persistence of infectious complications (Fig. 12). He also had a positive blood culture for multiple Gram-negative rods. The patient's course was further complicated by multiple discharges and readmissions. Complications included pleural effusions necessitating bronchoscopies, recurrent respiratory infections, chest tube placement, and further hardware removal with repeat irrigation procedures. Despite ongoing multidisciplinary management, the patient demonstrated progressive clinical deterioration over the subsequent 5–6 months. The cumulative burden of chronic infection, spinal instability, and systemic decline precluded



Figure 11: Clinical photographs of patient's closed incision following months of wound debridement, antibiotic treatment, and complex closures by plastic surgery.



Figure 12: Sagittal cut of readmission thoracolumbar computed tomography scans. Continued sacral ulcer with erosion of sacrococcygeal junction likely due to osteomyelitis.

meaningful functional recovery. Ultimately, given the refractory nature of his injuries and complications, goals of care were redirected, and the patient was transitioned to hospice care.

Discussion

Back degloving injuries involving spinal hardware represent a uniquely complex management challenge. These injuries frequently result from high-energy trauma and may present with both open and closed degloving patterns [8,9]. In the present case, the patient initially sustained open wounds; however, a Morel-Lavallée lesion subsequently developed, introducing a closed internal degloving component that further complicated an already prolonged recovery. This progression was likely attributable to more than 1 month of exposed necrotic tissue and spinal hardware prior to the availability of sufficient viable tissue for flap coverage. A similar mechanism was observed with Reid et al. (2019) [9].

Morel-Lavallée lesions are post-traumatic closed soft-tissue injuries caused by shearing forces that separate the subcutaneous fat from the underlying fascia, disrupting local capillaries and lymphatics and creating a potential space in which blood, lymph, and necrotic fat accumulate. These lesions may go unrecognized initially, particularly in polytrauma patients in whom life-threatening injuries are prioritized. If not addressed in a timely manner, they can become encapsulated, are prone to infection, and may prove resistant to conservative therapy. Hudson et al. described such delayed presentations as contour deformities frequently requiring surgical intervention due to fibrous pseudocapsule formation and persistent fluid collections [2].

In the setting of spinal trauma, where instrumentation integrity and soft-tissue coverage are critical, the presence of a Morel-Lavallée lesion substantially increases the risk of wound breakdown and infection [10]. In this patient, recurrent wound dehiscence, purulent drainage, and eventual hardware exposure were likely compounded by the evolving lesion. NPWT and staged debridement were essential in controlling infection and preparing the wound bed for delayed closure. Nevertheless, this case illustrates that even with aggressive management, chronicity and recurrent infection can necessitate hardware removal, prolonged antibiotic therapy, and extended wound care.

These findings are consistent with prior literature that highlights the diagnostic and management complexity of Morel-Lavallée lesions. Hudson et al. emphasized conservative surgical approaches in chronic lesions, whereas Dini et al. and Sakai et al. demonstrated the utility of VAC therapy and dermal regeneration matrices in the management of degloving injuries [2,5,6]. Hakim et al. further underscore the importance of early recognition and aggressive surgical management in improving outcomes in complex trauma [1].

Morel-Lavallée lesions should be suspected in polytrauma patients with persistent or evolving soft-tissue swelling near high-friction interfaces, and early MRI or ultrasound is recommended to facilitate diagnosis prior to pseudocapsule formation. Delayed diagnosis may ultimately require surgical excision, prolonged VAC therapy, and hardware revision. Multidisciplinary coordination among plastic surgery, infectious disease, and rehabilitation services is essential to optimize patient outcomes. These injuries are associated with significant morbidity and mortality, and should be managed with a high level of interdisciplinary care.

Declaration of patient consent: The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient has given the consent for his/ her images and other clinical information to be reported in the journal. The patient understands that his/ her names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

Conflict of interest: Nil **Source of support:** None

References

1. Hakim S, Ahmed K, El-Menyar A, Jabbour G, Peralta R, Nabir S, et al. Patterns and management of degloving injuries: A single national level 1 trauma center experience. *World J Emerg Surg* 2016;11:35.
2. Hudson DA, Knottenbelt JD, Krige JE. Closed degloving injuries: Results following conservative surgery. *Plast Reconstr Surg* 1992;89:853-5.
3. Hudson DA. Missed closed degloving injuries: Late presentation as a contour deformity. *Plast Reconstr Surg* 1996;98:334-7.
4. Veena PW, Babu R, Venkatesh MS, Udayashankar C, Deepak KL. Degloving injuries of the abdominal wall. *J Wound Care* 2013;22:562-8.
5. Greenhill D, Haydel C, Rehman S. Management of the morel-lavallée lesion. *Orthop Clin North Am* 2016;47:115-25.
6. Dini M, Quercioli F, Mori A, Romano GF, Lee AQ, Agostini

Conclusion

This case demonstrates that closed degloving injuries can arise as a delayed and insidious complication of high-energy spinal trauma, even when the initial presentation is dominated by open wounds and polytraumatic injuries. In this patient, a Morel-Lavallée lesion developed over the instrumented thoracolumbar spine, precipitating an elongated course of recurrent wound breakdown, infection, hardware compromise, and ultimately multistage reconstruction. The report underscores that an intact dermis may conceal progressive deep soft-tissue necrosis, and that failure to recognize this early permits the accumulation of blood and necrotic fat within a potential space that is highly susceptible to infection. For the orthopedic surgeon managing spinal trauma, where instrumentation integrity depends on durable soft-tissue coverage, a high index of suspicion for evolving closed degloving injury is essential. Early advanced imaging, timely drainage, staged debridement with NPWT, and coordinated multidisciplinary care offer the best opportunity to control infection, preserve spinal stability, and avert the cascade of complications illustrated here.

Clinical Message

Morel-Lavallée lesions should be anticipated as a possibility in polytrauma spine surgery patients, particularly when there is evolving soft-tissue swelling over instrumentation. Because intact skin can mask extensive necrosis, early recognition via MRI or ultrasound, prompt drainage, and staged multidisciplinary management are critical to preventing wound breakdown and infection.



T. Vacuum-assisted closure, dermal regeneration template and degloved cryopreserved skin as useful tools in subtotal degloving of the lower limb. *Injury* 2012;43:957-9.

7. Sakai G, Suzuki T, Hishikawa T, Shirai Y, Kurozumi T, Shindo M. Primary reattachment of avulsed skin flaps with negative pressure wound therapy in degloving injuries of the lower extremity. *Injury* 2017;48:137-41.

8. Dodwad SN, Niedermeier SR, Yu E, Ferguson TA, Klineberg EO, Khan SN. The Morel-Lavallée lesion revisited: Management in spinopelvic dissociation. *Spine J* 2015;15:e45-51.

9. Reid DB, Daniels AH, Haque MU, Palumbo MA. Successful

treatment of morel-lavallée lesion of the back with transcutaneous transmyofascial bolstered progressive tension suturing. *Orthopedics* 2019;42:e399-401.

10. Kanakaris NK, Ciriello V, Stavrou PZ, West RM, Giannoudis PV. Deep infection following reconstruction of pelvic fractures: Prevalence, characteristics, and predisposing risk factors. *Eur J Trauma Emerg Surg* 2022;48:3701-9.

Conflict of Interest: Nil Source of Support: Nil	How to Cite this Article
Consent: The authors confirm that informed consent was obtained from the patient for publication of this article	Morar H, Ngwa F, Patel D, Pazonis T. Degloving in Disguise: Managing a Delayed Spinal Morel-Lavallée Lesion after Thoracic Fracture-Dislocation. <i>Journal of Orthopaedic Case Reports</i> 2026 October;16(10): 90-96.

