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Large Lumbosacral Morel-Lavallée Lesion in a Polytrauma Patient: A Case Report on the Failure of Percutaneous Sclerotherapy and Resolution After Catheter Drainage

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Abstract

We report a large lumbosacral Morel-Lavallée lesion, a closed degloving injury in which shear separates the skin and subcutaneous fat from the deep fascia, in a polytrauma patient in whom the diagnosis was delayed by 25 days and percutaneous sclerotherapy twice failed before the collection resolved with catheter drainage. A 31-year-old man was ejected from a vehicle in a high-speed rollover and sustained a severe traumatic brain injury among multiple other injuries. His admission trauma computed tomography (CT) showed a dorsal subcutaneous hematoma from the coccyx to T12, read as a simple hematoma and unremarked on a repeat scan three days later. He was deeply sedated, lay supine on the lesion, and had the overlying abrasions under occlusive dressings. On day 25, a large fluctuant swelling was found over his right flank and buttock, and CT showed a subcutaneous collection of at least 194 × 47 × 103 mm crossing the midline. Ultrasound-guided aspiration yielded 590 mL on day 30, followed by sclerotherapy with sodium tetradecyl sulfate (Fibrovein; STD Pharmaceutical Products, Hereford, UK), and 700 mL on day 40, followed by sclerotherapy with ethanol. The catheter was removed at the end of each procedure, and the collection recurred within days on both occasions. At a third procedure on day 46, 400 mL was aspirated, and a 12-French pigtail catheter was left in place; it was accidentally dislodged after three days, but the collection did not return. All aspirates were sterile, and the site remained clinically resolved at two months. Recognition was delayed because a severe brain injury and prolonged sedation left him unable to report pain or swelling. Both recurrences followed procedures in which no catheter was left in the cavity, over a site where effective compression could not be maintained in a bedbound patient, and these factors may have contributed to the failure of sclerotherapy.

Categories: Trauma, Radiology, General Surgery
Keywords: catheter drainage, closed degloving injury, delayed diagnosis, lumbosacral, morel-lavallée lesion, percutaneous sclerotherapy, polytrauma

Introduction

A Morel-Lavallée lesion is a closed degloving injury. Tangential shear separates the hypodermis from the deep fascia and tears the perforating vessels and lymphatics that cross that plane, and the cavity left behind fills with blood, lymph, and necrotic fat [1]. If it is not treated early, an inflammatory reaction walls the cavity off behind a fibrous capsule, which can prevent reabsorption and cause progressive enlargement for months [1]. Six radiological types are described according to the contents of the cavity and the thickness of that capsule, from a simple seroma with no capsule to a chronic organizing hematoma with a thick one [2]. Formation of a capsule reduces the effectiveness of simple drainage and generally leads to recurrence rather than cure [2].

Published data on how often these lesions occur in the lumbosacral region vary widely. A pooled review of 204 lesions from 29 reports found only seven (3.4%) lesions in the lumbosacral region [3]. A retrospective review of 1,493 consecutive pelvic computed tomography (CT) studies in patients with pelvic fractures found a Morel-Lavallée lesion in 12.2% of patients, of whom 24.2% had a lumbar lesion and 20.9% a flank lesion; thus, posterior sites accounted for 45.1% of the total [4]. Lumbar lesions in that series were also the largest at any site, with a median volume of 68.4 mL against 19.1 mL for the thigh [4]. An Australian case series of 66 lesions recorded nine lumbar and gluteal lesions (13.6%) over a 10-year period [5]. Series compiled from patients who present clinically find posterior lesions rare; a series compiled from imaging finds them common and large. Beckmann and Cai proposed that a posterior lesion produces little visible deformity, and hence fewer patients present clinically [4]. Posterior lesions are probably not uncommon, but they are not easily detected.

The lesions are also difficult to recognize on imaging. In a retrospective review of CT scans of 28 clinically confirmed lesions, the interpreting radiologist suggested the diagnosis in only one (4%) case and made no comment on the soft tissues at all in seven (25%) cases; in the acute subgroup, 11 of 18 scans were reported as a hematoma and one as a contusion [6]. The clinical hallmark is a soft fluctuant area, which may take

several days to appear, and some lesions show no external sign at all, with loss of local sensation being the only finding [7]. In polytrauma patients, the more obvious injuries usually dominate attention, and skin discoloration may present late [8]. A prospective cohort of 115 patients in a trauma intensive care unit found that injuries missed at primary, secondary, and tertiary surveys were usually detected because the patient complained of pain or altered sensation [9], and that route is closed in a patient who is sedated.

Little has been reported about lumbosacral lesions that go unrecognized in sedated polytrauma patients, and the choice between sclerotherapy and sustained catheter drainage for large or late lesions is not standardized. We report one case that was present on the admission trauma scan, went unrecognized for 25 days while the patient was sedated, and then failed two ultrasound-guided aspirations with sclerotherapy, in which a sclerosing agent was instilled into the emptied cavity to induce fibrosis and obliterate the space [10] before resolving after a catheter was left in for three days. Two features made it interesting: four CT studies spanning the injury and its treatment recorded the evolution of the lesion, which is rarely documented in such chronological detail, and the sequence of procedures separated the sclerotherapies from simple drainage, highlighting the effectiveness of the latter. Our aim is to describe how the lesion was missed and how it evolved and to report the outcome of each percutaneous approach.

Case Presentation

Written informed consent was obtained for publication of this report and its images, and all images have been de-identified. A 31-year-old man, previously well, was the unrestrained front seat passenger in a high-speed rollover in remote northern Australia and was ejected approximately 70 meters from the vehicle. His Glasgow Coma Scale score was 5, and he was intubated at the referring hospital for retrieval by air to our trauma center.

He had a left subdural hematoma with midline shift and subarachnoid hemorrhage, a left external auditory canal fracture, a cardiac contusion, bilateral pulmonary contusions, and a flail segment of the left first to third ribs. He also had a vertical coccygeal fracture with an adjacent presacral hematoma, a Schatzker III fracture of the left lateral tibial plateau, and a left scapular fracture. Extensive de-epithelializing friction abrasions covered his lower back, both flanks, and the left shoulder.

The admission trauma CT showed a subcutaneous hematoma tracking up his back from the coccyx to the T12 spinous process, together with the coccygeal fracture and the presacral hematoma. Apart from the coccyx, there was no pelvic, acetabular, or lumbosacral spinal fracture (Figures *1*, *2*, first column). The dorsal collection was reported as a simple hematoma rather than a possible degloving injury. On the day of admission, the overlying abrasions were scrubbed in the theater and dressed with occlusive silver dressings.

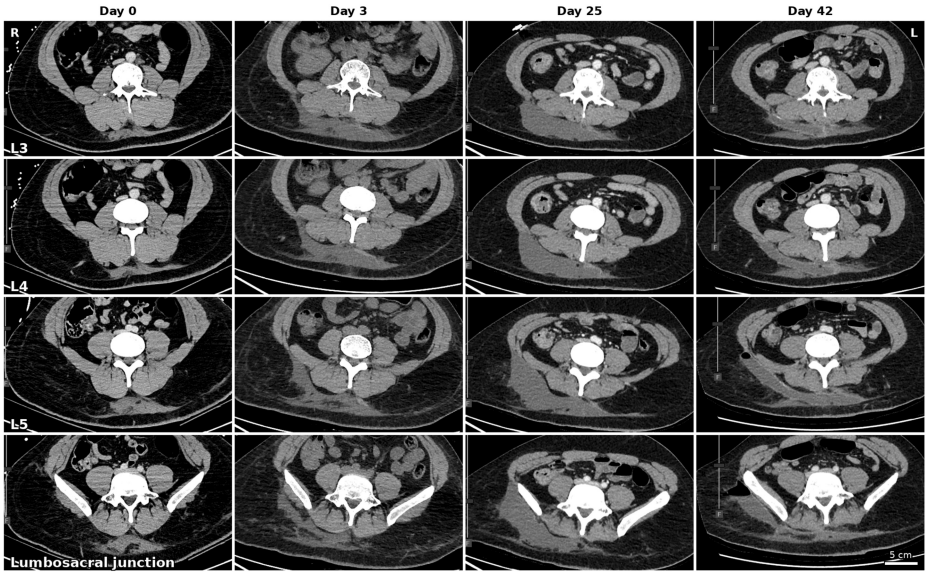


FIGURE 1: Serial axial computed tomography through the lumbar region

Each row is one axial level, from L3 at the top to the lumbosacral junction at the bottom, and every row shows the same four studies in the same order: the day of injury, day 3, day 25, and day 42. All panels are reproduced at the same scale and are aligned on the posterior skin surface and the midline. Anatomical left is on the right of each panel. The progressive expansion of the thin posterior subcutaneous collection is clearly demonstrated in this series.

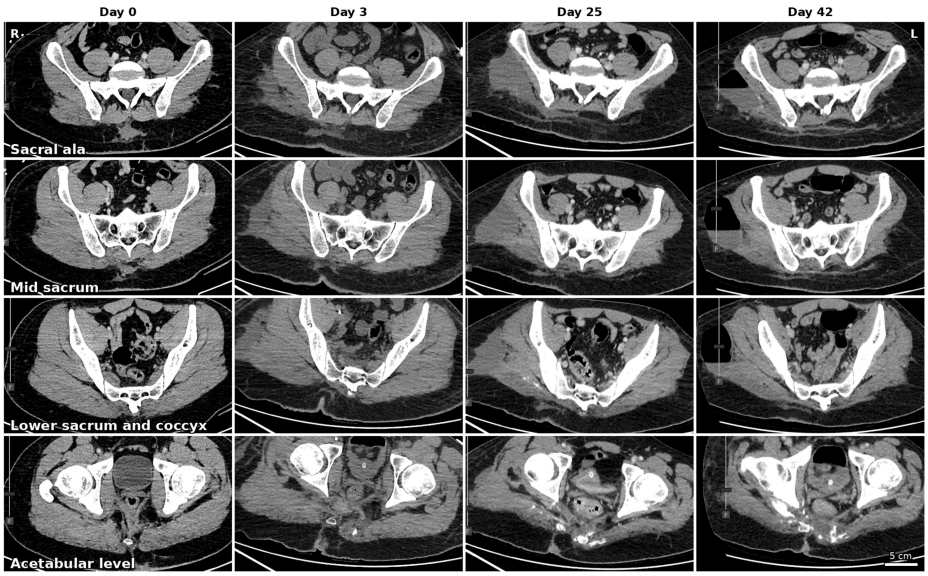


FIGURE 2: Serial axial computed tomography through the sacrum and gluteal region

The series continues caudally from Figure 1, with rows running from the sacral ala at the top to the acetabular level at the bottom. Rows and columns are arranged as in Figure 1. The collection lies superficial to the gluteal muscles, is largest on the right, and extends across the midline. On day 42, two days after the second aspiration, it has recurred and contains gas, seen as the sharply marginated black area in the right flank.

His intensive care course was dominated by refractory intracranial hypertension requiring deep sedation. Repeat CT on day 3 showed that the coccygeal fracture displacement had increased from less than 6 mm to 35 mm. The dorsal soft tissues drew no further comment, and no measurement of the collection was recorded (Figures *1*, *2*, second column).

On day 25, during routine nursing care, a large fluctuant swelling over his right flank and buttock was noted. His white cell count was 15.6 × 10^9/L (reference 4.0-11.0 x 10^9/L) and his C-reactive protein had risen to 91 mg/L (reference <5.0 mg/L), and therefore an infected collection was considered a likely possibility. CT re-demonstrated the subcutaneous collection, now measuring at least 194 × 47 × 103 mm over the posterior right flank and buttock, extending medially across the midline over the lower lumbar region (Figures *1*, *2*, third column). The appearance and the mechanism together made a Morel-Lavallée lesion the likely diagnosis.

On day 30, ultrasound showed a well-defined hypoechoic subcutaneous collection of 197 × 25 × 152 mm, estimated at 397 mL. An 8.5-French catheter was placed using the Seldinger technique under ultrasound guidance, and the collection was drained to dryness, yielding 590 mL of hemoserous fluid, after which 6 mL of 3% sodium tetradecyl sulfate foam (Fibrovein; STD Pharmaceutical Products, Hereford, UK) was instilled as a sclerosant. The volume aspirated exceeded the ultrasound estimate. The catheter was removed at the end of the procedure, and no compression was applied. Microscopy of the aspirate showed leucocytes, no squames, and no organisms, and culture showed no growth.

By day 38, the swelling had returned. Ultrasound of the right buttock showed a complex collection of approximately 189 × 111 × 102 mm with an estimated volume of 1,035 mL, larger than the volume drained eight days earlier.

On day 40, a 12-French catheter was placed under ultrasound guidance, and approximately 700 mL of serous fluid was aspirated until no residual fluid could be seen. Ten mL of 0.5% bupivacaine was instilled, followed by 100 mL of 96% ethanol, which was massaged into the cavity for 12 minutes and then aspirated, and pressure was applied. The catheter was removed at the end of the procedure. Microscopy showed leucocytes and erythrocytes with no organisms, and there was no growth at 48 hours or after extended incubation. CT at 48 hours, on day 42, showed the collection had recurred and now contained gas as well as fluid, which was attributed to air introduced at the aspiration (Figures *1*, *2*, fourth column).

On day 46, a 12-French soft locking pigtail catheter was placed under ultrasound guidance, 400 mL of blood-stained fluid was aspirated to dryness, and a pressure dressing was applied. On this occasion, the catheter was left in situ and connected to a bellows suction drain (Bellovac; Wellspect HealthCare, Mölndal, Sweden). No sclerosant was used. Culture of the aspirate showed no growth.

The catheter was accidentally dislodged on day 49, three days after insertion. The intention had been to leave it until the output stopped and for at least seven days. His C-reactive protein across days 38 to 49 was 7.8, 9.2, 7.8, 3.6, and 2.3 mg/L (reference <5.0 mg/L), respectively, and his white cell count on day 49 was 6.7 × 10^9/L (reference 4.0-11.0 x 10^9/L).

The three percutaneous procedures are summarized in Table *1*.

Procedure and day	Access and catheter	Volume aspirated	Sclerosant	Catheter left in situ	Aspirate microbiology	Outcome
Procedure 1, day 30	Ultrasound-guided Seldinger insertion of an 8.5-French drain; collection drained to dryness	590 mL	Sodium tetradecyl sulfate 3% foam (Fibrovein), 6 mL	No	Leucocytes, no squames, no organisms seen; no growth on culture	Recurrence; ultrasound on day 38 showed approximately 1,035 mL of collection, larger than the volume first drained
Procedure 2, day 40	Ultrasound-guided direct stick insertion of a 12-French drain, single pass; no discernible residual fluid	700 mL	Bupivacaine 0.5%, 10 mL, then 96% ethanol, 100 mL, massaged for approximately 12 minutes and aspirated	No	Leucocytes and erythrocytes, no organisms seen, no growth after 48 hours or extended incubation	Recurrence; computed tomography on day 42 showed a recurrent collection containing fluid and gas
Procedure 3, day 46	Ultrasound-guided access with an 18-gauge trocar needle and Amplatz wire; tract dilated to 12 French and a 12-French soft locking pigtail drain inserted	400 mL	None	Yes, on bellows suction (Bellovac); dislodged accidentally on day 49, three days after insertion	No growth on culture	No reaccumulation; site clinically resolved at two months of follow-up

TABLE 1: Summary of the three percutaneous procedures

There was no clinical recurrence of the collection during the remainder of his admission or through two months of rehabilitation follow-up, by which time the site had resolved completely. No follow-up imaging was obtained. Across the three procedures, 1,690 mL was drained in total, and every aspirate was sterile.

The clinical course is summarized in Figure *3*.

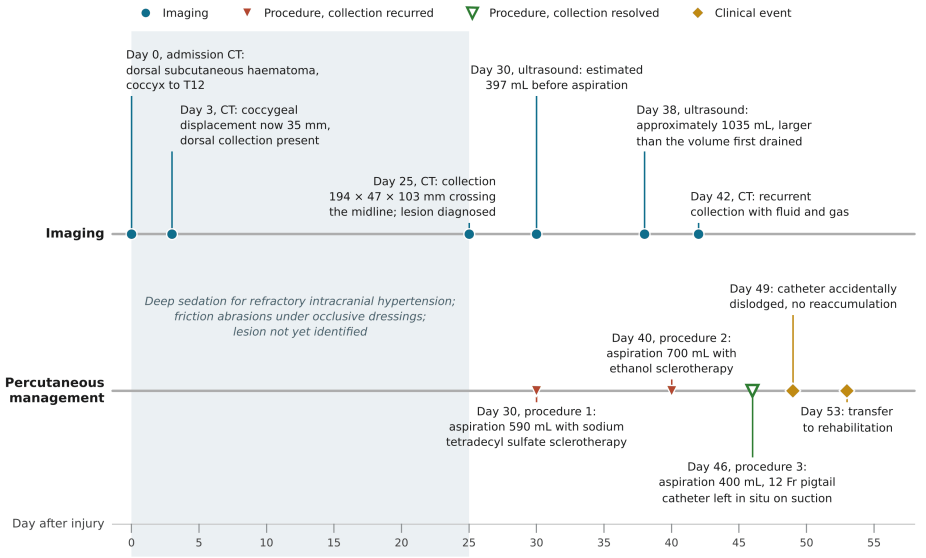


FIGURE 3: Timeline of the clinical course from admission to transfer to rehabilitation

The shaded interval marks the period of deep sedation for refractory intracranial hypertension, during which the lesion was present on imaging but had not yet been identified. Circles mark imaging studies. Triangles mark the three percutaneous procedures and are coded by outcome, filled where the collection recurred and open where it did not. Diamonds mark clinical events.

CT, computed tomography

Image credit: The image was created by the authors using Matplotlib 3.11.2 (Matplotlib development team, NumFOCUS, Austin, TX, USA).

Discussion

The large Morel-Lavallée lesion was undetected for 25 days due to multiple reasons, which are important to note. The back of a sedated, supine patient is seen only at log rolls and dressing changes. The patient could not complain of pain or swelling. His tibial plateau fracture and knee brace kept him on his back, lying on the lesion for most of the day and keeping it out of sight. Occlusive dressings over the friction abrasions made any swelling harder to detect. This is consistent with published data: distracting injuries are known to delay diagnosis in polytrauma [8], and missed injuries in sedated patients usually surface only when the patient becomes conscious and reports pain [9].

The lesion was present on the admission scan. It was reported as a dorsal subcutaneous hematoma, in keeping with the non-specific appearance of an acute Morel-Lavallée lesion on CT, which mimics a simple hematoma [6]. This should therefore not be considered a reporting error. The scan on day 3 showed the same finding, which drew no further comment. The cost of delay is measurable: in that same series, lesions treated at a mean of seven days did better than those treated at a mean of 33 days [6]. Our patient received his first targeted treatment on day 30.

By day 25, this was an established lesion rather than an acute one, and capsule formation is well described at that interval. Once a Morel-Lavallée lesion is encapsulated, simple drainage is often not curative and repeated recurrence is the usual course, which is consistent with the course in this patient [2].

The four studies give an unusually complete record of how the lesion behaved. On the day of injury, the dorsal subcutaneous plane holds a thin layer of blood, reported at the time as a hematoma. By day 3, it is visibly thickened. By day 25, it is a broad, well-defined, low-attenuation collection that has crossed the midline. These three scans show the lesion developing without intervention over 25 days in a man who was lying on it almost all the time. The fourth CT scan, on day 42, demonstrated rapid reaccumulation after complete aspiration. Series of this kind are usually compiled from patients who present late, and thus the early appearance is inferred rather than seen. In our case, it was imaged on the day it happened and then imaged twice before treatment, providing a rare insight into the natural progression of this injury.

Published results for aspiration of lesions of this size are not encouraging. In the Mayo Clinic series of 87 lesions, 56% recurred after percutaneous aspiration, against 19% of those managed by observation or a compression wrap and 15% after operative drainage or debridement [11]. Non-operative management was

applied to the smaller lesions in that series, and the treatment groups were therefore not directly comparable. Within the aspiration group, however, lesions that recurred had yielded a median of 450 mL against 27 mL in those that resolved, and none that resolved had yielded more than 275 mL [11]. In our patient, 590 mL was drained at the first procedure. A systematic review of 964 lesions found the same pattern, with percutaneous management resulting in recurrence more often than any other modality, at 15% overall and 23.9% in lesions larger than 100 mL [12]. The same review nevertheless recommends sclerodesis, the term used in several series for obliteration of the cavity by sclerotherapy, for lesions of up to 400 mL [12], and a doxycycline series resolved 15 of 16 persistent lesions with a mean aspirate of 387 mL and a maximum of 700 mL [10]. There is therefore evidence that collections of this size can resolve without an open operation.

Effective regimens appear to have a common factor, which is sustained apposition of the cavity walls. Doxycycline sclerodesis is followed by tight elastic compression for 4 to 12 weeks, and the authors attributed their single failure to a patient who would not comply with the compression and their slowest responses to abdominal wall lesions where compression is difficult to apply [10]. Alcohol sclerodhesis, as originally described, is not a percutaneous procedure: the cavity is opened and washed out, and a drain is left on vacuum suction for seven days after the ethanol is instilled [13]. Open debridement is used to anchor fat or dermis to fascia with rows of sutures, and a drain is placed [14]. Percutaneous debridement with a brush is followed by a closed suction drain on wall suction [15], and a small series applying that technique to delayed lesions reported continuous suction as one of only two changes it made [16]. In a pooled review of peri-pelvic lesions, drainage without suction recurred in seven of 12 cases against one of 34 with suction [17]. In each of these regimens, the primary treatment (the sclerosant, the sutures, or the brush debridement) is combined with a second measure, either compression or suction drainage, that holds the walls of the cavity together until they adhere and the space is obliterated.

In our patient, no indwelling catheter was left after aspiration and instillation of sclerosant at the first and second procedures. Effective compression was not feasible in a bedbound patient requiring constant pressure offloading, which allowed the cavity walls to separate again. The collection recurred on both occasions, as shown on ultrasound on day 38 and on CT on day 42.

The third procedure differed in two respects: no sclerosant was used, and a catheter was left in situ on suction, which kept the cavity drained. There were no further recurrences. It is possible that residual effects of the sclerosants contributed to the eventual resolution, and it would be counterintuitive to regard the omission of an agent at the third procedure as a factor in the cure. The indwelling drain was the most significant difference between the first two procedures and the successful third procedure.

The drain was removed inadvertently three days after insertion (day 49), which is the lower limit of the range of three to eight days reported for drains left after percutaneous debridement [15]. The intended duration was a minimum of seven days, or longer if output continued. No recommendation on the duration of drainage can therefore be drawn from this case.

The average rate of refilling was approximately 130 mL per day after the first aspiration (1,035 mL over eight days) and approximately 65 mL per day after the second (400 mL over six days). After the third aspiration, the collection did not recur even though the drain was removed after only three days, which suggests that the rate of fluid accumulation had fallen well below these earlier rates.

The failure of the first two procedures may also be explained by the size of the collection. The aspirated volumes of 590 mL and 700 mL, and the volume of 1,035 mL estimated on ultrasound, were at or beyond the upper end of the volumes described in sclerotherapy studies. The largest aspirate in the doxycycline series was 700 mL [10], and the lesions in which the systematic review found sclerodesis most effective averaged 387 mL [12]. A cavity of this size may have been beyond the capacity of a sclerosant to close, whether or not a drain was left.

Several of the sources cited here argue against percutaneous management altogether, on the grounds of deep infection, results inferior to operation, and unacceptable rates of recurrence and colonization in large delayed lesions [7,8,11,18]. The two recurrences in this case are consistent with that view. However, the case also illustrates that percutaneous methods can achieve healing without infection even in a large collection: the first aspirate of 590 mL was more than twice the largest volume that resolved after aspiration in the Mayo series [11].

Rising inflammatory markers at the time the swelling was found raised the possibility of infection, and this prompted the first aspiration. Bacterial colonization has been reported in 46% of sampled lesions, independent of the time to debridement [7]. However, all three aspirates in this patient were sterile, including after extended incubation, despite repeated percutaneous intervention. The presence of gas in the cavity on CT on day 42 was a concern, but there was no microbiological evidence of infection, and it was most likely explained by air introduced at the aspiration two days earlier.

This single case report has limitations. Magnetic resonance imaging was not used to stage the lesion.

Resolution was determined clinically rather than by imaging, although there was no clinical evidence of recurrence at two months. The removal of the drain at three days was inadvertent. The successful procedure also had the advantage of time, as the patient's cognition was improving and manual pressure offloading was becoming less of a concern, and it may have benefited from the residual effects of the sclerosants.

Conclusions

A Morel-Lavallée lesion can be present on the admission trauma scan and then grow for weeks in a patient who cannot report it. A dorsal subcutaneous hematoma on a trauma scan deserves to be named as a possible closed degloving injury and closely monitored, particularly in a patient who is about to be sedated. Friction abrasions should raise concern about deeper shearing injury and should not be regarded as superficial wounds alone. The back of a sedated patient needs careful evaluation at every log roll and every dressing change.

In this large, late-presenting lumbosacral lesion, two aspirations with a sclerosant were followed by recurrence within days, and the collection resolved after a catheter was left in for three days. The published regimens that succeed pair sclerotherapy or excision with a mechanism that keeps the cavity walls together, whether a compression bandage, sutures, or a drain on suction. In a supine patient with a lesion over the sacrum, effective compression is often not possible, and an indwelling suction drain is a practical alternative. Serial imaging from the initial admission made it possible to follow the evolution of the lesion. In a large lesion, the course of this case favors leaving a drain on suction once the cavity has been emptied.

Additional Information

Author Contributions

All authors have reviewed the final version to be published and agreed to be accountable for all aspects of the work.

Concept and design: Fergus J. Walsh, Mohan Dias, Finn D. Walsh

Acquisition, analysis, or interpretation of data: Fergus J. Walsh

Drafting of the manuscript: Fergus J. Walsh

Critical review of the manuscript for important intellectual content: Fergus J. Walsh, Mohan Dias, Finn D. Walsh

Disclosures

Human subjects: Informed consent for treatment and open access publication was obtained or waived by all participants in this study. **Conflicts of interest:** In compliance with the ICMJE uniform disclosure form, all authors declare the following: **Payment/services info:** All authors have declared that no financial support was received from any organization for the submitted work. **Financial relationships:** All authors have declared that they have no financial relationships at present or within the previous three years with any organizations that might have an interest in the submitted work. **Other relationships:** All authors have declared that there are no other relationships or activities that could appear to have influenced the submitted work.

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