# A Rare Case of a Closed, Internal Degloving Injury to the Fifth Digit

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## Statement of Purpose

To present a rare, isolated internal degloving injury of the fifth digit and its surgical management.

## Literature Review

Internal degloving injuries are rare, devastating injuries usually the result of high energy trauma. A single national level one trauma center performed a retrospective analysis on degloving injuries from 2011 to 2013. In their three year study period, overall incidence of these injuries among trauma admissions was only 4%. Only 20.2% of these cases were closed injuries (1). In closed internal degloving injuries, more commonly referred to as Morel-Lavallee lesions, the skin and subcutaneous tissue are separated from the deep fascial layer. The shearing force from this injury disrupts vascular and lymphatic channels creating a collection of fluid including necrotic fat or sanguineous drainage. The collected fluid causes an inflammatory reaction creating a capsule around the lesion lending to its often inability to self resolve and slow growth of the lesion. These lesions are an indication for surgical evacuation due to risk for developing infection or potential skin necrosis with progression of the lesion. Most commonly these lesions occur in the pelvis and thigh. It is exceedingly rare to be observed in the foot, even more so with isolated injuries to the digits (2). The management of closed degloving injuries to the toes is not well established due to the overall low incidence. Risk of vascular insufficiency due to severe compression and shearing forces is well established in the available published literature. When salvage of the digit is attempted, it is imperative to perform a thorough vascular examination. Doppler ultrasound evaluation of digital vessels and capillary refill test can be utilized to assess perfusion to the digit (3). Especially in the setting of significant crush injuries and high energy trauma with concern for vascular compromise more proximally, a modified Allen's test can be utilized. Due to the highly variable nature of the foot's vascular supply and abundant interconnections between the dorsal and plantar vascular system, the Allen's test can help potential plantar or dorsal prominent blood supply which can ultimately affect surgical planning in regards to incision placement (4). While salvage of the digit in the setting of adequate perfusion and more immediate surgical intervention is possible, the mainstay of management for this condition has not been well established due to overall paucity of published literature and rarity of the condition. Of the available published case reports, primary amputation is more common (5,6).

## Case Study

A 31 year-old-male presented to the clinic for isolated fifth digit pain and deformity sustained six weeks after rolling a large refrigerator over the area. Imaging and clinical examination consistent with internal degloving of the fifth digit with associated hematoma formation causing significant pain and deformity. After thorough discussion on options including salvage of the digit with attempted open reduction with pinning, primary amputation or continued conservative management, the patient elected to proceed with an elective partial fifth digit amputation. The postoperative course was uncomplicated and the patient was noted to have significant reduction in pain post-intervention.

## Surgical Procedure

A standard fish mouth type incision was performed to the distal aspect of the fifth digit with care to preserve as much soft tissue as possible. The incision was carried down in anatomic layers. A significant amount of synovial fluid was expressed from the dorsal soft tissues. Additionally, significant debris was encountered and thought to be a sequelae of the traumatic injury. The distal phalanx was noted to have dislocated plantar-medially. The digit was disarticulated at this level. The surgical site was then irrigated with normal sterile saline. Healthy bleeding was noted to the skin edges and surgical wound bed. The incision was then closed with 4-0 Nylon.

Fig 1. Clinical picture of internal degloving injury


Fig 2&3. Pre and post-operative plain film images

## Analysis and Discussion

Closed, internal degloving injuries of the foot are exceedingly rare and usually are the consequence of high energy trauma. The mechanism of this injury was proposed by Flaherty et al (7) who coined this injury as the "empty toe". They described a dual longitudinal and dorsal to plantar compression forces on the underlying bone while the soft tissue of the digit remains fixed. The force can cause circumferential separation of the overlying soft tissue from the bone. Because the overlying epidermis is intact, it is difficult to visualize the extent of soft tissue damage. Neurovascular compromise is of significant concern and can ultimately affect the viability of the digit. In our case, due to the chronicity of the patient's injury and resultant adaptation of soft tissue and neurovascular structures making salvage of the digit challenging, the patient opted to pursue a primary, elective partial digit amputation. At last noted follow up, the patient was able to return to their pre-injury functional level without residual pain. Although these isolated digital injuries are exceedingly rare, they should remain high on our index of clinical suspicion as the risk of skin necrosis and secondary infection can be potentially devastating.

## References

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