

Progressive Hematoma in an Older Adult: Closed Internal Degloving Injury of the Knee

Sagar Narang, MBBS, MS

Abstract

Closed internal degloving injury of soft-tissues has been reported in the pelvic-acetabular area after high-velocity trauma. More recently, this lesion has been reported in the knees of young athletes involved in contact sports. The injury is often brought late to the notice of the clinician, and sometimes the diagnosis is missed. Effective treatment relies heavily on clinical examination, and magnetic resonance imaging is helpful as a diagnostic tool. Treatment may depend on time between injury and presentation, patient age, collection severity, and the effects of previous treatment. Lesions that threaten skin vascularity and show rapid progression require emergency management. Minimally invasive techniques are preferred over extensive procedures. Elderly patients need to be observed for progression of the initial lesion and development of late complications, which may require emergency intervention. Clinicians should tailor the rehabilitation protocol to the patient's age and the severity of the lesion.

This case report of a 55-year-old female patient covers the nature, diagnosis, and management of a progressively dissecting hematoma that evolved into a massive closed internal degloving lesion.

In a closed soft-tissue internal degloving injury, trauma causes skin and soft-tissues to shear away from the underlying fascia, causing a subcutaneous pocket of hematoma, lymph, and necrotic fat to form. The extensive hematoma may jeopardize the vascularity of the overlying skin. In the medical literature, this syndrome has been associated with pelvic and acetabular trauma, localizing to the buttock, flank, and the proximal thigh.¹⁻⁴ Recently, the association of this lesion has been reported in young athletes after knee trauma in sports injuries.^{5,6}

This case report describes the unique nature of such injuries

in older patients as dissecting lesions, which may gradually become more complex and severe. This lesion, in a serious acute episode, may present in a way similar to that of compartment syndrome, necessitating early intervention to prevent full-thickness skin loss.

The patient provided written informed consent for print and electronic publication of this case report.

Case Report

A 55-year-old woman presented to our outpatient clinic reporting of swelling of the right knee after a fall. The knee had a collection of fluid in the suprapatellar area and an overlying abrasion. The patient was advised to rest and elevate the limb. Three days after presentation the swelling began to increase, and she began to have difficulty bending her knee. At the second visit, skin discoloration was localized to the proximal knee, and the patient was prescribed analgesics and advised to apply crepe bandages to the site. Despite these recommendations, the pain and swelling progressed. Day 6 after injury, the patient presented with huge swelling and extensive ecchymoses over the lower thigh and upper leg. She was not on any antiplatelet or anticoagulant medications and did not have any other medical ailments.

On examination, her right knee was grossly swollen and boggy, with a healing abrasion over the right suprapatellar region. There were cutaneous folds at the superolateral margin of the patella, defining the distal extent of the collection. The ecchymoses extended from the lower thigh to the upper calf and involved the posterior aspect as well. Skin discoloration varied from blue-black to yellow (Figure 1). Cutaneous sensation was impaired around the patella and lower thigh anteriorly. There was no local rise in temperature. Tenderness was localized to the medial collateral ligament and the suprapatellar region.

The patient was able to perform an active straight leg raise and move the knee painlessly from 30° to 90°. There was no distal neurovascular deficit on the right lower extremity. Routine radiographs of the knee showed no bony injury, but a lateral view showed a radiolucent area dissecting the soft-tissues anterior to the femur in the knee and up to the mid thigh (Figure 2). Ultrasonography and magnetic resonance imaging (MRI) were not employed at this time. Aspiration of the swelling was attempted as an outpatient procedure under sterile aseptic conditions. The aspirate was minimal (5 mL) and resembled

Author's Disclosure Statement: The author reports no actual or potential conflict of interest in relation to this article.

hematoma. A clinical diagnosis of progressively delaminating closed internal degloving injury of the knee was made. The surgical team decided to perform minimal-incision drainage as an emergency procedure.

A 1-cm incision was made over the most dependent part of the boggy collection. A Ryle tube (size 16) was gently inserted through the incision, and the cavity was lavaged with saline. Using a syringe, 200 mL of fluid was removed; this process was continued until the returning fluid was free of clots. Iatrogenic damage to the remaining fasciocutaneous feeders was avoided by not introducing sharp or abrasive instruments into the cavity. The incision was then closed with nonabsorbable sutures, a compression dressing was applied, and a long-knee immobilizer was placed. Intravenous antibiotics were administered for 48 hours postsurgery. The patient was comfortable after the procedure.

On postoperative day 4, knee swelling had gone down, the ecchymoses were resolving, and there was no additional collection. The knee and thigh were re-dressed, along with re-application of a compression bandage and replacement of the knee immobilizer. The patient was discharged with the advice to continue immobilization at home. At 2-week postoperative inspection, there was improvement in the skin and soft-tissue. There was a small collection of brown fluid in the suprapatellar region, and 25 mL of fluid (hemosiderin) was drawn out. Knee range of motion was painless, with mild terminal restriction. At 3-week follow-up, the patient was comfortable, and there was no collection (Figure 3). Skin turgor and mobility were the same as on the unaffected knee and thigh. The ecchymoses had resolved completely, and knee movements were normal and pain-free. The compression bandage and knee immobilizer were discontinued, and gradual knee-bending was started. The patient remained symptom- and lesion-free on subsequent follow-up.

Discussion

The closed internal degloving injury was first described by French physician Maurice Morel-Lavallée in 1853. This condition is caused by a shear force that tears-off fasciocutaneous perforating vessels. The tangential force directed at the junction of fascia and subcutaneous fat delaminates the compact contour of the soft-tissues, creating a subcutaneous pocket of blood, lymph, and fat.^{1,7} Over time, the fat may become necrotic, and the lesion may become infected.⁶

These lesions typically occur around the knees of young athletes involved in contact sports.^{6,8} Although age at presentation varies, reports indicate occurrence is most common in the third decade.⁸



Figure 1. Closed internal degloving injury of knee at 6 days after injury. Note distal extent of hemolympathic collection (arrow) and extensive ecchymoses.



Figure 2. Lateral radiographs of knee show radiolucent dissecting lesion (arrow) in anterior soft-tissues of knee and lower thigh.



Figure 3. Normal-looking knee and thigh at 3-week follow-up. No recollection or recurrence was noted. Knee movements were free and painless.

Lesions presenting around the knee developed after a high-velocity trauma, and in some cases, the patient presented to the clinician many weeks after injury.^{5,8,9} This patient's case is probably the first of its kind in that an extensive, progressively degloving knee lesion occurred after trivial trauma in an older adult.

Young patients with trauma from high-velocity sports, usually present early on and with varying amounts of hemolympathic collection. Sometimes the injury is inconspicuous, lacking the initial signs of ecchymoses and soft-tissue edema, and presentation is delayed.^{1,3,10,11} Low-velocity injuries in older adults may cause separation of soft-tissues from fascia, similar to what occurs in younger patients after high-velocity trauma. The increased incidence in women has been attributed to the anatomy of fat compartments (eg, larger, looser) and to the difference in anchorage of skin to underlying fascia.^{5,12} Vessel-wall fragility, poor immune status, poor collagen synthesis, medical comorbidities, and use of antiplatelet and anticoagulant medications may result in lesion spread and infection in older patients.

The type of ruptured vessel (eg, artery, lymphatic) may also determine the rapidity of collection and presenting symptoms.⁷ Interpretation of these injuries may have medicolegal implications as the physical nature of the injury may change over time.¹³ The slow-growing lymphatic fluid collections have high molecular weight and low coagulation properties¹⁴ and are often confused with prepatellar bursitis.

The clinical findings include a suprapatellar area of fluctuant swelling extending to the mid-coronal plane medially and laterally and proximally up to midhigh. Cutaneous sensation in the skin overlying the lesion is impaired.⁶ Routine radiographs of the knee should be obtained to rule-out bony injury. Ultrasonography can provide confirmation, and MRI, the gold standard for diagnosis,⁸ should be used when a case does not respond to conservative management or when the diagnosis is doubtful.^{4,15} The most common differential diagnoses in cases of closed knee degloving are prepatellar bursitis, quadriceps contusion, ligament or bony injury, muscle sprains, and joint infections.^{6,8}

Treatment options include elastic compression bandage, percutaneous drainage with debridement, and irrigation and suction drainage followed by pressure therapy.^{2,6,16-18} In a rapidly enlarging, painful, predominantly arterial lesion with blisters and ecchymoses, skin vascularity is at risk. Such a case requires emergent minimal-incision hematoma drainage and clot evacuation. At this stage, associated fractures about the knee can be treated with knee immobilization or with percutaneous fracture stabilization using minimally invasive surgical techniques. An open procedure for fracture fixation should be delayed 3 to 4 weeks. A recurrent lesion can be treated with repeat aspiration for a maximum of 3 collections.⁶ Persistence, progression, or incomplete resolution may prompt diagnosis of a recalcitrant or refractory lesion, usually associated with pseudocapsule formation (pseudocyst). Such cases may require sclerodesis of the cavity, with talc or doxycycline.⁶ Successful aspiration is defined as nearly complete removal of fluid inside the lesion cavity and restoration of normal knee appearance. Healing is defined as loss of fluctuation and elicitation of normal mobility of the injured skin on manual examination.¹⁷ For degloving lesions about the knee, average healing time is 3 weeks.⁶ Knee flexion exercises are started during the resolving stage. In elderly patients, keep watch for recurrence brought on by secondary delamination after a bout of vigorous exercise, early return to sports, or new, trivial contact trauma.^{6,19}

Dr. Narang is Associate Professor, Department of Orthopaedic Surgery, Lumbini Medical College Teaching Hospital and Research Centre, Palpa, Nepal.

Address correspondence to: Sagar Narang, MBBS, MS, c/o JH Varandani, 98 Christopher Rd, Vrindavan Gardens, Block A2, 10th

Floor, Flat 1, Kolkata 700046, India (tel, 97-798-4742-4355; fax, 97-775-522-755; e-mail, sagar_narang2001@yahoo.com).

Am J Orthop. 2013;42(8):376-378. Copyright Frontline Medical Communications Inc. 2013. All rights reserved.

References

- Hak DJ, Olson SA, Matta JM. Diagnosis and management of closed internal degloving injuries associated with pelvic and acetabular fractures: the Morel-Lavallee lesion. *J Trauma.* 1997;42(6):1046-1051.
- Hudson DA, Knottenbelt JD, Krige JE. Closed degloving injuries: results following conservative surgery. *Plast Reconstr Surg.* 1992;89(5):853-855.
- Letournel E, Judet R. Clinical presentation. In: Elson R, trans-ed. *Fractures of the Acetabulum.* 2nd ed. New York, NY: Springer-Verlag; 1993:337-397.
- Mellado JM, Pérez del Palomar L, Díaz L, Ramos A, Sauri A. Long-standing Morel-Lavallee lesions of the trochanteric region and proximal thigh: MRI features in five patients. *AJR Am J Roentgenol.* 2004;182(5):1289-1294.
- Borrero CG, Maxwell N, Kavanagh E. MRI findings of prepatellar Morel-Lavallee effusions. *Skeletal Radiol.* 2008;37(5):451-455.
- Tejwani SG, Cohen SB, Bradley JP. Management of Morel-Lavallee lesion of the knee: twenty-seven cases in the National Football League. *Am J Sports Med.* 2007;35(7):1162-1167.
- Gilbert BC, Bui-Mansfield LT, Dejong S. MRI of a Morel-Lavallee lesion. *AJR Am J Roentgenol.* 2004;182(5):1347-1348.
- Anakwenze OA, Trivedi V, Goodman AM, Ganley TJ. Concealed degloving injury (the Morel-Lavallee lesion) in childhood sports: a case report. *J Bone Joint Surg Am.* 2011;93(24):e148.
- Pitrez EH, Pellanda RC, Silva ME, Holz GG, Hertz FT, Hoefel JRF. Morel-Lavallee lesion in the knee: a case report. *Radiol Bras.* 2010;43(5):336-338.
- Kudsk KA, Sheldon GF, Walton RL. Degloving injuries of the extremities and torso. *J Trauma.* 1981;21(10):835-839.
- Kottmeier SA, Wilson SC, Born CT, Hanks GA, Iannacone WM, DeLong WG. Surgical management of soft-tissue lesions associated with pelvic ring injury. *Clin Orthop.* 1996;(329):46-53.
- Dye SF, Campagna-Pinto D, Dye CC, Eisman T. Soft-tissue anatomy anterior to human patella. *J Bone Joint Surg Am.* 2003;85(6):1012-1017.
- Luta V, Enache A, Costea C. Posttraumatic Morel-Lavallee seroma—clinic and forensic implications. *Rom J Leg Med.* 2010;18(1):31-36.
- Luria S, Applbaum Y, Weil Y, Liebergall M, Peyser A. Talc sclerodesis of persistent Morel-Lavallee lesions (posttraumatic pseudocysts): case report of four patients. *J Orthop Trauma.* 2006;20(6):435-438.
- Ciaschini M, Sundaram M. Radiologic case study. Prepatellar Morel-Lavallee lesion. *Orthopedics.* 2008;31(7):626,719-721.
- Tseng S, Tornetta P 3rd. Percutaneous management of Morel-Lavallee lesions. *J Bone Joint Surg Am.* 2006;88(1):92-96.
- Harma A, Inan M, Ertem K. The Morel-Lavallee lesion: a conservative approach to closed degloving injuries [in Turkish]. *Acta Orthop Traumatol Turc.* 2004;38(4):270-273.
- Kothe M, Lein T, Weber AT, Bonnaire F. Morel-Lavallee lesion. A grave soft-tissue injury [in German]. *Unfallchirurg.* 2006;109(1):82-86.
- Juehring DD, Richardson MD, Gallagher SM. Morel-Lavallee effusion—an uncommon cause of recurrent knee swelling: a case study. *J Acad Chirop Orthoped.* 2011;8(2):8-14.