James E. Colletti, MD
Kevin P. Kilgore, MD
Jennifer Derrick, MD

From the Department of Emergency Medicine, Mayo Clinic, Rochester, MN (Colletti, Derrick); and the Department of Emergency Medicine, Regions Hospital, St. Paul, MN (Kilgore).

0196-0644/$-see front matter

doi:10.1016/j.annemergmed.2008.06.462

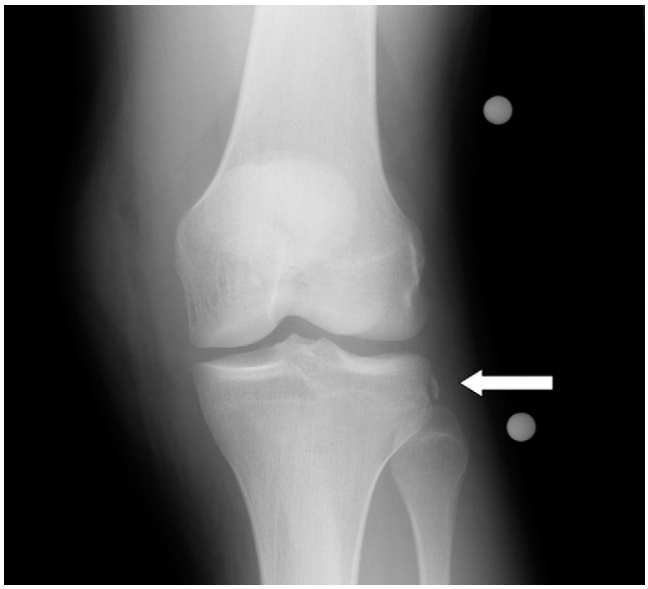

Figure 1. Radiograph of the knee demonstrating a small vertical avulsion injury of the lateral aspect of the proximal tibia immediately distal to the tibial plateau.

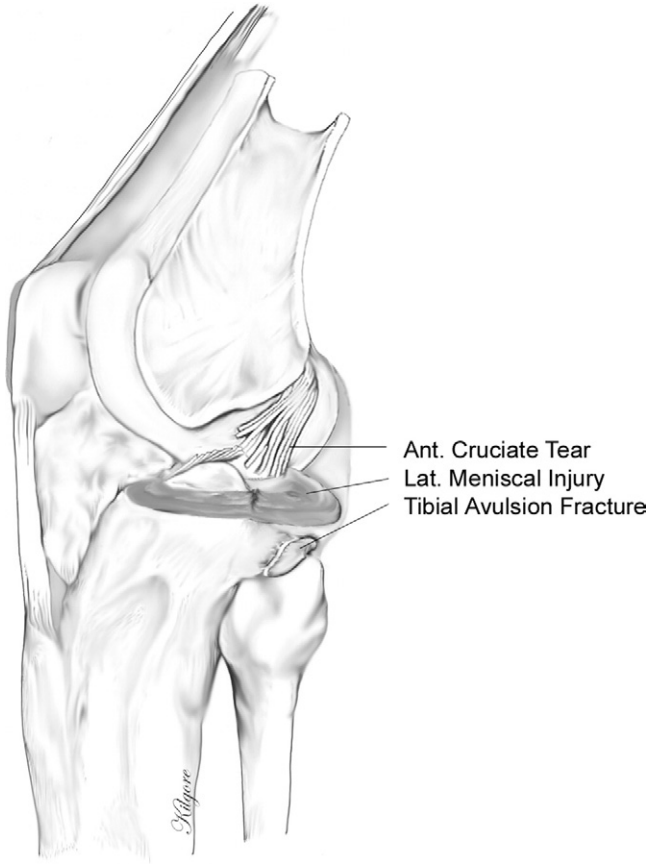

Figure 2. Illustration demonstrating the anterior cruciate ligament tear, meniscal injury, and a small vertical avulsion fracture of the lateral aspect of the proximal tibia immediately distal to the tibial plateau. Used with permission of James E. Colletti, MD, Department of Emergency Medicine, Mayo Clinic, Rochester, MN.

[Ann Emerg Med. 2009;53:403.]

A 19-year-old man presented after riding a 125-cc dirt bike. While accelerating, the bike slipped out from underneath him, and he fell onto his left side. He presented with pain in his left knee after his flexed knee went into extreme varus alignment. His physical examination result was notable for diffuse left knee swelling, ecchymosis of medial knee, and a large intraarticular knee effusion. Patellar apprehension test result was negative, and the Lachman's test result was positive. Knee motion was limited from −8 to 60 degrees of flexion. There was a firm endpoint with posterior drawer testing at the above mentioned flexion angle. The remainder of the ligamentous knee examination was limited as a result of pain and guarding. Radiographs were obtained (Figure 1).

For the diagnosis and teaching points, see page 409.
To view the entire collection of Images in Emergency Medicine, visit www.annemergmed.com

IMAGES IN EMERGENCY MEDICINE

(continued from p. 402)

DIAGNOSIS:

Osteochondritis dissecans. The radiograph reveals a lucency in the subchondral area of the lateral aspect of the right medial femoral condyle. This is diagnostic of osteochondritis dissecans, a necrotic bone lesion of unknown etiology, which occurs in adolescent athletes and can occur in adults. It is rare, with an incidence of about 20 per 100,000 people.[1] It is most commonly observed in the knee, especially in the lateral aspect of the medial femoral condyle, and is second most commonly observed in the ankle, usually in the talar dome. It often leads to separation of a bony fragment, resulting in a disrupted joint line and a loose body in the joint. Orthopedic referral is mandatory. Most cases are staged with magnetic resonance imagery (MRI) (Figure 2). Lesions meeting MRI criteria for stability are treated with a period of immobilization and close observation. Lesions thus deemed to be unstable are treated operatively with debridement, pinning, resection, or bone grafting. This patient required surgery. By the time of the operation, the fragment had displaced and was found in the suprapatellar bursa. The donor site was debrided and the fragment was reimplanted with absorbable nails.

This case of mild, subacute trauma also reminds us to think outside the box. The minor trauma 1 week before presentation was not relevant to the underlying disease process. Anchoring to the history of trauma would have led to misapplication of the Ottawa Knee Rule[2] and possibly false reassurance. Osteochondritis dissecans can certainly be managed with immobilization and orthopedic referral, and without radiographs. However, if the patient failed to follow up, the emergency physician could have been blamed for the eventual displacement of the fragment, described above.

The author is grateful to Dr. David Rosman, MD, for his assistance.

REFERENCES

1. Kocher MS, Tucker R, Ganley TJ, et al. Management of osteochondritis dissecans of the knee: current concepts review. *Am J Sports Med.* 2006;34:1181-1191.
2. Stiell IG, Wells GA, Hoag RH, et al. Implementation of the Ottawa Knee Rule for the use of radiography in acute knee injuries. *JAMA.* 1997;278:2075-2079.

IMAGES IN EMERGENCY MEDICINE

(continued from p. 403)

DIAGNOSIS:

Segond fracture. The Segond fracture is a small vertical avulsion injury of the lateral aspect of the proximal tibia immediately distal to the tibial plateau. The mechanism of injury is an axial load on a semiflexed knee, with internal rotation and varus stress.[1,2] The fracture has a strong association with an anterior cruciate ligament tear (75% to 100%), as well as meniscal injury (67% to 75%)[3-6] (Figure 2). A hemarthrosis is commonly present.[3] Clinically, signs of anterior instability such as a positive pivot-shift test result, Lachman's test, and anterior draw sign may be present.[5] The most specific clinical test is the pivot-shift test, but false-negative results may occur from a locked knee or guarding.[4] Furthermore, physical examination (Lachman's and anterior draw test) to evaluate the function of the anterior cruciate ligament may be unreliable as result of pain, hamstring resistance, or effusion.[7] Radiographically, the bone fragment is located on the lateral edge of the tibial condyle and is best visualized on the anterior-posterior view. The Segond fragment, seen on plain radiograph, is identified by magnetic resonance imaging only in one third of cases.[6] Although magnetic resonance imaging is not sensitive in the detection of the Segond fracture fragment, it is useful in demonstrating associated ligamentous and meniscal injuries.[6]

Management entails elevation, ice application, crutches, knee immobilization, and prompt orthopedic referral.[7] Consideration should be given to drainage of tense effusions for pain relief.

REFERENCES

1. Davis DS, Post WR. Segond fracture: lateral capsular ligament avulsion. *J Orthop Sports Phys Ther.* 1997;25:103-106.
2. Irvine GB, Dias JJ, Finlay DBL. Segond fractures of the lateral tibial condyle: brief report. *J Bone Joint Surg.* 1987;69-B: 613-614.
3. Dietz GW, Wilcox DM, Montgomery JB. Segond tibial condyle fracture: lateral capsular ligament avulsion. *Radiology.* 1986; 159:467-469.
4. Goldman AB, Pavlov H, Rubenstein D. The Segond fracture of the proximal tibia: a small avulsion that reflects major ligamentous damage. *AJR Am J Roentgenol.* 1988;151:1163-1167.
5. Bathala EA, Bancroft, LW, Ortiguera CJ, et al. Radiologic case study. Segond fracture. *Orthopedics.* 2007;30:689-688.
6. Weber WN, Neumann CH, Barakos JA, et al. Lateral tibial rim (Segond) fractures: MR imaging characteristics. *Radiology.* 1991;180:731-734.
7. Kerr HD. Segond fracture, hemarthrosis, and anterior cruciate ligament disruption. *J Emerg Med.* 1990;8:29-33.