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REVIEW

Management of the acute knee dislocation: The Pittsburgh experience

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KEYWORDS
Knee dislocation;
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Summary Traumatic dislocation of the knee is among the most severe form of ligament injury to the lower extremity. While the incidence of knee dislocations is low, this injury is associated with a high rate of complications including amputation. There is potential for a traumatic knee dislocation to present to the emergency department after spontaneous or in-field reduction. This requires a vigilant, comprehensive, and systematic approach to the injured knee and extremity to avoid limb-threatening oversights. At the University of Pittsburgh a comprehensive algorithm has been developed to facilitate accurate and efficient diagnosis and treatment of complex traumatic knee injuries. The following manuscript includes a detailed review of the literature and explains our specific approach to this diagnostic dilemma.
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Definition

Traumatic dislocation of the knee is among the most severe forms of ligament injury to the lower extremity. A knee dislocation entails complete disruption of the integrity of the tibiofemoral articulation. Subluxation is defined as disruption of the joint with some remaining contact of the joint surfaces. A multiligament knee injury encompasses two or more ligament injuries in a knee that has been fully or partially dislocated.[4,14,22,24,36,44,49] The knee may present clinically in either a reduced or a dislocated position, but should be treated as a dislocated knee even if dislocation was never witnessed.[9,21,39]

Aetiology

Knee dislocations are uncommon, constituting less than 0.5% of joint dislocations.[35] The documented incidence of observed knee dislocations on admission per institution per year is even less and varies from 1/10,000 to 1/100,000.[31,37,40] Hoover recorded only 14 cases at the Mayo Clinic over 50 years.[16] Usual mechanisms of injury include motor vehicle collisions (MVC), industrial accidents, farm injuries and sports-related injuries.[4,22] Kwolek et al. reported three children sustaining anterior knee dislocations (Fig. 1) as a result of trampoline accidents.[25] Sports-related knee dislocations are likely to be caused by a lower velocity of impact than MVC, and have a lower reported association with neurovascular lesions and fractures.[39]

Figure 1 Lateral radiograph demonstrating anterior dislocation of the knee.

Classification

Classifications of knee dislocations have been based on either an anatomical and or a positional scheme. The positional classification, as described by Kennedy, categorises knee dislocations according to tibial position in relation to the femur. Five types were initially defined, i.e. anterior, posterior, lateral, medial and rotatory.[22] Rotatory knee dislocations were subdivided into four groups, i.e. anteromedial, anterolateral, posteromedial and posterolateral. Although well established and useful, the positional classification system has limitations; up to 50% of knee dislocations are spontaneously reduced before evaluation and cannot be classified with the Kennedy system. Therefore an anatomical system was developed, based on ligament injury with additional designations of C (arterial injury) and N (neural injury). A single cruciate tear is described as KDI and bicruciate tears without collateral tears are designated KDII. Bicruciate tears with involvement of a medial collateral ligament (MCL) tear are classified as KDIIIM or, with involvement of a lateral collateral ligament (LCL) and posterolateral corner (PLC) tear as KDIIIL. KDIV involves all four ligaments and KDV involves a fracture-dislocation. In general, the higher the number, the greater the injury to the knee.[8]

The majority of the literature supports the observation that anterior knee dislocations are the most common, usually resulting from a hyperextension mechanism.[11,12,22] In a large review by Green and Allen, 40% of 245 knee dislocations were anterior.[11] In the classic cadaver study by Kennedy, anterior dislocation produced injury to the posterior capsule at 30°, followed by injury to the anterior cruciate ligament (ACL) and the posterior cruciate ligament (PCL) as hyperextension continued. The popliteal artery was then stretched, with definitive rupture at approximately 50° of hyperextension.[22]

Posterior dislocations are the second most common at 33%, and are caused by direct application of a posterior force to the anterior tibia.[11] The anterior blow to the tibia can occur while the foot is fixed on the ground during contact sport, or by abrupt deceleration and dashboard strike to the anterior tibia with the knee in a flexed position during an MVC.[12,45] The PCL is key to posterior stability and is

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