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Review/ Praca poglądowa

The tibial spine fractures – Infrequent but noteworthy issue

Oderwanie przyczepu piszczelowego więzadła krzyżowego – rzadkie i ważne zagadnienie

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ABSTRACT

The tibial spine fractures occurs mainly in children and adolescents because the tibial intercondylar eminence is not completely ossified. It is believed that the tibial spine fractures are correspondent to the more frequent anterior cruciate ligament injury in adults. Treatment depends on the degree of fracture. 4-grade Meyers and McKeever scale is the most commonly used method in the classification. Grade I is the least complicated and grade IV is complete fragmentation of the detached element. There are no consistent guidelines or recommendation about various degrees of fracture treatment. Many surgical treatment methods are described. Complications reported in the current literature including arthrofibrosis, non-union, mal-union, pain and severe laxity lead to detailed analysis of available literature and long-term follow-up. **Objective:** The purpose of this publication is to give information about diagnosis and treatment of the tibial eminence fracture. It is addressed to the doctors, especially paediatricians and paediatric orthopaedics who deal with this issue. Knowledge of this topic is very valuable due to the possible serious complications.

Introduction

The tibial spine fractures are relatively rare. The incidence rate per 100 000 person-years is about 3 [1]. This type of fracture occurs more frequently in children and adolescents, probably due to the tibial intercondylar eminence not completed ossifying. It is said that the tibial spine fractures is correspondent to the anterior cruciate ligament injury in adults [2, 3]. The most frequent injuries that can lead to tibial spine fractures are skiing, soccer, and football injuries and injuries due to motor vehicle accidents [4].

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Symptoms

Patients with a tibial spine avulsion will present with a swollen and painful knee with an inability to bear weight on the affected extremity. Lachman or anterior drawer tests may be positive, such as in an ACL tear, but the pain can make it difficult for the clinician to perform a proper physical examination of the affected knee [5]. Physical examination should include a complete neurologic and vascular examination of the lower extremity as well as a thorough musculoskeletal examination of the knee. Several studies have shown an association between eminence fractures and injury to the collateral ligaments, menisci, and articular cartilage [6–8].

Classification

Since 1959, Meyers and McKeever classification is used to classify tibial eminence fractures into I–III categories. It was updated in 1977 by Zaricznyj by adding the IV category [9, 10]. A type I fracture is the least severe, with a non-displaced or minimally displaced anterior margin and excellent bony apposition. In a type II fracture, the anterior 1/3 to 1/2 of the fragment is displaced, with an intact posterior hinge. Type III fractures are classified into two subcategories. Type IIIA avulsion fractures have complete separation of the fragment from the bony bed without apposition, and type IIIB fractures are completely displaced and rotated cephalad [9, 11]. Fracture displacement and disruption of the normal ACL tibial attachment block full knee extension and can cause symptoms of functional instability [12]. Prompt operative reduction and fixation of Meyers and McKeever6 type II and III tibial spine fractures are crucial to minimization of the risks of fracture non-union, symptomatic knee laxity, and loss of range of motion in the patient [5].

Assessment

The pre-operative work-up included anterior-posterior and lateral radiographs of the knee and either computed tomography (CT) or magnetic resonance imaging (MRI) [13]. Plain radiography is the imaging modality of choice. Fracture of the tibial spine can be easily displayed on plain radiographs, particularly the lateral view. Although the anterior–posterior view and the medial oblique view may be very helpful, they may not accurately show the amount of displacement [14]. Computed tomographic scanning allows improved visualization of the fracture fragment compared with radiographs and provides a more precise assessment of the fracture and presence of comminution. Magnetic resonance imaging (MRI) can be helpful in preoperative planning by identifying concomitant injuries of the knee and the position of the fragment relative to the soft tissue structures that may impede reduction [11]. MRI is also useful in determining if interstitial injury of the ACL is present [15]. Clinical testing including the Tegner score, IKDC score, and laxity was measured using the Rolimeter [13]. Tegner activity level scale is similar to Lysholm scale in conditions such as ligament injury of knee, meniscal tears, knee cartilage lesions, traumatic knee dislocation, patellar instability, patellofemoral pain, and knee osteoarthritis and interventions in these. The IKDC is one of the instruments most commonly used to determine results following various knee procedures including ACL reconstructions [16]. The Rolimeter is a reliable device in objectively evaluating knee joint laxity.

Treatment

There are various methods of treatment available for patients with intercondylar eminence fracture, depending on the fracture type. Non-operative treatments are recommended for the non-displaced or minimally displaced fracture [14]. Type I fractures treatment needs a simple orthopaedics care. The general consensus among researchers is that non-displaced fractures can be treated with long-leg cast immobilization [17, 18]. There is much more difficulty to manage with the higher grades fractures. The treatment of type II fractures is more controversial than other types; both operative and non-operative treatments have been recommended. Non-operative treatment typically involves cast immobilization for 4–6 weeks, with or without aspiration, and closed reduction of the knee in extension [15]. Many methods of surgical treatment exist but there is no consensus on which method of fixation works best. Type III fractures with completely avulsed intercondylar eminence are often treated surgically. There are two traditional schools of thought regarding the recommended treatment of the tibial intercondylar eminence fracture. One school advocates attempted closed reduction by extension of the knee [19] with pressure by the lateral femoral condyle on the displaced fragment [20]. The other school advises open reduction and internal fixation since the fracture cannot be reduced by manipulation due to the interposed soft tissues [21], especially the anterior horn of the medial meniscus [22]. According to Meyers and McKeever, it is the muscle spasm rather than the intervening soft tissues that prevents closed reduction. Selection of the operation type depends on individual orthopedist assessment. Advantages of arthroscopic treatment are minimal morbidity and early motion, and the disadvantage is high learning curve linked to knee arthroscopy surgical technique. Open techniques are recommended when direct vision of lesion is needed [1]. Relying on the current literature, neither arthroscopic nor open treatment is unequivocally recommended as the standard [23]. Hemarthrosis, clots, and osteochondral fragments had to be removed to obtain an optimal view of the fracture site. Fixation of displaced intercondylar eminence can be performed using Kirchner wires, steel wire cerclage, intraosseous sutures, screws with washers, intrafocal fixation, and retrograde compression screws anchored in bone [3]. The selection depends on the size of avulsion. Fixation with screws and sutures are the most common methods [24]. Absorbable suture fixation is recommended in highly fragmented fractures and is characterized by low risk of bone fragmentation and ligament cutting. On the contrary, screw fixation is associated with risk of bone fragmentation and ligament

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