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Case Report

Avulsion Fracture of the Fibular Head: Report of 2 Cases

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Abstract: Fibular head avulsion fractures are rare injuries that often reflect significant trauma to the posterolateral corner of the knee. This case report presents two adult patients with avulsion fractures of the fibular head, both involving lateral collateral ligament damage. The first case involved bilateral knee trauma after a motor vehicle accident, while the second resulted from a sports-related injury. Diagnosis was confirmed via imaging, including identification of the "arcuate sign" on radiographs and 3D CT scans. Surgical management through direct screw fixation was performed in both cases, followed by structured rehabilitation. At one-year follow-up, both patients showed complete recovery with restored knee stability and full range of motion. This report highlights the importance of early recognition and comprehensive treatment to prevent long-term posterolateral instability and functional impairment.

Keywords: Fibular head avulsion, arcuate sign, posterolateral corner, lateral collateral ligament, knee instability, screw fixation, trauma, rehabilitation, case report, orthopedic surgery.

INTRODUCTION

Avulsion fracture is defined as the tearing away of a bone fragment at the osseous insertion point of a ligament, tendon, or joint capsule. It is common among adolescents due to the fragility of their apophyses [1]. However, adults can also be affected [1]. The knee remains particularly susceptible to this type of injury due to its abundance of tendons, ligaments, and meniscal attachments [2]. Avulsion fractures of the fibular head remain rare, and their management should be done urgently with prolonged and rigorous postoperative monitoring to detect signs of ligamentous instability or meniscal involvement [2].

OBSERVATIONS AND METHODS

The authors report the clinical observations of two cases of fibular head avulsion with lateral collateral ligament injury, collected at the Traumatology-Orthopedics Department II of Mohammed V Military Instruction Hospital and treated by direct screw fixation of the fibular head.

Case 1

A 32-year-old patient with no medical history, involved in a motor vehicle accident, presented with a trauma caused by dashboard impact, resulting in severe pain and total functional impairment of both knees. Upon admission to the emergency department, the patient was stable. He presented with a swollen and painful right knee and an extensive bruise on the left knee's external aspect. Flexion-extension mobilization was painful but possible, with a tender point over the fibular head. Ligamentous testing revealed lateral laxity on forced varus with no anterior drawer. Radiological assessment showed a fracture of the external tibial plateau on the right knee and an "arcuate sign" indicative of fibular head avulsion on the left knee (Figure 1). Further evaluation with 3D reconstructed CT scans was performed for detailed analysis (Figure 2). The patient underwent surgery for osteosynthesis : percutaneous screw fixation of the right external tibial plateau and direct screw fixation of the left fibular head after identification and protection of the common peroneal nerve (Figure 3 and 4). Postoperative recovery was uneventful; immobilization with a removable brace was maintained for 8 weeks for both knees. Passive rehabilitation was initiated in the third week using an arthromotor and isometric quadriceps and hamstring contractions, followed by active rehabilitation with strength exercises after 3 months. At one-year follow-up, complete fracture consolidation was observed, with full range of motion restored in both knees and no signs of instability or laxity in the left knee.

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Figure 1: Standard X-ray of the left knee showing the 'Acuate' sign: fibular head avulsion

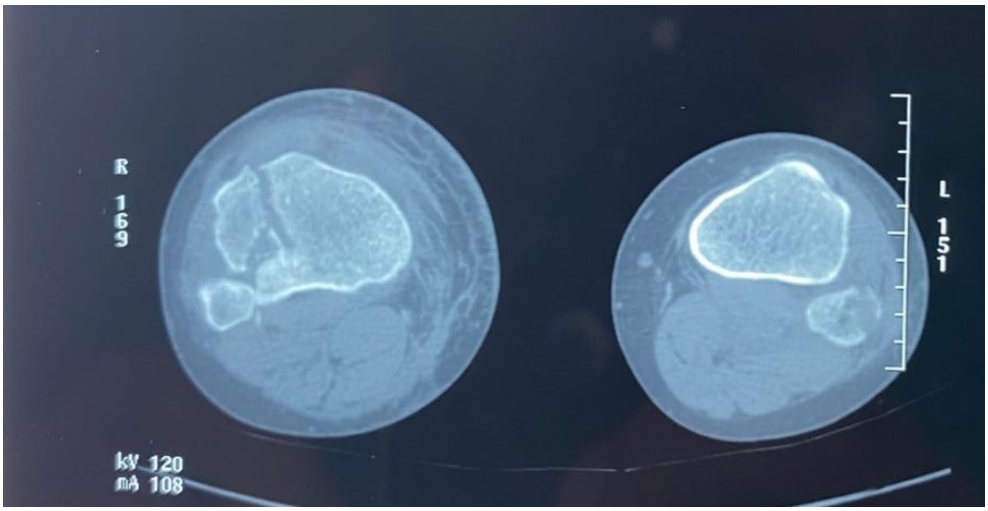

Figure 2: CT scan images of the fracture of the right tibial plateau and the avulsion of the fibular head

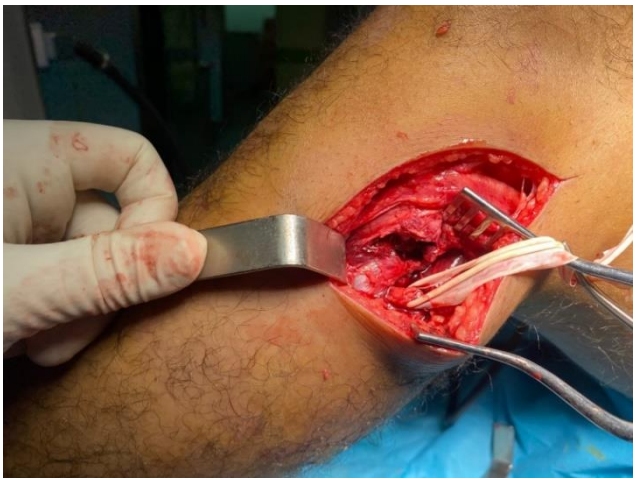

Figure 3: Identification of the avulsion following identification of the common peroneal nerve

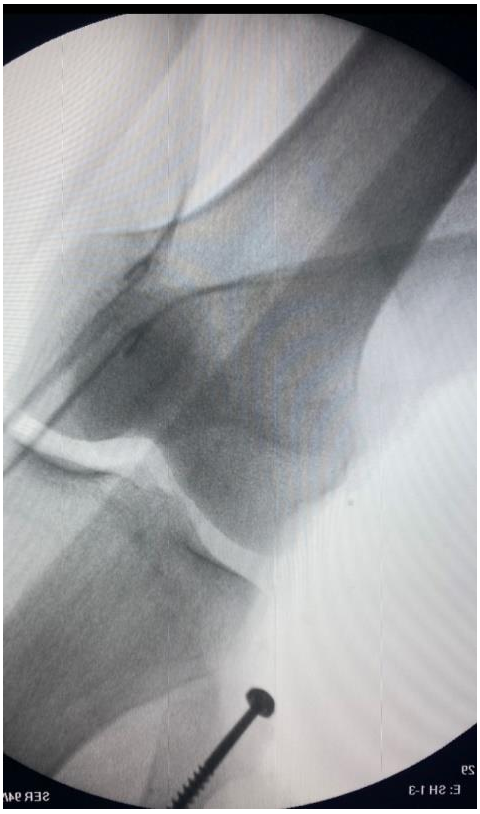

Figure 4: Radiological control of the appearance of the fibular head

Case 2

A 43-year-old patient with no previous medical history presented 5 days after a sports injury during football, with his right knee forcibly twisted into varus position during a tackle to the inner aspect of the injured leg. The patient complained of persistent pain, and clinical examination revealed a painful knee with limited flexion. Ligamentous testing showed painful lateral laxity on forced varus with no anterior drawer, while meniscal testing was normal. Radiographic evaluation revealed fibular head avulsion, and the patient underwent surgery for direct screw fixation of the fibular head, followed by immobilization with a removable brace for 8 weeks. Postoperative recovery was uneventful, with passive rehabilitation using an arthromotor and isometric quadriceps and hamstring contractions initiated in the third week, followed by active rehabilitation with strength exercises after 3 months. At one-year follow-up, complete recovery of knee mobility was noted, with no ligamentous laxity observed.

DISCUSSION

Avulsion fractures of the fibular head occur in 0.6% of all knee avulsion fractures. Injuries affecting the ligaments in the posterolateral space of the knee are significant and can lead to posterolateral instability, which is considerably less common than anterolateral instability. Such injuries are often subtle, presenting with clinical paucity and are frequently overlooked during initial examination.

The posterolateral structures of the knee are complex, comprising ligaments and tendons acting as static constraints to posterior translation, varus angulation, and external rotation of the knee. These structures include the lateral collateral ligament, the fabellofibular ligament, the popliteofibular ligament, the arcuate ligament, the popliteal tendon, and the biceps femoris tendon, with the popliteofibular ligament considered the primary static stabilizer of the posterolateral corner of the knee.

The fibular styloid process serves as the attachment site for the arcuate ligament, the fabellofibular ligament, and the popliteofibular ligament, collectively known as the arcuate complex. Identification of a fibular head avulsion fracture is crucial as it may reflect injury to these ligaments, although interstitial tears are more common than osseous avulsions. The arcuate sign, described as a small bony fragment detached from the fibular head by arcuate complex injury, aids in diagnosis. Several different types of fibular head avulsion fractures occur, depending on the attachment sites of numerous ligaments fixed to the fibular head.

Fibular head avulsion fractures have been attributed to lateral collateral ligament and biceps femoris tendon injuries in most reported cases. Such fractures may be associated with other ligamentous and musculotendinous injuries in the posterolateral corner of the knee. Standard radiography reveals the arcuate sign, while lateral radiographs obtained with slight external

rotation help confirm the fibular injury site when insufficient information is obtained from routine anteroposterior and lateral radiographs.

Isolated lateral collateral ligament injuries do not exist, and associated injuries of posterolateral formations must be carefully sought. Magnetic resonance imaging plays a crucial diagnostic role, and associated central pivot lesions should also be investigated. Surgical treatment is required for posterolateral injuries, and the main mechanism of injury involves forced varus with the knee in hyperextension or varus flexion with internal rotation.

Injuries are often located near or on the distal insertion, typically resulting in bony avulsion in the middle of the fibular head with attachment of the biceps femoris. Distal lesions may also involve lateral collateral ligament detachment from the fibular head without avulsion, exposing the bone.

These injuries require surgical treatment due to the difficulty in treating residual chronic retro-ligamentous anterolateral laxities. All injuries should be addressed, including lateral meniscus suture, popliteal reinsertion or suturing, biceps femoris suture, and lateral collateral ligament suture or reinsertion. Posterior-lateral repair is challenging in emergencies, with various plastic surgeries often reserved for chronic injuries. Rehabilitation should be initiated early, maintaining a 15° flexion deficit in the first postoperative month.

CONCLUSION

Despite its rarity, fibular head avulsion fracture represents a significant injury affecting the posterior and lateral stabilizing structures of the knee. Effective management of fibular head avulsion fracture requires a multidisciplinary approach, including accurate diagnosis, appropriate surgical treatment, and meticulous rehabilitation to achieve satisfactory outcomes and prevent long-term complications.

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