Case report

Bicondylar conjoint Hoffa's fracture with patella entrapped in the fracture: A rare case report

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ABSTRACT

Bicondylar Hoffa fracture involving both the femoral condyles is a rare injury. Conjoint variety with intact bone bridge between condyles in intercondylar notch area is even rare.

We report a conjoint variety of bicondylar open grade III A Hoffa's fracture with patella entrapped in the fracture with quadriceps rupture in an adult which was surgically treated with initial debridement and later open reduction with fixation and quadriceps repair. The final outcome at 1 year post injury is satisfactory.

To the best of our knowledge, no such case has been reported till date in English literature.

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1. Introduction

Hoffa fracture is an uncommon and difficult articular injury where coronal orientation of fracture line separates a large condylar articular portion of distal femur from distal femur. First described by Hoffa in 1904,¹ is an unusual injury in adults and rarer still in children. Hoffa fracture usually affects a single femoral condyle, more commonly the lateral condyle. A conjoint bicondylar pattern of this injury is rare, with 11 cases reported in English literature till date, with 1 case reporting Hoffa fracture with patellar dislocation.² Such peculiar pattern of injury leaves fragments floating in joint and devoid of vital soft tissue attachments; thereby jeopardizing blood supply of fractured bones.³

We report an open grade III A Hoffa fracture with displacement of patella into the coronal split of the fracture with quadriceps rupture, which was successfully treated by two stage open reduction and internal fixation. To best of author's knowledge, no such case has been reported. The case highlights complexities associated with such intra-articular injury patterns.

2. Case report

A 35 year old male presented to orthopedic emergency after being hit by a speeding motor vehicle with an open injury of right

knee. Physical examination revealed two lacerated wounds over the superior aspect of knee and proximal leg with an open knee joint. Movements of knee were grossly restricted and painful. There was no distal neurovascular deficit. The patient was hemodynamically stable with no other system or limb injury.

Radiographs revealed displaced coronal plane fracture of both condyles with patella entrapped in the fracture itself [Figs. 1 and 2]. CT scan of the knee revealed a conjoint bicondylar Hoffa fracture with patella displaced posteriorly to lie in the coronal split of femoral condyle [Fig. 3].

The injured limb was initially splinted in an above knee posterior splint. Patient was emergently taken under anaesthesia for through debridement of the wounds. The lacerations were extended to adequately visualize the fracture. The anterior articular part of distal femur was buttonholing through the quadriceps muscle with complete disruption of the extensor apparatus from superior edge of patella. The patella was displaced posteriorly to lie in the coronal split of the femoral condyles. Thorough knee joint lavage and wound debridement was done. The patella was reduced to its anatomical position and the quadriceps tendon was tagged to superior pole of patella. The wounds were closed over suction drain and the limb was splinted in extension. Intravenous antibiotics were continued for 5 days.

As the suture lines showed good healing and there was no clinical evidence of infection, the patient was planned for definitive fixation of fracture and repair of extensor apparatus of the knee 10 days post-injury. The same incisions were used to expose the fracture. Open reduction of fracture was done under direct visualization and fixation was achieved using 7 mm partially

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Fig. 1. Pre operative AP radiograph.

threaded cannulated screws directed from anterior femoral surface to posterior femoral condyles under C-arm control. Two screws were used for fixation of each condyle following principles of lag screw fixation. The proximal screws were placed in the extra-articular supra-patellar area whereas the distal screws were through the cartilage, hence was sunk adequately [Figs. 4 and 5]. Limb was splinted in long leg slab.

Fig. 2. Pre operative lateral radiograph.

Fig. 3. Pre operative CT Scan (solid black arrow depicting patella & white arrow depicting fracture line).

Fig. 4. Post operative AP radiograph.

Fig. 6. Post operative AP radiograph after 6 months.

Fig. 7. Post operative lateral radiograph after 6 months.

Fig. 5. Post operative lateral radiograph.

The wound healed uneventfully. Following suture removal, rehabilitation was started slowly and guarded with a hinged knee brace with drop lock to start passive assisted range of motion. Initially patient had 20° of extension lag with 70° of flexion. CPM exercises were started. The knee range of motion was progressively increased with no extension lag and 120° flexion after 1 year of rehabilitation. X rays were done at 6 months post operative period depicting union of fracture site [Figs. 6 and 7].

3. Discussion

The isolated tangential posterior articular fracture of the distal femur in coronal plane was first described by Hoffa in 1904.¹ This

fracture variant is often unicondylar. Bicondylar variety is rare, more so is conjoint variety.⁴

Hoffa fractures are supposed to happen by a shearing force on the posterior femoral condyle; both direct impact and vertical shear with twisting mechanisms have been proposed. Lewis et al.⁵ argued that axial load to the lateral femoral condyle with the knee in 90° or more of flexion produces these posterior tangential fracture patterns and rotational force may modify orientation of fracture line. Lateral condyle is most often affected due to presence of physiological genu valgum.⁵ The distance of the fracture line from the posterior femoral cortex increases with the increase in the knee flexion at the time of impact. Bicondylar injuries can be proposed to be an extension of the fracture pattern as the next level of severity of the traumatic insult.

The diagnosis requires high index of clinical suspicion and good radiographs; even a CT scan or MRI especially in pediatric age group. Bicondylar variant may also be missed on plain radiographs due to overlapping of condylar shadows.⁶

Open reduction is preferred treatment for Hoffa fractures.^{6–9} In bicondylar fractures, standard anterior midline incision with medial parapatellar release and lateral dislocation of the patella, allows direct access to the articular aspect of the fracture, and can be safely used.⁶ An individualized screw only construct is often practiced. The application of two anteroposterior cancellous screws from the anterior intact cortex to both Hoffa fragments, to provide rotational stability, is usually recommended.³

Depending on the extension of the fracture line, detachment of the insertions of the popliteus tendon, lateral head of the gastrocnemius muscle, anterior cruciate ligament, and lateral ligaments are common and may lead to knee instability or disruption of blood supply to the fragments.¹⁰ The popliteal vein and artery with their branches (superior lateral and medial genicular arteries) are situated directly between the medial and lateral condyles. Bicondylar Hoffa's fracture predisposes trauma to these arteries. Interruption of ingressing genicular branches to condyles may cause subchondral necrosis.¹¹

Multiple surgical modalities for the definitive treatment of distal femoral fractures comprise of external fixation, intra-medullary nailing, and plate osteosynthesis with either open reduction and internal fixation, or minimally invasive plate osteosynthesis (MIPO). Various plating options for such fracture morphology includes antiglide plating, buttress plate fixation,

fixed-angle devices like the angled blade plate (ABP) or the dynamic condylar screw (DCS), and locking plates. External fixation, however, as a temporary fixation device is indicated in polytraumatised patients, patients with massive soft tissue damage, open fractures, and situations with logistic or infrastructural limitations.

Arthroscopy-guided fixation of these fractures has also been advocated for acute Hoffa's fracture with large fragments with minimal comminution; the advantages include avoidance of soft tissue dissection without arthrotomy, decrease blood loss, intra articular visualization, fast recovery and mobilization.¹²

This report consists of a combination of a conjoint variety of bicondylar Hoffa fracture with patella entrapped the fracture line with complete quadriceps rupture, which has not been reported yet.

Discrete fracture anatomy, difficult diagnosis, difficult surgical exposure, infeasibility of conventional implants for distal femur fractures and variable fixation construct with poor strength, high amount of shear forces across fracture line and high propensity of avascular necrosis and arthrosis add to complexities and prognosis associated with Hoffa fracture.

4. Conclusion

Bicondylar conjoint Hoffa's fracture with patella displaced in Hoffa's fracture line with quadriceps rupture is a rare injury. Such rare injury should be treated by early open reduction and internal fixation to avert problems like avascular necrosis, joint instability and quadriceps retraction while simultaneously taking cautions to avoid surgical trauma to vascularity of fragments and articular cartilage. This case adds to the literature depicting the rare fracture

morphology not described before & its surgical difficulties and complications.

Conflicts of interest

None.

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