



NEGLECTED DISTAL FEMORAL EPIPHYSEAL INJURY IN A YOUNG ADULT- TREATMENT STRATEGIES – A CASE REPORT

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ABSTRACT

Neglected Distal femoral epiphyseal injury in young adults is a rarely encountered clinical entity. The axial malalignment and the functional impairment creates a challenge in management of this injury. The soft tissue contractures, its proximity to neurovascular structures and a complicated osseo-ligamentous anatomy of the knee calls for precise surgical expertise.

We report a case of neglected epiphyseal injury of the distal femur creating a multiplanar deformity- axial and coronal (similar to a Hoffa's type of lesion in adults) and the management strategies adopted based on the concept of distraction epiphysiolysis to achieve a successful result.

Neglected distal femoral epiphyseal injuries are rarely encountered clinical problem. They pose a great challenge to the operating surgeon and demands meticulous planning in operative management of this lesion. Anatomical reconstruction is essential to obtain limb alignment. Distraction epiphysiolysis is one such good strategy as a initial step in such a complicated scenario to overcome soft tissue contractures which helps in achieving a safe and anatomical reconstruction in next stage.

KEYWORDS : Epiphysiolysis, neglected distal femoral epiphyseal injury, Staged reconstruction, complicated soft tissue pathology

INTRODUCTION

Physeal distraction is an accepted technique for limb lengthening or deformity correction. Heuter-Volkman stated that shear at the physis promotes growth and compression decreases growth. Distraction epiphysiolysis describes gradual distraction (1mm/day) of the growth plate which creates a fracture at the physis in the layer between the maturing chondrocytes and the hypertrophic layer¹.

Incidence of distal femur epiphyseal injury in young adults is low^{2,3}, but have a high incidence of complications- varus or valgus malalignment, vascular impairment and peroneal nerve injury.^{4,5,6} The complex pathological soft tissue anatomy pose a great amount of difficulty in achieving anatomical reconstruction.

CASE PRESENTATION

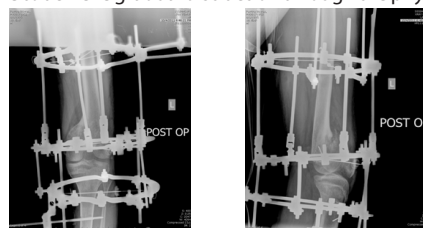
A 16 year old boy presented to us with deformity of left knee and limb shortening 8months



following a alleged history of a significant injury to his left knee while playing football. He was treated earlier elsewhere conservatively soon after the injury with immobilization and massage for about 3 weeks. Later the boy started ambulation and range of motion exercises gradually. His presenting clinical features were: able to stand and walk independently with varus deformity of 20° and limb length discrepancy approximately 2 cms. Minimal knee effusion present with Gross wasting of the thigh muscles. Abnormal bony prominence over the anterior aspect of the distal end femur. Minimal tenderness over the joint line ROM active flexion 10-90°, FFD of 10°, varus of 20°. No Distal neurovascular deficit. Radiological assessment of the injury revealed a malunited and completely anteriorly displaced distal femoral condyles. Subluxation of the knee noted.

Knee joint spanning Ilizarov femoral frame was applied with wires passing through the Epiphysal fragment of the distal femur in its

axis. Percutaneous Osteotomy of the distal Femoral physeal plate was done to achieve gradual distraction through the physeal plate.



Distraction of the femoral epiphysis was started 5 days after the index surgery at the rate of 1mm/day in the differential manner to correct varus alignment. Continued distraction was carried out for a period of 3 weeks. At this stage the ilizarov frame was realigned followed by a static phase for 4 weeks.

Monitoring of distraction was done radiologically and after obtaining sufficient realignment of the limb and epiphysal distraction the Ilizarov frame removal and A/K Slab application done.



Follow-up x rays showed good distraction thro the physis and knee subluxation reduced.

Corrective osteotomy, bone grafting and fixation with butress plate was done 12 weeks after the first surgery



Almost two years after the first surgery the patient presented with normal looking knee with no bony tenderness with just 1 cm muscle wasting of the left thigh with no Extensor lag. Also he had a ROM of upto 120*.



DISCUSSION

Distal femur physeal injuries are rare in children^{2,3}, but associated with high rate of complications requiring resurgery- most common being growth disturbance, shortening and neurovascular injury. The close proximity of the popliteal vessel to the posterior surface of the femur separated by only a fat pad, make surgical intervention difficult and more so in malunited fractures, where soft tissue adherence is known⁷. The chance of peroneal nerve neuropraxia is also common due to varus tilt and medial rotation.

The distal end of femur contributes to 70% of femur growth and 37% of lower limb length.^{8,9} Salter harris Type II injury is most common in during sport injury. Unlike in adults where there is also ligament injury, in skeletally immature there is more chance of physeal involvement.¹⁰

In the first stage we used Ilizarov fixator which helped us in preventing soft tissue stretching and helped in physeal distraction initially thus following the principles of Distraction epiphysiolysis. Since the patient was nearing skeletal maturity, we attempted this procedure as the probability to cause further growth disturbance is minimal. This has the advantage of preventing a possible neurovascular damage.

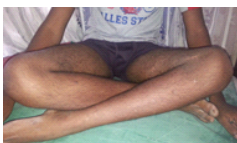
The second procedure involving corrective aligning osteotomy and fixation with a lateral plate was done away from the original fracture site.

Historically supracondylar fractures of femoral bones in adolescents are most frequently caused by cartwheel accidents¹¹ and now due to valgus stress during sport injury.^{12,13,14,15} The main reason is the anterior or lateral impact forces on a flexed knee. Fractures of the distal femoral end in children may involve the metaphysis, epiphysis and femoral shaft. They often lead to lysis along the growth plate, which is the most fragile part of the bone. The majority of these fractures concern children in the age of 12–14 years.¹⁶ Lower limb fractures are connected with much worse prognosis than upper limb fractures. Shortenings and deformations of the lower limbs are much worse tolerated than the ones in the upper limbs, due to a higher physiological load.

CONCLUSION

Although neglected malunited distal femoral epiphyseal injuries are rarely seen, they pose a great challenge to the operating surgeon and meticulous care needs to be taken for post op management. More so in this case it was a neglected injury in malunion. Anatomic reduction is important to minimize the risk of arthritis and growth plate arrest which is a common complication in this type of injury, apart from neurovascular risk. In the position of flexed knee especially beyond 90* the instant center of rotation glides on the posterior condyles and restoring the normal biomechanics and with prevent arthritis and promote normal function. Distraction epiphysiolysis needs to be done in a patient near skeletal maturity and we could use this principle here.

final result



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