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Case Report

Poland Type IV Fracture of Proximal Tibia along with Fracture Fibula

Dr. Sheikh Irfan Bashir* M.B.B.S, P.G. DIP. Orthopaedics, DNB Orthopaedics

DNB Scholar, Department of Orthopaedics, Indraprastha Apollo Hospital, New Delhi, India

***Corresponding author**

Dr. Sheikh Irfan Bashir, D.N.B. Scholar, Department Of Orthopaedics, Indraprastha Apollo Hospital, New Delhi, Shah-E- Hamdan Lane, Umerabad II, Zainakote, Srinagar, Kashmir, J&K, Pin: 190012, India, Tel: 08713934211; Email: sheikhirfanb@gmail.com

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Abstract

Fractures of the Proximal tibial epiphysis are rare. We report a case of proximal tibial epiphyseal fracture with completely separated and displaced physis . The injury was a result of high speed road traffic accident. The fracture displacement was such that it was difficult to put it in any existing classification system except poland type 4. The injury has a high risk of neurovascular compromise. The patient had a feeble anterior and posterior tibial pulses on admission .We managed the case on emergency basis and went for closed reduction and internal fixation by smooth krishner wires .The results were good in both immediate and early follow-up despite the gross injury to physis.

INTRODUCTION

All the injuries resulting from high speed trauma are on increase due to lifestyle changes and increasing vehicular accidents; so is the case with previously found rare injuries. Out of all epiphyseal fractures, the proximal tibial epiphyseal fractures constitute only 0.5% – 3 % [1] Most common among these fractures is the type II Salter Harris fracture [1,2]. The author report a case of poland type IV(complete physeal separation with fracture of epiphysis) proximal tibial epiphyseal fracture, with fracture of fibula and vascular compromise. The fracture was managed by closed reduction and internal fixation with smooth K-wires. Poland type IV fracture is Fracture through entire physis with epiphyseal fracture as well. The author could not find any case of Poland type IV fracture of proximal tibial epiphysis reported in English literature to the best of his knowledge. As the incidence of high energy trauma is on sharp rise, such cases which are rare still; need to be reported so that we could develop a good evidence based approach to their management in the near future to meet the emerging challenges in the management of such severe injuries.

CASE REPORT

A 14 year old Indian male belonging to the lower socioeconomic strata presented to emergency department with history of a high speed road traffic accident. His leg got stuck in the front portion of his motor bike and his body was thrown forwards leading to direct impact on tibia and hyperextension at knee. He complained of severe pain and inability to flex his knee. On examination there were multiple bruises and abrasions along with swelling around his knee. His left leg was in attitude of extension at knee. The distal pulses i.e. anterior and posterior tibial were feeble on the affected side. Leg was splinted in a cramer wire splint and sent for an antero-posterior and lateral radiograph. Radiograph shows evident displacement of the tibial epiphysis from its metaphysis along with a suspicion of a crack in the epiphysis and fracture fibula. Because of the compromised vascularity of the leg; immediate reduction of the fragment was done. Under general anaesthesia and C-arm control fracture displacement was reduced but it was unstable. So fracture was fixed by two K- Wires. Fracture fibula was not fixed. There was

Figure 1 Lateral Radiograph of the Left Knee showing complete physeal separation of physis with bony shadow of the transepiphyseal fracture displacement along with fracture fibula.

Figure 2 Anteroposterior Radiograph of the Left Knee showing fracture proximal physis.

Figure 3 Post-operative lateral Radiograph of the same Knee.

restoration of pulse volume after the reduction was achieved. The knee was put in above knee posterior plaster slab with knee in 20 degrees of flexion. The pulses were confirmed to be satisfactory. The pins were removed after 3 weeks and partial weight bearing was allowed after 4 weeks and full weight bearing after 8 weeks. The patient was under follow-up for two years of injury and there was no evidence of growth disturbance and knee function being normal.

DISCUSSION

Fracture of the Proximal Tibial Epiphysis constitute 0.5% – 3 % of all epiphyseal fractures. So it is the one of rare fractures of the epiphysis [1]. The majority cases are male, and are Type II injuries with a peak incidence in between 12 and 14yrs [1-3]. An epiphyseal fracture commonly results from avulsion of the epiphysis by traction through the attached ligaments. A fracture of the proximal tibial epiphysis is, therefore, a rare injury because

Figure 4 Post-operative Antero-posterior Radiograph of the same knee with quite evident trans epiphyseal fracture line in the centre of epiphysis.

of the absence of collateral ligament attachments. The described mechanism of injury in our case is direct impact to the proximal tibia with the knee in extension or hyperextension, with or without valgus or varus strain. Closure of the proximal tibial physis starts posteriorly, making the anterior part more vulnerable; and predisposing this age group to type 1 or 2 Salter-Harris injuries [3]. This may explain why this injury often affects people between 15 and 21 years of age. The detachment of the tibial tuberosity is commoner because of the secondary ossification center of the tibial tuberosity. [4]. A common finding throughout the literature is the difficulty in maintaining the reduction with cast alone [2]. The majority of reports used conservative measures for displaced type I and II salter harris injuries; and open reduction and internal fixation of displaced type III, IV and V [2]. Some authors regret not fixing type I and II fractures, with subsequent loss of reduction and unsatisfactory outcomes. In this case which does fit in Poland classification as a type 4 fracture i.e. complete separation with fracture of the epiphysis; achieving reduction and maintaining it is really a difficult task and has high chances of redisplacement in near future. The chances of growth disturbances and joint complications if reduction not properly achieved in cases of fracture through physis have been documented. So we reduced the fracture separation and fixed it with two k-wires, as it was unstable after reduction under C-arm control. The generalised prognosis differs in between the Salter and Harris and the Proximal tibial epiphyseal injuries [3]. Growth differences being common in type 1 and type 2 salter harris injuries while less common in Salter Harris type 3and type 4 injuries is due to the less trauma to the physis in the latter two [5]. Although, in part this may also reflect the difficulty in maintaining the reduction with cast alone, as this was used in the majority of type I and II injuries and could have contributed to the poor outcomes in this group [6]. This is further supported by our case in which besides the injury to the physis and the epiphysis there were satisfactory

results, which may be due to early and proper internal fixation. We could not find any case of Poland type 4 fracture of the proximal tibial physis being reported. Bukhart et al has reported a comprehensive review of 28 cases of proximal tibial physeal injury from the mayo clinic. This has been the report with highest number of cases [2]. Nicholas et al repoted a case with delayed vascular compromise, while up till now a total of eleven cases of tibial physeal injury with vascular compromise have been reported [6]. As no case of Poland type 4 fracture displacement in the proximal tibial epiphysis being reported until now more cases and evidence is needed for mechanism of trauma as well as recommendation for treatment of such injuries.

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Informed consent

The patient and his father gave informed consent before his inclusion in the study. The study was authorized by the local ethical committee and was performed in accordance with the ethical standards of the 1964 Declaration of Helinski as revised in 2000.

Author contributions

SIB was the surgeon in charge of the patient described within this report. SIB conducted the literature review and analysed the gathered reports for the described injury. SIB composed and wrote the manuscript. The author read and approved the final manuscript.

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