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Transepiphyseal separation of distal Humerus: A case report and review of literature

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Abstract
Transepiphyseal fracture of distal humerus (TFDH) in a infant is a rare injury which is often missed due to lack of ossific nuclei around distal humerus and mistaken for elbow dislocation. Plain radiaographs of elbow fail to detect this injury. We report a case of delayed diagnosis of TFDH in a one year old1 boy which was managed conservatively with good functional outcome.

Keywords: distal humeral epiphyseal separation, elbow, peadiatric, infant, transepiphyseal fracture of distal humerus

1. Introduction
Transepiphyseal fracture of distal humerus (TFDH) or ephiphysiolysis of distal humerus is a rare injury seen in children younger than three years of age [1]. It is least Commonest of all physeal injuries which in all comprise 3.9 %. [2]. The reported incidence of this injury is 1: 35000 births. [3] The diagnosis of this condition is very challenging and in particular differentiating it from elbow dislocation is very difficult and plain radiographs are not
decisive since ossification centers around elbow are not ossified during this age group.

Case Report
One year old male child was brought to accident and emergency by his parents with alleged history of fall few hours back resulting in trauma to his left elbow presenting as pain, swelling and limitation of left elbow movements. Initial X rays of left elbow suggested TFDH. He was seen by on call orthopedic surgeon who treated it by closed reduction and above elbow plaster slab in 100 degrees flexion(Fig 1 /2). On 12th day post trauma follow up antero
Posterior and lateral x- rays of left elbow revealed loss of humero ulnar alignment with post eriorsuperior displacement of radio ulnar complex with early callus formation around distal humerus thus establishing the diagnosis of TFDH with early healing stage. Under General anaesthesia closed manipulation with correction of deformity and application of posterior plaster slab was done on 12 th day of injury (Fig 3).The plaster slab maintained and at 4 weeks plaster splint was removed and child encouraged to start gentle elbow mobilization. On follow up at 14 weeks the TFDH had remodeled well and repeat radiographs showed healed fracture without displacement of bones with full range of movements of left elbow with no deformity without any shortening of affected limb (Fig 4)

Fig 1: Radiograph post trauma. suggestive of TFDH

Fig 2: Radiograph after initial reduction.

Fig 3: Radiograph at 12 days post injury after reduction

Fig 4: Radiograph at 14 weeks after injury showing healing with remodeling of TFDH

Discussion

Transepiphyseal fracture of distal humerus (TFDH) occurs in neonate and children below the age of three years. This is a rare injury was first reported by Camera in 1926. [4] Very few case reports and case series have been published about this condition. This injury is a variant of supracondylar fracture seen in older children. Commonest causes of this injury include birth injuries (emergency caesarian sections and vaginal deliveries) child abuse, falls and direct trauma [3, 5]. Traumatic separation of epiphysis results from rotator shearing forces with fracture commonly extension type with distal epiphysis lying posterior to metaphysis [6].

TFDH has been classified into three groups as per Delees classification:

Group A: TFDH (seen in infants upto12 months age) before the secondary ossification centre of the Capitellum appears without metaphyseal spike usually SH Type 1 physis injury. 2

Group B: TFDH (seen in children 12 months to 03 years of age) with ossification centre of the Capitellum appears with metaphyseal spike indicating SH Type 2 physis injury.

Group C: TFDH (seen in older children between 03 and 07 years of age) with secondary ossification centre of the Capitellum with large metaphyseal fragment which may be confused with lateral condyle or low supracondrylar fractures of humerus.

Clinically TFDH presents with swelling, tenderness and limitation of elbow joint movements Associated with muffled crepitus. Infants below 03 years with swollen elbow and pseudo paralysis secondary to trauma TFDH should be suspected. Differential diagnosis includes traumatic dislocation of elbow, septic arthritis, osteomyelitis and possibility of child abuse or any metabolic disorder should be kept in mind. Diagnosis based on plain radiographs or elbow in newborn or infant is very difficult in absence of ossification centres of distal humerus, proximal ulna and radius. At best plain radiographs shows relationship of radioulnar complex and distal humerus metaphysis. In TFDH the radioulnar complex together with distal humeral epiphysis is displaced posteromedially (Fig 1). Elbow Ultrasonography, MRI scan and Arthrography are helpful in arriving at correct diagnosis. Ultrasonography is a non-invasive diagnostic procedure to differentiate elbow dislocation from distal humeral epiphysiolysis. The cartilaginous epiphysis appears as hypoechogenic structure while the bones appear as highly ecchogenic structure. Moreover periosteal reaction can be seen as early as 7-10 days after injury confirming the diagnosis. [3] However the USG is operator dependent and painful in presence of fracture. MRI scanning is preferred mode of investigation as it visualizes soft tissues and bones in all planes without any manipulation of elbow and no exposure to ionizing radiation. Only limiting factor is that it is not available at all centres and is expensive. Ideally should be performed after the meal when the baby is fast asleep. Anesthesia is rarely required. Arthrography is an invasive procedure with exposure to ionizing radiation and carries risk of infection and usually performed during definitive treatment to demonstrate the injury and is no longer practiced as MRI and Ultrasonography are safer mode of investigations. TFDH even with delayed diagnosis conservative management has shown to have favorable outcome with any residual deformity correcting itself with growth even when anatomic relationship is not maintained initially possibly as in Salter Harris type 1 lesion the entire epiphyseal growth plate remains with epiphysis so damage to growth plate is not common. [3, 5]. Some authors prefer us of intraoperative arthrography and closed pinning for good alignment of fracture and stability in such cases [7, 3].

Limitation of ROM, cubitus varus and rarely cubitus valgus as have been reported as long term complication associated with TFDH [1, 2, 3]. which can be treated in later childhood byosteotomies if required.

Conclusion

TFDH is a rare injury which can be easily missed as it is confused with posterior dislocation of elbow and only high index of suspicion can help in correct diagnosis Diagnosis of this condition can be estabilished by ultrasonography, MRI, Arthrography. Favourable functional outcome can be obtained with closed reduction and plaster cast splint or percutaneous pinning. Cubitus varus is the most common complication described

Conflict of Interest

The author declares he has no conflict of interest.

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