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CASE REPORT

Treatment of a paediatric pathological femoral fracture with a distal tibial locking plate

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Case report

A nine-year-old girl sustained a pathological fracture in the distal femoral metaphysis whilst body boarding in ankle deep surf. Plain radiographs at the local hospital demonstrated a simple fracture pattern through an area of abnormal bone. She underwent a manipulation under anaesthetic and was documented to have an unstable fracture during the reduction and was placed in a long leg cast, with moderate residual deformity. She was then transferred to our hospital. Previously she had complained of intermittent bilateral aching legs of a diffuse nature, which had been diagnosed as "growing pains". Blood test including full blood count, electrolytes, clotting, calcium, liver function and sedimentation rate were normal.

Plain radiographs were interpreted as showing a fracture through a benign lesion that was likely to represent a non-ossifying fibroma, but its exact nature could not be determined. A CT scan was performed which showed residual malalignment and the lesion occupying 60% of the medullary canal in the antero-posterior view and the entire medullary canal in the lateral view (Fig. 1). The CT scan report stated that the lesion was likely to represent a non-ossifying fibroma, but recommended a further opinion from an orthopedic oncologist. The advice from the regional bone tumor service was to perform an open biopsy.

Due to the unstable nature of the fracture and the need for open biopsy the decision was taken to perform internal fixation at the time of biopsy. The fracture was approached through a lateral subvastus approach. Significant periosteal stripping was noted and multiple biopsies were taken from the

Figure 1 CT scan following closed reduction.

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sclerotic edges of an apparent 1 cm defect within the medullary cavity on the medial side, which was curetted. Following reduction, the fracture was stabilised with an A.O. distal tibial locking plate (Fig. 2). This plate utilizes 3.5 mm screws, is 3.5 mm thick and is manufactured from stainless steel. The patient made an unremarkable recovery and was allowed to mobilise protected weight bearing with crutches. No external supports were required in the immediate post-operative period. Five weeks following surgery the patient discarded her crutches and plain radiographs confirmed fracture healing with callus formation and remodeling. Clinical review at five months showed no evidence of limb length discrepancy or malalignment. Radiographs taken at that time show fracture union and no evidence of physeal arrest or malalignment (Fig. 3). Histology confirmed that the lesion was a non-ossifying fibroma.

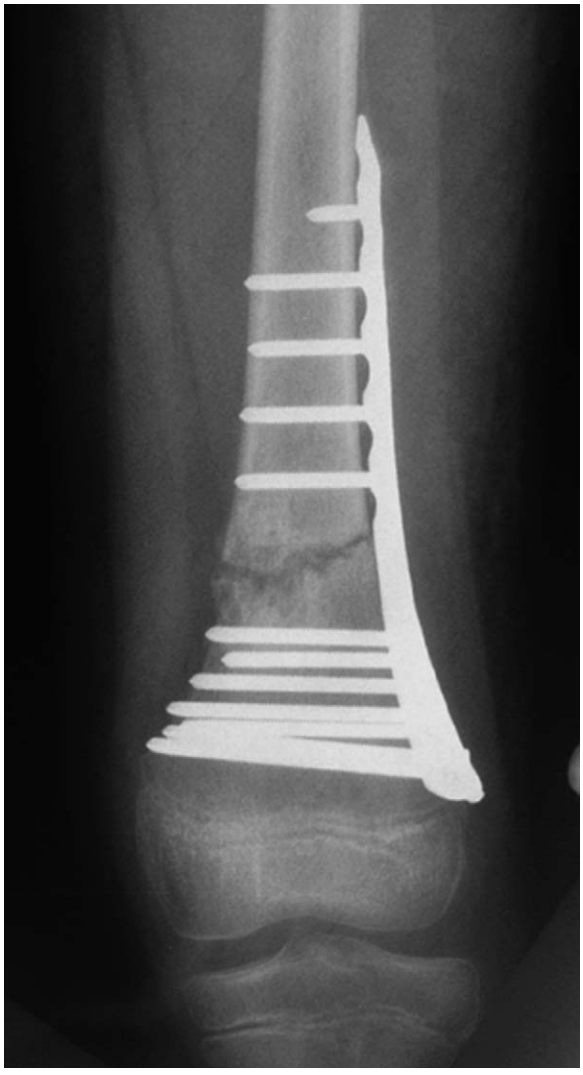

Figure 2 One week post operatively.

Figure 3 Five months post operatively.

Discussion

Unstable or displaced metaphyseal fractures of the distal femur in children can be associated with an underlying musculoskeletal condition and may require surgical intervention. Smith et al.[3] noted that fractures of the supracondylar region of the femur occurred through pathological bone in one third of cases. They found that displaced fractures required surgical intervention and their preferred approach was plate fixation if possible. Arata et al.[1] noted that in their series of pathological fractures through non-ossifying fibromas the distal femur accounted for 17% of cases. They performed biopsy in all cases and recommended curettage, bone grafting and internal fixation in unstable fractures. In undisplaced fractures secondary to metaphyseal fibrous defects Betsy et al.[2] recommended cast

immobilisation until fracture healing followed by biopsy, curettage and bone grafting. They noted that ''infrequently'' internal fixation is required, to achieve stability and healing in unstable fractures.

In our case conservative treatment was not considered appropriate because of the need to obtain an open biopsy and the failure of closed methods to maintain a satisfactory reduction.

The A.O. distal tibia locking plate (Synthes, Glutz Blotheim-Strasse 3, 4500 Solothurn, Switzerland) is designed for minimally invasive application to the distal tibia in adults and this relatively new implant, was released for clinical use in 2002. This implant was deemed to be a suitable implant in this case, because the relatively high concentration of screws in the distal part of the plate would allow adequate fixation in the relatively small area above the physis and below the level of the lesion. The plate required no contouring because it is already pre-contoured to fit the medial aspect of the distal tibia (adult) and in this case was an anatomical fit to the distal femur. The obliquity of the fixed angle distal locking holes in the plate allowed the passage of screws, which were parallel to the physis.

It is acknowledged that this plate is not designed for the immature femur. It was assumed that the forces experienced by the plate in the femur of a nine-year old girl would not exceed those expected in the tibia of an adult. In this case fracture union occurred before any adverse event with regard to the fixation. No reports of this application of the A.O. tibial plate have been reported in the literature and A.O. International have no such reports.

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