COACTION PUBLISHING

Management of pediatric femoral shaft fractures with long intramedullary kirshner wires

Intramedullary titanium elastic nails (TEN) have been used for treatment of the pediatric patients with femoral shaft fractures in the last 15–20 years. They are load bearing devices and are flexible to allow bending. Small incisions are required for introduction of these nails and they are easy to remove. High cost is a disadvantage. However in the developing countries, where cost and affordability are a concern it is not feasible to use titanium elastic nails. In my centre, the titanium rigid intramedullary nails were available but not the elastic and flexible nails. Risk of avascular necrosis of the femoral head exists when done in skeletally immature children. Entry point at pyriformis fossa may injure the lateral epiphyseal vessels leading to avascular necrosis of the femoral head, whereas entry point at the trochanteric tip may cause damage to the trochanteric physis with advancing growth of the child. Rigid intramedullary nailing is probably best reserved for children over 12 years of age.

Due to the unavailability of titanium nails, we used stainless steel Kirshner wires as an intramedullary device in the treatment of 14 children – 11 boys and three girls (age 5–12) – admitted to *Sebha medical Centre, Sebha, Libya*, between September 2009 and December 2010 with a diaphyseal fracture of the femur. All were closed fractures with no neurovascular compromise.

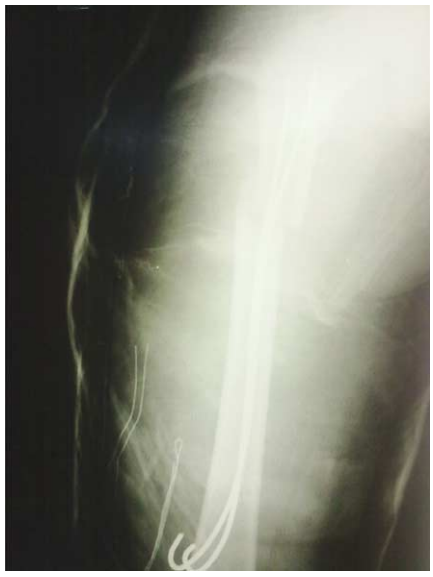

Fig. 2. Postop xr ap view.

Eleven children sustained motor vehicle accidents and three sustained falls from height. Two patients also had Salter Harris type 2 injury of distal radius. Fracture pattern was transverse in eight, spiral oblique in five and comminuted in one. Nine fractures were middle

Fig. 1. Preoperative xr.

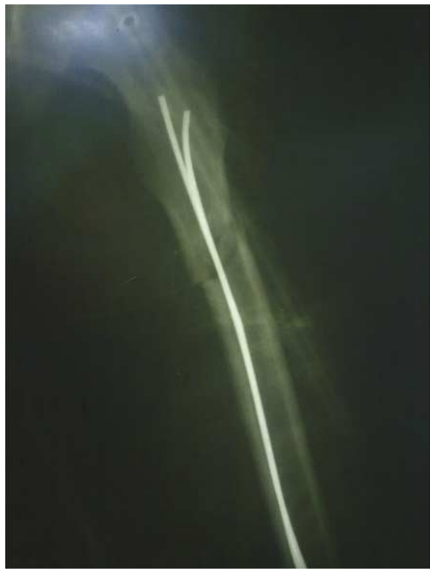

Fig. 3. Lateral post op xr.

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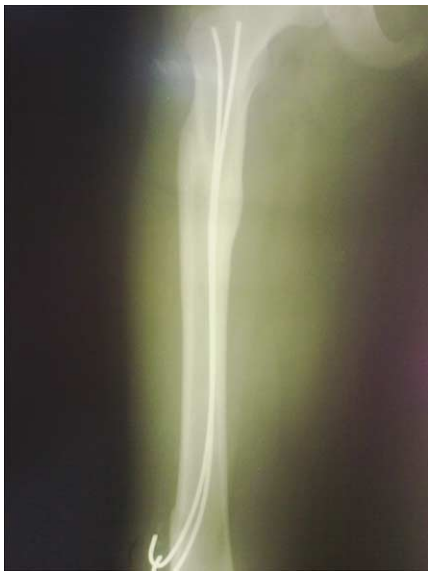

Fig. 4. Healed fracture.

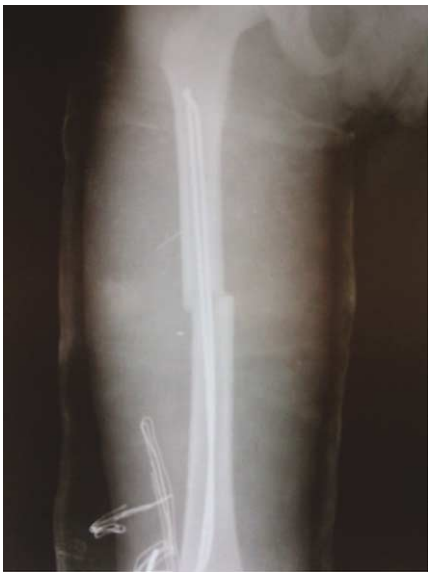

Fig. 6. Post op xr ap view.

third, three were proximal and two were distal shaft fractures. Skin traction was given for all patients. All patients underwent preanaesthetic checkup and were taken up for surgery within 24–48 h.

Fractures were treated by closed intramedullary 'K' wire stabilization. Constant diameter of 3 mm was used. The patients were operated in a lateral position on radiolucent. The lower limbs were positioned to keep the other leg at an angle to not interfere with the C-Arm positioning. Wherever possible two 'K' wires were passed both from lateral aspect of lower femur above the physis. In one patient upper end of lateral femur was chosen as entry point due to fracture location. Incision was deepened until cortical exposure after incising periosteum. A 3.2 mm drill bit was used to make a pilot hole in the lateral cortex. Next, an angled awl was used to enter the medullary cavity. The pointed tip of the 'K' wire was cut off and the tip slightly bent. The 'K' wire was then pushed with a Jacob's Chuck until resistance was met and then gentle hammering allowed the curved tip to slide the inner cortex. Under C-arm control the fracture was reduced and the wire was passed through the fracture site in to the proximal fragment. On one occasion, minimally invasive open reduction was done to facilitate reduction and pass the 'K' wire across the fracture site. Wherever possible, two wires were passed. In very small children with narrow medullary canal, one wire was deemed

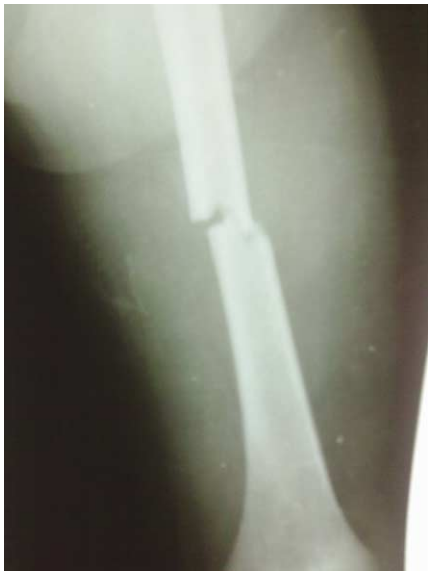

Fig. 5. Pre op xr.

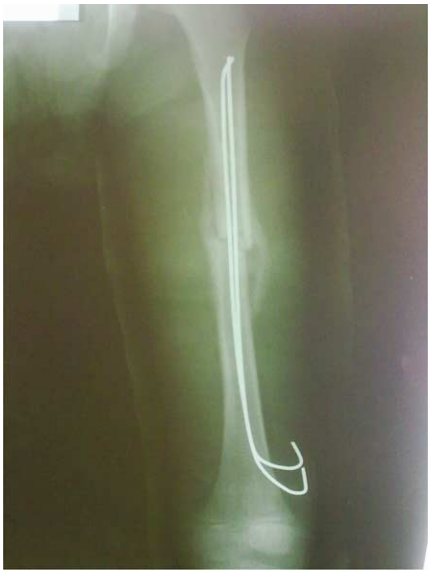

Fig. 7. Healing fracture.

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appropriate. The wires were positioned in divergence and the tip was anchored around 1–2 cm distal to the physis. The wire was cut distally after bending to allow it to lie along the lateral cortex. Where required, the second wire was introduced slightly proximal or distal to the first wire.

Post-operative, above-knee cylinder cast was given in approximately 45° of knee flexion, for 4 weeks after which it was removed and fresh above-knee cast in extension was applied. Partial weight bearing was allowed as per the tolerance.

All fractures were radiologically united at around 8 weeks (6–10 weeks). Sequential radiographs are shown in Figs. 1–7. One patient had 1.5 cm limb length discrepancy. None of the patients had any joint stiffness. The 'K' wires were removed in all patients at around 9–12 months postoperative. There was no refracture. Thirteen children had a good result and one case had a satisfactory result as per Flynn's criteria.

Hence, long and thick Kirshner wires were used to stabilize the fractures; supine position requires use of fracture table and continues traction. We have performed all the surgeries in lateral position on a simple radiolucent table and do not feel that fracture a table is necessary unless the operation is delayed by over a week. Instability and angulation can be a concern with 'K' wire fixation but with a postoperative cylinder cast in 45° of flexion for 4 weeks, there was no evidence of any angulation at the fracture site.

In conclusion

Intramedullary 'K' wire fixation has a place in the management of pediatric diaphyseal femoral fractures, because it is technically simple, quick to perform, safe and reliable and avoids prolonged hospitalization. However, meticulous attention to surgical technique is of paramount importance. It is albeit less rigid than the titanium elastic nails but in the absence of the latter, it affords a cheap and easily available method of osteosynthesis.

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