

Rigid Nail Fixation in Malunited and Delayed Treated Femoral Fractures in Children Aged 9-12 Years

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ABSTRACT

A total of 40 children in the age group 9-12 were selected. They had malunited fractures or fractures which had a shortening of at least 2.5 cm and were treated at least 2 weeks after injury. All these patients were treated with open retrograde K nailing using rigid hand reamers. The fractures united between 2-6 months. 39 nails were removed between 6-18 months from surgery. There was one infection which settled after nail removal at 3 months. There were no incidences of malunion, non union, refracture, varus, valgus. There was no significant leg length discrepancy (>1.5 cm), in particular there was no incidence of avn of the femoral head.

METHODS AND MATERIALS

A total of 40 cases were included in this study. Out of these 15 were malunions and 25 were cases treated later than two weeks after fracture with an overlap greater than 2.5cm. Patient age group was 9-12 years. The patients were followed up for at least 3 years. 10 of these patients were seen up to 10 years after their femoral fractures for reasons other than those related to femoral fracture surgery. These patients had their fracture sites opened, fractures reduced manually. The medullary canal was either reamed with rigid hand reamers or not reamed at all. The reamers were introduced from the fracture ends and passed up and down the proximal and distal fragments. Proximally the piriform fossa was pierced with caution in order not to disturb the medial circumflex artery (MCA). Rigid Kuntscher nails were passed retrogradely into the proximal fragment, pushed gently through the piriform fossa, fracture reduced manually and the nail was then pushed distally across the fracture into the distal fragment. In case of length stable fractures, the patients were mobilised at 48 hrs. In 3 cases which were length unstable weight bearing was delayed for 6 weeks.

RESULTS

40 patients aged between 9-12 years with a minimum follow-up of 3 years were selected. 15 were malunions and 25 had their treatment delayed for longer than 2 weeks because of late presentation. All these fractures united within 3-9 months with an average of 4 months. There was no incidence of malunion, non union, refracture, shortening greater than 1.0 cm, varus or valgus. Most importantly there was no

incidence of avn of femoral head. 10 of these patients were seen as late as 10 years after their initial fracture surgery. These late reviews were not related to their fracture treatment but because of other orthopedic problems.

All nails, but one, were removed after 6-18 months of surgery.

Only one of these patients developed an infection which settled after removal of nail at 3 months following fracture union.



Fig. 1:

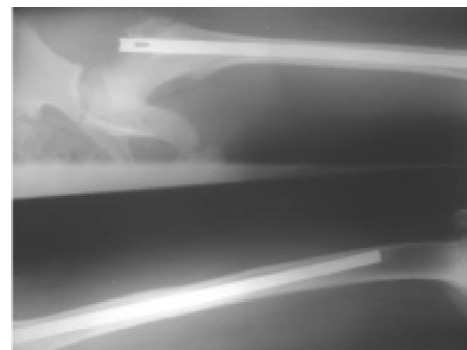


Fig. 2:

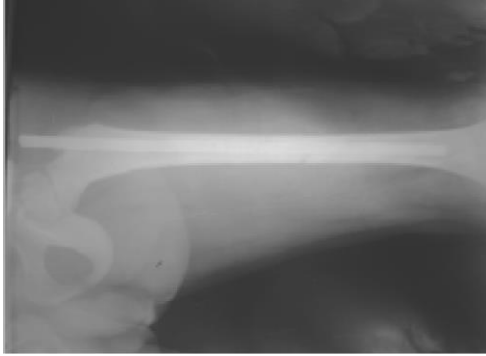


Fig. 3:

DISCUSSION

The treatment of femoral shaft fractures in children is generally conservative. However, in the case of 9-12 olds with malunions or overlap of fragments greater than 2.5cm and treatment delayed for longer than two weeks, the treatment options become radically limited. The ideal operative treatment for diaphyseal fractures is closed flexible nails which is not possible in these cases because you need to open up the fracture to reduce it and once reduced flexible nails are not strong enough to keep the alignment of the fragments.

External fixators are associated with a high incidence of pin tract infection of up to 37% as well as refractures and plastic deformation of bones.

Another option is plates and screws. However, in the soft young bone the purchase of the screws is weak and it is likely that the screws might come loose. This requires the patient to be kept non-weight bearing till the fracture has almost united. This problem has been addressed to an extent by the advent of locking plates. However, locking plates in the third world are a prohibitively expensive option. Another disadvantage of plates is that you need to make rather large incisions first to put them in and then to remove them.

Rigid locked or unlocked nails have been used routinely in children older than 12 years and are considered safe because the trochanteric apophysis damage is averted. In 9-12 year olds the ideal fixation is considered to be flexible retrograde closed nails. However, if the fractures are treated 2 or more weeks of injury you have to open up the fracture site and you need an implant sturdier than flexible nails. The use of rigid nails in this group is highly controversial with the possibility of serious complications and this was undertaken with extreme care and performed by senior consultants.

In our study we have used rigid Kuntzner nails which are cheap and strong enough to withstand

the excessive forces at work when the fractures have been treated late. The arguments against the use of rigid nails is the possible damage to the greater trochanter apophysis and damage to the MCA leading to AVN of the femoral head. These neglected fractures needed to be opened up in order to obtain reasonable reduction. This enabled us to perform retrograde reaming. This was performed with a rigid hand reamer and the pyriform fossa was perforated carefully in order to minimize damage to the MCA.

Technically the advantage of rigid nailing is a sturdy fixation leading to early mobilisation. The removal of nail did not require a large incision over the fracture site. All fractures united without any refractures, damage to apophysis, malunion or AVN of femoral head. The use of rigid manual reamer introduced retrograde probably prevents the damage to MCA. There was only one infection which was easily controlled.

CONCLUSION

Of all the options available for the fixation of late treated femoral diaphyseal fractures rigid nailing of fractures was performed. The potential complications listed in the use of these nails were not encountered. Excellent results i.e., 100% union rate and almost no serious complication was seen. It is therefore recommended that rigid nails may be used to fix all late treated fractures of femoral shaft in 9-12 yrs (and beyond) that require the fracture site to be opened up so that you can pass the reamer (rigid) retrograde.

However, in case of primary fixations for femoral shaft fractures in this age group may still be closed flexible retrograde (Nancy or Ender) nails because the proximal apophysis is avoided and the MCA is not at risk.

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