

Closed Interlocked Nailing Of A Fractured Femur Without X-Ray Guide In First Trimester Pregnancy: A Case Report

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Abstract

Diagnosis and treatment of fractures of the long bones of the lower limbs in pregnant patients in the first trimester present a peculiar risk of exposing the foetus to ionizing radiations during X-ray evaluation and X-ray guided treatment, which may cause deranged embryogenesis. The mother is also at risk of having deep vein thrombosis from prolonged confinement during non-operative treatment with traction. The alternative to conservative treatment which is open reduction and internal fixation in the first trimester of pregnancy, apart from the complications that follow surgery and anaesthesia, is reasonably safe.

We are reporting this case to highlight a technique of closed interlocked intramedullary fixation of a comminuted diaphyseal femoral fracture which was devoid of radiation risk to the patient and foetus because no X-ray imaging assistance was used and did not require a special targeting device and the fracture table.

CASE REPORT

I. J. is a 23 year- old pregnant woman who fell from a storey building which had no protective railings. She landed on her right side and noticed painful swelling and deformity of the right thigh with inability to get up and walk. She did not suffer any other injury. Initial x-rays revealed a displaced comminuted fracture of the right femur.

During secondary survey, she gave a history of amenorrhoea of 8 weeks duration. Ultrasound scan showed a gravid uterus of 10 weeks gestational age.

Her packed cell volume was 30% (haemoglobin concentration was 10g/dl). Electrolytes and urea, and fasting blood sugar levels were normal. She was evaluated by the obstetricians who excluded threatened abortion. She had closed reduction and internal fixation with a size 13mm/40cm Kuntscher nail which was modified to enable application of one proximal and two distal interlocking screws. The C-arm image intensifier was not used during this procedure because of the risk of irradiation to the foetus. The estimated blood loss at surgery was 400ml. The entire procedure which lasted 118 minutes was done under epidural anaesthesia 48 hours after the injury.

OPERATIVE PROCEDURE

Informed consent was obtained from the patient.

The patient was placed in the supine position under epidural anaesthesia with a sand bag under the ipsilateral gluteal region with the trochanteric bulge of the same side at the edge of the operating table. The skin was prepared and draped with the ipsilateral lower limb draped free.

Prophylactic antibiotics (Ceftriazone 1gram and metronidazole 500mg) were given intravenously. The greater trochanter was exposed through a longitudinal skin incision. The piriform fossa was located with the gloved finger and an awl (Herzog awl) was used to perforate it to gain access to the proximal end of the intramedullary canal. A blunt tipped 2mm guide wire was introduced into the proximal fragment. A longitudinal incision was made over the lateral condyle of the femur and developed to expose the condyle. The intramedullary cavity of the distal end of the right femur was exposed through a longitudinal anterolateral cortical window that was made on the lateral condyle. The limb was put under traction through the ipsilateral ankle by a scrubbed assistant while counter traction was applied by a non-scrubbed assistant whose hands were placed under the axillae. The guide wire was advanced into the distal fragment at the third attempt. Confirmation of distal intramedullary placement of the guide wire was made by visualizing the wire through the cortical window. The intramedullary canal was reamed over the guide wire with hand-held, hollow reamers to size 14. A size 13mm/40cm Kuntscher nail was then inserted over the guide wire which

was removed after the intramedullary nail had been advanced well into the distal fragment. The nail was advanced further with the aid of a mallet and punch until only 1.5 cm of it was projecting beyond the greater trochanter. Another nail of equal length and size was placed parallel to the one in the intramedullary cavity and used as a rough guide to the likely site for interlocking screws placement. Complementing this with the use of a malleable probe inserted through the cortical window we were able to identify the transverse holes in the K-nails and place two distal interlocking screws before inserting a single proximal screw. The wounds were irrigated with normal saline and closed in layers using nylon 2.0 for skin without drain.

She had post-operative intravenous ceftriazone 1gm daily for 72 hours and 500mg of metronidazole 8hrly for 24 hours. Intramuscular injection of 100mg of tramadol hydrochloride was given 8hrly for 72 hours as well as daily intramuscular injection of 75mg of diclofenac sodium for 5 days. Subcutaneous enoxaparin 40mg daily was given daily for seven days starting from the first day after surgery. She commenced soluble aspirin 75mg daily from the second day after operation and completed a 4 week course of it. The right lower limb was elevated on a pillow for 5 days. She commenced static quadriceps exercises on the 3rd day after the operation and was ambulated on a pair of axillary crutches (Non-weight bearing) from the 5th day after surgery. All stitches were removed on the fourteenth day after operation and she was discharged home the next day. She was lost to follow up at 14 weeks after the operation. Within the period she was available for follow-up, there was no wound infection, no limb length discrepancy or implant failure.

Figure 1

Figure 1: Pre-operative X-ray



Figure 2

Figures 2a and 2b: Post-operative X-rays



Figure 3

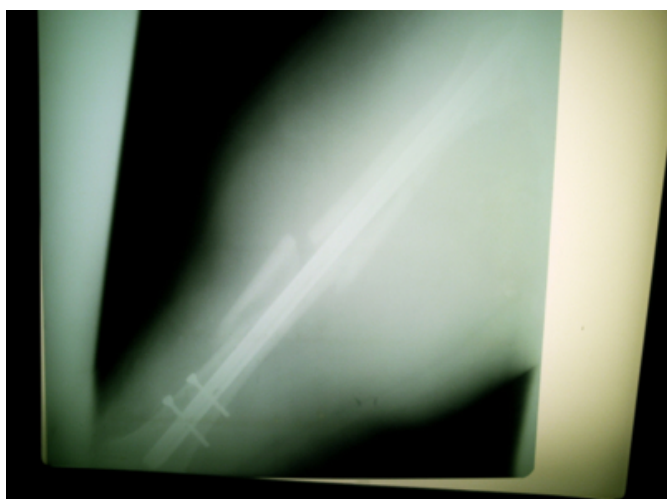


Figure 4

Figures 3a, b and c: Intraoperative views of the limb, Proximal and distal ends of the nail



Figure 5



Figure 6



DISCUSSION

This case is being reported because of the peculiarities of doing closed reduction and internal fixation under x-ray guide in the first trimester of pregnancy when there is a reasonable risk of radiation injury to the foetus,^{1,2} and the satisfactory application of an interlocked Kuntscher intramedullary nail without the aid of a targeting device, fracture table or an X-ray guide. The safest approach to the treatment of fractures in pregnant women would depend on the age of the pregnancy. Literature on operative treatment of fractures in the first trimester of pregnancy is scanty.

The traditional fear for surgery and anaesthesia in the pregnant patient is the risk of induced abortion. The options of treatment available to us in this patient were skin traction on a Thomas' splint or open reduction and internal fixation with either plate and screws or intramedullary nail. In this patient we opted for the interlocked intramedullary nail because of its superiority in maintaining length, rotational and axial stability and facilitating union in comminuted fractures of the femur.³ The risk of deep vein thrombosis that would follow prolonged immobilization with traction was an added consideration. With this risk in mind operative treatment was undertaken within 48 hours of the incident to enable early mobilisation.

The requirement of radiographic guide for standard closed reduction poses risks to the foetus which mainly involve disorders of embryogenesis which may lead to abortion or congenital anomalies. In this case, we were able to access the benefits of interlocked intramedullary nailing, without using intra-operative X-ray guide, a fracture table or a targeting device, by adopting an unusual operative

procedure. This procedure which enabled the operative treatment of a comminuted fracture of the femur in a pregnant woman without exposing the foetus to irradiation has added a new dimension to the use of interlocked nails for fixation of fractures after closed reduction and opens an opportunity for use of this method of fixation in hospitals in developing countries where an image intensifier is unavailable. This should be of value in developing countries in the tropics where the majority live on less than one United States Dollar per day and there is largely no effective means of financing their health care needs and this is without prejudice to the probability that hospitals in such places may not have facilities such as the C-arm X-ray machine, fracture table and conventional targeting device. In such settings, converting a regular K-nail to an interlocking nail simply increases the number of patients that can afford interlocked nailing whilst the modification in technique increases the number of facilities that can undertake such procedures.

Kanellopoulos et al had described this anterior cortical window access for distal locking as a salvage technique for distal locking which they resorted to as a result of malfunction of the image intensifier.⁴ In this particular case the technique became a handy solution to a dilemma over the approach to osteosynthesis of a comminuted femoral fracture in a patient with early cyesis. This technique ostensibly opens a new opportunity for patients in underprivileged societies to benefit from the superiority of interlocked intramedullary nails over the unlocked Kuntscher nailing which is still in common use in such settings.⁵

In addition, operating room personnel including the principal surgeon are at risk from ionizing radiations during image intensifier guided intramedullary nailing⁶ and this risk in developing nations where surgeons are overwhelmed by the volume of patients may exceed safe limits. In conclusion, when viewed in the light of the dearth of equipment, unreliable healthcare financing and inappropriate maintenance of equipment to ensure radiation safety for patients and health personnel, we hereby make a case for the evaluation and modification of this technique for widespread use.

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