

OSTEOSYNTHESIS IN A CHILD WITH INFECTED NON-UNION NOF, NECK RESORPTION, AVN & IMPLANTS INSITU—A CASE REPORT

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ABSTRACT

Non union is one of the commonest complications of intra-capsular fracture neck of femur in children as well as in adults and it is the most challenging problem to treat if femoral head salvage is attempted. Another common complication is avascular necrosis (AVN) of the femoral head with most reported incidences being <15% (range 0% to 67%), which is similar to the complication rate with non-neglected femoral neck fractures. We are reporting a case of a 10 year old boy who underwent closed reduction and internal fixation with cannulated cancellous screws elsewhere, for Delbert type III fracture neck of femur, which subsequently got infected with a draining sinus, and went in for non-union and AVN of femoral head, with complete resorption of the neck in 4 months time. We received the patient at that stage. He was managed by two stage surgery. Initially the implants were removed, the screw tracks curetted out and filled with antibiotic sponge. After the infection was eradicated, osteosynthesis and neck reconstruction was done using fibular strut and cancellous grafts through modified Watson Jones approach and anterior capsulotomy. We avoided metal implants for fear of infection, and therefore also a subtrochanteric osteotomy. A hip spica cast was given for 6 weeks. The neck length was restored, vascularity restored and fracture united with an excellently functioning hip.

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INTRODUCTION

Fractures of the femoral neck in children are not common¹. They represent fewer than 1% of all the paediatric fractures². However, complications accompanying these fractures are frequent—specifically avascular necrosis, non union and early closure of the proximal physis of the femur—resulting in decrease of neck length and *coxa vara*. The incidence of non union varies from 7 to 10%, depending on the location of the fracture in the neck of femur.^{2,3,4} Delbet was the first to describe the fractures of the femoral neck. He published the first classification in the French litera-

ture. Since then, Colonna⁵ has quoted the Delbet classification, which is still accepted in all the literature regarding this subject, and Ratliff⁶ has described the evaluation criteria of the results, based on the presence of pain, joint mobility and the child's capacity to maintain a daily activity.

Most of the articles in the literature support bone grafting and a valgus osteotomy with some sort of fixation.⁷ Only few cases have been reported with non union neck of femur treated by fibular strut graft alone without fixation and osteotomy. We feel that our case was unique due to presence of infection which makes the situation





FIGURE 1. Post injury X-Ray Delbert type III fracture neck of femur.



FIGURE 3. When he presented to us - non union, AVN, neck resorption, implants cut out.



FIGURE 2. Initial fixation done elsewhere.



FIGURE 4. Fluoroscopy image showing non union and neck resorption.

complicated. Here, we report a case of paediatric femoral neck fracture which went in for all described complications including AVN, non union, infection and neck resorption which was managed successfully by staged surgery. In the first stage eradication of infection and in second stage osteosynthesis and neck length restoration was attempted.

CASE PRESENTATION

A 10 year old boy sustained fracture neck of right femur following a fall from a tree 4 months back and was initially treated elsewhere by closed reduction and cannulated cancellous screw fixation. Osteosynthesis however failed due to infection and poor fixation. He presented to us with non union, neck resorption, avascular necrosis of head of femur and infection with implants in situ.

His WBC count (13000 cells/cu.mm), ESR (40 mmhg/hour) and CRP (110) were elevated. X-Ray showed loosening of implants with surrounding osteolysis. He was managed in two stages. Initially implants were removed, debridement was done, screw tracks were curetted out and antibiotic sponge kept inside the tracks. Patient was also started on antibiotics. Once the infection got settled and the CRP became normal after two months, he was taken up for second stage surgery. He was treated by autologous fibular strut grafting and cancellous graft packing through a Modified Watson Jones approach. Intra-operatively he was put on traction table, reduction and alignment was checked under C-ARM guidance. We were able to restore the length of the neck with fibula graft under C-ARM guidance and cancellous graft harvested

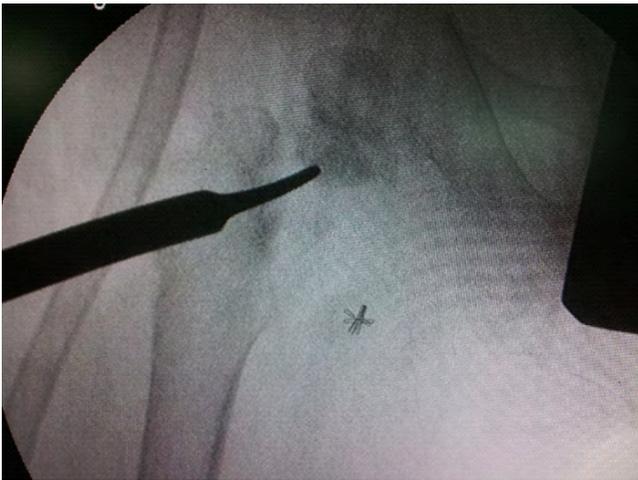


FIGURE 5. Fracture reduction.

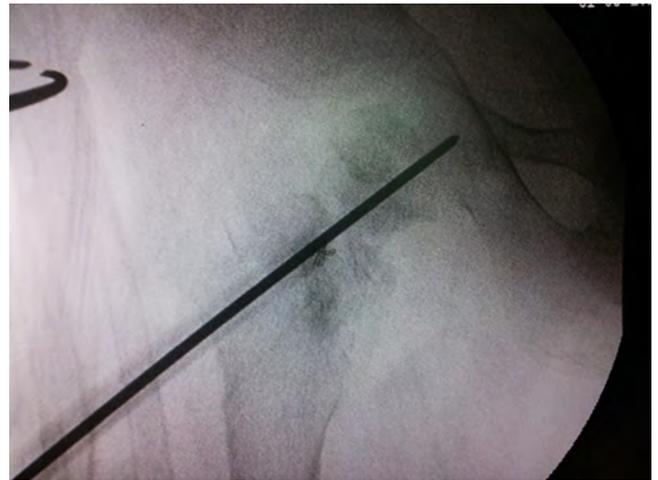


FIGURE 7. Insertion of fibula strut graft after reaming canal for graft.



FIGURE 6. Guide wire insertion fracture gap filled with cancellous graft.

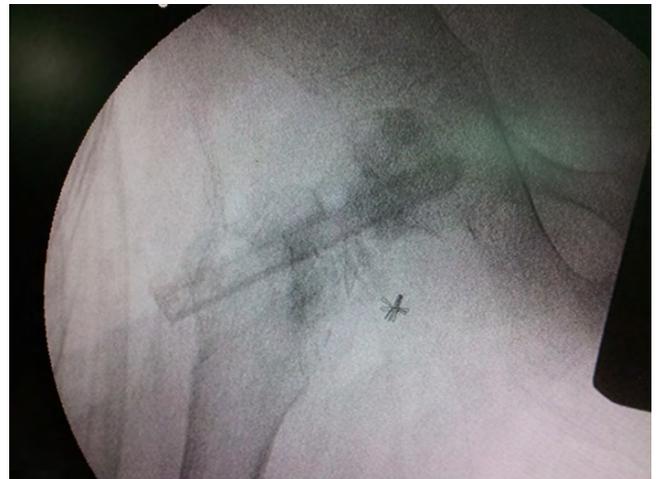


FIGURE 8. After graft placement.

from iliac crest was filled around fibula graft bridging fracture site through anterior capsulotomy.

Patient was immobilized in hip spica cast for 6 weeks, at which time plaster was removed and X-ray taken. Gradually hip and knee were mobilized. He was reviewed every month with radiographs which showed good union of fracture site. Vascularity of the head of femur spontaneously improved. Partial weight bearing with the support of walker was initiated at 3 months post op, with gradually increased weight bearing. Fracture consolidated by 6 months.

At present his fracture is completely united and vascularity of head of femur regained. He has got 1 cm shortening of limb and is back to school walking painlessly without support. Since the proximal physis is fused, we anticipate worsening of the present limb length discrepancy, which we plan to correct later.

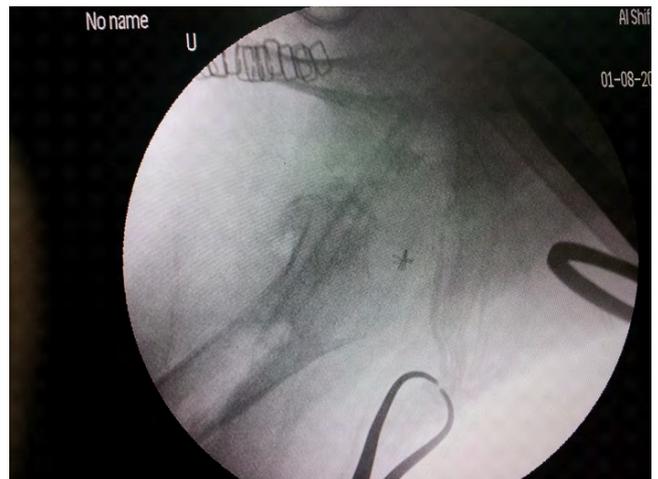




FIGURE 9. Post op X-Ray on hip spica cast.



FIGURE 11. X-ray at 6 months follow up showing fracture united, Shenton's line reformed, vascularity improved.



FIGURE 10. At 3 months follow up.

DISCUSSION

Fracture neck of femur in children is a rare injury and can lead to many complications. Nonunion and AVN are very common complications which is nearly equal in neglected and treated cases of fracture neck of femur.⁸ Infection further adds to the challenge in treating these cases. We had the chance to treat such a patient with failed osteosynthesis neck of femur with all known complication like infection, pseudoarthrosis, avascular necrosis and neck resorption. Investigation of nonunion of neck of femur should include TC, DC, ESR and CRP to rule out infection especially in failed osteosynthesis. MRI may be required if x-ray features are not conclusive of vascular status of head of femur. In the literature there are few articles about treating this challenging problem. All are supporting valgus osteotomy with some sort of fixation, few are supporting



FIGURE 12. At six months post op.

fibular grafting and cancellous screw fixation,^{4,9} but all concerning situations without infection.

We planned to tackle the infection first and go for osteosynthesis with bone grafting alone without osteotomy or use of any hardware for fixation, in view of the subsided infection. Fibular strut graft gave a very good structural support and also helped us to maintain the neck length. Cancellous graft helped in fracture healing and to some extent improve vascularity of

femoral head which made him walk again. Patient may have LLD which is to be addressed at skeletal maturity.

CONCLUSION

Although fracture neck of femur in children is a rare injury, complications are very common and challenging to treat. Thorough investigations are a must before treating these complications of neck of femur fracture. Infection must be ruled out in failed osteosynthesis. In selected cases fibula strut grafting and cancellous grafting allow neck reconstruction and fracture healing without fixation in children. Initial immobilization with spica cast and close follow up and monitoring during post operative period is essential to achieve the goal.

CONSENT

The patient's parents have given their informed consent for the case report to be published.

AUTHORS' CONTRIBUTIONS

YK analyzed and interpreted the patient data, MK diagnosed the condition, performed the surgery and was a major contributor in writing the manuscript.

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