

Crossed Steinmann Pin Fixation In Supracondylar Femur Fractures In Adults A Case Series

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Abstract

Supracondylar femur fractures in adults is a complex fracture constitutes approximately 1% of total fractures and 4-7% of all femoral fractures (Kolmert, 1982)¹. There is a bimodal distribution, with young patients with high energy trauma and elderly patients with low-energy falls. Approximately 85% of these fractures occur in patients over fifty years old (Shewring, 1992)². Treatment of the fracture depends on the fracture pattern, the amount of displacement and comorbid illness. Although internal fixation with plating devices is recommended by current orthopaedic guidelines in management of orthopaedic trauma, but in certain conditions like in an osteoporotic skeleton (old age patients which constitute the second and most affected peak as per the bimodal age distribution for this fracture) wherein these implants are expected to fail due to inadequate cortical hold resulting in screw back out. Also in open cases and in otherwise immunocompromised individuals wherein there is a high risk of post surgical wound infection and in cases wherein the comorbidities of the patient makes it impossible to carry out such invasive procedures and in highly comminuted fractures where it is impossible to maintain adequate reduction treatment with cross Steinmann pin fixation is a viable option. Cross Steinmann fixation technique is least invasive technique while still offers a considerable deal of rotational and vertical stability to such fractures. Moreover it's use in pediatric distal femoral physeal injury is accepted as per AO guidelines. We used crossed Steinmann pin fixation in 20 adult patients of supracondylar femur fractures for indications as stated above and found acceptable union rates comparable with those obtained using internal fixation devices.

Introduction

Of all femoral fractures, approximately 4-7% are distal femur fractures (Kolmert, 1982)¹. There is a bimodal distribution, with young patients with high energy trauma and elderly patients with low-energy falls. Approximately 85% of these fractures occur in patients over fifty years old (Shewring, 1992)². The incidence of supracondylar fracture after total knee arthroplasty is

approximately 1%. The treatment of this complex fracture remains a dilemma. There are no strict guidelines to follow and treatment is rather individual based. Treatment options depend on age of the patient, the type of fracture anatomy, the comorbid illnesses associated and its compounding.

While treatment with internal fixation devices is the recommended plan of action in these cases as per current orthopaedic guidelines, but in certain orthopaedic conditions like in old osteoporotic patients wherein there is a high risk of implant failure due to inadequate cortical hold, in patients with open fractures uncontrolled Diabetes and other immunocompromised individuals where there is a high chance of post operative infection and in patients with large cortical comminution wherein it is impossible to maintain length and an anatomical stable reduction, treatment with crossed Steinmann fixation is a viable option.

Materials & Methods

A total of 20 adult patients with supracondylar fracture were included in the study. Inclusion criteria included

- Old patients > 60 years of age
- Immunocompromised patients
- Open fractures
- Patients with infected implant in situ with implant failure
- Comminuted fractures
- Other causes of implant failure
- Uncontrolled DM

All other patients other than these indications were excluded from the study.

The patients were operated and crossed Steinmann fixation done using multiple Steinmann pins after attaining a stable anatomical reduction under fluoroscopic guidance. These patients were kept on a Above Knee cast for a duration of 4-6 weeks (mean duration of immobilization 5.6 weeks) and then transitioned to a hinged knee brace and partial weight bearing / Toe touch allowed. Radiographs at regular intervals are necessary to assess fracture healing. Patients may be seen initially at 2 weeks postoperatively followed by monthly intervals until the radiographs show a sign of union (3 out of 4

cortices). Full weight bearing was allowed only when radiological evidence was available suggestive of union. The pins were removed after 1 year of surgery

Observations

Out of 20 patients included in the study radiographic union was obtained in 16 cases and 4 cases required secondary Bone Grafting procedures. There was no specific time frame for the same as it was dependent upon the amount of comminution in the fracture fragments. However 16 cases had a radiographic union within 5 months of surgery. Post operative ROM exercises were started after the period of immobilization (4- 6 weeks) and average knee flexion of 94.7 degrees was achieved in these cases. There was no knee stiffness and no hardware related complications were seen in any of these cases. Varus collapse was seen in 2 cases who had extensively comminuted fractures.

Discussion

Although treatment with internal fixation devices is the currently the treatment of choice in supracondylar femoral fractures its use in many patients with concomitant comorbidities warrant special attention. This is in particularly referring to cases wherein there is susceptibility of implant failure either due to condition of the bone (osteoporosis) or due to sepsis (open fractures, immunocompromised individuals , uncontrolled DM) and in cases where the comorbidities do not allow to carry such invasive procedures crossed Steinmann pin fixation is an excellent alternative as it gives a certain amount of vertical and rotational stability , better alignment of fracture fragments, allows for early knee mobilization reduces hospital stay has no hazards of mechanical implants but at the same time retaining all the benefits of conservative management. We have used this technique in about 20 patients mostly belonging to elderly age group and found acceptable union rates to the tune of 80 percent. 4 cases out of 20 suffering from extensive bone loss however had to undergo secondary revision bone grafting procedures and 2 patients suffered from varus collapse. However there was no post operative infection in any case , some cases reported with hardware loosening probably due to shorter immobilization period . but there was no knee stiffness in any case as this form of fixation allows for early mobilization and has no associated hardware related fibrosis around the joint tissue .

Average ROM in these patients was to the tune of 94.7 degrees.

Conclusion

We concluded that crossed Steinmann fixation is an excellent alternative to internal fixation in supracondylar fractures of femur wherein the risks of the surgical procedure outweigh the benefits of the same. While this procedure retains all the benefits of conservative management it lacks all hardware related complications. It has a low rate of knee stiffness as it allows for early mobilization and has no post operative infection and reduces the hospital stay.

References

1. Kolmert L, Wulff K. Epidemiology and treatment of distal femoral fractures in adults. *Acta Orthop Scand* 1982;53:957-962.
2. Shewring DJ, Meggitt BF. Fractures of the distal femur treated with the AO dynamic condylar screw. *J Bone Joint Surg Br* 1992;74:122-125.

Illustrations

Illustration 1

Pre Operative roentgenogram of an old patient with comminuted Supracondylar fracture femur



Illustration 2

Intra Operative fluoroscopic AP view with Steinmann pin in situ of the same patient



Illustration 3

Intra Operative fluoroscopic lateral view with Steinmann pin in situ of the same patient



Illustration 4

Post Operative AP view roentgenogram of the same patient



Illustration 5

Post Operative Lateral view roentgenogram of the same patient

