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Management of Peri-Implant Supracondylar Fracture Femur – A Study of 20 Cases

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Abstract: *Fractures around implants are generally termed as peri implant fractures and those around joint replacement prosthesis as peri prosthetic fractures. Management of a secondary fracture with an implant in situ is always difficult because of the limited availability of implants and limited exposure. Here we report 20 cases of Peri-implant fractures which were managed successfully (95%) without disturbing the primary implant in situ by placing an additional distal femoral locking plate and fixing with unicortical locking screws over a period of 3 years.*

I. Introduction

Peri implant fractures of femur are on the increasing trend in recent past. Hence management of such fractures is definitely a challenge to the orthopaedician. Supracondylar fractures are generally a result of high velocity trauma in younger age group whereas associated osteoporosis additionally contributes to these fractures in elderly. The difficulties feared to be encountered are decreased bone mass and increase in the brittleness of the bone[1].These two factors play an important role in deciding the type of fixation. Locking plates and screws are designed to accurately manage fractures with osteoporosis[2]. Fractures around implants pose unique fixation challenges. A fracture is defined as a newly formed defect in cortical bone whilst a peri-implant fracture is specifically one that occurs in proximity to an implant. The original placement of the implant may predispose to later fracture, the long-term presence of the device may change the structure of the bone and increase susceptibility to fracture, and the implant itself may interfere with healing or the placement of other fixation devices[3].As more peri-implant fractures occur, the orthopaedic surgeon needs to learn methods to manage the specific problems involved. The method of treatment is well established particularly in peri trochanteric fractures and femoral shaft fractures, but there is still a lot of ongoing debate about the fracture of distal part of the femur.

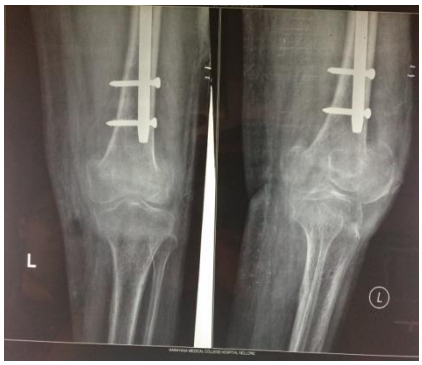
II. Methods And Materials

Here we had done a study on 20 cases of peri implant fractures with an intramedullary interlocking nail in situ. Initially a fresh fracture shaft of femur was treated with an IM interlocking implant resulting due to a road traffic accident or fall from height. Later due to secondary trauma and/or early rehabilitation they presented with a peri implant supracondylar fracture femur. Out of 20 cases 13 were male and 7 were female.

MALE	FEMALE	RATIO
13	7	1.85:1

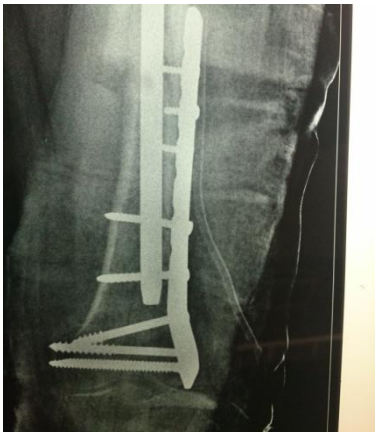
Age ranging from 45-70 and average age being 57.5 years. The follow up period of all patients were at an average of 12 months. The study was conducted from june 2010 to april 2013. The mean time from repair to diagnosis of nail failure was 3.75 months (range, 1.0–5.5 months).All 20 cases reported had a peri-implant supracondylar fracture femur.

Case – 1



Case - 2

Out of 20, 8 cases went through a secondary high velocity trauma while rest of them were of low velocity. In all 20 cases fracture shaft of femur was treated with intramedullary interlocking nail(open-2 closed-18) . The mean diameter of the nails was 11 mm (range, 10–12 mm).Full weight bearing was allowed at a mean of 8 weeks (range, 6–10weeks) after initial surgery. Dynamisation was considered in 6 cases when no callus was seen at a mean period of 10weeks (range, 6–12weeks), followed by complete weight bearing. Later peri implant supracondylar fracture was treated with distal femoral locking plate. Distal locking was done with cancellous locking screws while the proximal fixation was done with 4mm unicortical screws as they give a better stability than cerclage wires. Out of 20, in 4 cases proximal locking screws of the plate were directed from the plate through the distal locking holes of the nail in situ. Thus using the normal nail with the principle of a huckstep nail[4].

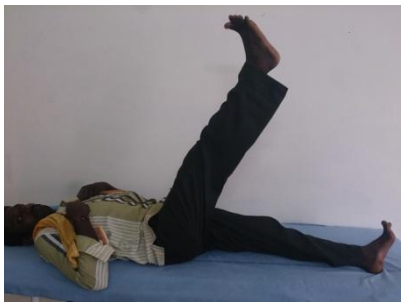


Mean blood loss during 2nd surgery was 550ml (range 250-550ml).Average operating time was 2.75 hours(range 1-4.5hours).

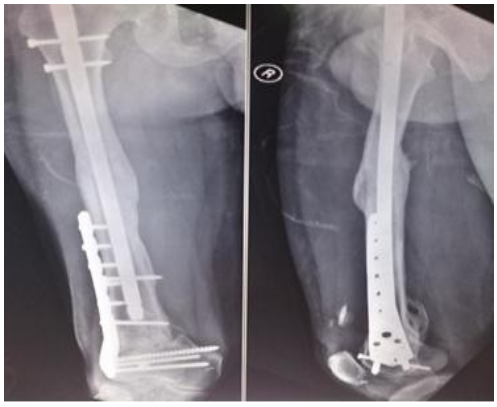
III. Results

Post operative protocol – 19 cases underwent active knee physiotherapy under constant supervision from 2nd post op day. We delayed active knee physio in one patient with deep infection. All patients required either two sticks or a frame to act as a walking aid during the first 6 weeks. At 12-16 weeks, no patient needed more than one stick as a walking aid. Once full weight bearing was started patient was asked to follow up at an interval 4 weeks for 4 months after which interval was increased to 3 months for next one year. Radiographs were taken at 6weeks, 12weeks, 6months and 1year.

Clinical Evaluation - At a mean follow-up of 17.5 months (range: 10- 25), all the fractures except one had united clinically. The satisfaction rate of surgery was 95% (19 patients). Limb length inequality was noted in five patients: (4 patients with 0-1cm difference, 1 patient with 2cm difference). Two patients had episodes of infection (one-superficial and one–deep). Superficial infection was treated with wound wash and post operative higher antibiotic therapy. Deep infection resulted in osteomyelitis at the supracondylar site for which both implants (IM nail and Locking plate) had to be removed followed by stabilisation with LRS and antibiotic beads after which there is evidence of callus formation




Radiological Evaluation - Radiographic assessment demonstrated no episodes of non-union. Fracture union occurred between 9 to 12 months in all cases. Femoral alignment was maintained in all cases (20 patients). There was one case of distal interlocking screw breakage, which was replaced through free hand technique. There were no cases of implant loosening.



IV. Discussion

We found a higher incidence of postoperative supracondylar fractures in the treatment of shaft femur fractures with the shorter diameter nail than the snug fit ones. A dynamised nail serves as a load-sharing device that can withstand a heavier load and promotes healing. The proximity of the fracture site and locking screw holes, in addition to weight bearing, may result in fatigue failure of the nail after dynamisation. Therefore, for distal fractures, full weight bearing should be delayed, even after dynamisation, or allow more time for the fracture site to consolidate rather than attempting early dynamisation. The 2 distal holes are the most common site of nail failure because of stress concentration caused by the hole effect and slot effect. Bucholz et al.[4] recommended keeping a distance of at least 5 cm between the fracture site and the middle screw hole: location of the more proximal screw hole of the 2 distal screw holes less than 5 cm from the fracture site may lead to fatigue failure, as stress in the nail is greater than its fatigue endurance limit. Some of these postoperative fractures could have been created during the operation since they occurred early (Aune et al. 1994) but the postoperative radiographs did not clearly show this, Almost all postoperative femoral supracondylar fractures were noted during the first 25 days after the fracture. The surgeon related causes for peri implant fractures were found to be

a.	Shorter Length Nail
b.	Anterior cortex itching of distal end of the nail
c.	Hammering for distal locking

The causes related to patient were divided into

a.	Secondary high velocity trauma in younger age group.
b.	Fracture due to osteoporosis in elderly age group.

V. Conclusion

Peri implant supracondylar fractures are on the rising trend in the recent past.Also management of these fractures require unique surgical technique with a good knowledge on the implants.Here we report 20 cases of peri implant supracondylar fractures in which 95% achieved union with placement of an additional distal femoral locking plate. Hence this is a reasonably good option in such cases especially in patients with osteoporosis.

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