

## **SURGICAL AND RADIOLOGICAL OUTCOME OF SUPRACONDYLAR FRACTURE OF FEMUR BY RETROGRADE INTRAMEDULLARY NAILING: OUR EXPERIENCE**

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### **HOW TO CITE THIS ARTICLE:**

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**ABSTRACT: BACKGROUND:** Supracondylar and intercondylar femoral fractures are serious injuries and difficult to treat and have potential to produce significant long term disability with poor results. Patients suffering a distal femoral fracture are at a high risk of morbidity and mortality. It is now recognized that distal femoral fractures are best treated with open/closed reduction and surgical stabilization. Many studies show retrograde intramedullary nailing is the best option. Our aim in this study is to evaluate surgical, radiological and functional outcome of retrograde intramedullary nailing in of distal femoral fractures. **METHODOLOGY:** 30 patients were including in the study. All the patients were treated with RIN and evaluated between May 2009 to September 2012 at Tertiary Care Hospital, Nellore. Modified knee rating system was used to assess functional outcome. Descriptive statistics were used to analyze the data. All the patients were followed up until fracture union occurred. **RESULTS:** Out of 30 patients, 21 male, 9 female, the mean age was 45±10 years. 15 were supracondylar and 5 intercondylar fractures. 28 simple and 2 cases were compound fractures 27 cases were due to RTA and 3 are due to fall. Radiologically 90% were type A fractures and 10% were type C fractures. The reported musculoskeletal trauma 66.3% of type A; 33.7% type C. Closed nailing was done in 9 patients of which 71% had excellent to good results and 29% had fair to poor results. In patients who underwent open nailing (21) 80% had excellent to good results and 20% had fair to poor results. The average range of motion was 105±10 degrees. There were no non-unions, one patient developed knee stiffness and one patient developed super infection which was the caused delayed union. The average time for union was 15.0±1.2 week. The duration of follow up was 6-28 months. **CONCLUSION:** Supracondular nail is the best implant to treat extra articular distal femoral and intra articular fractures without communication. Patient's suffering with distal femoral fracture has a high mortality rate and surgical intervention seems to improve both mobility and mortality. The open nailing also gives better results than close nailing.

**KEYWORDS:** Supracondylar femoral fractures, Retrograde intramedullary nailing, Modified knee rating system.

**INTRODUCTION:** Distal femoral fractures can result from either high energy injuries in young adults or low energy injuries in elderly patients with osteoporotic bone. This injury accounts for around 6% of all fragility fractures and its frequency is likely to rise with the increasing geriatric population. The incidence of distal femoral fractures is approximately 37/100,000 person-years.<sup>(1-4)</sup> Supracondylar and intercondylar femoral fractures are serious injuries and difficult to treat and have potential to produce significant long term disability with poor results.<sup>(5)</sup> The injury has a

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significant effect on patient's mobility with one series reporting only 18% were able to walk unaided with 23% housebound and 26% not able to perform social activities.<sup>(6)</sup> The options for surgical treatment are open reduction and internal fixation with Dynamic condylar screw, 95 degrees angled blade plate, locking condylar buttress plate, minimally invasive percutaneous plate osteosynthesis (MIPPO), Liss invasive stabilization technique (LISS plate technique), Ante-grade and retrograde intramedullary interlocking nailing.<sup>(7)</sup> Intramedullary nails offer potential biomechanical advantages over plates and screws because their intramedullary location results in less stress on the implant, they have the potential for load sharing, and can be inserted with minimal stripping of soft tissue. Given the appropriate fracture patterns, ante grade IM nailing in the treatment of distal femoral fractures has been associated with angular deformities because of inability of distal interlock of the ante grade nail to achieve control of the small and often osteoporotic distal fracture fragment.<sup>(8)</sup> The purpose of this study was to determine the clinical and radiological outcome in the management of supracondylar femoral fractures by the retrograde intramedullary interlocking nail.

**METHODOLOGY:** The present study includes 30 distal femoral fractures undergoing retrograde intramedullary nailing during May 2009 to September May 2012 at Narayana Medical College Hospital, Nellore were enrolled for the study. Institutional ethics committee approved the study protocol. Informed consent was obtained from study participants. Patients above 20 yrs of age, having a fracture of 9 cm or less with or without extension proximally into femur or distally into knee joint were studied. Pediatric patients, patients with fractures of AP type B1, B2, B3 and C3, patients who were not willing to come for follow up visits and patients sustaining Type III B compound injuries were excluded.

After admission of patient, a careful history was elicited from the patient and or attendants to reveal mechanism of injury and the severity of trauma. The patient were then assessed clinically to evaluate their general condition and the local injury. In general condition of the patient, the vital signs were recorded. Methodological examination was done to rule out fracture another sites. Palpation reveals abnormal mobility, crepitus and shortening of the affected limb. Distal vascularity was assessed by dorsalis pedis and posterior tibial arterial pulsations and capillary refilling. Radiograph of the knee with the distal half of the femur AP, lateral, right and left oblique views were obtained, pelvis with both hips AP view and tibia full length AP and lateral to rule out other fractures. The limb was then immobilized in Thomas splint. The patient was then taken up for retrograde Intra medullary Nailing of Distal Femoral Fractures. Post-operative period was uneventful and fracture was considered united when bridging callus was evident on one or more radiography and patient was able to walk full weight bearing without crutches. The fracture was said to be united when there was presence of periosteal callus bridging the fracture site and trabeculation extending across the fracture site. All the patients were followed up until fracture union occurred. Results were evaluated by functional evaluation scale developed by modified knee rating system.<sup>(9)</sup>

**RESULTS:** In our study 30 cases were studied, the average age was 45±10 years, 27 cases were due to RTA and 3 are due to fall. 28 simple and 2 cases were compound fractures Gustilo anderson type-1. 21 patients were male and 9 patients were female. Radiologically 90% were type A fractures and 10% were type C fractures. The reported musculoskeletal trauma 66.3% of type A; 33.7%

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type C. The duration of follow up was 6-28 months. Closed nailing was done in 9 patients of which 71% had excellent to good results and 29% had fair to poor results. In patients who underwent open nailing (21) 80% had excellent to good results and 20% had fair to poor results. The average range of motion was  $105\pm 10$  degrees. There were no non-unions, one patient developed knee stiffness and one patient developed super infection which was the caused delayed union. The mean time for union was  $15\pm 1$  week. 20 patients achieved union in 16 weeks and the remaining between to 16 to 20 weeks. And the last follow up 24(80%) had no pain at rest, 3(10%) had moderate knee pain and 3(10%) had mild knee pain. On the basis of modified knee rating scale 10 patients had excellent results with scores  $>85$  and above 14(47%) with good results (score 70-84), 5(17%) had fair results (score 60-69) and one patient (3%) with poor result (score  $<60$ )

**DISCUSSION:** Distal femoral fractures were confined to 7.5-9 cms of distal femur that is metaphyseal and condylar fracture. The present study is confined to functional outcome of supracondylar femoral fractures with supracondylar nailing. Leung K.S., Shen, W.Y. study (1991, J.B.J.S March Am) showed male to female ratio of 2:1:1. Leung study also showed 45% road traffic accidents, 30% fall from height, 9% fall at home and remaining 27% crush injuries.<sup>(10)</sup> According to our study most distal femoral fractures are due to road traffic accidents (73%). the rest was due to simple fall (17%) and due to fall from height (10%). Clinical 28 cases (93%) were simple fractures and two cases (7%) were compound fractures of Gustilo-Anderson type-1 (Gustilo RB, Anderson JT, J.B.J.S 1976; 58A)

According to AO classification radiologically (11) 27 fractures (90%) were type A and 3 fractures (10%) were type C1. musculoskeletal trauma 66.3% of type A; 33.7% type C. Closed nailing was done in 9 patients of which 71% had excellent to good results and 29% had fair to poor results. In patients who underwent open nailing (21) 80% had excellent to good results and 20% had fair to poor results. In our study we also found that better results are achieved in open nailing procedures.

Zickel RE et al study says 82 cases of type C1 fractures treated with Zickel supracondylar nail 46% had range of motion more than 90 degree. In 34 supracondylar nail all fractures healed with an average range of motion more than 100 degrees.<sup>(11)</sup> Lucas SE and Seligson D et al found the genucephalic nail is good treatment of supracondylar femoral fractures.<sup>(12)</sup> Barry and Paterson et al reported with 5 non-unions 3 implant failures and 1 deep infection. One had shortening with range of motion from 90 degree to 120 degree with average of 105 degrees.<sup>(13)</sup> Danzinger reported 95% union rate with retrograde nailing using GSH nail average range of motion 109 degree, 23 patients one non-union, one hardware failure, one impingement of patella.

In our study range of motion was 105 degree (average) there were no non-union with 1 poor result with knee stiffness and 1 superficial infection.<sup>(14)</sup> We recorded one case of (4%) infection is a compound fracture which was successfully treated with higher antibiotics. This case had delayed union. Janning reported the IMSC nail make possible a biological osteosynthesis of distal femoral fractures and that it also produces good functional outcome in the elderly. Janning HM et al (J. Ortho trauma 1998).<sup>(15)</sup> Leung et al reported average range of union was 14 weeks.

In our study union was achieved by 16 weeks in 20 cases (66.6%) in 10 cases it took between 16 to 20 weeks (33.3%). The time of union was 14 to 16 weeks. Incidence of knee pain

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after retrograde femoral nailing has been reported between 7% and 60%, Sanders et al found Musculoskeletal trauma series reported 36% of mild knee pain and 16% moderate knee pain at rest, 11% mild and 2% moderate pain. At the time of the most recent follow up examination out of 30 patients, 24(80%) had no pain at rest, 3(10%) patients had moderate knee pain and 3(10%) patients had mild knee pain.<sup>(16)</sup> In Leung's study<sup>(4)</sup> there are no non- unions and no infections. In our study we had I superficial infection and no non-unions. Dr. K. S. Leung et al reported excellent results in 35%, good results in 59%, fair in 6% and no poor results, JBJS 1991 March.<sup>(10)</sup> On the basis of modified knee rating schedule of the hospital for special surgery, we had 10 patients (33%) excellent results (score 85 and above). 14 patients (14%) with good results (score 70-84), 5 patients (17%) fir results (score 60 to 69) and one patient (3%) with poor result (a score less than 60 points) Supracondylar nail provides rigid internal fixation for rapid healing of supracondylar fractures with comparable functional outcome to lateral fixation devices and significant decrease in soft tissue dissection. Tushar Ubale et al and Arun K et al supported our study.<sup>(17-18)</sup>

**CONCLUSION:** Supracondylar nailing services to be better option for A.O type A and Type C1 supracondylar fractures. Patients who underwent early surgery had better results compared to patients for whom procedure was delayed. Most of the fractures were due to road traffic accidents in contrast to musculoskeletal trauma series where simple fall was the most common cause. Maximum numbers of patients were between 40-50 years. It is a surgeon's friendly procedure, less time consuming, less amount of blood loss. Less chances of non-union. We concluded open nailing gave better results than close nailing. In some cases even though callus was not seen in all quadrants in both views of x-rays, patients were able to walk without support and doing their duties without any functional disability. Finally we conclude that supracondular nail is the best implant to treat extra articular distal femoral and intra articular fractures without communication.

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Parameters	N	%
<b>Gender</b>		
Male	21	70
Female	9	30
<b>Age</b>		
21-30	1	4
31-40	8	26
41-50	12	40
51-60	6	20
61-70	3	10
<b>Laterality of fractures</b>		
Right	16	53.4
Left	14	46.6

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<b>Mode of Injury</b>		
RTA	22	73
Fall	8	27
<b>Type of Injury</b>		
Simple	28	93
Compound	2	7
<b>Gustilo type of fractures</b>		
Type A1	17	56
Type A2	5	17
Type A3	5	17
Type C1	3	10
<b>Associated Fractures</b>		
Ipsi lateral limb fractures	5	17
Head Injury	2	8
<b>Deformity</b>		
No	24	80
Mild	6	20
<b>Leg length discrepancy</b>		
No of discrepancies	24	80
Minimal (1-2 cm)	6	20
<b>Time taken for union</b>		
<16 weeks	20	66.6
>16 weeks	10	33.3
<b>Functional Outcome</b>		
Excellent	10	33
Good	14	47
Fair	4	17
Poor	1	3

**Table 1: Clinical characteristics and functional outcomes of patients treated for supracondylar fracture of femur by retrograde intramedullary nailing**

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