

# Outcome of Retrograde Nailing in the Treatment of Extra Articular Supracondylar Femur Fractures

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## ABSTRACT

**Objective:** To find out outcome of retrograde nailing in the treatment of extra articular supracondylar femur fractures.

**Study Design:** A prospective observational study.

**Place and Duration of the Study:** The Department of Orthopedic Surgery, Ghurki Hospital, Lahore, Pakistan from January 2020 to August 2021.

**Methodology:** A total of 92 patients of both genders aged 18 to 50 years with supracondylar femur fractures and supracondylar fractures with fracture line extending to distal third of femoral shaft were enrolled. Retrograde nailing was performed among all patients. Surgery time and functional outcome were noted. All surgeries were accomplished under spinal/epidural or general anaesthesia.

**Results:** Out of a total of 92 patients, there were 59 (64.1%) were male and 33 (35.9%) female. Overall, the mean age of patients was 33.12±9.08 years. The mean surgery time was noted to be 85.29±7.48 minutes. A total of 85 patients completed the designated period of 12-weeks for the evaluation of functional outcome. Excellent outcomes were observed in 47 (55.3%) cases, good 25 (29.4%), fair 9 (10.6%) and poor in 4 (4.7%) cases. Excellent to good outcomes were observed in 72 (84.7%) cases.

**Conclusion:** Retrograde nailing had good outcomes in the treatment of extra articular supracondylar femur fractures.

**Keywords:** Femur fracture, nailing, surgery time, functional outcome.

## INTRODUCTION

Distal femur fractures are among rare and severe forms with estimated frequency of 4 out of 100 fractures.<sup>1</sup> Among the old patients in orthopedic emergency departments, the distal femur fractures are the most common yet complicated issue.<sup>2</sup> The possible treatment options in this case are mostly therapeutic and where appropriate minimal invasive surgeries may also be done.<sup>1</sup> However, despite of advancements in treatment options and techniques of surgery, no consensus has yet been developed for the type of implant that should be used in certain situation for managing these types of fractures. There are many complications that are quite common as well as difficulties in union that makes the success of therapies challenging.<sup>3</sup> Hence the treatment to be used needs to be chosen wisely for individual patients according to the site of fractures, displacement, as well as the stability of the used prosthesis with help of the classification system that help us to decide for surgeries.<sup>4</sup>

Modern precontoured anatomic plates and nails are suitable for all types of distal femur fractures including the ones with articular extension. There are a number of adjuvant techniques available for the surgeon who is treating the patient for obtaining and maintaining reduction as well as preserving the biology of fracture.<sup>5-7</sup> One study reported that mean operation time in retrograde nailing was 102.3±20.6 minutes while excellent outcome was seen in 45% of patients with retrograde nailing, good outcome in 35%, and fair outcome in 15% of cases with retrograde nailing. Remaining 5% cases with retrograde nailing reported poor outcomes.<sup>3</sup>

Not much work is seen evaluating outcomes with retrograde nailing in the treatment of extra articular supracondylar femur fractures so this study was planned to find out outcomes with retrograde nailing in the treatment of extra articular supracondylar femur fractures.

## METHODOLOGY

This prospective observational study was done at department of orthopedic surgery Ghurki Hospital Lahore from January 2020 to August 2021. Approval from "Institutional Ethical Committee" was taken and written consent was acquired from all study participants.

Considering expected proportion of patients with poor outcomes as 5%,<sup>3</sup> margin of error 5% with confidence level of

95%, a sample size of 73 cases was calculated. During the study period, a total of 92 patients aged between 18 to 50 years of either gender with supracondylar femur fractures and supracondylar fractures with fracture line extending to distal third of femoral shaft were enrolled. Patients with pre-existing significant ipsilateral limb joint arthritis or comorbidities hampering rehabilitation, or gustilo grade 3b and 3c open fractures were excluded. Patients with old fracture (>3 weeks) or periprosthetic supracondylar femur fractures were also not enrolled. Cases having associated knee ligament tears or associated neurovascular injury were also not included. Non probability consecutive sampling technique was adopted.

Demographical history and contact details were taken at the time of enrollment. All surgeries were accomplished under spinal/epidural or general anaesthesia. Patients were discharged between 5<sup>th</sup> to 14<sup>th</sup> day post-surgery. Isometric quadriceps as well as knee hip ankle exercises were started after 1 day post-surgery. Non-weight bearing movement with the help of a walker was asked from second post-surgery day onwards. All cases were asked to follow up at 2-weeks, 4-weeks and then on a monthly basis till 6 months and then 3 months afterwards. After confirmation of the union, cases were asked to do full weight bearing. The data was collected on a specially designed Proforma.

Outcome was determined in the forms of mean surgery time and functional outcome. Surgery time was measured in minutes from induction of anesthesia to wound closure. Functional outcome was assessed using "Knee Society Score" and was labeled at 12 weeks postoperatively as "excellent (score 80-100)", "good (score 70-79)", "fair (score 60-69)" or "poor (score below 60)". All study data was collected on a predesigned proforma. Data was analyzed with SPSS version 26.0. Mean ± SD was calculated for age, BMI and operation time. Frequency and percentages were calculated for gender, living area and functional outcome.

## RESULTS

Out of a total of 92 patients, there were 59 (64.1%) were male and 33 (35.9%) female. Overall, the mean age of patients was 33.12±9.08 years while 57 (62.0%) patients were between 18 to 35 years of age. The mean surgery time was noted to be 85.29±7.48 minutes (ranging between 68 to 98 minutes). There were 54 (58.7%) patients who were living in rural areas. Table 1 is showing characteristics of all the patients.

Table 1: Characteristics of Patients Undergoing Retrograde Nailing for Extra Articular Supracondylar Femur Fractures (n=92)

Characteristics	Number (%)	
Gender	Male	59 (64.1%)
	Female	33 (35.9%)
Age in Years	18-35	57 (62.0%)
	>35 to 60	35 (38.0%)
Living Area	Urban	38 (41.3%)
	Rural	54 (58.7%)
BMI in kg/m <sup>2</sup>	≤30	64 (69.6%)
	>30	28 (30.4%)
Monthly Income	<20,000 PKR	44 (47.8%)
	20,000 to 50,000 PKR	30 (32.6%)
	>50,000 PKR	18 (19.6%)

A total of 85 patients completed the designated period of 12-weeks for the evaluation of functional outcome. Excellent outcomes were observed in 47 (55.3%) cases, good 25 (29.4%), fair 9 (10.6%) and poor in 4 (4.7%) cases. Excellent to good outcomes were observed in 72 (84.7%) cases. Table 2 is showing distribution of frequency of outcomes among patients.

Table 2: Distribution of Outcome among Patients (n=85)

Outcome	Number (%)
Excellent	47(55.3%)
Good	25 (29.4%)
Fair	9(10.6%)
Poor	4 (4.7%)

**DISCUSSION**

Unsatisfactory union outcomes and post-surgery complications with conventional open reduction and plating approaches in distal femur fractures have influenced surgeons to work for the improved biological fixation approaches. Retrograde nailing has been known to have low rates of post-surgery complications with much improved outcomes especially in extra-articular distal femur fractures.<sup>8-10</sup>

We found that 64.1% patients undergoing retrograde nailing were male. Local study by Shah SG et al from Karachi found 76.2% of the patients with distal femur fractures undergoing retrograde nailing to be male.<sup>11</sup> A local study from Faisalabad revealed mean age of the patients undergoing retrograde interlocking nail in supracondylar femur fractures to be 38.8±9.7 years which is little higher than what we noted (33.12 ± 9.08 years, ranging between 18-50 years) which could be due to the fact that they considered patients up to 60 years of age while we had included patients up to 50 years of age in the present study.<sup>12</sup> Our findings in terms of mean age are almost similar to the findings of an earlier retrospective study conducted by study Demirtas A et al from Turkey where they noted mean of the patients undergoing retrograde intramedullary nailing to be 31.1 years (ranging between 17-49 years).<sup>13</sup>

In the present research, we found excellent outcomes in 55.3% cases, good 29.4%, fair 10.6% and poor outcomes in 4.7% cases. Excellent to good outcomes were observed in 84.7% cases. Study done by Demirtas A et al found revealed excellent to good outcomes in 76.9% of cases undergoing retrograde nailing in extra-articular fractures of the distal femur showing very good effectiveness of the studied procedure.<sup>13</sup> Local data by observed non-union in only 3.2% patients undergoing retrograde nailing among supracondylar femur fractures with a follow up period of 24-weeks.<sup>12</sup> Becher S in a retrospective case series of open femoral shaft fractures who underwent intramedullary nailing revealed non-union rate of 3%.<sup>14</sup> Anup K et al from India found non-union rates of 2.9% with retrograde nailing while majority of the cases attained union between 12<sup>th</sup>-18<sup>th</sup> weeks post-surgery.<sup>15</sup> El-Kawy and colleagues observed all patients to achieve non-union who

underwent retrograde femoral nailing for supracondylar fracture femur during a median follow up period of 14-weeks.<sup>16</sup> Neubauer T et al from Austria with a median follow up span of 16-weeks noted radiological union rates of 95%.<sup>17</sup>

Our study had some limitations as well. As this was single center study, our findings cannot be generalized. Non-randomization and absence of a comparator group were also the limitations of this study.

**CONCLUSION**

Retrograde nailing for the treatment of extra articular supracondylar femur fractures was found to have good functional outcomes. Further comparative trials with other contemporary approaches are required to compare retrograde nailing for the treatment of extraarticular supracondylar femur fractures.

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