

## ORIGINAL ARTICLE

**Functional Outcome of Intramedullary Tibial Nail in Distal Femur Shaft Fractures**

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**ABSTRACT**

**Objective:** Assessment of the functionality in patients with supracondylar fracture of femur managed with intermedullary tibial nails.

**Study Design:** Case Series Study.

**Place and Duration of Study:** We conducted a prospective cohort study for 6 months, from September 2021 to February 2022.

**Materials and Methods:** 25 adult patients presented in the accidents and emergency department of Railway General Hospital, Rawalpindi. They were managed using tibial nail and their functionalities after the operations were managed using the Tegner-Lysholm Criteria measured at 2 weeks, 6 weeks, and 12 weeks till union achieved

**Results:** Five of our patients were females and twenty males. Average healing time was calculated at 15 weeks and 6 days approximately (2.646 SD) 24% (n=6) showed excellent healing, 48% (n=12) had good results and 28% (n=7) had fair results. We did not observe any complications.

**Conclusion:** Tibial nails are convenient and effective to manage the patients with supracondylar fracture of femur and show good functional outcomes.

**Key Words:** *Retrograde Femoral Nail, Supracondylar Femur Fractures, Tibial Nail.*

**Introduction**

Distal femur fractures are very commonly seen in patients suffering from high intensity trauma.<sup>1</sup> They contribute to 0.4% of all fractures.<sup>2</sup> A unanimous mode of management for the different types of distal femur fractures; transverse, oblique, spiral, and comminuted, is still debated by orthopedic surgeons.<sup>3</sup>

Renowned surgeons like Sir John Charnley, initially managed, supracondylar fractures conservatively using manipulation and casting, skeletal traction, external splints, and braces.<sup>4</sup> Unfortunately, these resulted in poorer outcomes and complications like non-union, mal-union and compartment syndrome causing significant disability.<sup>5</sup>

With the advancements in surgical techniques

majority of femoral fractures now achieve good results.<sup>6</sup> Initially distal femur fractures were managed using dynamic condylar screws, condylar blade plates, distal femoral locking plates, and less invasive stabilization system plates.<sup>7</sup> The most significant disadvantages of these surgical options were deep tissue dissections, postoperative collection of hematomas, infection and a large surgical incision resulting in a scar on the lateral aspect of the thigh, except for less invasive stabilization system technique.<sup>8</sup> The application of blade plates requires great expertise and not many orthopedic surgeons are skilled in it.<sup>9</sup> Furthermore, blade plates and dynamic condylar screws mechanically pull the distal fragment of the femur laterally which can result in mal-rotation and consequently implant failure.<sup>10</sup>

Recently retrograde intramedullary nailing for the management of supracondylar fracture of femur is being accepted owing to minimal blood loss, smaller surgical incisions, lower risks for infection, early weight-bearing and decreased operative time.<sup>11</sup> However, retrograde femoral nails designed especially for the fixation of supracondylar femoral fractures are expensive and not cost effective for patients in developing countries.<sup>12,13</sup>

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Use of tibial plates for fixation of supracondylar fractures of femur is being employed by a few surgeons due to cost effectiveness and analogous success rates as specially designed distal femoral nails.<sup>14</sup> We evaluated the functional outcomes of tibial locking nails in the supracondylar fractures of the femur.

### Materials And Methods

We conducted a prospective study for 6 months, from September 2021 to February 2022. 25 adult patients presented in the accident and emergency department of Railway General Hospital, Rawalpindi with supracondylar fracture of femur.

The inclusion criteria were distal one-third femur fractures, linear Type A extra-articular supracondylar femur fractures, and closed fractures. The exclusion criteria were all open fractures, B2, C2, B3, C3 fractures, and preoperative deformity. The study was commenced after getting approval from the Ethical review board of the Hospital. upon taking informed consents, all the patients were managed using tibial Nail by an experienced consultant orthopedic surgeon team.

A midline incision of 4cm was made from the inferior pole of the patella up to tibial tuberosity. The para-tenon over the patellar tendon was incised sharply and the patellar tendon was split in the midline along with the direction of its fibers. A straight bone awl was used and inserted into the knee joint through the split tendon and positioned against the femoral inter-condylar notch. The position of awl was confirmed using the image intensifier as antero-posterior and lateral. A guide wire was passed after making an entry point and the awl removed. The fracture fragments were aligned under image intensifier and guide wire passed in the proximal fragment. The distal fragment was then reamed with flexible reamers and the predetermined tibial nail of appropriate diameter and length was then loaded over the jig. The nail was finally inserted over the guide wire and its position confirmed with the help of image intensifier. Depending on the length of the nail, the proximal holes were locked. After inserting both proximal and distal locking screws, the jig was then disengaged, the joint washed thoroughly with normal saline to remove the debris, homeostasis achieved, and incision closed in layers. Particular

attention was paid to repair para-tenon of patellar tendon.

Postoperative x-rays were obtained, and patients were discharged on the 2nd postoperative day after non-weight bearing mobilization. Follow-ups were done after 2 weeks, 6 weeks, and 12 weeks till union. The functional outcome was measured using Tegner-Lysholm criteria, which measures the functional outcome in terms of limping, pain, locking, stair climbing, support, instability, swelling and squatting. The follow up was ensured by taking phone numbers of the patients. SPSS 23 was used for statistical analysis. Frequencies and percentages were calculated for the categorical variables while mean and standard deviations were calculated for the numerical variables. Statistical significance was defined as a P value of 0.05. P value of 0.05 was considered statistically significant.

### Results

Out of 25 patients 20(80%) were male and 5(20%) were female. The mean age in our study was 37. The average time of healing was between 12 and 21 weeks and mean time of healing was estimated near 15 weeks and 6 days with a standard deviation of 2.464 as shown in Table I

Functionality assessed using Tegner-Lysholm scoring system showed excellent scores for 24% (n=6), good scores for 48% (n=12) and 28% (n=7) showed fair scores after management through tibial nail for supracondylar fractures of femur as assessed at 12 weeks interval (Table II).

### Discussion

In our study we treated 25 patients treated with tibial nail for supracondylar fracture of femur and documented 24% (n=6) showed excellent healing, 48% (n=12) had good results and 28% (n=7) had fair results. Average healing time was calculated at 15 weeks and 6 days approximately (2.646 SD)

Retrograde nails for the management of femur fractures are a widely accepted and convenient option for most of extra articular supracondylar fractures of the femur. They are considered a preferred option compared to conventional blade plates, condylar screws and newer locking plates in terms of stability, surgical exposure and healing time.<sup>15</sup> Nails have load sharing capability and provide better stability at the fracture site that promotes the

use of closed technique more commonly.<sup>16</sup> Retrograde nails have low complication rates compared to other methods when used for the fixation of the supracondylar femur fractures.<sup>17</sup>

Our study was conducted on 25 patients, and 20 were male and 5 females. The mean time of healing was 15 weeks and 6 days compared to 25 weeks in a study by Gurkan et al. in which supracondylar femur fractures were fixed with standard retrograde femoral nails.<sup>18</sup> None of our patients had complications of nonunion or malunion. Our results were comparable to Gurkan et al. who reported excellent results in 29.4% (n=5), good in 35.3% (n=6), moderate in 31.2% (n=5), and poor results in 5.9% (n=1) of their patients.

Only 3 patients in our study developed coronal deformity. One patient developed valgus deformity and the other two patients developed varus deformity. This was also observed by Gurkan et al in which postoperative radiographic examination showed varus angulation of 10° in 23.5% (n=4) and posterior angulation of 10-20° in another 23.5% (n=4) patients.

7 patients developed flexion contractures of 5 degrees while one patient developed extension contracture. Contractures developed because of poor compliance of patients to physiotherapy. There were no nail ends protruding into the joint space.

All nails were kept up to the level of lesser trochanter of the femur, to reduce the chances of stress fracture, implant failure and rotational instability.<sup>19</sup>

All our cases were managed using a closed technique using a tibial nail compared to Rao et al. who converted 25% of the cases to open technique for reduction of the fracture fragment.<sup>20</sup> Rao et al. reported excellent results for 65% of their patients with the mean healing time of 16.2 weeks. Average knee flexion was 108 degrees with an extensor lag of 4.15 degrees.

Simil Sanders et al managed 18 patients of supracondylar femur fractures using AO Universal Tibial Nail, 92% fractures healed within 12 weeks with no complications like infection, loss of reduction, or nail failure.<sup>21</sup> Knee flexion averaged at around 120 degrees, while only two knees had an extensor lag of more than 5 degrees. They reported the cost of retrograde Smith and Nephew femoral

nails to be twice the price of Zimmer tibial interlocking nails making it a more cost-effective method of fixation.

our study had few limitations like in follow up of our study, we did not see postoperative complications like infection, nonunion, loss of reduction, stress fracture, or implant failure. further studies are recommended to confirm our results.

## Conclusion

It is concluded that the retrograde tibial locking nails for stabilization of extra articular supracondylar fractures of femur are convenient and result in good functional outcome in most of the patients. we recommend tibial nail, an implant of choice to treat supra condylar fracture femur. Tibial nail has the added advantage of economic feasibility for the patients and easy learning curve for junior surgeons. However, more studies are required to support the evidence of our research.

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#### CONFLICT OF INTEREST

Authors declared no conflicts of Interest.

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#### DATA SHARING STATEMENT

The data that support the findings of this study are available from the corresponding author upon request.

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