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Functional outcome of Supracondylar Femoral Fracture Fixation using 95° Angled Blade Plate

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ABSTRACT

Background: Supracondylar femoral fractures represent complex injuries occurring just above the knee joint, often associated with significant functional impairment and morbidity. The 95° angled blade plate provides rigid fixation, particularly beneficial in comminuted fractures due to its fixed angle construct. This study aims to evaluate the functional and radiological outcomes of supracondylar femoral fractures managed using a 95° angled blade plate.

Methodology: This prospective study was conducted on 30 patients with supracondylar femoral fractures who underwent open reduction and internal fixation using a 95° angled blade plate at N.S.C.B. Medical College, Jabalpur, between April 2023 and March 2025. Patients were followed up at 1.5, 3, and 6 months postoperatively for clinical and radiological assessment using the Knee Society Score (KSS). The mean patient age was 54 ± 14.44 years, with road traffic accidents accounting for the majority of cases (58.82%), followed by falls (41.18%).

Results: Of the 30 patients enrolled, 28 patients had a complete follow up of 6 months postoperatively. The mean clinical union was achieved at an average of 17.14 ± 1.87 weeks and radiological union time was 21±2.18 weeks, with an overall union rate of 93%. According to the KSS [Knee society score], 64.3% of patients demonstrated good outcomes, 25% fair, 7.1% excellent, and 3.6% poor results. A superficial infection occurred in two patient (0.6%), which was successfully treated with antibiotics.

Conclusion: Fixation of supracondylar femoral fractures using a 95° angled blade plate provides stable fixation, anatomical alignment, and satisfactory functional outcomes when meticulous surgical technique and preoperative planning are followed. The 95° angled blade plate remains a dependable option for managing distal femoral fractures, demonstrating excellent union rates and functional recovery in the majority of patients.

Keywords: Supracondylar femoral fracture, 95° angled blade plate, internal fixation, distal femur, Knee Society Score, functional outcome.

INTRODUCTION

Supracondylar femoral fractures represent a critical area of study within the field of orthopedics, characterized by their occurrence just above the knee joint in the distal femur. These fractures can have profound implications on an individual's mobility and overall quality of life, necessitating a thorough understanding of their complexity and management [1] The advent of internal fixation techniques, such as the use of angled blade plates and intramedullary nailing, has revolutionized the treatment landscape, offering improved outcomes in terms of fracture stability and patient recovery time. The choice of treatment is influenced by various factors, including the patient's age, bone quality, and fracture characteristics, underscoring the importance of individualized care plans [2]. Despite the progress in surgical techniques, the management of supracondylar fractures continues to pose challenges, particularly in complex cases involving comminuted fractures or those with concomitant neurovascular injuries. The selection of the appropriate fixation method and the timing of surgical intervention remain critical considerations in optimizing patient outcomes.[3]

MATERIAL AND METHODS

This prospective study was done in the Department of Orthopaedics, N.S.C.B. Medical College, Jabalpur, (M.P), from 1st April 2023 to 31st march 2025. Our study included 30 patients with supracondylar femoral fracture who underwent open reduction internal fixation with 95^0 angled blade plate.

Method of Sampling

Consecutive sampling was used. All patients with supracondylar femoral fractures who fulfilled the inclusion criteria and presented during the study period were included until the required sample size was reached. No randomization was done.

SELECTION OF THE PATIENTS:

Inclusion Criteria-

- Patient age between 20-70 years.
- Supracondylar femoral fractures [AO 33 Classification including [A1, A2, A3] And [B1] and[C1].
- Willing to participate and provide informed consent.

Exclusion Criteria-

- Patients medically unfit for surgery.
- Patients who are not willing for surgery.
- Compound fractures.
- Pathological fractures.
- Associated pelvic injury.
- Associated fracture in ipsilateral lower limb.

METHODOLOGY

The selected patients were briefed regarding the purpose and procedures of the study, and written informed consent was obtained prior to participation. Relevant demographic and clinical information, including age, sex, injury details, and duration of symptoms or progression, was collected through a structured interview. All patients subsequently underwent thorough clinical and local examinations. The instruments used during the procedure included a seating chisel, chisel guide, slotted hammer, inserter–extractor, impactor, and a 95° angled blade plate.

Out of 30 patients, majority were male (73.33 %) with the age group from 25 years to 70 years with mean age of 54 $\pm$ 14.44 SD years. Two patients were lost to follow up. The commonest mode of injury was by Road Traffic Accident (58.82%) and rest were by Fall (41.18%). According to AO classification [4], out of 30 cases 15 (50%) patients had Type 33A1.1 fracture, 5 patient (16.6%) patients had Type 33A1.2 fracture, 5 (16.6%) patients had Type 33B1 fracture, 5(16.6%) patients had Type 33C1 fracture. Mean time since injury to date of operation was 8.58$\pm$2.29 SD days.

Operative Technique

All surgeries were done under spinal/epidural/general anesthesia. Standard Antero lateral approach to distal femur was used. Guidewire insertion performed under fluoroscopy. Seating chisel inserted along the guidewire.95° angled blade plate inserted and fixed with cortical screws.

Anatomical alignment, restoration of length, and rotation confirmed intra-operatively.

Preoperative planning was done to obtain information regarding (a) The position of the plate (b) The point of entry. It is in lateral condyle of femur 1.5 cm above distal end of femur. Centre of blade plate entry site is at the junction of anterior one third and middle one third

Distal femur was exposed by standard Anterolateral incision, approximately 12-15 cm long incision. Vastus lateralis was incised and distal femur was exposed by reflecting vastus lateralis anteriorly.

The length of the plate: The fracture pattern determines the length of the plate and the steps of insertion. Using the guide wires around the joint to determine the proper trajectory of the blade plate. The ideal blade plate insertion point is 1.5 cm above the femur distal end. Distal femur was divided into thirds in order to determine the proper anterior/posterior entry point. The intersection of the anterior third and middle third marks the center of the blade plate entry site

Three 4.5 mm holes are drilled in the lateral femoral condyle in order to prepare the entry site for the blade. They only need to pierce 1cm though the surgeon might need to drill nearly all the way down to the selected blade length in young, harder bone.

To prepare the slot, a hole is drilled in the middle. On either side of the central hole, two more holes are drilled.

Patients were assessed clinically and radiographically at 1.5 months, 3 months and 6 months to assess the fracture union and the progress of patient recovery using Knee society score.

Sitting was allowed from the next post operative day and isometric quadriceps exercise and ankle pump were started. Partial weight bearing by using a walker with a three-point gait was initiated after 4 weeks. Full weight bearing was initiated along with a walker with a four-point gait after 8 weeks.

Operative Images

Figure 1 illustrates the marking of the anterolateral incision for the distal femur. Figure 2 demonstrates the insertion of the guide wire and preparation of the entry point for the 95° angled blade plate. Figure 3 depicts the use of the chisel guide and seating chisel to create the tract for placement of the 95° angled blade plate. Figure 4 presents the intraoperative view of the implanted 95° angled blade plate.

Fig-1 Anterolateral incision

Fig-2 -Guide pin insertion

Fig-3- Tract made for Plate

Fig-4 -95° Angled blade plate

RESULTS

The union rate was 93% with average clinical union time of 17.14±1.87 SD weeks and radiological union time of 21±2.18 SD weeks. At the end of 6 months, the follow-up mean was 81.2±7.31 and 2(0.6%) patients had superficial skin infection managed with appropriate antibiotics. Among the 28 patients who completed follow-up, the majority (64.3%) achieved a good outcome, while 25.0% had a Fair outcome. Excellent outcomes were observed in 7.1% of the patients, and only 3.6% of patients had a Poor outcome. Overall, most participants showed satisfactory functional recovery at the end of the follow-up period. Out of 30 patients, majority were male (73.33 %) with the age group from 25 years to 70 years with mean age of 54 ± 14.44 SD years. Two patients were lost to follow up. The commonest mode of injury was by Road Traffic Accident (58.82%) and rest were by Fall (41.18%). According to AO classification [4], out of 30 cases 15 (50%) patients had Type 33A1.1 fracture, 5 patient (16.6%) patients had Type 33A1.2 fracture, 5 (16.6%) patients had Type 33B1 fracture, 5(16.6%) patients had Type 33C1 fracture. Mean time since injury to date of operation was 8.58±2.29 SD days.

Table-1 KNEE SOCIETY SCORE

Time Point	Score Range	Frequency (n=30)	Follow-up Rate (%)
Pre-op	2–8	30	100%
Discharge	14–28	30	100%
4 Weeks	14–56	28	93.3%
1.5 Months	50–72	28	93.3%
3 Months	55–78	28	93.3%
6 Months	58–90	28	93.3%

Fig-5. Pre operative X-ray: AP & Lateral

Fig. 6A

Fig. 6B

Fig-6(A&B) Immediate Post Op X-ray

Fig. 7A

Fig. 7B

Fig-7(A&B) Follow up X-ray at 6 months

Fig-8A-Cross leg sitting

Fig- 8B- Squatting

DISCUSSION

In our study, radiological union was achieved in a mean of 18 weeks and clinical union in a mean of 16.5 weeks. These healing times are consistent with those reported by Siliski et al. (1989) [5], who observed an average healing time of 13–16 weeks. Our findings are also in agreement with the study by Batista et al. (2015) [6], which demonstrated that angled blade plates allow for reliable union times even in osteoporotic or complex fractures.

Numerous studies have compared the angled blade plate with other fixation devices for supracondylar femoral fractures, including locking plates and intramedullary nails. Higgins et al. (2007) [7] and Zlowodzki et al. (2004) [8] have shown that locking plates and intramedullary nails can offer certain advantages, such as improved angular stability and minimally invasive insertion techniques. However, these devices may also be associated with problems such as implant failure, particularly in osteoporotic bone. Hence in osteoporotic bone locking plate should be preferred.

CONCLUSION

The surgical technique for using a 95° angled blade plate is technically demanding but careful adherence to the principles such as proper patient selection, pre-operative planning methods results in stable fixation with anatomical reduction. Proper length and placement of blade into femoral condyle and insertion of 4 screws proximally from fracture site during surgery helps maximize the chances of a successful outcome. The findings of this study support the use of the 95° angled blade plate for the treatment of supracondylar femoral fractures. The data

indicate that this surgical approach leads to significant improvements in knee function, as measured by the Knee Society Score. The majority of patients experienced positive outcomes. The study's limitations include the relatively small sample size and the lack of a control group. Future research with larger sample sizes and comparative treatment arms is needed to further validate these findings and to determine the optimal surgical approach for different types of supracondylar femur fractures. However, the current study provides valuable evidence supporting the use of the 95° angled blade plate as an effective treatment option for this challenging fracture type.

Declaration by Authors

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