

## Original ARTICLE

### Assessment of treatment outcome of inter-condylar and supra-condylar fractures of femur by Swashbuckler approach: A clinical study

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#### ABSTRACT:

**Background:** Various surgical approaches in the past literature have suggested achieving an adequate exposure of the distal femoral articular surface, including medial/lateral parapatellar approaches, Swashbuckler approach, tibial tubercle osteotomy, and combined medial and lateral approaches. Hence; the present study was undertaken for assessing the treatment outcome of inter-condylar and supra-condylar fractures of femur by Swashbuckler approach. **Materials & methods:** 10 adult patients with open reduction and internal fixation of distal femur fractures with multifragmentary articular involvement were included were initially managed according to advanced trauma life support guidelines. The fractured limb was splinted in a Bohler-Braun frame, with the application of skin traction. Radiological evaluation was done in all the patients. Distal femur stainless steel implant was used. The knee was mobilized on the 1st or 2nd postoperative day, depending on the degree of postoperative pain. The clinical and radiological evaluation was done. Knee Society Score (KSS) was evaluating the outcome of treatment. **Results:** Mean duration of surgery was found to be 90.3 minutes. Mean time for bony union was found to be 16.8 weeks. In the present study, excellent results were obtained in 70 percent of the patients while good results were seen in 20 percent of the patients. **Conclusion:** For a better functional outcome proper anatomical restoration and alignment is required which can be achieved by swashbuckler approach as proper exposure of joint is possible to reconstruct the articular surface.

**Key words:** Swashbuckler approach, Femur

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#### INTRODUCTION

The knee joint is formed between the distal femur and proximal tibia, with the synovium covering the femur in a saddle configuration and reflecting anteriorly and superiorly on the femur behind the patella and draping inferiorly and posteriorly on the caudad surface of the femur, medially and inferiorly over the lateral surfaces of the cruciate ligaments, and down to the tibial articular surfaces.<sup>1-3</sup>

Of the two condyles, the lateral condyle is larger and more prominent than the medial condyle. Like its counterpart, it is also associated with a lateral epicondyle, which functions as a point of attachment for the lateral collateral ligament. The lateral condyle also has a shallow groove below the lateral epicondyle through which the popliteal tendon travels. It is known as the groove for popliteus. Inter-condylar and supra-condylar fractures of femur constitute a significant proportion of fractures. Various surgical approaches in the past literature have suggested achieving an

adequate exposure of the distal femoral articular surface, including medial/lateral parapatellar approaches, Swashbuckler approach, tibial tubercle osteotomy, and combined medial and lateral approaches.<sup>4-6</sup> Hence; the present study was undertaken for assessing the treatment outcome of inter-condylar and supra-condylar fractures of femur by Swashbuckler approach.

#### MATERIALS & METHODS

The present study was conducted with the aim of assessing outcome of patients inter-condylar and supracondylar fracture of femur by Swashbuckler approach clinically. Written consent was obtained from all the patients after explaining in detail the entire research protocol. 10 patients with inter-condylar and supracondylar fracture were enrolled in the present study. 10 adult patients with open reduction and internal fixation of distal femur fractures with multifragmentary articular involvement were included were initially managed according to advanced trauma

life support guidelines. The fractured limb was splinted in a Bohler-Braun frame, with the application of skin traction. Radiological evaluation was done in all the patients. The patient was placed in supine on a radiolucent table. A sterile tourniquet was used only if necessary to avoid medial retraction of the quadriceps. All the patients were operated in the supine position on a radiolucent table. The Swashbuckler approach described by Starr et al. was used in all cases.<sup>7</sup> The provisional reduction was done with pointed clamps and K-wires, followed by insertion of lag screws. After anatomical reconstruction and rigid fixation of the articular block, attention was diverted to the extra-articular fracture, with repeat assessment of the fracture pattern. Distal femur stainless steel implant was used. The knee was mobilized on the 1st or 2nd postoperative day, depending on the degree of postoperative pain. The clinical and radiological evaluation was done. Knee Society Score (KSS) was evaluating the outcome of treatment. At 1 year follow-up, the Knee society score 17 was recorded, including the knee and functional subsets. A Knee Society Knee Score between 80 and 100 was regarded as excellent, between 70 and 79 was regarded as good, between 60 and 69 was regarded as fair, and <60 was regarded as poor. All the results were analysed by SPSS software.

**RESULTS**

A total of 10 patients were analyzed. 60 percent of the patients (6 patients) belonged to the age group of less than 40 years. Mean age of the patients of the present study was 32.19 years In 60 percent of the patients (6 patients), mode of injury was road traffic accident, while in the remaining patients, the mode of injury was fall from height. Mean duration of surgery was found to be 90.3 minutes. Mean time for bony union was found to be 16.8 weeks. In the present study, excellent results were obtained in 70 percent of the patients while good results were seen in 20 percent of the patients.

Table 1: Age-wise distribution

Age group (years)	Number of patients	Percentage of patients
18 to 30	4	40
31 to 40	2	20
41 to 50	3	30
51 to 60	1	10
<b>Total</b>	<b>10</b>	<b>100</b>
<b>Mean ± SD</b>	<b>32.19 ± 12.79</b>	

**DISCUSSION**

Fractures in the distal femur have posed considerable therapeutic challenges throughout the history of fracture treatment. Most of these surgical failures were due to inadequate fixation of the fracture fragments. The aim of treatment is to achieve anatomical reduction of articular surface, restoration of the limb length and alignment, as well as allowing for early limb mobilization to avoid articular stiffness and the loss of the muscle mass. Good planning and execution of surgery in complex C3 distal femur fractures results in better functional outcomes on par with other

means of fixation even in these intra articular injuries. Reconstruction of distal femur fractures especially in supracondylar and intercondylar fractures is a challenging task.<sup>8-10</sup>

Table 2: Mode of injury

Mode of injury	Number of patients	Percentage of patients
Road traffic accident	6	60
Fall from height	4	40
<b>Total</b>	<b>10</b>	<b>100</b>

Table 3: Duration of surgery

Duration of surgery	Number of patients	Percentage of patients
60 to 90 minutes	6	60
90 to 120 minutes	3	30
More than 120 minutes	1	10
<b>Total</b>	<b>10</b>	<b>100</b>
<b>Mean ± SD (minutes)</b>	<b>90.3 ± 15.6</b>	

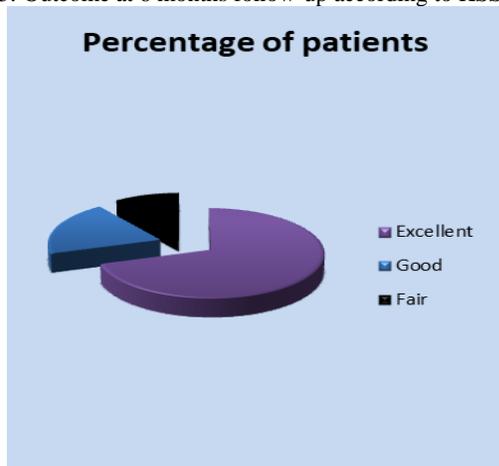
Table 4: Mean time of bony union

Time to bony union	Number of patients	Percentage of patients
9 weeks	2	20
12 weeks	4	40
24 weeks	6	60
<b>Total</b>	<b>20</b>	<b>100</b>
<b>Mean ± SD (weeks)</b>	<b>16.8 ± 7.16</b>	

A total of 10 patients were analyzed. 60 percent of the patients (6 patients) belonged to the age group of less than 40 years. Mean age of the patients of the present study was 32.19 years In 60 percent of the patients (6 patients), mode of injury was road traffic accident, while in the remaining patients, the mode of injury was fall from height. Agrawal A et al et al evaluated a consecutive series of patients with complex AO type C3 distal femur fractures to determine the clinicoradiological outcome after fixation with a single locked plate using modified swashbuckler approach. 12 patients with C3 type distal femur fractures treated with a lateral locked plate, using a modified swashbuckler approach, were included in the study. The extraarticular component was managed either by compression plating or bridge plating (transarticular approach and retrograde plate osteosynthesis) depending on the

fracture pattern. Primary bone grafting was not done in any case. The clinical outcome at 1 year was determined using the Knee Society Score (KSS).

Table 5: Outcome at 6 months follow-up according to KSS



The presence of any secondary osteoarthritis in the knee joint was noted at final followup. All fractures united at a mean of  $14.3 \pm 4.7$  weeks (range 6-26 weeks). There were no significant complications such as nonunion, deep infection, and implant failure. One of the patients underwent secondary bone grafting at 3 months. The mean range of motion of the knee was  $120^\circ \pm 14.8^\circ$  (range  $105^\circ$ - $150^\circ$ ). Seven patients had excellent, three patients had good and two patients had a fair outcome according to the KSS at 1 year. At a mean followup of 17.6 months, three patients showed radiological evidence of secondary osteoarthritis of the knee joint. However, only one of these patients was symptomatic. They concluded that the results of complex C3 type distal femur fractures, fixed with a single lateral locked plate using a modified swashbuckler approach, are encouraging, with a majority of patients achieving good to excellent outcome at 1 year.<sup>11</sup>

In the present study, mean duration of surgery was found to be 90.3 minutes. Mean time for bony union was found to be 16.8 weeks. Ahire R et al evaluated and compared a consecutive series of patients with AO type B and C distal femur fractures to determine the clinico-radiological outcome after fixation with distal femur locking compression plate using Swashbuckler approach and standard lateral approach. 60 patients with AO Muller's type B and C distal femur fractures (mostly type C2 and C3) were treated with distal femur locking compression plate (DF-LCP), 30 patients using swashbuckler approach and 30 patients using standard lateral approach. They concluded that the results of distal femur fractures using a swashbuckler approach are encouraging and comparable to standard lateral approach with a majority of patients achieving good to excellent outcome at 1 year especially in complex AO type C3 fractures.<sup>12</sup>

In the present study, excellent results were obtained in 70 percent of the patients while good results were seen in 20 percent of the patients. Patel YC et al reviewed 25 cases of distal femoral fractures surgically managed with distal femoral locking compression plate. Fractures were categorized according to OTA classification by Muller. 21 out of 25 patients had closed injury. Type A2 Muller's fracture was the most common fracture type 8

out of 25 patients (32%). Out of 25 patients 19 were male and 6 were female. The locking compression plate is the treatment of choice in the management of comminuted distal femoral fractures especially Type A fractures where we have found higher Neer scores.<sup>13</sup>

## CONCLUSION

From the above results, the authors conclude that for a better functional outcome proper anatomical restoration and alignment is required which can be achieved by swashbuckler approach as proper exposure of joint is possible to reconstruct the articular surface.

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