

ORIGINAL

Closed Versus Operative Treatment of Supracondylar-Intercondylar Fractured Femur

*Dr Hamdy F Gad

ABSTRACT

A retrospective study of thirty three fractures in adult patients involving the supracondylar-intercondylar areas of the femur was made. The average follow up was twenty two months. The majority of the patients were victims of road traffic accidents. Many patients had associated knee and other skeletal injuries. Fourteen patients were treated operatively by rigid internal fixation and nineteen were treated by traction for an average of eleven weeks, then followed by plaster of paris. The results were analysed, compared and discussed. It was found that the operative treatment is superior to non-operative method provided the surgeon applies the proper surgical principles.

Supracondylar-intercondylar fractures of the femur are difficult to manage and are associated with a wide range of potential complications¹. Closed reduction and traction followed by either long leg cast or by cast brace have been advocated by many authors^{2, 3}, while others have recommended open reduction and internal fixation with a variety of methods including blade-plate^{4, 5}, Rush rods⁶, Zickel devices⁷, and compression screw apparatus⁸. The

use of external fixators in open fractures has also been suggested.⁹.

These treatment modalities and the efficacy are still being evaluated and their results are still incomplete and controversial. The aim of this study is to compare operative and non-operative treatment of supracondylar-intercondylar fractures of the femur and to analyse the results.

METHODS

The medical records and radiographs of forty five patients who sustained supracondylar-intercondylar fractures of the femur during January 1982 to January 1989 were collected. Eleven patients who failed to attend the clinical evaluation or had insufficient records and one patient who had pathological fracture were excluded from the study, leaving thirty three fractures for review. Twenty eight patients were males and five were females. The age ranged from twenty two to seventy five years (average 48 years). The fractures were caused by motor-vehicle accidents in twenty four patients, fall from a height in eight and fall during walking in one.

*Acting Consultant Orthopaedic Surgeon,
Al-Razi Orthopaedic Hospital,
State of Kuwait.

Four fractures were open in the non-operative patients, while two patients in the operative group had similar problems. In all the open fractures wound excision was performed initially. An injury to the knee joint was present in many of the patients (Table 1).

TABLE 1
Associated Knee Injuries

	<i>Operative</i>	<i>Non-operative</i>
Open wound	2	4
Ant. cruciate lig.	2	2
Post-cruciate lig.	0	1
Med. collateral lig.	1	2
Lat. collateral lig.	1	1
Patellar fracture	1	3
Fracture tibial condyle	1	2

Twenty two associated skeletal and soft tissue injuries were encountered in seventeen patients in both groups (Table 2). All these patients were victims of road traffic accidents.

TABLE 2
Associated Injuries

	<i>Operative</i>	<i>Non-operative</i>	<i>Total</i>
Craniofacial	3	2	5
Abdominal injuries	1	2	3
Thoracic injuries	1	1	2
Proximal femoral fracture ipsilateral side	1	1	2
Fracture tibial shaft	1	2	3
Fracture pelvis	1	3	4
Fracture spine	1	2	3

The radiological classification to the supracondylar-intercondylar fractures according to ASIF was followed:

C₁ Fractures, are simple supracondylar fractures extending into the joint.

C₂ Fractures, have in addition comminution of the supracondylar portion.

C₃ Fractures, are further complicated by intra-articular comminution.

According to this classification, the distribution of the fractures are shown in Table 3 in both groups.

TABLE 3
The Distribution of the Fractures According to the Radiological Classification.

<i>Fracture type</i>	<i>Operative</i>	<i>Non-operative</i>
C ₁	3	7
C ₂	10	8
C ₃	1	4

METHODS OF TREATMENT

Skeletal traction: In nineteen patients the fractures were treated by skeletal traction with the knee flexed 45 degrees for an average of eleven weeks (range eight to eighteen weeks). This was followed by mobilisation of the patient after application of a long leg cast in six patients, while seven patients had cast brace, and six were mobilised without external splintage. All the patients treated by this method were under physiotherapy care during and after traction.

Open reduction and internal fixation: Fourteen patients were treated surgically by open reduction and internal fixation following the principles of the ASIF group¹⁰. The internal fixation devices consisted of twelve condylar blade-plate, one buttress plate and one straight plate. Whenever possible all other fractures were stabilised at one operation. The

interval between the injury and operative fixation ranged from five to thirty days (average 12 days). A delay in the operation of more than two weeks was because of multiple trauma, poor medical condition or the unsatisfactory skin condition. In open fractures it was our policy to wait after wound excision and delay the operation until complete healing of the wound. Cancellous bone graft was used in eight patients, all were classified as grade C₂. Prophylactic antibiotics were used in all patients.

Post-operative treatment: Elevation of the lower limb keeping the hip and the knee flexed 45 degrees for two days, then non-weight bearing mobilisation of the patient was usually encouraged. Patients were allowed to weight-bear after evidence of radiological union. No cast or brace was applied unless the ligaments were repaired. Knee movements were started on the first post-operative day.

RESULTS

The average follow up to all patients was twenty two months (range 10 – 60 months).

1. **Length of time in hospital:** The average stay in the hospital was twenty eight days in patients treated operatively (range 12-55 days), while in the non-operative group the average was ninety days (range 40-220 days).
2. **Fracture Union:** In the non-operative patients bone union occurred at an average of sixteen weeks (range 13-32 weeks); one patient had delayed union and three patients had non-union that necessitated bone grafting. All fractures united with an average of thirteen weeks in the operative group (range 11-18 weeks).
3. **Range of movement:** In the operative group nine patients had full range of knee movement, four knees had flexion restricted to 110 degrees, one patient had 10 degrees extension lag with knee flexion up to 90 degrees. In patients treated by traction eight had full range of knee

movement, while eight had flexion restriction between 90-110 degrees, and four patients had extension lag 10-40 degrees.

4. **Shortening and malalignment:** Shown in Table 4.

TABLE 4
Shortening and Malalignment

	Number of patients	
	Operative	Non-operative
– Shortening		
< 2 cm	4	6
< 4 cm	1	3
> 5 cm	0	2
– Malalignment		
< 5°	2 varus	5 varus
5 – 10°	2 varus	4 varus
> 10°	0	2 varus

5. **Other Complications:** In the non-operative group two patients developed pulmonary embolism, two patients had common peroneal nerve palsy during the course of traction that recovered completely and three had pin-tract infection and the pins had to be removed. No infection or metal failure was reported in the operative group.

Classification and rating system: For each fracture, the final result was rated following the criteria described by Shelbourne⁶ (Table 5).

TABLE 5
Rating the Final Results

<i>Rating</i>	<i>Motion (degrees)</i>	<i>Angulation (degrees)</i>	<i>Pain</i>	<i>Shortening (cm)</i>
Excellent	Full extension Flexion > 120	None	None	None
Good	Full extension Flexion 90-120	< 5	Minimal, no medication	< 2.5
Fair	Loss of extension < 10 Flexion 70 - 90	5-10	Minimal, not requiring regular medication	2.5-5
Failure	Total < 60	> 10	Requiring daily medication or further surgery	> 5

Assessment of results: Using the previous mentioned rating, the final assessment and results were graded and are shown in Table 6.

TABLE 6
The Final Results in 33 Patients

	<i>Operative</i>	<i>Non-operative</i>
<i>Excellent</i>	9	8
<i>Good</i>	3	3
<i>Fair</i>	2	4
<i>Failure</i>	0	4

DISCUSSION

The danger of infection, the difficulty to obtain anatomical reduction to the intra-articular fracture and the lack of dependable system of rigid internal fixation were the reasons that made the orthopaedic surgeons advocate the conservative treatment to such fractures^{1, 2, 11, 12}. Siliski et al¹³ reported three cases of postoperative infection, two of them necessitated amputation. In this series the use of prophylactic antibiotic therapy and postponing surgery in open fractures until the wounds soundly healed probably avoided this complication.

The length of time the knee was immobilised was an important factor in predicting the functional end result¹⁴. Patients treated operatively, began knee mobilisation earlier than those treated non-operatively and had a superior result (Fig 1). Many



Figure 1a A patient showing a full degree of knee flexion following supracondylar-intercondylar femoral fracture treated by condylar plate.

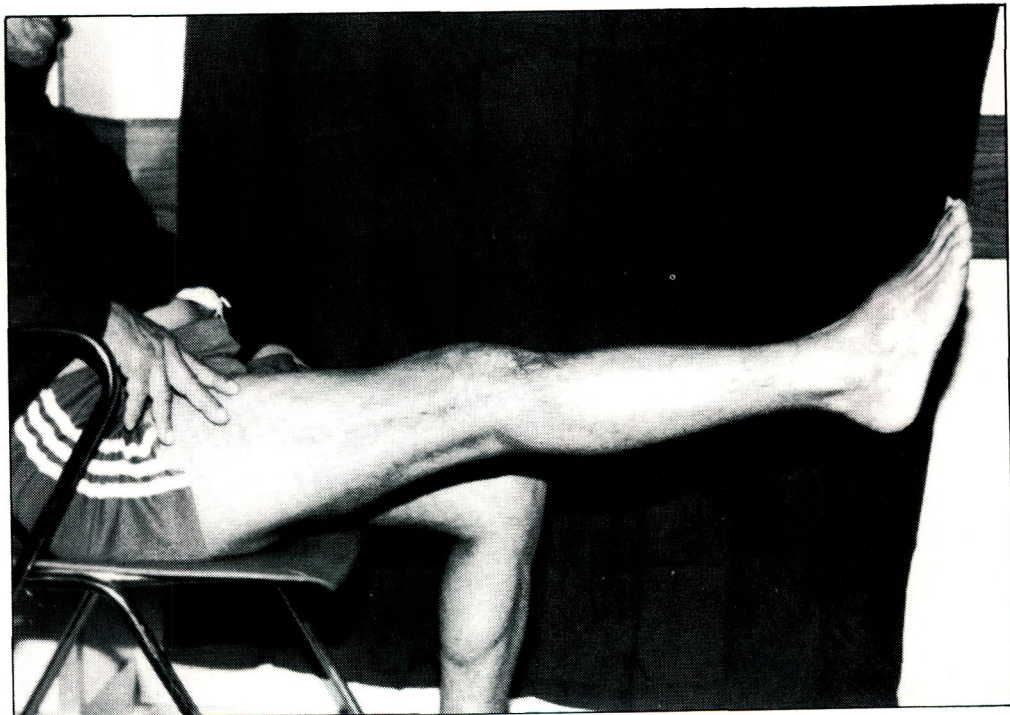


Figure 1b Full extension of the knee
His x-ray shown in figure 5.

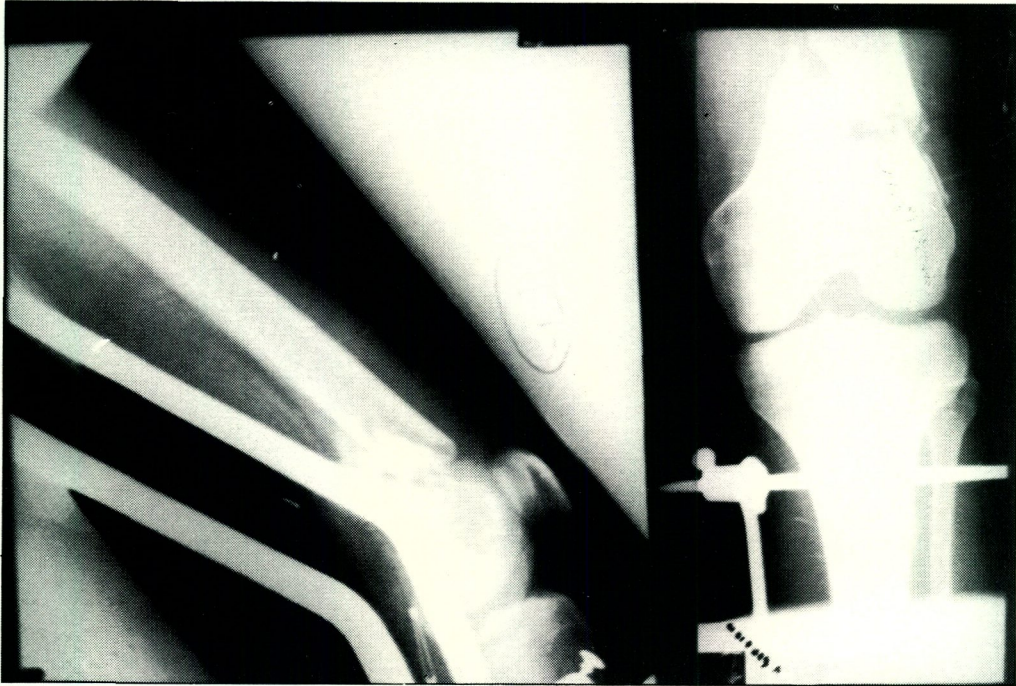


Figure 2a The initial x-ray of a supracondylar-intercondylar femoral fracture treated by traction.

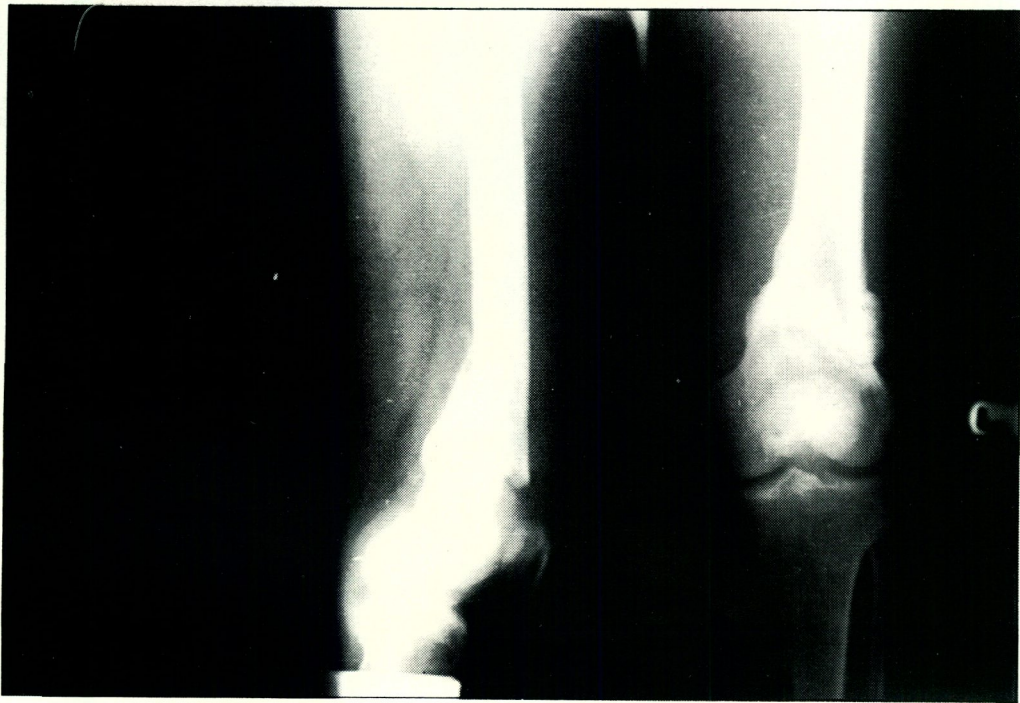


Figure 2b After union with malalignment as shown in the lateral view.

authors have demonstrated the importance of early mobilisation and its correlation with good results^{15, 16}. Furthermore, the incidence of malunion in general, and genu varum in particular, was less

common in fractures treated operatively (Fig 2 & 3). This is probably due to the rigid internal fixation after reducing the fracture, which is difficult to achieve in patients treated by traction (Fig 4).



Figure 3 United supracondylar-intercondylar fracture in an unacceptable malalignment treated conservatively.



Figure 4a The initial x-ray of a supracondylar-intercondylar femoral fracture.



Figure 4b After internal fixation by condylar plate.



Figure 4c After union.

An analysis of the comminuted fractures and those which developed varus deformity, illustrate the importance of medial cortical buttress in those fractures¹⁴. Neers et al² noted that comminuted fractures in traction tend to fall into varus and internal rotation deformity because of lack of medial support and the pull of adductor muscles. Other authors observed the importance of providing medial support with bone grafting in comminuted

fractures¹⁷. The current study suggested that this observation is correct.

The healing rate was better in the operative group. Furthermore, the incidence of delayed union or non-union was more frequent in the non-operative patients. This incidence compared favourably with that of other series¹¹. Probably the use of cancellous bone grafting was an important factor¹³ (Fig 5).



Figure 5a The initial x-ray of a supracondylar-intercondylar femoral fracture.

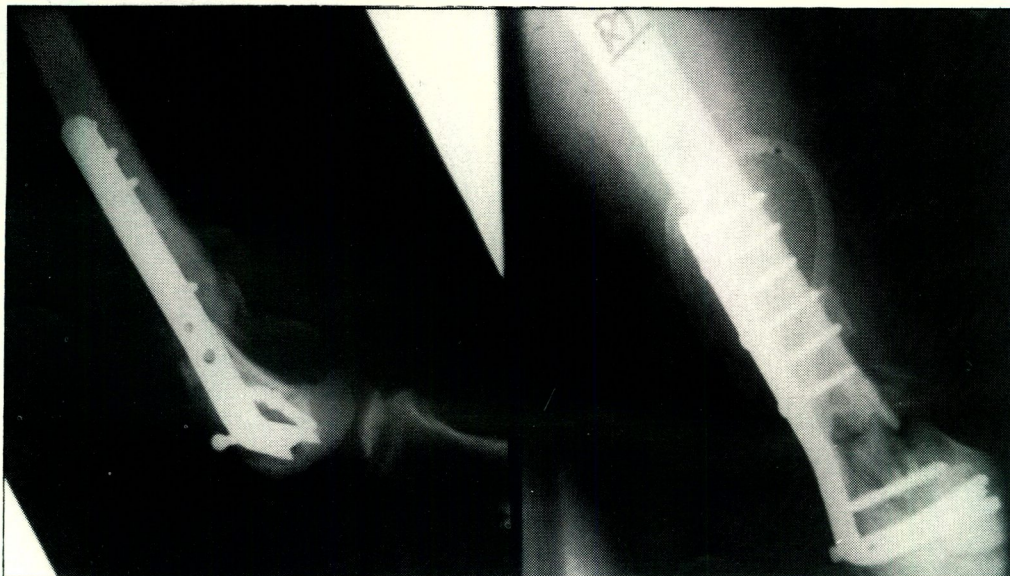


Figure 5b After fixation by condylar plate.



Figure 5c After union.

Pain influence the final result, and was more observed in the non-operative patients. Damage to the articular surface at the time of injury and long immobilization may result in late degenerative joint changes¹⁴. On the other hand active knee movement immediately after the operation avoided this problem and also avoided the complications of long recumbancy^{15, 16}.

CONCLUSION

The results of this study show that operative treatment of supracondylar-intercondylar fracture of the femur by rigid internal fixation is superior to conservative methods. This was due to anatomical reduction, early mobilisation of the knee and exercising the adjacent muscles which is fundamental in obtaining a good result. Proper technique is essential for the success of such procedures.

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