Original research article

A study on clinical profile of patients with distal femur fracture

[1]Dr.GururajaMeravanigi,[2]Dr. K G Ravi

[1,2]Associate Professor, Department of Orthopedics, Basaveshwara Medical college and Research Institute, Chitradurga, Karnataka, India

Corresponding Author:

Dr.GururajaMeravanigi

Abstract

The femur being the longest and strongest bone in the body is subject to enormous amounts of stresses. The distal shaft of femur which gradually widens is quite resistant to stress concentration and failure. But with aging, slow bone turnover and reduced resistance of the skeletal structures, this part is more liable to shatter than the mid-shaft. As soon as patients were brought in to our cares, detailed clinical history was obtained. Then clinical assessment of general condition, skeleton and soft tissue injuries were done, peripheral vascular status was assessed and there injuries ruled out shock was treated appropriately. The injured limbs of all patients were immobilized either by Thomas splint, pop slab or skeletal traction there were no criteria to select the mode of immobilization. Road traffic accidents were major cause of supracondylar fractures. Out of 33, 25(75.75%) patients sustained fractures because of RTA. Remaining 8 patients had a history of fall.C2 type of fracture was more common (Muller's Classification).

Keywords: Clinical profile, distal femur fracture, road traffic accidents

Introduction

The femur is the longest and the strongest bone in the human body. The shaft is narrowest centrally and expands a little upwards and more so towards its distal end. The distal third of the shaft has 4 surfaces. Anterior surface, lateral surface, medial surface and posterior surface. The distal end is widely expanded as a bearing surface for transmission of weight to the tibia, it has two massive condyles which are partly articular. Anteriorly the condyles unite and continue into a shaft, posteriorly separated by a deep intercondylar fossa and projecting beyond the plane of the popliteal surface[1].The articular surface is a broad area like an inverted U, for the patella above and the tibia below. The patellar surface extends anteriorly on both condyles, but largely the lateral: transversely convave, it is vertically convex andgrooved for the posterior patellar surface. The tibial surface is divided by the itercondylar fossa but is anteriorly continuous with the patellar surface, its medial part is a broad strip on the convex inferoposterior surface of the medial condyle, gently curved with a medial convexity. Its lateral part covers similar aspects of lateral condyle but is broader and passes straight back. The lateral condyle is laterllay flat and is less prominent than medial. Its most prominent pint is lateral epicondyle. The medial surface of the lateral condyle is the lateral wall of the intercondyar fossa. To its lateral epicondyle is attached the fibular collateral ligament and posterosuperior to this lateral head ofgastrocnemics is attached. Attached anteriorly in the groove is popliteus[2, 3].

The femur being the longest and strongest bone in the body is subject to enormous amounts of stresses. The distal shaft of femur which gradually widens is quite resistant to stress concentration and failure. But with aging, slow bone turnover and reduced resistance of the skeletal structures, this part is more liable to shatter than the mid-shaft. The deformities that result from fracturers of the distal third of femur and the imbalance of muscle pull[4].

The initial trauma and the imbalance of muscle pull. After its initial effect, trauma has no further influence. However muscle pull exerts deforming forces continuously until union is strong enough to withstand this stress. 4 large groups play dominant roles, the quadriceps, adductors, hamstrings and gastrocnemius[5].

In supracondylar fractures and intercondylar fractures, the gatrocnemius may produce joint incongruity by causing posterior angulation or displacement of the distal fragment or by rotating and spreading the condylar fragments. The quadriceps and hamstrings produce overriding and angulation of the fragments during the proximal fragment into the suprapatellar pouch causing further displacement and haemorrhage. The wide attachement of the adductor muscles to the distal medial aspect of the shaft tend to create a vaus deformity at the fracture site. These deforming forces are resisted to some extent by the tension forces of the lateral thigh musculature and facialata. When instituting measures to correct deformity and to prevent its recurrence one must consider these dynamic deformity forces. In T or Y

condylar fractures, the proximal fragment may be driven into the distal fragment, wedging the condyles apart. This displacement is dur largely to muscle pull[6].
Vascular and neurological damage are rare, but the possibility must always be considered because of the proximity of the popliteal vessels and nerves, especially the common peroneal nerve.

Methodology
Data collection was based on patient evaluation through detailed history, clinical examination and roentgenografic examination. For the fracture to be included in this study part of the fracture line has to extend distal to horizontal line drawn on APX-RAYS 9 cm above the distal articular surface of the femoral condyles. Thus trans condylar fractures, fractures involving the intercondylar notch and supracondylar fractures without extension in to the notch were all considred and included in the series. This was followed by surgical management.
Following patients were excluded from the study.

1. Age less than 16 years or open physeal plate, whichever is later.
2. Pathological fractures.
3. Associated neurovascular injuries/open fractures.
4. Patient lost in follow up.

As soon as patients were brought in to our cares, detailed clinical history was obtained. Then clinical assessment of general condition, skeleton and soft tissue injuries were done, peripheral vascular status was assessed and there injuries ruled out shock was treated appropriately. The injured limbs of all patients were immobilized either by Thomas splint, pop slab or skeletal traction there were no criteria to select the mode of immobilization.
Fractures were evaluated using x rays and then classified according to MULLER"s classification. Patients were subjected to routine investigations for surgical fitness. Following investigations were carried out routinely.

- Blood teasts, haemoglobin, RBS.
- Urine analysis.
- Blood grouping and cross matching.

ECG
Other investigations when found necessary were done, consent taken, case was prepared for surgery. Pre-operative procedure included.

- Improvement of general condition.
- Preoperative antibiotics.
- Preparation parts.
- Enough blood was arranged.

Internal fixation devices were arranged depending upon the fractures and surgeons preference.
For the purpose of analysis the fractures were classified using the MULLERS comprehensive classification based solely on radiographic appearance of the fracture. The final long term result was rated using NEER'S score. The rating described by Neer' *et al*., assigns points for pain, function, capability of work, gross anatomy and radiographic appearance. This rating was developed specifically for evaluation of fractures of the distal femur.

Results

Table 1: Age group

	Group		Total
	Dynamic Condylar Screw	Locking Condylar Place	
Age 20 & Less	1 5.9%	1 6.3%	2 6.1%
21-30	2 11.8%	1 6.3%	3 9.1%
31-40	5 29.4%	2 12.5%	7 21.2%
41-50	8 47 1%	6 37.5%	14 42.4%
61-70	1 5.9%	2 12.5%	3 9.1%
Total	17 100.0%	16 100.0%	33 100.0%

Slide 24 patients had fracture on their right side and other 9 on their left side.

Table 2: Side involved

		Group		Total
		Dynamic Condylar Screw	Locking Condylar Place	
SIDE	L	5 29.4%	4 25.0%	9 27.3%
	R	12 70.6%	12 45.0%	24 72.7%
Total		17 10.0%	16 100.0%	33 100.0%

X^2= 0.001, p=0.999, NS

Mode of Injury: Road traffic accidents were major cause of supracondylar fractures. Out of 33, 25(75.75%) patients sustained fractures because of RTA. Remaining 8 patients had a history of fall.

Table 3: Mode of injury

		Group		Total
		Dynamic Condylar Screw	Locking Condylar Place	
Mode of Injury	Fall	2 11.8%	6 37.5%	8 24.2%
	RTA	15 88.2%	10 62.5%	25 75.8%
Total		17 10.0%	16 100.0%	33 100.0%

X^2= 1.736, p=0.188, NS.

Table 4: Type of fracture according to Muller's classification

		Group		Total
		Dynamic Condylar Screw	Locking Condylar Place	
Type of Fracture	A1	1 5.9%	2 12.5%	3 9.1%
	A2	2 11.8%	2 12.5%	4 12.1%
	B1	1 5.9%	0 .0%	1 3.0%
	C1	1 5.9%	1 6.3%	2 6.1%
	C2	12 70.6%	9 56.3%	21 63.6%
	C3	0 .0%	2 12.5%	2 6.1%
Total		17 10.0%	16 100.0%	33 100.0%

X^2 exact test p= 0.735, NS

Discussion

Most of the early literature considered femoral fractures as a whole and it not differentiate the distal femoral fractures into aseparate group. In 1933, Mahorner and Bradburn reported their results of treatments of femoral fractures with skeletal traction. Of all the fracture in their series, the distal femoral fractures had the poorest results. In 1935, Lorenz Bohler recommended a Braun splint, placed posteriorly at the level of the fracture rather than the knee, to help control the supracondylar fragment. The same was subsequently advocated by both Smile and Charnley.

Later investigators recommended the two-pin technique to control the supracondylar fragment. Watson-Jones[1], in 1955, disagreed, believing that the risk of peroforation of the femoral artery was too high. He recommended standard proximal tibial skeletal traction only using knee flexion to control the supracondylar fragment.

Two classed articles came out within a year of each other in the in the North American literature in the 1960s. Stewart *et al.*,[2], from the Campbell clinic, reported in 1966 on a 20-year review of fractures of the distal femur. The authors concluded as follows:

"Conservatism should be taught and practiced more universally, Treat the patient not the x-ray".

Neer*et al.*,[3], in 1967 reported on supracondylar fractures treated at New York Orthopedic Hospital over a 24-years period. They proposed three part classification system and also a rating system for evaluation based on functional and anatomic assessment. In conclusion, Neer*et al.*,[3], felt operative intervention should be limited to the debridement of open fractures or the internal fixation of a fracture with an

ISSN:0975-3583,0976-2833 VOL14, ISSUE12,2023

associated problem such as an arterial injury.
In 1958, the Swiss AO group was formed, commencing a new era of fracture care. They recommended the principles of anatomic reduction of the fracture fragments, preservation of the blood suplly, stable internal fixation, and early active pain-free mobilization. It was not unitl 1970 that the AO published its first results onTreatment of supracondylar femur fractures according to these principles, Wenzl*et al*.,and Shatzker[4, 5]*et al*., followed AO principles for treatment of distal fractures and reported that open reduction that open reduction internal fixation ensures a very high rate of success.
Olenrud*et al*.[6], in 1972, reviewed 15 patients with complex articular fractures of the distal femur. He reported 92% good to excellent results with the use of the angled blade plate.
In 1982, Mize *et al*.,[7, 8] reported on ORIF of distal femoral fractures using AO technique. They also recommended the use of extensile surgical approach for complex intraarticular fractures.
In the 1970s and 1980s the wave of enthusiasm for open reduction and internal fixation was not limited to AO techniques. In an attempt to find alternate procedure that were less technically demanding but produced the same results, numerous fixation devices were popularized. Zickel[9, 10]*et al*., reported in 1977 on the use of the supracondylar Zickel device.
Giles *et al*.,[11] reported in 1982 on the use of a supracondylar lag screw and side plate for fixation of fractures of distal femur, which compared very favourably with other reported series of similar fractures, Similar excellent results with the use of this device have been reported by Hall Pritchett, Regazzoni*et al*.,and Sanders *et al*., Brown and d'Arey[12] reported on the use of a nail plate with ad adapted additional medial compression plate to provide stable fixation on both sides of the femoral condyles.

Conclusion

- 24 patients had fracture on their right side and other 9 on their left side.
- Road traffic accidents were major cause of supracondylar fractures. Out of 33, 25(75.75%) patients sustained fractures because of RTA. Remaining 8 patients had a history of fall.
- C2 type of fracture was more common (Muller's Classification).

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