

Fracture of the femur after knee arthroplasty

Boe Falkenberg Nielsen¹, Vivian Stausholm Petersen¹ and Jens Erik Varmarken²

The supracondylar fracture of the femur is a serious complication after total knee arthroplasty. We report our experience in the management of 16 patients with this complication and suggest that the main line of treatment should be conservative. Open reduction and plate fixation is precarious. In displaced fractures, however, the Rush pin technique was useful.

Supracondylar femoral fracture in patients with a total knee prosthesis is an unusual late complication and has been sparingly reported (Hirsch et al. 1982, Ritter et al. 1985, Sisto et al. 1985, Merkel and Johnson 1986). We present 16 patients with this complication.

Patients and methods

From January 1978 through December 1985, 12 women and 4 men with a previously inserted total knee prosthesis were treated for an ipsilateral supracondylar femoral fracture. The median age of the patients was 75 (60-86) years, and the prostheses had been inserted 1-11 years previously. Prior to injury, all had acceptable knee function. All the patients had various degrees of osteoporosis, and all the fractures occurred following trivial trauma (Table 1). Four patients were on steroid therapy because of advanced rheumatoid arthritis. In 2 patients there was radiographic evidence that the arthroplasty operation had injured the anterior femoral cortex. Ten undisplaced or slightly displaced fractures were treated with a hexalite or Scotch cast bandage. Six fractures could not be retained by conservative

measures, which led to AO plating in 4 patients and Rush pinning in 2.

Results

All except one fracture united within 13 weeks. In the conservatively treated group of patients, no complications occurred, and the function of the patients had returned to the preinjury status within 1 year. Three internally fixed fractures - one treated with an open reduction and AO plate and two treated with closed reduction and Rush pins - united without complications and regained their prefracture function. Three of 4 patients who had early open reduction and internal fixation had complications. One patient who had an AO blade plate inserted developed a deep infection around the prosthetic material leading to loosening and osteomyelitis ending with an arthrodesis. In another patient treated with the insertion of a 10-hole AO plate, a chronic fistula with communication to the femoral component developed. The patient's health did not allow further surgical intervention, and the final result was unsatisfying, with restricted range of motion and persistent pain. In a third patient who had a 10-hole AO plate inserted, the distal screws loosened after 3 weeks. The fracture united without further surgical intervention with 15° forward angulation. After 1 year the patient had problems with the knee giving way while standing.

Two patients treated with the Rush pin technique had some posterior angulation of the distal femoral fragment, but both patients regained their prefracture function.

Departments of Orthopedics at ¹Gentofte Hospital and ²Rigshospitalet, University of Copenhagen, Denmark

Table 1. Supracondylar fracture of the femur following total knee arthroplasty

A	B	C	D	E	F	G	H	I	K	L	M
1	M/65	R	T	c	fw	st	5	c	-	11	u
2	F/78	A	T	c	sf	st	6	c	-	12	u
3	F/77	R	T	w	sw	st	11	c	-	11	u
4	M/75	A	T	-	fw	so	4	c	-	12	u
5	M/80	A	T	-	fw	st	3	c	-	12	u
6	F/86	A	H	-	fw	so	4	cr	-	11	u
7	F/68	A	T	c	sf	so	8	c	-	12	u
8	F/76	A	T	-	sf	so	6	c	-	12	u
9	F/71	A	T	-	fw	st	1	c	-	13	u
10	F/81	R	H	c	fw	st	5	c	-	12	u
11	F/62	R	T	-	fw	uo	4	a	a	-	s
12	F/78	A	T	c	fw	uo	6	a	b	12	s
13	F/78	R	T	w	sw	uo	3	a	c	13	us
14	F/85	A	H	-	fw	uo	5	a	-	11	u
15	M/82	R	H	c	fs	ut	4	r	-	12	u
16	F/60	R	T	-	fw	uo	2	r	-	12	u

A Case number.

B Sex/age.

C Diagnosis; A arthrosis, R rheumatoid arthritis.

D Prosthesis; H hinged, T total condylar.

E Prefracture ambulatory status; c cane(s), w wheelchair.

F Cause of injury; fw fell while walking, fs fell from step, sf slipped on floor, sw slipped from wheelchair.

G Fracture type; so stable oblique, st stable transverse, uo unstable oblique, ut unstable transverse.

H Years from arthroplasty to injury.

I Treatment; a Ao plate, c cast, cr 2 crutches, r 2 Rush pins.

K Complications; a deep infection, arthrodesis, b deep infection, chronic fistula, c loosening of plate, malunion.

L Weeks for healing.

M Function; s severely restricted, u unchanged, us unstable knee.

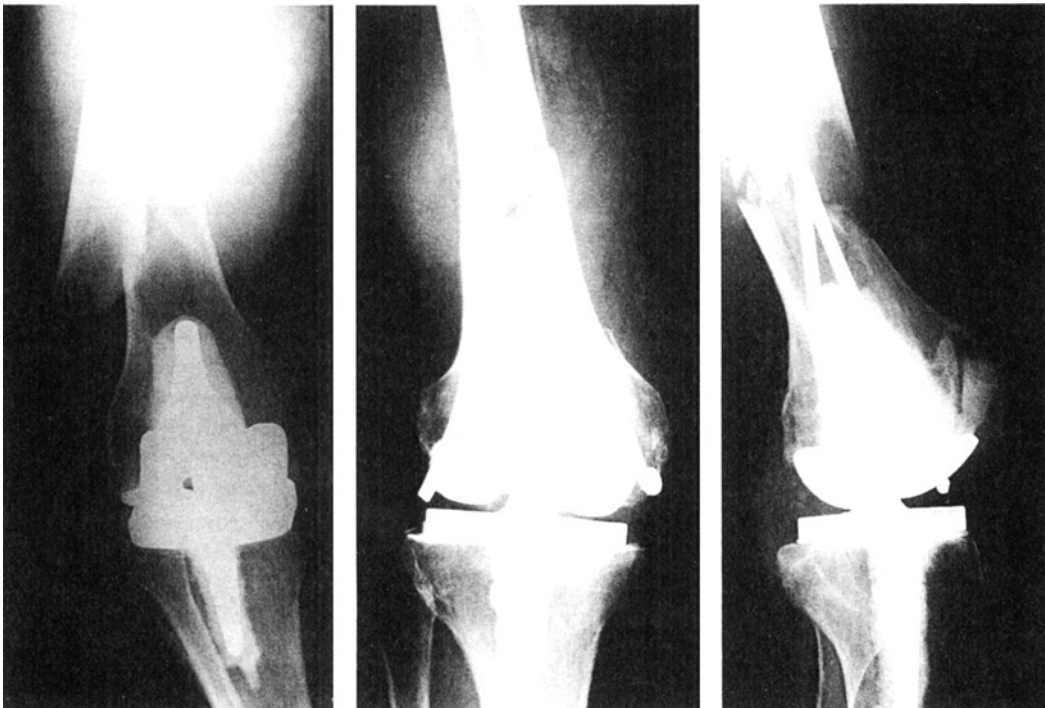


Figure 1. Case 15. A 82-year-old man with rheumatoid arthritis. Four years after arthroplasty with a spherocentric prosthesis, the patient fell on a step. The fracture healed in 3 months after closed reduction and Rush pinning.

Discussion

In agreement with earlier reports, we found radiographic evidence of osteoporosis in all our patients. Penetration of the anterior aspect of the femoral cortex during the arthroplasty may also represent a potential risk of supracondylar fracture (Sisto et al. 1985, Merkel et al. 1986). This was the only radiographic finding related to the operation that seemed to predispose to supracondylar fracture in our series.

Patients with a stable, undisplaced or slightly displaced supracondylar fracture after total knee replacement may be treated conservatively with a cast and instant mobilization, and the healing time is comparable to that in patients without a knee prosthesis (Neer et al. 1967).

Greater problems arise in the treatment of an unstable, displaced fracture. Because these patients frequently are in the advanced age group with concurrent diseases and sometimes undergoing steroid therapy, a longer period of immobilization, including traction, often is undesirable. In these patients, internal fixation with quick

mobilization seems to be preferable. Conventional plate osteosynthesis may be precarious because of the extensive surgical exposure, the risk of accidental loosening of the prosthesis, and the osteoporosis in a bone that has already been mechanically stressed. In agreement with Kolmert et al. (1983) and Merkel and Johnson (1986), we experienced a high rate of complications following early open reduction and internal fixation. We have analyzed the cases of failed AO fixation in our series and found no obvious explanation for the disappointing results. The operations were performed by trained senior surgeons, prophylactic antibiotics were used, and the surgery was completed within a reasonable period of time. There were no problems with wound closure and no technical difficulties in the placement of the fixation device.

Our series suggests that the time of bone union is not prolonged when compared with nonprosthetic patients, that the main line of treatment should be conservative, and that Rush pinning is a usable and less extensive treatment method in suitable cases demanding internal fixation.

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