

Simultaneous ipsilateral trochanteric and femoral shaft fracture

Thirteen cases of concomitant trochanteric and shaft fracture of the same femur are reported. The hip fracture was initially missed in two cases. Osteosynthesis of both fractures was performed in ten cases. Both fractures healed in the 12 cases followed for 6 months or more. Osteosynthesis of both fractures is recommended, preferably by fixation with angled or straight plates, and Ender nailing in selected cases.

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Although ipsilateral trochanteric and femoral shaft fracture is a rare combination, its incidence is increasing, associated with high speed motor-vehicle accidents. Opinions concerning the sequence of traumatic events leading to this dual lesion, as well as its management, have differed. This paper contributes 13 cases accumulated in the last 15 years in two medical institutions at Montevideo.

Patients and methods

Thirteen patients with simultaneous ipsilateral trochanteric and shaft fracture of the femur were treated at the University Department and Institute of Orthopaedics and Traumatology, and the Department of Traumatology at the Insurance Bank Medical Centre, at Montevideo, during the period December 1968 to December 1983 (Table 1). Two of the cases have been reported previously (Masliah 1969, Barquet & Mussic 1983).

There were 11 males and 2 females with average age 41 (23–67) years. Twelve patients were injured in motor-vehicle accidents, and one fell from 6 meters. Ten patients were multi-injured, with other skeletal or visceral injuries. The hip fracture was intertrochanteric, without separation of the lesser trochanter, in 10 patients; cervico-trochanteric in one, and combined per- and subtrochanteric in two patients. The fracture line was more or less transverse in seven cases, slightly oblique in four, and oblique in two. There was no initial displacement in three cases; displacement was slight in three cases and great in seven. The shaft fracture was transverse in

seven cases, short oblique with a small third fragment in one, comminuted in four, and segmental in one. One of the shaft fractures was open. The fracture involved the middle third of the shaft in seven cases, the junction of the proximal and middle third in three, and the junction of the middle and distal third in two cases; the segmental fracture involved the middle third proximally and the junction of the distal third and the supracondylar region distally. Nine patients had major associated fractures or dislocations of the same limb. Six patients had severe injuries of the other limb.

The trochanteric fracture was initially diagnosed in 11 cases; in one case the diagnosis was delayed 2 days, and in another 8 days.

All cases were initially treated by skeletal traction, which was followed by immobilisation with spica cast in two patients. The trochanteric fracture was fixed with an ASIF 130° angled plate and the shaft fracture managed with a cast in one patient (Case 6). Both fractures were fixed with a long ASIF 95° angled plate in one patient (Case 11). In seven patients the hip fractures were fixed with ASIF angled plates or with nail-plates, and the shaft fractures with straight plates plus cancellous grafts in four cases. Ender nailing plus external protection in cast or in traction, respectively, was used in two patients. All patients managed with internal fixation were operated within the initial 3-week period.

Results

Twelve of the 13 patients have been followed for on average 42 (6–179) months.

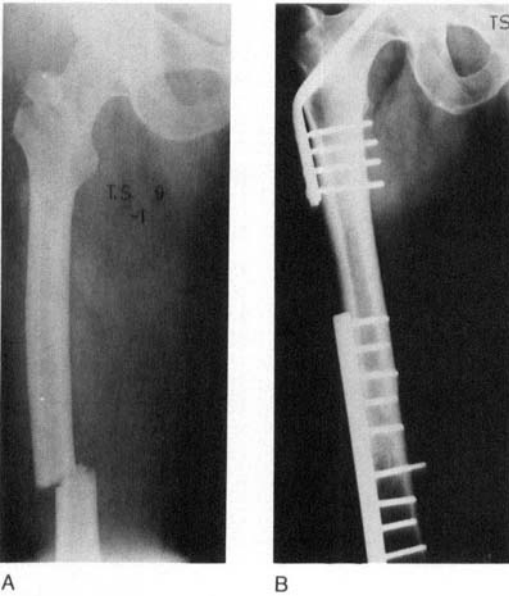


Figure 1. A. Trochanteric and shaft fractures of the right femur in a 37-year-old patient injured in an automobile accident (Case 9). B. Healing of both fractures 39 weeks after internal fixation. No functional limitation.

All the femoral fractures united. In Case 13, a patient who had both fractures fixed with an angled plate and a straight plate, infection had developed at both sites. One year after osteosynthesis the plates had been removed, sequestrectomy had been performed, and, in order to improve definite healing of the shaft, a functional brace had been applied.

Trochanteric and shaft fractures healed in good position without functional limitation, i.e. no limitation in activities of daily living, no loss of joint motion of more than 20 per cent, and no pain (Casey & Chapman 1979), in five patients. Three of them had been treated with an angled plate plus a straight plate (Cases 4, 5, and 9; Figure 1); one with a Thornton nail-plate plus a straight plate; and one with Ender nails plus 2 months with cast (Case 7; Figure 2). In three patients there was functional limitation even though both fractures healed in good position. In two of them moderate to severe knee stiffness occurred following ipsilateral knee and lower leg major fractures. The third patient was the one with infection (Case 13) who had no signs of infection 8 months after the last operation, but had hip and knee stiffness.

Shortening of 3–4 cm developed in three cases who all had either the shaft fracture or both fractures treated by traction or cast. Shortening was caused by malunion of the shaft fracture in Case 6, and of the trochanteric fracture in Cases 2 and 10. Functional limitation in these patients was also due to moderate to severe knee stiffness.

Discussion

The hip fracture in this associated lesion was intertrochanteric and more or less transverse or slightly oblique in most instances. This fracture seems to be caused by a longitudinal force applied on the femoral axis, with impact at the knee, and with the hip in the intermediate position of adduction-abduction, i.e. with the fem-



Figure 2. A. Cervicotrochanteric and segmental shaft fracture of the right femur in a 39-year-old patient (Case 7) after Ender nailing and external support with cast. B. Healing of fractures 64 weeks later. No functional limitation.

Table 1. Thirteen cases of simultaneous ipsilateral trochanteric and femoral shaft fracture

Case	Age	Sex	Side	Fracture		Major associated fractures		Treatment		Follow-up (mo)	Result
				Trochanter	Shaft	Left	Right	Trochanter	Shaft		
1	32	M	L	I, T	O, m			Ap	Sp	179	BFH (hip moderate varus), GF
2	23	M	L	I, O	Co, p-m	Ti	Fe		Tc	100	BFH (hip varus), -4 cm, knee stiffness
3	47	M	R	I, O	T, m		An, Fe ^b	Th	Sp	44	BFH, GP, GF
4	25	F	R	P, O	T, m			Ap	Sp	40	BFH, GP, GF
5	25	M	R	P ^c , T	T, m-d	Fe, Ti		Ap	Sp	40	BFH, GP, GF
6	52	M	R	I, O	Co, p-m	Ti	Pa, An	Ap	Tc	34	BFH (malunion shaft), -3 cm, knee stiffness
7	39	M	R	C, O	S, T, m	Ti			Ec	17	BFH, GP, GF
8	21	M	R	I, T	T, m		Fe ^b , Pa, Ti	Th	Sp	12	BFH, GP, knee stiffness
9	37	M	R	I, T	T, m-d			Ap	Sp	12	BFH, GP, GF
10	54	M	L	I, T	Co, m ^a	An			Tc	9	BFH (hip varus), -3 cm, knee stiffness
11	61	F	R	I, O	T, m		Fe ^b	Ap		-	-
12	67	M	R	I, T	T, m	Ti	Ti		Et	6	BFH, GP, knee stiffness
13	50	M	L	I, O	Co, p-m	Ti	Fo	Ap	Sp	19	BFH ^d , hip and knee stiffness

Fracture types: C = cervico-trochanteric; P = per-subtrochanteric; Co = comminuted; S = segmental; I = intertrochanteric; T = transverse; O = oblique. p, m, d = proximal, middle, distal third of the femoral shaft.

^a Open fracture, ^b intercondylar, ^c also posterior femoral head dislocation, ^d healed infection of both fractures.

Associated fractures: An = ankle, Fe = femur, Fo = foot, Pa = patella, Ti = tibia.

Treatment: Ap = ASIF-angle plate, Sp = ASIF straight plate, Tc = traction-cast, Th = Thornton nail-plate, Ec = Ender nailing plus cast, Et = Ender nailing plus traction.

Result: BFH = Both fractures healed, GP = good position, GF = good function (no limitation in activities of daily living, loss of joint motion <20%, no pain).

Case 5 had also a liver laceration.

oral head well seated in the acetabulum (Böhler & Aichner 1959, Alho 1980): the force presses the femoral head against the socket and produces this special trochanteric fracture or an almost vertical femoral neck fracture, or an acetabular fracture. The same force may cause the shaft fracture, but postulations as to the sequence of events differ: de Mourgues et al. (1975) and Haas et al. (1980) believe that the hip fracture occurs first; Dencker (1965), Schatzker & Barrington (1968), and Zettas & Zettas (1981) believe that the shaft fracture precedes the hip lesion. We believe that both fractures occur simultaneously; if they do not, then a single fracture would occur; in this we agree with Ravaglia & Zorzi (1955).

In addition to our two patients with delayed diagnosis of the hip fracture, we have found that the hip fracture was missed initially in 11 of 61 cases with information collected from the literature. To avoid diagnostic delay, patients

with femoral shaft fracture should have routine roentgenograms of the adjacent joints.

All three cases with cast immobilization in our series ended with shortening and functional limitation. The advantage of osteosynthesis in this dual lesion thus seems clear.

Küntscher nailing in combination with cancellous screws has been recommended for ipsilateral femoral neck and shaft fractures (de Mourgues et al. 1975, Reiler & Vécsei 1981). However, medullary nailing of the shaft precludes a stable internal fixation of the trochanteric fracture. The use of ASIF angled and straight plates was the most common procedure in our series; this method permits bone healing in good position with early pain-free mobilisation. If the shaft fracture involves the proximal third, both fractures can be fixed with a long-angled plate, and when the fracture involves the middle third the angled plate will fix the hip fracture and a broad straight

plate can be used for the shaft. A distal shaft fracture may be fixed with a straight or a condylar plate. This protocol involves extensive exposure and a relatively long operating time with increased risk of disturbed healing and infection (Grosse & Mochel 1980, Carret et al. 1981).

Ender nails, plus external protection, were efficient in achieving healing of both fractures in good position in both cases of our series; functional limitation in one of them was caused by associated severe knee injuries. This protocol diminishes the surgical trauma, but the stability achieved tends to be inadequate, and external protection may frequently be inconvenient in these multi-injured patients.

Even though it is difficult to define standard management for ipsilateral trochanteric and femoral shaft fractures, we conclude that osteosynthesis of both fractures should be performed as soon as the patient is in a stable condition. Fixation with angled and straight plates is a suitable protocol with Ender nailing as a therapeutic alternative for selected cases.

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