Acta orthop. Scandinav. *XXXV*, 16–20, 1964.

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REFRACTURE OF THE SHAFT OF THE FEMUR

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Refracture is a complication of fracture of the femoral shaft relatively seldom mentioned in the literature. For instance, in the major series published by *Böhler* (1951), *Street* (1951), and *Key & Lottes* (1951) no such complication was noted. On the other hand, *Stuck & Grebe* (1948) recorded refracture or secondary fracture in 21 of 124, and *Hartmann & Brav* (1954) in 12 of 135 cases.

During recent years several authors have reported bone absorption and refracture, so-called encircling fracture, after fixation with encircling wire or bands (*Olsson* 1949, *Arnesen* 1951, *Stören* 1958).

The cause of bone absorption around encircling wires has not been established with certainty. It would appear to result from movements of the fracture ends (*Arnesen, Stören*). Other factors which may be of importance are the character of the fixation material, corrosion, and infection. *Olsson*'s report of 44 different fractures treated with encircling wire described bone resorption around the wire in 9 cases and spontaneous fracture in 3. *Arnesen*'s investigation of 43 different fractures treated with encircling wire, absorption around the wire occurred in 2 cases, 1 of which was accompanied by spontaneous fracture.

MATERIAL

The investigated series of femoral shaft fractures, altogether 1,003, was collected from practically all Swedish hospitals during the three years between 1952 and 1954. The material comprises fractures mainly situated in the middle three fifths of the femur of patients 17 years old or more, where there was no probability of tumour involvement. Fracture healing can be evaluated in 837 of the 1,003 fractures.

A new break at or close to the old fracture, which was regarded as healed, is here termed refracture.

There was no significant difference in the incidence of refracture between different methods of treatment of either closed or open fractures (Tables 1 and 2).

TABLE 1
Closed Fractures. Frequency of Refracture.

Method of treatment	Total fractures	Refractures	
		No.	%
Closed methods			
Traction	196	2	1
Others	6	–	–
Open methods			
Intramedullary nailing	364	8	2
Encircling wire	83	3	4
Plate and screws	43	–	–
Others	45	2	4
Transfixation	4	1	(25)
Total	741	16	2

TABLE 2
Open Fractures. Frequency of Refracture.

Method of treatment	Total fractures	Refractures No.
Closed methods		
Traction	32	3
Other	1	–
Open methods		
Intramedullary nailing	40	–
Encircling wire	4	–
Plate and screws	7	–
Others	9	1
Transfixation	3	–
Total	96	4

In 17 of 20 cases refracture occurred in connexion with a new accident. In 3 there was no trauma. Eight patients sustained refracture within four months, 9 between four and twelve months, and 3 more than twelve months after the original fracture had united.

The extent of bone absorption—as observed on the roentgenograms

and therefore representing minimum values—amounted to between 1 mm. and 3 mm. in 17, and between 4 mm. and 6 mm. in 3 of 87 fractures treated with encircling wire. Two cases in which refracture resulted from bone absorption around the wire are here reported briefly.

No. 865. Male, 46 years, fell on March 29, 1954, and sustained an oblique fracture midway along the left femoral shaft. Traction was applied through the distal part of the femur. Operation on April 1: Fixation with 2 encircling wires + plaster immobilization. The fracture was united 7 months after the operation. There was at that time bone absorption of 1 to 2 mm. at both wires. These were not extracted. On October 4, 1955, about 18 months after the accident, the patient experienced pain in the left thigh not connected with any trauma. Roentgen examination revealed an oblique fracture at the same site as the original one. The refracture started at the level of the proximal wire. There was about 3 mm. bone absorption at both wires. Operation on October 12: Extraction of encircling wires + intramedullary nailing + grafting with bone chips from the iliac crest. The postoperative period was uneventful. The fracture was healed 6 months after the nailing operation.

No. 2308. Male, 21 years, fell off a fence on August 25, 1952, and sustained a long oblique fracture in the lower third of the left femoral shaft. Traction was applied through the tibial tuberosity. Operation on September 10: Fixation with 2 encircling wires + plaster immobilization. Roentgen examination on December 6, 1952, showed the fracture to be united. There was at that time bone absorption measuring around 2 mm. at both wires. These were not extracted. On March 29, 1953, sudden pain developed in the left thigh without any preceding trauma. Roentgen examination revealed refracture at the level of the proximal wire. There was about 2 mm. of bone absorption at each wire. The refracture was at first treated with traction, followed by plaster immobilization. No extraction of the wires. The fracture was healed after 5 months. At this time there was about 1 mm. of bone absorption at the distal wire. No further roentgen examinations were made.

DISCUSSION

Refracture supervened in 20 cases of 837, evenly distributed among the different methods of treatment. In most instances it was connected with a new trauma. If these patients had exerted more caution during the year following the fracture, the second break might have been avoided. Almost invariably the refracture occurred within this period.

Most authors recommend that encircling wires should be extracted as soon as healing permits (*Olsson,* among others). In both encircling fractures there was between 1 mm. and 2 mm. of bone absorption at the wires 3½ and 11 months, respectively, before the date of the new break. Had the fixation material been extracted at that time, refracture might possibly have been prevented since it was in neither instance preceded by any trauma.

SUMMARY

Refracture occurred in 2 per cent of the femoral shaft fractures which were treated at Swedish hospitals during the three-year period 1952 to 1954. The complication was of roughly equal incidence in the different treatment groups. Two of the 87 fractures treated with encircling wire were accompanied by encircling fracture.

RESUME

Examen de nouvelles fractures qui se sont produites dans 2 pour cent des cas de fracture du corps du fémur traités dans les hôpitaux suédois pendant la période de trois ans, 1952 à 1954. La complication présentait dans l'ensemble la même incidence dans les différents groupes de traitements. Deux des 87 fractures traitées par encerclage présentaient une fracture d'encerclage.

ZUSAMMENFASSUNG

Refraktur trat in 2 Prozent der Femurschaftbrüche auf, die an schwedischen Krankenhäusern während der Dreijahrsperiode 1952 bis 1954 behandelt wurden. Die Komplikation ereignete sich ungefähr mit gleicher Häufigkeit in den verchiedenen Behandlungsgruppen. Zwei der 87 Brüche, die mit Drahtumschlingung behandelt wurden, waren von einem kreisförmigen Bruch begleitet.

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