

A femoral fracture with an extruded 14-cm fragment treated by secondary locked nailing—a case report

Chi-Chuan Wu and Chun-Hsiung Shih

Department of Orthopedics, Chang Gung Memorial Hospital, 5, Fu-Hsin St. 333, Kweishan, Taoyuan, Taiwan, R.O.C.
Tel +886 3-3281200, ext. 2163. Fax -3285818
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A 16-year-old boy sustained a left type IIIa open fracture of his left femur in a motorcycle accident (Gustilo et al. 1987). Although the wound over the anterior aspect of the thigh was only 10 cm long, a 14 cm long bony fragment fell into the rice field. The patient and the piece of bone were immediately sent to a county hospital. After wound debridement, the bony fragment was autoclaved and put back into the wound. It was left open and the patient was transferred to our institution.

After the wound was cultured, a saline wet dressing was applied. Intravenous cephalosporin and gentamicin were given and the patient was sent to the operating room 18 hours after the injury.

Under spinal anesthesia, the wound was thoroughly debrided and irrigated with copious amounts of saline. The autoclaved bony fragment was rinsed with

saline and all visible foreign bodies were removed with a rongeur. Then it was put back into the thigh and covered with muscles.

The femur was stabilized with Ilizarov external fixation and the wound was left open. The wound was covered with a dry dressing and intravenous cephalosporin and gentamicin were given for 3 days. The wound was closed after 7 days. Postoperatively, the patient was permitted to ambulate with partial weight bearing.

The external fixator was left in place for 2 weeks. Then, it was removed and proximal tibial skeletal traction was used for 1 week. Finally, a Grosse-Kempf nail was inserted by closed nailing and locked at both ends. Postoperatively, intravenous cephalosporin antibiotics were used for 3 days. The patient was permitted to ambulate with non-weight bearing





1 week after removal of the Ilizarov external fixator a closed static locked nail was inserted. The fracture healed at 5.5 months.

At a 3-year follow-up, the fracture site had solidly united. Nevertheless, some cortical defects were still present.

and knee motion was encouraged.

The fracture healed after 5.5 months when knee motion was 0° – 140° . There were no infections, leg length discrepancy (> 2 cm) or malrotation ($> 10^{\circ}$). At the 3-year follow-up, the patient had recovered to his preinjury condition. Nevertheless, it was decided not to remove the nail, because of some cortical defects.

Discussion

Successful replantation of expelled fragments from the femur (Kirkup 1965, Abell 1966) and tibia (Hansson et al. 1977) has been performed before. At that time, the treatment alternatives were fewer, as there were no devices for external fixation of the femur. Moreover, the techniques of bone transfer and free vascularized bone grafts were not yet in practice. However, maintenance of the Ilizarov fixator and bone transfer requires a long period of treatment (Price and Cole 1990, Green et al. 1992). Reconstruction with a free vascularized bone graft is technically demanding, and hypertrophy of the graft takes a long time.

We sterilized the expelled fragment. If possible, mechanical cleaning alone is better, as incorporation and healing of boiled or autoclaved bone may be inferior to that of an allograft. Therefore, an allograft is another treatment alternative.

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