Fibrin fixation of osteochondral talar fracture

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Six osteochondral talar fractures in 5 patients were fixed with fibrin sealant. All the lesions healed uneventfully. After 1 year, 3 of the 4 athletes in the study had resumed their sports activities at the same level as prior to the accident.

We report 5 cases of fixation of talar dome fractures employing fibrin sealant.

Patients and methods

Five patients were treated surgically for talar osteochondral fractures during the period April 1987 to September 1987. In all the cases the fracture was caused by supination trauma of the ankle. Four of the 5 patients were injured during athletic activity; 3 at the competitive level. One patient (Case 1) was injured during military training, but was otherwise not athletically active (Table 1). All the patients were treated within 2 weeks after their injury.

At surgery the osteochondral fragments were found to be rotated with the cartilage facing the fracture bed. The fragments were reduced and fixed with fibrin sealant (Tisseel/Tissucol; Immuno, Austria). Concomitant ligamentous ruptures (Table 1) were sutured with Dexon. The ankles were immobilized in a plaster cast for 2–4 weeks and weight bearing omitted for 5–8 weeks after surgery. Clinical and radiographic examinations were performed every 3 months after surgery, and all the patients were followed for at least 12 months.

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Results

Case 5 had a superficial infection of the wound, which subsided after treatment with dicloxacillin. No other complications were encountered.

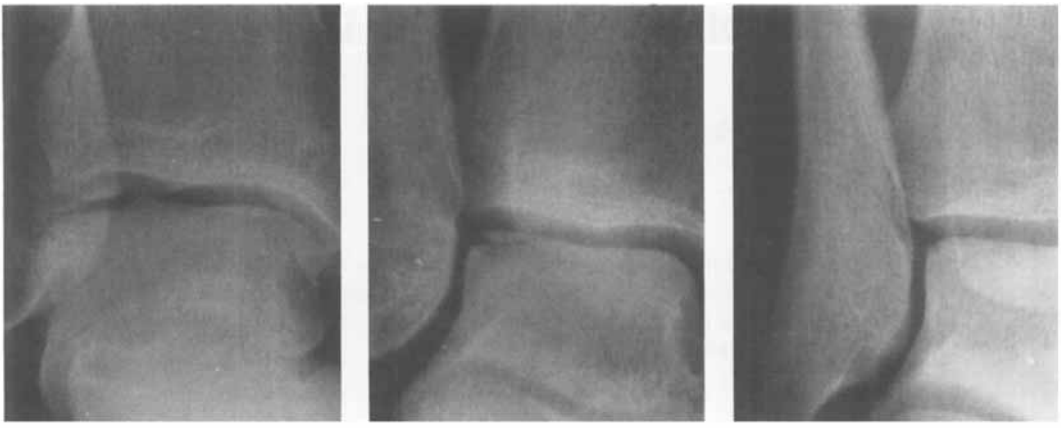
In all the cases the radiographs showed progressive incorporation of the fracture. Initially, the changes were most prominent at the junction between the deep part of the fragment and the surrounding bone, whereas smoothing and obliteration of the superficial subchondral zone were observed later in the follow-up period. Sclerosis or other local reactions of the bone adjacent to the fragment were not seen.

After 1 year, none of the patients had pain at rest. Case 5 occasionally had pain when walking, and 4 patients had intermittent pain when running. No patient experienced instability of the ankle. Three of the 4 athletes resumed sports activity from 6 months to 1 year after surgery; further, after 1 year, all were active at the same level as prior to the accident. Case

Table 1. Five cases of talar transchondral fractures. The stage of the lesions refers to the classification of Berndt and Harty[1]

Case	Age	Sex	Location	Size (mm)	Stage	Ligament ruptures
1	21	M	L	15 × 10	4	1, 2
2	17	F	L	10 × 5	4	1
3	16	M	L	12 × 8	4	1, 2
4	18	M	L	14 × 10	3	1, 2
5	17	M	L	10 × 10	4	1, 2
			M	20 × 10	3	3

Location: L lateral, M medial.
Ligament ruptures: 1 anterior talofibular ligament, 2 calcaneofibular ligament, 3 deltoid ligament.



Before surgery. The osteochondral fragment is rotated upside-down (stage 4).

Immediate postoperatively.

Healing 1 year after surgery.

Figure 1. Case 1. A 21-year-old man who had a supination trauma of his right ankle after falling from a scaffolding.

5 had to give up soccer because of pain when running.

Case 5 had persistent limitation of dorsal flexion, but the others had normal ankle mobility after 6 months. One year after surgery, none of the patients had abnormal talar tilting, but Case 1 had a minor anterior drawer sign.

Discussion

The surgical procedures advocated in the treatment of talar osteochondral fractures are removal of the fragment[1,2], fixation of the fragment with screws, pins, or bone pegs[3] or gluing with cyanoacrylate[4] or fibrin sealant[3,4,5]. Removal of the fragment eliminates the risk of loosening, but the cartilage defect may cause pain during activity[6]. Fixation of the talar fragment with screws or pins entails the risk of injuring the cartilage of the opposite tibial articular surface[4,7]. In theory, gluing seems to be a perfect surgical procedure in the treatment of osteochondral fragments[4]. Cyanoacrylate has a strength much higher than fibrin[8,9], but its adhesive effect is limited one week[7], whereupon it is merely a foreign body interfering with the incorporation of the osteochodral fragment[4,7]. In addition, cyanoacrylate is toxic[4,7].

The fibrin sealant is a physiologic glue containing freeze-dried human fibrinogen, bovine aprotinin, calcium chloride, and bovine thrombin. The fibrin is gradually decomposed and replaced by granulation tissue[4,7,10,11]. Although the adhesive effect only lasts 1 week[4], the granulation tissue formed presumably contributes to incorporation of the osteochondral fragment as indicated by animal experiments of the osteochondral fragment, as indicated by animal experiments[7,10,11].

The properties and applicability of the fibrin sealant in the repair of chondral and osteochondral fractures have been extensively investigated in animals[7,9–12]. In humans most reports have dealt with the fixation of chondral and osteochondral fractures in the knee[4,13]. Only a few reports concern the use of fibrin sealant in the treatment of osteochondral fractures of the ankle. Gaudernak[5] and later Zilch and Friedebold[3] concluded that the method was valuable, although the latter recommended combined fixation with fibrin sealant and bone pegs. Although primary stability of the fracture is achieved, the low strength of the fibrin sealant and the concomitant ligament damage necessitate immobilization for about 4 weeks postoperatively. In our series, only 1 patient had sequelae, presumably related to extensive ligament ruptures.

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