

Fibular autograft and silicone implant arthroplasty after resection of giant cell tumor of the metacarpal—a case report with 9-year follow-up

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A 32-year-old man had been treated by curettage and filling with tricalcium phosphate because of a giant cell tumor of the fourth metacarpal bone of the right hand. The tumor recurred almost immediately and the patient was referred to us (Figure 1). Radiographs showed a pathological fracture of the metacarpal bone. CT and MRI revealed a swollen osteolytic lesion extending into the diaphysis. Total body scintigraphy showed pathological uptake of contrast medium only at the lesion.

The lesion was exposed by a dorsal longitudinal incision, which included the previous surgical scar. The metacarpophalangeal joint was then dislocated, preserving the capsule and the collateral ligaments, and the metacarpal was resected at its proximal fourth. The resected segment was 4.5 cm long.



Figure 2. 10 months after surgery.



Figure 1. Preoperative.



Figure 3. 8 years after surgery, after the removal of the fixation device.



Figure 4. Clinical and functional status 9 years after surgery. Despite some wear in the prosthesis, there is full range of motion in the metacarpophalangeal joint.

A diaphyseal segment of the fibula, the same size as the resected segment, was harvested from the middle third of the left leg, where preoperative planning had shown suitable morphology. The bone segment was then shaped and prepared to host a silicone Swanson prosthesis, and fixed to the base of the metacarpal and the hamate by a 4-hole plate, without any fusion between hamate and fibular graft (Figure 2). Then the articular capsule was reconstructed and the residual interosseous muscles were placed over the prosthesis. The wrist was immobilized in a plaster cast. The histological examination confirmed the diagnosis of giant cell tumor.

The plate was removed after 1 year. At the latest follow-up examination, 9 years after surgery, function was excellent and the patient was able to use the hand normally in heavy manual work (Figure 3). Radiographs showed no sign of prosthesis loosening or local recurrence of the disease (Figure 4).

Discussion

Less than 5% of giant cell tumors involve the hand bones (Averill et al. 1980, Lopez-Barea et al. 1992, Athanasian et al. 1997a). Compared to other sites,

this tumor is often aggressive in the hand, with advanced bone destruction and often involvement of the articular cartilage (Averill et al. 1980, Athanasian et al. 1997a, Biscaglia et al. 2000). The risk of malignant transformation increases after local recurrence (Eckardt and Grogan 1986, Kay et al. 1994). The aim of treatment is to eradicate the disease but to preserve as much hand function as possible.

We consider that curettage and adjuvants are adequate when the tumor is stage 1 or 2, where the disease has not penetrated the cortex. Campanacci (1999) and Wittig et al. (2001) reported a recurrence rate in 46 of 61 patients with giant cell tumor of the hand, when treated by curettage with or without bone graft. This is much higher than the risk (10-20%) when the same technique is used in other sites without adjuvants (Campanacci 1999). Several authors advocate ablative surgery for hand giant cell tumor (Averill et al. 1980, Wold and Sweet 1984, Eckardt and Grogan 1986, Patel et al. 1987, Athanasian et al. 1997b).

Several methods have been described for reconstruction of the bone defect. Littler (1947) described metacarpal resection and reconstruction using grafts harvested from the tibia. Wilson and Lance (1965) suggested the use of grafts from the iliac crest. Later techniques made use of autologous metatarsal (Rinaldi 1976) or fibula grafts (Sanjay et al. 1989). Carlow and Khuri (1985) described the use of an iliac bone graft shaped so as to host a silicon implant (Swanson) to replace the metacarpophalangeal joint. Autologous fibular graft is more suitable for hosting the prosthetic implant, and to ensure effective purchase by the screws used for fixation with the adjacent bone of the carpus because of its cylindrical shape and mechanical strength (Athanasian et al. 1997b). A segmental autogenous bone graft decreases in density during the first 6 months, but gradually regains its mass and is generally comparable to normal cortical bone after 2 years. It is progressively revascularized by a process of creeping substitution (Enneking et al. 1980). This method has been described previously, but with only short-term results presented. The favorable outcome in our patient confirms the reliability of the method.

No competing interests declared.

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