Case report

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Circular resection for giant cell tumor of the ulna combined with vascularized fibilar fragment autoplasty

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Surgical resection of giant cell tumor of the left ulna diaphysis is presented. Circular resection and same-stage autoplasty with a vascularized left-side fibula fragment was performed. In the late postoperative period, there was no recurrence of the tumor. Full function of the left upper limb was achieved.

Keywords: giant cell tumor, microsurgery, bone grafting, reconstructive plastic surgery

Among all bone tumors, the giant cell tumor of the bone (GCT) takes a leading position in frequency of occurrence and is considered by many authors as a borderline tumor. Given the frequency of GCT in the group of bone tissue malignant tumors, that reaches up to 15.8 %, the problem of treating patients with this pathology acquires the greatest medical and social significance.

Most often, GCT affects the metadiaphyseal regions of limb long bones. Next frequent location is the area of the knee joint and flat bones [1–8]. The most radical method of GCT treatment in tubular bones is circular resection of the affected area. Circular resection of the affected area suggests an extensive segmental defect, in particular, in the bones of the forearm. There comes the problem of managing the bone loss [9–19].

Current orthopedics has a huge arsenal of methods and techniques for managing bone defects. However, reconstruction of forearm length is hampered by its peculiar anatomy, a pair bone and features of the sliding elements of the segment. The Ilizarov bifocal sequential compression-distraction osteosynthesis, proven by numerous positive results, undoubtedly has a worldwide fame and value in managing extensive long bone defects [20–24]. However, this technique is time-consuming and causes discomfort to patients. Also, restriction or complete loss of pronation-supination movements of the limb is undesirable [25, 27].

A non-free cortical-periosteal autologous graft harvested from the distal metaepiphysis of the radius on the vascular pedicle and widely used by many authors is effective only in the treatment of pseudoarthrosis of one of the forearm bones [27–30].

In our opinion, radical circular resection of the tumor in one of the forearm bones with simultaneous management of an extensive post-resection defect with a fragment of the fibula on microvascular anastomoses, stable osteosynthesis and early functional load is the method of choice in the treatment of patients with tumor lesions of the forearm bones.

The above approach is illustrated by the following clinical case.

Patient I., 17 years old, felt moderate pain in her left forearm and swelling. Before the operation, the necessary examinations were conducted, including radiography (Fig. 1a), computed tomography and scintigraphy of the skeleton.

Surgical performance Under regional anesthesia, a semilunar layered incision was made along the interna surface of the left forearm. The ulna bone tumor extended over a length of 6.0 cm. After circular resection of the destructive part of the ulna, the bone defect made 8.0 cm (Fig. 1b). An intraoperative radiography of the left forearm was taken next and no radiological signs of tumor lesion of the ulna were revealed (Fig. 1c).

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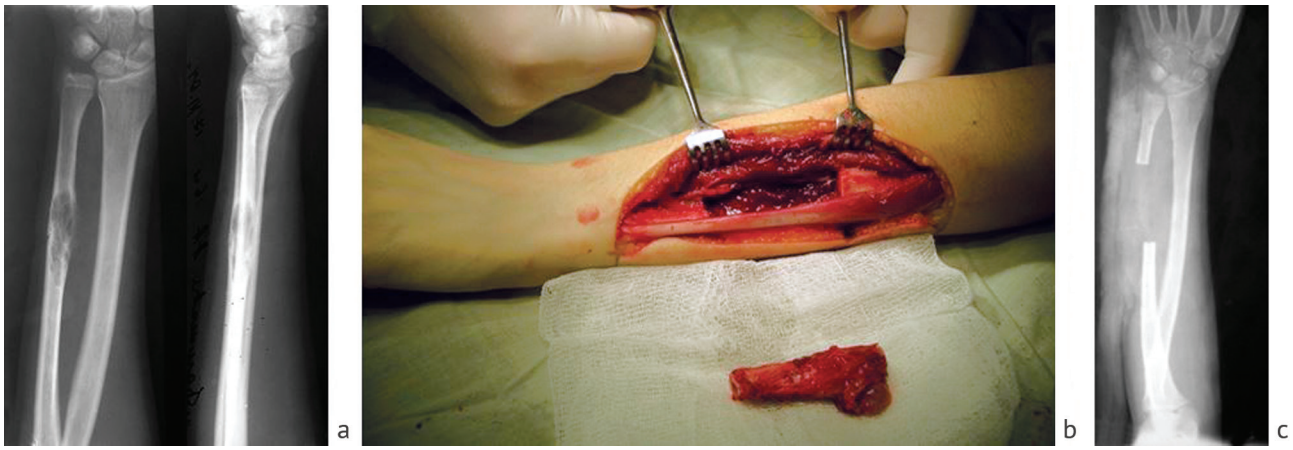

Fig. 1 Radiographs of the left forearm before surgery (***a***); ***b***, ***c*** photos and radiographs at the stages of the operation

Regional anesthesia of the left lower leg The fibula with the muscular envelope was exposed in a wave-like incision. The bone was resected circularly over a length of 9.0 cm in the middle third of the leg with the preservation of the vessels supplying the bone from the peroneal artery pool (Fig. 2a, 2b).

After the bone flap had been transferred to the recipient area, bone osteosynthesis was performed according to the type of "Russian castle" (Fig. 2c). The ulnar artery and saphenous vein were selected for revascularization of the autologous graft by applying microvascular anastomoses. Venous outflow of their bone flap was carried out by applying a microvascular end-to-end anastomosis with 8/0 thread with an atraumatic needle of the proximal vein of the autograft to the main vein. Arterial blood flow was restored by longitudinal arteriotomy of the ulnar artery and application of two arterial anastomoses with 9/0 thread and an atraumatic needle distal and proximal to the bone flap as "through revascularization".

Four weeks after the operation, early functional loading started using passive mechanotherapy on the Arthromot system for the elbow and wrist joints without pronation and supination of the forearm. Passive mechanotherapy continued 1.5 months with a gradual increase in the range of motion in the joints.

Radiographic control showed fusion of the autograft with the ulna 2.5 months after the operation. Full rehabilitation treatment was carried out for another month. One year after the operation, the metal implants were removed from the ulnar bone (Fig. 3a). At long-term follow-up, there was no tumor recurrence and the function of the left upper limb was full (Fig. 3 b, 3c, 3d).

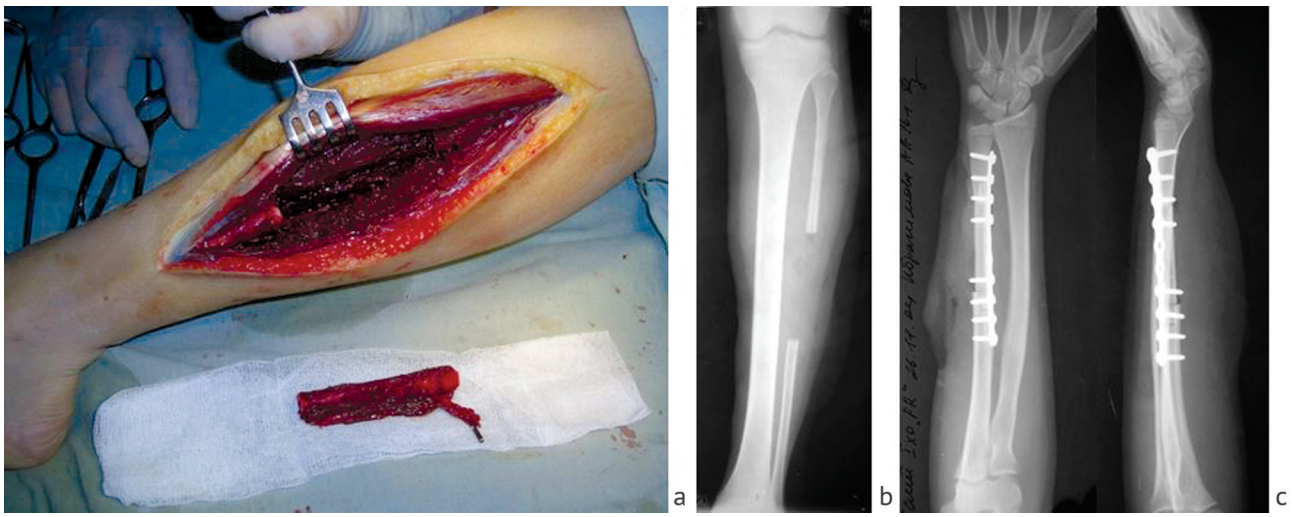

Fig. 2 Stages of the operation: ***a*** photo of bone autograft harvesting; ***b*** intraoperative X-ray of the donor leg; ***c*** radiographs of the left forearm

Fig. 3 Long-term outcome

Thus, if tumor affects one of the forearm bones, GCT in particular, an extensive circular bone resection might be used as a method of choice and a post-resection bone defect can be bridged with a fragment from the fibula on microvascular anastomoses.

Conflict of interests *None*

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