

## **Title**

**(Category :Bone Sarcoma)**

### **Is it suitable of limb-salvage surgery for primary bone sarcoma in the forearm?**

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## **Abstract**

### **Background**

(1)The incidence of primary bone sarcoma in upper distal extremity is very rare. (2) Due to less soft tissue, radius-ulna adjacent closely, function detailed requirements, difficult for safe margin and functional reconstruction management, amputation is a common choice. (3)Retain any degree function of forearm and hand was superior to extra – prosthesis. (4)It is necessary to understand the local control and functional status in forearm with limb-salvage surgery.

### **Questions/purposes**

The purpose of this study is to investigate the oncological outcomes of patients with malignant bone tumors in the forearm, the local control and reconstruction with limb-salvage surgery and the functional outcomes after limb-salvage procedures.

### **Methods**

Twenty-three primary bone sarcomas patients in forearm who underwent limb-salvage surgery with at least 12months follow-up were included in this retrospective study from 2000 to 2013. There were 18 males and 5 females. The mean and median ages were 24.65 and 17 years respectively (range, 8-54). 15 cases in the radius (proximal metaphysis 3, diaphysis 2, distal metaphysis 10), 8 cases in the

ulna (proximal 4, diaphysis 3, distal 1). The primary diagnosis was osteosarcoma in 9 cases, Ewing sarcoma in 6 cases, undifferentiated pleomorphic sarcoma in 3 cases, chondrosarcoma in 2 cases, angiosarcoma in 2 cases and low-grade central osteosarcoma in 1 case. We used adjuvant chemotherapy in high grade sarcoma and preoperative surgical planning for safe margin in each case. The surgical margin was divided into intralesional, marginal and wide. The reconstruction included iliac autograft with wrist fusion, ulna centralized, vascularized fibula graft, excision-alcoholization-replantation, autograft-prosthesis composite and prosthesis only, etc.

### **Results**

In this series, there were 2 achieve intralesional surgery, 8 marginal and 13 wide margin. The 3-year and 5-year survival rate was 89.2% and 71.3% respectively. And in high-grade sarcoma was 87.8% and 65.9% respectively. 2 cases developed local recurrence (2/23,8.7%), one relapse in 5 months and one in 38 months after initial surgery respectively. There was significant difference between intralesional surgery and marginal & wide resection ( $P=0.030$ ). 4 cases developed metastasis (4/23,17.4%) and 4 cases dead with these disease (4/23,17.4%) at last follow-up. There were 18/23 cases underwent reconstructive surgery, 5/23 cases without reconstruction (2 proximal radius, 1 distal radius, 1 ulna diaphysis and 1 distal ulna lesion), In 12/15 radial reconstruction, 7 cases underwent ulna centralized and wrist-ulna fusion, 3 cases iliac autograft and wrist-radial fusion, 1 case vascularized fibula graft, 1 case cement spacer. In 6/8 ulnar reconstruction, 3 cases used vascularized fibula graft (1/3 autograft-prosthesis composite), 1 case excision-alcoholization-replantation, 1 case radius centralized and 1 case elbow prosthesis. 3 patients had reconstructive complications (3/23,13.0%), 1 internal fixation failure, 1 aseptic loosening in elbow prosthesis and 1 wrist joint dislocation. The mean of functional scoring with Musculoskeletal Tumor Society (MSTS) was  $85.4\% \pm 7.7\%$ .

(1) The surgery of ulna centralized affected the forearm rotation but the elbow had no influence. (2) Wrist-Radial fusion affected the wrist movement but without forearm rotation involved. (3) Wrist-Ulnar fusion affected both the wrist movement and

forearm rotation.

### ***Conclusions***

(1) Most bone sarcomas in forearm achieved safe margin with preoperative surgical planning and adjuvant chemotherapy. (2) Limb-salvage surgery demonstrates favorable local recurrence with marginal or wide resection. (3) It was definitely that the function of any reconstruction should be much better than extra-prosthesis absolutely. (4) The incidence of complication was related to the reconstruction selection, biological reconstruction is recommended. (5) Limb-salvage with reconstructive surgery is safe, feasible, effective, durable and less complications, which is a good recommendation for bone sarcomas in forearm.

***Level of Evidence: Therapeutic Level IV.***