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**Title:** Reconstruction After Tumor Resection Of The Elbow - What Works Best?

Giovanni Beltrami<sup>1</sup>, Daniel A. Müller<sup>2</sup>, Guido Scoccianti<sup>1</sup>, Rodolfo Capanna<sup>1</sup>

<sup>1</sup>Orthopaedic Oncology Unit, Careggi University Hospital, Florence, Italy

<sup>2</sup>Department of Orthopaedics, Balgrist University Hospital, Zurich, Switzerland

Giovanni Beltrami: giovannibeltrami@virgilio.it  
Daniel A. Müller: daniel.a.mueller@me.com  
Guido Scoccianti: guido.scoccianti@alice.it  
Rodolfo Capanna: rodolfo.capanna@gmail.com

#### BACKGROUND

The elbow joint and the distal humerus are uncommon sites for primary bone tumors or metastatic disease. Nevertheless, the reconstruction of large bone defects around the elbow joint in the oncologic setting is a demanding situation due to complex biomechanics and close relation to crucial neurovascular structures. Different techniques ranging from modular prosthesis (MP) to osteoarticular allograft (OA) and allograft-prosthetic composite (APC) were available. OA and APC enable a better reattachment of soft tissue but have a higher potential of structural failures. There is still no agreement which technique should be preferred to provide a reliable and good functioning elbow joint.

#### QUESTIONS/PURPOSES

Three different reconstruction techniques of the elbow (OA, MP, APC) were compared in terms of complication rate, implant survival and functional outcome. The main purpose of the study was to evaluate the best functioning reconstruction technique for large bone defects of the elbow.

#### PATIENTS AND METHODS

A consecutive case series of 42 patients who underwent a resection of the distal humerus or the elbow joint from 1995 to 2013 in one institution was retrospectively reviewed. Mean age of the patients was 54 years (Range: 9-84). The most common reason for surgery was metastatic disease (n=22;52.4%), followed by soft tissue sarcoma with bone involvement (n=5;11.9%), giant cell tumor (n=4;9.5%) and osteosarcoma (n=4;7.1%). The diagnosis in the remaining 8 (19.0%) patients was either Ewing sarcoma, chondrosarcoma, plasmacytoma or a failed previous reconstruction. The bone defect was replaced by a MP in 26 cases (61.9%), whereas in 6 cases (14.3%) an APC and in 5 cases (11.9%) an OA was used. 5 patients (11.9%) presented a large bone involvement necessitating a prosthetic total humerus replacement. In 2 patients (4.5%) the reconstruction of the radial head with an OA was sufficient.

#### RESULTS

After a mean follow up of 44 months (Range: 24-204) 12 complications (28.6%) were observed: 5 nerve injuries (14.3%), 3 aseptic loosening (7.1%), 2 local tumor progressions, 1 allograft fracture (2.4%) and 1 deep infection (2.4%). In 5 cases the implant had to be removed (11.9%). A higher complication rate was observed in reconstructions using allograft (APC and OA) compared to MP (p=0.028). Regarding the functional results the mean MSTs score was 21.5 points (Range:8-32) and the mean ROM 92.5° (Range: 75-120°). No differences were found between MP, APC and OA concerning the functional outcome

#### CONCLUSION

Tumor resections around the elbow resulted in a high overall complication rate. APC and OA were more often prone to failures compared to MP, whereas the functional outcome did not differ. It seems that MP are the implant of choice for elbow reconstructions.