

**PP-046****3D-planned allograft reconstruction with patient specific jigs for the reconstruction of the proximal radius**R. Hack, M. Germann, L. Vlachopoulos, A. Schweizer, S. Keller, **B. Fuchs***Universitätsklinik Balgrist, Zurich, Switzerland*

**Introduction:** Primary tumors of the proximal radius are rare. Often, they can be resected without the necessity of reconstruction. However, if the tumors are large and the chorda obliqua has to be resected, some sort of reconstruction may be considered. The literature on this type of reconstruction is sparse, and there is no proven single best method. Leaving the radius flail may necessitate the reconstruction of a one bone forearm, prosthetic reconstruction may end up in loosening, and allograft reconstruction may be prone to failure because of the lack of a perfect match. Herein, we present the use of 3D planning based on preoperative MRI's and CT-scans using 3D print-outs and patient-tailored jigs for performing the osteotomies to reconstruct the proximal radius.

**Patients and Methods:** We herein present a 25 yo male and a 29yo female both with a Ewing's sarcoma of the proximal radius, as well as a 20 yo saleswomen with a intracortical aneurismal bone cyst of the proximal radius. Whereas in the latter patient, 1.5cm of the radial head could be spared, the resection length in the other two patients was 14 and 16 cm, respectively, including the radial head. 3D planning based on preoperative MRI's and CT's were used for all cases, with manufacturing custom-made jigs.

**Results:** Intraoperatively, custom-made jigs could be confidently used to perform the osteotomies. In the case of intercalary resection, an allograft was fitted into the defect while maintaining the correct position of the radial head, fixating the construct with a custom-made plate. Four years after resection, the patient is free of recurrence and has nearly normal pro-/supination. In another patient, the ipsilateral vascularized proximal fibula was harvested to use jigs to carpenter a radial head, which was fixated in place including the reconstruction of the annular ligament. The patient developed overt metastases thereafter and died 12 months post surgery. He had full flexion and extension, pro-/supination was 60/45. An allograft was used for the third patient, and 3D planning allowing to reconstruct the proximal radius that it perfectly matched the opposite side. Three months after surgery, the patient is pain free with full flexion/extension and pro-/supination of 70/45.

**Discussion:** 3D planning with 3D print-outs and custom-made jigs greatly assists in the reconstruction of the proximal radius, independent of using an allograft or a vascularized fibula, to correctly (and technically easily) place the construct in space allowing for optimal movement.