

**FC-075****How to avoid and treat nonunion of proximal humerus and femur after biological reconstructions – Biomechanical aspects****Z. Matejovsky<sup>1</sup>**, J. Lesensky<sup>1</sup>, I. Kofranek<sup>2</sup><sup>1</sup> 1st Medical Faculty Charles University, Prague, Czech Republic<sup>2</sup> Bulovka Hospital, Prague, Czech Republic

**Introduction:** In cases where the resection lies below the intertrochanteric line of the femur or surgical neck of the humerus biologic reconstruction is an option to endoprosthesis reconstruction especially in young patients or low grade sarcomas. Due to the potential risk of infections autologous grafts are preferred by some. The initially inferior diameter of the fibula may lead to failure of the graft due to inadequate loading if positioned wrongly. We present the wrongly positioned grafts with different types of fixation rigidities and the resulting nonunion and disappearing bone syndrome as well as prompt healing after correct graft loading.

**Material and Methods:** From 107 fibular grafts 33 were proximal humerus and 15 proximal femurs. From these 5 humeral and two femoral intercalary grafts that biomechanically failed were evaluated according to graft positioning, fixation type, resection length and graft type, age and tumor type. We compared them with biological reconstructions that worked well.

**Results:** Proximal femur: 9 year old boy, Ewings, resection, 16 cm, rapid osteolysis and thinning of the 18cm autologous fibula when placed laterally, but recovered quickly when repositioned medially. 17 year old female, HG osteosarcoma, resection 21cm, 23cm long vascular fibula had repeated plate failure despite repeated bone grafting until placed medially. Proximal humerus: 8,11,13,21,45 years, 1 osteosarcoma, 3 Ewings, 1 chondrosarcoma, resection 18cm (11-22), graft 21cm (15-27), 4 phlois plates, 1 semicircular plate. 4 fibulas non-vascularized, one vascularized combined with allograft humeral head. When graft placed in medial part of humeral head it fractured proximally and resorbed, when centrally it fractured proximally, when laterally a non union occurred distally. |Allograft resorbed complete lateral to fibula position. Fixation with 3 compared to 5 screws in humeral head failed. This healed by brace and adaptive fixation with 3 K-wires.

**Conclusion:** Fibular grafts must be placed in compression parts: in proximal femur medially in proximal humerus laterally to achieve good healing. If placed opposite resorption of graft occurs. Central positioning leads to non unions especially with too rigid fixations. Proximal humeral non-unions can be healed with adaptive osteosynthesis and bracing - in contrary to distal humerus where rigid fixation is recommendable.