INTRODUCTION: Multiple operative techniques are currently used for finger arthrodesis in clinical practice. The present study was designed to compare the biomechanical characteristics of typical arthrodesis techniques used in daily practice.

MATERIAL AND METHODS: Osteosynthesis techniques comprising wire cerclage, thread cerclage (PDS) or intraosseous wire suture were compared in a biomechanical experiment for resistance against bending loads. The mentioned techniques were applied to artificial specimens with resected articular surfaces or by using the cup-and-cone procedure. In this process, the specimens were tested using various Kirschner-wire insertion angles as well as different arthrodesis angles (20 degrees vs 40 degrees) in a 4-point bending test with each group consisting of 6 specimens of acrylic glass. The forces prevalent in the joint space were determined by prescale pressure measurement foils.

RESULTS: Wire tension banding resisted significantly higher bending moments than arthrodeses with thread tension bands (p< 0.05). All set-ups with tension banding techniques tolerated significantly higher loads than the intraosseous wire sutures without additional K-wires (p< 0.05), which showed unfavorable dislocation of contact areas resulting in instability even under relatively minor bending loads. Using the cup-and-cone technique, a geometrically larger
contact area could be achieved between two unloaded fragments, but this technique showed no advantages in the opposing bending moments compared with the conventional resection method. In both techniques, a dislocation of contact surfaces towards the palmar direction could be observed with increasing bending moment. While the use of thread tension band fixation reduces the risk of plastic deformation of both osteosynthetic material and bone stock, the problem of resorption rate has to be taken into account when choosing the material for the thread. CONCLUSIONS: Considering pressure distribution and stability with and without bending loads, it is not the most rigid osteosynthesis technique which should be viewed as the ideal treatment. In contrast, it is more important to consider the various and most likely conditions to be expected in daily life after arthrodesis and therefore to choose the type of technique distributing pressure as regularly as possible.