Introduction - The treatment of supracondylar fractures of the femur is still under discussion as an unsatisfactorily solved problem, and many biomechanical studies have been performed to compare devices like nailing or conventional plating systems [1-3]. Recently, a new system called Less Invasive Stabilization System (LISS) has been developed for distal fractures of the femur. Rather than rely on absolute mechanical studies have been performed to compare devices like nailing or conventional plating systems [1-3].

Materials and methods - Twelve fresh frozen pairs of cadaver human femurs were evaluated by Quantitative Computed Tomography (QCT) and Dual- Energy X-ray Absorption (DEXA) scanning for bone density and dimension classification. Three regions of interest served as comparison: a) The distal metaphysis, the junction diaphysis-metaphysis and the isthmus region. Average density ranged from 0.9 to 1.4 [g/cm3] in the isthmus region (Fig.1), from 0.15 to 0.38 [g/cm3] in the metaphysis.

The measurements show a good correlation of bone density between paired femora and a more extensive distribution between different matched pairs at all sites. Randomly selected femora were instrumented with a AO Synthes five-hole LISS plate and screws according to the surgical technique. A first series of the paired femora were instrumented with a six-hole DCS against LISS, a second one with a seven-hole CBP against LISS, both fixed with 4.5mm bicortical screws.

A one-centimeter gap was cut parallel to the knee baseline, at a defined distance (proportional to medio-lateral epicondylar dimensions) proximal to the distal end of the femur, to mimic an extra-articular supracondylar femur fracture (Type 33-A3, AO classification).

Discussion - The subsidence results from induced load-dependent stresses causing irreversible deformation. Irreversible deformation consists of two main contributions: Destruction (plastic deformation) of the bone due to excessive load and hence irreversible sinking of the screws into supporting bone as well as relative motion between screws and plate. The latter is only possible in conventional plating systems using screws without angular stability (toggling at the screw/plate junction). The results of this study show that screws with angular stability lead to a reduction of the amount of permanent deformation indicating a better quality of the anchorage in the bone.


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In average, total subsidence for the LISS was 51% lower than DCS, and 62% lower than the CBP system. Ten out of twelve paired tests showed more subsidence in the conventional bicortical fixation technique.

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