The effect of surgical washers on olive wire-bone surface kinetics –*A biomechanical study*

INTRODUCTION:

Several mechanical and biologic factors are proven to effect the result of distraction osteogenesis (1-2,14). Stability of fixation is an important mechanical issue in order to achieve a good regenerate bone (1-2,14). Type and configuration of K-wires are considered to have a great effect on fixation stability (2-3).

Crossing angle between the K-wires, increased wire diameter, tension and number and use of olive wires have already been identified to increase frame stability (2,3-7,4).

Osteoporotic bone is characterized by alterations in the architecture and composition of the osseous tissue. Change in structural properties lead to a thin, weak and brittle bone (5). Indications of external fixation have recently increased for the treatment of various musculoskeletal pathologies in osteoporotic patients (6).

In our daily practice, we observe many osteoporotic patients complicated by olive wire migration during ex. fixation **(Fig.1)**. This experience has brought us to create mechanical solutions to increase the stability and decrease surface pressure on the olive wire-bone unites. The following biomechanical study investigates the effect of surgical washers on surface kinetics between the olive wire and the cortical bone.

MATERIAL-METHOD:

We used olive wires with a diameter of 1.8 mm in the study. The smallest possible washer with mechanical integrity to be used on 1.8 mm K-wires has a diameter of three millimeters.

RESULTS:

DISCUSSION:

One of the major principles for fixation in osteoporotic bone is use of devices with a wire buttress (5).

For use in osteoporotic bone, a stopper with a larger surface area can be created by bending a normal transosseous wire into different configurations (3,7). Olive wires are also recommended for increased stability in osteoporotic bone (3,8)

CONCLUSION:

The established pressure equation in physics predetermines that an increased surface area between the olive wire and cortical bone also increases the tension of the K-wire, hence the stability of the ex.fix. Surgical washer utilized for this purpose decrease surface contact pressure and increase frame stability in patients with osteoporotic bones.

This study proves the benefit of washers on contact pressures without depending on their diameter. Therefore we recommend use of washers with the smallest diameter (3mm) in osteoporotic patients.

LITERATURE: