

# FIXATION STABILITY OF OBLIQUE WIRE IN ILIZAROV EXTERNAL FIXATOR

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## INTRODUCTION:

Ilizarov external fixator is a good option for periarticular fractures. Usage of wires in Ilizarov external fixator at metaphyseal bone have lower loosening rate but has lower stiffness compared to Schanz screw. Hypothetically, usage of oblique wires may improve the stiffness of Ilizarov external fixator. This experimental study was designed to compare the relative stiffness of various constructs using transverse wires, oblique wires and Schanz screws in the Ilizarov external fixator.

## METHODS:

Three types of Ilizarov configuration were constructed: Frame 1 with two transverse Ilizarov wires; Frame 2 with one transverse Ilizarov wire and one oblique Ilizarov wire; and Frame 3 with one transverse Ilizarov wire and one Schanz screw (Figure 1). Each configuration underwent axial loading and lateral bending tests for six times each. Load displacement curves were plotted to calculate the stiffness in each test. Data analysis were performed using SPSS version 23.

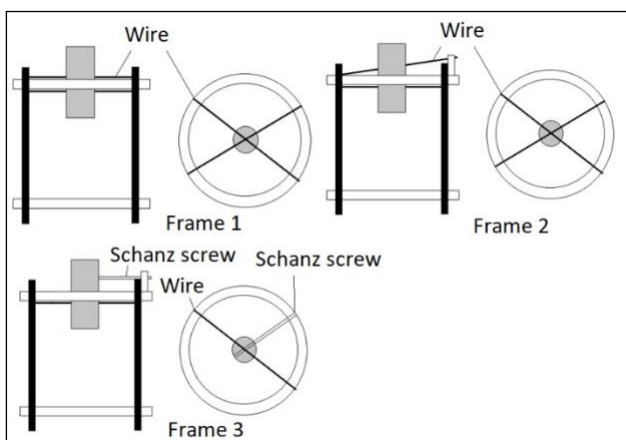


Figure 1: Ilizarov configurations

## RESULTS:

The axial loading stiffness of Frame 1 had no different compared to Frame 2 (Figure 2,  $p>0.05$ ). However, both wire Ilizarov configuration had significantly higher stiffness than Frame 3 (Figure 2,  $p<0.05$ ). Frame 2 had

higher lateral bending stiffness compared to Frame 1 and Frame 3 had the highest stiffness compared to the others (Figure 3,  $p<0.05$ ).

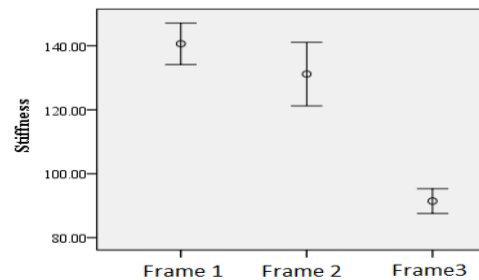


Figure 2: Axial loading stiffness in 95% CI

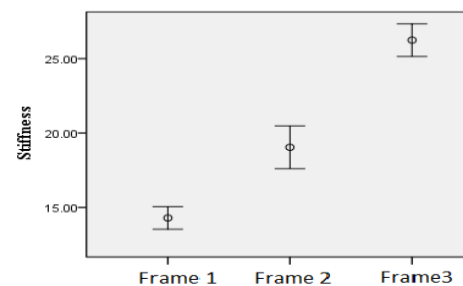


Figure 3: Lateral bending stiffness in 95% CI

## DISCUSSIONS:

Wire Ilizarov configuration showed higher axial loading stiffness than Schanz screw configuration due to cantilever effect of uniplanar half pin configuration. This can be improved by adding additional Schanz screws to the configuration. Oblique wire configuration has higher lateral bending stiffness than transverse wire configuration due to increased distance between the 2 wires of the configurations.

## CONCLUSION:

Applying tensioned wires in oblique position can improve the stability of the Ilizarov fixation.

## REFERENCES:

1. Sarpel Y, et al. Comparison of mechanical performance among different frame configurations of the Ilizarov external fixator: experimental study. J Trauma.2005;58(3): 546-552.