



Hadassah-Hebrew University Medical Center

## Optimal Fixation of Acute Scaphoid Fractures - A Cadaver Study

\* *Luria S*, \*\* *Lenart L*, \*\* *Lenart B*, \* *Peleg E*, \*\*\* *Kastelec M*  
\* *Hadassah-Hebrew University Medical Center, Jerusalem, Israel*  
\*\* *Institute "Jožef Štefan", Ljubljana, Slovenia*  
\*\*\* *University Clinical Center Ljubljana, Ljubljana, Slovenia*

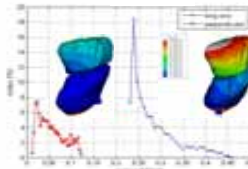
Institute "Jožef Štefan"



### Objectives

Several reports described the biomechanical advantage of central placement of a headless cannulated screw in transverse scaphoid waist fractures. Using a finite element computerized model it has been shown that for different fracture configurations, more stable fixation is achieved by a screw placed perpendicular to the fracture plane. In addition, central placement is technically difficult in specific clinical scenarios such as the case of a distal percutaneous approach.

There were 2 aims to the current study: 1. To confirm the results of the computerized model with a cadaveric model of an unstable oblique fracture; 2. To evaluate the placement of a screw perpendicular to the fracture through the scaphoid tuberosity.



Distal Oblique fracture displacement Herbert Type B1

Luria S, Hoch S, Liebergall M, Moshieff R, Peleg E. Optimal fixation of acute scaphoid fractures: finite element analysis. J Hand Surg Am. 2010 Aug;35(8):1246-50.

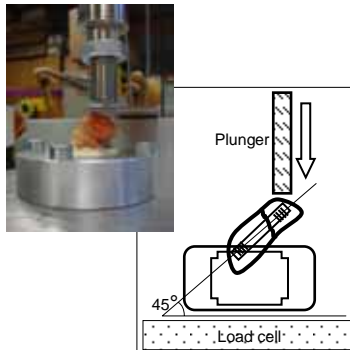
### Results



	Screw Position		
	Central	Perpendicular	
Stiffness (N/mm)	131 ± 69	131 ± 41	ns
Load at failure (N)	137 ± 69	148 ± 49	ns
Displacement at failure (mm)	1.2 ± 0.5	1.5 ± 0.3	ns

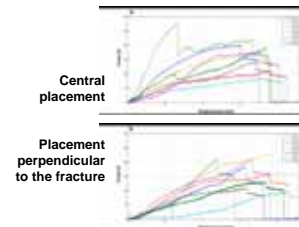
### Methods

Eight pairs of scaphoid bones were removed from fresh cadaveric wrists. Oblique osteotomies were designed for each specimen and fixated with a headless cannulated screw. In each matched pair, one of the scaphoids had the screw positioned, at the center of the base and the other was placed perpendicular to the fracture, as confirmed using fluoroscopy. The screw placed perpendicular to the oblique fracture resulted in the screw being directed toward the scaphoid tuberosity. Each specimen was potted in a holder and placed between a pneumatically driven plunger and a load cell. The load acting through the plunger was increased gradually and its excursion was measured as well. Stiffness, load at failure and mechanism of failure were measured, and the two groups (central vs. perpendicular screw placement) were compared with regard to stiffness and strength.



### Conclusions

Similar stability of the fixation was achieved when comparing placement of the screw perpendicular to the fracture plane or placement of the screw in a central position in the base of the scaphoid. Specifically, placing the screw through the tuberosity, without violating the trapezium or the scapho-trapezium joint, will not impair fixation stability according to this model of an unstable fracture.



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