Two- Versus Three-Screw Fixation of Long Oblique Proximal Phalanx Fractures of the Hand: a Biomechanical Cadaver Study
Jonathan Zelken MD, Austin Hayes MD, Brent Parks MSc, A. Al-Muhit PhD, Kenneth Means MD
Curtis National Hand Center at Union Memorial Hospital, Baltimore, MD

Introduction
- Unstable oblique fractures of proximal phalanx routinely treated with lag screws
- The AO Foundation recommends 3 lag screws
- To our knowledge, no biomechanical testing of 2 vs. 3 lag screws has been performed
- We propose 2 = 3 in biomechanical study during simulated rehab protocol

Methods
- Standardized oblique osteotomies were created
- Fractures randomized, fixated with either 0 (control), 2 or 3-1.5mm self-tapping cortex screws
- AO principles were respected
- Specimens underwent simulated rehab protocol (2000 flexion and extension cycles)
- Fracture displacement with loading was measured with differential variable reluctance transducer (DVRT)
- Pairwise comparison analyses using ANOVA

ANOVA Results
- DVRT: difference in displacement in 0 screws (N=5, 2.6 ± 1.7mm) and 2 screws (N=11, 0.4 ± 0.2mm)
- Difference in 0 screws vs 3 screws (N=10, 0.3 ± 0.2mm)
- NO difference in the 2 screws and 3 screws groups (p=0.863)

Equivalence and Noninferiority
- Both groups statistically equivalent
- Equivalence = 0.5 mm
- Power = 90%

Conclusions
- Early motion protocols simulated in cadaveric P1 fractures fixed with 0, 2, or 3 lag screws
- No significant difference in interfragmentary motion under cyclic loading
- Similar behavior should influence the way we approach oblique P1 fractures
- Reduce OR/ischemic time, cost, morbidity