

**Tangential Bicortical Locked Fixation Techniques Give Improved Stability for Fixation of Vancouver B1 Periprosthetic Femur Fractures**

Gregory S. Lewis, PhD<sup>1</sup>; Michele Bramer, MD<sup>2</sup>; Cyrus Caroom, MD<sup>3</sup>; Hwa Bok Wee, PhD<sup>1</sup>; Darin Jurgensmeier, MD<sup>1</sup>; Shane Rothermel, BS<sup>1</sup>; Samuel McArthur, MD<sup>1</sup>;

J. Spence Reid, MD<sup>1</sup>;

<sup>1</sup>Penn State University College of Medicine, Hershey, Pennsylvania, USA;

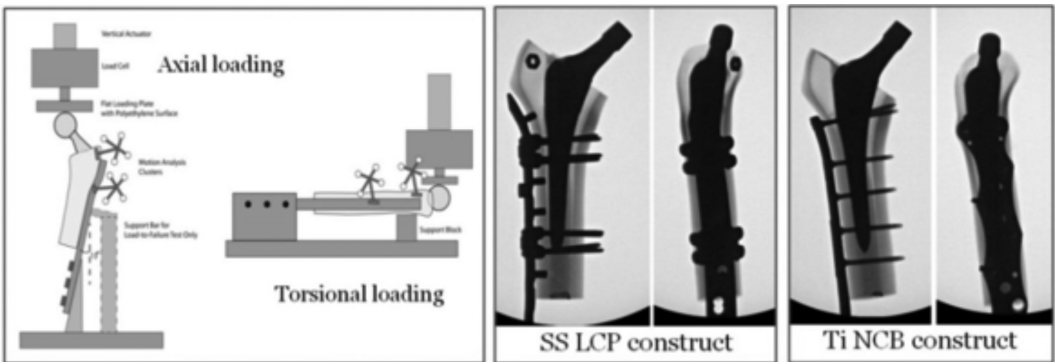
<sup>2</sup>West Virginia University College of Medicine, Morgantown, West Virginia, USA;

<sup>3</sup>Texas Tech University College of Medicine, Lubbock, Texas, USA

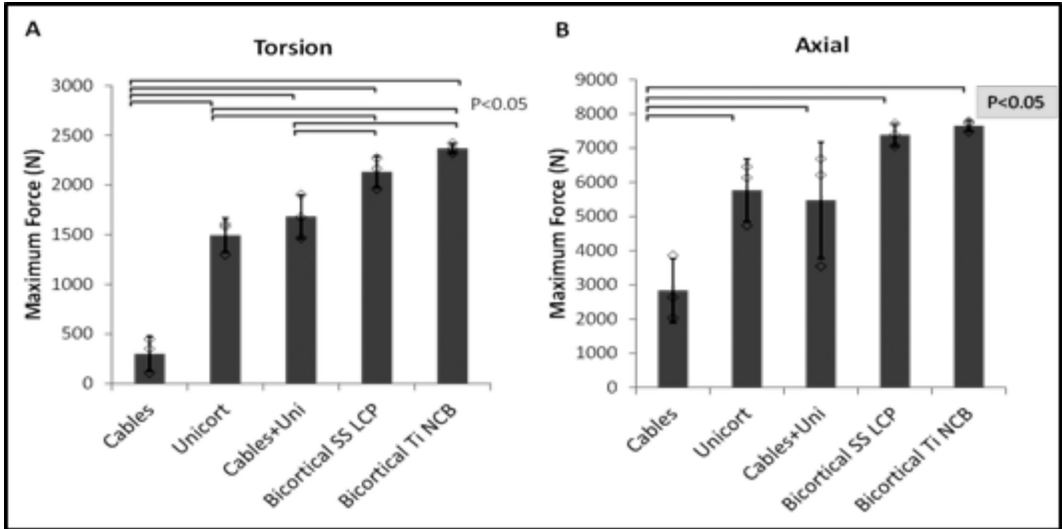
**Purpose:** The biomechanical difficulty in fixation of a Vancouver B1 periprosthetic fracture is purchase of the proximal femoral segment in the presence of the hip stem with or without a cement mantle. Several newer technologies have addressed this by providing the ability to place bicortical locking screws tangential to the hip stem with much longer lengths of screw purchase compared to unicortical screws (Synthes SS LCP, Zimmer Ti NCB). This study compares the stability of these newer constructs with previous methods (cables, unicortical screws, cables + unicortical screws) in a modern composite synthetic bone model.

**Methods:** 5 testing groups were created with each group containing 3 specimens (15 torsion, 15 axial). A Zimmer APS (size 5) prosthesis was cemented using a custom jig and vacuum cement techniques. The method of Zdero et al was modified to remove the distal femur segment and mount the distal plate directly on the testing apparatus mimicking a segmental defect. Specimens were loaded to failure in torsion and axial modes.

POSTER ABSTRACTS



## Results:



**Conclusion:** The addition of unicortical screws to a cable construct significantly improved load to failure. Both of the newer plate constructs incorporating bicortical tangential locked screws displayed significantly higher torsional load to failure (with trends toward higher axial load to failure) compared to the unicortical screw and cable constructs, and cables were inferior to other constructs in both loading modes. Fixation stability of the proximal segment of a Vancouver B1 fracture is significantly improved with the use of tangentially directed bicortical locking screws.

- The FDA has not cleared this drug and/or medical device for the use described in this presentation (i.e., the drug or medical device is being discussed for an "off label" use). For full information, refer to page 600.