

# ORTHOLOX® UHMWPE STERNAL CERCLAGE BAND SYSTEM MECHANICAL PROPERTIES

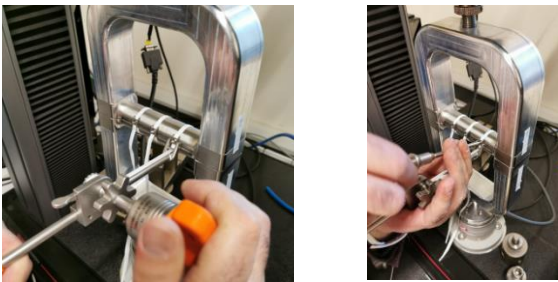
## Ortolog Research & Development

### Purpose

This study aims to determine the mechanical properties of the Ortholox® UHMWPE Sternal Cerclage Band System in a clinically significant test setup. In addition, these results compared with Polymer Cable, Steel cable and No. 5-0 (1.0mm Diameter) stainless steel wire.

### Material and Method

Test samples were secured around a pair of semicircular fixtures, mimicking sternum osteotomy. Three Ortholox® UHMWPE Sternal Cerclage Band Systems were wrapped around two semi-cylinders and locked in accordance with the technique. Tensioning was applied with a 4.0Nm T-Torque limiting device, and the set screw was tightened with a 4.0Nm torque limited screwdriver.



Picture 1. Application of the Ortholox® UHMWPE Sternal Cerclage Band System to the test rig

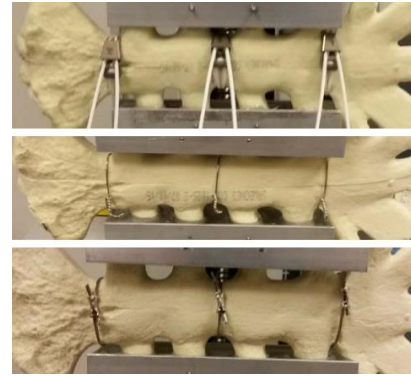


Picture 2. General view of test setup fixed with three Ortholox® UHMWPE Sternal Cerclage Band System

Testing was carried out using an INSTRON 5965 Universal Testing System (INSTRON, Norwood, MA). Lateral distraction was applied to a total of 17 samples at a rate of 10 mm per minute on four different days. In the comparison test, the sternal halves were distracted laterally at a speed of 10 mm/min, using the Chatillon LRX test system, until the yield strength was reached according to the method given in the literature [Cohen & Griffin 2002]. Anatomical sternum models (Sawbones® 1025-2) were used in these tests. The sternum models were split along their midlines and fixed with three Supercables (Kinamed®), No.5 stainless steel surgical wire (Ethicon®) and stainless steel sternal cable (Pioneer®).

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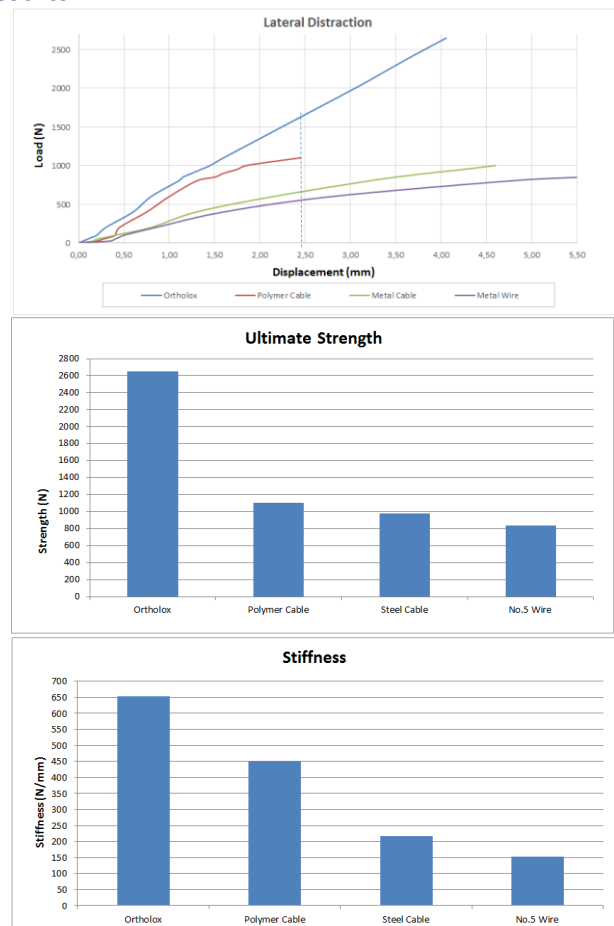
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Picture 3. 3x Supercable polymer cable, 3x steel surgical wire and 3x steel sternal multifilament cable assembled into the fixture.

The load-displacement behavior of each sternum model was recorded, and the ultimate strength and stiffness of each structure were calculated.

### Results



Ortholox® UHMWPE Cerclage Band System was found to be 141% times stronger and 1.5 times more rigid when compared to its closest alternative, the polymer cable. While the polymer cable was displaced by 2.45mm at ~1.100N (the yield strength), Ortholox® UHMWPE Sternal Band reached this value at ~1.625N. Because sneezing has been shown to generate 814 Newtons of lateral distraction force on the sternum [Adams 2014], Ortholox® UHMWPE Sternal Cerclage Band System offers a safe alternative to Polymer cable, metal-steel multifilament cable and steel wire for sternal closure.