

**Under Pressure: The Utility of Splitting Fiberglass Casts**

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**Purpose:** Univalving fiberglass casts after fracture manipulation or extremity surgery is commonly performed to reduce the risk of developing compartment syndrome. Previous experiments have demonstrated that univalving decreases intracompartmental pressures, but also alters cast mechanical properties, increasing risk for loss of fracture reduction. The purpose of this study was to correlate cast spacer width within a univalved cast as it relates to decreasing intracompartmental pressure.

**Methods:** 1-L saline bags with 200 to 250 mL removed were covered with 2-inch stockinette, Webril (50% overlap), and one roll of 3-inch fiberglass tape extending to the bag ends. Bags were connected to the arterial pressure line monitor. Resting pressure within each bag was recorded, then a water column was added to simulate two groups (n = 5 each) of clinical compartment syndrome (CS): Low Pressure CS (LPCS, range 28-31 mm Hg) and High Pressure CS (HPCS, range 64-68 mm Hg). After the designated pressure was reached, the fiberglass was cut with an oscillating cast saw, leaving the stockinette and Webril intact. Cast spacers were inserted into the univalve and taped into place at position #1 (3 mm wide), #2 (6 mm), #3 (9 mm), and #4 (12 mm). Pressure was recorded after the fiberglass was cut and following each spacer placement.

**Results:** In LPCS and HPCS groups, after univalve and placement of spacer position #1, pressure dropped by a mean 52% and 57%, respectively. Spacer #2, however, decreased the pressure by a mean 78% and 80%, respectively. Both spacer sizes significantly decreased the underlying pressure in both groups. Spacers #3 and #4 progressively reduced pressure to the pre-CS state within the cast, but not statistically significantly more than the previous spacer widths.

**Conclusion:** Our experimental model best replicates the iatrogenic elevation in the interstitial compartment pressure due to a rigid cast diameter, and not necessarily a self-sustained true compartment syndrome. Increasing the spread of a univalved cast to 9 mm of the initial cast diameter will reduce pressure to a pre-CS pressure; however, a spread of only 6 mm can effectively reduce the pressure to less than 30 mm Hg depending on the initial elevated intracompartmental pressure being observed. Although the utility of splitting a fiberglass cast has been previously demonstrated, we present evidence that highlights the benefit of spacing the split by at least 6 to 9 mm.