

## **Patella Fracture Fixation: A Biomechanical Comparison of Cannulated Screws and Anterior Tension Band With Low-Profile, Multiplanar Mesh Plating**

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**Purpose:** Our objective was to compare the efficacy of cannulated screw with anterior tension (CST) band to multiplanar mesh plating (MP) for the treatment of transverse patella fractures by assessing cadaveric fracture displacement after simulated cyclic loading.

**Methods:** Eight matched pairs of fresh frozen cadaveric knees free of overt disorders or patella damage were divided into 2 cohorts. Soft tissues were dissected leaving the extensor mechanism, joint capsule, and retinacular tissues intact. Transverse fractures at the midportion of the patella were created in each specimen using an oscillating saw and osteotome. For each pair, 1 specimen was repaired using CST and the second was repaired using MP. Each specimen underwent cyclic extension loading in a custom jig using a Materials Testing Systems machine. Load was increased by 2.5 lb (5.5 kg) after each 50-cycle interval. Gap formation across the fracture was measured at the end of each 50-cycle interval until catastrophic failure (defined as 2 mm of displacement) or a maximum of 500 cycles were completed.

**Results:** After 250 cycles, the mean gap formation at 45° extension in the CST cohort was 1312% greater compared with the MP cohort (CST:  $3.73 \pm 2.22$  mm [0.65-5.99 mm]; MP:  $0.28 \pm 0.24$  mm [0.78-0.02 mm],  $P < 0.0001$ ). A statistically significant difference between the cohorts was also in the mean gap formation at 5° extension (CST:  $3.62 \pm 2.16$  mm [0.47-6.21 mm], MP:  $0.18 \pm 0.30$  [-0.24 to 0.71 mm],  $P < 0.0001$ ). Three specimens of the MP cohort remained under gap criteria for 500 cycles. Omitting these 3, the MP cohort reached the gap failure criterion at a mean of 350 cycles. The CST cohort reached gap failure criterion at a mean of 256 cycles.

**Conclusion:** The MP cohort achieved superior durability of fixation when compared to the CST cohort as demonstrated by the greater average number of cycles completed prior to reaching gap failure. While a more technically challenging and expensive technique, mesh plating for patella fractures offers greater durability than traditional cannulated screw with tension banding. Based on prior studies, cost of the index procedure may be offset by a reduction in the need for reoperation.