

## Superior Outcomes after Operative Fixation of Patella Fractures using a Novel Cage Plate Construct: A Prospective Cohort Study

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**Purpose:** Displaced patella fractures (OTA 34) traditionally have been treated with anterior tension band constructs and are associated with poor patient-reported and functional outcomes. To address these inferior outcomes, we have developed a novel fixation construct that provides multiplanar fixation through a low-profile mesh plate with minimal iatrogenic disruption to the patella vascularity. The purpose of this prospective cohort study was to determine if the new fixation construct resulted in improved outcomes compared to tension band techniques.

**Methods:** A prospective cohort study was performed on consecutive patients with isolated, unilateral patellar fractures. During the initial study period from 2008-2011, patients were treated with traditional tension band techniques using a combination of Kirschner wires, cannulated screws, figure-of-eight wires, cerclage wires, and/or nonabsorbable sutures. During the subsequent study period from 2012-2014, a novel cage plate construct was used that spans half of the patella circumference laterally and provides multiplanar fixation through a low profile plate (figure). Additional suture fixation of the patellar tendon to the cage plate was utilized to address inferior pole comminution. Thirty patients treated with a tension band and eleven patients treated with the novel cage plate construct were included in the study. Subjective clinical outcomes and objective functional and strength outcomes were collected at 3, 6, and 12 months postoperatively.

**Results:** The two cohorts had similar baseline characteristics, including average age (60.0 years and 65.5 years, respectively), gender (80% female and 82% female, respectively), body mass index (23.2. and 23.4, respectively), and medical comorbidities. Patients with the cage plate construct had clinically and statistically significant superior clinical outcome scores using the Activities of Daily Living Scale of the Knee Outcome Survey (ADLS-KOS) at both 3 months (58.7 vs 72.2,  $P = 0.016$ ) and 12 months (74.9 vs 84.2,  $P = 0.024$ ). Closed kinetic chain functional testing demonstrated significantly better forward lunge scores in the cage plate cohort compared to the tension band cohort at 3 and 6 months ( $P$  values  $<0.001-0.035$ ). Open kinetic chain functional testing revealed significantly improved isometric, power, and endurance knee flexion in the cage plate cohort at 3, 6, and 12 months ( $P$  values  $0.003-0.045$ ). Thigh circumference difference was significantly decreased at 12 months in the cage plate cohort (1.31 cm vs 0.25 cm,  $P = 0.007$ ). Anterior knee pain at final follow-up was significantly decreased in patients with the cage plate (80% vs 9%,  $P <0.0001$ ).

**Conclusion:** Operative treatment of patella fractures using tension band constructs have resulted in impaired functional outcomes overall. In this prospective cohort study, the use of a novel fixation construct with multiplanar fixation and minimal disruption to patella vascularity has led to improved clinical and functional outcomes.



AP (a) and lateral (b) injury knee radiographs of a patella fracture in a 50-year-old woman. 3-dimensional CT reconstructions (c) reveal an AO/OTA34-C3 patella fracture. AP (d) and lateral (e) knee radiographs 12 months postoperatively.

The FDA has stated that it is the responsibility of the physician to determine the FDA clearance status of each drug or medical device he or she wishes to use in clinical practice.