Outcomes of Patella Fracture Fixation: Novel Wagon Wheel Technique versus Tension Band Construct

Alexandra Cancio-Bello, Aaron Owen, Nicolas Phillip Kuttner, Krystin Hidden[1], William Wood Cross[1], Stephen A Sems[1], Brandon J Yuan[1]
[1]Mayo Clinic

INTRODUCTION: Internal fixation of patella fractures remains technically challenging. Tension band constructs (TBCs) have been associated with high rates of implant prominence, and fracture comminution can make appropriate application of a tension band impractical. We present the results of a novel technique utilizing a transtendinous/transligamentous mini-fragment plate positioned peripherally around the patella with radially directed screws: the so-called wagon-wheel (WW) construct. Clinical outcomes and the rate of reoperation was compared to a cohort of patella fractures treated with TBCs.

METHODS: A retrospective review was performed on 59 patella fractures (OTA/AO 34) from 2010 to 2021 at a Level I trauma center. Patients were treated with a WW (n=22) or TBC (n=37). Postoperative protocols were similar between treatment groups. Clinical and radiographic outcomes were compared. Categorical variables were assessed via Fisher's exact test. ANOVA was used for continuous variables. Kaplan Meier analysis and Cox Proportional Hazard Regression were performed to evaluate time to event outcomes (i.e., union). Mean follow-up was 23 months.

RESULTS:

Range of motion at final follow up was similar between groups (-0.4°-115° and -0.8°-115° in the WW and TBC groups, respectively p=0.94). Two patients (10%) treated with WW were gait aid dependent, compared to 14 patients (38%) treated with TBC (p=0.031). There was no difference in the rate of nonunion between patients treated with WW vs TBC constructs (0% versus 6%, p=0.075) The WW construct had a significantly decreased incidence of symptomatic implants (5% versus 32%, p=0.02) and rate of reoperation (9% versus 38%, p=0.018). Treatment with the WW construct was associated with faster time to union (HR: 2.2; 95% CI 1.28-3.95, p=0.005).

DISCUSSION AND CONCLUSION:

The WW construct was designed with the goal of obtaining peripheral plate fixation to maximize fragment specific fixation while minimizing implant prominence. In our study, patients treated with the WW had statistically significant improvements in numerous outcomes including lower rates of gait aid usage, symptomatic implants, reoperations, and faster time to union. These early results may warrant a prospective comparison to help define the optimal role for this technique.

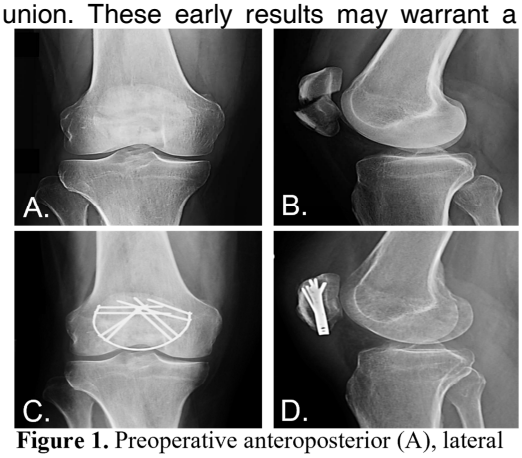

Figure 1. Preoperative anteroposterior (A), lateral (B) and 24-week postoperative anteroposterior (C), lateral (D) radiographs of the Wagon Wheel construct in a 55-year-old male patient.