

Radiostereometric Analysis of Inducible Micromotion After Locked Lateral Plating of Distal Femur Fractures

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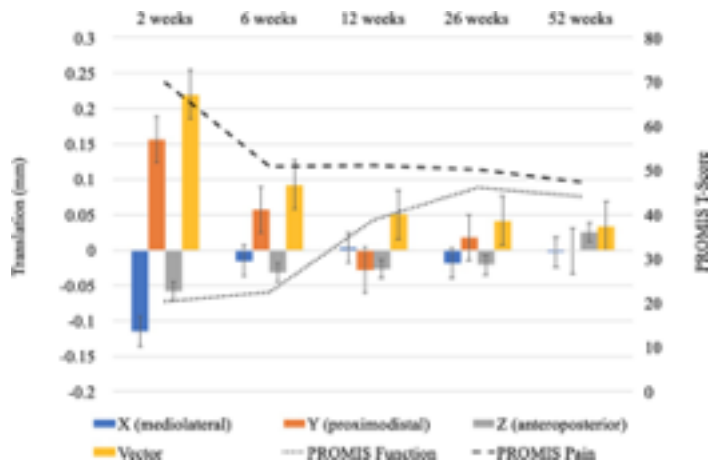
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Purpose: The aim of this study was to evaluate interfragmentary motion throughout the course of healing for distal femoral fractures using radiostereometric analysis (RSA) to determine if RSA is a viable technique for assessing nonunion.

Methods: 16 patients with operatively treated distal femur fractures were enrolled into a prospective study. Sample size was determined based on a nonunion rate of 10%, which would allow the detection of a 0.09-mm difference between the groups at (power = 0.9; $\alpha < 0.05$). Six tantalum beads were inserted in the most proximal and distal fracture fragments intraoperatively. Patients were evaluated postoperatively and at 2, 6, 12, 26, and 52 weeks from surgery. Two set of RSA radiographs were taken: (1) non-weightbearing and (2) with up to 30 lb of weight on the extremity in the axial plane. At each visit, a comparison between the radiographic sets was used to measure inducible micromotion. In addition, at each visit, patients completed the Patient-Reported Outcomes Measurement Information System (PROMIS) assessment of pain and function.

Results: 14 cases presented with evidence of progressive fragment bridging and improved symptoms at 26 weeks. For these cases of suspected union, inducible micromotion had decreased between 2 and 12 weeks ($P < 0.001$) and then remained constant over time ($P > 0.492$). Patient-reported pain and functional improvements paralleled the decreasing inducible micromotion through the course of the study (Fig. 1). Two cases (12.5%) proceeded to nonunion. In contrast with the cases of union, RSA for the cases of nonunion revealed no decrease in inducible micromotion by the 12-week visit ($P > 0.191$). At 12 weeks, nonunion cases demonstrated greater inducible micromotion in the proximodistal plane compared to the cases of union (mean difference: 0.17 mm (± 0.05); $P < 0.001$).

Conclusion: Fracture healing may be evaluated with RSA, which reveals differences in micromotion patterns between the cases of union and nonunion within 12 weeks of surgery.



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