

How Good Are We at Getting It Right? Anatomic Reductions Are Rarely Achieved for Severely Displaced Pilon Fractures and This Portends Severe Osteoarthritis

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Purpose: To evaluate the association among initial articular displacement of pilon fractures, articular reduction quality, and the development of severe osteoarthritis.

Methods: A retrospective review of patients with pilon fractures treated with open reduction and internal fixation was performed. Three orthopaedic surgeons reviewed injury, intraoperative, and postoperative radiographs to grade the initial articular displacement as <2 mm, 2–5 mm, or >5 mm, the postoperative residual articular displacement as 0 mm (anatomic), ≤2 mm, or >2 mm, and the Kellgren and Lawrence (KL) osteoarthritis (OA) grade as 0 (none), 1 (doubtful), 2 (minimal), 3 (moderate), and 4 (severe). The associations between initial and residual articular displacement and the development of grade 4 OA were evaluated.

Results: The review included 115 pilon fractures. The interobserver reliability among the three observers, for initial articular displacement, residual articular displacement, and KL OA grade were all considered to be moderate. Initial articular displacement on injury radiographs was associated with residual articular displacement on postoperative radiographs with 100.0% (28/28) of patients with <2 mm of initial articular displacement having 0 mm of residual articular displacement, compared to 51.7% (15/29) and 17.2% (10/58) of patients with 2–5 mm and >5 mm of initial articular displacement ($p<0.0001$). The development of KL grade 4 OA was significantly associated with both initial articular displacement ($p<0.0001$) and residual articular displacement ($p<0.0001$). All patients with an initial articular displacement <2 mm achieved 0 mm of residual articular displacement, and there were no cases of grade 4 OA. In contrast, grade 4 OA developed in 66.7% (4/6) and 85.7% (18/21) of patients with an initial displacement between 2–5 mm and >5 mm that had residual displacement >2 mm.

Conclusion: Anatomic reductions were achieved in only 17.2% of pilon fractures with >5 mm of initial articular displacement. Severe OA developed in 50% of these fractures, and the rate increased to 85.7% if there was a residual articular displacement >2 mm. Future studies are necessary to determine if high-risk fractures are better served by acute arthrodesis.