

## Comparison of Closed AO/OTA Type 43-C Distal Tibial Pilon Fractures Treated with Open Reduction and Internal Fixation Versus Ilizarov External Fixation

*Prism S. Schneider, MD, PhD, FRCSC<sup>1</sup>; Krishna C. Vemulapalli<sup>1</sup>; Stephen Davis, MD<sup>1</sup>; Milan Sen, MD<sup>1</sup>; Timothy S. Achor, MD<sup>1</sup>; Mark Brinker, MD<sup>2</sup>;*

<sup>1</sup>University of Texas Health Science Center, Houston, Texas, USA;

<sup>2</sup>Texas Orthopaedic Hospital, Houston, Texas, USA

**Purpose:** High-energy fractures of the distal tibial articular surface are associated with significant morbidity and postoperative complications. External fixation has been reported to have a lower rate of complications, at the cost of poorer reduction quality. The purpose of this study was to compare open reduction and internal fixation (ORIF) with Ilizarov treatment of closed AO/OTA 43-C pilon fractures. We hypothesized that there would be a higher complication rate associated with ORIF, but a higher rate of posttraumatic osteoarthritis (OA) associated with Ilizarov treatment.

**Methods:** After obtaining IRB approval, our institutional trauma databases were searched to identify patients with pilon fractures. Inclusion criteria were skeletally mature patients with closed AO/OTA 43-C fractures treated with ORIF or Ilizarov. Exclusion criteria were open fractures, follow-up <90 days, and AO/OTA 43-A or B-type fractures. Outcome measures included infection rate, nonunion rate, painful implants requiring removal, wound complications, and early, symptomatic posttraumatic OA. Statistical analysis included independent-samples *t*-tests and  $\chi^2$  analysis for demographic variables; relative risk (RR) was calculated using the Crosstabs function of SPSS.

**Results:** A total of 68 patients met the inclusion criteria. 41 were treated with ORIF (mean age = 40.7 ± 14.1 years), and 27 were treated with Ilizarov with percutaneous joint reduction (mean age = 48.3 ± 11.4 yrs). There was no difference between groups for gender, body mass index (BMI), and follow-up ( $P > 0.05$ ), but the ORIF group was significantly younger ( $P = 0.022$ ). There were significantly greater infections requiring inpatient treatment in the ORIF group (22%) compared to the Ilizarov group (3.7%) ( $P = 0.038$ ) and there was increased need for soft-tissue coverage in the ORIF group (14.6%), compared to none in the Ilizarov group. There was no significant difference between groups for nonunion (14.6% in ORIF group and 13.8% in Ilizarov group;  $P = 0.067$ ), however, six patients in the Ilizarov group had delayed unions requiring partial fibulectomy and compression or bone marrow injection. Ten patients treated with ORIF required removal of painful hardware (24%), both Ilizarov patients with percutaneous screws required removal (7.4%). There was a significantly increased rate of early, symptomatic posttraumatic OA in the Ilizarov group (34.5%) compared to the ORIF group (22%) ( $P = 0.002$ ) and three patients in the Ilizarov group required early arthrodesis. There was increased risk for infection with wound vacuum-assisted closure (VAC) (RR = 2.1), male gender (RR = 2.8), flap coverage (RR = 17.1), diabetes (RR = 2.0), and Ilizarov application >200 days (RR = 4.1). Risk factors for nonunion included wound VAC (RR = 2.0), male gender (RR = 2.9), BMI >30 (RR = 4.3), flap coverage (RR = 7.0), and diabetes (RR = 4.2).

**Conclusion:** High-energy pilon fractures can be treated with either ORIF or Ilizarov. There was an increased risk for infection, soft-tissue complications, and painful implants in patients treated with ORIF. Patients treated with Ilizarov were at increased risk for delayed union and symptomatic posttraumatic OA, requiring early arthrodesis.

- The FDA has not cleared this drug and/or medical device for the use described in this presentation (i.e., the drug or medical device is being discussed for an "off label" use). For full information, refer to page 600.