

Diagnosing Fractures of the Distal Tibial Articular Surface in Tibia Shaft Fractures: Is CT Always Necessary?

Richard Joseph Behlmer, BS; Paul S. Whiting, MD; Natasha Simske, BS; Ryan M. Graf, MD, MS; Gerald J. Lang, MD
University of Wisconsin, Madison, WI, United States

Purpose: Tibia shaft fractures are commonly associated with fractures of the distal tibial articular surface, with reported rates as high as 43%. Such fractures can be difficult to identify on plain radiographs, and controversy exists regarding indications for CT. The purpose of this study is to identify the incidence of articular fractures in a large series of tibial shaft fractures and to determine the utility of CT scan for diagnosis.

Methods: We conducted a retrospective review of all adult patients with tibia shaft fractures who underwent operative fixation over a 10-year period at a Level-I trauma center. Tibial shaft fracture location, type of articular fracture (extension of primary fracture vs separate malleolar fracture), and time of diagnosis (pre-, intra-, or postoperatively) were determined. Preoperative imaging modalities used and techniques for reduction and fixation were also recorded.

Results: Of the 565 tibial shaft fractures treated operatively during the study period, 106 (19%) had an associated fracture of the distal tibial articular surface. 41 fractures (39%) represented an extension of the primary fracture line, and 64 (60%) were separate malleolar fractures, including 42 fractures of the posterior malleolus (40% of articular fractures) and 22 of the medial malleolus (21%). There was 1 fracture of the anterolateral tibial plafond (1%). 99 of the 106 articular fractures (93%) were identified preoperatively, and 7 were identified intraoperatively (7%). Of the 99 articular fractures identified preoperatively, 90 (91%) were identified on plain radiographs, and 9 (9%) were diagnosed by CT scan (4 malleolar fractures and 5 cases of intra-articular fracture line extension). After excluding 24 CT scans performed for preoperative planning of previously identified articular fractures, a total of 59 preoperative CT scans were performed in search of an intra-articular fracture. In 50 patients (85%), no articular fracture was present, representing a yield of 15% among CT scans performed to rule out an articular fracture. There was no difference in distance from the primary fracture line to the articular surface between articular fractures diagnosed on plain radiographs versus CT (6.1 cm vs 7.9 cm, $P = 0.21$). Of the 7 articular fractures identified intraoperatively, 5 (71%) were posterior malleolus fractures and 2 were extensions of the primary fracture line. All 7 fractures were nondisplaced.

Conclusion: In a large series of tibia shaft fractures, the incidence of fractures of the distal articular surface was 19%. Plain radiographs alone identified 85% of all articular fractures. CT scans performed in search of articular fractures had a low yield (15%). The majority (71%) of fractures not identified preoperatively were nondisplaced fractures of the posterior malleolus. Widespread use of CT scans to diagnose fractures of the distal tibial articular surface in the setting of tibia shaft fractures does not appear warranted.