The Hyperextension Tibial Plateau Fracture Pattern: A Predictor of Poor Outcome

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Purpose: Bicondylar tibial plateau (BTP) fractures are the most common fractures that affect the knee. Hyperextension BTP (HEBTP) fractures are an important, but understudied, subset of BTP fractures. The intention of this retrospective analysis was to compare the clinical and functional outcomes of patients with HEBTP fractures, both in varus and valgus, to those with other complex BTP fractures.

Methods: This study was a retrospective review of tibial plateau fractures over a 7.5-year period. A consecutive series of BTP fractures that met criteria were included. The following were required for inclusion in this analysis: Schatzker V or VI fracture pattern (OTA type 41-C), complete imaging, and a minimum 1-year follow-up. Patient demographics, radiographic, clinical and functional outcomes using the Short Musculoskeletal Function Assessment (SFMA), and all complications were recorded. Patients were divided into 2 groups, either hyperextension or non-hyperextension injury mechanism, based on standardized radiographic criteria and compared. The HEBTP fractures were those determined to have the following radiographic findings: (1) loss of the normal posterior slope of the tibial plateau, (2) tension failure of the posterior cortex, and (3) compression of the anterior cortex. Follow-up data was obtained at standard follow-up time points for both groups, and analyzed.

Results: A total of 84 patients were included in the study. There were 69 patients with 69 knees (82%) that had sustained non-hyperextension BTP fractures and 15 patients with 15 knees (18%) that had HEBTP fractures. Groups did not differ in regard to patient demographics, duration to follow-up, or range of knee motion at 1-year postoperative follow-up. Patients with hyperextension mechanisms did, however, have higher functional (SFMA) scores (33.6 ± 22.4 vs 19.6 ± 18, $P = 0.013$) and trended toward higher pain scores, indicating worsened functional outcomes. HEBTP fracture patients were also more likely than their non-hyperextension mechanism counterparts to have associated soft-tissue damage (27% vs 4%, $P = 0.011$) and to develop posttraumatic osteoarthritis (33% vs 10%, $P = 0.047$).

Conclusion: Non-HEBTP and HEBTP fracture patients have similar outcomes in terms of range of motion at approximately 1 year of follow-up, but differ significantly in terms of functional recovery and types of complications associated with their injuries. Physicians who care for these injuries now can counsel patients regarding potential outcomes and more realistic expectations regarding their prognoses.