Outcomes in acute vs. delayed definitive fixation of bicondylar tibial plateau fractures

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INTRODUCTION: This study aims to determine the efficacy of primary definitive fixation for bicondylar tibial plateau fracture, comparing surgical outcomes of patients stratified by either single definitive fixation within or >72 hours, to a staged approach with external fixation.

METHODS: Retrospective chart review was performed at three American College of Surgeons (ACS) Level 1 Trauma Centers for patients treated for bicondylar tibial plateau fractures identified by OTA classification 41C and corresponding CPT codes. All patients were initially temporized until initial surgery with a knee immobilizer. Patients were divided into 3 groups, (1) staged fixation with temporizing external fixator (ex-fix) followed by open reduction internal fixation (ORIF), (2) acute primary ORIF within 72 hours, (3) subacute primary ORIF > 72 hours. Data collected included fracture classification, hospital length of stay (LOS), time from injury to initial and/or definitive surgery, method of surgical fixation, wound closure, perioperative complications, and unplanned return to the operating room (uRTOR) within 12 months of definitive fixation.

RESULTS: 192 patients met inclusion criteria: 100 patients treated with staged fixation with temporizing ex-fix (group 1), 79 patients were treated with definitive ORIF ≤72 hours (group 2), 13 patients were treated with definitive ORIF >72 hours (group 3). Patient characteristics including smoking status, end stage renal disease (ESRD), obesity, mechanism of injury were significantly different between groups (Table 1). Incidence of open fracture was not significant between groups (Table 2). Time to initial surgery was lowest in group 1 and highest in group 3 (p <0.001). Length of stay from definitive surgery was significant between groups, with group 2 being the lowest (4.78±6.08 days) and highest in group 3 (9.77±23.2 days) (p <0.001, Table 2). Incidence of any complication was not significant between groups. Of our included patients, 144 had radiographic analysis related to AO-OTA classification; patients in group 1 were more commonly 41C3, and evenly spread between 41C1-3 in group 2 (p = 0.029, Table 4). Wound dehiscence, wound drainage, and compartment syndrome complications after initial surgery were significantly higher in those patients treated first with external fixation than those treated with primary fixation <72 hours (Table 3). Incidence of no complication was highest in group 2 (81%) vs. group 1 (37.1%) or group 3 (69.2%) (p <0.001). In group 1, factors predictive of any complication included asthma (p = 0.073); in group 2, predictive factors were cancer (p = 0.038) and ESRD (p = 0 038); in group 3 there were no predictive factors of any complication. Factors predictive of uRTOR in group 1 were cardiovascular disease (CVD) (p = 0.006), there were no predictive factors for uROTR in group 2 or group 3.

DISCUSSION AND CONCLUSION: Recent literature has challenged the traditional requirement of staged fixation of bicondylar tibial plateau fractures due to concern for wound complications; however, no objective measure exists to determine appropriate timing based on patient characteristics. This study demonstrates that carefully selected patients may be treated with early definitive ORIF within 72 hours of injury while minimizing complications and unplanned return to the operating room. Predictive analysis in this cohort is limited by the sample size included for those patients treated by primary definitive fixation. Future studies will aim to better elucidate patient characteristics that allow for patients to be accurately stratified into appropriate treatment groups.