Better Fracture Reduction in Patients Undergoing Early Definitive Fixation for Tibial Plateau Fractures with Acute Compartment Syndrome

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Purpose: The purpose of our study was to evaluate the timing of definitive fixation of tibial plateau fractures (TPFs) after compartment release. Our primary outcome was infection. Our secondary outcome was articular reduction and alignment.

Methods: A multicenter retrospective review of TPFs requiring operative repair that were complicated by acute compartment syndrome was performed. Patient demographics, injury characteristics, and treatment course were identified. Patients met inclusion criteria if treated with open reduction and internal fixation (ORIF) and fasciotomy, had >8-week follow-up, and were skeletally mature. Radiographs were blinded and graded on articular reduction and alignment by an attending orthopaedic surgeon. Patients were categorized into 2 groups: those receiving definitive fixation before or during fasciotomy closure (early fixation group) and those receiving definitive fixation after fasciotomy closure (delayed fixation group).

Results: A total of 79 patients met inclusion criteria. Thirty-eight were treated with early definitive fixation and 41 with delayed fixation. Gender, age, BMI, diabetic status, and smoking status were comparable between the groups (p= 0.48, 0.46, 0.19, 0.87, 0.23, respectively). Additionally, open fracture and AO/OTA classification was not significantly different between the groups (p= 0.07, 0.59, respectively). Patients undergoing early definitive fixation had a mean time to fixation of 4.0 days +/- 2.5 [3.2, 4.9] vs 17.5 +/- 12.6 [13.5, 21.4] (p<0.01). Deep infection was not significantly different between groups; 5 (13.2%) in the early fixation group and 5 (12.5%) in delayed fixation (p=0.90). In the early fixation group, 25 (39.7%) fasciotomy sites were closed with split thickness skin grafts (STSG) vs 7 (9.3%) in the delayed fixation group (p<0.001). Alignment was not significantly different between groups (p= 0.14). However, when comparing articular reduction between the two groups, early fixation resulted in a higher probability for attaining anatomic reduction, 27 (71.0%) vs 11 (27.5%) in delayed fixation (p<0.01).

Conclusion: Our study suggests early definitive fixation leads to improved articular reduction without an increased risk of infection. Acute compartment syndrome is a frequent complication in patients with tibial plateau fractures, and to date there is limited information to guide timing of definitive fixation. While this study is underpowered to appropriately evaluate risk in this setting, this study highlights the need for a further investigative study.