Management of External Fixation Devices for Staged Surgery

Colin Crickard, MD*; Rachel Seymour, PhD; Madhav Karunakar, MD;*
Carolinas Medical Center, Charlotte, North Carolina, USA

Background/Purpose: Temporizing external fixation has been described for multiple orthopaedic trauma surgeries to provide soft-tissue stabilization and allow for reduced inflammation in patients undergoing lower extremity surgery. Multiple authors have evaluated the ability to surgically prep an external fixator with varying degrees of success. Given this difficulty with residual bacteria on the external fixator there is significant concern with prepping one into a sterile field. There is also little consensus on the appropriate timing of external fixation removal in relation to skin prep and skin incision. Our purpose was to quantify the risk of infection, defined as culture-positive wound infection requiring surgical debridement, resulting from differing timing of external fixation removal in relation to skin incision and final skin preparation.

Methods: A retrospective review of all patients enrolled in a database for complex proximal tibial fractures was performed. Inclusion criteria were defined as the presence of an OTA 41-C3 proximal tibial fracture and the placement of an external fixator for soft-tissue temporization. The primary outcome measure was soft-tissue infection requiring surgical debridement. Secondary data regarding the presence or absence of compartment syndrome, open fracture, diabetes, tobacco use, as well as the subtype of OTA 41-C3 fracture were included along with demographic data such as patient age and body mass index (BMI).

Results: 146 patients with OTA 41-C3 type proximal tibia fractures were identified. Of these patients 112 had placement of an external fixation for temporization of the soft tissues. 22 patients had incomplete data regarding the removal of external fixation and were excluded. Nine patients had retention of the external fixator after definitive surgery for various reasons and were also excluded. The remaining 81 patients comprised the data study group. Of these 81 patients, 38 had removal of the external fixator before skin incision and before the final skin preparation for surgery, defined as "pre-op". 43 patients had external fixation removed intraoperatively after skin incision for the definitive surgery, defined as "intra-op". The overall rate of infection in the "pre-op" group was 18.4% compared to 25% in the "intra-op" group. However, the difference in the rate of infection was not significant. In the "pre-op" removal group, age was associated with infection (53 years vs. 42 years, $P = 0.018$). In the "intra-op" group there was a significant association between the presence of open fracture and the risk of infection (4 vs. 1, $P = 0.011$). The mean BMI for the sample was 30 kg/m^2, the same in both groups ($P = 0.787$).

Conclusion: In this consecutive series of OTA 41-C3 tibial plateau fractures there was not a significant association with infection and timing of removal of the external fixator in relation to definitive operative fixation. Significant differences were noted within the "pre-op" and "intra-op" groups with regard to patient age and the presence of an open fracture.

See pages 99 - 147 for financial disclosure information.