

Single-Incision Fasciotomy Decreases Infection Risk Compared to Dual-Incision Fasciotomy in Treatment of Tibial Plateau Fractures with Acute Compartment Syndrome

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Purpose: Tibial plateau fractures with concomitant acute compartment syndrome (ACS) are devastating injuries associated with high rates of infection and nonunion. Both single-incision (SI) and dual-incision (DI) fasciotomies have been proven to adequately decrease lower extremity compartmental pressures. The purpose of this study was to compare surgical site infection rates in tibial plateau fractures with ipsilateral ACS treated with SI versus DI fasciotomies.

Methods: A retrospective review of patients with ACS and tibial plateau fractures was conducted at 2 Level I trauma centers from 2001 to 2021. All patients underwent emergent 4-compartment fasciotomy and eventual definitive plate and screw fixation of their tibial plateau fractures with a minimum 3-month follow-up. The primary outcome was surgical site infection requiring surgical debridement.

Results: 190 patients met inclusion criteria (SI: n = 127, DI: n = 63). These were almost exclusively high-energy injuries with 86.8% bicondylar fractures, 14.2% open fractures, 8.4% with an associated vascular injury, and 57.9% AO/OTA 41-C3 fractures. Similar to previous studies, the overall infection rate in this setting was 25.8% (49/190). Both groups were similar in terms of demographic variables including: age, gender, body mass index (BMI), diabetes, smoking status, injury mechanism, polytrauma, vascular injury, open fracture, unicondylar versus bicondylar, and AO/OTA classification (all $P > 0.05$). The SI fasciotomy patients had significantly fewer surgical site infections compared to the DI fasciotomy patients (SI 18.1% vs DI 41.3%; $P < 0.001$; odds ratio [OR] 2.28, [confidence interval (CI) 1.42-3.66]). This difference in infection rates remained significant in multivariate regression analysis controlling for other risk factors (vascular injury, diabetes, BMI, and gender; SI vs DI OR 3.62, $P = 0.001$). Patients with a dual (medial and lateral) surgical approach and DI fasciotomies developed a surgical site infection in 60% of cases (15/25) compared to 21.3% of cases (13/61) in the SI group ($P < 0.001$). The nonunion rate was similar between the 2 groups (SI 5.5% vs DI 9.5%; $P = 0.3$). The SI fasciotomy group required fewer debridements ($P = 0.04$) until closure but there was no difference in days until closure (SI 5.5 vs DI 6.6; $P = 0.09$). There were zero cases of incomplete compartment release requiring return to the operating room.

Conclusion: Tibial plateau fractures with concomitant ACS demonstrate high rates of surgical site infections. However, patients with DI fasciotomies were more than twice as likely to develop a surgical site infection compared to SI patients despite similar fracture and demographic characteristics between groups. Orthopaedic surgeons should consider prioritizing SI fasciotomies in this setting.