Can Dorsal Dermal Fascial Fenestrations Treat Acute Compartment Syndrome of the Foot?
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Purpose: Treatment of compartment syndrome of the foot with fasciotomies remains controversial. Dorsally based dermal fascial fenestrations (DDFF) have been used to treat severe foot trauma with compartment syndrome. The efficacy of this technique has not been studied. The purpose of this study was to evaluate compartment decompression with DDFF compared to traditional fasciotomies in a foot compartment syndrome model. We hypothesized that fasciotomies and dorsal dermal fenestrations would provide equivalent compartment decompression.

Methods: 10 cadaver limbs were used for this study and intracompartmental pressure was monitored in the first dorsal interosseous (FDIO), abductor (ABD), and superficial plantar (SP) compartments with a Stryker monitor. A compartment syndrome model was created based on similar existing models in the leg using pressurized normal saline in the 3 compartments. Each compartment was pressurized, allowed to equilibrate and recorded. Pressure measurements were repeated in the same manner after completing DDFF and then after standard fasciotomies. Our primary outcome variables were intracompartmental pressure in the 3 compartments for 4 specific conditions: (1) baseline pressure, (2) pressure in the compartment syndrome model, (3) pressure after DDFF, and (4) pressure after fasciotomies. Analysis was completed using repeated-measures analysis of variance.

Results: Fasciotomy decreased compartment pressures within 10 mm Hg of baseline pressure in all compartments tested (average pressure [mmHg] 11.4 vs 5.3 FDIO, 8.5 vs 8.8 ABD, 10.2 vs 7.6 SP; all P values <0.001). DDFF only decreased the average pressure in the first dorsal interosseous compartment to 43 mm Hg (95% confidence interval 28-59, P <0.001). DDFF did not provide a significant decrease in pressure in the abductor and plantar compartments. Pressure decrease following fasciotomy compared to DDFF was significantly greater in all 3 compartments studied (average pressure [mmHg] 11.4 vs 43.2 FDIO, 8.5 vs 70 ABD, and 10.2 vs 75 SP; all P values <0.005).

Conclusion: Fasciotomies were more effective at decreasing intracompartmental pressure than fenestrations. Our results suggest that DDFF do not provide decompression of the abductor and plantar compartments of the foot and only partial decompression of the dorsal compartments. We recommend caution in using fenestrations alone to treat acute compartment syndrome of the foot.