

The Efficacy of a Single-Incision Versus Two-Incision Four-Compartment Fasciotomy of the Leg: A Cadaveric Model

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Background/Purpose: Techniques for one- and two-incision four-compartment fasciotomies of the leg are well described in the literature. The two-incision technique remains the gold standard for addressing acute compartment syndrome of the leg. Controversy exists as to whether a single-incision approach adequately releases the deep posterior compartment. Replicating an established cadaveric model, this study investigates the efficacy of single-incision and two-incision fasciotomies to satisfactorily decompress all four compartments of the leg. We hypothesized that both techniques would adequately release all compartments of the leg and that a compartment syndrome could not be recreated in the deep posterior compartment after release by either technique.

Methods: Acute compartment syndrome was simulated in eight paired, fresh-frozen cadaver legs by infusing normal saline into all four compartments until pressures were greater than 60 mm Hg without evidence of decay. Subsequent four-compartment fasciotomies were performed on each pair, randomizing the legs to one- and two-incision techniques. Pressures were recorded at the proximal and distal third of each compartment before and after the decompression. Following fascial release, the deep posterior compartment was re-infused in an attempt to recreate an acute compartment syndrome. Statistical analysis was performed using the Student *t*-test with significance set at a *P* value <0.05.

Results: Sustainable pressures of greater than 60 mm Hg were established in all four compartments of each specimen. The post-fasciotomy pressures in all compartments were reduced to less than 30 mm Hg using both the single-incision and two-incision techniques. There was no statistically significant difference in post-release pressure between the two techniques in any compartment. The average post-release pressure in the deep posterior compartment was 4.6 mm Hg (range, 0-10 mm Hg) for those limbs receiving the single-incision technique and 5.6 mm Hg (range, 1-10 mm Hg) for specimens that underwent the two-incision technique ($P = 0.44$). After complete fasciotomy, it was not possible to recreate acute compartment syndrome in the deep posterior compartment of any specimen, with post-reinfusion pressures ranging from 0-16 mm Hg for the single-incision group and 3-15 mm Hg for the two-incision group.

Conclusion: A single-incision four-compartment fasciotomy is as effective as a two-incision technique for release of acute compartment syndrome in this cadaveric model. Successful deep posterior compartment decompression is achieved with either approach. Further clinical studies to determine the efficacy of the single-incision technique for decompression of acute compartment syndrome of the leg are warranted.