

Radiographic Predictors of Compartment Syndrome after Tibial Fracture

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Purpose: Compartment syndrome (CS) is a potentially devastating injury that has been associated with tibial fractures. Little data exist regarding the radiographic predictors of CS. Our hypothesis was that radiographic measures of the fracture would be associated with the development of CS.

Methods: Our study group was a consecutive series of patients with tibial fractures with CS (n = 40) and without CS (n = 341) at a single Level I trauma center. Radiographs were reviewed and the following parameters were recorded: fracture classification according to the AO/OTA system and the Schatzker system for plateaus, proximal extent of fracture, distal extent of fracture, location of center of fracture, length of fracture, and location of fracture. Bivariate logistic regression was used to determine the relationship between the radiographic parameters and likelihood of compartment syndrome. Medical records were then reviewed for evidence of CS diagnosed by an attending orthopaedic surgeon and treated by emergent fasciotomy.

Results: Consistent with existing dogma, CS was most likely with more proximal fractures such as those in the second decile of the tibia, occurring at a rate of 38%. What has not been previously reported is that the rate of CS rose monotonically according to length of the fracture line, peaking at 38% when the fracture comprised between 40% and 60% of the total tibial length. Schatzker VI fractures developed CS at a rate of 27%, whereas only 4% of 25 Schatzker IV medial plateau fracture dislocations developed CS. Further analysis demonstrated that odds of CS increased by a factor of 1.91 (95% confidence interval [CI] 1.46 to 2.49) for every 10% of the total tibial length the fracture occupied. The odds of CS decreased by 27% (95% CI 16%, 37%), 23% (95% CI 32%, 13%), and 18% (95% CI 27%, 9%) for every 10% of the total tibial length the proximal fracture extent, fracture middle, and distal fracture extent were away from the proximal end of the tibia, respectively. In comparison to all plateau fractures, Schatzker VI plateaus have an odds ratio of CS of 3.98 (95% CI 1.68, 9.45), whereas in contrast to previous case series we did not observe Schatzker IV to have a statistically significant association with CS: odds ratio is 0.17 (95% CI 0.02, 1.29).

Conclusion: To our knowledge this is the largest series to rigorously examine radiographic predictors of CS. In keeping with expectations, we observed that Schatzker VI plateau fractures and more proximal fractures are more likely to develop CS. However, to our knowledge this is the first study to propose a powerful new predictor of CS, the total length of the fracture. This parameter may be of use to clinicians as they evaluate patients for their risk of CS and in helping to diagnose patients with CS.

Alumni

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