Do Objective Data Change the Diagnosis of Acute Compartment Syndrome (ACS) in Patients with Tibia Fractures?

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Purpose: This study examines whether continuous compartment pressure and muscle oxygenation data affected the likelihood of ACS as assessed using retrospective expert panel review.

Methods: The Predicting Acute Compartment Syndrome (PACS) study collected detailed clinical data, continuous pressure and oxygenation data, and 6-month outcomes in 191 patients with high-energy tibia fractures. Nine experienced orthopaedic trauma surgeons assessed the likelihood of ACS on a 0-100 scale for each patient after reviewing the clinical and outcome data alone and did so again after viewing additional continuous pressure and oxygenation data. Patients were placed into low-, uncertain-, and high-likelihood groups. For this study, patients were placed into 1 of 9 categories based on all possible before/after combinations. For each initial group, the proportion of patients in that group that changed to another group was calculated. In addition, the number of likelihood assessments that were qualitatively higher, lower, or unchanged after reviewing the pressure/oxygenation were determined, and finally the magnitude of any changes in likelihood was determined.

Results: Of 852 assessments, 52% were unchanged by the additional information, 32% were reassigned lower risk, and 15% higher risk. There were 127 instances in which an expert initially assessed a patient as high-likelihood ACS; objective data changed the assessment to low or uncertain in 13%. There were 618 instances in which patients were assessed as low likelihood of ACS, and objective data changed the assessment to uncertain or high likelihood in 6%. In 107 instances the assessment of ACS was uncertain based on clinical and outcome data; in these cases the additional objective data changed the assessment to a more definitive high or low category 60% of the time: 49% of the time the likelihood was changed to low and 11% of the time it was changed to high.

Conclusion: In the PACS study, when an expert panel assessed a patient as having high or low likelihood of ACS using clinical and 6-month outcome data, the addition of objective muscle pressure or oxygenation data infrequently changed the assessment of ACS risk. In patients with an uncertain clinical diagnosis, such additional data were helpful and changed the assessment of risk more than half the time.