



DIAGNOSTIC TECHNOLOGY

Infrared Imaging for Detection of Compartment Syndrome

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Background

Early compartment syndrome is difficult to diagnose and a delay in the diagnosis can result in amputation.

Objectives

To explore the potential of Infrared imaging, a portable and non-invasive technology for detecting compartment syndrome in patients with multiple trauma. The authors hypothesized that compartment syndrome is associated with a reduction in surface temperature in the involved leg and the temperature reduction can be detected by infrared imaging.

Methods

Prospective, observational study of a convenient sample of critically ill trauma patients imaged in the ED of a Level 1 trauma center between July and December 2006. The average temperature of the anterior surface of each lower leg was measured with a radiometrically calibrated 320 x 240 VOx uncooled microbolometer array L-Wave IR camera. The absolute difference in surface temperature between legs in trauma patients

with (n = 5) and without (n = 26) unilateral compartment syndrome was determined by an investigator blinded to injury pattern using Thermography Suite Software. The diagnosis of compartment syndrome was made intraoperatively.

Results

There was a greater difference in surface temperature between legs in patients with compartment syndrome $1.53 \pm 0.5^{\circ}\text{C}$ compared with patients without compartment syndrome $0.41 \pm 0.3^{\circ}\text{C}$ (ANOVA confidence interval 0.79 to 1.45, $p < 0.05$). The surface temperature was always lower in the leg with compartment syndrome compared with the contralateral leg.

Conclusions

Infrared imaging was able to detect a reduction in surface temperature in legs with compartment syndrome. This non-invasive technology holds promise for detection of compartment syndrome in trauma patients presenting to an ED.