Acute Compartment Syndrome: Where Pressure Fails, pH Succeeds

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Background/Purpose: Failure to recognise and treat acute compartment syndrome (ACS) early leads to significant morbidity. Current practice is dependent on the use of clinical signs and intracompartmental pressure (ICP) monitoring to identify the syndrome but there is still debate regarding the accuracy and interpretation of these findings. A more direct and reliable system is required.

Methods: Patients admitted with limb injuries at risk of developing an ACS underwent intramuscular (IM) pH and ICP monitoring with regular clinical assessment for the presence of the syndrome during their hospital stay. Fasciotomies were performed on those with clinical and/or pressure-based evidence of an ACS as per the unit's protocol. All patients were subsequently assessed for evidence of a missed compartment syndrome during routine follow-up and at specific research clinics at 6 and 12 months.

Results: Of the 62 patients participating in the trial, 51 subjects completed the follow-up protocol and were therefore included in the final analysis. They were divided into 2 groups: those who had evidence of a compartment syndrome, either initially (fasciotomies [n = 13]), or at follow-up (no fasciotomies [n = 7]), and those who had no evidence of an ACS (n = 31). The sensitivity and specificity for the worst values for each variable were calculated allowing receiver operator characteristic (ROC) curves to be created. These identified an area under the curve of 0.921 for pH, 0.732 for absolute pressure, and 0.591 for delta pressure. To achieve a sensitivity of 95%, an absolute pressure of greater than 30 mm Hg was only 30% specific, and a delta pressure of less than 33 mm Hg was 27% specific, while IM pH was 80% specific at this level (pH <6.38).

Conclusion: This study highlights the issues concerning the current diagnostic methods for ACS and provides the breakthrough that has been long anticipated. Despite the dependence on clinical and pressure-based evidence for diagnosing ACS in this study, intramuscular pH radically outperformed both the highest ICP and the lowest delta pressure. Using IM pH to diagnose ACS, clinicians can confidently identify patients early and accurately, significantly reducing the morbidity associated with this syndrome.

PAPER ABSTRACTS