

Complications Are Reduced with Appropriate Resuscitation, Measured by Correction of Metabolic Acidosis

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Purpose: The optimal timing for definitive orthopaedic care is often unclear in polytrauma patients. The goal of this study was to prospectively assess the safety of the Early Appropriate Care (EAC) strategy, a previously published model that recommends definitive fixation within 36 hours if one of the following three parameters is met: lactate <4.0 mmol/L, pH = 7.25, or base excess (BE) = -5.5 mmol/L. EAC directs treatment to either damage control orthopaedics or early definitive fixation of axial and femoral fractures. We hypothesized that complications would occur with similar frequency in patients who had 1/3, 2/3, and 3/3 of the resuscitation parameters at time of surgery.

Methods: 335 patients were prospectively treated with EAC at a Level I trauma center, with 332/335 (99.1%) having fixation with at least one parameter at goal. Patients were grouped by the number of parameters at goal at the time of definitive fixation: 0/3, 1/3, 2/3, 3/3, or not all three labs drawn. Those in the 1/3 and 2/3 groups were combined into a separate group: incomplete parameter resuscitation (IPR), and complications were compared with patients who did have all (3/3) parameters at the time of surgery: full parameter resuscitation (FPR). Regression analysis was performed with ASA (American Society of Anesthesiologists), ISS, gender, and presence of various fractures for likelihood of developing a complication. Complications in the 6-month postoperative period were adjudicated by an independent multidisciplinary physician committee, and included infection, sepsis, PE/DVT (pulmonary embolism/deep vein thrombosis), renal failure, multiorgan failure, pneumonia, and ARDS (acute respiratory distress syndrome).

Results: 66 patients (19.7%) developed a total of 90 complications, which was lower than the 22.1% complication rate in a historical cohort of 1443 patients at our hospital. The complication rate in patients with only 1 EAC parameter at protocol goal at the time of surgery was 34.3%, which was higher than other groups ($P < 0.05$). Patients with IPR did not have significantly more complications versus FPR (31.8% vs 22.6%, $P = 0.078$). Those with a femur fracture were less likely to receive FPR at the time of surgery ($P = 0.034$); however, they were also less likely to have a complication (25.7% vs 13.1%, $P = 0.024$). For patients with fractures other than the femur, FPR was not a significant predictor of complication rate, but showed important trends (29.2% vs 46.4%, $P = 0.085$). Regression analysis showed male gender and ISS to be independent predictors of a complication, while FPR was not a significant predictor of whether a complication would occur.

Conclusion: EAC guidelines are effective at reducing postoperative complications and offer a powerful subjective treatment algorithm dictating timing of care. Definitive fixation should proceed when at least one of the following criteria is met: lactate <4.0 mmol/L, pH >7.25 , or base excess (BE) >-5.5 mmol/L. This study highlights important trends in the IPR and FPR groups, suggesting differences in resuscitation parameters may further guide care

The FDA has stated that it is the responsibility of the physician to determine the FDA clearance status of each drug or medical device he or she wishes to use in clinical practice.

in certain patients; additional study is needed. Therefore, we advocate for use of the existing protocol, while continuing research on these high-risk subgroups, the timing required for resuscitation, and other factors that may predict complications.