

**Early Appropriate Care of Orthopaedic Injuries in Elderly Multiple-Trauma Patients**

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**Background/Purpose:** This study was designed to evaluate clinical predictors of complications in multiply injured elderly trauma patients with orthopaedic injuries. Previous work from our institution has established resuscitation parameters that minimize complications with early fracture management. Protocol recommendations included definitive management of mechanically unstable fractures of the pelvis, acetabulum, spine, and femur within 36 hours, provided the patient demonstrated a positive response to resuscitative efforts, including lactate  $<4.0$ , pH  $\geq 7.25$ , or base excess (BE)  $\geq -5.5$  mmol/L. This protocol has been applied to all skeletally mature patients, but patients with advanced age or preexisting medical issues may require unique parameters to mitigate risk of complications and mortality.

**Methods:** Between October 2010 and March 2013, 376 skeletally mature patients with 426 unstable fractures of the pelvis ( $n = 73$ ), acetabulum ( $n = 58$ ), spine ( $n = 112$ ), and / or proximal or diaphyseal femur fractures ( $n = 183$ ) were treated at a Level I trauma center and were prospectively studied. Subgroups of patients age  $\leq 30$  years ( $n = 114$ ) and  $\geq 60$  years ( $n = 37$ ), treated within 36 hours of injury, were compared. Low-energy fractures were excluded. The ISS, Glasgow Coma Score (GCS), and American Society of Anesthesiologists (ASA) classification were determined. Lactate, pH, and BE were measured at 8-hour intervals and perioperatively. Complications included pneumonia, pulmonary embolism (PE), acute renal failure (ARF), acute respiratory distress syndrome (ARDS), multiple organ failure (MOF), deep vein thrombosis (DVT), infection, sepsis, and death.

**Results:** Patients  $\leq 30$  years old (y/o) were more likely to sustain gunshot wounds ( $P = 0.039$ ), while those  $\geq 60$  y/o were more likely to fall from a height ( $P = 0.002$ ). There were no differences in the frequency of pelvis, acetabulum, spine, or femur fractures. In patients who underwent definitive fixation within 36 hours of injury, younger patients had lower GCS ( $12.3 \pm 4.32$  vs.  $14.2 \pm 2.77$ ,  $P = 0.003$ ), and lower ASA ( $2.58 \pm 0.86$  vs.  $3.03 \pm 0.76$ ,  $P = 0.004$ ), with no difference in ISS ( $25.0 \pm 9.64$  vs.  $24.6 \pm 8.99$ ). At least one complication occurred at similar rates for patients  $\leq 30$  y/o (15.8%) and  $\geq 60$  y/o (16.2%), but younger patients were more likely to develop PE or ARDS (both, 3.5% vs. 0.0%,  $P = 0.045$ ). At the time of fixation for patients  $\leq 30$  y/o and  $\geq 60$  y/o, there were no differences in lactate ( $2.09 \pm 0.95$  vs.  $1.86 \pm 0.81$ ), pH ( $7.32 \pm 0.07$  vs.  $7.32 \pm 0.09$ ), or BE ( $-3.79 \pm 3.73$  vs.  $-3.42 \pm 4.30$ ). Subgroup analysis evaluating the severity of acidosis incrementally within patients  $\leq 30$  y/o showed more overall complications if pH was  $< 7.30$  ( $P = 0.042$ ) or BE  $< -6.0$  ( $P = 0.049$ ); there were trends toward more pulmonary complications with lower BE and more pneumonia with lower pH. Patients  $\geq 60$  y/o demonstrated more sepsis if BE was  $< -6.0$  ( $P = 0.046$ ); they trended toward more overall complications with lower BE and more MOF and death with lower pH. The older cohort trended toward being more prone to sepsis than the younger cohort with lower BE. Higher ASA was associated with a greater incidence of any complication, pulmonary complication, pneumonia, ARDS, MOF, sepsis, and death, irrespective of patient age.

**Conclusion:** Early appropriate care aims to definitively manage major skeletal injuries by treating patients once they have been adequately resuscitated in order to minimize

complications. ASA score has important implications in predicting complications. Further study is needed in a larger sample to determine whether previous resuscitation parameters guiding timing of definitive fixation in elderly patients should be more conservative to decrease their risk of complications.

- The FDA has not cleared this drug and/or medical device for the use described in this presentation (i.e., the drug or medical device is being discussed for an “off label” use). For full information, refer to page 600.