Fact or Fiction: Is the Extreme Elderly Trauma Patient at a Greater Risk for Developing Contrast Induced Nephropathy?

Kimberly Broughton-Miller, APRN, Regina Doan, RN, Jodi Wojcik, APRN, Karina Pentecost, APRN, Michelle Frisbie, APRN, Brian Harbrecht, MD
University of Louisville Hospital Department of Surgery

Purpose
The U.S. population is aging rapidly as the “baby boomers” started to turn 65 in 2011. United States residents age 65 and over grew from 35 million in 2000, to 49.2 million in 2016, accounting for 12.4% and 15.2% of total population, respectively. By 2030, it is projected that 71 million Americans will be 65 or older. This is roughly 20% of the projected U.S. population. As the population continues to live longer and stay active, the elderly trauma patient will become more and more frequent. It was felt that the older population would be more at risk for a contrast induced nephropathy especially with increasing numbers of contrast boluses. We evaluated the effect of contrast dye load in the extreme elderly trauma patient. It was theorized that trauma patients >74 years who received multiple contrast boluses were at a greater risk for acute kidney injury with increased morbidity and mortality.

Methods
A retrospective analysis of all trauma patients admitted from 2014-2016 at an urban Level 1 trauma center was performed. A total of 9,923 patients were reviewed with 851 meeting the extreme age requirement of >74 years. Nine patients were excluded for DOA/LOS=0 days and 6 were excluded for no creatinine values, leaving 836 total patients in the study. These patients were further reviewed for comorbidities, mechanism of injury, including injury severity score (ISS), and number of contrast boluses received, both in house and at transferring facility. Other parameters reviewed were initial creatinine, creatinine increase >0.3mg/dl, highest creatinine and discharge creatinine. Acute Kidney Injury (AKI) was defined as creatinine increase greater than 50% of admission level. Acute Kidney Injury (AKI) was defined as creatinine increase >0.3mg/dl, highest creatinine and discharge creatinine. Acute Kidney Injury (AKI) was defined as creatinine increase greater than 50% of admission level. The presence of chest (p<0.000) or extremity injuries (p<0.000) and systolic blood pressure <110 in the emergency department (p<0.011). The development of acute kidney injury resulted in a significant increase in the hospital length of stay of 10.7±11.5 vs 5.5±5.7 days and ICU days were 8.1±10.9 vs 2.4±5.3.

Findings

Conclusions
Statistical analysis of the data revealed that Acute Kidney Injury (AKI) had a significant impact on the increase in the hospital length of stay, amount of ICU days and the number of ventilator days required. It was also found that having an injury to the chest or an extremity, placed the elderly at a significantly higher incidence of AKI. The systolic blood pressure also impacted the occurrence of AKI in the patient population. Even a blood pressure reading of less than 110mmHg systolic had a significant impact of the development of AKI. However, any degree of AKI significantly increased mortality of the patient. Interestingly, the co-morbidities of hypertension and diabetes had no statistically difference associated with them. This study revealed that frequently the highest level of serum creatinine was noted on admission laboratory values. Some initial thoughts on why this occurred include; possible chronic state of dehydration both physiologic and medication induced or inadequate resuscitation of elderly patients due to concerns of fluid overload.

References

Implications
• Guide development of treatment algorithms to prevent increased morbidity and mortality in the extreme elderly
• Lead practice in caring for this patient subset which is a growing segment of the trauma population
• Provide a basis for better risk stratification of elderly trauma patients
• Heighten awareness of kidney function preservation in a fragile population
• Explore utilization of permissive hypotension in the pre hospital setting as it affects the trauma population