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KEYWORDS

• Geriatric • Trauma • Injury • Aging

KEY POINTS

- Geriatric trauma patients are a unique patient population that require individualized assessment and management strategies.
- Changing pathophysiology, increased incidence of co-morbid conditions and the use of anticoagulant medications augment the impact of trauma on geriatric patients.
- Geriatric trauma patients are often under triaged therefore a high index of suspicion should be maintained even with seemingly minor mechanisms of injury.
- Use of diagnostic imaging for geriatric trauma patients should be liberal.
- Elderly patients are at high risk of suicide and elder abuse.

INTRODUCTION

Epidemiology

The population of the United States is aging. By 2030, 1 in 5 Americans will be more than 65 years old¹ and by 2050 the US Census projects that the population aged 65 years and older will double and approximately 4.5% of the population will be more than 85 years old.² By then, geriatric patients will make up nearly 40% of all trauma cases.^{3,4}

In 2013, unintentional injury was the eighth leading of cause of death in older patients, with an estimated 25,000 deaths related to falls.^{5,6} Trauma in the elderly costs more than \$34 billion in direct medical costs every year. Approximately three-quarters of the total cost is related to traumatic brain injury (TBI) and injuries to the lower extremities, including hip fractures.⁷

The care of elderly patients with trauma presents a unique set of challenges. The combination of comorbid health conditions, prescribed medications, and frailty makes older patients more vulnerable to trauma and subsequent complications, including infections, pneumonia, venous thromboembolism, and multisystem organ failure. Patients more than 65 years old are twice as likely to die compared with younger patients with similar injury severity score (ISS). Studies suggest that mortality increases 6.8% for every year beyond age 65 years.^{3,8} Elderly patients are undertriaged a significant

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portion of the time and are more likely to go to a nontrauma center than younger patients. Some investigators recommend that any patient older than 70 years with trauma should be transported to a trauma center regardless of their ISS.^{9,10}

This article addresses the challenge of treating geriatric patients with trauma, covering differences in anatomy and physiology, triage and resuscitations, as well as addressing some special situations, including elder abuse, hypothermia, and suicide.

Geriatric Anatomy and Physiology

Frailty, aging versus underlying disease

Mortality after trauma increases with age starting as young as age 40 years. However, chronologic age has been shown to be less important in trauma than frailty. Frailty is defined as impairment of function of multiple systems that increases the susceptibility to physical and physiologic stressors.^{3,11,12} Frailty is difficult to quantify because the index tools are long and time consuming, making them difficult to apply in the emergency setting.¹³ The patient's baseline functional status and evidence of sarcopenia may be considered as surrogate markers of frailty.^{13,14} Frail patients with poor functional status and multiple comorbidities have been shown to have worse outcomes after trauma.

Head and neck

Traumatic brain injury is the leading cause of traumatic death in the elderly. The brain shrinks over time. Decreasing brain volume causes stretching of the bridging veins, making them more susceptible to tearing and bleeding from the shearing forces in trauma. Furthermore, cerebrovascular autoregulation and free radical clearance are impaired with age. This process contributes not only to worsened brain injury in elderly patients but to delayed recovery.^{15,16} Elderly patients are at higher risk for significant intracranial injury in minor head trauma, and have more frequent bleeds and severity of intracranial hemorrhage (ICH) if taking oral anticoagulants.¹⁷ It is important to note that the clinical decision rules designed to decrease the use of computed tomography (CT) brain in minor head trauma have all found increased significant findings on CT in the elderly. Therefore, although use of clinical judgment is advised in determining the need for advanced imaging in patients more than 65 years old with minor head injury, the clinician should have a lower threshold to CT scan this population.^{18,19} Similarly, the same 2 research groups (NEXUS II c-spine, Canadian c-spine) excluded elderly patients from the low-risk decision rule because of higher numbers of significant fractures in this population.

Chest

Cardiac Heart disease may affect outcomes of elderly patients with trauma through diminished cardiac reserve. Patients with a history of congestive heart failure (CHF), and those on warfarin or β -blockers are at higher risk of poor outcomes after trauma.²⁰ The exact mechanism and physiology related to worse outcomes in CHF are not entirely understood and there are no clear studies to guide management in the emergency department (ED). It is thought that the decreased reserve is related to structural and functional cardiac changes of aging and a significant reduction in cardiac function during the stress of trauma. During evaluation of a geriatric patient with trauma the clinician should take a careful cardiac and medication history. Hypotension and poor cardiac output should be treated with inotropic and chronotropic medications and consideration of balloon pump in severe cases.²⁰

Pulmonary

The mechanics and physiology of breathing change with age. Increased chest wall rigidity and worsening kyphosis may lead to impaired respiratory muscle insertion

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