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## Silver Trauma: Changing Patterns of Trauma in the Older Population

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**ABSTRACT**

An 80-year-old male presented to the emergency department complaining of central chest pain following a road traffic accident at 25 miles/hr. Following investigation of cardiac markers and chest x-ray, the patient was diagnosed with non-complicated sternal fracture. Silver trauma sustained by older adults due to various forms of trauma take prolonged time to heal due to the physiological changes that occur in aging such as decreased bone density, diminished organ function and reduced capacity for repair. Management of silver trauma requires a multidisciplinary approach and emphasis needs to be placed on early mobilisation to facilitate recovery. This case report highlights a growing area of concern in healthcare, given the aging population and economic burden placed on the NHS. If this vulnerable population is not managed with specialised care and preventative measures.

**Keywords**

Silver trauma, Aging and injury, Age-related injury trends, Trauma management in older adults, Geriatric emergency care.

**Background**

Silver trauma refers to the injuries sustained by older adults, typically those aged 65 and above, due to various forms of trauma. This term highlights the unique considerations and challenges in managing trauma in this age group. The term “silver” signifies the older population, often associated with grey or silver hair. Silver trauma encompasses a range of injuries that can occur due to falls, motor vehicle accidents, physical assault, or other accidents. For instance, sternal fractures are a relatively rare injury in the general population, with an incidence of less than 0.5% of all fractures [1]. However, their incidence increases in road traffic accidents (RTAs) and following the use of incorrect technique during cardiopulmonary resuscitation (CPR) [2]. Additionally, elderly individuals are more susceptible to sternal fractures and take a longer time to recover due to the physiological changes that occur in bones during aging and pre-existing medical conditions [3-5].

**Case Presentation**

An 80-year-old male presented to the Emergency Department complaining of central chest pain following a road traffic accident (RTA) at 25 miles/hr. The patient was the main driver and hit the car in front of him. The patient experienced bruising to the chest with no other injuries and no loss of consciousness. He was found to have non-complicated sternal fracture. The patient has a past medical history of glaucoma and right bundle branch block.

An X-ray of the sternum and chest were used to confirm fracture of the sternum. There was a displaced fracture of the sternum at about 7.5 cm below the manubriosternal joint with overriding fracture fragments.



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## Discussion

Sternal fractures can occur either by direct blunt trauma such as during a RTA when the chest impacts the steering wheel or indirect forces, for example following CPR when excessive force is applied [2]. The incidence of sternum fractures following RTAs have risen following the increased use of seat belts [6]. This is a result of the sternum sitting in the centre of the chest wall, therefore absorbing most of the force exerted by a seatbelt during impact, making it more susceptible to fractures [7]. CPR is another common cause of sternal fractures, attributed to the incorrect technique of increased compression rate and depth during the procedure [4]. Additionally, sternal fractures caused by trauma are more commonly fractures to the sternal body, whilst fractures to the manubrium and xiphoid process are less common [1]. Given that the sternal body connects to the ribs, it is crucial for the structural integrity of the chest wall and fractures to the sternal body can lead to significant complications including damage to organs such as the heart and lungs, respiratory compromise, pain and mobility issues [8,9].

There are several factors that warrant consideration in silver trauma which can affect older adult's response to trauma. These include decreased bone density, reduced skin elasticity, and diminished organ function, which can complicate the diagnosis and treatment of injuries. For instance, older individuals are more susceptible to fractures following traumatic events and they also experience prolonged fracture healing [10]. This is primarily due to the physiological changes that occur with aging, including decreased bone density, calcium content, bone elasticity, bone repair capacity and mechanical strength [11]. The loss of bone mass in older age occurs due to the loss of calcium and other minerals from bone. This is corroborated by findings from a study which showed that the risk of fracture decreased by 17 – 30% in adults aged 65 to 71 years when they consumed high-dose vitamin D and calcium [12]. Calcium makes up the bone matrix and vitamin D promotes calcium absorption, both of which are important to maintain bone health. When these substances diminish, as has been shown to occur during the aging process, bones become more susceptible to fractures [11]. When taken together, the loss of bone density that occurs with aging result in bones having a reduced capacity to absorb energy from impacts, making them more susceptible to fractures.

Additionally, the healing process is also prolonged as calcium is essential for the mineralisation of the bone matrix. If calcium levels are insufficient, then the healing process is delayed [13]. In line with this, a study has found that the healing process is significantly prolonged in those aged 65 and above compared to those aged between 18-41 years old [10]. However, the findings from this study are not conclusive in determining whether aging prolongs fracture healing because the patients in the elderly group showed signs of osteoporosis. This suggests that prolonged fracture healing may occur due to osteoporosis instead of the aging process itself. Nonetheless, the physiological changes that occur with aging have been shown to result in increased predisposition to fractures and possible extended healing time. In elderly patients, fractures are

also more likely to occur due to the loss of bone elasticity, which means that the bone has reduced elastic strength to withstand stress. It has been found that a combination of reduced sternum elasticity and ossification of the costal cartilages during the aging process can increase the risk of sternum fracture [14].

Isolated sternal fractures commonly heal naturally over time; therefore, the management of sternal fractures involves analgesia, cardiac monitoring and observations. Surgical intervention is only required for displaced or unstable fractures [5]. However, older patients require regular monitoring due to increased risk of respiratory complications. This shows that there are several factors that influence the management of trauma in the elderly including pre-existing medical conditions, polypharmacy and frailty [15,16]. These can increase the risk of complications during recovery due to the changes in the body's response to trauma and this highlights the importance of providing careful attention to older patients during the healing process of sternum fractures to ensure the risk of complications are minimised.

When regarding the management of silver trauma, an initial assessment is conducted which involves stabilising the patient and considering the potential for multiple injuries and underlying health issues. A comprehensive geriatric assessment is then performed, incorporating a thorough evaluation of medical, psychological and social factors. A multidisciplinary approach is vital to ensure input from specialists such as geriatrics, surgery, emergency medicine, physiotherapy, occupational therapy and social work. During rehabilitation, an emphasis needs to be placed on early mobilisation and ensuring a support system to facilitate recovery.

There are challenges with the diagnosis of trauma in the elderly due to comorbidities and presentation of symptoms. For instance, sternum fractures in older patients can be misdiagnosed due to the presentation of symptoms [17]. The most common clinical presentation of a sternum fracture is chest pain. However, some cases of sternal fractures may present with severe chest pain that can be misdiagnosed for myocardial infarction or pulmonary embolism [14]. The differential diagnoses can be ruled out by conducting an ECG and measuring cardiac markers and D-dimer. In contrast, some patients may not experience chest pain following a sternum fractures, therefore diagnosis of such fractures solely rely on imaging techniques such as chest X-ray and computed tomography. This emphasises the challenges that can arise during the diagnosis of sternal fractures, particularly in elder patients which can contribute to the economic burden to the NHS.

This case reports shows that silver trauma represents a significant and growing area of concern in healthcare, given the aging population. This is due to a combination of physiological changes that occur during aging that can make the elderly more susceptible to trauma and prolong healing. Effective management requires a comprehensive, multidisciplinary approach tailored to the unique needs of older adults. By understanding and proactively

addressing the specific challenges associated with trauma in the elderly, healthcare providers can improve outcomes and quality of life for this vulnerable population.

### Learning Points

The key insights to be gained from this report are as follows

1. Silver trauma highlights the unique considerations and challenges in managing trauma in those aged 65 and above. These include physiological changes, pre-existing medical conditions, polypharmacy, mental and cognitive status, frailty, increased risk of complications and social and psychological factors.
2. As highlighted by this case report, in elderly populations the risk of sternum fractures following RTAs and incorrect CPR procedures are increased. Moreover, the recovery of such fractures are prolonged due to the aforementioned physiological changes that occur with aging.
3. Diagnosis of sternum fractures can be difficult owing to the nature of clinical presentations in different individuals. Some may present with chest pain, so it is important to distinguish this from myocardial infarction or pulmonary embolism, whilst others may not present with any chest pain.
4. Although the management of sternum fractures is generally minimal, as they tend to heal naturally over time, careful monitoring is essential in older patients due to the increased risk of respiratory complications and the slower healing process associated with aging.

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