

Management of Geriatric Trauma: General Overview

Geriyatrik Travma Yönetimi: Genel Bakış

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ÖZ

Türkiye İstatistik Kurumu (TÜİK) verilerine göre; 2012 yılında 5 milyon 682 bin olan yaşlı nüfus (65 yaş ve yukarı yaş) 2016 yılına kadarki süreçte %17,1 artarak 6 milyon 651 bin olmuştur. Bu bilgiler ışığında, yaşlanmakta olan ülkemizde daha fazla oranda geriyatrik travma örnekleri ile karşılaşacağımızı öngörebiliriz. Bu durum ise, travmaya genel yaklaşım açısından, diğer yaş gruplarıyla aralarında belirgin fark yaratmasa da, azalmış fizyolojik rezerv, ikincil sorunlar ve olası gizli travmalar açısından dikkati gerektirir. Travma yönetiminin temellerinde yatan birincil ve ikincil bakıya ait kurallar aynen uygulanırken sergilenmesi gereken bu dikkat gereksinimini ortaya çıkaran pek çok faktör vardır.

Kullanılan ilaçlar, alerji öyküsü olup olmaması, eşlik eden bir kronik hastalıkların bilinmesi, bu hastaların yönetimi sırasında gözönüne alınan faktörlerden sadece birkaçıdır. Yine, travma öncesi son sağlık durumu travmanın etiolojisinde rol oynayabileceğinden; eşlik eden hastalık öyküsü ve/veya eski elektrokardiyografi, kan şekeri değeri gibi kayıtlar da gözden geçirilmesi gerekenler arasındadır.

Sonuç olarak, geriyatrik travma hastalarına dikkatle genel fizik muayene yapılıp, tanı-tedavi ve süreç yönetimini etkileyebilecek faktörler değerlendirilmelidir. Özellikle yaşlı popülasyonda stabil gibi görünen hastaların, çok kısa bir sürede ve erken bir uyarıcı semptom olmadan kötüleşebileceği unutulmamalıdır.

Anahtar kelimeler: Geriyatri; travma; yönetim

ABSTRACT

According to the Turkish Statistical Institute (TSI), the Turkish geriatric population (aged 65 and above) increased from 5,682,000 in 2012 to 6,651,000 in 2016. This represents an increase of 17.1%. With respect to this information, geriatric trauma cases in Turkey are likely to increase over the coming years. Though this is unlikely to transform conventional medical approaches to trauma in geriatric patients, extra attention must be paid to this population's hidden trauma and complications secondary to reduced physiological reserves. When applying the basic principles of primary and secondary assessment in trauma management, myriad factors contribute to this need for additional caution when treating the elderly.

Medications, history of allergies, and the identification of any accompanying chronic diseases are just a few of the multiple factors that must be considered when managing elderly patients. Furthermore, patients' general health statuses prior to the trauma and accompanying medical histories should be evaluated alongside any prior tests such as ECGs or blood sugar measurements.

To summarize, geriatric patients must undergo general physical examination and factors affecting diagnosis, treatment, and process management must be analyzed and accounted for. The health of geriatric patients may deteriorate rapidly and without warning, even when it appears stable. This represents a unique challenge with this patient group and must not be overlooked.

Keywords: Geriatrics; trauma; management

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Introduction

In the United States of America (USA), more than 1 million patients over 65 years of age present to the emergency department at least once a year due to trauma. At least 46,000 of these cases resulted in the patient's death (1).

Due to the perpetual rise in global geriatric populations, successful geriatric trauma management is of ever-increasing importance. Although geriatric patients typically experience low energy trauma incidents, they may still be seriously injured. Due to pre-existing conditions (e.g. hypertension) and/or medications (e.g. beta blockers), geriatric patients' response to injury is different than young or adult populations (2). Mental health conditions (e.g. dementia, delirium) may affect diagnosis. Chronic diseases (e.g. cirrhosis, coagulopathy, COPD, ischemic heart disease) lead to a two-fold increase in mortality rates for trauma patients (3).

As with the development of trauma, many factors are associated with changes in clinical outcomes. While assessing physiological changes, chronic diseases, and medication usage associated with advancing age, attention must also be paid to the following prominent factors;

Physiological changes and pathologies associated with advanced age

Though all bodily systems are affected by aging, three systems are typically considered to be of particular importance: the respiratory, cardiovascular, and central nervous systems.

- For the respiratory system, reduction in functional capacity and lung elasticity as well as increased rigidity of the thoracic wall leads to accompanying reduction in tidal volume (4). Additionally, stress and chronic obstructive pulmonary disease (COPD) are possible causes of decreased capacity for compensation. Clinical outcomes such as simple rib fractures and severe respiratory failure may occur as a result.
- For the cardiovascular system, a reduction in arterial elasticity, heart valve conditions, cardiac muscle loss accompanying to a reduced capacity to pump, and a reduced response to catecholamines may cause a marked reduction in ability to compensate in the case of injury or shock (5). Independently, physiological changes such as prior heart failure or coronary artery disease may contribute to decompensation.
- For the central nervous system, cerebral atrophy and the stretching or tearing of bridging veins leads to the frequent occurrence of secondary subdural haemorrhage (4). Furthermore, the association between advancing age and an increased risk of dementia and similar pathologies may complicate the diagnosis and treatment of patients.

Elderliness and its comorbidities' effects on trauma

Hypertension (HT), diabetes mellitus (DM), cirrhosis, ischemic heart disease, COPD, and degenerative central nervous system disorders are the primary comorbidities in the geriatric population (6).

In addition to their negative effects on trauma outcomes, physiological changes, comorbidities, and medication usage play a role in masking the severity of trauma, inhibiting effective patient management, and delaying the healing process.

Due to the effect of all these factors;

Simple traumas such as same-level falls may cause serious injury, rendering medical professionals incapable of predicting severity of injury (7).

The majority of geriatric patients are hypertensive; hypotension must therefore be evaluated relative to their normal blood pressures (8).

Geriatric patients may lose their ability to compensate in hypotensive states due to usage of medications such as beta blockers (9).

The use of warfarin and antiplatelet medications increase the risk of systemic or intracranial haemorrhage (10).

Mechanisms of Injury

Falls, motor vehicle accidents, burns, and pedestrian injuries are the most common mechanisms of injury in geriatric patients (11).

Notably, in the USA, fall-related geriatric admissions reach over 2.3 million cases and cost 30.4 billion dollars. Furthermore, simple low energy falls are associated with a serious risk of mortality (12). The most common fall-related condition in the geriatric population is traumatic brain injury. Almost half of the deaths in this population are secondary to same-level falls causing traumatic brain injury (13).

Geriatric Patient Population Trauma Examination and Management

Internationally accepted standards of trauma management must be upheld and utilized in geriatric patients. Accordingly, primary assessment of geriatric trauma patients closely resembles that of adult trauma patients. In addition to this, clinicians must take extra care to take patients' age into account during primary and secondary assessment in cases where it is of clinical importance.

The following steps in patient care must be carried out while taking both the patient's medical history and physiology into account:

Airway assessment: Patients' airways must be assessed immediately at presentation to the emergency department through evaluating their ability to talk. When assessing geriatric patients' airways, it is important to note that some patients may struggle to talk due to anatomical differences from other patient groups. For this reason, geriatric patients

must be categorized as difficult intubations, and alternative airway management methods must be prepared (14, 15).

Dentures or absent teeth may cause difficulties during airway management. Dentures may block a patient's airway. If dentures are not blocking the airway, conducting bag-valve-mask ventilation with dentures in place will increase adherence rates. In some geriatric patients, the absence of teeth may also increase difficulty of ventilation (14).

Certain arthritic conditions can also lead to difficulties. Temporomandibular arthritis may lead to an insufficient range of motion in the jaw, while cervical arthritis may prevent patients from extending their necks sufficiently (15).

In order to prevent hypotension, extra attention must be paid to medication dosage during drug-assisted orotracheal intubation. Additionally, patients must be closely monitored. Similarly, dosages of barbiturates, benzodiazepines, and similar sedative drugs must be reduced by 20 - 40% during rapid sequence intubation to decrease the risk of cardiovascular depression (16). For the same reason, etomidate should be preferred over propofol and high dose benzodiazepines for induction of anaesthesia, due to the risk of causing haemodynamic depression of the latter two (17).

Breath assessment: Geriatric patients are at particular risk of hypercapnea, hypoxia, and respiratory failure. This is due to lung/thoracic wall issues being insufficiently compensated in this patient group. Increased respiratory workload in these patients can be attributed to a decrease in thoracic wall compliance. Consequently, increased risk of complications such as lung edema, pulmonary emboli, and atelectasis is observed in geriatric patients (4).

While providing respiratory support to elderly patients, extra care should be paid to the following points:

1. Supplementary oxygen should be provided regardless of oxygen saturation (18).
2. Early intubation should be carried out in cases of serious thoracic wall injuries or increased CO2 levels (due to underlying respiratory diseases) (19).
3. If non-invasive respiratory support is utilized, tidal volumes of 7 - 8 cc/kg (500-600cc) should be preferred, and during this process gastric distention should be prevented to decrease the risk of vomiting or inhibited ventilation (20).

Assessment of circulation: When assessing circulatory function, low cardiac output secondary to reduced cardiac contractility must be considered for geriatric patients. If patients suffer from coronary failure secondary to atherosclerosis, hypertension, or structural myocardial changes, it is prudent to note that post-traumatic hypoxia and hypovolemia may cause compensatory tachycardia

leading to acute myocardial infarction, acute left heart failure, and/or life-threatening defects (21).

Due to geriatric patients' increased systemic vascular resistance, or hypertension seen in the overwhelming majority of geriatric patients, seemingly normal blood pressure values may actually reflect a hypotensive state. Consequently, an adjusted hypotensive reference value for geriatric patients has been specified as 100 mmHg (22). This adjusted value should be used when treating geriatric patients.

As this patient group presents an increased risk of hypotension and ischemia, sufficient and appropriate fluid replacement is vital. Similarly, treatment should aim to normalize cardiac output and prevent tissue hypoxia while taking care not to cause volume overload. Extra care must also be paid to patients on diuretic medications during fluid replacement therapy as they may have a larger volume deficit. In order to evaluate optimal fluid levels central venous pressure, echocardiography, or ultrasonography should be utilized. In addition, parameters such as blood lactate levels and base deficit, or shock index may be used as indicators of tissue perfusion (23).

Hypotension is related to volume depletion (dehydration, sepsis, or bleeding), pump problems (heart failure or loss of left ventricular function), or heart rate (tachycardia or bradycardia). Keeping these conditions in mind, unresponsiveness to bolus fluid infusion or blood transfusion in the absence of heart failure should be treated as a likely hemorrhage (24).

Neurological assessment: The direct association of neurological deficit with mortality secondary to trauma render this assessment particularly important (25). Irrespective of etiology, the application of ABCDE and its effect on fast and effective evaluation and treatment is of critical importance. At this stage, determining chronological onset of neurological problems or trauma is of no importance in primary assessment.

Another condition that must be kept in mind while treating these patients is an increased incidence of subarachnoid or subdural hemorrhage secondary to cerebral atrophy. To reiterate, anticoagulants or antiplatelet drugs used in the treatment of comorbidities increase the risk of epidural hemorrhage (26). Conversely, atherosclerotic disease increases risk of ischemic stroke secondary to blunt cervical trauma or shock.

Another risk specific to geriatric patients is an increased rate of cervical spine injury from same-level falls due to osteoporotic and arthritic conditions. Serious cervical spine injuries may be observed even in patients falling from relatively low surfaces such as beds. For this reason, advanced imaging must be considered even in cases of low energy trauma.

Complete assessment (completely undressed): This critical step of trauma assessment must assess acute injuries and chronic skin lesions or soft tissue injuries secondary to diabetes or peripheral vascular diseases. This can prevent serious, life-threatening harm and help identify the locations of any hidden minor injuries.

Geriatric Disease and Medication

Given both the physiological and structural changes that occur with advancing age and the multitude of accompanying diseases, the importance of using medication in trauma management cannot be overstated. For example, due to thinning of the skin, microvascular circulatory changes, and subcutaneous tissue loss in geriatric patients, pre-warmed intravenous fluids and blood products (excluding thrombocytes) may be required to reduce risk of hypothermia. Non-intubated patients administered sedatives such as benzodiazepines in combination with analgesics risk respiratory depression and delirium (27). For this reason, agitated or aggressive patients should be assessed for hypoxia, hypoventilation, and shock risk prior to the administration of any sedative agents. Independently of this, elderly patients may be more susceptible to respiratory depression and hypotension, and lower starting doses should therefore be considered when administering analgesics (27).

Drugs that may influence patient management strategy should be accurately identified during medical history taking, as they are equally as important as drugs used in emergency treatment. For this purpose, warfarin, clopidogrel, salicylates, beta blockers, and ACE inhibitor usage especially should be identified prior to treatment (28). Likewise, the use of oral anticoagulants and antiplatelet agents increases risk of hemorrhage. Furthermore, beta blockers may mask tachycardia during hypovolemic shock. For these patients in particular, parameters independent of blood pressure, such as blood lactate and base deficit, must be evaluated. Accurate identification of medication usage is therefore absolutely vital.

Geriatric Patient Examination

All conventional trauma management strategies are applicable to geriatric patients. Additionally, certain specific examinations must be carried out with extra care. In this patient group, arterial or venous blood gas should be evaluated (23). Furthermore, occult shock that requires resuscitation can be predicted by evaluating lactate and base deficits; special attention should therefore be paid to these vital parameters (23). Hemorrhage and renal function tests, alcohol levels, urinary toxicological parameters, serum electrolytes, electrocardiography, elevated cardiac enzymes accompanying abnormal electrocardiographical findings or thoracic trauma, and suspicious elevations of creatine kinase

suggestive of rhabdomyolysis must also be investigated thoroughly (29).

As well as laboratory tests, thoracic and pelvic imaging should be carried out in all cases of low energy trauma. Computed tomography is necessary in cases of closed head trauma. Full body computed tomography should be considered for all at-risk patients (30).

Conclusion

In geriatric patients, conventional emergency department procedures should be followed: airway, respiration, and circulation should be assessed and monitored concurrently with vital parameters such as blood pressure, pulse, respiration rate, and oxygen saturation. Though advisable for all trauma patients, cardiorespiratory monitoring should be initiated earlier in geriatric patients.

Emergency department physicians should also be especially careful to prevent late diagnosis by assessing geriatric patients for cognitive changes. Likewise, stricter thresholds should be respected when measuring physiological changes in geriatric patients as this will improve outcomes and prevent delayed diagnosis of severe injuries. Limited physiological reserves may lead to seemingly minor injuries having life-threatening consequences for geriatric patients. Clinicians may observe rapid deterioration to unstable conditions in patients, despite the absence of any precipitating symptoms. Due to the physiological changes induced by medications used, chronic diseases must also be accounted for when examining and treating patients.

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