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Geriatric Cervical Spine Injury

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Introduction

According to the National Hospital Ambulatory Medical Care Survey, there are 12 injury-related emergency department visits for every 100 persons over the age of 65 annually. Geriatric patients account for a quarter of trauma admissions nationally. Cervical spine injuries are relatively common in the elderly population.^[1] These injuries are associated with high morbidity and mortality rates.^[2]

The percentage of elderly patients with trauma has been on the rise and will continue to increase into the ensuing decades.^{[2][3][4][5]} Clinicians are cautioned to maintain a heightened index of clinical suspicion to rule out cervical pathology even in the setting of low-energy mechanisms of injury, for example, ground level falls. Often geriatric traumas present with confounding variables such as baseline dementia, auditory and visual impairment, and inherent difficulty when cooperating with the acute physical examination.^{[0][0]}

Etiology

Most geriatric cervical spine injuries are secondary to falls (greater than 60%). They can, however, occur secondary to any traumatic mechanism (for example, motor vehicle accidents, assault, forced hyperextension or hyperflexion injuries). Geriatric patients have a higher risk of low-energy injuries secondary to, but not limited to, osteoporosis, osteopenia, and a generalized decrease in the spinal columns physiologic protective capabilities secondary to decreases in total mobility and degenerative changes.^{[0][0]}

Epidemiology

One-third of geriatric patients sustain falls each year, and 12% of elderly Americans present to emergency departments annually for injury-related visits. Given that people over age 65 are the fastest growing segment of the population, this represents a significant burden of disease.

While the epidemiology of traumatic cervical spine fractures is not well-known or established for the general adult population, the incidence rate demonstrates a bimodal class pattern by age groups. These injuries first reach a peak incidence rate in patients age 15 to 54 years of age, and the second peak incidence is reached between ages 65 to 80 years of age.^[9] Cervical fractures have a 2.6% to 4.7% prevalence rate in patients older than 65 years old, and most studies cite at least a 50% (or greater) incidence rate of low energy or ground level falls as the source of these cervical spine fractures.^{[10][0]}

Pathophysiology

The cervical spinal column is composed of seven stacked vertebrae with intervening intervertebral disks. The spinal column is made of 2 columns: (1) an anterior column comprising vertebral bodies, discs, the stabilizing anterior and posterior longitudinal ligaments, and (2) a posterior column, composed of the pedicles, laminae, facets, spinous processes, and stabilizing ligamentum flavum, capsular ligaments, and nuchal ligament complex.

cervical spine prone to injury. Spinal injuries are considered unstable if both the anterior and the posterior column are disrupted at the same level.

In the young cervical spine, the most mobile segment, and therefore the segment most prone to injury, is C4 to C7. As the cervical spine ages, it is believed that degenerative changes result in decreased mobility in the lower cervical spine, making C1 to C2 the most mobile segment, and therefore, the most prone to injury. It has also been noted that low-velocity mechanisms of injury (such as fall, as compared to motor vehicle crashes) are more likely to result in upper cervical spine injury than lower cervical spine injury, regardless of age. Older individuals are more likely to have low-velocity mechanisms, with falls being the most common cause of cervical spine injury. Therefore, it is not surprising that the most common cervical spine injury seen in geriatric patients is an injury at C2, followed by injury at C1.

Elderly patients may have other pathologies increasing the risk of cervical spine injury, including ankylosing spondylitis, rheumatoid arthritis, and cervical canal stenosis. They are also more likely to have metastatic spinal tumors and decreased bone density related to aging. The presence of pre-existing cervical spine abnormalities increases the risk of spinal cord injuries in elderly patients, particularly central cord syndrome and anterior cord syndrome.

History and Physical

Most geriatric patients with cervical spine injury will relate a history of trauma. However, cervical spine injury may be secondary to a minor mechanism that the patient may not have considered worth reporting. For example, forceful pulling on the hand in the setting of spine tumor. In this population, it is also important to remember that cognitive decline is common in both patients coming from home and patients coming from facilities, and the history may be somewhat limited or incomplete. A high index of suspicion for occult trauma is important. The provider should attempt to obtain a history from witnesses and caregivers regarding the event.

It is important to consider the potential for an underlying medical reason for the presenting trauma. Geriatric patients may be involved in motor vehicle accidents or falls as a result of arrhythmia, stroke, dissection, infection, seizure, metabolic disturbance, hemorrhage, or polypharmacy. These patients often have both medical disease as well as traumatic injury, and both need careful evaluation.

The physical exam should be thorough, beginning with the ABCs and proceeding through a complete neurologic exam. The patient should be fully exposed and rolled to assess for other signs of injury/infection, and every joint should be ranged to avoid missing occult injury.

Evaluation

The best diagnostic test readily available to assess for cervical spine injury in the emergency setting is a CT scan. Plain radiographs are limited in the geriatric patient because of osteopenia and osteoarthritis. Further, the most commonly injured areas of the cervical spine in the geriatric patient (C2 and C1) are poorly visualized on plain films. Therefore, when a decision to image a geriatric patient is made, the provider should obtain a CT scan.

Since the overall incidence of injury to the spine is low, and CT scanning is costly and exposes patients to ionizing radiation, several validated decision rules provide guidance as to which patients can safely forego advanced imaging. The two most common decision rules used to clear the cervical spine are the Canadian C-spine Rule and NEXUS (National Emergency X-radiography Utilization Study). Unfortunately, the Canadian C-spine Rule mandates imaging of any patient age 65 or older and further requires the patient has a Glasgow coma score (GCS) of 15. This makes it useless in reducing imaging in the geriatric trauma patient.

The NEXUS decision rule (absence of focal neurologic deficit, absence of intoxication, absence of midline neck tenderness, and absence of distracting injury in a patient with normal alertness) has been validated in geriatric patients for detection of clinically important injuries. However, data are conflicting, and many providers are reluctant to use this decision rule in the geriatric patient. NEXUS also suffers from difficulty with reproducibility of results. "Normal alertness" and "absence of distracting injury," in particular, are subject to interpretation by the evaluating provider. One prospective study on geriatric patients used "baseline mental status" as a substitute for "normal alertness" and "signs of trauma to the head or neck" as a substitute for "distracting injury" and found NEXUS to be 100% sensitive in detection of cervical injury, but the incidence of injury in this study was low.^{[0][0]}

the geriatric trauma patient has double the risk of cervical spine injury as compared to younger patients, the provider should have a low threshold to image these patients.

Geriatric patients with a cervical spine fracture have a high rate of fractures to other vertebrae in the spinal column. Therefore, diagnosis of a fracture in the cervical spine should prompt imaging of the spine in its entirety.[0][0][0][0][0][0]

Treatment / Management

Management of cervical spine injury in geriatric patients is controversial. Options for upper cervical spine injuries include rigid collar immobilization without reduction, halo cast immobilization with reduction, and surgical management. A metaanalysis of these management strategies found no difference in morbidity, mortality, or complications, and non-union was common. Since patients often have other associated injuries, these patients should be managed by a multidisciplinary team including trauma surgery, orthopedics, physical therapy, and medical doctors.[0]

Enhancing Healthcare Team Outcomes

An interprofessional approach to cervical spine injury in the elderly is recommended.

Unlike the younger patient, the management of cervical spine injury in the elderly patient remains controversial. Making the treatment more difficult is that many elderly patients also have numerous comorbidities. Thus, these patients are best managed by a multidisciplinary team that includes trauma surgery, orthopedics, physical therapy, and medical doctors. No matter what treatment approach is undertaken, one should consider the patient's age, comorbidity and potential complication of the procedure. Many elderly patients may not be candidates for surgery, and one also has to take into account the post-procedure quality of life.[0]

Questions

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