CLINICAL VIGNETTE

The Head Drama Behind Geriatric Trauma

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Case

A frail 89-year-old female presented to urgent care for difficulty ambulating after a fall that occurred 4 days ago. The patient has a history of moderately severe Alzheimer's dementia, diabetes mellitus type 2, hypertension, osteoporosis with prior right femoral neck fracture and left greater trochanteric fracture (both surgically repaired), stage IV chronic kidney disease, and myelodysplastic syndrome with anemia and leukopenia. Her home medications include metformin, aspirin, simvastatin, and lisinopril. Per the family, the patient was bending over to open a drawer, lost her balance and fell onto her left side. Her family denied any head trauma and any loss of consciousness. The patient was initially able to ambulate at her baseline without an assistive device. Over the next 3 days, she became progressively less ambulatory and eventually was unable to walk which prompted her urgent care visit.

The patient was directly admitted to the hospital. Her physical exam was notable for tenderness to palpation over the left posterior hip; otherwise, she was pleasant, smiled during the examination, and appeared to be at her baseline cognitive status without obvious neurological deficits. A gait exam could not be performed due to pain. Bilateral hip X-rays and computed tomography (CT) scan of the left hip revealed moderate degenerative changes of the hip joint without fracture, dislocation, or other osseous abnormality. Orthopedics was consulted, and recommended attempting weight bearing as tolerated with physical therapy (PT). She participated only minimally with PT but was able to bear weight and walk a few feet with the walker. Throughout her hospital stay she reported generally feeling unwell. The patient would not complain of pain but grimaced occasionally with movement. She was given scheduled acetaminophen and as needed oxycodone for pain and was planned for discharge to a skilled nursing facility for physical therapy.

On the fourth hospital day, the patient's daughter expressed concerns about discharge given a subtle change in cognition which was not observed by the primary team. The daughter noted her mom to have a flattened affect and altered speech. She also noticed the patient was not using her left hand. Brain MRI/MRA revealed a large right hemispheric subdural hematoma (SDH). There was a resultant right hemispheric sulcal effacement and 4mm of leftward midline shift. Trace left hemispheric subdural hematoma was also noted without significant mass effect.

Neurosurgery was consulted and given the large size of the hematoma with neurological symptoms, recommended evacuation. A subdural drain (SDD) was placed at the bedside, after transfer to the ICU and she was started on levetiracetam for seizure prophylaxis. On the fourth day of her ICU stay, she developed worsening confusion, and CT scan showed reaccumulation if the right SDH. Her SDD was removed, and she underwent right craniotomy, SDH evacuation with right frontal subdural drain placement. The surgery was successful and uncomplicated, however, her postop hospitalization included electrolyte imbalances, delirium, drug-induced rash, and urinary tract infection. The patient gradually recovered and was discharged to an acute rehab unit after a 20-day hospitalization.

She has been closely followed and one year after her hospitalization, has returned to her pre-hospitalization baseline mental and functional status.

Discussion

Falls are the most common cause of injury in patients over the age of 65 and account for almost 75% of all trauma.[1,2] A systematic review of 18 studies reported a 27% probability of falling at least once in any given year for individuals $\geq$ 65 years and older.[3] Geriatric patients are more likely to sustain injuries from blunt trauma, particularly fractures, than their younger counterparts.[4,5] While the causes for falls in many geriatric patients are seemingly benign, falls can lead to dire medical and economic consequences. These can include fractures, spinal, thoracic, and cerebral injuries, the need for tracheal intubation, blood transfusion and death.[1,4,6,7]

Falls in the elderly mostly occur from a standing position on a level surface, and the most common significant complications are orthopedic injuries. The geriatric population has an increased risk for all types of fractures, particularly hip and rib fractures, due to age-related physiologic changes like lower bone density. In addition to fracture risk, older adults are at greater risk of injury and death from falls because of a number of anatomic and physiologic changes in the brain and surrounding structures that accompany aging. In older patients, the dura adheres tightly to the skull and bridging veins become stretched. This increases the risk of subdural hemorrhage from head injury. Also, as a person ages, there is approximately a 30% reduction in brain size between the ages of 30 and 70.[8] Brain atrophy increases the space in which blood can

accumulate and may delay the development of symptoms and signs associated with subdural hemorrhage. Because of brain atrophy, geriatric patients are less likely to manifest neurologic signs of increased intracranial pressure and may have delayed neurologic signs, even in cases of significant intracranial injury.[9-11] This explains the delayed symptom manifestation in this patient. Older adults also have impaired capacity to respond to the stress of severe injury.

Because of these changes, obtaining an accurate assessment of neurologic function can be difficult,[10] especially when there are comorbidities such as underlying dementia and reduced sensation that are part of aging. There is some debate about how to evaluate geriatric patients with minor blunt head trauma. Minor blunt head trauma is defined as trauma with no loss of consciousness, no focal neurologic deficits, and a normal Glasgow coma scale score. The two largest studies examining cranial CT in minor head injuries, the Canadian CT Head Rule (CCHR) and New Orleans Criteria (NOC), categorized elderly patients as high risk and excluded them from their algorithm. Other studies have confirmed the relationship between age and increased rates of traumatic brain injury.[12,13] Because there is greater likelihood that geriatric patients with head trauma will return to independent living if they are treated promptly,[9,11,14] most studies support the liberal use of CT in the evaluation of elderly trauma patients who have closed head injuries as cost effective and clinically appropriate.[15] The CDC American College of Emergency Physicians (ACEP) joint guideline for mild traumatic brain injury recommend imaging in adults greater then 65 without or without loss of consciousness or amnesia.[16] Conversely, the National Institute for Health and Care Excellence (NICE) guidelines only recommend head imaging in older adults if additional risk factors are present such as loss of consciousness, amnesia, or use of anticoagulants.[17]

According to a 2015 report, hospital adjusted expenses for non-profit hospitals is approximately $3,752/day in California.[18] At UCLA, the cash packaged pricing for CT Brain without Contrast is $340, and $1210 for a MRI Brain with/without Contrast.[19] Given difficulty in obtaining accurate first assessments of geriatric trauma patients, the relative ease of obtaining a head CT, the low cost, and lower concerns of radiation risk in the geriatric population, we recommend all geriatric trauma patients with suspected head injury should be evaluated with head CT.

This 89-year-old frail patient with moderately severe Alzheimer's dementia, did not have a head CT because the family denied head trauma and the patient had a normal admissions neurological exam. She developed neurological decline during her hospital stay due to a large subdural hematoma that could have been diagnosed on admission. Due to her underlying brain atrophy, this patient did not manifest neurologic signs until the subdural hemorrhage was large enough to cause a midline shift. Her history and presentation were further complicated by her moderately severe Alzheimer's dementia, which made it difficult for providers to do an accurate cognitive assessment and for her to report specific symptoms aside from generally feeling unwell. Additionally, this patient's fall was unwitnessed. All patients with an unwitnessed fall who are cognitively unable to provide an accurate history should be assumed to have suffered head trauma. Given that elderly trauma patients with head injury or even suspected head injury can have significant intracranial injury and yet manifest no neurological deficits during their initial examination, head CT was justified presentation.

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