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Head Injury in Older Adults: To Scan or Not to Scan? Ten Tips to Make the Best Decision

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ABSTRACT

Ground-level falls are a leading cause of emergency department (ED) visits by older adults. In addition to understanding the cause of the fall, the assessment of potential fall-induced injuries such as traumatic intracranial hemorrhage can be highly challenging for emergency clinicians. Premorbid conditions, medications, and concomitant injuries can all interfere with the physical examination and impact the prevalence of signs traditionally associated with traumatic brain injury (TBI). When it comes to the decision to potentially investigate for a traumatic intracranial hemorrhage with brain imaging such as head computed tomography (CT), many potential predictors and factors will be considered. Symptoms, history, medications, frailty, functional status, level of care, cost, and access to imaging will all potentially influence that decision-making process. This brief review article will help make that decision in the interest of the patient and the health care system.

1.	**Explore goals of care early.** Goals of care are often one of the last things we explore with patients in the ED. However, for frail older adults, exploring goals of care should be among the first things we do, particularly relative to the decisions to investigate or not. If the head CT shows a traumatic intracranial hemorrhage, would this patient consider neurosurgery as an option? Is it aligned with their wishes? If not, you can likely stop there. Imaging is not needed and you need to focus on what is important for the patient.
2.	**A patient over 65 years old and mild traumatic brain injury = head CT scan** Not all head traumas are TBI. A TBI is defined as a head impact associated with at least one neurologic symptom (loss of consciousness, amnesia, confusion, etc.). The recommendation for older adults who have sustained a TBI is clear: A patient ≥ 65 years old following a TBI should be investigated with brain imaging.[1] New data suggests that this 65+ age threshold could potentially be adjusted to >75, but the safety of this cut-off needs to be confirmed with more robust data.[2]
3.	**TBI-related symptoms are less predictive of intracranial hemorrhage and are often delayed.** Different physiological changes associated with aging such as cerebral atrophy increase the risk of traumatic intracranial hemorrhage, even following a minor head impact. These changes leave more places for a hemorrhage to expand before becoming symptomatic compared to younger adults. Therefore, it often requires more time and a larger intracranial hemorrhage before the patient displays neurological signs or a decreased GCS. A normal physical examination cannot rule out a traumatic intracranial hemorrhage.
4.	**Temporal and occipital external signs of trauma increased risk of intracranial hemorrhage.** The absence of external signs of trauma decreases the odds of intracranial traumatic hemorrhage. In the opposite, external signs of trauma (bruising, hematoma, or laceration) located on temporoparietal or occipital regions are associated with an increased risk of intracranial bleeding.[3] In a large prospective Canadian cohort study, the presence of external signs of head trauma was one of the factors strongly associated with intracranial bleeding.[4]

5.	**Aspirin (ASA) alone is not associated with increased risk of intracranial hemorrhage.** Low-dose aspirin alone is not associated with intracranial hemorrhage.[5] Hence, it should not be a factor that influences our decision to perform a head CT.
6.	**Clopidogrel and warfarin are associated with increased risk of intracranial hemorrhage.** In head-injured patients, with or without a TBI, the risk of intracranial hemorrhage is higher in those taking clopidogrel or warfarin. For instance, a prospective cohort of adults with blunt head trauma reported a prevalence of intracranial hemorrhage of 12% for patients on clopidogrel and 5% for those on warfarin (with an INR >2.4.)[6] The risk associated with warfarin is higher than the one associated with other anticoagulants.[7]
7.	**The impact of oral anticoagulants on intracranial bleeding, if there is any, is likely small.** There is no definitive evidence, but the impact of oral anticoagulants seems to be very limited.[8] In the largest prospective cohort study of older adults assessed in an ED following low-level, oral anticoagulation had no impact on the risk of intracranial hemorrhage.[4] Hence, this should not be the most important factor to consider when deciding whether or not to do a head CT.
8.	**Do not repeat the head CT to rule out delayed intracranial hemorrhage.** The evidence is clear: there is no benefit to repeating the head CT with the aim to investigate for delayed intracranial hemorrhage. Delayed intracranial hemorrhage is rare (approximately 1% in anticoagulated patients). This small risk does not justify a systematic approach mandating repeat head CT 6 to 24 hours after the initial negative head CT.[4] Adverse events associated with prolonged ED length-of-stay such as delirium are well described and more threatening to older adults than the risk of delayed hemorrhage.
9.	**Consider frailty as a risk factor for adverse events after a head injury.** Frailty is associated with the poorest outcomes such as death, admission, and discharge to a long-term care setting following a trauma.[9] The literature on frailty and head injury is more limited but the clinical experience of trauma experts shows that frail older adults have limited prognosis when confronted with a traumatic intracranial hemorrhage. This factor is important to consider.
10.	**Do not forget to organize a follow-up to evaluate post-trauma symptoms.** It is always a good idea to organize a follow-up for older adults following a fall. In addition to assessing risk factors of falls, clinicians could consider screening for post-concussion symptoms. Advanced age is associated with an increased risk of persistent post-concussion symptoms.[10] A follow-up process could help mitigate this potentially underrecognized condition in older adults.

The literature on this topic is growing fast in recent years. There are no clinical decision rules or tools to help us stratify the risk in a more robust way. Hopefully, these ten tips guide us and our patients to make the best decision possible.

KEYWORDS

Head injury, mild traumatic brain injury, intracranial hemorrhage, anticoagulant, computed tomography

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