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Patient Safety Tip of the Week

September 21, 2021

Repeat CT in Anticoagulated Patients After Minor Head Trauma Not Cost-Effective

One topic that has remained controversial over the years is how often delayed intracranial hemorrhage occurs in anticoagulated patients who suffer blunt head trauma. In several of our columns we have described cases where patients did develop subdural hematomas after they had an initially negative CT scan. But most case series have demonstrated that the overall risk is quite low.

A new study (Borst 2021) identified patients in a trauma registry who were on antithrombotic (anticoagulant and antiplatelet) medications during a 5-y period and who underwent a head computed tomography for blunt trauma. Per their institution protocol, patients with an initial negative head computed tomography underwent repeat imaging 6 hours after their initial head computed tomography. All patients were admitted to the trauma service and observed for 12 to 24 hours with neurologic checks every 2 hours.

The initial head computed tomography was negative in 82% of 1,377 patients. Of those with an initial negative head computed tomography, 12 patients (0.9%) developed an intracranial hemorrhage that was identified on the second head computed tomography (6 had intraventricular hemorrhage, 3 had subdural hematoma, 2 had subarachnoid hemorrhage, and 1 had an intraparenchymal hemorrhage). None of the patients with delayed intracranial hemorrhage developed a change in neurologic status, required an intracranial pressure monitor, or underwent neurosurgical intervention.

Although delayed intracranial hemorrhage was more common in patients on anticoagulants than on antiplatelet agents, the study was not powered to detect a difference between these two groups. The authors also note that, given the small percentage of patients with known INR's in the supratherapeutic range, their results may not apply to patients with supratherapeutic INR levels.

The estimated total direct cost of the negative head computed tomography scans was $926,247. Applying their findings to a hypothetical case where a delayed intracranial hemorrhage is missed, they estimated the ICER per QALY at $132,321, not meeting the generally accepted criteria for cost-effectiveness.

We'll note that the methodology used likely overestimated the potential cost savings. The authors estimated the cost of negative head CT's by multiplying the average charge for a noncontrast head CT scan ($2,179) by the Healthcare Cost and Utilization Project cost-to-charge ratio. If you are a trauma center (the study institution was a Level 1 Trauma Center) and have round-the-clock radiology staffing, your actual marginal cost for doing that second non-contrast CT scan is actually quite small. Even if you have to call in a radiology tech, the marginal cost is probably considerably lower than their calculated value. Nevertheless, we all like to avoid any study that adds little value.

Based on the findings of their study, the institutional protocol at the study institution was updated. Repeat head CT scans are no longer performed unless the patient has an INR >3.5 or a mental status decline on neuro checks performed every 2 hours during their 12- to 24-hour admission for observation.

The results of the study are reassuring. One question still unanswered is the optimal timing of the initial CT scan. Perhaps it might make sense to delay the initial scan in patients who are alert, not drowsy, and having no neurological signs to 6 hours. But a key to clinical management of these patients was that they did observe the patients for 24 hours, with neuro checks performed every 2 hours.

We should also note that the many clinical decision rules on deciding which patients with minor head trauma should get CT scans do not apply to patients on anticoagulants.

Some of our previous columns on head trauma in the anticoagulated patient:

April 16, 2007 "Falls With Injury"
July 17, 2007 "Falls in Patients on Coumadin or Heparin or Other Anticoagulants"
June 5, 2012 "Minor Head Trauma in the Anticoagulated Patient".
July 8, 2014 "Update: Minor Head Trauma in the Anticoagulated Patient"
August 21, 2018 "Delayed CT Scan in the Anticoagulated Patient"

Some of our previous columns on CT scans in minor head trauma:

April 16, 2007 "Falls With Injury"
July 17, 2007 "Falls in Patients on Coumadin or Heparin or Other Anticoagulants"
March 2010 "CATCH: New Clinical Decision Rule for CT in Pediatric Head Trauma"
November 23, 2010 "Focus on Cumulative Radiation Exposure"
June 5, 2012 "Minor Head Trauma in the Anticoagulated Patient".
July 8, 2014 "Update: Minor Head Trauma in the Anticoagulated Patient"
January 2017 "Still Too Many CT Scans for Pediatric Appendicitis"
March 2017 "Update on CT Scanning after Minor Head Trauma"
September 2017 "Clinical Decision Rule Success"
August 21, 2018 "Delayed CT Scan in the Anticoagulated Patient"

References:

Borst J, Godat LN, Berndtson AE, et al. Repeat head computed tomography for anticoagulated patients with an initial negative scan is not cost-effective. Surgery 2021; 170(2): 623-627 Published online: March 26, 2021
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