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Evidence Based Medicine

CAN ANTICOAGULATED PATIENTS BE DISCHARGED HOME SAFELY FROM THE EMERGENCY DEPARTMENT AFTER MINOR HEAD INJURY?

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☐ **Abstract—Background: Anticoagulated patients have increased risk for bleeding, and serious outcomes could occur after head injury. Controversy exists regarding the utility of head computed tomography (CT) in allowing safe discharge dispositions for anticoagulated patients suffering minor head injury. Clinical Question: What is the risk of delayed intracranial hemorrhage in anticoagulated patients with minor head injury and a normal initial head CT scan? Evidence Review: Four observational studies were reviewed that investigated the outcomes of anticoagulated patients who presented after minor head injury. Results: Overall incidence of death or neurosurgical intervention ranged from 0 to 1.1% among the patients investigated. The studies did not clarify which patients were at highest risk. Conclusion: The literature does not support mandatory admission for all anticoagulated patients after minor head injury, but further studies are needed to identify the higher-risk patients for delayed bleeding to determine appropriate management.** © **2014 Elsevier Inc.**

☐ **Keywords—head injury; anticoagulation; medical imaging; prognosis**

CASE REPORT

A 68-year-old man with a history of atrial fibrillation, for which he takes warfarin for anticoagulation, presents to your Emergency Department (ED) after a fall from standing height. He struck his forehead on the concrete but suffered no loss of consciousness (LOC). He has a mild headache, has had no nausea or vomiting, and his wife states that he has had no altered mental status since the fall. On examination, he has a Glasgow Coma Scale (GCS) score of 15, a superficial abrasion to his forehead, no cervical spine pain or tenderness, and a normal neurologic examination. His international normalized ratio (INR) is 2.8. His head computed tomography (CT) scan is normal. After updating the patient's tetanus immunization, you discharge him home in the care of his wife. That night after your shift you recall that in Italy, standard of care in patients with head injury on anticoagulation is 24 h of observation followed by a repeat CT scan. You consider the efficacy of such a protocol, and begin asking yourself about the patient's risk of delayed intracranial hemorrhage (ICH).

CLINICAL QUESTION

What is the risk of delayed ICH in anticoagulated patients with minor head injury and a normal initial head CT scan?

CONTEXT

Traumatic brain injury results in just over 1.3 million ED visits, 275,000 hospitalizations, and 52,000 deaths

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annually in the United States (US) alone, with an increase in ED visits and hospitalization of 14.4% and 19.5%, respectively, from 2002 to 2006 (1). In elderly patients suffering a fall, long-term anticoagulation has been shown to increase not only the incidence of ICH compared to those not on anticoagulation (8.0% vs. 5.3%, $p < 0.0001$), but to also increase mortality in those with ICH (21.9% vs. 15.2%, $p = 0.04$) (2). Additionally, the use of warfarin prior to blunt head trauma has been shown to increase mortality compared to those not taking anticoagulants, with an odds ratio of 2.008 (95% confidence interval [CI] 1.634–2.467) (3).

Unfortunately, the rate of preinjury warfarin use has been increasing in trauma patients in the US, from 2.3% in 2002 to 4.0% in 2006 ($p < 0.001$); in patients older than 65 years, use increased from 7.3% in 2002 to 12.8% in 2006 ($p < 0.001$) (4). Patients older than 65 years account for approximately 10% of ED visits and 30% of admissions for traumatic brain injury (5). The projected growth of our elderly population will likely lead to a significant increase in the number of ED visits for head injury from this group of patients (6).

Given the increasing number of head injury patients seen in the ED, and the increase in concomitant anticoagulant use, the clinical dilemmas surrounding these patients have become more and more relevant. Although clinical decision rules such as the Canadian CT Head Rule, the New Orleans criteria, and the NEXUS-II criteria exist to help determine which head injury patients require a head CT scan, these rules do not apply to anticoagulated patients (7–9). Studies in patients taking warfarin who suffer minor head injury have shown incidences of ICH ranging from 6.2% to 29%, leading some authors to conclude that most, if not all, such patients should undergo routine cranial CT scanning on presentation (8,10–14).

One important question surrounds the prognostic implications of a normal cranial CT scan in head injury patients on anticoagulant therapy. Although some European guidelines suggest that all anticoagulated patients with head injury should be admitted for a period of routine observation, these recommendations are not based on studies of the prevalence of delayed ICH (15,16). The question remains whether a period of observation or routine serial CT scanning is warranted in such patients.

EVIDENCE SEARCH

Using PUBMED, a search strategy of "warfarin" OR "Coumadin" OR "anticoagulation" AND "trauma" AND "intracranial hemorrhage" was entered on September 12, 2012, resulting in 279 articles. This strategy identifies four articles relevant to the clinical question. The bibliographies of the selected articles were reviewed but revealed no further relevant articles.

EVIDENCE REVIEW

The Value of Sequential Computed Tomography Scanning in Anticoagulated Patients Suffering from Minor Head Injury (17)

Population. The study population was patients presenting to Hospital 12 de Octubre in Madrid, Spain within 48 h of minor head injury on anticoagulant therapy. A total of 137 patients presented during the study period, mean age 76 years, 33% men, with a median interval from trauma to CT scan of 3.2 h.

Study design. This was a prospective observational study performed from October 2005 to December 2006. Patients with a negative initial CT scan were admitted for 24 h of observation, with serial neurologic examinations performed every 4–6 h. A control CT scan was performed 20–24 h after the initial scan. Demographic data and subsequent examination data were obtained by neurosurgical residents. CT scans were interpreted by radiology or neurosurgery staff. Findings on control CT scans were compared to the initial CT scan and classified as unchanged or worsened (defined as the presence of any sign of ICH).

Primary outcome. Incidence of ICH on control CT scan.

Inclusion criteria. Patients aged older than 16 years, suffering head injury within 48 h of presentation, with GCS score of 14–15, currently treated with heparin or warfarin, with a normal initial CT scan, were included.

Main results. The mean INR was 3.8, and the median time to control CT scan was 20 h. Delayed ICH was observed in 2 of 137 patients, for an incidence of 1.5% (95% CI 0.4–5%); both of these were among the 3 patients in the study who were also on an antiplatelet agent and were among the 10% with LOC. No patients required change in management based on control CT scan findings (0%; 95% CI 0–3%). The difference in incidence of bleeding between patients with and without concomitant antiplatelet use was statistically significant (absolute risk reduction [ARR] 67%; $p = 0.01$) as was the difference between patients with and without LOC (ARR 14%; $p = 0.004$).

Delayed Intracranial Hemorrhage after Blunt Trauma: Are Patients on Preinjury Anticoagulants and Prescription Antiplatelet Agents at Risk? (18)

Population. The study population was patients presenting to Scripps Mercy Hospital in San Diego, CA, a Level I trauma center, suffering head injury while taking anticoagulant of antiplatelet agents. Five hundred patients

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