Head injuries in warfarinised patients

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ABSTRACT

Introduction: The objective of this study was to study the clinical course and outcome of warfarinised patients who were hospitalised because of head trauma.

Methods: 13 patients (ten males and three females; median age 69 years) who presented to the Royal Perth Hospital, Australia and who had suffered a head injury between July 1994 and June 2000 while concurrently taking warfarin, were studied.

Results: Confusion was the commonest presenting symptom (four patients). Five patients presented after more than 24 hours of the injury. Eight patients were anticoagulated for thromboembolic disease and five for atrial fibrillation. The patients had a median injury severity score of 25 (range 1-43). The median international normalised ratio was 2.4 (range 1.8-10) on admission and 1.8 (range 1.0-10) on discharge. 11 of the 13 patients had computed tomography of the head. Intracerebral bleeding was the commonest injury (nine patients). The median length of hospital stay was six days (range 3-30). Five patients died (38.5%).

Conclusion: Warfarinised patients who sustain minor head trauma should be hospitalised for close neurological observation and should have a low threshold for performing computed tomography.

Keywords: computed tomography, head trauma, intracerebral haemorrhage, warfarin

Singapore Med J 2006; 47(8):676-678

INTRODUCTION

Patients who are treated with wafarin have an increased risk of intracranial haemorrhage following head trauma[1]. A low threshold for computed tomography (CT) of the brain in such patients is advised. Minor symptoms following head injury of warfarinised patients should be treated more seriously and investigated more thoroughly[2]. Several studies on warfarinised patients who presented following a head injury were conducted. CT of the brain was essential to the majority of these patients so as to establish the diagnosis.

The Royal Perth Hospital acts as the tertiary referral centre for severely injured patients in Western Australia and is the centre for neurosurgery. It has a catchment population of 1.8 million inhabitants. We studied the clinical records of warfarinised patients, who were admitted to the Royal Perth Hospital over a period of six years and who had a history of head trauma, in order to evaluate their clinical course and outcome.

METHODS

Records of patients, who were admitted to the Royal Perth Hospital with a head injury and who were at the time taking warfarin, were collected from the prospective Trauma Registry database between July 1994 and June 2000. This database records all adult trauma patients admitted for more than 24 hours and those who had died. There are approximately 19,000 patients registered on the database, excluding those who died at the trauma scene or during transport. Details of the trauma registry and data collection have been recently published[3,4].

RESULTS

13 patients were studied (ten males, three females). The patients had a median age of 69 years (range 50-86 years) years and a median injury severity score of 25 (range 1-43). The mechanism of injury is shown in Table I. The majority had slipped and fallen. Those who were found on the floor had a history of repeatedly falling down, assuming that this was also the cause of injury. Confusion was the commonest presenting symptom (Table II). Five patients (38.5%) presented immediately after trauma, three (23.1%) within 24 hours, two (15.4%) within 48 hours and three (23.1%) more than 48 hours after injury. There was

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Table I. List of causes of head injury.

Cause	Number (%)
Fell down (slipped)	9 (69.2%)
Road traffic collision	2 (15.4%)
Unknown (found lying on floor)	2 (15.4%)
Total	13 (100%)

Table II. Clinical symptoms at presentation.

Clinical symptoms	Number (%)
Confusion	4 (30.8%)
Seizure	3 (23.1%)
Headache	2 (15.4%)
Nausea and vomiting	1 (7.6%)
Bruising	1 (7.6%)
Neurological deficit	4 (30.8%)

Table III. Indications for anticoagulation.

Indication for anticoagulation	Number (%)
Thromboembolism	8 (61.5%)
Atrial fibrilation	5 (38.5%)
Neurovascular disorders	2 (15.4%)

Table IV. Brain CT findings and outcomes of patients.

CT findings	Number	Outcome
Intracerebral haemorrhage only	5	alive
Intraventricular and intracerebral haemorrhage	3	dead
Subdural haematoma	1	dead
Normal	2	alive

no significant difference in mortality rate between those who presented within 24 hours and those who presented more than 24 hours (four out of eight cases compared with one out of five; p=0.27, Fisher's exact test). Those who died had significantly lower Glasgow Coma Scale (GCS) scores on admission (median GCS 3; range 3-15) compared with those who survived (median 14; range 11-15; p=0.035, Mann-Whitney U test). There was no significant difference between admission and discharge GCS for those who survived (median 14; range 11-15, compared with median 14; range 14-15; p=0.1, Wilcoxon signed rank test).

Both patients who were involved in road traffic collisions had chest trauma and died. One of them also had fracture of the femur and liver injury. The indication for anticoagulation was secondary to thromboembolic disease in the majority of patients (Table III). At least one cardiac risk factor was present in each patient, the most common being ischaemic heart disease (seven patients) and diabetes mellitus (seven patients). Anticoagulants were immediately stopped on admission and anticoagulation was reversed for those who presented with neurological findings or those who had evidence of intracranial haemorrhage on CT.

The median international normalised ratio (INR) was 2.4 (range 1.8-10) on admission and 1.8 (range 1.0-10) on discharge. The median length of hospital stay was six days (range 3-30 days). Five patients in the series died (38.5%).

11 patients underwent CT of the brain while two patients did not. Nine out of 11 CTs of the brain were positive for intracranial lesions (Table IV). Out of the 11 patients who underwent a CT of the brain, four died. Three died from intraventricular haematomas over the course of 24 hours to two days, and one patient had a subdural haematoma and died after three days due to cardiac complications. A neurosurgical opinion was sought in all of these cases and none were suitable for neurosurgical intervention. Of the patients who underwent CT of the brain and survived, five patients had intracerebral haemorrhage and two had a normal brain CT. Only two of those who survived had a follow-up CT of the brain, and there was no change in the CT findings in both cases. The patients who did not have a CT scan included one patient who had an INR of 10 on admisson. The patient suffered cardiac arrest the next day and died before any further investigations could be done. The other patient sustained minor scalp laceration. He was admitted for observation and discharged the following day. After discharge, two of the seven patients were fully alert and oriented while the other five had weak memory and intermittent confusion.

DISCUSSION

The present study highlights the importance of hospital admission of warfarinised patients who sustain even minor head injury. The majority of our patients had low energy trauma due to falls. Despite that, the mortality in this subgroup was high (three out of 11). Both patients who sustained road traffic collisions died. Strict neurological observation and brain CT is essential for diagnosis of intracerebral bleeding. There are conflicting results in the

literature regarding this recommendation. Garra et al[5] analysed 65 minor head-injured patients with pre-injury anticoagulation. Head injury was defined as minor when there was no loss of consciousness and no acute neurological abnormality. They reported no deaths, but the study was biased in that cases with minor outcomes were selected. Only 38 of the 65 patients actually had a documented anticoagulation level. Kennedy et al compared 61 patients with pre-injury warfarin to a control group of similar patients[6]. They did not show a significant difference in mortality rates between the groups. The analysis, however, was not specific for head injuries alone. Wojcik et al retrospectively reviewed 832 head-injured patients from trauma registry data over a six-year period[7]. They found that pre-injury anticoagulation had no adverse effect on mortality or hospital stay, as compared with a case-matched group of patients not taking warfarin. It is noted, however, that head injury mechanism was not specified and that the INR levels were not included.

In contrast, numerous studies showing head-injured warfarinised patients have an adverse outcome compared to non-warfarinised patients. Hyek and Singer looked at risk factors for intracranial haemorrhage in patients taking warfarin[1]. They highlighted the importance of maintaining prothrombin time ratios in warfarinised patients under 2.0. Risk of intracranial haemorrhage was increased above this level. Patients on warfarin have a five- to ten-fold increased risk of spontaneous intracranial haemorrhage. Two cases of patients on warfarin who developed intracranial haematoma after an apparent minor head injury were reported by Saab et al[2]. One patient underwent surgical evacuation of a subdural haematoma, while the other patient suffered a large intracranial haemorrhage and died. They suggested all such patients be admitted for standard neurological observation and a lower threshold for CT of the brain. The lack of publications on the risks of minor head injury in the warfarinised patient led Volans to publish guidelines on the screening of these patients. This included a recommendation for admission and standard neurological observation and a low threshold for performing CT[8].

A retrospective review by Karni et al of 16 warfarinised patients suffering head trauma showed a mortality rate of 50%[9]. The authors compared these patients with a case-matched control group of 257 patients. The mortality rate in this group was 20%. Li et al[10] retrospectively reviewed 144 patients who suffered head trauma, had concurrent warfarin use and who underwent CT of the head. The results showed clinically important injuries in ten patients (7%). They concluded that head CT is necessary in all patients on anticoagulants who suffer minor head trauma. Mina et al[11] tested the hypothesis that pre-injury anticoagulation adversely affects the morbidity and mortality of trauma patients with intracranial injury. The study looked at 37 patients who suffered an intracranial injury and were taking warfarin or other anticoagulants at the time of admission. The patients were compared to a control group which was equally matched. The results showed a 33% mortality in the anticoagulated group taking warfarin compared with an 8% mortality in the control group. They concluded that trauma patients with pre-injury anticoagulation had a four- to five-fold higher risk of death than non-anticoagulated patients.

Although our study has a smaller sample size than other studies, our results are similar and the conclusions drawn are the same. The setting of our hospital is different from those large trauma centres where large studies have been performed. Our data have been collected over six years and support the recommended practice guidelines of other studies. In summary, our study has shown that warfarinised patients who are admitted with head injury have a high mortality. Warfarinised patients who sustain even minor head trauma should be hospitalised for close neurological observation and should have a low threshold for CT of the brain.

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