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ORIGINAL ARTICLE

Determining the risk of development of cranial pathology in patients with minor head injury using antiagregan-anticoagulants

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Abstract

Background: The use of antiplatelet/anticoagulant drugs, which increases bleeding tendency, among patients has been increasing by age. Such patients can be admitted to the emergency department with minor head trauma, and some ambiguities might occur in the management of emergency departments. This study is conducted to determine the factor of intracranial haemorrhage in anticoagulated patients and the patients on antiplatelet therapy and its effect on clinical management, identifying predictors of positive imaging findings and their outcomes.

Methods: Via a prospective analysis, patients who all had minor head trauma between June 1st, 2014 and May 1st 2015 have been included in this study. For this study, there are several inclusion criteria such as being evaluated by doctors in the Emergency Department (ED) and not being interfered during the diagnosis and the treatment. Through the study, the medications, the mechanism of injury, and Cranial Computed Tomography (CT) results have been reviewed. In addition, the demographic data, symptoms, and clinical examinations of the patients have also been recorded.

Results: 606 patients, who were admitted to the emergency department between the above-mentioned dates, with minor head trauma have been included in the study. When the data of the patients is examined, it can be seen that the average age of the patients is 48.6 ± 22.6. In addition, 57% (n = 345) of the patients are men and 43% (n = 261) are female. Also, 30% of them (n:182) were taking antiplatelet/anticoagulant. Patients who use antiplatelet/anticoagulant are older than the patients who didn't use antiplatelet/anticoagulant therapy. According to the CT results, there has been a pathological finding in 14,6% of them. However, this is not statistically significant (p=0,762). Similarly, there is no statistically significant difference between 68 users of antiplatelet and anticoagulant therapy (p = 0.865). Nausea seems to be statistically significant in patients with pathology in the Cranial CT (p=0,045).

Conclusions: Patients with minor head trauma who used Acetyl Salicylic Acid (ASA) might end in mortality or might have intracranial haemorrhage. However, the symptoms of the patient, the physical examination and the laboratory data are insufficient to predict the risk of intracranial pathology.

Keywords: Minor Head Trauma, Antiplatelet/Anticoagulant Therapy, Intracranial Pathology.

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INTRODUCTION

Traumatic brain injury (TBI) is one of the most common conditions in emergency departments with 200 new cases in per 100,000 people. (1). It is the primary cause of trauma-related fatalities in all age groups and the leading cause of death in patients aged 65 and above. (2)

As individuals age, the use of antiplatelet and anticoagulant medications increases due to several conditions such as atrial fibrillation, coronary artery disease, cerebrovascular diseases, and deep vein thrombosis (3). Moreover, elderly patients are at an elevated risk of falls or other injuries (4). Various studies have reported an increased risk of both spontaneous and traumatic bleeding, especially with warfarin use (5). In addition, elderly patients using ASA or clopidogrel have demonstrated a heightened risk of mortality associated with head trauma. However, studies indicate that the initial Glasgow Coma Scale (GCS) score and the extent of haemorrhage on brain seen in computed tomography (CT) can predict the mortality in these patients (6).

Minor head injury is typically defined as patients with a Glasgow Coma Scale (GCS) score of 15 upon hospital admission, with or without post-traumatic amnesia or loss of consciousness (7). It is among the most common reasons for emergency department admissions (3). Although the use of CT has increased the diagnosis rates of head traumas, the removal of CT scans for minor head traumas remains an issue of debate (6). Also, the indications for CT scans in patients with minor head trauma who are using anticoagulants or antiplatelet medications are not entirely clear. In a prospective study, clinical findings and brain CT results have been found to be compatible, but in another study, it is determined that a CT scan is unnecessary for patients with minor head trauma (6,7).

The purpose of this study is to examine the relationship between a patient's symptoms, physical signs, and diagnostic tests, as well as the risk of complications in patients with minor head trauma who are using antiplatelet or anticoagulant medications. It is aimed to identify various factors such as age, medical history, concurrent medications, and symptoms that might predict mortality and morbidity in these patients. By identifying the factors that indicate the risk of developing cranial pathology in patients with minor head trauma using anticoagulants or antiplatelets, we hope to shorten the duration of hospital stays in the emergency department, prevent unnecessary testing, and reduce malpractice.

MATERIALS AND METHODS

This study is designed as a prospective observational clinical study and conducted in the Adult Emergency Department of a University Medical Faculty with an annual adult patient number of 55,000 between June 1st 2014 and May 31st 2015.

This study was approved by the clinical research Ethics Committee of Gazi University Faculty of Medicine (Date: 23.06.2014, Number: 337).

Inclusion and Exclusion Criteria:

All minor head trauma patients who agreed to participate in the study and aged 18 and over with a GCS score of 15 have been included in the study. Patients with a GCS score of ≤14, polytrauma patients, pregnant patients, patients with known intracranial masses, bleeding disorders, and thrombocytopenia have been excluded from the study.

Data Collection:

The patients who applied to a university hospital adult emergency department for minor head trauma have been included in the study. The contact information, the demographic data, medications used, the medical history, vital signs, physical examination findings, existing symptoms, diagnostic tests, pathological laboratory and radiological findings, and the trauma mechanism of the included patients have been recorded on the study form.

One month after the patient's initial ED visit, the responsible research assistant for the study scanned the hospital registration system or contacted the patient/patient's relatives via phone to inquire if the patient had developed any additional trauma-related complaints, whether there was a re-visit to the hospital or not, and if there were any morbidity and mortality-related information. All the acquired data were recorded on the study form.

Statistical Analysis:

The normality of the variables is examined by using the Kolmogorov-Smirnov and Histogram methods. For continuous variables, arithmetic mean ± standard

deviation or median and minimum/maximum values are used depending on the distribution structure. Post-hoc statistics are used to determine from which group the difference has been originated and if there is a difference between groups. Chi-square tests, Fisher, Kruskal Wallis, and Bonferroni tests are used in statistical analyses. SPSS for Windows 20 (SPSS Inc. ®, Chicago, USA) program is used to analyse the data. The results with $p<0.05$ are considered to be statistically significant.

RESULTS

Between June 1st 2014 and May 31st 2015, a total of 52,096 patients applied to the University Hospital Adult AS. Of these patients, 1,000 (1.91%) of them had head trauma. There were 619 minor head trauma patients who met the study criteria, but 13 patients who did not want to participate in the study and met the exclusion criteria were removed, leaving 606 patients for the study. Of these patients, 182 (30.02%) were using an antiplatelet and/or anticoagulant drug (Figure 1).

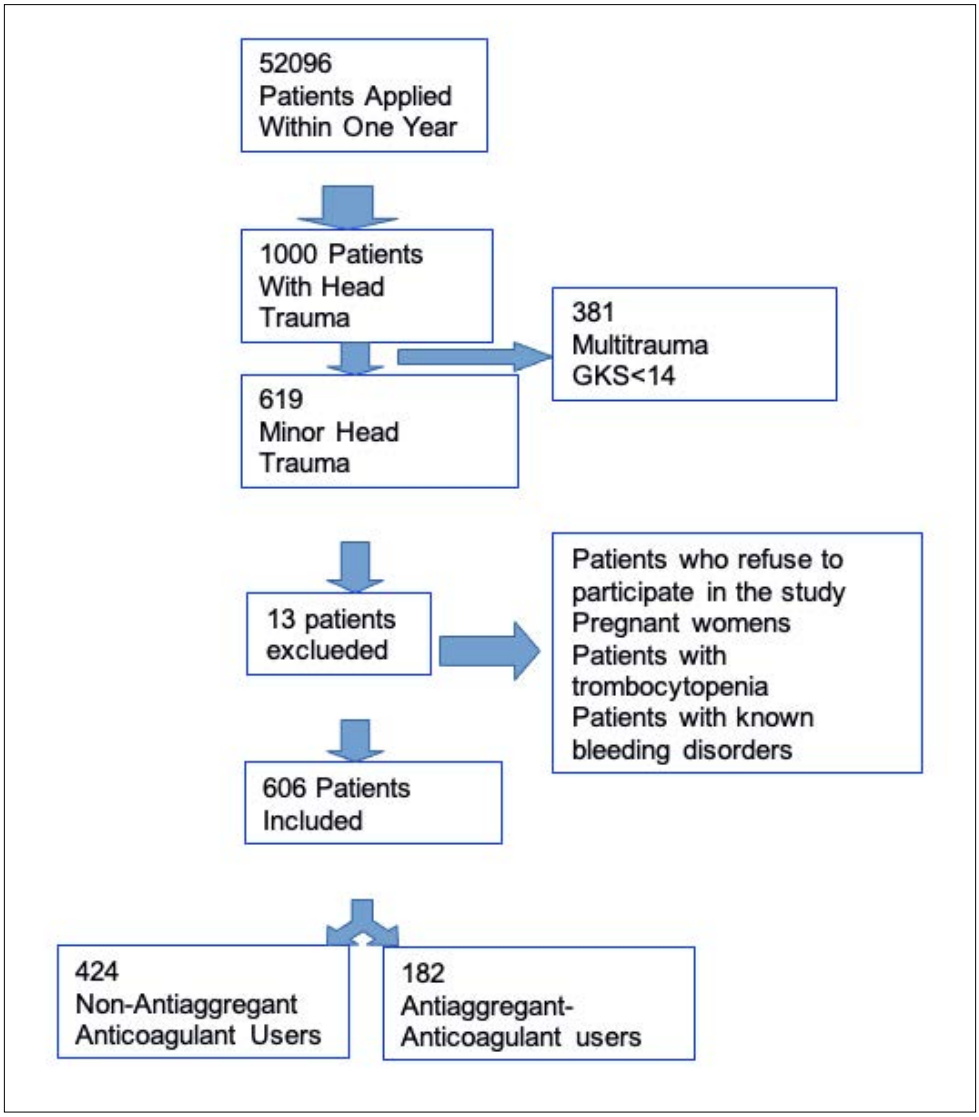

Figure 1. Flow Chart

The mean age of the 606 patients who presented with minor head trauma is 48.6±22.6 (min:18 max:101), with 57% (n:345) male and 43% (n:261) female rates. The rate of the patients using antiplatelet and anticoagulant drugs is found to be 30.0% (n:82). The average age of these patients is 71.98±12.4 (min:41 max:101), and 47% (n:86) are male. Patients who used antiplatelet and anticoagulant drugs are mostly elderly and female, and there is a statistically significant difference between those who did and did not use antiplatelet and anticoagulant drugs (p=0.000, p=0.002).

When the medical histories of all patients are examined, hypertension is most frequently detected at a rate of 24.2% (n:147), while diabetes mellitus (DM) and coronary artery disease (CAD) are detected at frequencies of 10.5% (n:64) and 9.7% (n:59), respectively. In patients using antiplatelet and anticoagulant drugs, hypertension is observed at a rate of 65.4%, CAD at a rate of 31.0%, and DM at a rate of 29.7% (Table 1).

Table 1. The Demographic Data of the Patients

	Antiaggregant-Anticoagulant users n=182	Non- antiaggregant-anticoagulant users n=424	p=+
	mean ±SD	mean ± SD	
Age	71.98±12.4	38.55±17.5	
Gender	n (%)	n (%)	<0.001
Female	96 (52.7)	165 (38.9)	0,002
Male	86 (47.3)	259 (61.1)	
Comorbid Factors	n (%)	n (%)	
DM*	54 (29.7)	10 (2.4)	<0.001
HT**	119 (65.4)	28 (6.6)	<0.001
CAD***	57 (31.0)	2 (0.5)	<0.001
CVO****	14 (7.0)	1 (0.2)	<0.001
AF*****	12 (6.6)	0	<0.001
Other	39 (21.4)	11 (2.6)	<0.001

*DM: Diabetes Mellitus, **HT: Hypertension, *** CAD: Cornerary Artery Disease, **** CVO: Cerebrovascular Event, *****AF: Atrial Fibrillation, +: Pearson Chi-Square

The primary mechanism of injury in patients with minor head trauma is determined to be falls, at a rate of 46% (n:281). When ED admission symptoms are examined, the most commonly observed symptoms are nausea,10% and headache, 33%.

When the admission symptoms of patients using and not using antiplatelet and anticoagulant drugs are compared, it is seen that there has been no statistically significant relationship for symptoms other than dizziness (Table 2).

Table 2. The comparison of admission symptoms of the patients using and not using antiaggregant-anticoagulant drugs

Symptoms n (%)		Antiaggregant-Anticoagulant Users	Non-Antiaggregant-Anticoagulant Users	Total	p=+
		n (%)	n (%)		
Nausea	yes	167 (91.8)	44 (10.4)	201 (33.7)	0.257
	no	15 (8.2)	380 (89.6)	395 (66.3)	
Headache	yes	54 (29.7)	149 (35.1)	203 (33.4)	0.112
	no	128 (70.3)	275 (64.9)	403 (66.5)	
Concussion	yes	3 (1.6)	4 (0.9)	7(1.1)	0.353
	no	179 (98.4)	420 (99.1)	599 (98.8)	
Amnesia	yes	6 (3.3)	14 (3.3)	20 (3.3)	0.984
	no	176 (96.7)	410 (96.7)	586 (96.6)	
Consciousness	yes	2 (1.1)	5 (1.2)	7 (1.1)	0.647
	no	180 (98.9)	419 (98.8)	599 (98.8)	
Seizure	yes	2 (1.1)	1 (0.2)	3 (0.4)	0.216
	no	180 (98.9)	423 (99.8)	603 (99.5)	
Dizziness	yes	18 (9.9)	17 (4)	35 (5.7)	**0.05**
	no	164 (90)	407 (96)	571 (94.2)	
Visual impairment	yes	3 (1.6)	10 (2.4)	13 (2.1)	0.418
	no	179 (98.4)	414 (97.6)	593 (97.8)	
Syncope	yes	2 (1.1)	7 (1.7)	9 (1.4)	0.461
	no	180 (98.9)	417 (98.3)	597 (98.5)	
+: Pearson Chi-Square					

Of the 606 patients included in the study, 58% (n:349) underwent a Cranial CT based on the decision of the clinician. 47.8% (n:167) of these patients were using antiplatelet or anticoagulant drugs. Among the 182 minor head trauma patients who were using antiplatelet/anticoagulant drugs, Cranial CT was performed for 91.6% (n:167) of the patients, while among the 424 patients who were not using these drugs, only 42.9% (n:182) of them underwent Cranial CT based on the decision of the clinician, which seems to be significantly lower (p=0.000). The rate of Cranial CT performed by clinicians has increased significantly as the number of patients with symptoms increased (p=0.000).

Moreover, pathological findings are detected in 14.6% (n:51) of the patients who underwent Cranial CT. 23 of these patients were using antiplatelet and/or anticoagulant drugs. The most common pathological finding has been subarachnoid haemorrhage (SAH), which has been observed in 28% (14) of the patients. Only one patient had SAH, subdural haemorrhage, and skull fracture together. In addition, two patients had both SAH and subdural haemorrhage, two patients had both SAH and skull fracture, and one patient had both subdural haemorrhage and skull fracture. It is determined that there has been no statistically significant difference in the incidence of pathology on Cranial CT between the patients using and not using antiplatelet-anticoagulant drugs (p=0.762). However, when pathological findings are examined individually, the incidence of SAH seems to be significantly higher in patients not using these drugs than in those who were using them (p=0.038).

When the use of antiplatelet and anticoagulant medications among patients is examined, it is found that 134 patients used ASA, 31 patients used clopidogrel, 15 patients used warfarin, 1 patient used DMAH, and 7 patients

used dabigatran. However, when the analysis is done individually, it seen that there is no statistically significant difference in the pathology detected in the Cranial CTs of the patients using ASA, clopidogrel, and warfarin (as determined by the Pearson Chi-square and Fisher tests). Due to the small number of patients using dabigatran (7 patients) and DMAH (1 patient), the detection of pathology in Cranial CT could not be statistically evaluated (Table 3).

Table 3. Pathology status in cranial CT according to the drugs used

Drugs		with pathology in Cranial CT n (%)	without pathology in Cranial CT n (%)	p=+
ASA	Using	14 (11.6)	107 (88.4)	0.241
	Not	37 (16.2)	191(83.8)	
Clopidogrel	Using	7 (24)	22(76)	0.164
	Not	44 (13.8)	276 (86.2)	
Warfarin	Using	2 (14.3)	12 (85.7)	0.972
	Not	49 (14.6)	286 (85.4)	
Dabigatran	Using	1 (16.6)	5 (83.4)	0.615
	Not	50 (14.6)	293 (85.4)	
+: Pearson Chi-Square				

Besides, cranial pathology is detected in 10% of the patients using ASA (n:14), 22.5% of the patients using clopidogrel (n:7), and 14% of the patients using dabigatran (n:1). Only one patient using ASA had both subdural hematoma and SAH. The mean INR value for the patients who were using warfarin is 2.2 (min:0.9, max:4.69), and three patients had an INR value greater than 3. Although two patients using warfarin had ischemia detected in their Cranial CT, none of the patients had intracranial bleeding (Table 4).

Table 4. The distribution of pathological CCT findings of the patients using antiaggregant-anticoagulant

	ASA	Clopidogrel	Warfarin	Dabigatran	DMAH
SAH	2	1	0	0	0
Subdural Hematoma	5	1	0	0	0
Parenchymal Hematoma	2	2	0	1	0
Skull Bone Fracture	2	0	0	0	0
Facial Bone Fracture	2	3	0	0	0
Other	2	0	2	0	0
Total	15	7	2	1	0

Out of the 606 patients included in the study, 19 (3.1%) were hospitalized, 11 of them in services and 8 of them in intensive care units (Table 5). Furthermore, no statistically significant difference is found in the discharge patterns of the patients from the emergency department based on the use of antiplatelet and anticoagulant medications (p=0.47).

Table 5. Exiting the patients from the emergency department

	Antiaggregant-Anticoagulant Users n (%)	Non-Antiaggregant-Anticoagulant Users n (%)	Total
Discharge	174 (95.6)	413 (98.5)	587 (96.9)
Service	5 (2.7)	6 (1.4)	11 (1.8)
Intensive Care	3 (1.6)	5 (1.1)	8 (1.3)
Total	182 (100.0)	424 (100)	606 (100.0)

90% of the patients were diagnosed with only minor head trauma, while in 6.6% of the patients, other body injuries were also present in addition to minor head trauma (Table 6).

Table 6. Using and not using antiaggregant/anticoagulant Distribution of Patients' Diagnoses

Diagnoses	Antiaggregant-Anticoagulant Users n(%)	Non-Antiaggregant-Anticoagulant Users n(%)	Total
Intracranial pathology	12 (6.5)	20 (4.7)	32 (5.2)
Other cranial pathologies	11 (6.0)	8 (1.8)	19 (3.1)
Other body area injury	19 (10.4)	21 (4.9)	40 (6.6)
Total	182 (100)	424 (100)	606 (100)

Also, the frequency of other body and intracranial pathology is seen to be statistically significantly increased in patients using anticoagulant-antiplatelet drugs (p=0.024). Of the patients using antiplatelet-anticoagulant drugs, 84% (n:153) was diagnosed with only minor head trauma, 10.4% (n:19) had other body injuries in addition to minor head trauma, and 6% (n:12) was diagnosed with intracranial pathology.

It has been observed that the patients with intracranial or other pathology detected in Cranial CT had an increase in related complaints and outpatient clinic visits. These visits were generally due to the need for follow-up examinations in line with their current diagnoses.

When the final statuses of patients using antiplatelet-anticoagulant agents are examined one month later, it is seen that 82% (n:149) of them had no recurring complaints, 10% (n:19) of them visited the outpatient clinic with the same and/or related complaints, 3% (n:5) of them visited the emergency department for the same and/or related reasons, and one of them died in the intensive care unit before being discharged from the hospital (Table 7). Also, eight patients could not be reached as they did not respond to the follow-up call.

Table 7. The status of the patients using antiaggregant/anticoagulant, one month after trauma

Type of discharge from the emergency department	Latest Status After 1 Month				Total⁺ n (%)
	No Re-application n (%)	Outpatient Clinic Applications n (%)	emergency department Applications n(%)	Deceased n (%)	
Discharge	146 (87.4)	16 (9.6)	5 (3.0)	0 (0)	167 (100)
Service	3 (60)	2 (40)	0 (0)	0 (0)	5 (100)
Intensive Care	0 (0)	1 (50)	0 (0)	1 (50)	2 (100)
Total⁺	149 (85.6)	19 (10.9)	5 (0.9)	1 (0.6)	174 (100)
+: Row percentages					

Three out of 606 patients with minor head trauma (0.5%) died within one month after the trauma. Two of the three patients did not have any pathology detected in their Cranial CT. The other patient who died and had pathology detected in their Cranial CT was a 46-year-old individual who was using antiplatelet-anticoagulant drugs (ASA + clopidogrel). The other two patients who died and did not have any detectable intracranial pathology were in their 80s and were not using any antiplatelet-anticoagulant drugs. When comparing the mortality rates between patients who were using the drugs and those who were not, statistically significant higher rates have been observed in patients who were using the drugs ($p=0.000$) (Pearson Chi-square test, post hoc test).

DISCUSSION

The world is experiencing an increase in the elderly population due to the advancements in medicine and technology, which leads to a longer life expectancy and more improved living standards (8). As a result, the population of Turkey is expected to have a 17% proportion of people over the age of 65 by 2050, compared to 6% in 2000. With the rise of the elderly population, the use of antiplatelet and anticoagulant drugs has also increased (9). Therefore, identifying risk factors for intracranial events in patients who use these drugs is thought to be crucial, especially considering the prevalence of head trauma cases in emergency departments (10).

It is important to note that the accumulation of atheromatous plaques in cerebral vessels and cortical atrophy in elderly individuals make the brain a sensitive area (11). Studies have shown that the risk of intracranial bleeding increases in patients using anticoagulants who have suffered head trauma, with the most common cause being a simple fall at their own level. This increased risk is associated with the growing elderly population and the corresponding rise in anticoagulant use (12).

In this study, it has been found that patients who used antiplatelet and anticoagulant drugs accounted for 30% of those with minor head trauma, with an average age of 72. Other studies have also reported similar age distributions (13). Simple falls are found to be the most common cause of head trauma, which is consistent with the previous research (6).

In another retrospective study that was conducted between 1999 and 2004, patients who used ASA and clopidogrel were examined. When looking at their current diseases, it was found that CAD was 40%, cerebrovascular accident (CVA) was 29%, and atrial fibrillation (AF) was 6%. In our study, when the current diseases of those using antiplatelet-anticoagulant are examined, the rates are; CAD is 31%, CVA is 7%, and AF is 6.6% (6).

In a study that investigated the indications to perform a brain computed tomography (Cranial CT) in minor head trauma based on symptoms such as nausea, amnesia, and headache were found to have a statistically significant relationship with the pathology detected on Cranial CT (14). In our study, it is seen that there has been a significant relationship between nausea, vomiting, amnesia, and the pathology detected on Cranial CT. Additionally, there has been a relationship between the absence of amnesia and the absence of pathology on Cranial CT. There has also been a significant relationship between patients without any symptoms and the absence of pathology on Cranial CT.

In a study conducted in 2011, no relationship was found between the use of medication and the pathology detected on Cranial CT in minor head trauma patients using antiplatelet-anticoagulant drugs. However, a significant relationship was found between amnesia and the pathology detected on Cranial CT (13). In Viola et al.'s study, no significant relationship was found between amnesia, nausea, headache, and Cranial CT in minor head trauma patients (15). In another study, minor head trauma patients using warfarin were examined, and a significant relationship was found between headache, nausea, amnesia, and confusion and pathology detected on Cranial CT, while a significant relationship was found between disorientation and pathology (16).

In our study, it is determined that there has been no significant relationship between the use of medication and Cranial CT, as well as between symptoms and the pathology detection in Cranial CT among those using antiplatelet-anticoagulant drugs. Saboori et al. investigated the indications for Cranial CT in minor head trauma and examined the relationship between headache, nausea, amnesia, loss of consciousness, confusion, and seizure and pathology development in Cranial CT in patients over 6 years of age. They found a significant relationship

between nausea and confusion and Cranial CT, but did not find a significant relationship between amnesia, dizziness, headache, and Cranial CT. They also found that as the number of symptoms increased, the frequency of pathology development in Cranial CT also increased (17). In our study, overall, it is seen that there is no increase in the frequency of pathology detection in Cranial CT as the number of symptoms has increased, but in the group of patients using medication, there is an increase in the frequency of pathology development in Cranial CT as the number of symptoms has increased.

When various studies in the literature are reviewed, it is seen that Sacco et al. reported a significant relationship between coagulopathy and Cranial CT in studies of moderate head trauma patients with a GCS score of 13-14. In contrast, Gomez et al. did not find a significant relationship between coagulopathy and Cranial CT in a study of moderate head trauma patients (18-19). Mina et al. performed a retrospective study of anticoagulant-treated head trauma patients and found no significant relationship between drug use and pathology in Cranial CT, although there was a significant difference in INR levels (4). Another retrospective study of patients with a GCS score of 15 and no neurological deficits who were using anticoagulants recommended against routine Cranial CT imaging. A study of minor head trauma patients using ASA and clopidogrel found a significant relationship between drug use and pathology in Cranial CT (21).

Miller reported a 6.1% incidence of intracranial injury in 1382 cases of minor head trauma evaluated via CT (22). Boran reported a 9.2% incidence of pathology in Cranial CT in 371 patients with a GCS score of 15 (23). In this study, 3% of minor head trauma patients have been diagnosed with intracranial pathology, and 5.4% of patients using antiplatelet and anticoagulant agents have been diagnosed with intracranial pathology, which is statistically significant ($p < 0.05$). There is also a statistically significant difference between the use of SAK medication and non-use ($p < 0.05$). Another study of intracranial haemorrhage patients using ASA and clopidogrel did not find a significant difference in drug use regarding intracranial pathology (24).

In a study examining the lengths of hospital stays and complications of minor head injury patients using antiplatelet-anticoagulant agents, it was found that patients using antiplatelet agents stayed in the hospital less frequently, but there was no statistically significant difference between patients using warfarin. Considering mortality rates, it was observed that patients using antiplatelet agents had a higher mortality rate. However, this study has been retrospective and there have been uncertainties in the data of some of the patients included in the study (25).

In Brewer et al.'s study, it was found that the mortality rate of minor head injury patients using antiplatelet-anticoagulant agents increased after an intracranial haemorrhage, but their study was also retrospective and the study group consisted of only 140 patients. Besides, they were unable to access some of the patients' data (13). In our study, it has been determined that the use of antiplatelet-anticoagulant agents increases mortality. 19 patients have been included in our study and they were followed up with the brain surgery clinic and their recommendations were followed. No surgical intervention was required for any of the patients.

In a study examining minor head injury patients using warfarin, it was found that the use of warfarin increased mortality (16). In our study, only one of the three deceased patients was using ASA, and the other patients were not using antiplatelet-anticoagulant agents. Another study suggests that patients with an INR>3 are at high risk for mortality. In another study, it was found that the average INR value of patients using warfarin was 2.4 and the mortality rate was high in patients with an INR>4. Similarly, Karni et al. found that mortality increased in elderly patients with minor head injury using warfarin, but their GCS was between 11 and 13 (27). In a level 3 systematic review, it was suggested that the INR value cannot be a determinant for delayed bleeding risk (28). In our study, there are 15 patients using warfarin, and only one of the three patients with an INR value greater than 3 had ischemia detected in their Cranial CT, while no pathology was found in the other patients. This result might be due to the small number of patients.

There are not many studies conducted with dabigatran, and the number of studies evaluating patients with minor head trauma is also limited. In a study that examined

patients with trauma using dabigatran and warfarin, no significant differences were found in terms of patient survival and intracranial pathology (29, 30). In another study, it was found that the risk of bleeding associated with dabigatran was lower than that of warfarin (31). In another study with an average GCS of 14.6, five patients using dabigatran were compared to 25 patients using warfarin and 25 patients not using any medication, consequently, it was found that the mortality rate was higher with dabigatran (32). All of these studies are retrospective and have a small number of patients. In our study, there is no significant difference between dabigatran and warfarin in terms of mortality and the incidence of intracranial pathology.

Several studies have followed patients who were using antiplatelet-anticoagulant medication and had negative CT results by performing intermittent control CT scans, and the new pathology detection rate was found to be between 0.6% and 6%. However, this did not lead to any changes in the patients' vital functions, clinical status, or treatment (33, 34, 35). In another study, risk factors for delayed intracranial haemorrhage were examined in patients using antiplatelet-anticoagulant medication, and in a series of 500 patients who underwent two CT scans six hours apart, the incidence of delayed bleeding was found to be 1%. They concluded that patients with a normal initial CT scan could be discharged if there was no neurological deterioration during follow-up (36). In our study, the need to revisit the emergency department or outpatient clinic within one month of follow-up is lower in patients with no intracranial pathology detected than in those with intracranial pathology.

Although the study has been conducted in a tertiary university hospital, the number of patients included in the study is limited and could not cover all patients. Some of the patients had to be excluded because their symptoms and physical examination findings were not recorded. We were not able to obtain the final status of 8 patients using antiplatelet and anticoagulant medications because we could not reach them by phone. The final status data of these patients might have changed the possible patient outcome analyses.

In cases of head trauma, cranial CT is recommended in all the criteria of the American College of Emergency Physicians (ACEP), Canada, New Orleans, and Nexus II criteria, even if the patient has a GCS score of 15, in the presence of recurrent vomiting, age ≥ 65 years, clinical findings of skull base fracture, coagulopathy, dangerous mechanism, and presence of focal neurological deficit (4,31).

The results obtained in this study contribute to the existing literature on the relationship between anticoagulant use, symptoms, and the presence of pathology in brain computed tomography scans in patients with minor head trauma. It is crucial to take into account these factors in order to make informed decisions regarding the treatment and further evaluation, and ultimately improving patient outcomes.

Declarations

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This study was approved by the clinical research Ethics Committee of Gazi University Faculty of Medicine (Date: 23.06.2014, Number: 337).

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