



Anticoagulation therapy a risk factor for the development of chronic subdural hematoma

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ARTICLE INFO

Article history:

Received 20 August 2012

Received in revised form

17 September 2012

Accepted 13 October 2012

Available online 3 November 2012

Keywords:

Chronic subdural hematoma

Anticoagulants

Antiplatelet aggregation agents

Head trauma

Recurrence

ABSTRACT

Objective: Chronic subdural hematoma (CSDH) is a common disease among the elderly and with increasing incidence we have chosen to focus on associations between development and recurrence of CSDH and anticoagulation and/or antiplatelet agent therapy.

Methods: We conducted a retrospective review of 239 patients undergoing surgery for CSDH over a period of six years (2006–2011). Risk factors such as age, head trauma, anticoagulant and/or antiplatelet agent therapy and co-morbidity were investigated along with gender, coagulation status, laterality, surgical method and recurrence.

Results: Seventy-two percent of the patients were male and the mean age was 71.8 years (range 28–97 years). Previous fall with head trauma was reported in 60% of the patients while 16% were certain of no previous head trauma. The majority of patients (63%) in the non-trauma group were receiving anticoagulants and/or antiplatelet agent therapy prior to CSDH presentation, compared to 42% in the trauma group. Twenty-four percent experienced recurrence of the CSDH. There was no association between recurrence and anticoagulant and/or antiplatelet agent therapy.

Conclusion: Anticoagulant and/or antiplatelet aggregation agent therapy is more prevalent among non-traumatic CSDH patients but does not seem to influence the rate of CSDH recurrence.

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1. Introduction

The incidence of chronic subdural hematoma (CSDH) has been reported to be 3.4 per 100,000 in patients younger than 65 years of age, and 8–58 per 100,000 in those older than 65 years [1]. Because of the continuing rise of life expectancy in the western world [2] and the increasing use of anticoagulants and antiplatelet aggregation agents (AAA) [3–5], the incidence of CSDH is expected to rise. This underlines the importance for an improved understanding of the relation between the development of CSDH and the use of anticoagulants and AAA.

Treatment of CSDH depends on clinical symptoms and the size of the hemorrhage. Three main surgical techniques exist for the evacuation of CSDH: burr-hole craniostomy (BHC), twist-drill craniostomy (TDC) and craniotomy. BHC is associated with a lower rate of recurrence [1] and lower rate of severe complications compared to TDC and craniotomy [6]. The use of closed-system drainage following BHC has been reported to further reduce recurrence rate and mortality [7].

The role of anticoagulants and AAA in the development and recurrence of CSDH is unclear [3,5,8,9]. These agents are widely used to reduce the risk of both venous and arterial thromboembolic events in patients with prosthetic heart valves and in others diagnosed with atrial fibrillation, cerebrovascular disease, ischemic heart disease and peripheral arteriosclerosis [10]. Patients suffering from CSDH while receiving anticoagulants and/or AAA have their medication discontinued in order to minimize the risk of further hematoma expansion. In emergency situations where immediate intervention is required, rapid reversal of anticoagulation is needed. Reversal of warfarin is generally accomplished by infusion of fresh frozen plasma (FFP), prothrombin complex concentrate or vitamin K and the reversal of AAA can be met by platelet transfusion [11].

The aim of this study was to investigate associations between treatment with anticoagulants and AAA, and the development and recurrence of chronic subdural hematomas.

2. Materials and methods

A retrospective study was performed over a 6-year period between January 2006 and November 2011 at the Department of Neurosurgery, Rigshospitalet, Copenhagen, Denmark. Two hundred and eighty-four patients who had surgical evacuation for CSDH were identified. Exclusion criteria comprised

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hygromas but also ventriculoperitoneal shunts, arachnoid cysts, CNS-lymphomas, acute myeloid leukemia with chemotherapy, since these have been reported to be direct causes of non-traumatic CSDH [12–15]. Thirty-two patients were excluded. Thirteen medical records in paper form from 2006 to 2007 were not to be found. This yielded a total of 239 records for the study.

Patients were grouped by sex, age, head trauma/no head trauma, time interval between head trauma and symptom presentation, regular use of anticoagulants and/or AAA, coagulation status at admission, recurrence, time of recurrence, co-morbidity, alcohol units per week (standardized), laterality, and surgical technique. Patients with an expressed history of head trauma were categorized as the “trauma group”. Patients with no definitive head trauma, but a tendency to fall (TTF), were categorized as the “TTF-group”. Patients that explicitly denied head trauma were categorized as the “non-trauma group”, and patients who had not been asked about head trauma prior to CSDH presentation according to the medical records, were categorized as the “trauma unknown group”.

Cardiovascular co-morbidity included venous and arterial thromboembolic disease, hypertension, atrial fibrillation, ischemic heart disease, dyslipidemia, apoplexy, congestive heart failure and diabetes mellitus type 1 and 2. Coagulation status was determined with the use of international normalized ratio (INR), activated partial thromboplastin time (APTT), thrombocytosis status and, when necessary, with thrombelastograph hemostasis analyser (TEG).

Anticoagulation therapy was defined as treatment with warfarin. AAA therapy included acetylsalicylic acid (ASA), clopidogrel and dipyridamole.

The diagnosis was established with CT-scan of the head prior to admission. Recurrence was defined as reoperation for an ipsilateral symptomatic CSDH confirmed by CT-scan of the head. All data was collected in Excel version 12.2.9 and statistical analyses were done with SPSS software version 19.0.0. Significance was set at 0.05 when using Student's *t*-test and Chi-squared test.

3. Results

The study included a total of 239 patients, of which 171 were males (72%) and 68 were females (28%) in the age range of 28–97 years. Mean age was 71.8 years (median 72); 70.7 years among males (median 71) and 74.8 years among females (median 77.5). A hundred and four patients (44%) received pre-morbid anticoagulant and/or AAA therapy. Seventy-seven of these (74%) were males and 27 (26%) were females. Warfarin was used by 34 patients (14%), AAA by 63 patients (26%) and warfarin combined with AAA by seven patients (3%) in this study.

3.1. Head trauma

A hundred and forty-four patients (60%) had a history of previous head trauma averaging 51.8 days (median 35 days) prior to admission (trauma group). Thirty-eight patients (16%) had not suffered head trauma prior to the CSDH (non-trauma group). Seventeen patients (7%) had a tendency to fall but without knowing about previous head trauma (TTF group). For 40 patients (17%) there was no information about head trauma (trauma unknown group).

In the following, the TTF group and the trauma unknown group are excluded from analyses regarding anticoagulant and/or AAA therapy and recurrence.

3.2. Type of anticoagulation

Twenty-four patients (63%) in the non-trauma group were receiving pre-morbid anticoagulant and/or AAA therapy. This was significantly more compared to the trauma group where the equivalent was 61 (42%) ($p=0.022$) (Table 1).

Table 1
Trauma groups vs. anticoagulation and/or AAA therapy.

	Trauma, n (%)	Non-trauma, n (%)	
Anticoagulation/AAA	61 (42)	24 (63)	$p=0.022$
No therapy	83 (58)	14 (37)	
Total (n)	144	38	

AAA: antiplatelet aggregation therapy.

In the non-trauma group there were 10 warfarinised patients (42%), compared to 15 patients (25%) in the trauma group (NS). The equivalent figures for AAA were 13 (54%) and 40 (66%) respectively (NS). Six patients in the trauma group had warfarin and AAA combined, as well as one patient in the non-trauma group (Table 2). There was no association in the use of single- or combination therapy of anticoagulants and AAA between males and females. Mean INR levels were significantly higher in the non-trauma group compared to INR levels of the trauma group (1.42 vs. 1.20, $p=0.03$). The average time between head trauma and admission to the hospital did not vary significantly between the group taking anticoagulants and/or AAA and those who did not.

3.3. Co-morbidity

Presence of one or more diseases in addition to CSDH was identified in 198 patients (83%). Most commonly seen were diseases within the cardiovascular system including diabetes mellitus type 2 ($n=143$). Other disorders were alcohol dependence ($n=41$), psychiatric disorders ($n=29$), respiratory diseases ($n=12$), malignant diseases ($n=11$) and endocrinological disorders (diabetes mellitus type 2 excluded) ($n=12$). The non-trauma group was associated with higher grade of co-morbidity, though not statistically significant. Diseases related to the cardiovascular system were more prevalent in this group compared to the trauma group (74% vs. 59%, NS), as well as hypertension and diabetes mellitus (42% vs. 36% and 13% vs. 9%, NS) and atrial fibrillation (24% vs. 16%, NS).

3.4. Treatment and laterality

The most common procedure was BHC in local anaesthesia followed by a closed system drainage for 24–48 h ($n=178$, 74%). Sixty-one patients (26%) were operated on under general anaesthesia, either with BHC ($n=46$) or craniotomy ($n=15$). 112 hematomas (47%) were located on the left side of the hemispheres, 85 hematomas (36%) on the right side, while 42 were bilateral (18%).

3.5. Recurrence and outcome

Fifty-seven patients (24%) were identified as having recurrence of the hematoma that required re-evacuation. The mean age of the patient group with recurrence was 74.2 years (median 76), which was slightly older than those without recurrence (71.2 years, median 72, NS). The recurrence rate did not differ significantly with age (Fig. 1), and there was no significant difference of recurrence in the trauma group compared to the non-trauma group

Table 2
Specific therapy vs. trauma groups.

	Trauma, n (%)	Non-trauma, n (%)
Warfarin ^a	15 (24)	10 (42)
AAA ^a	40 (66)	13 (54)
Warfarin + AAA ^a	6 (10)	1 (4)
Total (n)	61	24

AAA: antiplatelet aggregation therapy.

^a NS.

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