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IMPACT OF DISCONTINUATION OF ANTITHROMBOTIC THERAPY AFTER SURGERY FOR CHRONIC SUBDURAL HEMATOMA

IMPACT DE L'INTERRUPTION DES ANTITHROMBOTIQUES APRÈS TRAITEMENT CHIRURGICALE DE L'HÉMATOME SOUS DURAL CHRONIQUE

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ABBREVIATIONS

- Chronic subdural hematoma (cSDH)
- Antithrombotic therapy (AT)
- Thromboembolic event (TE)
- Hemorrhagic recurrence (HR)
- Vascular event (VE)
- Antiplatelet therapy (AP)
- Anticoagulant (AC)
- Case Report Form (CRF)
- New oral anticoagulants (NOACs)
- Vitamin K antagonist (VKA)
- Low molecular weight heparin (LMWH)
- Prothrombin Ratio (PR)
- Activated partial thromboplastin time (aPTT)
- Deep venous thrombosis (DVT)
- Pulmonary embolism (PE)
- Odds ratio (OR)

- Prothrombin complex concentrate (PCC)
- Transient ischemic attack (TIA)

ABSTRACT

Introduction

The management of antithrombotic therapy (AT) after surgery for chronic subdural hematoma (cSDH) requires taking account of the balance of risk between hemorrhage recurrence (HR) and the prophylactic thromboembolic effect (TE). The goal of the present study was to evaluate the prevalence of vascular events (VE: TE and/or HR) in the first 3 postoperative months after cSDH evacuation in patients previously treated by AT. The impact of AT resumption was also evaluated.

Patients and methods

This observational prospective multicenter collaborative study (14 French neurosurgery centers) included patients with cSDH treated by AT and operated on between May 2017 and March 2018. Data collection used an e-CRF, and was principally based on an admission questionnaire and outcome/progression at 3 months.

Results

In this cohort of 211 patients, VE occurred in 58 patients (27.5%): HR in 47 (22.3%), TE in 17 (8%), with mixed event in 6 cases (2%). Median overall time to onset of complications 26 days \pm 31.5, and specifically 43.5 days \pm 29.25 for HR. Non-resumption of AT significantly increased the relative risk of VE [OR: 4.14; 95% CI: 2.08 - 8.56; $p < 0.001$] and especially of TE [OR: 7.5; 95% CI: 1.2 - 42; $p < 0.001$]. The relative risk of HR was significantly increased when AT was resumed at less than 30 days ($p = 0.015$).

Conclusion

The occurrence of VE in patients operated on for cSDH and previously treated by AT was statistically significant (27.5%). HR was the most common event (22.3%), whereas TE

accounted for only the 8%, although with shorter time to onset. In order to prevent TE risk, AT should be restarted after 30 days, as HR risk is greatly decreased beyond this time.

Key-words: Anticoagulant; Antiplatelet therapy; Antithrombotic; Chronic subdural hematoma; Vascular disorders; Thromboembolism.

INTRODUCTION

Chronic subdural hematoma (cSDH) is the result of micro-bleeding of an inflammatory membrane crossed by neo-vessels, developing around a hemorrhagic collection in the subdural space [1]. By a rebleeding process, these new and fragile vessels constitute the pathophysiological mechanism for the development of cSDH. The main risk factor is prophylactic antithrombotic therapy (AT) [2-7], discontinuation of which is recommended as soon as the diagnosis is made, because of the risk of local rebleeding and despite their prophylactic effect against thromboembolic events (TE) [7-13]. The rate of hemorrhagic recurrence (HR) in cSDH has been estimated at 9-33% [14-17], and is the main feature globally impacting prognosis [5, 18]. Although correction of coagulopathy during cSDH treatment is unanimously implemented [15, 19], the risk of TE related to AT discontinuation remains unknown [20].

In the scientific community, the best timing for AT reintroduction remains an open question without any clear recommendations available. Decision-making is thus very difficult, and the results available in the literature are quite contradictory and sometimes confusing [6, 14, 21]. For example, some authors reported that restarting antiplatelet therapy, unlike anticoagulants, did not increase the risk of rebleeding [11]; others reported that the risk was the same for both types of AT [21]. Consequently, AT resumption strategies differ according to the surgeon's

individual ideas, clinical experience, locally established protocols and departmental tradition [3-5, 11, 13, 19, 22].

For this reason, a distinction should be made between local vascular events such as HR and systemic vascular events such as TE.

The objectives of this multicenter prospective study were to evaluate the prevalence of local symptomatic HR and systemic TE complications occurring within the first 3 months after evacuation of a cSDH in patients treated by AT; we also assessed risk factors and analyzed the impact of the resumption of AT on the occurrence of these events.

PATIENTS AND METHODS

Study design

This multicenter longitudinal prospective observational study was conducted over 12 months (from May 2017 to March 2018) in 14 French neurosurgery centers (Besançon, Bordeaux, Caen, Colmar, Dijon, Lille, Nancy, Nice, Poitiers, Reims, Rouen, Saint-Etienne, Strasbourg, and Toulouse). The observational standard care study respected teams' therapeutic policy regarding AT; no instructions were given about AT, surgical procedure or perioperative management.

The primary objective was to assess the prevalence of HR and TE complications in the first 3 postoperative months after cSDH evacuation in patients previously treated with AT.

The secondary objectives were to evaluate postoperatively: a) mean time to HR and TE onset, b) overall mortality, c) impact of postoperative prophylaxis measures on the occurrence of vascular complications, d) risk factors for vascular events, e) and mean time to reintroduction of AT and its impact on VE.

Population

The chronic nature of cSDH was confirmed on preoperative brain CT scan in terms of signal density in Hounsfield units (HU): hypo-dense (<25 HU) or iso-dense collection (25-35 HU) in the subdural space. The inclusion period was 8 months.

The included patients were: 18 years old or over, operated on for cSDH (uni- or bi-lateral), and preoperatively treated by AT (whatever the molecule and mode of administration).

Exclusion criteria comprised: acute SDH without chronicity; cSDH without AT, operated on or not; non-operated cSDH treated by AT; previous surgery for cSDH or any other intracranial surgery in the previous 6 months; and proven dementia or neurological or psychiatric history responsible for impaired cognition, motor impairment, or consciousness disorder (Glasgow <7).

The inclusion period was 8 months, with total follow-up of 3 months. The operative date was the starting point for observation and data recording. Thus, a longitudinal prospective cohort was formed.

Endpoints

Postoperative VEs included HR and TE occurring during the first 3 postoperative months (with operative date considered as Day 0: “starting point”).

- HR was defined as any new clinical sign and/or neurological deterioration associated with an increase in the volume of the subdural collection on CT scan compared to the previous postoperative CT scan.
- Systemic TEs comprised: ischemic or transient stroke, myocardial infarction, deep venous thrombosis (DVT), pulmonary embolism (PE), systemic embolism, and cardiac valve thrombosis. They were suspected by clinical warning signs, evaluated by a qualified practitioner and diagnosed by complementary clinical exploration and imaging: stroke by magnetic resonance imaging (MRI), PE by thoracic CT

angiography, DVT by lower-limb Doppler ultrasound, cardiac valve thrombosis by transthoracic cardiac ultrasound, systemic embolism by digital subtraction angiography (DSA), and myocardial infarction by electrocardiogram.

- Mortality was defined as deaths within 3 months postoperatively.

Time to resume AT was dichotomized as early (<30 days) or late (> 30 days).

Methodology and data collection

Patient information was given and consent collected by a third-party investigator in each center.

At admission, after checking eligibility, the investigating physician informed the patient and family of the objective of the study, the nature of the clinical monitoring (at 6 weeks and 3 months), and the noninvasive complementary examinations (pre- and post-operative brain CT scan). Non-opposition to the protocol was obtained as provided for by the French Act of March 9, 2007 which provides a framework for current-care research as defined by the Act of August 9, 2004. Acknowledgment of information received was confirmed by a signature at the bottom of the information sheet by the patient or a family member.

After inclusion, data were collected by the principal investigator of each center and recorded on the two electronic case report forms (e-CRF): "hospitalization", completed at the end of the hospital stay, "follow-up" completed 3 months after the operation (at outpatient clinic follow-up or by telephone interview) [Figure 1].

Hospitalization questionnaire variables comprised:

- Patient: gender, age, symptomatology, ongoing medication, medical history, and type of AT (anticoagulants (AC), antiplatelet therapy (AP)) with indications.
- cSDH and perioperative management features: cSDH side, emergency or scheduled surgery, type of surgery and technique, use and management of postoperative

drainage, hemostasis assessment, modalities and type of postoperative thromboprophylaxis, total hospital stay, and complete immobilization time.

Follow-up questionnaire variables comprised:

- HR: time of onset, treatment, hospitalization related to AT treatment, mortality.
- TE complications: time of onset, nature (hemorrhagic and/or ischemic stroke, transient ischemic attack (TIA), myocardial infarction, DVT, PE, systemic embolism, cardiac valve thrombosis).
- Corticosteroids.
- Timing of AT resumption and type of AT.

Statistical analysis

All data were processed and analyzed using MS Excel and R software (basic package and EpiR, EpiDisplay, DescTools). Univariate logistic models were generated to calculate Odds Ratios (OR). An alpha threshold of 5% was set for tests and 95% confidence intervals. Means were compared on Student test and proportions on Chi-square test. Chi proportion comparison tests, with Yates correction when expected numbers were less than 5, were performed. Fisher's exact test was used when numbers were too small for Chi-square test. For univariate analysis, categorical variables were expressed according to age (> 75 years), male gender, recent trauma, AT type (AC, VKA, NOACs, AP, or associated AP-AC), surgical variables (emergency vs scheduled, single trepanation vs other, insertion of drain or not, drainage time 24-48h vs other), postoperative thromboprophylaxis (drug or not; if yes, time to initiation <48h vs other; mechanical or not; mobilization time <24h vs).

Ethics

This study was conducted in accordance with the Ethical Principles for Medical Research Involving Human Subjects set out in the 2004 revision of the Helsinki Declaration and its subsequent amendments in 2008 and 2013 to adhere to the world Medical Association's quality requirements. The study was approved by the Strasbourg University Hospitals review board N° IRB (FC/file 2017-48). In writing this manuscript, we followed the recommendations set out in the STROBE report for prospective studies [23].

RESULTS

Description of the population

The average number of patients included in each of the 14 neurosurgery centers was 15 [range 9 to 27]. As detailed in Table 1, this population of 211 patients had a mean age of 79.6 years \pm 9.22 [95% CI 78.4 - 80.9] with male predominance (M/F sex ratio, 3/1). History of head trauma was found in 141 patients (66.8%). Conventional risk factors for cSDH (chronic alcoholism, hereditary thrombophilia, CSF shunt, epilepsy) were recorded in less than 10% of patients for each feature. The main presenting symptomatology was hemiparesis, in 46.4% of cases, followed by mental confusion in 42.7%, unstable gait and vertigo in 35.1%, headache in 30.3%, and language dysfunction in 17.1%. cSDH was unilateral in 168 patients (79.6%), mostly left-side (n = 91/168).

187 of the 211 patients (88.6%) were treated by single AT and 24 (11.4%) by several AT agents [see also Table 2]. AT was oral AC in 104 patients (49.3%), and AP in 131 (62.1%). Types of AC comprised vitamin K antagonist (VKA) (n=80; 76.9%), new oral anticoagulation agents (NOACs) (n=22; 10.4%) and low molecular weight heparin (LMWH) (n=2; 0.9%). Types of AP comprised acetylsalicylic acid (n=92; 43.6%), clopidogrel (n=29; 13.7%) and a combination of both (n=10; 4.7%).

Indications for AT treatment were multiple (278 pathologies listed for 211 patients): cardiac etiologies (atrial fibrillation, flutter, coronary artery disease, stent, valvulopathy, mechanical valve) in 139 patients (65.8%), followed by neurological diseases (stroke) in 39 patients (18.5%), and primary prophylaxis in 35 (16.6%). Arterial thromboembolic etiologies (arteritis obliterans of lower limbs, vascular stenosis, stent, bypass) were found in 37 patients (17.5%) and venous thromboembolic etiologies (PE, DVT) in 24 (11.4%) [see also Table 3]. Mean time between initiation of AC therapy and the first surgical procedure for cSDH was 90.3 months \pm 71.09 [72.8 - 107.8], and 83.2 months \pm 77.18 [65.4 - 100.9] for AP.

Surgical treatment of cSDH ideally required correction of the pathological hemostasis, achieved in 81 (77.9%) of the 104 patients on AC and 33 (25.1%) of the 131 on AP [see also Table 2]: i.e., a majority of patients on AC prior to surgery had a normal coagulation pattern, obtained either by medical coagulopathy and/or when delayed surgery allowed spontaneous correction of hemostasis (n=23; 22.1%). The same was true in the AP group, except for 43 patients (32.9%) who were operated on without wait time or correction of hemostasis.

This immediate preoperative strategy achieved correct hemostasis in a majority of patients, with platelet count between 150,000 and 450,000/mm³ (190 patients; 90%), Prothrombin Ratio (PR) > 70% (192; 91%) and activated partial thromboplastin time (aPTT) <1.2 (183; 86.7%). Nevertheless, international normalized ratio (INR) remained pathological (> 1.2) in 53 patients (51%) [see also Table 4]. Surgical evacuation of the cSDH was performed in emergency (<24h) in 119 patients (56.4%), and used a single burr-hole in 138 (65.4%). A subdural drain was inserted in 207 patients (98.1%), for 24-48 hours in 169 (80.1%), associated to strict bed rest in 182 (86.3%) [see also Table 4]. Mean bed rest was 2.3 \pm 1.95 days [95% CI, 2 - 2.5] and mean hospital stay was 18.6 \pm 11.16 days [95% CI, 17.1 - 22.1]. Postoperative thromboprophylaxis by LMWH was prescribed in 122 patients (57.8%), and

mechanical prophylaxis by leg stockings and/or sequential pneumatic compression in 185 (87.7%).

Prevalence of postoperative vascular events

Fifty-eight patients experienced VEs within 3 months postoperatively (27.5%): local HR and systemic TE complications [see also Table 5].

Isolated local HR concerned 41 patients (19.4%) and isolated systemic TE 10 patients (4.7%), with multiple events in 7 patients (3.3%): in 6 patients (2.8%), local HR combined with systemic TE complication, and in 1 patient 2 systemic TE complications.

Twenty-nine of the 47 patients with local HR (13.7%) had redo evacuation surgery and 18 (8.5%) were conservatively managed.

Mean time to VE onset was 38.9 ± 30.26 days [95% CI, 30.7 - 47.1]: 43.5 ± 29.25 days [95% CI, 34.8 - 52.1] for HR and $26 \text{ days} \pm 31.5$ [95% CI, 9.8 - 42.2] for TE.

Risk factors for vascular events.

On univariate analysis [see also Table 6], age > 75 years, bilateral cSDH, history of recent trauma, and cardiac etiology for AT treatment were not associated with significantly greater VE risk.

The only significant risk factor for postoperative VE was early mobilization ($p = 0.04$), while single burr hole ($p = 0.06$) associated to early thromboprophylaxis ($p = 0.09$) showed a trend for VE.

For HR, 2 risk factors were identified: a) early mobilization ($p = 0.008$) and b) absence of subdural drain ($p = 0.039$).

Resumption of AT

AT resumption was prescribed in 123/211 patients (58.3%): AC in 62/104 (59.6%) and AP in 72/131 (55%) [Table 7]. Non-resumption of AT (AC or AP) significantly increased VE risk (OR = 4.14 [2.08; 8.56]; $p < 0.001$), while resumption showed a protective impact (OR = 0.24 [0.12; 0.48]; $p < 0.001$) against both local HR (versus non-resumption, OR = 3.46 [1.68, 7.38]; $p < 0.001$) and systemic TE (versus non-resumption, OR = 7.5 [1.2; 42] $p < 0.001$). In addition, resumption of AT was a protective factor against local HR (OR = 0.29 [0.14, 0.60] $p < 0.001$).

Regarding time to resumption, early (<30 days) compared to late resumption (> 30 days) increased HR risk (OR = 4.8 [1.22, 27.74] $p = 0.015$) [Table 6].

Mean time to AT resumption was 37.9 days \pm 34.57 [95% CI, 32; 43.9]: 46 days \pm 37.74 [95% CI, 36.8 - 55.2] for AC and 31.2 days \pm 28.25 [95% CI, 24.6 - 37.7] for AP.

Forty-two patients were readmitted to neurosurgery (19.9%), with a mortality rate of 4.7% (10/211 patients) at a mean 49.1 days \pm 48.6 [95% CI, 14.3; 83.9].

DISCUSSION

In 58 of this cohort of 211 patients who underwent cSDH surgery, most with normal coagulation status after AT interruption, a vascular event occurred (27.5%) within 3 months post-operatively. HR was predominant ($n = 47$; 22.3%), with mean onset of 43.5 days. In contrast, an isolated TE complication occurred in 10 patients (4.7%) and multiple TEs in 7, 6 of whom had local HR. On univariate analysis, risk factors for local HR comprised absence of subdural drainage, early postoperative mobilization (<24h). In addition, absence of AT resumption significantly increased the risk of HR and occurrence of systemic TE complications. However, early (< 30 days) compared to late (> 30 days) resumption of AT significantly increased the risk of local HR.

Basic features

cSDH mainly affects the elderly, with a male-to-female ratio of 2.5:1 [5]. The results of our study are consistent with these findings, with an average age of 79.6 years, M/F sex ratio of 3:1 and left hemisphere predominance. The sex difference can be explained by the anatomic shape of the skull, which could influence the left and male prevalence of cSDH [24]. History of head trauma was also found in 66.8% of cases, which is in line with the rates of 50-80% in the literature [5]). Univariate comparison showed that optimal prognosis for surgically managed cSDH depends on the degree of emergency (directly related to the patient's neurological status), use of a single burr hole associated to subdural drain placement after normalization of coagulopathy with immediate mechanical and medical thromboprophylaxis started within 48 hours postoperatively. Also it seems that postoperative mobilization should be started after removal of the subdural drain.

cSDH HR and AT treatment

Guha et al. reported a 19% postoperative risk of rebleeding. In the meta-analysis by Wang et al. [25], HR rate was 26% with AC and 21% with AP; there was also a positive correlation, with OR = 2.20 [1.45 - 3.33] ($p = 0.0002$) for AC, and OR = 1.64 [1.17 - 2.30] ($p = 0.004$) for AP [25]. In our study, no patients were without; even so, the percentage of HR was consistent with the literature, was 22.3% for either type of AT.

After resumption of AT treatment, Fornebo et al. [26] found a rebleeding risk of 13.9%. In the meta-analysis by Phan et al. [20], the overall HR rate in the group of patients restarting AT was 14.8%, compared to 18.6% ($p = 0.591$) in the group that did not resume. In our study, the rate of HR after resumption of AT was 13% (16/123) versus 35.2% (31/88) without resumption, showing resumption of AT to be a protective factor (OR = 0.29 [0.14, 0.60]; $p < 0.001$). The latter feature is not easily explicable, although previously reported in other

studies [7, 22]; it may be due to a tendency of clinicians to resume AT in patients in whom risk of HR is lower.

Thromboembolic (TE) complications and AT treatment

Guha et al. [7] found a non-significant trend for increased thromboembolism in patients on preoperative AT after evacuation of cSDH (2.60% vs. 0.81%). However, Murthy et al. [27] reported that AC resumption was associated with a significantly lower TE rate (6.7% versus 17.6% for patients who did not resume AC), without impacting HR rate.

In the meta-analysis by Phan et al. [20], TE rate was statistically higher in non-resumption than resumption of AT ($p = 0.01$): 6.8% vs 2.9% respectively.

Likewise, in the present series, non-resumption of AT was therefore a significant risk factor for TE, with rates of 15.9% versus 2.4% with resumption (OR = 7.5 [1.2 - 42] ($p < 0.001$ for non-resumption)).

Role of thromboprophylaxis

Ducruet et al. [15] recommended drug thromboprophylaxis on removal of the subdural drain, but the time to AT resumption was at the surgeon's discretion. Tahsim-Oglou et al. [28] reported increased rebleeding and re-intervention rates in patients who initiated LMWH (Enoxaparin 40 mg daily) on the first postoperative day. Similarly, Forster et al. [5] reported increased recurrence in high-risk patients who started postoperative LMWH at therapeutic doses. In the present study, 57.8% of patients had postoperative thromboprophylaxis with LMWH. There was a non-significant tendency for HR in patients who received LMWH for postoperative prophylaxis compared to those who did not ($p = 0.09$).

In accordance with the American College of Chest Physicians' clinical guidelines, pharmacological prophylaxis could be added to mechanical prophylaxis in patients at high risk for venous thromboembolism once hemostasis and risk of hemorrhage are controlled

[29]. In addition, the new cranial neurosurgery guidelines of the European Anesthesiology Society recommend an interval of at least 24 hours after surgery before initiating LMWH prophylaxis [30].

AT resumption timing and vascular events

There is a general consensus on resumption of AC treatment in symptomatic patients with cSDH [15], but not on whether and how to resume AT postoperatively [25]. In addition, risk of TE was estimated to be 1/30, 4/30 for HR in two studies [4, 31]. On the basis of these results, Poon et al. [12] suggested that the risk of short-term HR exceeds the risk of TE vents. Several studies analyzed ideal timing of AT resumption. Some authors [14, 19, 32-35] suggested early resumption at 3 days to 3 weeks while others [7, 9, 36] suggested a mean interval of >1 month. In the present study, time to resumption averaged 46 days \pm 37.74 [95% CI 36.8 - 55.2] for AC and 31.2 days \pm 28.25 [95% CI 24.6 - 37.7] for AP, with non-resumption of AT treatment at 3 months in 88/211 patients (41.7%). Resumption of AT treatment significantly protected against TE, with a lower complications rate ($p < 0.001$). Nevertheless, early (<30 days) compared to resumption of AT (> 30 days) resulted in a greater risk of HR ($p = 0.015$).

These results are clearly in contradiction with some studies that consider early resumption (<30 days) to be safe [7, 26]. Nevertheless, a recent study analyzing the management of AC in patients with mechanical valves and intracerebral hemorrhage found that AT resumption less than 2 weeks after a hemorrhagic episode was associated with increased rebleeding rate [37]. Extrapolating these results, it seems safer to resume AT after 2 weeks postoperatively and preferably after 1 month.

Tools that can help clinicians in resuming AT

To assess risk of bleeding, Chari et al. [22] reported that risk stratification systems such as CHA₂DS₂-VASc [38], HEMORR₂HAGES, HAS-BLED and ATRIA scores could be useful

in assessing patient whether receiving or not receiving AT. Bischof et al. reported that thromboelastography could be used to control coagulation and predict postoperative complications due to hypercoagulability [39]. The classification system of Nomura et al. [40], which stratifies risk of rebleeding according to cSDH density on CT could also be useful. Further studies are needed to assess efficacy.

Limitations

The present study had certain limitations. a) Data on when AT achieves optimal postoperative AT levels were lacking. In this population of older, people often with **complex diet**, several elements can impact the effectiveness of AT. b) Postoperative INR was not performed for AC patients. c) No postoperative CT was performed. The imaging could be of great help, having undoubtedly a crucial role in the decision-making process for AT resumption. d) The influence of drugs such as corticosteroids and atorvastatin could not be fully assessed. However, for corticosteroids, no study has currently shown superiority over simple drug termination [41, 42]. In this population of elderly patients, which often has several cardiovascular risk factors, the use of atorvastatin in some patients may have created a bias. This treatment, used in hypercholesterolemia, can improve angiogenesis and reduce inflammation in cSDH [43-45]. The lack of evidence on AT management after evacuation of cSDH can be explained by the number of variables, including individual risk profile and variability in surgical procedure, but also by the power, dose and variable resumption time of the AT drug. All these variables make it almost impossible to perform a randomized controlled trial, which would be essential to validate our findings that AT resumption is a safe and effective attitude, very favorably impacting global outcome in such a complex and fragile group of patients.

CONCLUSION

The rate of vascular events in patients undergoing cSDH surgery is not negligible, at 27.5%. HR was the most frequent event (22.3% in our series), in contrast to TE (8%) although time to onset was shorter. To prevent VE risk, resumption of AT seems essential, without increasing HR risk if done after the 30th postoperative day.

Disclosure of interest

The authors declare that they have no competing interests.

LEGENDS

Figure 1. *Chronology of the study with information period of the e-CRF questionnaire.*

Table 1. *Clinical characteristics of the 211 patients on admission.*

Table 2. *In the 211 patients, nature of antithrombotic (AT) treatment, and corrections.*

Table 3. *Pathologies for which antithrombotic therapy was mandatory in the 211 patients.*

Table 4. *In the 211 patients, hemostasis correction, type of surgery, and thromboprophylaxis.*

Table 5. *Prevalence and total number of vascular events in the 211 patients followed during the first 3 postoperative months.*

Table 6. *Univariate comparison of variables according occurrence of a vascular event of hemorrhagic recurrence.*

Table 7. *Risk induced by the resumption/non-resumption of AT, AC and AP according to occurrence of a vascular event, thromboembolism or hemorrhagic recurrence.*

REFERENCES

- [1] Almenawer SA, Farrokhyar F, Hong C, Alhazzani W, Manoranjan B, Yarascavitch B, et al. Chronic subdural hematoma management: a systematic review and meta-analysis of 34,829 patients. *Ann Surg.* 2014;259:449-57.
- [2] Baechli H, Nordmann A, Bucher HC, Gratzl O. Demographics and prevalent risk factors of chronic subdural haematoma: results of a large single-center cohort study. *Neurosurg Rev.* 2004;27:263-6.
- [3] Stanisic M, Lund-Johansen M, Mahesparan R. Treatment of chronic subdural hematoma by burr-hole craniostomy in adults: influence of some factors on postoperative recurrence. *Acta Neurochir (Wien).* 2005;147:1249-56; discussion 56-7.
- [4] Torihashi K, Sadamasa N, Yoshida K, Narumi O, Chin M, Yamagata S. Independent predictors for recurrence of chronic subdural hematoma: a review of 343 consecutive surgical cases. *Neurosurgery.* 2008;63:1125-9; discussion 9.
- [5] Forster MT, Mathe AK, Senft C, Scharrer I, Seifert V, Gerlach R. The influence of preoperative anticoagulation on outcome and quality of life after surgical treatment of chronic subdural hematoma. *J Clin Neurosci.* 2010;17:975-9.
- [6] Chon KH, Lee JM, Koh EJ, Choi HY. Independent predictors for recurrence of chronic subdural hematoma. *Acta Neurochir (Wien).* 2012;154:1541-8.
- [7] Guha D, Coyne S, Macdonald RL. Timing of the resumption of antithrombotic agents following surgical evacuation of chronic subdural hematomas: a retrospective cohort study. *J Neurosurg.* 2016;124:750-9.
- [8] De Bonis P, Trevisi G, de Waure C, Sferrazza A, Volpe M, Pompucci A, et al. Antiplatelet/anticoagulant agents and chronic subdural hematoma in the elderly. *PLoS One.* 2013;8:e68732.
- [9] Kamenova M, Lutz K, Schaedelin S, Fandino J, Mariani L, Soleman J. Does Early Resumption of Low-Dose Aspirin After Evacuation of Chronic Subdural Hematoma With Burr-Hole Drainage Lead to Higher Recurrence Rates? *Neurosurgery.* 2016;79:715-21.
- [10] Kamenova M, Nevzati E, Lutz K, Dolp A, Fandino J, Mariani L, et al. Burr-Hole Drainage for Chronic Subdural Hematoma Under Low-Dose Acetylsalicylic Acid: A Comparative Risk Analysis Study. *World Neurosurg.* 2017;100:594-600.
- [11] Nathan S, Goodarzi Z, Jette N, Gallagher C, Holroyd-Leduc J. Anticoagulant and antiplatelet use in seniors with chronic subdural hematoma: Systematic review. *Neurology.* 2017;88:1889-93.
- [12] Poon MTC, Al-Shahi Salman R. Association between antithrombotic drug use before chronic subdural haematoma and outcome after drainage: a systematic review and meta-analysis. *Neurosurg Rev.* 2017.
- [13] Rust T, Kiemer N, Erasmus A. Chronic subdural haematomas and anticoagulation or anti-thrombotic therapy. *J Clin Neurosci.* 2006;13:823-7.
- [14] Okano A, Oya S, Fujisawa N, Tsuchiya T, Indo M, Nakamura T, et al. Analysis of risk factors for chronic subdural haematoma recurrence after burr hole surgery: optimal management of patients on antiplatelet therapy. *Br J Neurosurg.* 2014;28:204-8.
- [15] Ducruet AF, Grobelny BT, Zacharia BE, Hickman ZL, DeRosa PL, Andersen KN, et al. The surgical management of chronic subdural hematoma. *Neurosurg Rev.* 2012;35:155-69; discussion 69.
- [16] Mori K, Maeda M. Surgical treatment of chronic subdural hematoma in 500 consecutive cases: clinical characteristics, surgical outcome, complications, and recurrence rate. *Neurol Med Chir (Tokyo).* 2001;41:371-81.
- [17] Nakaguchi H, Tanishima T, Yoshimasu N. Factors in the natural history of chronic subdural hematomas that influence their postoperative recurrence. *J Neurosurg.* 2001;95:256-62.
- [18] de Araujo Silva DO, Matis GK, Costa LF, Kitamura MA, de Carvalho Junior EV, de Moura Silva M, et al. Chronic subdural hematomas and the elderly: Surgical results from a series of 125 cases: Old "horses" are not to be shot! *Surg Neurol Int.* 2012;3:150.
- [19] Gonugunta V, Buxton N. Warfarin and chronic subdural haematomas. *Br J Neurosurg.* 2001;15:514-7.

- [20] Phan K, Abi-Hanna D, Kerferd J, Lu VM, Dmytriw AA, Ho YT, et al. Resumption of Antithrombotic Agents in Chronic Subdural Hematoma: A Systematic Review and Meta-analysis. *World Neurosurg.* 2018;109:e792-e9.
- [21] Ohba S, Kinoshita Y, Nakagawa T, Murakami H. The risk factors for recurrence of chronic subdural hematoma. *Neurosurg Rev.* 2013;36:145-9; discussion 9-50.
- [22] Chari A, Clemente Morgado T, Rigamonti D. Recommencement of anticoagulation in chronic subdural haematoma: a systematic review and meta-analysis. *Br J Neurosurg.* 2014;28:2-7.
- [23] von Elm E, Altman DG, Egger M, Pocock SJ, Gotsche PC, Vandenbroucke JP, et al. The Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) statement: guidelines for reporting observational studies. *Ann Intern Med.* 2007;147:573-7.
- [24] Lee KS. Chronic Subdural Hematoma in the Aged, Trauma or Degeneration? *J Korean Neurosurg Soc.* 2016;59:1-5.
- [25] Wang Y, Zhou J, Fan C, Wang D, Jiao F, Liu B, et al. Influence of antithrombotic agents on the recurrence of chronic subdural hematomas and the quest about the recommencement of antithrombotic agents: A meta-analysis. *J Clin Neurosci.* 2017;38:79-83.
- [26] Fornebo I, Sjavik K, Alibeck M, Kristiansson H, Stahl F, Forander P, et al. Role of antithrombotic therapy in the risk of hematoma recurrence and thromboembolism after chronic subdural hematoma evacuation: a population-based consecutive cohort study. *Acta Neurochir (Wien).* 2017;159:2045-52.
- [27] Murthy SB, Gupta A, Merkler AE, Navi BB, Mandava P, Iadecola C, et al. Restarting Anticoagulant Therapy After Intracranial Hemorrhage: A Systematic Review and Meta-Analysis. *Stroke.* 2017;48:1594-600.
- [28] Tahsim-Oglou Y, Beseoglu K, Hanggi D, Stummer W, Steiger HJ. Factors predicting recurrence of chronic subdural haematoma: the influence of intraoperative irrigation and low-molecular-weight heparin thromboprophylaxis. *Acta Neurochir (Wien).* 2012;154:1063-7; discussion 8.
- [29] Guyatt GH AE, Crowther M, et al. American College of Chest Physicians Antithrombotic Therapy and Prevention of Thrombosis Panel: Executive summary: Antithrombotic Therapy and Prevention of Thrombosis, 9th ed: American College of Chest Physicians Evidence-Based Clinical Practice Guidelines. *Chest* 141: 7S-47S, 2012.
- [30] Faraoni D, Comes RF, Geerts W, Wiles MD, Force EVGT. European guidelines on perioperative venous thromboembolism prophylaxis: Neurosurgery. *Eur J Anaesthesiol.* 2018;35:90-5.
- [31] Lindvall P, Koskinen LO. Anticoagulants and antiplatelet agents and the risk of development and recurrence of chronic subdural haematomas. *J Clin Neurosci.* 2009;16:1287-90.
- [32] Amano T, Takahara K, Maehara N, Shimogawa T, Mukae N, Sayama T, et al. Optimal perioperative management of antithrombotic agents in patients with chronic subdural hematoma. *Clin Neurol Neurosurg.* 2016;151:43-50.
- [33] Kawamata T, Takeshita M, Kubo O, Izawa M, Kagawa M, Takakura K. Management of intracranial hemorrhage associated with anticoagulant therapy. *Surg Neurol.* 1995;44:438-42; discussion 43.
- [34] Tsushima S, Komeichi T, Niwa J. Resumption of Antithrombotic Therapy and the Operative Procedure in Recurrent Chronic Subdural Hematoma. *Japanese Journal of Neurosurgery.* 2013;22:625-630.
- [35] Yeon JY, Kong DS, Hong SC. Safety of early warfarin resumption following burr hole drainage for warfarin-associated subacute or chronic subdural hemorrhage. *J Neurotrauma.* 2012;29:1334-41.
- [36] Mirzayan MJ, Calvelli K, Capelle HH, Weigand J, Krauss JK. Subdural Hematoma and Oral Anticoagulation: A Therapeutic Dilemma from the Neurosurgical Point of View. *J Neurol Surg A Cent Eur Neurosurg.* 2016;77:31-5.
- [37] Kuramatsu JB, Sembill JA, Gerner ST, Sprugel MI, Hagen M, Roeder SS, et al. Management of therapeutic anticoagulation in patients with intracerebral haemorrhage and mechanical heart valves. *Eur Heart J.* 2018;39:1709-23.
- [38] Lip GY, Nieuwlaat R, Pisters R, Lane DA, Crijns HJ. Refining clinical risk stratification for predicting stroke and thromboembolism in atrial fibrillation using a novel risk factor-based approach: the euro heart survey on atrial fibrillation. *Chest.* 2010;137:263-72.
- [39] Bischof D, Dalbert S, Zollinger A, Ganter MT, Hofer CK. Thrombelastography in the surgical patient. *Minerva Anesthesiol.* 2010;76:131-7.

- [40] Nomura S, Kashiwagi S, Fujisawa H, Ito H, Nakamura K. Characterization of local hyperfibrinolysis in chronic subdural hematomas by SDS-PAGE and immunoblot. *J Neurosurg.* 1994;81:910-3.
- [41] Berghauer Pont LM, Dirven CM, Dippel DW, Verweij BH, Dammers R. The role of corticosteroids in the management of chronic subdural hematoma: a systematic review. *Eur J Neurol.* 2012;19:1397-403.
- [42] Kolia AG, Chari A, Santarius T, Hutchinson PJ. Chronic subdural haematoma: modern management and emerging therapies. *Nat Rev Neurol.* 2014;10:570-8.
- [43] Li T, Wang D, Tian Y, Yu H, Wang Y, Quan W, et al. Effects of atorvastatin on the inflammation regulation and elimination of subdural hematoma in rats. *J Neurol Sci.* 2014;341:88-96.
- [44] Quan W, Zhang Z, Tian Q, Wen X, Yu P, Wang D, et al. A rat model of chronic subdural hematoma: Insight into mechanisms of revascularization and inflammation. *Brain Res.* 2015;1625:84-96.
- [45] Wang D, Li T, Wei H, Wang Y, Yang G, Tian Y, et al. Atorvastatin enhances angiogenesis to reduce subdural hematoma in a rat model. *J Neurol Sci.* 2016;362:91-9.

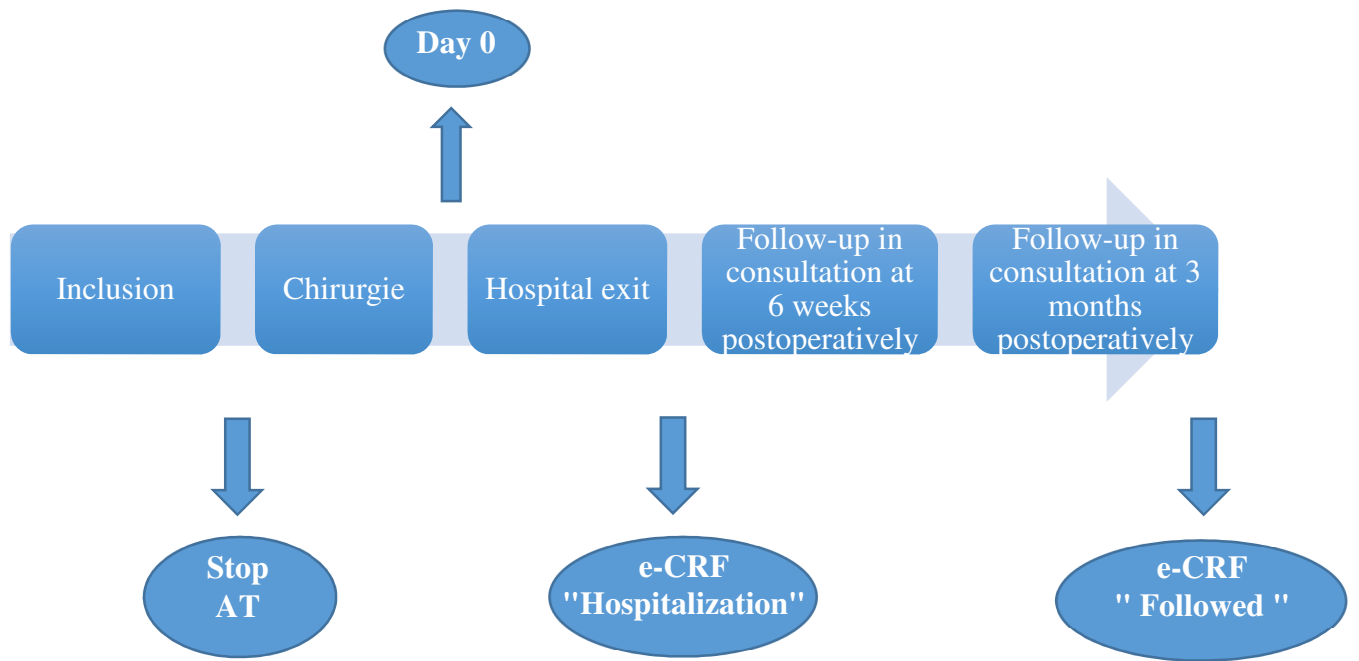


Figure 1. Chronology of the study with information period of the e-CRF questionnaire.

Table 1: Clinical characteristics of the 211 patients on admission.

<i>Clinical features</i>		Total – n (%)
Age		
	<i>Years (Mean±SD)</i>	79.6 ± 9.22
Gender		
	<i>Female</i>	53 (25.1)
	<i>Male</i>	158 (74.9)
Recent cranial trauma		
	<i>No</i>	70 (33.2)
	<i>Yes</i>	141 (66.8)
Risk factors		
	<i>Chronic Alcoholism</i>	21 (10)
	<i>Epilepsy</i>	0 (0)
	<i>Thrombotic event <6 months</i>	15 (7.1)
	<i>Hereditary thrombophilia</i>	4 (1.9)
	<i>Shunt</i>	1 (0.5)
Initial symptomatology		
	<i>Weakness of a limb</i>	98 (46.4)
	<i>Confusion</i>	90 (42.7)
	<i>Disturbed balance</i>	74 (35.1)
	<i>Headache</i>	64 (30.3)
	<i>Language disorder</i>	36 (17.1)
	<i>Drowsiness</i>	33 (15.6)
	<i>Convulsions</i>	10 (4.7)
	<i>Memory disorder</i>	7 (3.3)
	<i>Visual disorder</i>	4 (1.9)
	<i>Nausea / Vomiting</i>	3 (1.4)
	<i>Asymptomatic</i>	3 (1.4)
Side of cSDH		
	<i>Right</i>	77 (36.5)
	<i>Left</i>	91 (43.1)
	<i>Unilateral</i>	168 (79.6)
	<i>Bilateral</i>	43 (20.4)

Table 2. In the 211 patients, nature of antithrombotic (AT) treatment, and corrections.

Variables	Total – n (%)
Nature of AT Treatment	
	n = 211
Anticoagulant (AC)	104 (49.3)
Vitamin K antagonist (VKA)	80 (76.9)
Fluindione (Préviscan)	68 (32.2)
Warfarin (Coumadine)	7 (3.3)
Acenocoumarol (Sintrom, Minsintrom)	5 (2.4)
New oral anticoagulants (NOACs)	22 (10.4)
Rivaroxaban (Xarelto)	9 (4.3)
Dabigatran (Pradaxa)	6 (2.8)
Apixaban (Eliquis)	7 (3.3)
Low molecular weight heparin	2 (0.9)
LMWH: Tinzaparin (Inohep)	2 (0.9)
Antiplatelet (AP)	131 (62.1)
Acetylsalicylic acid (AA)	92 (43.6)
clopidogrel	29 (13.7)
AA and clopidogrel association	10 (4.7)
Including AP and AC association	24 (11.4)
Resumption methods	
	n = 104
Anti-coagulant resumption	
Stop and wait	23 (22.1)
Vitamin K (vit K) alone	27 (26)
Prothrombin complex concentrate (PCC) alone	17 (16.3)
Association vit K + PCC	37 (35.6)
Anti-aggregation resumption	n = 131
No	43 (32.9)
Stop and wait	55 (42)
apheresis platelet concentrate (APC) transfusion	32 (24.4)
fresh frozen plasma (FFP) transfusion	1 (0.7)

Table 3. Pathologies for which antithrombotic therapy was mandatory in the 211 patients.

<i>Diseases</i>	Total – n (%)
<i>Cardiac Etiologies</i>	139 (65.8)
<i>AF / flutter</i>	69 (32.7)
<i>Coronary artery disease</i>	36 (17.1)
<i>Heart stent</i>	22 (10.4)
<i>Mechanical valve</i>	10 (4.7)
<i>Valvulopathy on native valve</i>	2 (0.9)
<i>Neurological Etiology</i>	39 (18.5)
<i>Stroke</i>	
<i>Primary prevention</i>	35 (16.6)
<i>Venous etiologies</i>	24 (11.4)
<i>PE</i>	13 (6.2)
<i>DVT</i>	11 (5.2)
<i>Arterial etiologies</i>	37 (17.5)
<i>Arteritis obliterans of the lower limbs</i>	16 (7.6)
<i>Peripheral vascular stenosis</i>	10 (4.7)
<i>Peripheral vascular stent</i>	6 (2.8)
<i>Abdominal aortic aneurysm</i>	1 (0.5)
<i>Bypass</i>	4 (1.9)
<i>Other</i>	4 (1.9)
<i>(Polycythemia vera, vascular dementia, Tako Tsubo, essential thrombocytosis)</i>	

Table 4. In the 211 patients, hemostasis correction, type of surgery, and thromboprophylaxis.

<i>Perioperative period</i>	Total – n (%)
Biological parameters of hemostasis	
Last INR value	n = 104
0.8-1.2	51 (49)
1.2-2	45 (43.3)
2-3	6 (5.8)
>3	2 (1.9)
	n = 211
Last PR value	
< 50	1 (0.5)
50-70	18 (8.5)
70-90	98 (46.4)
>90	94 (44.5)
Last platelet count	
<150,000	14 (6.6)
150,000-450,000	190 (90)
>450,000	7 (3.3)
Last aPTT ratio	
<1.2	183 (86.7)
1.2-2	26 (12.3)
>2	1 (0.5)
>3	1 (0.5)
Surgical act	
Context	
Emergency (<24h)	119 (56.4)
Scheduled	92 (43.6)
Type	
Single trepanation	138 (65.4)
Double trepanation	21 (10)
Craniotomy	43 (20.4)
Twist drill	4 (1.9)
Other	5 (2.4)
Drain installation	
No	4 (1.9)
Yes	207 (98.1)
Duration of drainage	
<24h	25 (11.8)
24-48h	169 (80.1)
>48h	14 (6.6)
Postoperative thromboprophylaxis	
Drug	122 (57.8)
Immediate post-op	4 (3.3)
24-48h	56 (45.9)
2-3 days	40 (32.8)
3-7 days	17 (13.9)
1-2 weeks	2 (1.6)
>2 weeks	2 (1.6)
Pursued until recovery of curative treatment	1 (0.8)
Mechanical	
No	25 (11.8)
Contention stockings	185 (87.7)
Intermittent mechanical compression (IMC)	1 (0.5)
Mobilization	
Bed rest during drainage	182 (86.3)
Early rising (before 24h post op)	18 (8.5)
Mobilization according to tolerance (Free)	11 (5.2)

Table 5. Prevalence and total number of vascular events in the 211 patients followed during the first 3 postoperative months.

Vascular complications	n (%) Patients			Total Vascular Events	
	Isolated		Associated		
cSDH hemorrhagic recurrence	Unique	41 (19.4)	All etiologies	6 (2.8)	47
			+ Myocardial infarction	1 (0.5)	1
			+ Systemic embolism	1 (0.5)	1
			+ Stroke	2 (0.9)	2
			+ DVT and PE	1 (0.5)	2
+ DVT	1 (0.5)	1			
Thromboembolic complications	All etiologies	10 (4.7)	DVT		10
			PE		
			Systemic embolism		
			Myocardial infarction		
			Stroke		
			Heart valve thrombosis		
			TVP + AVC	1 (0.5)	
Total Patient n = 58 (27.5)		51 (24.2)		7 (3.3)	66

deep vein thrombosis (DVT), pulmonary embolism (PE),

<i>Variables</i>	<i>Event (n) / No vascular event (n)</i>	<i>Relative risk OR [95% CI] p</i>	<i>Hemorrhagic recurrence (n) / No hemorrhagic recurrence (n)</i>	<i>Relative risk OR [95% CI] p</i>
<i>Age > 75 years</i>	44 / 104	1.48 [0.71 ; 3.2] (NS)	34 / 114	1.26 [0.58 ; 2.91] (NS)
<i>Bilateral initial hemorrhage</i>	15 / 28	1.55 [0.70 ; 3.35] (NS)	11 / 32	1.30 [0.54 ; 2.99] (NS)
<i>Male gender</i>	46 / 112	1.40 [0.65 ; 3.2] (NS)	39 / 119	2.15 [0.87 ; 6.1] (p = 0.08)
<i>Recent trauma</i>	43 / 98	1.61 [0.79 ; 3.41] (p = 0.19)	33 / 108	1.34 [0.63 ; 2.99] (NS)
<i>Pathology : Cardiac Etiologies</i>	42 / 97	1.0 [0.58 ; 1.75] (NS)	32 / 97	0.67 [0.47 ; 1.54] (NS)
<i>Anticoagulant (AC)</i>	30 / 74	1.14 [0.6 ; 2.19] NS	25 / 79	1.29 [0.64 ; 2.64] (NS)
<i>VKA</i>	26 / 54	1.49 [0.77 ; 2.88] (p = 0.20)	22 / 58	2.63 [0.68 ; 15.15] (p = 0.131)
<i>NOACs</i>	4 / 18	0.45 [0.14 ; 1.99] (NS)	3 / 19	0.54 [0.09 ; 1.96] (NS)
<i>Antiplatelet therapy (AP)</i>	34 / 97	0.82 [0.42 ; 1.6] (NS)	27 / 104	0.83 [0.41 ; 1.73] (NS)
<i>AC and AP association</i>	6 / 18	0.87 [0.26 ; 2.44] (NS)	6 / 18	1.22 [0.37 ; 3.50] (NS)
<i>Surgery</i>				
<i>Emergency (<24h)</i>	33 / 86	1.02 [0.54 ; 1.99] (NS)	25 / 94	0.93 [0.45 ; 1.90] (NS)
<i>Single trepanation</i>	39 / 99	1.12 [0.56 ; 2.26] (p = 0.064)	33 / 195	1.38 [0.64 ; 3.11] (NS)
<i>Installation of drain</i>	55 / 152	0.12 [0.0023 ; 1.56] (NS)	43 / 164	0.09 [0.0018 ; 1.22] (p = 0.039)
<i>Drainage time 24-48h</i>	47 / 122	1.09 [0.48 ; 2.6] (NS)	37 / 132	1.34 [0.52 ; 3.90] (NS)
<i>Postoperative thromboprophylaxis</i>				
<i>Drug</i>	37 / 78	1.69 [0.87 ; 3.34] (p = 0.095)	32 / 90	1.76 [0.85 ; 3.73] (p = 0.099)
<i>Time to initiation (<48h)</i>	15 / 45	0.84 [0.39 ; 1.73] (NS)	11 / 49	0.45 [0.17 ; 1.11] (p = 0.064)
<i>Mechanical restraint</i>	49 / 137	0.64 [0.25 ; 1.75] (NS)	37 / 149	0.48 [0.18 ; 1.34] (p = 0.12)
<i>Mobilization (<24h)</i>	9 / 9	2.79 [1.05 ; 7.45] (p = 0.04)	9 / 9	3.86 [1.26 ; 11.85] (p = 0.008)

Table 6. Univariate comparison of variables according occurrence of a vascular event of hemorrhagic recurrence

<i>Treatment during 3-month follow-up</i>		Vascular events n = 58		cSDH hemorrhagic recurrence n = 47		Thromboembolic complications n = 17	
		<i>n (%)</i>	<i>Relative risk OR [95% CI] p</i>	<i>n (%)</i>	<i>Relative risk OR [95% CI] p</i>	<i>n (%)</i>	<i>Relative risk OR [95% CI] p</i>
Antithrombotic	<i>No resumption</i>	41 (70.7)	4.14 [2.08 ; 8.56] p < 0.001	31 (66)	3.46 [1.68 ; 7.38] p < 0.001	14 (82.4)	7.5 [1.2 ; 42] p < 0.001
	<i>Resumption</i>	17 (29.3)	0.24 [0.12 ; 0.48] p < 0.001	16 (34)	0.29 [0.14 ; 0.60] p < 0.001	3 (17.6)	0.13 [0.03 ; 0.5] p < 0.001
	<i>Early < 30 days</i>	14 (24.1)	5.54 [1.42 ; 31.99] p = 0.007	13 (27.7)	4.8 [1.22 ; 27.74] p = 0.015	3 (17.6)	–
	<i>Late > 30 days</i>	3 (5.2)	0.18 [0.03 ; 0.70] p = 0.007	3 (6.4)	0.21 [0.036 ; 0.82] p = 0.015	0 (0)	–
Anticoagulant	<i>No resumption</i>	53 (91.4)	4.96 [1.83 ; 16.91] p < 0.001	42 (89.4)	4.18 [1.53 ; 14.29] p = 0.001	16 (94.1)	7.3 [1.08 ; 312.3] p = 0.026
Antiplatelet therapy	<i>No resumption</i>	46 (79.3)	2.27 [1.07 ; 5.10] p = 0.022	35 (74.5)	1.8 [0.83 ; 4.09] p = 0.12	15 (88.2)	4.22 [0.94 ; 39.03] p = 0.059

Table 7. Risk induced by the resumption/non-resumption of AT, AC and AP according to occurrence of a vascular event, thromboembolism or hemorrhagic recurrence. Risk induced by the resumption/non-resumption of AT, AC and AP according to occurrence of a vascular event, thromboembolism or hemorrhagic recurrence..

