

# Risk Factors for Subdural Bleeding in Elderly Population

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## ABSTRACT

*In the elderly, a larger proportion of the intracranial bleeds is related to non-traumatic causes or is caused by slight trauma – such that in a younger patient would not be expected to cause a bleed. In clinical practice, there is a prevailing impression that these bleeds, especially subdural hematomas of chronic and sub-chronic duration with or without acutization (evidence of »fresh« bleeding) are in many cases related directly to the use of anticoagulant therapy. A retrospective survey of medical documentation was performed for patients treated at the Neurosurgery Clinic of KBC Rijeka during the period of 2011 and 2012. Statistical analysis showed a significantly greater incidence of spontaneous SDH (subdural hematoma) in patients taking oral anticoagulation therapy (Fisher exact test,  $p < 0.01$ ). In the article 3 typical cases of such patients are also presented. This survey confirmed the existence of a relationship between oral anticoagulant therapy and SDH, in particular the subgroup of »spontaneous« SDH. A larger study is planned.*

**Key words:** aged, intracranial subdural hematoma, anticoagulants, trephining, comorbidity

## Introduction

The continuous expansion of the elderly segment (older than 60) of the population is driving the development of geriatric medicine and with it that of geriatric neurosurgery. Mostly this is concerned with the surgery of the ageing spine, intracranial tumors and intracranial bleeding. In the elderly, a larger proportion of the intracranial bleeds is related to non-traumatic causes or is caused by slight trauma – such that in a younger patient would not be expected to cause a bleed. This can be explained by the physiological and pathological changes of the ageing brain, for most part. Here we can blame the atrophy of the brain matter, changes in the endothelium of the older vasculature, especially the ever more fragile bridging veins, atherosclerotic disease etc. In clinical practice, there is a prevailing impression that these bleeds, especially subdural hematomas of chronic and sub-chronic duration with or without acutization (evidence of »fresh« bleeding) are in many cases related directly to the use of anticoagulant therapy. In any case the chronic use of anticoagulant therapy is related to worse outcomes and more complication in the treatment of SDH in the elderly, especially if the therapy is poorly controlled or inadequate<sup>1</sup>.

## Analysis

The aim of our survey was to verify if the clinical impression that taking anticoagulation therapy, as well as older age, co-morbidities or chronic alcoholism increases the risk for SDH. A retrospective survey of medical documentation was performed for patients treated at the Neurosurgery Clinic of KBC Rijeka during the period of 2011 and 2012. We identified 82 patients treated for SDH. All patients were admitted, most were treated operatively, and all were controlled by CT scan(s). 83% of patients were male. 73% were 60 years old or more, and the average age of the surveyed patients was 65.4. Such statistical distribution is comparable to most recent similar studies on the subject. 64 out of the 82 SDHs were characterized as traumatic and 18 as spontaneous. 67 out of the 82 SDHs were characterized as acute and 15 as chronic. The overall mortality was found to be 24%. The mortality in the group on oral anticoagulant therapy was 33%. A low-risk and an elevated-risk group were identified. The elevated-risk group consisted of elderly patients, with co-morbidities and/or on anticoagulant therapy, and chronic alcoholics.

64 patients belong to the elevated-risk group vs. 18 in the low-risk group. 13.5% of the patients were on oral anticoagulant therapy, but when considering only the spontaneous SDH group 39% of these patients were on oral anticoagulant therapy. Statistical analysis showed a significantly greater incidence of spontaneous SDH in the oral anticoagulant group (Fisher exact test,  $p < 0.01$ ).

### Case 1

Male, 78, presents to the ED with headache, right sides weakness and mild disorientation. Takes oral anticoagulant therapy because of atrial fibrillation. Recalls being hit on the head 40 days before, denies loss of consciousness or vegetative symptoms at the time. He is operated with a good recovery, and discharged home. On follow up 1 month and 6 months later he is well, without relapse.

This case portrays what we feel is the prototype patient taking oral anticoagulant therapy and developing a subdural hematoma that is related to a remote and minor trauma. The presumed pathogenesis of this case is an acute subdural hematoma following the actual trauma that did not present with changes in the clinical picture and went unnoticed. A chronic subdural hematoma then formed. A characteristic of the chronic subdural hematoma is the formation of neomembranes which are highly vascularized. A small lesion of this fragile new vascularization in a patient on anticoagulant therapy can lead to a bleed that will cause deterioration in the clinical picture. In Figure 1a this can be seen in the fact that the subdural hematoma can radiologically be interpreted as chronic with some »fresh« bleeding.

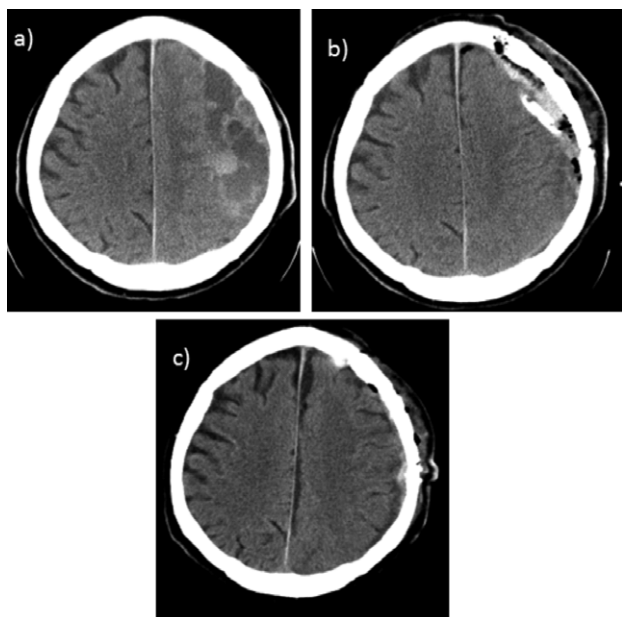


Fig. 1. a) Preoperative SDH; b) with drain in place; c) control.

### Case 2

Male, 77, presents to the ED after falling from own height and hitting his head. Denies losing consciousness but feels nauseous and has vomited a few times. Uses oral anticoagulant therapy because of permanent atrial fibrillation.

The initial CT scan (Figure 2a) shows contusions, SAH, and small SDHs less than 6mm in thickness both frontally and temporally, as well as a fracture of the occipital bone. He is treated conservatively and the next CT scan (Figure 2b) shows a regression of the intracranial hemorrhage. He is discharged home and scheduled for a control CT scan 3 weeks later.

The control CT scan (Figure 2c) shows a subacute SDH with thickness of 15 mm and mass effect. At this time the patient has no neurological defect, but due to the size of the hematoma he is operated on. Recovery from surgery (Figure 2d) goes well, and he is discharged home. No relapse is found on follow-up.

Both before the initial hospitalization and after the discharge, this patient has a poorly regulated dosage of warfarin, the INR (international normalized ratio) in both cases being above the range. This case illustrates how patients on anticoagulant therapy are prone to bleeds with minimal or nonexistent history of trauma, and may not have a remarkable clinical picture while having a radiological finding meriting surgery. The suspicion for intracranial bleeding should be high in patients on oral anticoagulant therapy although they many nota present with a »strong« clinical picture.

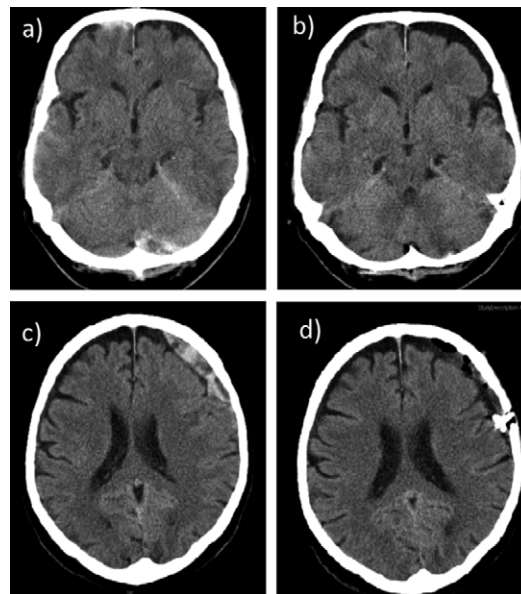


Fig. 2. a) The initial CT scan shows contusions, SAH, and small SDHs; b) control CT scan shows a regression of the intracranial hemorrhage; c) control CT scan 3 weeks later shows a subacute SDH with thickness of 15 mm and mass effect; d) postoperative control CT scan.

### Case 3

Male, 81, presents to the ED due to a change in the level of consciousness and left sided weakness. The initial CT scan is shown in Figure 3a. There is no relevant history of trauma. He is taking oral anticoagulant therapy because of previous heart surgery. He is operated on and has a good recovery (Figure 3b).

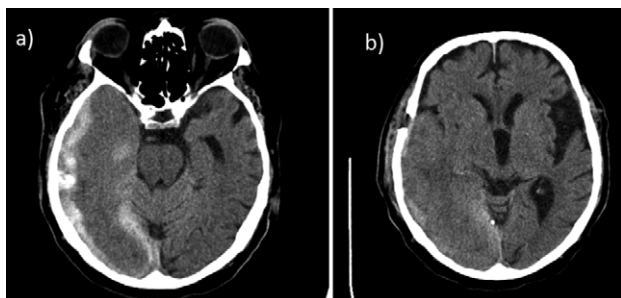


Fig. 3. a) initial CT scan showing SDH; b) postoperative control CT scan showing regression.

His case is an example of SDH with no history of head trauma whatsoever. The initial scan shows a large diffuse bleed, which is inhomogenic – it can be postulated that there were multiple periods of bleeding, like in the previous case aided by badly regulated INR values. When a critical mass was reached neurological signs became apparent.

What is similar in all cases was that minimal surgery was chosen as method of choice – due to the distribution and presentation of the hematomas as well as in attempt to minimize the extent of the surgical procedure as not to »cause« further complications related to the bleeding diathesis, for most part.

### REFERENCES

1. MENDITTO VG, LUCCI M, POLONARA S, POMPONIO G, GABRIELLI A, *Ann Emerg Med*, 59 (2012) 451. — 2. ASPEGREN OP, ÅSTRAND R, LUNDGREN MI, ROMNER B, *Clin Neurol Neurosurg*, 115 (2013) 981. DOI: 10.1016/j.clineuro.2012.10.008. — 3. DOODLEY

### Discussion

Our hypothesis that patients on anticoagulant therapy have a greater overall risk for SDH was not proved but we did show that this is true for spontaneous hematomas. Also we showed a somewhat increased mortality in this subgroup of patients. We did show an increased incidence of SDH in the elevated-risk group of patients (elderly – >60, chronically ill, chronic alcoholics). Similar results were presented in a recent study by Aspergren<sup>2</sup>. The relationship between oral anticoagulation and subdural hematomas following a minor trauma or of presumed spontaneous origin has been present in the literature since the 1960s<sup>3,4</sup>. Oral anticoagulant therapy, especially Vitamin K antagonists<sup>5</sup> (warfarin, which is the most commonly used oral anticoagulation therapy in our area) is considered as a distinct risk factor in assessing patients with head trauma, or changes in consciousness and neurological status without clear evidence of head trauma (among others, included in for example the NICE guidelines and similar).

### Conclusion

This survey confirmed the existence of a relationship between oral anticoagulant therapy and SDH, in particular the subgroup of »spontaneous« SDH. A drawback of this survey was too small a number of patients for a more in-depth statistical analysis. A larger study is planned. The plan is to assess all the patients taking oral anticoagulation therapy in Rijeka region and possibly establish risk patterns and precautionary measures for this growing population.

DM, PERLMUTTER I, *JAMA*, 187 (1964) 396. — 4. DIAMOND T, GRAY WJ, CHEE CP, FANNIN TF, *Br J Neurosurg*, 2 (1988) 351. — 5. CONNOLLY BJ, PEARCE LA, HART RG, *Stroke*, 45 (2014) 1672. DOI: 10.1161/STROKEAHA.114.005430.

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### FAKTORI RIZIKA ZA SUBDURALNO KRVARENJE U STARIJOJ POPULACIJI

#### SAŽETAK

U starijoj populaciji veći broj intrakranijalnih krvarenja povezan je uz netraumatske uzroke ili uzrokovan minimalnom traumom – za koju se u mladoj osobi ne bi očekivalo da izazove krvarenje. U kliničkoj praksi postoji dojam da su takva krvarenja, naročito subduralna krvarenja kroničnog ili sub-kroničnog tijeka sa ili bez akutizacije, povezana direktno s oralnim antikoagulansom u terapiji. Učinjena je retrospektivna studija na osnovu postojeće dokumentacije

pacijentata liječenih 2001.g. i 2012.g. na Klinici za Neurokirurgiju KBC-a Rijeka. Statistička naliza pokazala je statistički značajnu veću incidenciju spontanih subduralnih hematoma (SDH) u pacijentata na peroralnon antikoagulacijskoj terapiji (Fisher exact test,  $p < 0,01$ ). U sklopu članka prikazana su i 3 tipična slučaja. Ova je studija pokazala povezanost peroralne antikoagulantne terapije i SDH, naročito u podgrupi pacijenata kod kojih je subduralni hematoma okarakteriziran kao »spontani«. Planira se veća studija.