

Risk Factors of Reoperation and Outcome of Patients Operated for Chronic Subdural Hematoma in a Teaching Hospital in Rabat

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Abstract

Background: chronic subdural hematoma is a common pathology, especially in the elderly. Although it has a good prognosis, it poses the problem of recurrence after surgical evacuation. Objective: To analyze the risk factors of reoperation in patients surgically treated for chronic subdural hematoma (cSDH) and evaluate the outcome of patients who benefited from a reoperation. Materials and Methods: A retrospective review was conducted in a single University Hospital Center in Rabat (Morocco) on 49 patients operated on from January 2020 to June 2021 for cSDH. Possible risk factors described in the literature were analyzed and the outcome of post-operative course was evaluated. Statistical significance was defined by p-value < 0.005. Results: 49 patients underwent surgical evacuation of cSDH. The sex ratio of male/female was 3.08. The mean age was 70.6 years. Concerning the medical history, 8.2% were diabetics, 10.2% had heart disease, 18.4% had hypertension, 16.3% associated of comorbidities, 2% had pulmonary embolism, and 2% had neoplasm. 18.4% were on anticoagulation therapy, no patients were on new oral anticoagulants. The clinical findings upon admission were motor deficit at 57.1%, signs of intracranial hypertension at 20.4%, altered consciousness at 16.9% and impaired behavior at 6.1%. 28.6% of patients had a past history of head trauma. The pre-operative CT scan showed unilateral cSDH at 81.6%, midline shifts at 77.6%, and false membranes at 34.7%. Blood appeared chronic at 40.8%, subacute at 24.5%, and mixed densities at 34.7%. The post-operative course was uneventful in 73.5%. According to Ibanez grading 8 patients had mild complications (grade I) and 5 moderate complications (grade II) after the first surgery. We recorded 10.2% of patients who needed a second surgery

because of the deterioration of neurologic status or motor deficit associated with an abnormal CT scan. According to the GOS, 85.7% of patients had a good recovery while 10.2% died. None of the factors assessed was found to be a risk factor for reoperation. **Conclusion**: No risk factors of reoperation after an initial burr hole evacuation for cSDH were found. However medical history and male sex was common condition among reoperated patients with their CT scan showing a chronic aspect of blood, midline shift and false membranes. Most patients who underwent revision surgery died on the postoperative course.

Keywords

Chronic Subdural Hematoma, Risk Factors of Reoperation, Outcome

1. Introduction

Chronic subdural hematoma (cSDH) is a common neurosurgical condition with an incidence of 1.7 - 20.6 per 100,000 persons per year and predominantly affect elderly patients [1] [2]. These data are expected to increase with the aging population. This population often has many comorbidities and thus constitutes a challenge for its management. Although some authors have declared cSDH are common lesions that can be easily treated with minimum morbidity or mortality [3], the morbidity varies from 0% - 25%, and mortality can reach up to 32% [2]. The major complication in the management of cSDH is recurrence with the need for reoperation in this fragile population. Following the surgical evacuation, the rate of recurrence of cSDH varies between 2.3% - 38.7% according to the operative technique [4]. Many studies have sought for risk factors of rebleeding including epidemiologic characteristics, radiological findings, clinical symptoms, laboratory value and the use of anti-coagulation drugs. Unfortunately, the results are contradictory, and no risk factor has been formally established.

In this study, we sought to analyze risk factors of reoperation in patients surgically treated for chronic subdural hematoma. Furthermore, we have evaluated the outcome from patients who benefited of a reoperation.

2. Materials and Methods

2.1. Population

We realized a consecutive enrollment over the study period. The medical charts of patients aged more than 18 years treated surgically for cSDH at the Ibn Sina University Hospital Center, Ibn Sina from January 2020 to June 2021 were re-trospectively analyzed. All cases of acute SDH, subdural hygroma, or patient charts with missing data were excluded. The approval of the ethic committee of the hospital was obtained prior to the collection of the data.

2.2. Patient Management

All patients disposed of a head CT scan showing cSDH prior admission. The his-

tory and clinical presentation were consigned in the medical file.

Routine preoperative checkup was done before the surgery including full blood count, prothrombin, activated thromboplastin time and ionograms. For patient under anticoagulation therapy, the international normalized ratio (INR) was obtained. Those treated by platelets aggregation inhibitors was operated on with a shift of 5 - 9 days depending on the molecule if the clinical condition allowed it. Those presenting with a critical condition benefited from platelet transfusion prior to surgery. Vitamin K antagonist drugs were switched by low molecular weight heparin at the curative dose and stop the eve of the surgery after checking prothrombin and INR value (>60% for prothrombin and <1.2 for INR). For the emergency cases, vitamin k and prothrombin complex were given before the surgery.

Patients benefit from either one burr hole or two depending on whether the hematoma is septate or not with a close suction. All the procedures were done under general anesthesia. Patients benefited from corticosteroids on post-operative courses with low molecular weight heparin subcutaneous administration 4000 UI starting after the withdrawal of the drain.

A control CT scan was systematically done after 48 hours. The indication of reoperation was taken according to the clinical state (decreased consciousness) and radiological findings (e.g., persistence of bleeding, midline shift).

2.3. Data Collected

The medical file was analyzed in other to collect epidemiologic data (e.g., age, sex), history of head trauma, comorbidities, use of anticoagulation (including aspirin, warfarin, clopidogrel, ticagrelor, etc.), CT scan characteristics (unilateral or bilateral, aspect of blood, signs of recent bleeding, midline deviation), neurologic state, need for reoperation. The outcome was assessed at the discharge of hospital with the Glasgow Outcome Scale (GOS).

2.4. Statistical Analysis

Categorical variables were tested with the chi-squared test. We have at first use univariate logistic regression regarding with the need of reoperation and the variable age, sex, comorbidity, use of anti-coagulation and next the outcome of patients reoperated of cSDH. Statistical significance was defined by p-value < 0.005. We used the software Jamovi 2.3.

2.5. Results

During the study period, 49 patients underwent surgical evacuation of cSDH. The sex ratio of male/female was 3.08. The mean age was 70.6 years with a range of 41 - 102 years. Concerning the medical history: 8.2% of diabetics, 10.2% of heart disease, 18.4% of hypertension, 16.3% of association of comorbidities (hypertension, diabetics, chronic kidney disease), 2% of pulmonary embolism and 2% of neoplasm. There were 18.4% on anticoagulation therapy and no patients on new

oral anticoagulants. According to Markwalder classification, 20.4% were Markwalder I, 6.1% were Markwalder II, 57.1% were Markwalder III and 16.9% were Markwalder IV. A history of head trauma was recorded in 28.6% of patients. The pre-operative CT scan showed unilateral cSDH at 81.6%, midline shift at 77.6% and false membranes at 34.7%. Blood appeared chronic at 40.8%, subacute at 24.5%, and mixed densities at 34.7%. **Table 1** summarizes data concerning medical history, neurologic status prior to the surgery and radiologic findings.

The post-operative course was uneventful in 73.5% of patients and the others showed complications such as rebleeding, subdural empyema, stroke, meningitis, pulmonary and urinary tract infection. According to Ibanez grading 8, patients had mild complications (grade I) and 5 moderate complications (grade II) after the first surgery. Complications are showed in **Table 2**.

Variable	Value (%)	
Medical history		
Diabetes	4 (8.2)	
Hypertension	9 (18.4)	
Heart disease	5 (10.2)	
Association of comorbidities	8 (16.3)	
Pulmonary embolism	1 (2)	
Neoplasm	1 (2)	
Anticoagulation therapy	9 (18.4)	
Clinical findings		
Markwalder I	10 (20.4)	
Markwalder II	3 (6.1)	
Markwalder III	28 (57.1)	
Markwalder IV	8 (16.9)	
Past history of head trauma	14 (28.6)	
CT scan findings		
Unilateral	40 (81.6)	
Midline shift	38 (77.6)	
False membrane	17 (34.7)	
Aspect of blood on CT scan		
Chronic	20 (40.8)	
Mixed densities	17 (34.7)	
Subacute	12 (24.5)	

 Table 1. Data concerning medical past history, neurologic status prior the surgery and radiologic findings.

Classification Ibanez	Complications	Number of patients
	Stroke	2
Grade I	Meningitis	1
	Pulmonary infection	4
	Urinary tract infection	1
Grade II	Rebleeding	3
	Subdural empyema	2

Table 2. Summary of complications in the peri operative period.

A second surgery was indicated in 10.2% of patients because of the deterioration of neurologic status or motor deficit associated with significant acute SDH or empyema obvious on CT scan. According to the GOS, 85.7% of patients had a good recovery while 10.2% died. **Table 3** summarizes the outcome of patients.

2.6. Univariate Analyses of Factors Predicting Reoperation

None of the factors assessed (past medical history, diabetics, hypertension, heart disease, sex, history head trauma, anticoagulation therapy, radiological findings and density of blood on CT scan) was found to be a risk factor of reoperation (Table 4).

2.7. Analysis of Outcome of Patients Reoperated

Of the 5 patients who benefited from a reoperation, 4 died on post operative. (Table 4)

3. Discussion

The recurrence rate for cSDH in the literature varies from 2.3% - 38.7% according to the surgical technique [4] and the time of follow up [5]. We recorded a per-hospital recurrence rate of 10.2% consistent with the literature.

Many factors have been assessed as predictors of the recurrence of cSDH emphasizing the difficulty in the management of this disease. Recently history of chronic diseases such as hypertension and chronic kidney disease have been found to be a predictive factor for the need of reoperation in 30 days after initial evacuation [1]. Although more than half of our population and 4 of the 5 patients reoperated presented comorbidities, it has not been associated with the risk of reoperation. Systemic chronic diseases are known to expose to vascular complications and then increase bleeding tendency.

Anticoagulation therapy as a risk factor for the recurrence of cSDH is still a subject of controversy. While anticoagulation drugs especially warfarin and clopidogrel are associated with high rates of recurrence [1] [4] [6], it is not the drugs themselves which increase the rate of rebleeding but the underlying poor vascular condition [1].

GOS	Value
1	5 (10.2)
3	2 (4.1)
5	42 (85.7)

Table 3. Outcome of patients operated for cSDH.

 Table 4. Univariate analysis of predicting factors of reoperation.

Variable	Non reoperated patients	Reoparated patients	Univariate analysis, p-value
Past medical history	24	4	0.276
Diabetes	9	1	0.981
Hypertension	16	1	0.466
Heart disease	4	1	0.445
Sex			
Male	32	5	0.179
Female	12	0	
Head trauma	14	0	1.136
Use of anticoagulation	7	2	0.187
Radiologic findings			
Unilateral	36	4	0.921
Midline shift	34	4	0.890
Presence of false membrane	14	3	0.210
Density of blood			
Chronic	16	4	
Mixed	17	0	0.131
Subacute	11	1	
GOS			
1	1	4	
3	2	0	<0.001
5	41	1	

None of our radiological findings have been associated with the risk of reoperation. However, some authors have found that bilateral hematoma is associated with recurrence because of brain atrophy there is a poor re-expansion of the brain after evacuation and thus an increased risk of rebleeding [7]. Although we did not find the presence of false membrane as a predictive factor of recurrence, we found that the majority of non-reoperated patients didn't show this characteristic on their CT scan. This finding is in line with the literature which found that recurrence is significantly lower in patients with homogenous type of cSDH [6].

The Ibanez grading system for neurosurgical complications [8] in our study shows a greater percentage of mild complications in our study population after the first surgery. Although this classification does not reveal the entire disability caused by the surgery it gives an idea on the gravity of the adverse effects after surgery.

Outcome of patients operated for cSDH is favorable. We found 85.7% of the patient had a good outcome according to the GOS. However, 4 of the 5 patients who underwent a second surgery died. This can be explained by the advanced age, the comorbidities, the fact that all our surgeries are conducted under general anesthesia and the decreased consciousness. Many centers prefer to perform the evacuation of cSDH under mild sedation to avoid anesthesia complications, especially in this population which is fragile and has many comorbidities. Moreover, low neurological status has been described as the sole factor of in hospital death in patients admitted for this disease [9].

4. Conclusion

Chronic subdural hematoma is a common pathology in neurosurgery. Although the outcome of patients operated on for cSDH is good, recurrence with a need for reoperation remains an issue. We did not find any risk factors of reoperation after an initial burr hole evacuation, but medical history and male sex was common condition among reoperated patients furthermore their CT scan showed a chronic aspect of blood midline shift and false membranes. Most patients who underwent revision surgery died on the postoperative course.

5. Limits

Our study presents some limitations first, our small sample cannot allow us to make general conclusions or identify risk factors, and the retrospective design of the study.

Disclosures

The authors did not receive any funding for the preparation of this work. This paper is an original work that has not been considered or reviewed by any other publication and has not been published elsewhere in the same or a similar form. All authors of the manuscript have read and agreed to its content and are accountable for all aspects of the accuracy and integrity of the manuscript.

Authors' Contribution

Michèle Yolande MOUNE: conceptualization, data collection and analysis, writing original draft-editing;

Jose DIMBI MAKOSSO: conceptualization, writing original draft-editing; Mustapha HEMAMA: supervision, validation; Alngar DJIMRABEYE: conceptualization, writing original draft-editing;

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Statement of Institutional Review Board Approval

The approval of the ethic committee of the hospital was obtained prior to the collection of the data.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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