

A Proposed Neurological Acute Subdural Hematoma Score

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Abstract

Introduction

The prognosis of acute subdural hematoma (aSDH) remains poor. After identifying neurological factors associated with a poor prognosis for this condition in our series, we propose a predictive score for poor prognosis: "The Yaounde Neurological Acute Subdural Hematoma Score" (YN-aSDH Score).

Methodology

This was a cross-sectional study carried out in the neurosurgery departments of Yaounde Central Hospital, the Yaounde Military Hospital, and the Yaounde General Hospital during the period from January 01, 2008, to December 31, 2018. The prognosis was considered poor for patients who died or were in a permanent vegetative state at discharge from the hospital. Four neurological factors of poor prognosis were retained. Based on their association with a poor prognosis, we proposed a predictive score (YN-aSDH Score).

Result

The YN-aSDH score was scored as follows: GCS 3-8 = 3, GCS 9-12 = 2, GCS 13-15 = 1; Preoperative hemiplegia: present = 2, absent = 0, Postoperative convulsions: present = 1, absent = 0, Recurrence of aSDH: present = 1, absent = 0. The maximum possible score = 7 while the minimum score = 1.

Interpretation: All patients who died or were in a vegetative state had a score greater than or equal to 3.

Conclusion

A YN-aSDH between 3 and 7 predicts a poor prognosis. Its reliability and validity should be confirmed in larger prospective studies.

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Introduction

Acute subdural hematoma remains a frequent pathology in neuro traumatology. Despite therapeutic advances, this condition still has a poor prognosis with significant morbidity and mortality in the short, medium, and long term (1,2). This study proposes after having identified the factors of poor prognosis in patients operated on for this disease, a predictive score of poor prognosis for this pathology, a score based essentially on the neurological factors identified: "The Yaounde Neurological Acute Subdural Hematoma Score" (The YN-aSDH score).

Methods

We conducted a cross-sectional study in the neurosurgery departments of Yaounde Central Hospital, the Yaounde Military Hospital, and the Yaounde General Hospital with retrospective data collection over ten years (from January 01, 2008, to December 31, 2018). We included in this study the records of adult patients operated from an aSDH, including at least the following parameters: age, sex, profession, type of trauma, data from the clinical examination at admission, CT scan results, management (medical and surgical), evolution until discharge from the hospital. All records missing any of these parameters were excluded, as well as records of patients undergoing trephination operations.

Sampling was consecutive, non-probabilistic, and exhaustive. Data were collected using a data sheet and analyzed using R software version 3.5.0. The Chi2 test and the Fisher exact test were used to assess the homogeneity between groups, the Odd Ratio with its 95% confidence interval was

used to assess the association between variables.

The prognosis was considered poor for patients who died or were in a permanent vegetative state at hospital discharge. The analysis of poor clinical prognosis factors was done, and we retained only neurological factors for our scale. According to their importance in patients with poor prognosis, we proposed a predictive scale of poor prognosis: YN-aSDH score. The study was conducted in accordance to strobe guidelines for cross-sectional studies (3).

Results

Data from 60 patients were included in this study. Patient ages ranged from 17 to 86 years with a mean of 48.6 ± 17 years. The age range of 40 to 50 years was the most represented with 12 patients (20%). This series consisted of 76.6% male and 23.4% female, with a sex ratio of M/F = 3:1. The main causes of head injury were, in decreasing order of frequency: motor vehicle accidents 19 (65%); falls 13 (21.6%); assaults 07 (11.6%) and domestic accidents 01 (1.6%). The initial Glasgow coma scale (GCS) of patients was distributed as follows: GCS 15-13: 29 (48.3%); GCS 9-12: 21 (35.0%) and GCS 3-8: 10 (16.7%). Five patients had preoperative hemiplegia and of these three had a poor prognosis (Table 1). All patients in the series were operated on via craniotomy. Nine patients died (15.0%). One patient remained in a vegetative state (1.7%). The GCS of the 10 patients with a poor prognosis was as follows: GCS:3-8 5(50.0%); GCS:9-12 3(30.0%); GCS:13-15 2(20%). The postoperative complications identified were: infection 3 (5%); seizures 2 (3.3%); deep vein thrombosis 1 (1.7%); pulmonary embolism 1 (1.7%) and recurrence of

hematoma 1 (1.7%). Nine patients died (15.0%). One patient remained in a vegetative state (1.7%). The poor prognostic factors determined, after univariate logistic regression were: initial GCS between 3-8 ($P = 0.008$); preoperative hemiplegia ($P = 0.008$); and the hemiplegia ($P = 0.008$).

(OR: 0.10; 95% CI 0.03-0.6; $P = 0.019$) and postoperative complications (OR: 0.16; 95% CI 0.04-0.72; $P = 0.015$). In patients who had a postoperative complication, 50% (5) had a poor prognosis, and 14% (7) a good prognosis. According to the chi-square test of equal proportion, the observed difference was statistically significant ($P = 0.03$). Univariate logistic regression showed that patients who had a postoperative complication had a 90% probability of having a poor prognosis.

The factors of poor non-neurological prognosis identified and excluded: infection 3 (5%); deep venous thrombosis 1 (1.7%), and pulmonary embolism 1 (1.7%).

Based on the aforementioned predictive factors, an aSDH score was developed as presented in table 2.

Discussion

This study aimed to propose a predictive score of poor prognosis in patients operated on for an acute subdural hematoma in Yaounde (Cameroon) after identifying the factors of poor prognosis in these patients. Our study's main limitation remains the retrospective mode of data collection, which can lead to data loss inherent to any study of this type. Still, the inclusion criteria applied allowed us to obtain reliable data.

Some of the poor prognostic factors identified in this study, such as, initial GCS, postoperative complications in general, have hitherto been described in literature. Concerning the initial GCS, it appears that the initial GCS of 3-8 was significantly related to poor prognosis ($P = 0.008$). This result is similar to those reported by Vladimir et al. (4) ($P < 0.005$) in Bulgaria in 2016 and Won et al. (5) ($P = 0.0005$) in Germany in 2017. In this series, patients' mortality rate with an initial GCS 3-8 was 50%, a rate similar to that previous cohorts.

The main postoperative complications identified in this study, namely: infection 5%; seizures 3.3%; DVT 1.7%; pulmonary embolism 1.7% and bleeding recurrence 1.7%. Infection was the most predominant complication (5%). This finding was similar to Won et al. [5] (4.4%). Our results, however, differ from that of Monsivais et al. (6) in 2018 in the USA, for which thromboembolic disease was the most common postoperative complication. We opted to eliminate general complications and to focus only on those of a neurological nature. This choice has allowed us to remain within the scope of the neurosurgical pathology (aSDH) that was the focus of our work.

Preoperative hemiplegia appeared to be a poor prognostic factor and to the best of our knowledge has not yet been studied in the literature for this pathology. On the other hand, other factors predictive of poor prognosis have been reported in the literature (7).

Table 1. Clinical summary of patients with poor prognosis

Patients	GCS 3-8	GCS 9-12	GCS 13-15	Preoperative Hemiplegia	Postoperative convulsions	Recurrence of aSDH	Pulmonary embolism	Infection	Evolution	YN-aSDH score
1	Yes	No	No	Yes	No	No	No	No	Death	5
2	Yes	No	No	No	No	No	No	No	Death	3
3	No	Yes	No	Yes	Yes	No	No	No	Death	5
4	Yes	No	No	Yes	Yes	No	No	No	Death	6
5	No	Yes	No	No	No	Yes	No	No	Death	4
6	Yes	No	No	No	No	No	No	No	Death	3
7	No	No	Yes	No	No	No	Yes	No	Death	2
8	No	Yes	No	No	No	No	No	Yes	Death	3
9	Yes	No	No	No	No	No	No	No	Vegetative state	3
10	No	No	Yes	No	No	No	No	Yes	Death	2
Total	5	3	2	3	2	1	1	2	10	

Table 2. YN-aSDH Score

GCS scoring	Preoperative hemiplegia scoring	Postoperative convulsions scoring	Recurrence of aSDH scoring
<ul style="list-style-type: none"> GCS 3-8 = 3 points GCS 9-12 = 2 points GCS 13-15 = 1 point 	<ul style="list-style-type: none"> Present = 2 points Absent = 0 point 	<ul style="list-style-type: none"> Present = 1 point Absent = 0 point 	<ul style="list-style-type: none"> Present = 1 point Absent = 0 point
<p>Minimum score = 1 and Maximum score = 7</p> <p>Interpretation All the patients who died and the one in vegetative state had a score greater than or equal to 3</p>			

From the clinical analysis of patients with a poor prognosis (Table 1), we observed that initial GCS, preoperative hemiplegia, hematoma recurrence, and postoperative convulsions were the neurological predictors of poor prognosis this series. A rating was thus proposed for each of these items according to its importance as in table 2.

Conclusion

This study's results allowed us to propose a poor prognosis predictive score after analysis of poor prognostic factors in patients operated on for an acute subdural

hematoma in Yaounde: YN-aSDH score between 3 and 7. We propose that the validity, reproducibility and generalizability of our proposed score be tested in a larger prospective cohort.

Acknowledgments

None

Conflict of Interest

None

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