Treatment of Chronic Subdural Hematoma in Adults at the University Hospital of Brazzaville (Congo)

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Abstract: The aim of this study was to describe the treatment of chronic subdural hematoma (CSDH) in a neurosurgical setting, at the University Hospital Centre of Brazzaville. We conducted a descriptive study with retrospective data collection from 2014 to 2021 (a period of eight years). We included adult patients treated at the hospital for this condition. The variables studied were diagnostic, therapeutic and evolutionary. We selected 81 patients. They were over 60 years old in 49 cases (60.5%). The Glasgow coma scale was between 13 and 15 in 50 cases (61.7%). The Markwalder grade was 1 in 34 cases (42%) and 3 in 24 cases (29.6%). The hematoma was unilateral in 62 cases (76.6%) and bilateral in 19 cases (23.4%). The thickness of the hematoma was greater than or equal to 2 cm in 64 cases (79%). All patients underwent surgery. Single burr hole surgery was performed in 68 patients (84%). Drainage was placed in all the patients. The outcome was favourable in 43 cases (53.1%). Complications were noted in 38 cases (46.9%). Five patients (6.2%) died, including two cases of empyema, two cases of neurological deterioration and one case of postoperative sepsis. In univariate analysis, we found a statistically significant association between the Glasgow coma scale (P = 0.0004) and the thickness of the CSDH (P = 0.02) with the occurrence of complications. In multivariate analysis, the Glasgow Coma Scale and bilateral nature were factors influencing the occurrence of complications, adjusting for age and the hematoma thickness. Patient care may be improved by early surgical treatment in a patient with a favourable Glasgow score. Surgical techniques are varied, but postoperative drainage seems essential.

Keywords: Chronic Subdural Hematoma, Surgery, Brazzaville

1. Introduction

Chronic intracranial subdural hematoma (CSDH) is an encapsulated collection of blood and fluid on the surface of the brain. Following trauma, which is often mild and not always obvious, a complex process of interrelated mechanisms, including inflammation, membrane formation, angiogenesis and fibrinolysis, appears to promote the development of the hematoma [1-3]. CSDH is a complex disease with an overall incidence of 1.7-20.6 per 100,000 people per year and is more common in the elderly population [4].

The treatment of CSDH is mainly surgical. It has improved considerably in recent years with the availability of computed tomography (CT) or magnetic resonance imaging (MRI) and the development of surgical techniques. However, the best treatment strategy is still debated [5, 6]. In the Republic of Congo, CSDH has a frequency of 6% of all neurosurgical pathology and accounts for 15.8% of operative activity in neurosurgery [7, 8].

The aim of this study was to describe the management of

chronic subdural hematoma in a neurosurgical setting, at the University Hospital Centre of Brazzaville (UHCB).

2. Materials and Methods

We conducted a descriptive, cross-sectional study. Data collection was retrospective, from January 1, 2014 to December 31, 2021, spanning eight years.

The UHCB's Polyvalent Surgery department was the site of the study, where the neurosurgical team comprises five practitioners. The operating room is equipped with various instruments, including those for emergency skull surgery and scheduled interventions, but lacks any trephines or endoscopic neurosurgery equipment.

Following the diagnosis of CSDH, surgical intervention was recommended for any symptomatic patients presenting with an imaging scan (CT or MRI) indicating suggestive appearance and a correlation with the respective clinical symptoms. Medical intervention involving a combination of corticosteroid therapy and oral hydration was recommended for minor symptoms and/or subdural lesions deemed minimal (without mass effect), with regular outpatient monitoring.

Surgery would be delayed for five days from the latest intake if the patient had ingested acetyl salicylic acid, given that the level of severity permits. In cases where anticoagulant treatment was deemed necessary, low molecular weight heparin was prescribed as a substitute, at a therapeutic dose, with administration ceased a day prior to surgery, to be then resumed the following day. Acetyl salicylic acid could only be resumed three weeks later, after undergoing a brain CT for confirmation.

The surgical procedure involved the following steps:

1. general anesthesia with orotracheal intubation,
2. one or two holes, depending on the surgeon,
3. rinsing was performed with isotonic saline, until clarification,
4. the punctiform opening of a false membrane if it is visible and accessible, followed by a resumption of rinsing,
5. the placement of the drain was either subdural, with the use of a urinary catheter or a glove-finger device (in the form of a Delbet blade), or subcutaneously adjacent to the hole (s) with rigid tubing. The drainage was maintained for 48 hours,
6. postoperatively, the patient was placed in a flat position, without a pillow or in the Trendelenburg position. Intravenous hyperhydration with two liters of isotonic saline per day was administered for 48 hours, followed by a oral hydration. Antibiotic prophylaxis was given for 48 hours, and corticosteroid therapy was prescribed based on the surgeon's assessment of pre- or postoperative clinical severity,
7. antiepileptic prophylaxis was recommended for a minimum of two months if the patient has not had a seizure before,
8. control cerebral imaging was performed only if there was clinical deterioration.

All patients aged 18 years or older were eligible for inclusion, whilst those with incomplete medical records were excluded.

The survey's data was gathered from the department's data registry and the patients' medical records. Information on the patients' evolution (follow-up) was obtained via telephone calls to either the patients or their parents and recorded on a pre-defined survey sheet. The variables studied were diagnostic, therapeutic and evolutionary.

The Markwalder classification was used to assess the degree of clinical severity.

Epi info software version 7.2.5.0 was used for the statistical analyses. Results for qualitative variables were presented in number and proportion. The quantitative variables were expressed as means accompanied by standard deviations, or medians with quartiles. The dependent variable was "complications'', including mortality. The Mantel-Haenszel chi-square test was used in univariate analysis, to verify association between the explanatory variables. To conduct the logistic regression, the dependent variables "complications" were coded as 0 for the absence of complications and 1 for the presence of complications. The Likelihood chi-square test was employed to determine the significance of the explanatory variables used in the multivariate analysis. A likelihood ratio was applied to assess and select among various regression models, and the one that closely corresponds to the sample studied was selected. The statistical significance level for all performed tests was set at 5%, accompanied by a confidence interval of 95%.

Prior approval was obtained from the ethics committee, and no conflicts of interest were declared.

3. Results

Diagnostic Aspects

We selected 81 patients.

The patients were between 18-35 years old in 4 cases (4.9%), 36-60 years old in 28 cases (34.6%) and over 60 years old in 49 cases (60.5%). Chronic alcoholism was observed in 33 patients (50.7%). The consumption of anticoagulants or antiplatelet drugs was reported in seven cases (8.6%).

The Glasgow score was between 3 and 8 in 6 cases (7.4%), 9 and 12 in 25 cases (30.9%) and between 13 and 15 in 50 cases (61.7%).

The Markwalder grade presented mild symptoms (grade 1) in 34 cases, which corresponds to 42% of the cases. Grade 2, characterized by drowsiness or disorientation, was found in 16 cases (19.8%), while grade 3, consisting of stupor with appropriate responses to noxious stimuli, was found in 24 cases (29.6%). Finally, grade 4, which involves coma with no motor response to painful stimuli and decerebrate or decorticate posture, was observed in 7 cases (8.6%).

On CT scan or MRI, the hematoma was located frontally in 3 cases (3.7%), fronto-parietally in 23 cases (28.4%) and hemispherically in 55 cases (67.9%). We identified 62 cases (76.6%) of unilateral hematoma and 19 cases (23.4%) of bilateral hematoma. Among the 81 patients in the series, the

thickness of the CSDH was greater than or equal to 2 cm in 64 cases (79%) and less than 2 cm in 17 (21%).

Treatment

Antiepileptic medication was prescribed for seizures in 65 cases, constituting 80.3% of the patients. Among these, seven patients had already suffered a seizure and 58 patients were prescribed medication for prophylaxis. Corticosteroids were prescribed in 37 cases (45.7%).

All patients underwent surgery, with 68 patients (84%) undergoing single burr hole surgery for hematoma and 13 patients (16%) undergoing the two-hole procedure. A drainage system was inserted into all patients for 48 hours, except for three cases where it was retained due to its productivity.

Among 81 cases, 60 (74%) featured a subdural drain placed opposite the burr hole. The remaining 21 (26%) had the drain located at the same point.

The drainage approach employed a urinary catheter in 39 cases (48.2%), a rigid tubing (for perfusion) in 29 cases (35.8%), and glove fingers in 13 cases (16%). Figure 1 depicts the patient's head after the surgery, showcasing bilateral drainage systems installed in the glove fingers.

Source: Brazzaville University Hospital Centre

Figure 1. *Head of the patient at the end of the operation (bilateral chronic subdural hematoma). The arrow indicates the glove finger drainage system.*

Evolution

During the hospital stay following surgery, 43 patients (53.1%) experienced a positive outcome with clinical improvement observed either upon awakening or within 72 hours. A total of 38 cases (46.9%) reported complications which included persistent deficits (26 cases, 32.1%), consciousness disorders (4 cases, 4.9%), psychiatric disorders (3 cases, 3.7%), cerebral empyema (3 cases, 3.7%) in patients with drainage lasting longer than 48 hours, and persistence of a compressive and symptomatic hematoma (2 cases, 2.5%). Five patients (6.2%) died, including two cases of empyema,

two cases of neurological deterioration and one case of postoperative sepsis.

Follow-up (after hospitalization) provided information about 20 patients (24.7%), at four months (in two patients), six months (in five patients), nine months (in six patients), eleven months (in two patients) and two years (in seven patients). Out of these patients, 10 lived without any sequelae, six had a residual motor deficit, and four patients had died due to unspecified causes, two within two months and two within two years.

The median length of hospitalization was 7 days (Q1 = 5 and Q3 = 12), with extremes of 2 and 60 days.

Univariate analysis revealed that complications were not associated with âge (p = 0.05755) or chronic alcoholism (p = 0.09612); an unfavorable Glasgow score was found to be linked to complications (p = 0.00046), and complications were associated with high hematoma thickness (p = 0.0209). There was no association found between the number of burr holes and the occurrence of complications (p = 0.9525).

Table 1 demonstrates the combined influence of age, Glasgow score, thickness of the hematoma, and whether it was unilateral or bilateral on the occurrence of complications, as determined by logistic regression.

Table 1. *Logistic regression results.*

		Complication		OR	CI 95 %	p-value
		Yes	No			
Age (yo)	18-35	1 (2.6)	3 (7)	1	1	-
	36-60	10 (26.3)	18 (41.8)	1.5	[0.1-20.0]	0.7439
	> 60	27 (71.1)	22 (51.2)	3.2	[0.3-40.3]	0.3579
GCS	13-15	16 (42.1)	34 (79.1)	1	1	-
	9-12	17 (44.7)	8 (18.6)	4.7	[1.6-13.5]	0.0045
	3-8	5 (13.2)	1 (2.3)	10.6	[2-105.3]	0.0439
Hematoma thickness (cm)	< 2	4 (10.5)	13 (30.2)	1	1	-
	≥ 2	34 (89.5)	30 (69.8)	3	[0.6-6.6]	0.2207
Bilateral character	No	11 (28.9)	8 (18.6)	1	1	-
	Yes	27 (71.1)	35 (81.4)	3.4	[1-11]	0.0435

GCS: Glasgow coma scale; OR: odds ratio; CI: confidence interval; p: probability

4. Discussion

Our primary constraint was the restricted amount of data accessible in particular files used in a retrospective context. Furthermore, the study's framework lacks an archiving system. The files for the three distinct specialities coexisting in the same department are catalogued in a single registry.

Corticosteroids were used in 37 patients (45.7%). The benefit of this protocol was not evaluated in our study. Dran *et al.* [8] in a retrospective study of 198 cases reported that the difference in patient survival in the two groups was significant in favor of the corticosteroid group, including after multivariate analysis. The authors suggest conducting a prospective study to verify this hypothesis.

Antiepileptic prophylaxis was administered in 58 cases (71.6%). Bah *et al.* [9] reported the administration of

antiepileptics in all patients after surgery. It is standard practice to incorporate antiepileptic prophylaxis during the perioperative period of cranioencephalic surgeries. In case of a late postoperative crisis occurring after the first week, a basic treatment is administered for three to six months [10].

All patients underwent surgery, with craniotomy performed through one or two trephine holes (by hematoma). The creation of a burr hole was identified in 68 patients (83.9%), and two burr holes per hematoma in 13 patients (16.1%). Maiga *et al.* [11] reported the creation of a single burr hole in 67 patients (98.5%) and two burr holes per hematoma in one patient (1.5%). Nayil *et al.* [12] in a randomized study of 254 cases on the number of holes made per hematoma did not find any significant difference in the evolution of patients in the two groups.

All patients benefited from a drainage system. The drain was placed in the subdural space in 60 patients (70%), next to the burr hole in 21 patients (26%). The most used type of drain was the bladder catheter (48.2%). Bakhti et al. [13] in a prospective study of 189 cases reported the use of the glove finger device in all patients, with a cure rate of 86.2%. For Diallo et al. [14] CSDH drainage using a Foley (urinary) catheter is an interesting alternative, in the absence of conventional drains, and allows similar results to be obtained.

In the entire series, 43 patients (53.1%) had a favorable outcome. Bah et al. [9] had a rate of 54.5%. Agaly et al. [15] had a rate of 90.6%. Indeed, it is accepted that the prognosis of CSDH is favorable in 80 to 90% of cases [10]. Complications were identified in 38 patients. Persistent motor deficit was the most frequent complication, with 26 cases, or 32.1%; this result is higher than that of a previous study, with only one case of persistent deficit [16]. This result is not reported by the other authors; this could be linked to the fact that the post-operative follow-up, poorly supported in our study, would have made it possible to observe an evolution in the rate of recovery of the motor deficit. We noted five deaths, or 6.2%. Hodé *et al.* [17] as well as Agaly *et al.* [15] reported mortality of 4 and 1.2%. In the literature, post-operative mortality varies between 0 and 10% [18].

In univariate analysis, we found a statistically significant association between the Glasgow coma scale (P = 0.0004) and the thickness of the CSDH (P = 0.02) with the occurrence of complications. Ro et al. [19] found the same results in their study. In the multivariate analysis, the occurrence of complications was influenced by the Glasgow Coma Scale and the bilateral nature, adjusted for age and hematoma thickness. Maiga et al. [11] in their study about 20 patients involving bilateral CSDH reported an increased risk of complications in the bilateral group, with a poor preoperative clinical grade. In the literature, bilateral CSDH have a prognosis comparable to unilateral hematomas. However, the rate of postoperative pneumatocele and the risk of recurrence would be higher in the subpopulation of bilateral hematomas [10]. We did not find a statistical link between age, the number of burr holes made per hematoma, chronic alcoholism and the occurrence of complications.

5. Conclusion

Chronic subdural hematoma is a prevalent condition amongst the elderly in the neurosurgery field. The principal treatment approach is surgical intervention. The most widespread surgical method involves conducting a craniotomy via a burr hole (83.9%). Postoperative drainage is performed for 48 hours, irrespective of the surgical approach. Nearly fifty percent of the cases exhibit positive outcomes. The most prevailing short-term complication is the persistence of neurological deficit. Mortality stands at approximately 6%. Higher frequency of complications is linked with a low Glasgow score and the bilateral nature of the hematoma.

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