

Comparative Epidemiological Profile of Elderly and Non-elderly Patients Operated on Chronic Subdural Hematoma

Perfil Epidemiológico Comparativo de Pacientes Idosos e Não Idosos Operados de Hematoma Subdural Crônico

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ABSTRACT

Background: Traumatic brain injury is a severe condition in elder patients. Young patients usually have better prognosis compared to the elderly. Head trauma might represent an initial event that leads to death in this population. **Objective:** To evaluate was to evaluate the epidemiological profile of elderly patients operated on chronic subdural hematoma (CSDH). **Methods:** This is a descriptive, observational and retrospective case series. The use of anticoagulant and antiplatelet drugs, length of hospital stay, mortality and CSDH recurrence, among others, were the evaluated variables. **Results:** A total of 328 patients had their records assessed. Patients younger than 60 years formed group 1 (n=102) and those older than 60 years formed group 2 (n=226). Ageing is correlated to higher mortality. Acetylsalicylic acid and anticoagulant drugs usage in both groups did not correlate to worse outcomes. In group 2, there were 33 deaths during hospital stay (14.6%) and 14 deaths within one year after surgery (6.2%). Only one death was registered in group 1. **Conclusion:** Ageing is an important isolated prognostic factor.

Keywords: Subdural hematoma; Elderly; Craniocerebral; Trauma

RESUMO

Background: Lesão traumática de encéfalo é uma condição grave em pacientes idosos. Pacientes jovens geralmente têm melhor prognóstico comparado aos idosos. Traumatismo de crânio pode representar um evento inicial que leva à morte esta população. **Objetivo:** Comparar o perfil epidemiológico de uma série de pacientes idosos e não idosos operados de Hematoma Subdural Crônico (HSDC). **Método:** Estudo descritivo, retrospectivo e observacional em série de casos, com avaliação do uso de anticoagulante, antiagregante plaquetário, tempo de internação, a mortalidade e a recorrência do HSDC, entre outros. **Resultados:** Analisamos 328 pacientes divididos em dois grupos: grupo 1, com pacientes com menos de 60 anos (n = 102) e grupo 2, pacientes com mais de 60 anos (n = 226). O aumento da idade correlacionou-se com maior mortalidade. O uso de ácido acetil salicílico e anticoagulante nas populações geral e idosa não se correlacionou com piores desfechos. Na população do grupo 2 houve 33 óbitos internados (14,6%) e 14 óbitos em um ano após a cirurgia (6,2%). Houve somente um óbito na população do grupo 1. **Conclusão:** O aumento da idade é um fator prognóstico isolado importante.

Palavras-chave: Hematoma subdural crônico; Idosos; Traumatismo cranioencefálico

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INTRODUCTION

Chronic subdural hematoma (CSDH) is a blood collection resulting from a tear in small bridging veins that drain the cortical surface to dural sinuses. Frequently, it is a consequence of minor traumas, such as falls or mild cranial traumatisms ¹.

Such condition might be aggravated by the use of anticoagulant and antiplatelet drugs, as well as cerebral atrophy, circumstances often associated with the elderly ², ³. Chronic alcoholism is also related to a higher occurrence of CSDH, considered the cerebral atrophy and the falls ⁴.

The general mortality rate in patients older than 60 years surpasses 15% and increases with time, mostly after the eighth decade of life ^{5,6}.

Standard treatment is surgical, consisting of dura mater trepanation, irrigation of subdural space with saline and subdural drain placement for up to 48 hours.

The objective of this study is to evaluate the epidemiological comparative profile of elder patients and younger ones who underwent surgery for CSDH.

METHODS

This is a descriptive, observational and retrospective case series, based on analysis of electronic medical records of patients submitted to surgery for CSDH at the Hospital de Base do Distrito Federal, Brasília, Brazil, from January 2014 to December 2015.

The following variables were assessed: age, gender, anticoagulant and antiplatelet drugs use, traumatic brain injury (TBI) classification (mild, moderate, severe), signs and symptoms, Glasgow coma scale (GCS) at hospital admission and discharge, Glasgow outcome scale (GOS), hematoma

laterality, complications, length of hospital stay after surgical procedure, mortality during hospital stay, mortality within one year after surgery and CSDH recurrence within one year. Irrigation of the subdural space with saline and subdural drain placement for continuous drainage through trepanation was the surgical technique of choice in all cases.

Patients with spontaneous arachnoid hemorrhage or whose medical records were incomplete or lacking clinical information were excluded, as well as patients with subdural infection.

Data analysis was performed on the SPSS software, version 21.0 (IBM, Armonk, NY, USA). An exploratory data analysis and association tests based on variables selection were conducted.

For all associations between variables, a chi-square test (x^2) was performed. For binary variables (with only two categories), an odds ratio (OR) was calculated. Pearson linear correlation (r) was used to quantify associations among numeric variables. Student's t test (t) was used to assess the difference between 'time of hospital stay' and 'use of acetylsalicylic acid' or 'anticoagulant drugs'. The association between 'age' and 'GOS' was evaluated with the non-parametric Kruskal-Wallis (H) test. The significance level (p) applied throughout the study was of 5%.

No contact with patients was established during this research, considered that all required data could be found on medical records. No patient was requested to return to the hospital, given that no complications that demanded a correction or an intervention were identified. Medical records assessment and data collection had the informed consent term waived and the study was approved by the Committee for Ethics in Research under protocol 1.655.691.

RESULTS

A total of 328 medical records was analyzed. The convenience sampling method was applied for their selection. Most of

the patients were male (92.5%). The results were divided in two groups, according to the patients age: Group 1: Patients younger than 60 years (n=102); and Group 2: Patients older than 60 years (n=226).

The age range was 20 to 96 years old. The general mean age was 65.7 ± 18.0 years old. The mean age in group 1 was 44.0 \pm 9.5, and in group 2 was 75.5 \pm 9.1. Patients older than 60 years (group 2) comprehended 68.9% of total amount of the cases. Almost half of the total number of patients was older

than 70 years. The distribution of patients according to their age is described in Figure 1.

No trauma was reported in approximately 25% of the patients in groups 1 and 2. Among the 245 patients that reminded a trauma history, a CSDH was diagnosed after 38.5 days on average.

The analyzed variables in both groups (n=328) are classified as categorical (Table 1) and numeric (Table 2).

	Variable	Frequency	%
	Vallable	requeriey	70
Age	<59 years	103	31.1
	>60 years	226	68.9
Laterality	Left	135	41.3
	Right	89	27.1
	Dilateral	104	31.7
Midline deviation	Yes	107	32.6
	NO	221	07.4
Death during hospital	Yes	34	10.4
stay	NO	294	89.6
Death within one year	Yes	14	4.3
	No	314	95.7
Hoodoobo	Yes	205	62.2
neauache	No	123	37.5
Consciousnoss	Yes	164	50
impairment	No	164	50
	Yes	197	60.1
Motor deficit	No	131	39.9
	Yes	21	6.4
ASA	No	327	93.5
Anticoagulant	Yes	8	2.4
	No	320	97.5
	1	25	7.6
GOS	2	0	0
	3	9	2.7
	4	30	9.1
	5	264	80.5
Desperation	Yes	28	12.9
Reoperation	No	300	87.1
Tatal			
IUlai		328	100

Table	1.	Description	of	categorical	variables
Table		Description	U1	categorical	variabics.

	Age (Years)	Length of hospital stay (Days)	Lapse of Time after trauma (Days)*	GCS Hospital Admission	GCS Hospital Discharge
Ν	328	328	245	328	328
Mean	65.7	12.3	38.5	13.5	14.2
Median	69	6	30	15	15
SD	18	16.2	38.8	2.5	2.4

Table 2. Descriptive analysis of numeric variables

* Time passed after trauma was mentioned by 245 patients. SD: standard deviation



Figure 1. Patients with chronic subdural hematoma (n=328) operated between 2014 and 2015 distributed according to age (years).

Out of the patients who died during hospital stay, only two regularly used ASA (6%) and other two used anticoagulant drugs (6%). In group 2 patients, there was no relation between the use of ASA and mortality during hospitalization ($x^2=0.234$; p=0.624) or one year after surgery ($x^2=0.099$; p=0.752). The same was observed with the use of anticoagulants in this group; with no considerable correlation to mortality during hospital stay ($x^2=0.308$; p=0.579) or one year after surgery ($x^2=0.001$; p=1.0).

No relation between the increase in length of hospital stay and the use of ASA (t=0.690 days; p=0.491) or anticoagulant drugs (t=-1.040 days; p=0.299) was observed in group 2.

A difference in deaths during hospital stay whenever associated with a midline deviation was not observed (p=1.0), independently of age. However, patients who experienced headaches were found to have an increased mortality during hospitalization (p < 0.001), with a probability of death 4.72 higher than that of patients who did not experience headaches (95% CI=0.097-0.46).

The same was observed with patients admitted at the hospital with consciousness impairment, as evidenced by a statistical difference in deaths during hospital stay when associated with that variable (x^2 =18.9; p < 0.001). The odds ratio for death in patients admitted with consciousness impairment was of 6.831 (95% CI=2.573-18.136), in comparison to those who did not have their consciousness impaired.

Reoperation, despite increasing the length of hospital stay, was not related to a higher number of deaths ($x^2=0.821$; p=0.365) in either groups (7 patients in group 1 and 21 in group 2).

Data concerning the association of those variables with mortality, as previously described, is summarized in Table 3.

Variable	p value	Mortality increase	Comments
ASA	0.624	No	Only 6.4% regularly used ASA. Two deaths in patients using ASA
Anticoagulant drug	0.579	No	Only 2.45% regularly used an anticoagulant drug. Two deaths in patients using anticoagulant drug
Midline deviation	1.000	No	67.38% had midline deviation
Headache	<0.001	Yes	Chance of death 4.72 times higher
Consciousness impairment	<0.001	Yes	Chance of death 6.83 times higher
Reoperation	0.365	No	Increases length of hospital stay without increasing mortality

Table 3. Analyzed variables related to mortality during hospital stay.

Considering the age of patients, an important difference in deaths during hospital stay was identified ($x^2=14.035$; p<0.001), specially within group 2, which registered almost the totality of deaths. When comparing different age brackets within the population older than 60 years, patients who were 70 years old or older died more than patients who were 60 to 69 years old ($x^2=15.266$; p<0.001). Pearson correlation between age and GCS at hospital admission (r=-0.182; p=0.001) and between age and GCS at hospital discharge (r=-0.165; p=0.003) indicated that GCS at hospital admission and discharge tends to decrease as age increases, even though the association was weak. With the Kruskal-Wallis test (H), no correlation between age and GOS was identified (H=2.608; p=0.456) when median age was related to different GOS categories, as observed in Figure 2.



Figure 2. Kruskal-Wallis test, comparing GOS to age.

It is possible to observe, though, that the length of hospital stay tends to increase as the age increases (r=0.121; p=0.029). A linear regression between the two variables, with the length of hospital stay as the dependent variable, is depicted in Figure 3, as well as the use of ASA and anticoagulant drug.

Concerning to death and age, our data indicated that for each additional year of age, the chance of dying during hospital stay for treating CSDH was 1.21 times higher (OR=1.21; IC 95%=1.014-1.443). Similarly, each additional year of age

resulted in a chance of dying during the first year after surgery 1.12 times higher (OR=1.122; IC 95%=1.002-1.257). The use of acetylsalicylic acid (ASA) and anticoagulant drugs in both groups did not correlate to worse outcomes. In group 1, no patient in use of ASA or anticoagulant drugs died. In group 2, two patients in use of ASA or anticoagulant drugs died (x^2 =0,67; p<0.001).



Figure 3. Distribution of patients regarding lenght of hospital stay vs age

DISCUSSION

Most of the patients in this study were older than 60 years (68.9%), and half of these were older than 70 years. The mean age was 65.7 years, which corroborates to the influence of age on the occurrence of CSDH⁷. Considering only the ages of patients gathered in group 2, a mean of 75.5 years was observed.

Predisposition to falls, repetitive low energy traumatisms, subdural space enlargement and a tendency to coagulopathies might be factors that explain the significant prevalence of CSDH within the elderly ⁸. Another important factor is the grade of cerebral atrophy observed on such age group, which predisposes to substantial hemorrhagic collections on the subdural space ⁹.

This study did not address the trauma etiology, given that most of the traumatic events are of low energy and are not detected in up to 35% of cases in the elderly population 10. A total of 74.5% of the patients reported suffering a trauma prior to the CSDH. In group 2, 77.8% remembered and reported a previous trauma, which is a number slightly higher than those described in the scientific literature ^{11, 12}. In group 1, 81.3% had a trauma history at admission.

In Table 4, results from different studies concerning to the age, mortality and cranial traumas in elderly patients with CSDH were compared.

Table 4. Kruskal-Wallis test, comparing GOS to age.

Author, Year	Mortality (%)	Traumatism (%)	Mean age (Years)
Asghar, 2002 ⁷	17	64.5	79
Maeda, 2001 ¹³	1.2	57	67
Rozzelle,1995 ⁶	31	70	71

In our study, it was observed that only 9.2% of patients older than 60 years, regularly used ASA or anticoagulant drugs. Their use is described in the literature as an intensifier of bleeding during surgery for intracranial hematomas drainage, which heralds a poor prognosis 6,13 .

ASA and anticoagulant drugs are regarded as risk factors for other types of cerebral hemorrhages other than CSDH, such as spontaneous subarachnoid hemorrhage or intraparenchymal hemorrhage, specially within the elderly⁸. This risk of developing intracranial hemorrhages was found to be 42 times higher in a population using anticoagulant drugs when compared to a population that did not use anticoagulant drugs¹⁴.

Differently from data found in the literature ^{6,13}, the use of ASA or anticoagulant drugs was not correlated to an increased mortality in our study. In group 2, 33 patients died, and only two used ASA (6%) and other two used anticoagulant drugs (6%), resulting in no statistical significance established. The low mortality specially related to anticoagulant drugs might be related to the low prevalence of use in our series.

No significant association with the increase in length of hospital stay was found either. On the average, patients older than 60 years using ASA or anticoagulant drugs were hospitalized for 10.02 days. This might be justified by the fact that surgical patients in our neurosurgery unit tend to be kept at the hospital for longer periods (average of 13.7 days), which lessens the impact of anticoagulant and antiplatelet drugs on the length of hospitalization.

The ageing is considered as the isolated factor with the most relevant probability of death. The chance of death during hospitalization is described as 17.2 times higher in patients older than 60 years when compared to patients younger than 60 years^{15, 16}, which substantiates the vulnerability of the elderly patients. Our findings also support such idea, showing that the chances of dying during hospitalization or within one year of surgery for CSDH are respectively 1.21 and 1.12 times higher for each additional year of age, as described by other authors^{2, 8, 17}. Age as an isolated prognostic factor to the outcome of the CSDH is already consensual in the literature

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^{6, 13}. It is important to note that all the 33 deaths in group 2 occurred in patients older than 71 years.

In our series, the correlation between age and length of hospital stay was positive and statistically significant (r=0.121; p=0.029), indicating that as the age increases, the length of hospital stay also increases. It is partially explained by the pronounced incidence of chronic diseases, limited functional reserve, higher susceptibility to infections and aggravation of immobility risk factors that are related to the surgical act in patients older than 60 years, increasing the length of hospitalization 6,7,18,19 .

In the younger population, however, the CSDH is rarer, being more commonly associated with recent traumas and manifesting more precocious symptoms and smaller volumes, as a result of the low cerebral compliance^{15, 16}. Our data shows only one death among patients younger than 60 years during hospital stay and none within the first year after surgery, confirming the important influence of the age on the prognosis and also the necessity of a certain degree of expansion of the subdural space for the development of CSDH ²⁰.

Independently of age, the occurrence of headache or consciousness impairment is correlated to the increased chance of death during hospital stay. Both symptoms are related to the presumable increase of the intracranial pressure (ICP) and to the mass effect on the cerebral parenchyma.

Hematoma laterality (or if bilateral), midline deviation and necessity of reoperation were not found to impact on the prognosis or mortality. In a different manner, the current literature supports that traumatic expansive lesions with a midline deviation have a poorer prognosis due to the more intense compressive effect ⁹. In our study, only 32.6% of the patients presented midline deviation. Of those, 57% were in group 1, which resulted in minor mortality, and that might explain the insignificant influence on the prognosis.

Reoperation is more related to the surgical technique than to other isolated variables. The use of postsurgical subdural drains decreases the need for reoperation²¹ and they are routinely used

in our unit for both craniotomies and trepanation procedures ²². Our global reoperation rate was 12.9% (groups 1 and 2), which is in accordance with the literature, as shown in Table 5. No significant correlation between age and reoperation was established in our study, accordingly to the literature ¹³.

Author, Year	Reoperation (%)	Mean age (Years)	Surgery
Maeda, 2001 ¹³	9.8	67	T*
Regan, 2015 ²⁴	6,6	72	T*
Regan, 2015 ²⁴	24.1	68	C†

Table 5. Results of case series with patients who had CSDH, in	۱
which reoperation, age and surgical technique were analyzed	

*T = Trepanation

[†]C = Craniotomy

Even though some studies did not consider the CSDH as benign condition ², our study demonstrated a GOS maximum score in 77% of patients within the first year of follow-up in groups 1 and 2. The maximum score (5 points) in more than three quarters of the patients reflects an excellent middle- and long-term functional recovery in most of the cases. Ageing did not correlate to a worse GOS scoring within one year after surgery. This evidences that although increasing of mortality, the long-term functional prognosis for patients older than 60 years, who were discharged from hospital after surgery for CSDH, is not necessarily poor.

This "all or nothing" feature, implicated to the CSDH, is also observed elsewhere²³. It is a disease of low morbidity in a middle-term and few functional sequelae, in spite of mortality rates that might be of up to 28% in the population older than 65 years⁷.

CONCLUSION

In conclusion, ageing is the most important and well established isolated prognostic factor for CSDH. Aging also increase length of the hospital stay. Headache or consciousness impairment has important correlation with death regarding the age.

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