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ORIGINAL

Impact of neurological complications on subarachnoid hemorrhage

Impacto de las complicaciones neurológicas en la evaluación de pacientes con hemorragia subaracnoidea

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ABSTRACT

Introduction: subarchnoid hemorrhage (SAH) constitutes a severe neurological emergency associated with high morbidity and mortality. Represents 5 % of strokes. Its forecast varies according to its etiology, initial severity snd appearance of secondary complications.
Objective: characterize the epidemiological and clinical profile of patients with subarachnoid hemorrhage at the Dr. Miguel Enríquez hospital.
Method: an observacional, descriptive and retrospective study was carried out at the Dr. Miguel Enriquez Surgical Hospital from January 2022 to December 2024. The qualitative variables were summarized in absolute frequencies and percentages. The quantitative variables in mean and standard deviation. To evaluate the association between qualitative variables, Fisher's exact test was applied.
Results: a total of 67 patients with a diagnosis of subarachnoid hemorrhage were evaluated. The average age was 59 years (SD= 18,2). The average of the Glasgow scale in the sample studied was 11,2 (SD= 4,87). Seizures (31,3 %) predominated. The most frequent non – neurological complication was bacterial bronchopneumonia (49,3 %). The analysis of the association between mortality and neurological complications revealed that the rebleeding (p< 0,001) and the severe Glasgow (p< 0,001) presented a statistically significant relationship with a higher risk of mortality.
Conclusions: the identification of factors associated with mortality is key and allows to prioritize early evaluation strategies aimed at the prevention of complications.

Keywords: Subarchnoid Hemorrhage; Mortality; Neurological Complications.

RESUMEN

Introducción: la hemorragia subaracnoidea (HAS) constituye una emergencia neurológica grave asociada a una alta morbimortalidad. Representa el 5 % de los accidentes cerebrovasculares. Su pronóstico varía según su etiología, gravedad inicial y aparición de complicaciones secundarias.
Objetivo: caracterizar el perfil epidemiológico y clínico de los pacientes con HSA en el Hospital "Dr. Miguel Enríquez".
Método: se realizó un estudio observacional, descritptivo y retrospectivo, en el Hospital Clínico Quirúrgico "Dr. Miguel Enríquez" de enero de 2022 a diciembre de 2024. Las variables cualitativas fueron resumidas en frecuencias absolutas y porcentajes. Las variables cuantitativas en media y desviación estándar. Para evaluar la asociación entre variables cualitativas se aplicó el test exacto de Fisher.
Resultados: se evaluaron un total de 67 pacientes con diagnóstico de hemorragia subaracnoidea. La media

de edad fue 59 años (DE= 18,2). La media de la escala de Glasgow en la muestra estudiada fue de 11,2 (DE= 4,87). Predominaron las convulsiones (31,3 %). La complicación no neurológica más frecuente fue la bronconeumonía bacteriana (49,3 %). El análisis de la asociación entre mortalidad y complicaciones neurológicas reveló que el resangrado (p< 0,001) y el Glasgow severo (p< 0,001) presentaron una relación estadísticamente significativa con un mayor riesgo de mortalidad.
Conclusiones: la identificación de factores asociados a la mortalidad es clave y permite priorizar estrategias de evaluación temprana dirigidas a la prevención de complicaciones.

Palabras clave: Hemorragia Subaracnoidea; Mortalidad; Complicaciones Neurológicas.

INTRODUCTION

Subarachnoid hemorrhage (SAH) is a serious neurological emergency associated with high morbidity and mortality. It accounts for 5 % of strokes, with an incidence of approximately 10 per 100000 inhabitants per year. Its prognosis varies depending on its etiology, initial severity, and the appearance of secondary complications. [1] Different series report that this condition causes about 25 % of stroke-related mortality. In comparison, between 20 % and 30 % of patients who survive are left with severe neurological sequelae despite advances in diagnostic and therapeutic management. Quality of life studies show that less than a third of patients recover their previous occupation and lifestyle after 18 months.[2] Various risk factors have been described for the development of this hemorrhage; among the most significant are a history of high blood pressure and smoking. Eighty percent of non-traumatic SAHs are caused by intracranial aneurysms, which rarely cause symptoms until they rupture. Symptoms include sudden, severe headaches, usually with loss or impairment of consciousness and meningeal signs. Non-contrast cranial computed tomography is the first diagnostic step. A puncture should be performed if the test is negative and suspicion persists. The recommended diagnostic tests to determine the source of the hemorrhage are magnetic resonance imaging and angiography.[3,4] In terminal hospitals, where more complex cases are received, identifying factors associated with adverse outcomes is vital for optimizing intervention strategies.[3] This study aims to characterize the epidemiological and clinical profile of patients with SAH at the "Dr. Miguel Enríquez Hospital".

METHOD

An observational, descriptive, retrospective study was conducted at the Dr. Miguel Enríquez Surgical Hospital from January 2022 to December 2024. The study population consisted of all patients diagnosed with subarachnoid hemorrhage at the Dr. Miguel Enríquez Hospital during the study period, and the sample was made up of those patients who met the inclusion criteria. Non-probability sampling was used for convenience.

Inclusion criteria: Patients diagnosed with subarachnoid hemorrhage by computed tomography over 18 years of age were included.

Exclusion criteria: Incomplete medical history.

The following variables were considered: age, sex, skin color, Glasgow scale, complications, and mortality.

With the information collected, an automated database was created using Microsoft Office Excel version XP, which was then exported to the statistical program Jamovi version 2.4.14 for data processing. Qualitative variables were summarized in absolute frequencies and percentages. Quantitative variables were summarized in mean and standard deviation. Fisher's exact test was used to evaluate the association between qualitative variables. A significance level of 5 % was used. A difference was considered significant when the test probability was less than 0,05.

The patients' personal data included in the study were kept confidential, with due respect for their autonomy and privacy.

RESULTS

A total of 67 patients diagnosed with subarachnoid hemorrhage were evaluated during the study period. The mean age was 59 years (SD= 18,2), although patients over 60 predominated in both sexes (table 1). In terms of skin color, white patients were more frequent (62,7 %), followed by black patients (22,4 %).

Table 1. Distribution by age and sex

Age	Feminine	Male
< 30	2 6,8 %	4 10,5 %
30-60	12 41,3 %	15 39,5 %
>60	15 51,7 %	19 50,0 %

The mean Glasgow scale score in the study sample was 11,2 (SD= 4,87). When stratified by severity, patients with mild Glasgow scores predominated (59,7 %), followed by those with severe Glasgow scores (34,3 %). (table 2)

Table 2. Distribution of patients according to severity on the Glasgow scale

Glasgow	No	%
Mild (13 - 15)	40	59,7
Moderate (9 - 12)	4	6,0
Severo (3 - 8)	23	34,3

Table 3 shows the distribution of neurological and non-neurological complications. Among the former, seizures predominated (31,3 %), followed by rebleeding (10,0 %). The most frequent non-neurological complication was bacterial bronchopneumonia (49,3 %), followed by urinary tract infection.

Table 3. Distribution of neurological and non-neurological complications

	No	%
Neurological complications		
Seizures	21	31,3
Reloading	7	10,0
Vasospasm	6	9
Hydrocephalus	5	7,5
Complications Non-neurological		
Bacterial bronchopneumonia	33	49,3
Urinary tract infection	30	44,7
Pressure Ulcer	29	43,3

Figure 1 shows that of a total of 67 patients diagnosed with subarachnoid hemorrhage analyzed in this study, 28,40 % died.

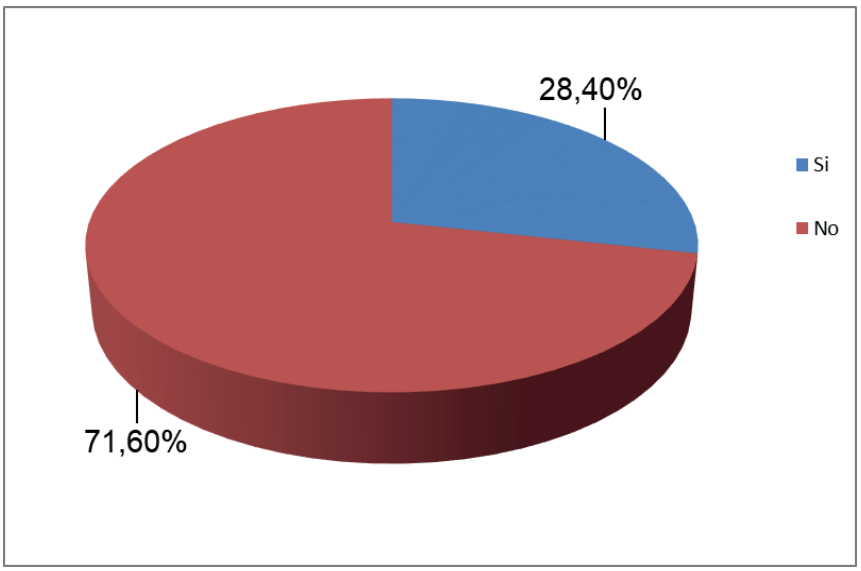

Figure 1. Distribution of patients according to mortality

Analysis of the association between mortality and neurological complications revealed that rebleeding (p< 0,001) and severe Glasgow (p< 0,001) were statistically significantly associated with an increased risk of mortality. Hydrocephalus, seizures, and vasospasm were not statistically significantly associated with mortality. (table 4)

Table 4. Association between neurological complications and mortality

Variables	Mortality				p-value
	Yes		No		
	Number	%	Number	%	
Hydrocephalus	1	20,0	4	80,0	1,000
Seizures	6	28,6	15	71,4	1,000
Vasospasm	1	16,7	5	83,3	0,667
Reloading	7	100	0	0,00	< 0,001
Glasgow Severe (3 - 8)	13	56,5	10	43,5	< 0,001

DISCUSSION

HSA is a neurological condition with high complication and mortality rates, and its prognosis remains unfavorable.[5] This study reports neurological complications, including seizures, rebleeding, vasospasm, hydrocephalus, and non-neurological complications, including bacterial bronchopneumonia, urinary tract infection, and pressure ulcers.

Riveros et al.[6] reported that 45,71 % of patients had complications, of which 23,81 % were vasospasms, which were, in turn, associated with hydrocephalus. Vasospasm is a preventable complication, so its high incidence calls for measures to reduce its occurrence. Oliveira et al.[7] suggest in their research that this complication could be associated with inflammation. However, they concluded that the neutrophil/lymphocyte ratio and the platelet/lymphocyte ratio on admission did not help predict functional outcomes or the risk of vasospasm.

In this study, rebleeding was shown to be statistically significant due to its association with an increased risk of mortality. Rebleeding usually occurs early and is one of the most feared complications. Its risk is estimated at 20 % in the first 15 days, 50 % in the first month, and 78 % at 6 months.[8]

Cedeño et al.[9] suggest that 20-40 % of patients die within 6 months, while another 15-25 % may be left with severe neurological sequelae. Aleksanteri et al.[10] report that of the 7,198 patients hospitalized with SAH, the 30-day mortality rate was 20,4 %. On the other hand, Imberti et al.[11] report lower figures of up to 15 %. In this study, the figure is 28,40 %.

Other factors influencing mortality include the patient's clinical condition at admission, especially in elderly patients, the severity of the initial hemorrhage or blood volume, and severe impairment of consciousness or neurological compromise, as seen in 34,3 % of the patients studied. The latter is a significant predictor, measured using the Glasgow Coma Scale, which hurts patient survival.[12]

These have been explained and associated with various mechanisms caused by severe neuronal destruction, cerebral ischemia secondary to increased intracranial pressure, ventricular arrhythmias with increased catecholamines, and subsequent sympathetic stimulation.[11]

The incidence of this condition has been increasing in recent years, particularly in people over 75, who have a poorer prognosis than younger people. The literature suggests that this is due to its association with different comorbidities. Qi et al.[13] found that the most common age was 65 to 87. This is consistent with the data collected in this study, where patients over 60 predominate.

CONCLUSIONS

Identifying factors associated with mortality is key and allows for prioritizing early assessment strategies and interventions to prevent potentially avoidable complications. Standardized protocols that emphasize strict neurological monitoring are a fundamental pillar in the care of patients with SAH.

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CONFLICT OF INTEREST

The authors declare that they have no conflict of interest.

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Conceptualization: Lisbel Garzón Cutiño.
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