ORIGINAL ARTICLE

Clinical and therapeutic profile of patients who are victims of non-traumatic subarachnoid hemorrhage in the unified health system in the municipality of Barbacena – MG

Perfil clínico e terapêutico dos pacientes vítimas de hemorragia subaracnóidea não traumática no sistema único de saúde no município de Barbacena – MG

Gabriela de Castro Silva[1], Lara Machado Seixas[1], Maria Clara Lopes Nobre[1], Raissa Mara Simões Faria[1], Roberta Denise Alkmin Lopes de Lima[1], Anderson Tavares Rodrigues[2]

DOI: 10.5935/2238-3182.20140099

ABSTRACT

Introduction: The non-traumatic subarachnoid hemorrhage (HSANT) remains with unchanged incidence rates, in contrast to the reduction in the occurrence of other cerebrovascular disorders. It shows high morbidity and mortality and causes disability in young people. **Objective:** to evaluate the clinical characteristics and treatment of non-traumatic HSA victims. **Method:** cross-sectional and descriptive study of 91 medical records from victims of non-traumatic HSA undergoing cerebral angiography in the Unified Health System (SUS) in Barbacena, between 2006 and 2010. **Result:** 55.0% of HSANT occurred in women; 48.3% between 31 and 50 years of age, with an average of 47 years old; explosive headache was the initial complaint in 84.6%; 71.2% hypertense and 65.9% due to aneurysm. Hydrocephalus was developed in 100% of patients undergoing surgery after the 16th day after surgery; 100% of those infected remained hospitalized for more than six days. **Conclusion:** HSANT predominates in women between 31 and 50 years of age, having the explosive headache as the main complaint and aneurysmal disease as the main etiology. Hypertension was the major risk factor. The risk of infection is higher in patients admitted for more than six days, and the development of hydrocephalus seems to be associated with late surgical treatment.

Key words: Subarachnoid Hemorrhage; Intracranial Aneurysm; Headache.

RESUMO

Introdução: *a hemorragia subaracnóidea não traumática (HSANT) permanece com taxas de incidência inalteradas, em contraste com a redução de ocorrência de outras afecções cerebrovasculares. Possui alta morbimortalidade, sendo causa de incapacidade em jovens.* ***Objetivo:*** *avaliar as características clínicas e terapêuticas de vítimas de HSA não traumática.* ***Método:*** *corte transversal, descritivo, de 91 prontuários de vítimas de HSA não traumática, submetidas à angiografia cerebral, no Sistema Único de Saúde (SUS) em Barbacena, entre 2006 e 2010.* ***Resultado:*** *a HSANT ocorreu em 55,0% das vezes em mulheres; 48,3% entre 31 e 50 anos de idade, com média de 47 anos; queixa inicial, em 84,6% das vezes, a cefaleia explosiva; 71,2% hipertensos e 65,9% devidos a aneurisma. Em 100% dos pacientes submetidos à cirurgia houve, após o 16º dia de pós-operatório, o desenvolvimento de hidrocefalia; e 100% dos infectados permaneceram internados por mais de seis dias.* ***Conclusão:*** *a HSANT predomina em mulheres entre 31 e 50 anos de idade, tendo como queixa principal a cefaleia explosiva e como etiologia principal a doença aneurismática. A hipertensão arterial sistêmica foi o grande fator de risco. O risco de infecção é mais alto em pacientes internados além de seis dias e o desenvolvimento de hidrocefalia parece associar-se ao tratamento cirúrgico tardio.*

Palavras-chave: *Hemorragia Subaracnóidea; Aneurima Intracraniano; Cefaleia.*

[1] Medical School student at the Medical School of Barbacena. Barbacena, Minas Gerais – Brazil.
[2] MD. Specialist in Intensive Medicine, Cardiology, and Nephrology. Professor at the Medical School of Barbacena. Barbacena, Minas Gerais – Brazil.

Submitted: 2013/05/13
Approved: 2014/08/18

Institution:
Medical School of Barbacena
Barbacena, MG – Brazil

Corresponding Author:
Maria Clara Lopes Nobre
E-mail: mariaclaraln123@gmail.com

INTRODUCTION

The non-traumatic subarachnoid hemorrhage (HSANT) is a clinical event characterized by an intracranial vessel rupture with blood retained between the pia mater and the arachnoid. It mainly affects people in the fifth decade of life and its main cause is the aneurysmal disease. It is estimated that one in every 10,000 inhabitants is affected accounting for about 30,000 cases/year in the United States. The HSANT incidence rates remain unchanged in the last three decades, in contrast to the reduced rate of other cerebrovascular disorders.[1-4]

The main predisposing factors of aneurysmal HSANT are smoking and hypertension, therefore, associated with modifiable factors in lifestyle. Knowing these factors is essential to act appropriately in the primary prevention to reduce rates of morbidity and mortality since around 45% of the victims die and most survivors become chronically disabled when they should still be active.[1,3,5,6]

The clinical profile of patients affected by HSANT is known in the world's population. However, there are no studies defining characteristics such as age of higher occurrence, main risk factors, and morbidity and mortality rates for the population of communities similar to that in the city of Barbacena. It is essential to know this profile due to the severity and high costs generated by this disease, both in the acute phase and in rehabilitation, which can determine the most appropriate and effective strategies for approaching HSANT in this city.

This study seeks to create the clinical and therapeutic characteristics of HSANT victims living in a small city and users of the Unified Health System (SUS).

METHOD

This is a cross-sectional study of the clinical and treatment characteristics of HSANT victims undergoing cerebral angiography, in the SUS of Barbacena city, between 2006 and 2010.

The patients included in this study were exclusively HSANT bearers, submitted to cerebral angiography and hospitalized and treated in the Santa Casa de Misericórdia of Barbacena, regardless of gender, age, or other variables.

Out of 222 patients undergoing cerebral angiography, 91 were studied; all others were excluded because they have not been located or the invalidity of their results.

Forms containing filling gaps for the variables of interest in the study were used in data collection.

The information recorded were patient´s initials, medical records´ number, clinical manifestations and diagnostic at hospitalization, characteristics of comorbidities, complementary examinations, treatment and complications, and the Hunt-Hess, Fischer, and Glasgow classification. Patient´s anonymity was preserved.

Data analysis was performed in statistical micro processing using Stata version 9.2 after typing the data recorded in the forms.

Frequency distributions were created, and averages, standard deviations, and percentages indicated for each variable were calculated. Comparisons between the subgroups in the study were conducted in contingency tables, of RxC type, or ANOVA tables. The Chi-square or Fisher tests were used in the evaluation of the statistical significance of differences obtained in the comparisons in the ANOVA tables. The significance level adopted in the study was 5%.

RESULTS

The results are data obtained from the medical records of patients undergoing cerebral angiography in Barbacena, in the period between 2006 and 2010. Out of 222 cerebral angiographies analyzed, only 91 medical records were studied because it was not possible to locate all angiographies records or records showing valid results for the study. Out of these 91 records, the date in one of the cerebral angiography record was not available; therefore, the number of cerebral angiographies used for the classification of ictus-angiography time interval was 90.

The records were examined to determine clinical and therapeutic profiles of HSANT patients under their clinical and epidemiological characteristics, which included: gender, age, comorbidities, clinical picture, ictus date, hospitalization place, aneurysm, quantity and location of aneurysms, surgical treatment performance, type of surgical treatment, use of dexamethasone, complications, death, dates of computed tomography of cerebral angiography, surgery, complications, and admission and discharge from the Intensive Care Unit (ICU).

Several epidemiological, clinical and therapeutic, characteristics of HSANT patients were analyzed, including frequencies of recorded intervals between

ictus and surgery, and ICU admission and discharge among patients that had or had not vasospasm (Tables 1, 2, and 3).

Table 1 - Clinical and therapeutic characteristics of non-traumatic HSA patients hospitalized at the Santa Casa de Misericórdia Hospital in Barbacena between 2006 and 2010

Variables	N	%	Low interval	High interval
Gender				
Male	41	45,0	34,7	55,5
Female	50	55,0	44,5	65,4
Age range				
13 to 30	8	8,8	2,9	14,7
31 to 50	44	48,3	37,9	58,8
51 to 85	39	42,9	32,5	53,2
Death				
Yes	19	20,9	12,4	29,4
No	72	79,1	70,6	87,6
Comorbidities				
High blood pressure				
Yes	42	71,2	59,3	83,1
No	17	28,8	16,9	40,7
Smoking				
Yes	17	28,8	16,9	40,7
No	42	71,2	59,3	83,1
Diabetes mellitus				
Yes	9	15,2	5,8	24,7
No	50	84,7	75,3	94,2
Coronary artery disease				
Yes	0	0,0		
No	59	100,0		
Other Comorbidities				
Yes	12	20,3	9,7	31,1
No	47	79,7	69,1	90,2
Aneurysm				
Yes	60	65,9	56,0	75,8
No	31	34,1	24,1	44,0
Anterior circulation				
Yes	49	53,8	43,4	64,3
No	42	46,1	35,7	56,6
Posterior circulation				
Yes	3	3,3	-0,4	7,0
No	88	96,7	93,0	100,4
Anterior and Posterior circulation				
Yes	8	8,8	2,9	14,7
No	83	91,2	85,3	97,1

Continue...

... continuation

Table 1 - Clinical and therapeutic characteristics of non-traumatic HSA patients hospitalized at the Santa Casa de Misericórdia Hospital in Barbacena between 2006 and 2010

Variables	N	%	Low interval	High interval
Clinical picture				
Headache				
Yes	77	84,6	77,1	92,2
No	14	15,4	7,8	22,9
Vomiting				
Yes	42	46,1	35,7	56,6
No	49	53,8	43,4	4,3
Loss of consciousness				
Yes	37	40,7	30,4	50,9
No	54	59,3	49,0	69,6
Motor deficit				
Yes	30	33,0	23,1	42,8
No	61	67,0	57,2	76,9
Stiff neck				
Yes	55	60,4	50,2	70,7
No	36	39,6	29,3	49,8
Convulsion				
Yes	18	19,8	11,4	28,1
No	73	80,2	71,9	88,6
Glasgow				
03 to 07	7	11,1	3,1	19,1
08 to 13	10	15,9	81,0	96,9
14 to 15	46	73,02	61,8	84,3
Hunt-Hess				
1	2	11,1	-5,0	27,2
2	10	55,6	30,1	81,0
3	4	22,2	1,0	43,5
4	2	11,1	-5,0	27,2
Fischer				
1	12	15,6	7,3	23,9
2	32	41,6	30,3	52,8
3	10	13,0	5,3	20,7
4	23	29,9	19,4	40,3
Interval from ictus to surgery				
00-03	74	93,7	88,2	99,2
04-35	5	6,3	0,8	11,8
One aneurism				
Yes	38	41,8	31,4	52,1
No	53	58,2	48,0	68,6
Multiple aneurisms				
Yes	22	24,2	15,2	33,1
No	69	75,8	66,8	84,8

Continue...

... continuation

Table 1 - Clinical and therapeutic characteristics of non-traumatic HSA patients hospitalized at the Santa Casa de Misericórdia Hospital in Barbacena between 2006 and 2010

Variables	N	%	Low interval	High interval
Clinical picture				
Interval from ictus to angiography				
00-03	27	30,0	20,3	39,6
04-35	63	70,0	60,3	79,3
Complications				
Vasospasm				
Yes	14	15,3	7,8	22,9
No	77	84,6	77,0	92,2
Repeated bleeding				
Yes	7	7,7	2,1	13,3
No	84	92,3	86,7	97,9
Hydrocephaly				
Yes	6	6,6	1,4	11,8
No	85	93,4	88,2	98,6
Infection				
Yes	11	12,1	5,3	18,9
No	80	87,9	81,1	94,7
Infection site				
Urinary system and lungs	1	9,1	-11,2	29,3
Right upper limb	1	9,1	-11,2	29,3
Abdomen	1	9,1	-11,2	29,3
CNS	2	18,2	-9,0	45,3
Surgical scar	2	18,2	-9,0	45,3
Lung	4	36,4	2,5	70,2
Hyponatremia				
Yes	3	3,3	-0,5	7,0
No	88	96,7	93,0	100,4
Interval from ictus to vasospasm				
00-03	2	14,3	-6,7	35,2
04-15	8	57,1	27,5	86,8
16-43	4	28,6	1,5	55,6
Interval from ictus to repeated bleeding				
00-15	4	57,1	12,5	120,1
16-66	3	42,9	-20,1	87,5
Therapeutics				
Surgery				
Yes	55	60,4	50,2	70,7
No	36	39,6	29,3	48,8

Continue...

... continuation

Table 1 - Clinical and therapeutic characteristics of non-traumatic HSA patients hospitalized at the Santa Casa de Misericórdia Hospital in Barbacena between 2006 and 2010

Variables	N	%	Low interval	High interval
Therapeutics				
Surgical treatment				
Clipping	54	59,3	49,0	69,6
Conservative	36	39,6	29,3	49,9
Embolization	1	01,1	-1,0	-3,3
Dexamethasone				
Yes	63	69,2	59,6	78,9
No	28	30,8	21,1	40,4
Interval from ICU admission to discharge				
00-06	32	59,2	45,7	72,8
07-66	22	44,7	27,2	54,3
Admission				
Ward	64	70,3	60,8	79,9
ICU	27	29,7	20,1	39,2
Urgent surgery				
Yes	9	9,9	3,6	16,1
No	82	90,1	83,8	96,4
Urgent surgery procedure				
DVE implant	6	66,7	28,2	105,1
Clipping	3	33,3	-5,1	71,8
Interval from ictus to surgery				
00-03	12	21,8	10,5	33,1
04-15	28	50,9	37,3	64,5
16-43	15	27,3	15,1	39,4

The average interval between ictus and surgery was 11.5 days (SD=8.5) among those who presented vasospasm, and 11.1 days (SD=8.8) among those who never showed vasospasm. The Fischer test value for the comparison was equal to 0.02 and p=0.882. The average time of ICU stay was 16.3 days (SD=22.1) and 7.5 days (SD6.3) among those who presented and did not present vasospasm, respectively. The Kruskal-Wallis test showed H0=0.506 and p=0.476.

The frequency of recorded intervals between ictus and surgery, and admission and discharge from ICU was also studied among patients who had repeated bleeding or did not have; test results of statistics significance were applied in the comparison of frequencies (Table 4).

Table 2 - Averages and standard deviations of patient's ages and intervals between studied dates

Characteristics	N	Average	SD	IC 95	
				Inferior	Superior
Age	91	47,0	12,6	44,4	49,6
Interval from ictus to surgery	79	0,96	4,1	0,4	18,8
Interval from ictus to angiography	90	7,4	6,7	64,4	88,6
Interval from ICU admission to discharge	54	9,0	10,8	60,2	119,4
Interval from ictus to surgery	55	11,2	8,6	88,7	135,3
Interval from ictus to vasospasm	14	10,0	8,7	49,5	150,5
Interval from ictus to repeated bleeding	7	28,1	24,2	57,7	505,1
Interval from ictus to hydrocephaly	6	21,3	35,8	-162,9	589,5
Interval from ictus to infection	11	22,2	23,5	63,3	380,3
Interval from ictus to hyponatremia	3	30,0	16,6	-113,4	713,4
Interval from ictus to death	19	24,6	25,0	125,8	366,8
Interval from ICU admission to hospital discharge	51	15,1	14,0	111,3	190,2
Interval from ICU admission to death	18	19,4	19,6	96,5	291,2
Interval from surgery to vasospasm	14	-1,5	12,8	-89,2	59,2
Interval from surgery to repeated bleeding	6	23,5	24,5	-22,0	492,0
Interval from surgery to hydrocephaly	3	3,0	39,9	-960,8	120,8
Interval from surgery to infection	7	9,6	19,6	-68,0	260,5
Interval from surgery to hyponatremia	3	11,3	9,2	-116,1	342,8
Interval from surgery to death	12	19,2	20,0	71,3	313,3

Table 3 - Frequency of intervals from ictus to surgery, ICU admission and discharge discriminated or not by those with vasospasm

Compared characteristics	Vasospasm - Yes		Vasospasm - No		X2/F	P
	N	%	N	%		
Interval from ictus to surgery						
00-03	3	21,4	9	21,9		
04-15	6	42,8	22	53,6	–	0,663
16-43	5	35,7	10	24,4		
Interval from ICU admission to discharge						
00-06	5	55,6	27	60,0	–	1,000
07-66	4	44,4	18	40,0		

The average interval between ictus and surgery was 7.5 days (SD-8.6) among those who presented repeated bleeding, and 11.6 days (SD=8.3) among those who never showed repeated bleeding. The Fischer test value for the comparison was 1.24 and p=0.270. The average time of ICU stay was 20 days (SD=0.0) among those who showed repeated bleeding and 8.7 days (SD=10.8) among those who have not showed repeated bleeding. The Kruskal-Wallis test showed H=1.92 and p=0.175.

The frequency of recorded intervals between ictus and surgery, and admission and discharge from ICU was also studied among patients with or without hydrocephalus and the results of the tests of statistical significance were applied in the comparison of frequencies (Table 5).

Table 4 - Frequency of intervals from ictus to surgery and ICU admission and discharge discriminated or not by those with repeated bleeding

Compared characteristics	Repeated bleeding - Yes		Repeated bleeding - No		X2/F	P
	N	%	N	%		
Interval from ictus to surgery						
00-03	3	50,0	9	18,3		
04-15	2	33,3	26	50,1	–	0,234
16-43	1	16,7	14	28,6		
Interval from ICU admission to discharge						
00-06	0	0,0	32	60,4	–	0,407
07-66	1	100,0	21	39,6		

The average interval between ictus and surgery was 29 days (SD=13.5) among those with hydrocephalus and 10.2 days (SD=7.2) among those without the disease. The Fischer test value for comparison was 17.64 and p=0.0001. The average time of ICU stay was 7.5 days (SD=7.8) and 9 days (SD=11.0) for those with or without hydrocephalus, respectively. The Fischer test value for the comparison was 0.04 and p=0.846.

Table 5 - Frequency of intervals from ictus to surgery and ICU admission and discharge discriminated or not by those with hydrocephaly

Compared characteristics	Hydrocephaly - Yes		Hydrocephaly - No		X2/F	P
	N	%	N	%		
Interval from ictus to surgery						
00-03	0	0,0	12	23,1		
04-15	0	0,0	28	53,8	-	0,026
16-43	3	100,0	12	23,1		
Interval from ICU admission to discharge						
00-06	1	50,0	31	59,6	-	1,000
07-66	1	50,0	21	40,4		

The frequency of recorded intervals between ictus and surgery, and admission and discharge from ICU was also studied among patients with or without infection and the results of the tests of statistical significance were applied in the comparison of frequencies (Table 6).

Table 6 - Frequency of intervals from ictus to surgery and ICU admission and discharge discriminated or not by those with infection

Compared characteristics	Infection - Yes		Infection - No		X2/F	P
	N	%	N	%		
Interval from ictus to surgery						
00-03	2	25,0	10	21,3		
04-15	4	50,0	24	51,1	–	1,000
16-43	2	25,0	13	27,7		
Interval from ICU admission to discharge						
00-06	0	0,0	32	65,3	8,014	0,005
07-66	5	100,0	17	34,7		

The average interval between ictus and surgery was of 13.7 days (SD=14.9) among those who presented infection and 10.7 days (SD=7.2) among those who never showed infection. The Kruskal-Wallis test revealed H=0.014 and p=0.904. The average time of ICU stay was 11 days (SD=2.0) among those who had infections and 8.8 days (SD=11.4) among those who did not have an infection.

The frequency of recorded intervals between ictus and surgery, and admission and discharge from ICU was also studied among patients who had hyponatremia or those who did not have it, and the results of statistical significance tests were applied in the comparison of frequencies (Table 7).

The average interval between ictus and surgery was 18.6 days (SD=21.7) among patients with hyponatremia and 10.7 days (SD=7.5) among those without the disease. The Kruskal-Wallis test showed H=0.138 and p=0.710. The average time of ICU stay was 13 days (SD=0.0) among those with hyponatremia and 8.9 days (SD=10.4) among those without it. The Kruskal-Wallis test showed H=1.274 and p=0.259.

Table 7 - Frequency of intervals from ictus to surgery and ICU admission and discharge discriminated or not by those with hyponatremia

Compared characteristics	Hyponatremia - Yes		Hyponatremia - No		X2/F	P
	N	%	N	%		
Interval from ictus to surgery						
00-03	1	33,3	11	21,1		
04-15	1	33,3	27	51,9	–	0,784
16-43	1	33,3	14	26,9		
Interval from ICU admission to discharge						
00-06	0	0,0	32	60,4	–	0,407
07-66	1	100,0	21	39,6		

The frequency of recorded intervals between ictus and surgery, and admission and discharge from ICU and use or not of dexamethasone was also studied among patients who passed away or did not pass away; the results of the tests of statistical significance were applied in the comparison of frequencies (Table 8).

Table 8 - Frequency of intervals from ictus to surgery and ICU admission and discharge and use of Dexamethasone discriminated those who died or survived

Compared characteristics	Death - Yes		Death - No		X2/F	P
	N	%	N	%		
Interval from ictus to surgery						
00-06	00	00,0	32	62,7	–	0,062
07-66	03	100,0	19	37,3		
Interval from ICU admission to discharge						
00-03	06	46,1	06	14,3	–	0,064
04-15	04	30,8	24	57,1		
16-43	03	23,1	12	28,6		
Dexamethasone						
Yes	12	63,2	51	70,8	0,415	0,519
No	07	36,8	21	29,2		

The average stay in the intensive care unit among those who died was of 29.3 days (SD=31.8) and 7.8

days (SD=7.6) among those who survived. The Kruskal-Wallis test showed H=4.13 and p=0.042. The average interval between ictus and surgery among those who passed away was 9.6 days (SD=13.1) and 11.7 days (SD=6.9) among those who survived. The Kruskal-Wallis test showed H=2.84 and p=0.092.

DISCUSSION

Necessary information for all variables was not obtained and, therefore, the discussion is the reflection of what was found, nevertheless, the available information was enough to characterize the cases examined here.

HSANT predominated in females (55.0%), between 31 and 50 years old (48.3%), and average age of 47 years old (SD=12.6), as observed in other studies, with mortality of 20.9%, associated with HSANT, reported in other studies as 45%.[1]

As found is this study, hypertension is an important risk factor for the development of aneurysmal HSANT[3] in which 42 patients evolved this way (71.2%). The risk of HSANT aneurysmal development in smokers is almost double compared to nonsmokers;[1] this is the only risk factor constantly identified in several studies. A total of 28.8% of the patients were identified as smokers, and in 71.2% of the remaining patients, the information about smoking habits were not found, however, it was not possible to confirm if they were not smokers.

The aneurysmal disease is the main factor causing HSANT and most aneurysms are located in the anterior arterial circulation.[1] These data are similar to those obtained in this study, showing 60 patients (65.9%) with aneurysmal HSANT, and 49 of them (53.8%) with an aneurysm located in the anterior arterial circulation.

HSANT begins with a holocranial explosive headache, which is its characteristic most frequent symptom[7] also observed in 77 patients (84.6%) in this study. Other associated complaints were vomiting, loss of consciousness, motor deficit, neck stiffness, and seizures (Table 1). The incidence of convulsive crisis after bleeding varies from 6% to 18.6%, being found in 18 patients (19.8%) in this study.

The clinical classification of HSANT victims uses grading scales according to neurological deficits such as the Glasgow coma scale (GCS) and Hunt-Hess scale. The severity levels of the GCS are defined as: serious (≤8), moderate (9-12), and light (≥13). In developed countries, 5% of inpatients with brain injuries are classified as serious and 80% as light. In the casuistic analyzed here, out of the 63 patients classified by the GCS, 46 (73%) had 14-15 points. Level II in the Hunt-Hess scale is the most frequent observation.[4] In this study, out of the 18 patients classified by the Hunt-Hess scale, 10 presented level II at the time of hospitalization (55.6%).

The Fisher scale was developed to quantify the bleeding and indicate vasospasm due to variability in the extension and level of involvement of cerebral vessels, where the most prevalent is level 3 on the Fisher scale.[4] The Fisher scale applied to patients in this study identified level 2 in 32 patients (41.6%).

Brain computed tomography (CT) is the initial exam to be considered after the clinical suspicion of HSANT, which shows great sensitivity when performed early.[7] In this study, 74 patients (93.7%) underwent brain CT within three days from ictus.

Cerebral angiography is considered the "gold standard" exam among radiological examinations for the detection of aneurysmal HSANT and identifies potential aneurysms and their location and quantity. The minority of patients have multiple aneurysms and most aneurysms are located in the anterior cerebral circulation.[1] The data in this study was similar, with 22 patients (24.2%) having multiple aneurysms and 49 (53.8%) in the anterior circulation.

Cerebral angiography is essential for therapeutic planning; the determination of the interval between ictus and cerebral angiography is fundamental to establish an appropriate treatment.[2] Most angiographies (70%) in our study were conducted on the fourth day, with an average of seven days after ictus.

Vasospasm was the most frequent described complication, observed in 14 patients (15.3%) as described in another study,[3] with its maximum occurrence in the first two weeks and average on the 10th day (SD=8.7). Repeated bleeding was most noted in the first two weeks, with an average on the 28th day (SD=24.2), as reported in other studies.[8,9]

It is possible to prevent cerebral vasospasm with the institution of early surgical therapy and removal of coagulated blood from the subarachnoid space.[10] In this study, there was no relationship between the vasospasm and the time of ictus and surgery (p=0.663). The differentiation between ICU stay and vasospasm (p=1.0) was not possible, probably due to the small sample size.

The treatment of aneurysmal HSANT with surgical clipping or embolization should be performed to reduce the rate of repeated bleeding.[6] The surgery time after HSA was significantly correlated with the

probability of preoperative repeated bleeding, being 5.7%, 9.4%, 12.7%, 13.9%, and 21.5%, between 0 and 3, 4 and 6, 7 and 10, 11 and 14, and 15-32 days, respectively. In this study, there was no significant difference regarding the moment of surgery and repeated bleeding, probably due to the small sample size (p=0.234). The comparison between the two groups according to the length of ICU stay showed similar results indicating absence of a correlation between (p=0.407).

HSA contributes to the development of acute hydrocephalus because it suddenly involves liquor circulation.[11] Patients in this study who developed hydrocephalus waited an average of 17.6 days to be operated; and the others, 10.2 days (p=0.026). The development of hydrocephalus seems to be associated with the time between ictus and surgery. The comparison between the two groups regarding admission and discharge from the ICU did not differ in frequency (p=1.000) or average (p=0.846).

In this study, 11 patients (12.1%) showed some infection as a complication, most of the time (36.4%) in the respiratory tract, diagnosed on average 22 days from ictus and as seen in other studies.[2] The comparison between those who showed infection with those who did not show infection, did not show evidence of a correlation between infection and the time of ictus and surgery (p=1.000). Patients admitted to the ICU show a higher probability of contracting infections, which is due to the length of stay among other factors.[11,12] The risk of infection is higher when the hospitalization stay exceeds 48 hours,[12,13] being proportionately higher with the length of hospitalization.

The treatment methods of HSANT can be: a) conservative – considered in small aneurysms (≤ 10 mm) in asymptomatic patients; b) surgical clipping; and c) embolization.[14] In this study, 36 (39.6%), 54 (59.3%), and one (1.1%) patients received conservative, surgical clipping, and embolization treatment, respectively. The current HSANT approach[6] shows two options: obliterate the aneurysm by surgical clipping or embolization. The surgical clipping is the preferred method, as performed in this study, carried out in 59.3% of the cases and embolization in 1.1%.

The patient's recovery as depending on how soon the surgery was performed after ictus is controversial, seeming better when held between zero and three days after ictus.[15,16] About 20% of patients are operated before the fourth day and most of them between the fourth and the 16th days after ictus; with an average of 11.2 days (SD=8.6). In this investigation there was no significant difference between surgery performed early (up to three days after ictus) and not early (after the fourth day from ictus) due to the number of deaths (p=0.064), and probably explained by the sample size.

The use of dexamethasone in the HSA treatment is controversial, without specific evidence that it is beneficial;[17] it is often used anyway, as in the present study, being administered in 63 patients (69.2%). Dexamethasone is not beneficial in intracerebral hemorrhage and can increase the risk of infection and mortality. There are no data confirming these effects in HSANT.[18] The protection of the use of dexamethasone in relation to death was not observed in the present study.

The prolonged ICU hospitalizations are more frequent in more severe patients at admission and are associated with high hospital mortality.[19] Most of the patients (59.2%) had an ICU stay of less than 7 days, with an average of 9.0 days. All patients who died remained in the ICU for more than six days with an average time of 29.3 days. These values were not significant and suggest that the probability of dying seems to be proportional to the length of ICU stay.

CONCLUSION

Some of our results could not be compared with those from other studies. However, they allowed concluding that HSANT in patients from Barbacena city is predominant in the female gender, age group from 31 to 50 years old, with the most prominent symptom being explosive headaches, with GCS between 14 and 15 points at admission, level II on the Hunt-Hess scale, and level 3 in the Fisher scale. Its main cause is the aneurysmal disease with the predominance of one single aneurysm in the anterior circulation. Vasospasm is most prevalent complication, and surgical clipping was the most used therapeutic procedure. The risk of infection is higher in patients hospitalized in the ICU for periods longer than six days. The development of hydrocephalus seems to be associated to the length of waiting time for the surgical treatment after ictus. Hypertension was the main risk factor for the development of aneurysmal HSANT.

REFERENCES

1. Turcato C, Pereira SW, Ghizoni MF. Hemorragia subaracnoide. Arq Cat Med. 2006; 35(2):78-84.

2. Spotti AR, Lima EG, Santos MLT, Magalhães ACA. Angiografia pela ressonância magnética nos aneurismas intracranianos: estudo comparativo com a angiografia cerebral. Arq Neuropsiquiatr. 2001; 59(2):384-9.
3. Suarez JI, Tarr RW, Selman WR. Aneurysmal subarachnoid hemorrhage. N Engl J Med. 2006; 354(16):1755-7.
4. Bonilha L, Marques EL, Carelli EF, Fernandes YB, Cardoso AC, Maldaum MVM, *et al*. Risk factors and outcome in 100 patients with aneurismal subarachnoid hemorrhage. Arq Neuro-Psiquiatr. 2001; 59(3):676-80.
5. Feigin VL, Rinkel GJE, Lawes CMM, Algra A, Bennett A, Gijin J, *et al*. Risk factors for subarachnoid hemorrhage: an updated systematic review of epidemiological studies. J Amer Hear Assoc. 2005; 36:2773-80.
6. Bederson JB, Connolly SJ, Batjer HH, Dacey RG, Dion JE, Duldner JE, *et al*. Guidelines for the management of aneurysmal subarachnoid hemorrhage. J Amer Hear Assoc. 2009; 40:994-1025.
7. Lopez FG, Valverde CML, Sanchez P. Manejo general en cuidados intensivos del paciente con hemorragia subaracnoidea espontânea. Rev Med Inten. 2008; 32(7):342-53.
8. Jennett, B. Development of glasgow coma and outcome scales. J Neurosc. 2005; 2(1):24-8.
9. Charpentier C, Audibert G, Guillemin F, Civit T, Ducrocq X, Bracard S, *et al*. Multivariate analysis of predictors of cerebral vasospasm occurrence after aneurysmal subarachnoid hemorrhage. J Neural Sci. 1999; 30(7):1402-8.
10. Masahiro M, Takeshi K, Takashi U, Toshiaki T. Prevention of vasospasm by early operation with removal of subarachnoid blood. J Neurosurg. 1982; 10(3):301-7.
11. Graff-Radford NR, Torner J, Adams HP, Kassell NF. Factors associated with hydrocephalus after subarachnoid hemorrhage: a report of the cooperative aneurysm study. Arch Neurol. 1989; 46(7):744-52.
12. Lima ME, Andrade D, Haas VJ. Avaliação prospectiva da ocorrência de infecção em pacientes críticos de unidade de terapia intensiva. Rev Bras Terap Inten. 2007; 19(3):34-7.
13. Vincent JL, Bihari DJ, Suter PM. The prevalence of nosocomial infection in intensive care units in Europe: results of the european prevalence of infection in intensive care (EPIC) study. JAMA. 1995; 274:639-44.
14. Bernardo WM, Lima F, Bernardo LS. Qual a eficácia das micromolas intracerebrais em relação ao procedimento de clipagem cirúrgica nos aneurismas cerebrais rotos? Rev Assoc Med Bras. 2010; 56(6):620-1.
15. Haley ECJ, Kassell NF, Torner JC. The international cooperative study on the timing of aneurysm surgery: the north american experience. Stroke. 1992; 23(2):205-14.
16. Gans K, Nieuwkamp DJ, Rinkel GJE, Algra A. Timing of aneurysm surgery in subarachnoid hemorrhage: a systematic review of the literature. J Neurosurg. 2002; 50(2):336-42.
17. Biller J, Godersky JC, Adams JRHP. Management of aneurysmal subarachnoid hemorrhage. Stroke. 1988; 19(10):1300-5.
18. Sharafadinzadeh N, Baghebanian SM, Pipelzadeh M, Moravej-ale A, Ghanavati P. Effects of dexamethasone in primary intracerebral hemorrhage in the South West of Iran, Pak. J Med Sci. 2008; 24(4):502-5.
19. Abelha FJ, Castro MA, Landeiro NM, Neves AM, Santos CC. Mortalidade e o tempo de intervenção em uma unidade de terapia intensiva cirúrgica. Rev Bras Anestesiol. 2006; 56(1):34-5.