

Vascular surgery experiences and the results in the first two years of a newly-established neurosurgery clinic

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Abstract

Background: Aneurysmal hemorrhages have been the mostly seen cause of spontaneous subarachnoid hemorrhages. Aneurysmal hemorrhages are situations with a high rate of mortality and morbidity. It is really crucial that the treatment of an aneurysm should be operated by experienced tertiary clinics. Newly established clinics need experienced doctors and clinic reflexes in which patient follow-up is conducted properly in order to manage the treatment process ideally.

Methods: In this study, the 6-month clinical results of patients with aneurysmal subarachnoid hemorrhage who have been operated in our newly established hospital have been evaluated. Moreover, the results are compared with other clinics and literature.

Results: The study included 27 (57%) female patients and 20 (43%) male patients. It is determined that the average age of all patients is 55.42 (+- 1.68). 6 months mortality rate was 19.14%. The patients were operated within 24 hours after admission to the clinic

Conclusion: It is determined that the treatment unit for aneurysmal subarachnoid hemorrhage in our hospital is similar to the ones in other clinics and the ones mentioned in the literature. It is also seen that the early surgical planning in our hospital positively affects patient survival in keeping with the literature.

Keywords: Subarachnoid Hemorrhage, Cerebral Aneurysms, Stroke, Brain Aneurysms.

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INTRODUCTION

The most common cause of a nontraumatic subarachnoid hemorrhage (SAH) is aneurysmal subarachnoid hemorrhage. The global incidence of aneurysmal SAH is seen as 7.9/100000. The incidence of aneurysmal SAH differs according to countries and regions (1). The average age for the rupture of an aneurysm is 50-55. Also, it is mostly seen between the ages of 40 and 60 (2-4). Hypertension, smoking and family history are the most important risk factors (5, 6).

After the aneurysm is ruptured, the blood flows in cerebrospinal fluid (CSF) and diffuses in CSF. Generally, it diffuses in cistern and ventricles. However, it also diffuses in parenchyma and rarely to a subdural distance. Within that period, intracranial pressure increases. Although aneurysmal hemorrhages usually end in a few seconds, they frequently reoccur in the first 24 hours (7, 8). Beyond the re-bleeding, other two most important complications of aneurysmal SAH are hydrocephalus and vasospasm (9, 10).

Grading aneurysmal SAH is vital in terms of the management of the treatment process. Glasgow Coma Scale, Hunt Hess classification, WFNS and Fisher Grading Scale have been used to grade aneurysmal SAH. These graders directly affect the prognosis and the treatment process. It is seen that the treatment modalities and algorithms of ruptured aneurysms have been changing and improving since the first aneurysm clip was done by Dandy in 1938 and endovascular coiling procedure was done by Gugliemi in 1990 (11, 12).

In this study, it is aimed to evaluate aneurysm surgeries that have been conducted by our team, started in 2020, in the newly-established University of Health Sciences, Bursa City Hospital. Although both surgical and endovascular treatments have been performed in our hospital, in this study, it is aimed to compare the results of the surgically treated patients with the literature and to evaluate their prognosis.

MATERIALS AND METHODS

University of Health Sciences in Bursa City Hospital was put into service in July, 2019. Neurovascular Surgery department was opened in January, 2020. There are 40 beds in our neurosurgery service. Intensive care patients

are being followed-up in surgical intensive care unit and/or anesthesia intensive care unit. When the need for intensive care of these patients ends, they are particularly moved to neurosurgery service to be followed-up. There are 2 neurosurgery operating rooms and the aneurysm operations are conducted by the helps of experienced staff and nurses. Once the decision to operate is made for a patient, routine CT angiography is done and based upon the clinical condition of the patient, digital subtraction angiography (DSA) is also done. In case of re-bleeding, the surgical operations are emergently conducted within 24 hours. Before and after clipping, vascular flow is checked by intraoperative doppler. The images that belong to the patients are stored in the databases of our hospital and City Health Administrative.

The patients admitted to our clinic have had a neurological examination first. After being diagnosed as SAH via CT, the patients have been examined for etiology search via CT angiography and digital subtraction angiography (DSA), if needed. During this process, routinely, the patients have started using dexamethasone, antiepileptic therapy and nimodipine. The WFNS values and Fisher scales of the patients have been recorded. Hypertensive and hypervolemia have been followed-up among patients postoperatively. Hyperglycemia and hyperthermia have been avoided and laboratory support has been given. In any case of need, sedation is given, and the patients have been followed. For the patients who have had vasospasm, control DSAs have been conducted and they are given selective intraarterial nimodipine. For the patients who have had vasospasm and communicating hydrocephalus, it has been tried to decrease the burden of blood elements in cerebrospinal fluid via lumbar punctures. In order to make an evaluation about the WFNS scores, mortality and morbidity values of the patients in admission and modified Rankin Scales (mRS) in the 6th month have been evaluated. The locations of aneurysms have been observed and the results have been compared with the literature. For the patients, mRS scores are grouped as good for 0-2, mortality and dependent patient for 3-6.

Statistical analyses were performed using IBM SPSS Statistics for Windows, version 22.0 (IBM Corp., Armonk, NY, USA). Descriptive statistics were presented as numbers and percentages for categorical variables and as mean \pm standard deviation for continuous variables.

This study was approved by the clinical research ethics committee of the Health Sciences University, Bursa Faculty of Medicine, Bursa City Hospital (Date: 28.05.2022 number: 2022-08/08).

RESULTS

In our clinic, aneurysm surgery is started to be applied in January 2020. Since then, to November 2021, 47 patients, who admitted to our hospital with aneurysmal SAH,

have been operated in a 13-month active working period because of the intensive care unit restrictions that lasted 10 months in which we were not able to conduct surgeries during Covid-19 pandemic. 27 of them (57%) are female patients. It is seen that the age distribution of the patients is normal for both genders according to the Shapiro-Wilk test. It is determined that the average age of all patients is 55.42 (+ 1.68), the average age of female patients is 57.96 (+ 2.14), and the average age of male patients is 52 (+ 2.57) (Table 1).

Table 1. Clinical results according to GCS scores

Patients' treatment results of 6-month period according to their admission scores.			mRS (0-6)		Total
			Good (0-2)	Dependent patient and mortality (3-6)	
GCS scores in admission	Good (15-14)	Number	18	4	22
		Percentage	81.8%	18.2%	100.0%
	Medium (13-9)	Number	9	2	11
		Percentage	81.8%	18.2%	100.0%
	Bad (8-3)	Number	5	9	14
		Percentage	35.7%	64.3%	100.0%
Total Percentage		Number	32	15	47
		68.1%	31.9%	100.0%	

Note: Admission scores of the patients have been evaluated by GCS and they are grouped as good between 14-15, medium between 13-9 and bad between 8-3. At the end of 6-month period, the patients have been re-evaluated. The results of the treatment and mRS scores are grouped as good clinical results between 0-2 and dependent and lost patients between 3-6.

The mortality rate is 19.1% among all patients while this rate increases up to 35.7% among surgically treated patients with low GCS scores. Although they have been admitted to our hospital with high GCS scores, only 4 of our patients, one of whom was post op 10, died. During the day, two patients had re-bleeding aneurysm after the diagnostic angiography and before the surgery. Due to this

re-bleeding, they had low GCS scores and were taken into emergent surgical operation, but the patients died in the following process because of acute myocardial infarction. It is seen that, the better admission GCS scores the patients have, the better clinical results they reach. This situation is seen to be statistically significant with Pearson Chi-Square test (Table 2).

Table 2. Mortality rates of patients in coma or not

			Patients' final status for six months period		Total
			Good	Dependent/Dead	
Patients' status in admission	Not in coma	Number	27	6	33
		Percentage	81.8%	18.2%	100.0%
	In coma	Number	5	9	14
		Percentage	35.7%	64.3%	100.0%
Total		Number	32	15	47
Percentage			68.1%	31.9%	100.0%

Note: When the patients' status in admission and patients' final clinical status for six-month period are compared, it is seen that poor conscious is directly related to mortality and morbidity. (Fischer's exact test $p < 0.05$)

When the locations of aneurysm have been examined, it is seen that middle cerebral artery (MCA) is mostly operated. The other locations are anterior communicating artery (ACOM), posterior communicating artery (PCOM), distal anterior cerebral artery (DACA) and internal carotid artery (ICA) in order (Table 3).

Table 3. Aneurysm locations

		Number	Percentage
Aneurysm locations	MCA	21	44.7
	ACOM	17	36.2
	PCOM	6	12.8
	ICA	1	2.1
	DACA	2	4.3
	Total	47	100.0

Note: Considering the aneurysm location distributions, it is seen that the most operated aneurysms are MCA aneurysms.

DISCUSSION

Although our clinic is a newly-established one, neurovascular cases have been gradually increasing. It is seen that the rate of female patients to male patients is 1.35. It is also determined that when we compare the demographic values such as the average age of our

patients with other data from both our country and abroad, the results are roughly similar (13-16).

When the locations of aneurysms are examined among older clinics which have been conducting such operations longer than us, it is seen that the most common ones are similar in order, MCA (44.7%), and ACOM (36.2%) (15). It is also detected that the discharge and good clinical result rate in the 6th month of other clinics is 67.2% (15). When we have evaluated our clinic results, it is seen that the rate is 68.1%, similarly. When the surgery rates of the patients with low GCS values (GCS values 8-3) increase, the mortality and morbidity rates relatively increase, but it is seen that the recovery rates of the patients in coma are substantial. The meta-analysis study of Yao et. al. demonstrates that early surgery decreases the mortality and morbidity rates of the patients with SAH either operated or not (17). Therefore, patients with aneurysmal SAH are being operated as soon as possible in our clinic. Although it has been the early stages of aneurysmal surgery in our clinic, we believe that early surgery is one of the reasons of our success which has similar rates with other clinics.

It is obvious that, even the patients are operated without wasting time, one of the most important factors is the GCS values of the patients in admission to the hospital. In our study, similar to the ones in literature, it is seen that the patients with low GCS values have significantly high mortality and morbidity rates.

It is apparent that operating the patients at early stages has positive effects on the success of the treatment. In newly-established clinics, planning these kinds of operations is significant in terms of clinical routines which can improve staff training. It is known that the clinical results of the patients with low GCS scores in admission are worse. However, it is estimated that early surgery would be more promising for these patients, too. Although we are a new clinic, bleeding aneurysm treatments performed by following the current literature have provided acceptable values according to the literature.

Declarations

The authors received no financial support for the research and/or authorship of this article. There is no conflict of interest.

This study was approved by the clinical research ethics committee of the Health Sciences University, Bursa Faculty of Medicine, Bursa City Hospital (Date: 28.05.2022 number: 2022-08/08).

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