Original Article

Functional out come after cerebral AV aneurysms clipping

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ABSTRACT

Objective
To assess the impact of surgical treatment of ruptured cerebral aneurysms on physical and cognitive functioning of patients.
Patients and Methods
From January 2008 to May 2009, 18 patients operated for ruptured cerebral aneurysms at Shifa International Hospital Islamabad were included in this retrospective study. Admission assessment was done using Hunt-Hess grade. All patients were followed 3 and 12 months postoperatively with a thorough physical examination and clinical investigations. Functional independence measure (FIM) scale was used to assess the outcome.
Results
Of 18 patients, 14 (78%) were men, and 4(28%) were woman. The mean age was 34 years (range 28 to 58 years). Those who underwent clipping for ruptured cerebral aneurysms had reduced verbal memory; otherwise, they had improved cognitive function 12 months postoperatively.
Conclusion
Surgical clipping of cerebral aneurysms yielded optimal functional outcome despite having cognitive and psychological deficits. (Rawal Med J 2010;35:).
Key words
Intracranial aneurysms, clipping, subarachnoid hemorrhage.

INTRODUCTION

Subarachnoid hemorrhage (SAH) is a most common presentation of intracranial aneurysms[1]and often has devastating outcome, if not treated in time.[2] Most intracranial aneurysms remain asymptomatic until rupture, with only 10% presenting prior to rupture, usually with symptoms of mass effect.[3] SAH accounts for 5%-10% of all strokes presenting in the 5th decade of life.[4-7] After aneurysmal rupture, SAH causes diffuse neurotoxic damage to the exposed cerebrum.[8] Subsequent vasospasm and ischemia may lead to the more local damage. Therefore, they never regain their previous mental and social well being and end up with some degree of cognitive and psychological deficit. [9-12] This impairment leads to difficulty with reintegration into the social environment often, despite the good functional physical outcome. The aim of this study was to determine the impact of surgical treatment of ruptured cerebral aneurysms on physical and cognitive functioning of these patients with extended follow up.

PATIENTS AND METHODS

All adult patients admitted to the Department of Neurosurgery and operated for aneurysmal SAH over a period of 16 months from January 2008 to May 2009 were included in this study. Data were gathered from the hospital records. Admission criteria were assessed using the Hunt-Hess five grade scale, describing the patient's condition immediately after SAH. Clinical history, physical examination, CT and MRA confirmed the diagnosis of SAH due to a ruptured aneurysm. Aneurysms were treated microsurgical clipping with few having external ventricular drain (EVD) or ventriculo peritoneal shunting, if hydrocephalus developed. Functional status was assessed from admission to discharge to the subsequent follow up visits using the functional independence measure (FIM).[5,13]

The FIM grades from impairment to disability and correlates with the degree of supervision. [11-14] Functional status is measured on a scale of 1 (totally dependent) to 7 (independent) for 18 categories (tasks such as performance in self care, sphincter control, transfers and locomotion, communication, and social cognition). By adding the points for each item, the possible total score ranges from 18 (lowest) to 126 (highest level of independence). The FIM may be separated into motor (13 items) and cognitive (five items) scales. Functional gains were calculated by comparing admission and discharge FIM scores. SPSS 10 was used for analysis of statistical data.

RESULTS

Of 18 patients, 14 (78%) were men and 4 (22%) were women. The mean age was 34 years, with age range from 28 to 58 years. On admission, the clinical condition showed Hunt-Hess grade 1 to 4 (Table 1).

Table 1. Clinical condition at admission according to the Hunt-Hess scale.

Hunt-Hess grade*	Patients (n (%))	
I	5 (28%))	
II	8 (44%))	
III	3 (17%))	
IV	2 (11%))	
V	0 (0))	

*Grade I, mild headache, slight nuchal rigidity; grade II, moderate to severe headache, nuchal rigidity, no neurological deficit other than cranial nerve palsy; grade III, drowsiness/confusion, mild focal neurological deficit; grade IV, stupor, moderate-severe hemiparesis; grade V, coma, decerebrate posturing.

Motor impairment was seen in 72 % patients. Evaluation of risk factors showed 78 % with hypertension, 17 % with both hypertension and diabetes mellitus and only 6% with diabetes mellitus.

Table 2. The Fisher Grade CT classification of study population.

Grade	Number of Patients	CT scan findings
Grade 1	0	No hemorrhage event
Grade 2	12	Subarachnoid hemorrhage less than 1 mm thick
Grade 3	2	Subarachnoid hemorrhage more than 1 mm thick
Grade 4	4	Subarachnoid hemorrhage of any thickness with intra-ventricular hemorrhage (IVH) or parenchymal extension

Twelve patients had Fisher grade (Table 2) of 2 and 2 had grade of 3, all showed good recovery after surgery, while 3 out of 4 patients who were with grade of 4 died during 1 to 2 weeks hospital stay (Table 3).

Table 3. Demographic characteristics, clinical symptoms and surgical outcome.

Gender n=18	**Number**	**Percentage**
Male	14	78%
Female	4	22%
Mean Age in Years	59	
Type of aneurysm		
Right sided	5	28%
Left Sided	13	72%
Motor deficit	13	72%
Meningismus	7	39%
Headaches	**all**	**100%**
Operating surgeon		
Surgeon himself	all	100%
Surgical resident	Nil	
Surgery (clipping) n=18		
Operated cases **(Revision procedure)**	1	6%
Death	3	17%

Table 4 shows low to moderate FIM gain in our cases.

DISCUSSION

No definite method can predict deficit accurately in ruptured cerebral aneurysms, likewise, time interval between surgery and postoperative outcome cannot be judged.[4-6,15] All of our cases got operated as soon as diagnostic work up was completed after they presented in emergency. Postoperative assessment showed that cognitive deficit was more limiting than motor deficit. Although Glasgow Outcome Scale (GOS) has been

used in past to assess motor outcome, it is no longer used to assess these patients.[7,11,12] Thus, we did not use this scale in our study.

Table 4. Result of FIM, assessment (n=15).

	Admission FIM mean (motor+cognitive subscore)	Discharge FIM mean (motor+cognitive subscore)	FIM gain
FIM total score	54.6	86.27	31.67

SAH commonly results from aneurysms smaller than 10 mm at their greatest diameter.[16] Our findings of a higher incidence of thick SAH in patients with a very small aneurysm agree with those of Roos, et al.[17] More recently, Russell et al[18] reported a semi quantitative study of the volume of SAH on CT scans compared with aneurysm size. We noted 100% association of the hypertension, as compared to the study by Stephen B et al[18] who reported 50% association in their cases.

Aneurysm size, patient age and surgeon's experience are strong predictor of worse functional outcome.[19] In our study, senior surgeon himself operated on all patients which resulted in better outcome. Two (11%) of our patients had aneurysm size of more than 10mm, while rest of all patients had size between 5-10mm. One patient of both aneurysm size groups died. Roos, et al reported that patients with larger aneurysms were more likely to have a poor outcome (GOS Score 3, 2, or 1) at 3 months post-SAH than patients with smaller aneurysms.[14] Aneurysm location did not have effect on the patient's presentation and on the post surgical outcome[19] but the relationship between aneurysm location and functional outcome could not be determined in our study because the number of patients in each location-based subgroups was too small for the statistical analysis.

In Danish Aneurysm Study, patients with aneurysms measuring 10 mm or smaller were more likely to have attained a "normal daily functional capacity," more likely to have resumed their previous occupation, and more likely to have a "normal mental outcome" compared with patients with aneurysms measuring between 11 and 24 mm. We noted the same outcome as most of our patients were between 5-10mm aneurysms size.

Our results were favorable due to the fact that all of our patients were operated by senior surgeon in timely fashion at a single center and during a course of one year. The age distribution was comparable with the existing literature as most of the patients experience SAH in their fifth decade,[4-7] although the male/female ratio was somewhat different. The distribution of the aneurysms localization in the group showed similarities with some other series.[6,7] By the time of discharge from hospital, most patients had achieved a good functional status, and 28% (5 out of 18) were completely without any motor impairment.

FIM with the combination of motor and cognitive grades depending on the motor and social deficits after SAH at admission and before discharge provided us a unique and extremely rewarding measure to grade disease and assess physical and social outcome. This justifies our early safe procedure but demands the need to have better structured early inpatient rehabilitation through continuous behavioral therapy soon after surgery during their inpatient course of stay.

CONCLUSION

After SAH the outcome is invariably affected by the early surgery. Cognitive deficit is more worrisome than physical sequelae and necessitates the need to start early inpatient rehabilitation through continued cognitive and behavioral therapy to have better social adaptation after an episode of SAH.

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