ORIGINAL ARTICLE

Surgical Outcome of Anterior Circulation Cerebral Aneurysm Surgery, A Review of 52 Cases

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ABSTRACT

Object: *To assess the variables contributing to surgical outcome after anterior circulation cerebral aneurysm clipping.*

Design: *Descriptive study.*

Place and duration of study*: Combined Military Hospital Rawalpindi from Jan 2006 to Dec 2010.*

Material and Methods: *A total of 52 cases were included in the study who underwent surgical clipping of anterior circulation cerebral aneurysm at neurosurgical centre CMH Rawalpindi from Jan 2006 to Dec 2010. Data collection was done using non-probability convenient sampling. Both male and female were included in the study. Patients with multiple, unruptured and those of posterior circulation aneurysms were excluded from the study. Patients were divided in two groups. The first group was operated in less than three weeks time after subarachnoid haemorrhage while the second group was operated after three weeks. CT angiography was used for the diagnosis of aneurysms. Postoperatively obliteration of the aneurysms was confirmed radiologically three weeks after the procedure. Postoperative results were compared for each group.*

Results: *Between Jan 2006 and Dec 2010, 52 patients harbouring anterior circulation cerebral aneurysms were selected for the study. Mean age was 48.35 years. 72% were males while 28% females. Overall the patients operated in first group had a combined morbidity of 7% while second group patients had a combined morbidity of 3.6%. Patients less than 50 years of age with aneurysm size of less than 10 mm and Hunt and Hess grade of 1 and 2 had a morbidity of 2.4%. Patients more than 50 years of age with aneurysm size of more than 10 mm and Hunt and Hess grade of 3 had a morbidity of 8%. Only one patient in second group died in the postoperative period due to hypostatic pneumonia.*

Conclusion: *Age of the patient, size of the aneurysm, Hunt and Hess grade and the timing of surgery are independent predictors of surgical outcome in anterior circulation cerebral aneurysm surgery.*

Key Words: *Cerebral Aneurysm.*

INTRODUCTION

The dawn of modern aneurysm surgery came in 1933 when the first planned intracranial operation of a saccular aneurysm was conducted by Dott.[1,2] One third of neurosurgical literature is about neurovascular diseases. During the last decade advances in SAH management including surgical techniques, the exact timing of surgery has greatly reduced the postoperative morbidity and mortality.

A successful treatment requires three dimensional anatomic conceptualization, slackening of the brain, a thorough understanding of the anatomic features, performance of meticulous surgical technique including vascular control and preservation of perforators and a full array of clips.[3,4] Surgical clipping was introduced by Walter Dandy of the John Hopkin Hospital in 1937. The same procedure was also carried out in our study on all patients.

The most significant factor in determining outcome are grade (Hunt and Hess grade) and age. Generally patients with Hunt and Hess grade I and II on admission and patients who are younger can anticipate a good outcome without death or permanent disability. Older patients and those with poorer Hunt and Hess grade have a poor prognosis. Generally about one third of patients have a poor outcome, death or permanent disability.[5,6]

Despite remarkable advances in management, aneurismal SAH continues to be associated with high rates of morbidity and mortality. Aneurysms usually remain silent and get noticed only when they rupture and present with spontaneous SAH.

Three mechanisms are proposed for the mortality associated with aneurismal SAH – acute hydrocephalus, re-bleeding and cerebral ischemia due to vasospasm.

MATERIALS AND METHODS

This study was carried out in neurosurgical department combined Military Hospital Rawalpindi from Jan 2006 to Dec 2010. A total of 52 patients were selected for the study including both male and female. These patients presented to the emergency department with subarachnoid hemorrhage. CT angiogram was done to confirm the presence of aneurysm. They were categorized on the basis of Hunt and Hess SAH grade. Only the patients harbouring anterior circulation ruptured aneurysms with Hunt and Hess grade 1, 2 and 3 were included in the study. Patients having multiple aneurysms, unruptured and posterior circulation aneurysms were excluded from the study. The patients were divided in two groups, first group having 24 patients while the second group had 28 patients. Microsurgical aneurysm clipping was done in all patients, the first group was operated in less than 03 weeks time after subarachnoid haemorrhage ahd the second group was operated after 03 weeks of haemorrhage. Frontotemporal craniotomy with slight modification was used for approaching all thes aneurysms arising from anterior circle of willis. Postoperatively they were discharged after the removal of stitches. Complications in the form of seizures, weakness or visual deficit were recorded it present. The variables studied are age of the patient, size and location of the aneurysm, timing of surgery and Hunt and Hess SAH grade. Data collection was done using non-probability convenient sampling. Surgical outcome in terms of morbidity and mortality was calculated for each group.

Inclusion Criteria

- Anterior circulation aneurysms.
- Ruptured aneurysms.
- Hunt and Hess grade 1, 2 and 3.

Exclusion Criteria

- Multiple aneurysms.
- Unruptured aneurysms.
- Posterior circulation aneurysms.
- Hunt and Hess grade 4 and 5

Statistical Analysis

Data had been entered and analyzed using SPSS version 11. Descriptive statistics were used to describe the data frequencies along with percentage for categorical variables and means and standard deviation for numerical variables. Chi square test was used to compare the groups.

RESULTS

Between Jan 2006 and Dec 2010, 52 patients harbouring anterior circulation cerebral aneurysms were selected for the study including both military and civilian patients. They were randomly divided in two groups. The age ranged from 38 years to 64 years with the mean of 48.35 years. 72% were males while 28% were females. Clinical symptoms were as follows. 48 patients presented with headacne; 35 had vomiting; 9 had dysphasia; 14 had motor deficit, 4 had homonymous hemianopia while 23 patients presented with altered consciousness. 15 patients had no neurological deficit (Table 1). In our study 29 patients had anterior communicating artery aneurysm, 3 patients had aneurysms arising from pericallosal artery, 13 patients had middle cerebral artery aneurysms, 5 patients had posterior communicating artery aneurysm while 2 patients were harbouring ophthalmic artery aneurysm (Table 2). The size of the aneurysm varied from 3 mm to 28 mm. 29 patients were placed in Hunt and Hess grade 1, 19 patients in grade 2 and 4 patients in grade 3. Microsurgical Clipping was performed in all cases. Overall the patients operated in first group had a combined morbidity of 7% while second group patients had a combined morbidity of 3.6%. this is due to the difficulty access to the aneurysm because of inflamed and swollen brain, retraction related brain injury, prolonged surgery and increased incidence of postoperative seizures and cognitive deficit in the first group. Analysis of risk factors revealed that age of the

patient, size of the aneurysm, Hunt and Hess grade and the timing of surgery has important influence on surgical outcome. Patients less than 50 years of age with aneurysm size of the less than 10 mm and Hunt and Hess grade of 1 and 2 had a morbidity of 2.4%. Patients more than 50 years of age with aneurysm size of more than 10 mm and Hunt and Hess grade of 3 had a morbidity of 8%. Only one patient in second group died in the postoperative period due to hypostatic pneumonia.

Table 1: *Frequency of Symptoms.*

Symptoms	No. of Patients	Percentage %
Headache	48	92.3
Vomiting	35	67.3
Dysphasia	9	17.3
Motor deficit	14	26.92
Homonymous Hemianopia	4	7.69
Altered Consciousness	23	44.23

Table 2: *Distribution of Aneurysm.*

Aneurysm Site	No. of Patients	Percentage %
A – Com artery	29	55.76
Middle Cerebral Artery	13	25
P – Com artery	5	9.61
Pericallosal artery	3	5.76
Ophthalmic artery	2	3.84

DISCUSSION

An aneurysm is a localized dilatation of a vessel caused by hemodynamic, structural, genetic, traumatic, infectious or neoplastic process. Engorged with blood, the aneurysm either causes pressure on the surrounding brain tissue or it ruptures. Aneurysms develop for a variety of reasons including age, genetic predisposition and less commonly from injury or infection. Saccula or berry aneurysms resembling a small sac are the most common type and often requires intervention. Often an aneurysm can go undiagnosed for a long period of time as they rarely produce symptoms, unless they rupture. When aneurysm enlarge or rupture most people develop a migraine like headache, commonly described as "the worst headache of my life". Other symptoms include altered sensorium, nausea vomiting, neck stiffness, photophobia and weakness. Ruptured cerebral aneurysm causes the blood to seep into the subarachnoid space (subarachnoid haemorrhage) or into the brain parenchyma (intracerebral haemorrhage). Computed tomography, magnetic resonance angiography and four vessel cerebral angiography are used for the diagnosis of cerebral aneurysms.

In this modern era of aneurismal subarachnoid haemorrhage management, even with the availability of multiple treatment modalities, morbidity and mortality rates have not appreciably declined. Re-haemorrhage and cerebral vasospasm are the major causes of death among initial survivors. Reduction in the time to diagnose the aneurysm may lead to quicker definitive treatment. A possible reason for failure to improve outcome is the lack of a practical modality to diagnose aneurysms that would enable expeditiously proceeding to early management.

There are various risk factors that are potential predictors of surgical outcome. These are the age of the patient and the size and location of an aneurysm.[7-9]

Aneurysm Size

Solomon, et al;[8,9] found that aneurysm size had an important influence on surgical outcome. The morbidity and mortality rate for unruptured aneurysm was 0% for aneurysm less than 10 mm in diameter, 6% for aneurysm between 10 and 25 mm, and 20% for aneurysm greater than 25 mm in diameter.

Aneurysm Location

Aneurysm location within the posterior fossa is associated with an increased incidence of poor outcome which is due to the technical difficulties involved in achieving adequate intracranial exposure and proximal control.[10,11]

Patient Age

An increase of 2.4 in relative risk was obtained in patients who were older than 50 years of age. This is due to an increase incidence of atherosclerotic and/or calcified aneurysm neck and dome in addition to medical co-morbidities in the older patients.[12]

It is widely accepted that surgical clip occlusion yields longstanding aneurysm obliteration and extre-

mely low rates of subsequent SAH from a completely obliterated lesion. In a recent study[13] Lozer et al reported an annual rate of post op SAH of 0.18% for all clip occluded aneurysm and 0% for completely obliterated lesion during 7.4 years of follow up. Asgari et al[13] reported a re-bleeding rate of 0.4% in 1170 patients with completely clip occluded aneurysm during a 12 year follow up period. In a study of long term angiographic outcome in surgically treated aneurysms, David et al[15] demonstrated 1.5% recurrence in 135 aneurysms in which were placed. Therefore the long term result of surgical clip occlusion is reliable, although periodic follow up review may also be necessary in surgically treated patients.

CONCLUSION

Age of the patient, size of the aneurysm, Hunt and Hess grade and the timing of surgery are independent predictors of surgical outcome in anterior circulation cerebral aneurysm surgery.

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