ORIGINAL RESEARCH PAPER

Volume-8 | Issue-6 | June-2019 | PRINT ISSN No. 2277 - 8179

INTERNATIONAL JOURNAL OF SCIENTIFIC RESEARCH

MICROSURGICAL ANEURYSM SURGERY IN A RESOURCE LIMITED TERTIARY CARE HOSPITAL: OUR EXPERIENCE

Neurosurgery

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ABSTRACT

- The most common cause of spontaneous SAH is aneurysmal rupture which is a neurological emergency usually presenting with severe headache. The diagnosis of SAH is missed in12-51% of patients with headache. In patients presenting with spontaneous SAH the diagnosis of aneurysm(~11.7%) can be missed Annual incidence of aneurysmal SAH is estimated to be approximately 6–7 per 100,000 persons. Below 50 years of age, the incidence among men and women are similar .Beyond 50 years, the incidence is higher in women. The incidence is reported to be1.24-1.6 times more in women as compared to men.
- **Aims and Objectives-**To evaluate the feasibility of performing Aneurysmal clipping in resource limited tertiary care hospital and evaluate its outcome.
- **Materials and methods-** Our study is a retrospective analysis of Aneurysm surgeries performed since May 2015–October 2018 in Neurosurgery operation theatre in the Department of Neurosurgery, Calcutta National Medical College and Hospital (CNMC &H).
- **Results and discussion-**73 aneurysms were clipped in the aforementioned period. Average Age of the patients-53.25. M:F Ratio-1:1.7. Common clinical presentations-Headache(most common), Nausea, vomiting, Meningismus, Focal neurological deficit, Seizures, altered consciousness. Other parameters studied included incidence of different type of aneurysms, WFNS grade of the patient, average duration of surgeries, types of clips used and the complications of the surgery.
- **Conclusion-** We have analysed our data and noted a slightly higher overall mortality and complication rate as compared to other studies at high volume centers. The results though have improved over time. This proves the feasibility of performing aneurysmal surgery at a resource limited hospital.

KEYWORDS

INTRODUCTION:

Early in the eighteenth century, suggestions of intracranial aneurysms began to appear in the medical literature, largely through the work of prosectors. Morgagni of Padua[1] described dilatation of the posterior branch of both carotid arteries in 1761. Ruptured aneurysms were first reported in 1765 by Biumi of Milan.[2] In 1814, Blackall[3] published the report of a patient with subarachnoid hemorrhage (SAH) related to an intracranial aneurysm. This set the stage for recognition of the most common manifestation of the disorder. Wilks, who was also from Guy's Hospital, described a sanguinous meningeal effusion, again linking the clinical features associated with the anatomical lesion.[5]The dawn of modern neurosurgery came in 1933 when Egas Moniz demonstrated an aneurysm by the technique of cerebral angiography, which he had discovered[6]. The first malleable haemostatic clips in neurosurgery had been introduced by Cushing in 1911, but they were not appropriate for aneurysms. Schwartz developed a spring clip with cross legs, which was modified by Mayfield by making a smaller, tweezer like applicator for it [7]. The first direct operation on an intracranial aneurysm was performed by Norman Dott, who wrapped a ruptured aneurysm in 1933,[8] and the first obliterative clipping of an aneurysm was performed by Walter Dandy in 1938[9]. The results of surgery improved dramatically when the operating microscope was introduced in the 1960s[10] and a subsequent improvement followed the use of the calcium antagonist nimodipine and the maintenance of a high fluid intake to lessen the risk of delayed cerebral ischaemia.[11]

In 2002, the international subarachnoid aneurysm trial (ISAT) caused a paradigm shift in the management of ruptured intracranial aneurysm towards a preference for endovascular coiling over surgical clipping [12]. Furthermore, the recent barrow ruptured aneurysm trial (BRAT) conducted by McDougall et al. also concluded that patients who underwent surgical clipping were 1.68 times more likely to have poor outcomes compared to those who underwent EVT. In addition, the one-year follow up of patients who underwent endovascular coiling showed a good outcome compared to clipping patients [13]. However, the recently published ISAT 5-year follow up data demonstrated that the differences in outcomes of the two treatment modalities have vanished over the years [14]. This lack of definite guidelines holds special importance in a setup like ours where Interventional facilities are not available and we depend on surgical clipping for management of our aneurysm patients.

OBJECTIVES:

The aims and objectives of this retrospective study was to review the demographic data of our patients undergoing microsurgical clipping of aneurysm, the morphology and incidence of different types of aneurysms, the clinical features at presentation, the grades of patients at presentation and their eventual outcomes, the operative times and eventual complications of aneurysm surgery at a resource limited setup.

MATERIALS AND METHODS:

Our study is a retrospective analysis of Microsurgical clipping of aneurysm surgeries performed since May 2015–October 2018 in Neurosurgery operation theatre in the Department of Neurosurgery, Calcutta National Medical College and Hospital (CNMC &H).

This study included all patients admitted with angiographic evidence of symptomatic intracranial aneurysms, including ruptured and unruptured intracranial aneurysms who underwent microsurgical clipping of aneurysm in the aforementioned period. Data were obtained from neurosurgical and anaesthesia records. Data were entered into a master chart containing proforma that included demographic information , duration from ictus to surgery, clinical features, WFNS Grading , type of aneurysm, details about surgery performed, type of clip used for aneurysmal clipping, duration of surgery and eventual complications of surgery.

Statistical evaluation was performed. Normally distributed continuous variables are expressed as mean (SD) and non-normally distributed data variables as median (range). Differences between groups were analyzed by Student's unpaired 't' test for normally distributed data. Chi-square test was used for categorical variables. The value of P <0.05 was considered significant.

RESULTS:

In our study period, a total of 73 patients were treated by Microsurgical clipping of aneurysm. All these cases were planned for definitive procedure at the earliest, but in elective schedule as we have access to the Cath lab facility only on Saturdays from 10am-2pm and CT

angiogram facilities are housed separately making it difficult to shift patients with poor general condition.

Demographic findings are noted in the following table(1,2)

Table 1
Average age-53.25

Age	Number of patients	percentage
0-19 years	0	0
20-39 years	7	9.58
40-59 years	34	46.57
60-80 years	32	43.83

Table 2

Sex M:F-1:1.7	Number of patients	percentage
Male	27	36.98
Female	46	63.02

The most common clinical feature was Severe headache which was seen in 66(90.41%) of the patients. Other clinical features were nausea, vomiting, meningismus, Focal neurological deficits, seizures, altered consciousness

Table 3

Clinical features	Number of patients	Percentage
Severe headache	66	90.41%
Nausea/Vomitting	30	41.09%
Meningismus	23	31.5%
Focal Neurological Deficit	18	24.65%
Seizures	9	12.32%
Altered consciousness	31	42.465%

WFNS grading of patients pre-operatively is mentioned in Table 4

Grade	Number of patients	percentage
Grade 1	18	24.65
Grade 2	20	27.39
Grade 3	17	23.28
Grade 4	9	12.32
Grade 5	9	12.32

Incidence of various types of aneurysms encountered in our study is mentioned in

Table 5

Types	Number of patients	Percentage
ACOM	41	54.66
DACA	6	8
MCA	12	16
ICA	6	8
PCOM	8	10.66
BASILAR TOP	2	2.66

The different clips available to us and used as per need is mentioned in table 6

- Average operating time was 3 hours 34 minutes
- Operating time ranged from 2 hours to 7 hours 4mins

Types	Number	Percentage
5mm curved	2	2.63
7mm straight	33	44
7mm curved	11	14.4
9mm straight	10	13.1
9mm curved	12	15.7
10mm straight	9	11.8
10mm curved	6	7.9

The Complications that we encountered in our study are demonstrated in Table 7

Complications	Number of patients	Percentage	Mukesh M Gupta et al 2008(AIIMS)
Superficial infections	1	1.33	-
Post-op haematoma	6	8	7%
Seizures	2	2.66	-
Infarct/Vasospasm	17	22.66	36%
C.N palsy	2	2.66	2%
Pulmonary embolism	1	1.33	4%
Meningitis	2	2.66	10%
Hydrocephalus	6	8	6%
Behavioral changes	2	2.66	-
Residual Hemiparesis/paraparesis	11	14.66	-
Systemic infection	10	13.33	2%
Dyselectrolytemias	19	25.33	19%
In hospital mortality	11	14.66	8%

DISCUSSION

A ruptured aneurysm is a neurosurgical emergency. A patient who has suffered a ruptured intracranial berry aneurysm can be injured by the initial haemorrhage or by the effect of subsequent aneurysmal haemorrhage, vasospasm, hydrocephalus, surgical complications , and medical complication[15]. Hence the care is aimed at avoiding subsequent compounding complications[15]. The two forms of treatment that is, surgical clipping and endovascular coiling for intracranial aneurysm have been compared in many previous studies published in the literature.[16,17] The results of the ISAT trial suggested that endovascular coiling gives rise to immediate results that are superior to surgery for the majority of aneurysms.[16] Nevertheless, it is by no means certain that the longterm outcome of coiling will be as satisfactory as successful clipping of an aneurysm[18,19].

In our study, we found the most common age group affected was 40-59 years comprising 46.57% of our patients(n=34). This was similar to a study conducted by Gupta et al [20] but different from similar other studies described in the literature [16,17]. It may be due to different genetic or environmental factors. There was a definite female predilection with M:F ratio being 1:1.7. This was similar to demographic data found in different studies.[21,22] .The most common complaints at presentation were severe headache and nausea/vomiting and altered consciousness. 75.32% of our patients were WFNS Grade I-III. The region of anterior communicating artery is one of the most common sited for intracranial aneurysms to occur[15]. We had a similar finding in our study with Acom Aneurysms constituting almost 55% of aneurysms.

One of the limitations of our setup is the clip availability with only certain specifications available and hence we are bound to use the available clips only. Vasospasm is the leading cause of death and morbidity in patients admitted in the tertiary care center with a ruptured aneurysm[15]. In our study about 36% patients developed vasospasm in the postoperative period. The other significant complications in our study group were Dyselectrolytemia(25.33%), Residual hemiparesis(14.66%), Systemic Infections(13.33). In our study, most common form of dyselectrolytemia was hyponatremia. Hydrocephalus which is seen in approximately 20% patients suffering from aneurysmal SAH as per literature was seen in only 8% of our patients. This could be due the fact that we routinely open lamina terminalis but it needs further evaluation. The mortality rate in our study was 14.66%. In a similar study by Gupta et al they found the mortality rate of 8%. There are a number of limitations in our setup like-No dedicated trained neurosurgical OT and ITU staff, Limited supply of aneurysm clips, No facility of intra-operative ICG, intra-operative neuromonitoring, micro-Doppler and trans-cranial Doppler,,Imaging facilities are located in a separate building, Non availability of intruments for interventional procedure . Inspite of so many limitations and adverse situations ,we are managing aneurysm patients and our results are acceptable and hence we recommend Microsurgical Clipping for management of Aneurysms in setups similar to ours.

CONCLUSION

Surgical clipping is effective and can provide a good long-term outcome. The most commendable consequence that it provides is a better long-term occlusion rate. The experience of the individual surgeon is important for a superior and enduring overall outcome.

Conflicts of interest

The authors declare that they have no competing interests.

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