Clinical Profile and Risk Factors of Aneurysmal Subarachnoid Haemorrhage in a Tertiary Level Hospital of Bangladesh

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Abstract:

Objective: *The present study was undertaken to evaluate the cninical features and risk factors of a patient who presented with aneurysmal subarachnoid haemorrhage.*

Design & setting: *The cross-sectional observational study was carried out in the Department of Neurology, Dhaka Medical College Hospital, Dhaka from January 2013 to January 2014.*

Methods: *Adult patients of spontaneous subarachnoid haemorrhage (SAH), diagnosed clinically and confirmed by CT scan of the head were included in the study. However, patients who are not capable financially of undergoing Digital Subtraction Angiography (DSA), traumatic subarachnoid haemorrhage, intracerebral haemorrhage and patients taking antiplatelet and anticoagulant drugs and with comorbidities were excluded. A total of 30 subjects meeting the above eligibility criteria were selected consecutively from the study population. After enrollment all patient underwent DSA.*

Results: *The present study demonstrated that 80% of the patients were 50 or younger than 50 years old (mean age 45.0 ± 9.4 years) with a male preponderance (60%). Sudden headache accompanied by vomiting was invariably complained by all the patients (100%) at onset of the disease. On admission two-thirds (66.7%) of the patients were unconscious. 4 out of 30 (16.65%) patients exhibited neurological deficit. Assessment of neurological impairment shows that 1(3.3%) patient had impaired motor function and 1 (3.3%) had sensory loss. Three patients (10%) exhibited cranial nerve palsy. While meningism was present in every patients, hemiplegia and monoplegia were completely absent. Of the risk factors, 43.3% of the patients had smoking habit and nearly half (46.7%) had hypertension and a few patients had diabetes (10%) and family historyof SAH (6.7%). Based on Glasgow Coma Scale, 7(23.3%) patients out of 30 in the present study were in grade-v.*

Conclusion: *In ruptured aneurysmal subarachnoid haemorrhage, sudden headache accompanied by vomiting was invariably complained by all the patients at onset of the disease. On admission two-thirds of the patients were unconscious and a few patients exhibited neurological deficit. Among the risk factors, hypertension and smoking demonstrated majority.*

Key words: *Subarachnoid haemorrhage, cerebral aneurysm, clinical profile, Bangladesh.*

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Introduction:

Subarachnoid hemorrhage (SAH) is the bleeding in the subarachnoid space - the area between the arachnoid mater and the pia mater surrounding the brain. This may occur spontaneously, usually from a ruptured cerebral aneurysm or may result from head injury.[1] It is a form of stroke and comprises 1 to 7 % of all strokes [2] and affects about 6/100,000 of the population and women are affected more commonly than men, usually present before the age of 65.[3] This is a medical emergency which can lead to death or severe disability even when recognized and treated at an early stage. Up to half of all cases are fatal and 10-15% dies before reaching to the hospital [4] and those who survive often have neurological or cognitive impairment.[5] Most of the survivors dies due to recurrence or re-bleeding - about 40% in first four weeks and 3% annually thereafter.[3] Cerebral aneurysms are the most common cause of non traumatic subarachnoid hemorrhage occurring in 60 to 80% of cases.[6,7] Other evidence says that cerebral aneurysm is responsible for 70 to 75% of spontaneous SAH, 5% of which is caused by AVM (arterio-venous malformation) and in 20% cases no causes are found.[8] Ruptured "berry" aneurysm is the most common among the aneurysmal SAH and

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is responsible for 85% of cases.[3] So, to determine anatomical site of cerebral aneurysm and securing them is essential to reduce mortality. In view of subsequent increased mortality and morbidity in patients of SAH, any investigation that is effective in planning further management to prevent re-bleeding, needs to be vigorously investigated. So, the purpose of the present study was to evaluate patients of SAH clinically and to determine the anatomical distribution and morphology of cerebral aneurysms in patients with subarachnoid hemorrhage (SAH) by DSA and to characterize the age and sex distribution of these patients.

Subarachnoid hemorrhage can be diagnosed clinically and can be confirmed by CT scan of head or by lumber puncture (LP) in CT scan negative cases. The classic symptoms of subarachnoid hemorrhage are thunderclap headache, described as 'like being kicked in the head or the worst ever'.[9] The headache from aneurysmal rupture develops in seconds to few minutes.[10] Vomiting occurs in 70% of patients with aneurysmal rupture and 1 in every 14 cases exhibit seizure.[2] Confusion, decreased level of consciousness or coma may be present. Neck stiffness usually presents 6 hours after initial onset of SAH.[11] Intraocular hemorrhage may occur in response to raised intracranial pressure. Subhyaloid hemorrhage or vitreous hemorrhage, which may be visible on fundoscopy, occurs in 3-13% patients with severe SAH.[12] Physical examination can provide information about the cause of SAH. Monoocular blindness may result from anterior communicating artery aneurysm if it is exceptionally large.[13] Complete or partial third nerve palsy is a well-recognized sign after rupture of an aneurysm of the internal carotid artery at the origin of posterior communicating artery. Approximately 85% of all spontaneous haemorrhage into the subarachnoid space arises from rupture of morphologically saccular type aneurysms at the base of the brain.[14,15] If SAH is suspected, CT scan of head is the first line investigation because of the characteristically hyperdense appearance of extravasated blood in the basal cisterns. The pattern of haemorrhage often suggests the location of any underlying aneurysm, although with variable degrees of certainty.[16] Lumbar puncture is done to exclude SAH in patients with a convincing history and negative brain imaging. Imaging modalities for detecting aneurysms are CT angiography, MR angiography and DSA. The first work using digital subtraction techniques was performed in the laboratory of Meyers. The actual subtraction techniques are accomplished by associated computer technology, resulting in greater contrast between transient blood flow within the vasculature and permanent structures (bones). Later developments in robotic C-arms allowed larger image intensifiers to be manipulated in multiple plains creating multiple views with image resolution greater than conventional angiography. The multiple views obtained have also been manipulated into three-dimensional (3D) images and movies allowing further analysis of cerebral aneurysms regarding their location, size and morphology. The introduction of nonionic contrast agents further increased image quality and reduced patient's risk of complication. With these advancements DSA is still considered as the gold standard.[17] Many studies showed that the sensitivity and specificity of digital subtraction angiography (DSA) is more than CTA and MRA in detecting, localizing and sizing cerebral aneurysms.[18, 19] The proper detection and localization of the cerebral aneurysm can be done more accurately by digital subtraction angiography (DSA). Moreover, DSA is the only technique for endovascular coiling to secure aneurysm.

Materials & Methods:

This study was a cross-sectional observational study. The study was carried out in the Department of neurology, Dhaka Medical College Hospital, Dhaka from January 2013 to January 2014. Adult (18-75 years) patients of subarachnoid haemorrhage (SAH), diagnosed clinically and were confirmed by CT scan of the head, of both sex, patients who are financially capable of doing DSA and patients who gave consent were included in the study. Traumatic subarachnoid haemorrhage, intracerebral haemorrhage, patients taking antiplatelet and anticoagulant drugs and patient with co-morbid conditions were excluded from the study. Data were collected in pre-designed structured questionnaire by the researcher himself. The subjects were thoroughly inform about the procedure of DSA and informed written consent was taken. Having obtained an informed consent from the attendant of all the study patients, the study was carried out on patients admitted in the Neurology Department of Dhaka Medical College Hospital (DMCH), Dhaka. Medical history and personal history like smoking

habit were noted. Detailed history was taken and thorough physical examination, especially neurological examination were carried out by the investigator himself to assess the Glasgow Coma Scale score and any neurological impairment. The overall score on the Glasgow Coma Scale is the sum of points for eye opening (4 points), best motor response (6 points), and best verbal response (5 points). It is a very reliable method for evaluating the level of consciousness) and the presence of focal neurologic signs. The higher the score, the worse is the prognosis.

Before reaching a final diagnosis, consultation was done with a Neurologist. History of unconscious patients was taken from their attendants. A sign of meningeal irritation was considered if there was neck rigidity with or without kernig's sign. The following information was collected from each patient: age, sex, hypertension, diabetes mellitus, hyper-cholesterolemia, current or previous smoking, previous incidence of SAH, family history of subarachnoid haemorrhage and family history of kidney disease. Emphasis was laid to determine the presence of aneurysm in patients with SAH using clinical findings and the findings of DSA. The patients of subarachnoid haemorrhage were diagnosed on the basis of clinical features and findings of CT scan of head.

Clinical features and examination findings were noted. Detailed drug history was taken. Investigations like CBC, serum lipid profile, blood sugar, serum creatinine, ECG, Chest X-ray were also done. Then Biplaner DSA was performed after 4 weeks via a femoral arterial approach by interventional neurologists. Each patient was evaluated immediately and 6 hours after DSA for any post-procedural complications and was advised to attend the Neurology Out-patient for subsequent follow-up. Data was analysed using statistical package for social software (SPSS).

Results:

Among 30 patients in the study, 18(60%) were male while 12(40%) were female. The mean (±SD) age of the patient was 45.00±9.4 years with the youngest and oldest patient were 18 and 59 years respectively. Presenting features demonstrate that headache and vomiting was invariably complained by the patients at onset. Two-thirds (66.7%) of the patients were unconscious at presentation (Table I).

Table-I

Distribution of patients by presenting features (n = 100)

Presenting features	Frequency	Percentage
Headache	30	100.0
Vomiting	30	100.0
Unconsciousness	20	66.7

Risk factors distributions are shown in table II. Approximately 44% of the patients had smoking habit and nearly half (46.7%) had hypertension. A few patients had diabetes (10%) and family history SAH (6.7%).

Table-II

Distribution of patients by risk factors (n = 30)

Presence risk factors	Frequency	Percentage
Smoking	13	43.3
Hypertension	14	46.7
Diabetes	3	10.0
Family history of SAH	2	6.7

Assessment of neurological impairment shows that 1(3.3%) patient had impaired motor function and 1(3.3%) had sensory loss. Three patients (10%) exhibited cranial nerve palsy. While meningeal irritation (manifested as neck rigidity) was present in every patients, hemiplegia and monoplegia were completely absent (table III).

Table-III

Distribution of patients by neurological impairment (n = 30)

Neurological impairment	Frequency	Percentage
Abnormal motor function	1	3.3
Impaired sensory function	1	3.3
Cranial nerve palsy(3^{rd} nerve)	3	10.0

Over one-third (36.7%) of the patients exhibited aneurysm in the anterior communication artery, 26.7% in the middle cerebral artery, 23.3% in the posterior communicating artery. Internal carotid artery and top of the basilar artery were seldom involved (table IV).

Table-IV

Distribution of patients by anatomical location of aneurysm (n= 30)

Anatomical location	Frequency	Percentage
Anterior communicating artery	11	36.7
Middle cerebral artery	8	26.7
Posterior communicating artery	7	23.3
Internal carotid artery	1	3.3
Top of the basilar artery	1	3.3

Discussions:

The present study demonstrated that 80% of the patients were 50 or younger than 50 years old with a male preponderance (60%). Although the incidence increase with age, half the patients in any series are found younger than 55 years at the time of subarachnoid haemorrhage.[15] However, a female preponderance of the disease has been seen in several studies.[3] The medical records of all residents of Olmsted county Minnensoata with a view to find the population-based incidence and prevalence rates of intracranial saccular aneurysm showed a total 348 intracranial aneurysms were detected among 270 persons during the 31-year period. There were 105 male subjects (39%) and 165 female subjects (61%). The mean age at diagnosis was 59.1 years.[16] The age-sex adjusted incidence rate for intracranial aneurysms excluding asymptomatic autopsy cases was 9 per 100000 person-years.[16]

In the present study sudden headache was invariably complained by the patients at onset. Consistent with this finding, sudden headache is the most characteristic symptom of subarachnoid haemorrhage in three out of four patients. Conversely, in patients who present with sudden headache alone in general practice, subarachnoid haemorrhage is the cause in one in ten patients.[17]

Vomiting is not a distinctive feature either because almost half the patients with nonhaemorrhagic thunderclap headache also report vomiting at onset.[18] However in the present study all the patients experienced vomiting at onset. Seizures at onset of the haemorrhage occur in one of every 14 patients with subarachnoid haemorrhage.[18-20] although none of the patients in the present series have had seizure, which may be due to chance error resulting from small sample-size.

On admission two-thirds (66.7%) of the patients were unconscious which quite consistent with the findings that two-thirds of all patients have depressed consciousness, of whom half remain in coma.[21] Neck stiffness is a common symptom, caused by the inflammatory response to blood in the subarachnoid space. It takes some 3–12 h to appear and might not develop at all in deeply unconscious patients, or in patients with minor subarachnoid haemorrhage.[22] Therefore, absence of neck stiffness cannot exclude the diagnosis of subarachnoid haemorrhage in a patient with sudden headache.

Very few patients in the present study exhibited neurological deficit (1 abnormal motor function, 1 sensory loss and 3 cranial nerve palsy) Focal neurological deficits occur when an aneurysm compresses a cranial nerve or bleeds into the brain parenchyma, or from focal ischaemia due to acute vasoconstriction immediately after aneurysmal rupture. Complete or partial third-nerve palsy is a well recognized sign after rupture of aneurysms, mostly of the internal carotid artery at the origin of the posterior communicating artery.

Of the risk factors, hypertension and smoking demonstrated their significant presence (around 45%) among the patients studied. Other studies also showed cigarette smoking hyper-tension and heavy alcohol as major modifiable risk factors.[23-25]

In the present study we used DSA in all patients to achieve a diagnosis. The sensitivity for detecting ruptured aneurysms, with conventional angiography as the gold standard, is currently about 95%.[27,28] A great advantage of CT angiography over MR angiography and catheter angiography is the speed with which it can be undertaken, preferably immediately after the CT scan of the brain by which the diagnosis of aneurysmal haemorrhage is made, and while the patient is still in the scanner.

Conclusion:

From the findings of the study it can be concluded that patients with aneurysmal SAH are usually middle-aged (younger than 50 years) and predominantly female. Headache and vomiting are universal complaints at onset. Smoking and hypertension are common modifiable risk factors. Though this study is a very small one but still it reflects a small light. A comprehensive and large scale study involving greater number of patients in multiple centres is

required to make a final comment regarding this issue.

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