

Modifiable Factors Associated with Intracerebral Hemorrhage

MUBASHER AHMED, SAJID HUSSAIN MUGHAL

Department of Neurosurgery, King Edward Medical University / Mayo Hospital, Lahore – Pakistan

ABSTRACT

Background and Purpose: *The purpose of the study was to evaluate modifiable factors causing intracerebral hemorrhage in our set up.*

Material and Method: *This prospective descriptive study was done at King Edward Medical University/ Mayo Hospital, Lahore from January 2009 to August 2010. Patients of spontaneous intracerebral hemorrhage admitted through emergency department were included. After history and examination, diagnosis of ICH was made on CT brain without contrast in all cases. Further evaluation was done by platelet count, INR, LFTs, renal function tests and CT angiogram brain. Modifiable factors studied were hypertension, coagulopathy and drugs. Only patients of negative CT angiogram were included in the study.*

Results: *Age range of patients was 11 to 85 years. Male were more than female i.e. 24 (54.5%). Maximum patients i.e. 10 (22.5%) had ICH in 7th decade. Maximum patient had uncontrolled hypertension as the cause of intracerebral hemorrhage i.e. 31 (70.5%). It was followed by coagulopathy and smoking i.e. 4(9.9%). Dengue fever was present 2 (4.5%) cases and both had low platelet count.*

Conclusion: *Hypertension is the commonest modifiable risk factor for ICH, affecting middle aged and elderly persons. All modifiable factors especially hypertension needs extensive public awareness programs to decrease mortality and morbidity related to ICH.*

Key Words and Abbreviations: *ICH: Intracerebral haematoma.*

INTRODUCTION

Spontaneous intracerebral haematoma (ICH) is a non traumatic bleed within brain parenchyma. It is a life-threatening condition that is associated with substantial morbidity and mortality. The incidence is 15 to 19 cases per 100 000 people in the general population.¹ It is 200 cases per 100 000 people among the elderly.²

Different factors play role in causing ICH. These factors may be categorized in to modifiable and non modifiable. Modifiable factors including hypertension, caagulopathies and drugs account for nearly 70% of ICH.³ Non modifiable factors include age, sex, aneurysm, arterio-venous malformation, bleed in tumors and amyloid angiopathy.

Commonest cause of spontaneous ICH is hypertension leading 40 – 60% ICH and is a modifiable factor.⁴ Another important modifiable factor is coagulopathy. It can be due to thrombocytopenia, leukemia, liver failure, renal failure and anticoagulation therapy

e.g. with warfarin. Drugs may be legal and illegal like amphetamine, heroin, alcohol, pseudoephedrine and cocaine.³

MATERIAL AND METHOD

This is a prospective descriptive study of 44 consecutive patients of spontaneous ICH who were referred from Emergency unit to Department of Neurosurgery, King Edward Medical University / Mayo Hospital Lahore from 1st January 2009 to 31 August 2010. After history and clinical examination, diagnosis of ICH was made on CT brain plain, in all cases (Fig. 1). Further evaluation was done by platelet count, INR, LFTs, renal function tests and CT angiogram brain. Modifiable factors studied were hypertension, coagulopathy and drugs. In patients having suspicion of dengue fever patients were also investigated for IgG and IgM antibodies.

Patients in whom CT angiogram brain did not

show any vascular malformation or aneurysm were included in the study. Any patient of trauma, subarachnoid hemorrhage with ICH or intraventricular extension was excluded from the study. Patients of recurrent intracranial bleed were also excluded from the study. Information about patients was collected on a performa.

Individuals are classified as a case of hypertension if their blood pressure is consistently at least 140mm Hg systolic or 90 mmHg diastolic using mercury manometer in all cases. All investigations were compared with normal standards values of laboratory.

RESULTS

Forty four patients admitted from department of emergency Mayo Hospital Lahore were included in the study. Maximum patients had ICH in 7th decades i.e. 10 (22.7%) followed by 8 (18%) patients in 6th decade. Minimum patients were admitted during second decade i.e. 2 (4.5%) patients (Table 1).

Table 1: Age Distribution.

Age (Years)	Patients	Percentage
11 – 20	2	4.54
21 – 30	6	13.5
31 – 40	4	9.10
41 – 50	7	15.7
51 – 60	8	18.2
61 – 70	10	22.5
71 – 80	7	15.7

There was slight male predominance. Male were 24 (54.5%) patients and 20(45.5%) were females (Table 2).

Table 2: Sex Distribution.

Sex	Patients	Percentage
Male	24	54.5
Female	20	45.5

Maximum patients i.e. 31 (70.5%) had hypertension as the underlying cause of ICH. Of them, 4

(9.9%) had associated diabetes mellitus as well. Only two patients had uncontrolled diabetes mellitus without any history of hypertension.

Two patients had IgM positive for dengue fever with low platelet count. Two patients had coagulopathy secondary to use of warfarin, with INR 5.0 and 5.5

In this study, 4 (9.9%) patients were smoker and in 3 cases we were unable to find out any associated modifiable risk factor as the cause of intracerebral hemorrhage.

Table 3: Modifiable Factors for ICH.

Risk Factors	Patients	Percentage
Hypertension	27	61.36
Hypertension + DM	4	9.9
Diabetes mellitus	2	4.54
Coagulopathy	4	9.9
Liver failure	0	0
Nephropathy	0	0
Smoking	4	9.9
Drugs	0	0
Unknown	3	6.8

DISCUSSION

Intracerebral hemorrhage is a life threatening condition associated with substantial morbidity and mortality. It accounts for 10 – 23% of strokes.⁵

Higher mortality rate can be predicted by the fact that only 38% of affected persons survive after first year during the post hemorrhagic period.⁶

Reported frequency of intracerebral hemorrhage in Pakistan is even higher; ranging from 24 to 46%.⁷ The number of young stroke patients in Pakistan is rising due to increase in number of ICH cases. Khan et al reported 26% of their patients of stroke were of 15-45 years of age.⁸

Intracerebral hemorrhage is associated with modifiable and non modifiable factors. Age, sex, aneurysm, arteriovenous malformation, bleeding in tumor and amyloid angiopathy are non-modifiable factors. Modifiable factors include hypertension, coagulopathy and drugs.

A study was mandatory to evaluate various

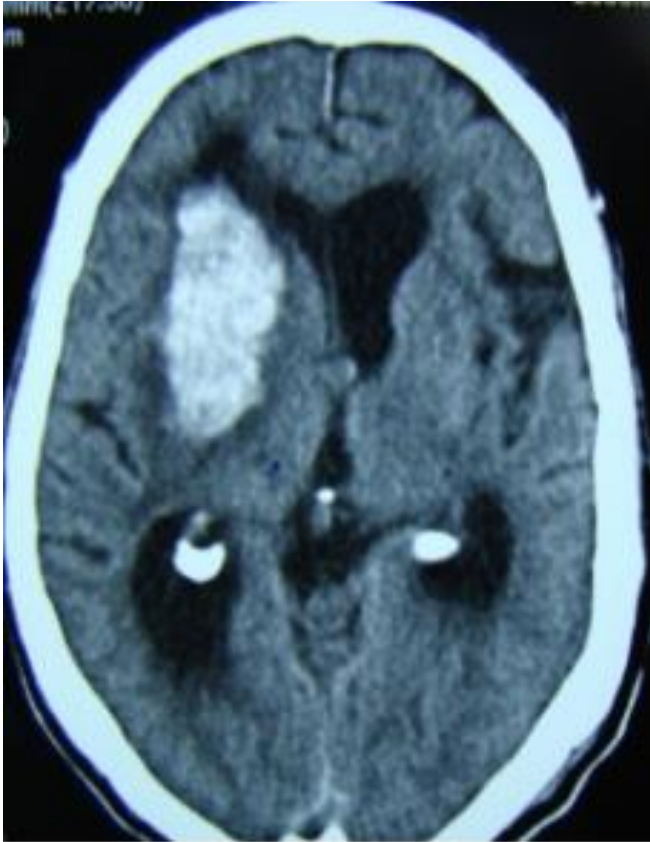


Fig. 1: Right basal ganglia intracerebral hemorrhage.

modifiable factors in Pakistan before launching a public awareness program.

Hypertension is the most important modifiable risk factor for intracerebral hemorrhage in middle aged and elderly persons.^{4,9}

The overall prevalence for having hypertension in Pakistani patients aged 15 years and above was 19.0%.¹⁰ In urban population, 22% over the age of 15 years, and 33% 45 years and above had hypertension.¹¹ Pakistani population with so much high prevalence of hypertension in relatively younger age group, may be considered as a community with patients of ICH in relatively younger age compared to developed countries. In our study, 17 (38%) patients were less than 45 year.

In this study, ICH secondary to hypertension by history was present in 31(70.5 %) cases (Table 3). It shows very high association of hypertension with ICH. The risk of ICH is comparable to study of Ojemann RG et al reporting that occurrence of hypertension among ICH patients varies from 45% to 70%.¹² Song et al reported closer relationship between decrease in incidence of hemorrhagic stroke and control of hyper-

tension compared to ischemic strokes and eventually mortality related to it¹³.

Hypertension approximately doubled the risk of ICH and discontinuation of antihypertensive drugs increases the risk of ICH.⁴ No patient in this study had well controlled blood pressure. Another study reported that 70% Pakistani were unaware about their high blood pressure and less than 3% had adequately controlled blood pressure.¹⁴ Our study showed high association of ICH and hypertension which is preventable by controlling hypertension.

Four patients (9.1%) in this study were currently smoking more than 20 cigarettes a day and were male. As reported in a prospective study in 2003, smoking increases the risk of hemorrhagic stroke in current cigarette smokers with a graded increase in risk of ICH. It also depends on number of pack years. More are cigarettes, more is risk of ICH.¹⁵ Patients who did not smoke or past smokers have equal risk of ICH.¹⁵

No patient in this study was consuming alcohol. Use of alcohol within 24 hours of the ICH in dose of 1 to 40, 41 to 120, or > 120 g of alcohol had a relative risk (95% confidence interval) of hemorrhage of 0.3 (0.2 to 0.7), 4.6 (2.2 to 9.4), and 11.3 (3.0 to 42.8), respectively, compared with those who had consumed 0 g.¹⁶ In addition, alcohol intake within 1 week before the onset of illness, excluding use within the last 24 hours, increased the risk of hemorrhage; adjusted risks were 2.0 (1.1 to 3.5) for 1 to 150 g, 4.3 (1.6 to 11.7) for 151 to 300 g, and 6.5 (2.4 to 17.7) for > 300 g compared with 0 g.¹⁶

In our study 2 (4.54%) patients were taking anticoagulant warfarin. There was no other associated factor like hypertension. Indication for anticoagulant therapy was not known in both of them. INR was not regularly checked in both of the cases. INR was 5 and 5.5 in these patients. There is no concept of INR clinic even at the level of teaching hospitals. Patients are advised anticoagulants but are not educated how to manage INR.

There were 2 patients of thrombocytopenia in this study. Both were diagnosed having ICH secondary to dengue fever. One patient was 25 years male and the other one 65 years female. Platelet count dropped in male patient to 80,000 mm³ and in female to 65,000 mm³ at the time of bleed. In both cases the platelets were not critically low. So there might be other factors that increased risk of ICH and need further evaluation in future. It is a grave public health issue for authorities providing health services in Pakistan.

CONCLUSION

It is concluded from this study that the most common modifiable risk factor associated with ICH is hypertension. So the burden of morbidity and mortality of intracerebral hemorrhage can be reduced if not eliminated by extensive public awareness program for control of hypertension. Risk of ICH is less due to drugs in Pakistan. However, dengue fever is becoming an important cause of thrombocytopenia and ICH in recent years. A similar study with a larger number of patients is recommended.

Address for Correspondence:

Dr. Mubasher Ahmed

FCPS, FRCS

Department of Neurosurgery

*King Edward Medical University / Mayo Hospital
Lahore – Pakistan*

REFERENCES

1. Woo D, Sauerbeck LR, Kissela BM, Khoury JC, Szaflarski JP, Gebel J, et al. Genetic and environmental risk factors for intracerebral hemorrhage: preliminary results of a population – based study. *Stroke* 2002; 33 (5): 1190–5.
2. Nilsson OG, Lindgren A, Stahl N, Brandt L, Saveland H. Incidence of intracerebral and subarachnoid haemorrhage in southern Sweden. *J Neurol Neurosurg Psychiatry* 2000; 69 (5): 601–7.
3. Martin NA, Holland MC : Spontaneous Intracerebral hemorrhage, In: Rengachary SS, Ellenbogen RG, editors. *Principles of Neurosurgery*. 2nd ed. USA: Elsevier Mosby; 2005: p. 259-269.
4. Thrift AG, McNeil JJ, Forbes A, Donnan GA. Hypertension. Three important subgroups of hypertensive persons at greater risk of intracerebral hemorrhage. 1998 Jun; 31 (6): 1223-9.
5. Lavados PM, Sacks C, Prina L, Escobar A, Tossi C, Araya F, et al. Incidence, 30-day case-fatality rates, and prognosis of stroke in Iquique, Chile : a 2 – year community based prospective study (PISCIS project). *Lancet* 2005; 365: 2206-15.
6. Dennis MS, Burns P, Sanderock PA, Bamford JM, Wade D, Warlow CP. Long-term survival after first – ever stroke : the Oxfordshire Community Stroke Project. *Stroke* 1993; 24: 796-800.
7. Syed NA, Khealani BA, Ali S, Hasan A, Akhtar N, Brohi H, et al. Ischemic stroke subtypes in Pakistan: The Aga Khan University Data Bank. *J Pak Med Assoc* 2003; 53: 584-8.
8. Khan JA, Shah MA. Young stroke : Clinical aspects. *J Coll Physicians Surg Pak* 2000; 10: 461-66.
9. Dennis MS, Burns P, Sanderock PA, Bamford JM, Wade D, Warlow CP. Long-term survival after first – ever stroke: the Oxfordshire Community Stroke Project. *Stroke* 1993; 24: 796-800.
10. Wild S, Roglic G, Green A, Sicree R, King H. Global prevalence of Diabetes: estimates for the year 2000 and projections for 2030. *Diabetes Care* 2004; 27: 1047-53.
11. Jafar TH, Levey AS, Jafary FH, White F, Gul A, Rahbar MH, et al. Ethnic subgroup differences in hypertension in Pakistan. *J Hypertens* 2003; 21: 905-12.
12. Ojemann RG, Heros RC. Spontaneous brain hemorrhage. *Stroke*. 1983; 14: 468-475.
13. Song YM, Sung J, Lawlor DA, Davey Smith G, Shin Y, Ebrahim S. Blood pressure, haemorrhagic stroke, and ischaemic stroke : the Korean national prospective occupational cohort study. *BMJ*. 2004; 328: 324–325.
14. Jafar TH, Levey AS, Jafary FH, White F, Gul A, Rahbar MH, et al. Ethnic subgroup differences in hypertension in Pakistan. *J Hypertens* 2003; 21: 905-12.
15. Kurth T, Kase CS, Berger K, Schaeffner ES, Buring JE, Gaziano JM. Smoking and the risk of hemorrhagic stroke in men. *Stroke*. 2003; 34: 1151–1155.
16. Juleas S, Hilbom, Palmaki H. Risk factors for spontaneous intracerebral hemorrhage. 1995 Sep; 26 (9): 1558-64.