A STUDY ON CLINICO- RADIOLOGICAL PRESENTATION OF STROKE AND ITS ASSOCIATION WITH OUTCOME

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Abstract

BACKGROUND: Cerebrovascular diseases include some of the most common and devastating disorders: ischemic stroke, hemorrhagic stroke, and cerebrovascular anomalies such as intracranial aneurysms and arteriovenous malformations. A stroke, or cerebrovascular accident, is defined by this abrupt onset of a neurologic deficit that is attributable to a focal vascular cause. Thus, the definition of stroke is clinical, and laboratory studies including brain imaging are used to support the diagnosis.

AIMS: 1.To correlate clinoradiological findings in terms of prognosis, 2. To know different types of stroke along with its area of involvement and vascular distribution and its relation with outcome, 3. Role of CT SCAN brain as an early diagnostic modality to say clinical outcome.

METHODS: This descriptive epidemiological study with a cross sectional study design is to be conducted in the department of medicine (indoor), R.G.KAR Medical College and Hospital. 1st June 2017 to 31st may 2018. 100 cases to be selected during study period based on following criteria. Detailed clinical history, clinical examinations with Radiological imaging like computed tomography of brain is done. We use scoring system like Intracerebral haemorrhage score, Glasgow coma scale, Modified rankin scale. Based on clinical examination proforma all the study population had been examined including recording of blood pressure and Glasgow coma score at the time of admission. Analysed by Modified Rankin scale till the 5th day post-hospital admission after stroke.

RESULT: Among the total 100 study population 59 cases were of Infarction and 41 cases were of Haemorrhagic type of stroke. Within the 59 Cases of Infarction 39 (i.e. 66%) were male cases and 20 (i.e 34%) were female cases. Within the 41 cases of Haemorrhage 29 (i.e. 71%) were male and 12 (i.e. 29%) were female. The mean age of the study population of Infarction cases was 55.55 years $\pm$ 12.84 SD. The mean age of the study population of Haemorrhage cases was 57.48years $\pm$ 13.46SD. Infraction cases show increased mortality among the group having systolic blood & diastolic pressure $\geq$ 180 mm of Hg, $\geq$ 110 mm of Hg respectively. Hemorrhagic cases show increased mortality among the group having systolic blood pressure, diastolic pressure $\geq$ 180 mm of Hg, $\geq$ 110 mm of Hg respectively.

CONCLUSION: Incidence of haemorrhage is much higher in India (41% as per our study). The study population between 51-60 years is most predominant age group in both the types of stroke. Most of the infarction cases presents with unconsciousness followed by slurring of speech. Most common presenting symptoms of Haemorrhagic stroke are unconsciousness, present at about 56% of cases. The most prominent risk factor in our study population is undetected and/or uncontrolled hypertension. Study population with SBP $\geq$ 180 and/or DBP $\geq$ 110 mm of Hg group have increased rate of mortality from stroke. The major type of ischemic stroke in our study population is partial anterior circulation stroke (PACI) 47.4%. Most of the study population having Infarction has developed severe disability at the end of 5 days of observation, comprising of 40.5% of the total observation.

Keywords: CVA (cerebrovascular accident), CT Scan (computed tomography), MRI (Magnetic resonance imaging), GCS Scale (Glasgow coma scale)

Introduction:

Stroke (previously known as a cerebrovascular accident) is rapidly developing clinical symptoms and/or signs of focal, and at times global (applied to patients in deep coma and to those with subarachnoid haemorrhage) loss of brain function, with symptoms lasting more than 24 hours or leading to death, with no apparent cause other than that of vascular origin (Hatano 1976). There is a wide range of severity, from recovery in a few days, through persistent disability, to death¹

Most cerebrovascular diseases are manifest by the abrupt concept of focal neurologic deficit, as if the patient was "struck by the hand of God"². Among all the neurologic diseases of adult life, the cerebrovascular disorders clearly rank first in frequency and importance. At least 40-50% of the neurological disorder in a general hospital is of these types. Despite valuable advances in stroke neurology, three things should be cleared. *First*, all physicians have a role to play in the prevention of stroke by encouraging the reduction of risk factors such as hypertension, diabetes and identification of potential signs of stroke, such as transient ischemic attacks, atrial fibrillation, and carotid artery stenosis. *Second*, careful bedside clinical evaluation integrated with the newer radiological testing methods provide the most promising approach to this category of disease. *Finally*, the last one or two decade have witnessed a departure from the methodical clinic pathologic studies that have been the foundation of our understanding that have been the foundation of our understanding of cerebrovascular disease. These multi centric trials have yielded highly valuable information about the natural history of variety of cerebrovascular disorders, both symptomatic and asymptomatic. However, this approach do suffers from number of weaknesses. Among them most important one is homogenized data derived from an aggregate of patients may not be applicable to a specific case at hand. Each of the multi-centric studies will therefore be critically appraised at appropriate points in the ensuing discussion³. Hemiplegia is the classic sign of cerebrovascular accident. But there are other manifestation as well including mental confusion, cognitive disorder, cranial nerve palsy, numbness and sensory deficit of many types, aphasia, dysarthria, motor deficit and so forth. Based on the neurological presentation the physician will localise the lesion sometimes so precisely that, even the affected arterial branch can

be specified including, whether an infarct or haemorrhage. Computed tomography scan demonstrate an accurately localised even small haemorrhage, haemorrhagic infarcts, subarachnoid blood, arteriovenous malformations, perilesional oedema, midlineshift caused by the lesion. Magnetic Resonance Imaging (MRI) also demonstrates this lesion accurately along with flow void in vessels, hemosiderin and iron pigment and the alteration resulting from ischemic necrosis and gliosis.

Between these two procedures, MRI is particularly advantageous in demonstrating small lacunar lesion deep in the hemispheres and abnormalities in the brainstem. CT scan actually lags behind MRI in demonstrating lesion involving brainstem and cerebellum. One of the diagnostic advances in the last decade has been the introduction of the diffusion-weighted technique (DWI) which allows early detection of an infarctive lesion within minutes of stroke, i.e., considerably earlier than CT scan or MRI.

MATERIALS & METHODS:

Descriptive observational with longitudinal study to be conducted in the department of medicine (indoor), R.G.KAR Medical College and Hospital. 1st June 2017 to 31st may 2018. 100 cases to be selected during study period based on following criteria.

INCLUSION CRITERIA:

Patient more than 12 years of age, Both sexes will be included, Patient presented with sudden onset neuro-deficit and radiological features of stroke.

EXCLUSION CRITERIA:

Patient diagnosed as metabolic encephalopathy, Patient with known or diagnosed intracranial tumour or metastasis, Patient with head injury, Patient with diagnosed subdural or extradural hematoma. Detailed clinical history, Including headache, vomiting, claudication, diabetes, hypertension, dyslipidemia. Along with history of smoking, alcoholism are taken. Detailed clinical examinations with Radiological imaging like computed tomography of brain are done. In few cases we will do MRI brain to rule out infarction. We use scoring system like Intracerebral haemorrhage score, Glasgow coma scale, Modified rankin scale. Based on clinical examination proforma all the study population had been examined including recording of blood pressure and Glasgow coma score at the time of admission.

Analysed by Modified Rankin scale till the 5th day post-hospital admission after stroke.

ETHICAL CLEARANCE:

The study required non-invasive investigations to be conducted on the outpatients and indoor patients. Hence, an ethical clearance has been tamed from the institution, R.G. Kar Medical College & Hospital, Kolkata.

STATISTICAL ANALYSIS:

All collected data will be analysed by appropriate statistical methods based on figures and tables. Grand chart was prepared by Microsoft Excel 2010 and statistical analysis was performed using SPSS-20 and Med Cal C software. Statistical tests were done to determine significance level and p value of <0.05 was taken significant.

RESULT

Among the total 100 study population 59 cases were of Infarction and 41 cases were of Haemorrhagic type of stroke. Within the 59 Cases of Infarction 39 (i.e. 66%) were male cases and 20 (i.e. 34%) were female cases. Within the 41 cases of Haemorrhage 29 (i.e. 71%) were male and 12 (i.e. 29%) were female. The mean age of the study population of Infarction cases was 55.55 years $\pm$ 12.84 SD. The mean age of the study population of Haemorrhage cases was 57.48 years $\pm$ 13.46 SD. Infarction cases show increased mortality among the group having systolic blood & diastolic pressure $\geq$ 180 mm of Hg, $\geq$ 110 mm of Hg respectively. Hemorrhagic cases show increased mortality among the group having systolic blood pressure, diastolic pressure $\geq$ 180 mm of Hg, $\geq$ 110 mm of Hg respectively.

Table 1: Various Outcomes of Infarction cases (initial 5 days) based on Modified Rankin's Scale

No.	Final Outcome at Day 5	No. of cases (n=59)	Percentage
1	Full recovery	3	5%
2	No significant disability despite some symptoms	8	13.5%
3	Moderate disability	4	7%
4	Moderately severe disability	11	19%
5	Severe disability	24	40.5%
6	Death	9	15%

Table 2: Intracerebral Haemorrhage Score and mortality in cases of parenchymal bleeding (n=37)

ICH Score	Survived	Death	Total	Fatality Rate
0	0	0	0	0%
1	3	0	3	0%
2	12	1	13	7.6%
3	6	2	8	25%
4	2	6	8	75%
5	0	4	4	100%
6	0	1	1	100%

DISCUSSION

In our study, among the study population the incidence of infarction and haemorrhage were 59% and 41% respectively. This data is supported by a study done in Nepal. According to them infarction is more common than haemorrhage as the cause of stroke and in contrary to western population; haemorrhagic stroke constitutes a significantly higher proportion of stroke. In their study, there were 58% cases were infarction and 42% cases were haemorrhage⁴. Elevated blood pressure is strongly associated with stroke risk and probably with all the main pathological types but its relationship is far more evident in haemorrhagic type^{5,6}. A meta-analysis from China suggests that hypertension may account for about half of all deaths from stroke in that country⁷. Although most of the information comes from consideration of diastolic blood pressure,

the relationship with systolic blood pressure is similar and possibly stronger and even isolated systolic hypertension is associated with increased incidence^{8,9,10,11}. In our study people with history of hypertension had an increased mortality rate from infarction, although this observation is statistically not significant. Similar result was also seen among haemorrhage cases. The risk factors for stroke include blood pressure, smoking, dyslipidemia, diabetes, atrial fibrillation, alcohol etc¹². In our study, hypertension was the predominant risk factor among the infarction cases followed by diabetes and smoking. Among the haemorrhage cases the predominant risk factor was hypertension followed by history of smoking and alcoholism. Stroke incidence increases in male and female as the arterial blood pressure increases, either systolic or diastolic. Isolated systolic hypertension increases the risk of stroke in the elderly¹³. Most cases of infarction presented with unconsciousness (50.8%) followed by slurring of speech and hemiparesis. Among the type of infarct based on Oxfordshire community stroke project proposed 4 easily defined sub group of cerebral infarction namely, 1) Large anterior circulation infarct (LACI), 2) Partial anterior circulation infarct (PACI), 3) Lacunar infarct, 4) Posterior circulation infarct (POCI). In our study maximum number in PACI (47.45%). According to computed tomography finding basal ganglia and fronto-parital region were most commonly involved, but the death rate was maximum in brain stem infarction cases. Glasgow coma scale is a neurological scale that aims to give a reliable, objective way of recording the conscious state of a person for initial as well as subsequent assessment. In our study all the 59 cases of infarction had been divided into two groups based on Glasgow coma scale. Those who had an initial GCS 3-7, end up with increase mortality rate, and that was statistically significant ($p < 0.0001$)

All the stroke cases with infarction had been followed for 5 days post admission and out comes were analysed based on modified ranking scale (mRS). As per the observation study population having infarction mostly suffered from severe disability (40.5%) followed by moderately severe disability (19%) and death (15%) at the end of 5th day of observation. The modified ranking scale is commonly used scale for measuring the degree of disability or dependence in the daily activities of people who have suffered a stroke or other causes of neurological disability, and it has become the most widely used

clinical outcome measure for stroke clinical trials. It was originally introduced in 1957 by Dr. John Rankin and later on modified¹⁴. Among the 41 haemorrhage cases 90% of cases were due to intra cerebral haemorrhage and 10% cases were due to sub arachnoid haemorrhage. Combining both the systolic and diastolic blood pressure patients are categorized into four groups. Those with SBP $\geq$ 180 and/ or DBP $\geq$ 110 mm of Hg have more mortality than the others and it is statistically significant ($p = 0.027$). Among the haemorrhage cases, those with GCS 3-7 had 13 cases (72.2%) of mortality, and this is statistically significant ($p < 0.0001$). Based on volume of bleeding, intra parenchymal haemorrhage cases are divided into two groups, taking 30 cc as a cut off value. Those with $\geq$ 30 cc bleeding in CT scan had 10 cases of mortality (76.9%) out of 13 cases. This is statistically significant observation ($p = 0.001$). Intra parenchymal haemorrhage cases are divided into four groups based on midline shift. Those without any midline shift constituted 45.9% of cases, and those with midline shift constituted 54.1 % of cases. Based on it is clearly evident that patient with midline shift had more mortality than without and it is statistically significant too ($p = 0.04$). The intra cerebral haemorrhage score is a simple clinical grading scale that allows risk stratification on presentation with intra cerebral haemorrhage. The use of a scale, such as ICH Score could improve standardisation of clinical treatment protocol and clinical research studies in ICH (25). As per ICH Score intra cerebral haemorrhage cases are divided into two groups, Score: 0-2 and 3-6. Those with score 3-6 constitute 92.8% of mortality among haemorrhage cases. So ICH Score 3-6 is associated with chances of increases mortality, it is statistically significant ($p = 0.0018$). Intra cerebral haemorrhage was most distributed in the basal ganglia region. 29 cases out of 41 haemorrhages (ie 70.73% of cases), were due basal ganglia haemorrhage. There was 34.4% of death among 29 basal ganglia haemorrhage cases. Also 2 cases of death out of 3 brain stem haemorrhage cases. Among the 29 basal ganglia haemorrhage cases 17 (58.6%) presented with intraventricular extension, and 12 (41.4%) without. There were 52.9% of death among the study population with intraventricular extension, and only 8.33% of death among the study population without intraventricular extension and it is statistically significant also ($p = 0.036$). Among the basal ganglia haemorrhage cases 13 (44.8%) presented with mass effect and 16 cases (55.2%)

presented without. Those presented with mass effect in the CT scan had 53.8% of death. Those without mass effect had 25% death only. However this observation is not statistically significant ($p = 0.270$). Mostly basal ganglia haemorrhage was associated with intraventricular extension followed by brain stem, fronto-temporo-parietal, cerebellar region. National Stroke Association's Stroke Prevention Advisory Board, an elite group of the nation's leading experts on stroke prevention, established the first Stroke

Prevention Guidelines. They were published in a 1999 issue of Journal of the American Medical Association (JAMA) and have been updated to reflect current medical standards. Developing countries account for 85% of global deaths from stroke (Gupta et al 2008). Stroke is also a leading cause of functional impairments¹⁵. Magnetic resonance imaging was more effective when it was performed a few days after the stroke. Lesions causing different types of lacunar syndromes had significantly different volumes, suggesting that the size of the lesion may influence clinical features. Magnetic resonance imaging may be the imaging technique of choice in the study of lacunar syndromes¹⁶

CONCLUSION

Incidence of haemorrhage is much higher in India (41% as per our study) in comparison to 15-20% in western population. The study population between 51-60 years is most predominant age group in both the types of stroke. Most of the infarction cases presents with unconsciousness followed by slurring of speech. Most common presenting symptoms of Haemorrhagic stroke are unconsciousness, present at about 56% of cases. The symptoms usually presents in combination, rather than alone. The most prominent risk factor in our study population is undetected and/or uncontrolled hypertension. It is evident that population with systolic blood pressure $\geq$ 180 mm of Hg has an increased mortality from stroke. Study population with SBP $\geq$ 180 and/or DBP $\geq$ 110 mm of Hg group have increased rate of mortality from stroke. Smoking is a strong risk factor for stroke, mainly haemorrhagic stroke. MRI is the finer investigation modality especially in early hours of stroke. Anatomical localisation, particularly in cases of haemorrhagic strokes is difficult, because cases mainly presents with altered sensorium and/or unconsciousness. The major type of ischemic stroke in our study population is partial anterior circulation stroke (PACI) 47.4%. Most of the study population

having Infarction has developed severe disability at the end of 5 days of observation, comprising of 40.5% of the total observation.

BIBLIOGRAPHY

1. Brain's diseases of the nervous system:11th edition.
2. Harrison's principle of internal medicine : 18th edition; chapter 370
3. Adams and Victor's Principles of Neurology; 9th edition. Chapter34, page 746
4. Naik M, Rauniyar RK, Sharma UK, Dwivedi S, Karki DB, Samuel JR; Clinico-radiological profile of stroke in eastern Nepal: a computed tomographic study. Kathmandu Univ Med J (KUMJ).2006 Apr-Jun;4(2):161-6
5. Thrift A G, McNeil J J, Forbes A et al. Melbourne risk factor study group (1998);three important subgroups of hypertensive persons at greater risk of intracerebral haemorrhage.Kypertension, 31, 1223-9
6. Whelton P.K(1994); epidemiology of hypertension: Lancet 344, 101-6
7. JIANG HE; KLAG M. J.; ZHENGLAI WU; WHELTON P. K. Stroke in the People's Republic of China. II: Meta-analysis of hypertension and risk of stroke
8. Shaper A G, Phillips A N, S J Pocock S J, Walker M.Risk factors for stroke in middle aged British men: BMJ. 1991 May 11; 302(6785): 1111–1115
9. Keli S, Bloemberg B, Kromhout D; Predictive value of repeated systolic blood pressure measurements for stroke risk. The Zutphen Study.Stroke. 1992 Mar; 23(3):347-51
10. Sagie A, Larson MG, Levy D. The natural history of borderline isolated systolic hypertension. Framingham Heart Study, N Engl J Med. 1993 Dec 23;329(26):1912-7.
11. Petrovitch H, Curb JD, Bloom-Marcus E. Isolated systolic hypertension and risk of stroke in Japanese-American men; Stroke. 1995 Jan;26(1):25-9
12. Brain's diseases of the nervous system:11th edition;p 784
13. Michael D. Cressman, DO, Ray W. Gifford Jr. Hypertension and stroke; Journal of the American College of Cardiology, Volume 1, Issue 2, Part 1, February 1983, Pages 521–527.
14. Rankin J (May 1957). "Cerebral vascular accidents in patients over the age of 60. II. Prognosis". Scott Med J 2 (5): 200–15. PMID 13432835
15. Gupta R, Joshi P, Mohan V, Reddy S, Yusuf S. Epidemiology and causation of coronary heart disease and stroke in India. Heart 2008; 94: 16-26
16. Hommel M, Besson G et al.;Prospective study of lacunar infarction using magnetic resonance imaging.