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A Study of Clinical and Radiological correlation in Patients of Cerebro-Vascular Accident.

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Abstract
Background and objective: *Our study was done to evaluate correlation of the clinical and radiological findings in CVA.* ***Methods:*** *A prospective observational study was done of 100 patients with provisional clinical diagnosis of recent stroke who underwent neuroimaging(CT/MRI). Patients with neurologic deficit due to head injury, suspected substance abuse and stroke mimics were excluded. Clinical findings were evaluated and tabulated independently and subsequently correlated with imaging finding from available patients' records.* ***Results:*** *The study showed male predominance (53%) and maximum number of patients belonged to 5th decade (Mean age-56.78 years) (29%).Infarcts(90%) were common than hemorrhage (7%).Multiple region infarct were predominant in 54 cases and Basal ganglia complex was the commonest location for hemorrhage (57%).Most common clinical finding was hemiparesis (87%) followed by speech abnormalities (41%).****Conclusion:*** *Ischemic stroke was more common than hemorrhagic stroke across all age groups. MCA territory infarcts (54%) and Basal ganglia complex bleed (57%) were the most common presentation in ischemic and hemorrhagic strokes respectively. There was significant concordance between clinical diagnosis and imaging findings.*

Key words: *Cerebrovascular accident, Middle cerebral artery, Computed tomography, Magnetic resonance imaging.*

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I. Introduction

Stroke, or cerebrovascular accident, is defined as an abrupt onset of neurological 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.[1] It is a common cause of hospitalization, morbidity and mortality in our environment. The 4 major types of stroke are cerebral infarction, Intracerebral hemorrhage, subarachnoid hemorrhage and venous occlusion[2]. The diagnosis of many subtypes of stroke require detailed clinical, radiological and laboratory evaluation.

Stroke mimics which are certain conditions that can present with a clinical picture similar to that of stroke. They may include intracranial neoplasm, subdural hematomas, abscess, cerebral atrophy, post-ictal states. Therapy for both ischemic and hemorrhagic stroke differ and may be detrimental if treatment for one is given for another. It is therefore important that stroke diagnosis and subtype are confirmed as this influences the course of management.

Radiological modalities play a crucial role in confirming and differentiating the subtypes of stroke. Thus, helps in maintaining, modifying or changing treatment of stroke. Computed tomography (CT) and MRI are speedy and patient tolerable. CT differentiate the subtypes of stroke, extra-axial lesions, infections, excludes tumors and other stroke-like conditions, now plays a vital role in making the diagnosis, defining the pattern of involvement[3]. Due to its increasing availability in recent time and cost effectiveness CT has evolved as primary investigating tool in management of strokes in our environment.

II. Aims and Objectives

1) To study clinical profile of patients with stroke.
2) Differentiate ischemic or hemorrhagic stroke.
3) Correlate clinical and radiological findings of patients.

III. Materials and Method

This is a prospective and observational study includes total 100 patients clinically presented with signs and symptoms suggestive of stroke and admitted in LG Hospital in the department of medicine from September 2017 to August 2019 and fulfilling the inclusion and exclusion criteria.

Inclusion criteria:

- Patients willing to give consent for enrolment in study.
- Patients with clinical diagnosis having stroke within 72 hrs. onset.
- Age >18 years.

Exclusion criteria:

- Head injury and suspected substance abuse.
- Stroke mimics.
- Pregnant females or patient allergic to contrast dye.
- Altered renal function
- Patients not willing to give consent

IV. Methodology

History included all symptoms pertaining to stroke in detail with emphasis on all the risk factors attributable to the stroke. A detailed clinical examination was done and neurological deficits were identified. Relevant investigations like complete blood count, erythrocyte sedimentation rate, routine urine analysis, blood glucose, blood urea, serum creatinine, serum lipid profile, Chest X-ray, CT scan head, were done for all patients. The results were analyzed to assess the etiology, risk factors, the pattern of clinical and radiological profile and outcome of patients until discharge from hospital. Since this study was aimed to correlate the findings during hospitalization, a long term follow- up was not required. CT imaging was performed with high speed helical scanner in all patients. Radiologically subjects were classified among the subgroups of anterior circulation, posterior circulation, lobar and lacunar etc.

V. Results

Out of 100 patients in study 53% (n=53) were males and 47% (n=43) were females. The maximum cases of stroke (29%, n=29) occurred between 50-60 years of age group followed by 60-70 years of age group (24%, n=24), age group 40-50 years (17%, n=17), age group 70-80 (14%, n=14), age group 30-40 years (10%, n=10) and age group 80-90 had least cases. (6%, n=6).

Clinical Profile- In our study the most common clinical presentation of stroke was motor deficit (Hemiparesis-87%, n=87) (Table 1)

Table 1: Clinical features of stroke

Clinical features	Number (n=100)	%
Seizures	9	9%
Loss of Consciousness	19	19%
Speech		
Abnormal	41	41%
Could not be Examined	19	19%
Giddiness	20	20%
Headache	18	18%
Motor deficit		
Hemiparesis	87	87%
Hemiplegia	07	07%
Monoparesis	04	04%
Sensory deficit		
Hemi sensory loss	10	10%
Cerebellar symptoms	02	02%

For hemorrhagic stroke more common risk factors were hypertension and DM 71.4% each. For ischemic stroke most common risk factor was hypertension (49.5%), followed by DM (33.33%), Smoking (31.2%). (Table 2)

Table 2- Risk factors associated with type of stroke

Risk factors	Type of stroke	
	Hemorrhagic (n=7)	Ischemic (n=93)
Smoking		
Absent	3(42.9%)	64 (68.8%)
Present	4(57.1%)	29 (31.2%)
Alcohol		
Absent	6 (85.7%)	81(87.1%)
Present	1 (14.3%)	12 (12.9%)
BMI		
Normal	7 (100%)	86 (92.5%)
Over weight	0	7 (7.5%)
Diabetes Mellitus		
Absent	2 (28.6%)	62 (66.7%)
Present	5 (71.4%)	31 (33.3%)
Hypertension		
Absent	2 (28.6%)	47(50.5%)
Present	5 (71.4%)	46 (49.5%)
CAD		
Absent	7 (100.0%)	79(85%)
Present	0	14 (15%)
Past history of stroke		
Absent	7(100.0%)	84 (90.3%)
Present	0	9 (9.7%)
OCP		
Absent	7 (100%)	88(94.6%)
Present	0	5 (5.4%)

Among 100 patients, 47% patients had abnormally high total cholesterol levels, followed by 40% cases with low HDL levels, 39% with high triglyceride levels. All cases of hemorrhagic stroke had high total cholesterol and decreased level of HDL and 57.1% cases had high triglyceride level, whereas in ischemic stroke 43% cases had high total cholesterol, 35.5% cases had decreased level of HDL and 37.6% cases had high triglyceride level.

In our study, during clinical neurological examination, 88% cases showed signs of anterior circulation stroke whereas 12% cases showed signs of posterior circulation.

Radiological finding

In our study, among 100 clinically stroke suspected cases, radiological evaluation in form of CT scan or MRI scan was done and radiological confirmation was achieved in 97% cases. Remaining 3% were early cases of stroke which couldn't be detected radiologically, as in very early lesions of stroke, radiological scans cannot pick up infarct and may turn out to be normal later on. Out of 97% confirmed cases, 90% were ischemic and 7% were hemorrhagic.

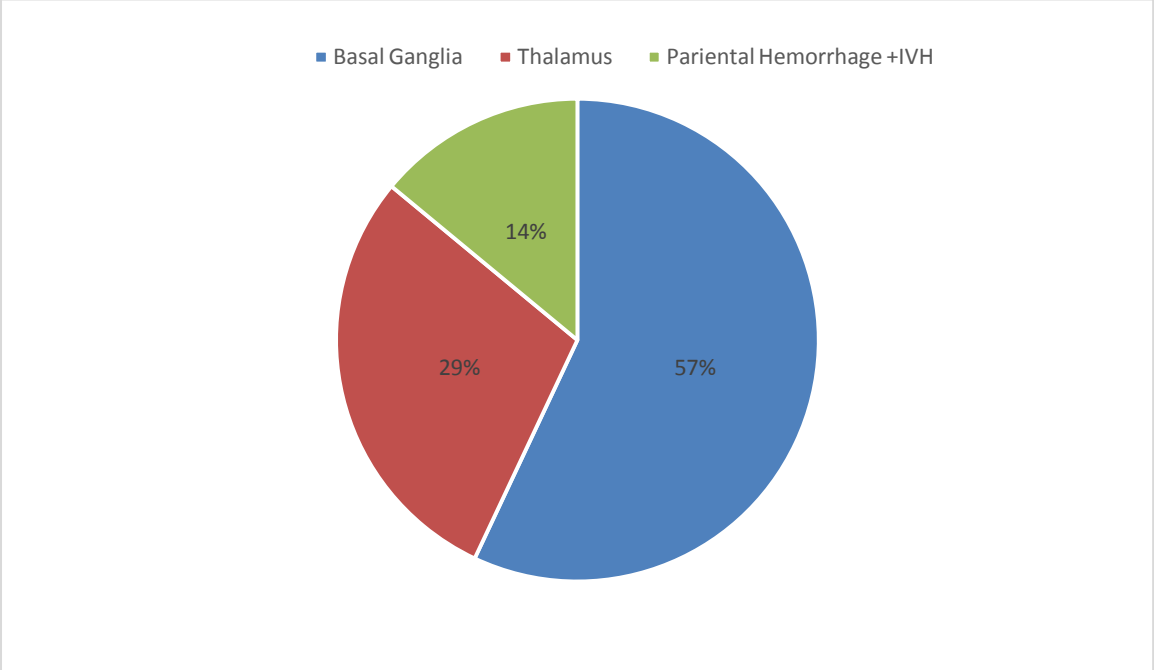
Among total 90 cases of ischemic stroke, most common site of ischemia was multiple region infarct (54.44%) followed by capsulo - ganglionic infarct (17.77%), Parietal infarct (12.22%), frontal infarct (8.88%).

Table 3: Anatomical region involved in ischemic stroke

Area involved in ischemic stroke	Number	Percentage
Frontal Infarct	08	8.88%
Parietal Infarct	11	12.22%
Temporal Infarct	01	1.11%
Occipital Infarct	03	3.33%
Cerebellar	02	2.22%
Capsulo Ganglionic Infarct	16	17.77%
Multiple Ischemic Infarct	49	54.44%

Among total 7 cases of hemorrhagic stroke, most common site of hemorrhage was in Basal Ganglia (57.14%), followed by Thalamic hemorrhage (28.57%) & Parietal Hemorrhage+ IVH in 14.29%. (Chart 1)

Chart 1 Anatomical region involved in hemorrhagic stroke



Among total 100 patients included in our study with provisional diagnosis of stroke, 97% cases showed radiological support. Out of 93 ischemic stroke radiological evidence was seen in 90 cases and out of 7 hemorrhagic stroke suspects, all 7 were confirmed radiologically. Remaining 3 cases had normal radiology report.

VI. Discussion

Stroke (Cerebrovascular accident) is a worldwide problem. Various risk factors are associated with an increased risk of cerebrovascular diseases viz. age, sex, race. Smoking, obesity and sedentary lifestyle, positive family history, other co morbid conditions like hypertension, diabetes mellitus, dyslipidemia, hypercoagulable state and drugs (e.g. steroid, oral contraceptive pills) also have significant impact on causation of stroke.

Our study was conducted in Dept. of General medicine, LG Hospital, Maninagar. Sex ratio in our study was 1.12:1 (M: F), which is similar to results of previous studies by Vaidya et al[4] (1.4:1), Asefa et al[5] (1.3:1) hence can be concluded as CVA is more common in males. The mean age of the patients in our study was 56.78 years, which is similar to studies done by Vaidya et al[4] (61) and Asefa et al[5] (50.6). Similar conclusion is given by previous studies.[4,5]

The most common clinical feature in our study was hemiparesis (87%, n=87) followed by speech involvement (41%, n=41) and altered sensorium (19%,n=19) which was similar to studies done by Bansal et al[6] in which hemiparesis was also most common feature (79.2%)followed by altered sensorium (57.2%) and speech involvement(30.4%) and Studies done by Vaidya et al[4] also reported similar pattern of clinical features- Hemiparesis (48%) followed by speech involvement(25.1%) and altered sensorium (13.1%).

Smoking was causative risk factor in 31.2% of ischemic strokes and 57.1% of hemorrhagic strokes in our study which correlates with studies done by Bevan et al[7] in which smoking was causative risk factor in 20.83% of ischemic strokes and studies by Alverez et al[8] reported smoking was causative risk factor in 56.74% of hemorrhagic strokes.

In the present study alcohol consumption as risk factor was observed in 12.9% of ischemic strokes and 14.3% of hemorrhagic strokes where as it was 16.7% and 28.26% in ischemic and hemorrhagic strokes respectively in Bevan et al[7]. In the studies by Alverez et al[8] it was noted in 37.82% of hemorrhagic strokes.

Hypertension was risk factor in 49.5% cases of ischemic stroke, which is similar to results of Bevan et al[7] (31.25%). Diabetes was risk factor in 33.3% of ischemic and 71.4% of hemorrhagic strokes in present study whereas it was 10.41% in ischemic stroke in Bevan et al[7] and 10.88% of hemorrhagic strokes in Alverez et al[8]. This did not concur with the present study probably because the less incidence of Diabetes Mellitus in Bevan et al[7] and Alverez et al[8]. In the present study CAD was present in 15% of the ischemic which is similar to results of Bevan et al[7] (14.58%).

Past H/O stroke was present in 9.7% of the ischemic stroke and none in the hemorrhagic stroke in our study whereas that was present in 6.25% cases of ischemic stroke in Bevan et al[7]. 5.4% of the ischemic and 0% of hemorrhagic strokes patients had history of consumption of OCP's whereas it was 18.75% and none in Bevan et al[7]. Present study did not correlate with the above study probably because the present study was done in urban set up.

In our study, ischemic stroke was noted in 90 patients, among total 90 cases of ischemic stroke, multiple region infarct was seen most commonly (54.44%). Most common region involved was capsule-ganglionic region 17.77%, parietal area 12.22%, frontal region 8.88%, occipital 3.33%, cerebellar 2.22% and temporal 1.11%. Results of present study are against the studies done by Vaidya et al[4] in which most common site of infarct was parietal region (33.7%) followed by frontal (16.7%) and Mishra et al[9] in which most common site of infarct was parietal region (41.7%). Results of our study are comparable to Vaidya et al[4] and Mishra et al[9] in frontal, temporal, occipital and cerebellar infarcts.

Intracerebral hemorrhage was seen in 7 cases, out of which 4(57.14%) had basal ganglia hemorrhage, 2(28.57%) had thalamic hemorrhage and 1(14.3%) had Parietal Hemorrhage + IVH which correlates with studies done by Vaidya et al[4] which shows Parietal Hemorrhage + IVH in 17.5% and thalamic hemorrhage 24.7% cases. Similar studies was done by Mishra et al[9] which reported comparable results in basal ganglia hemorrhage (43.9%)**.**

In our study clinico- radiological correlation was 96.77% in Ischemic stroke and 100% in Hemorrhagic stroke. This shows high sensitivity of radiology in detection of hemorrhagic stroke compared to ischemic stroke. Results of our study are similar to that of Budhrani et al[10]. This helps to achieve our aim of correlating clinical and radiological findings in patients with CVA.

VII. Conclusion

Stroke is one of the leading causes of increased morbidity and 3rd commonest cause of death in the world. It causes severe neurological damage which if not treated immediately, can lead to permanent morbidity. Both ischemic and hemorrhagic stroke have different therapeutic approaches. So careful clinical examination along with radiological imaging plays an important role for diagnosis and early initiation of therapy.

Clinical examination and radiological approach both go hand in hand for better patient management. Radiological investigations remain the Gold Standard in management of patients with stroke for better management, early intervention and outcome.

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