Original Research Article

Clinico-radiological Profile of Stroke in Western Nepal: A Computed Tomography Study

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ABSTRACT:

Introduction: Stroke is a major public health burden worldwide and is responsible for a large proportion of disability. It ranks third in the causation of morbidity and mortality. This study was carried out to establish the pattern of various types of cerebrovascular accident (CVA) in western Nepal, to correlate the clinical data and radiological findings in cases of stroke, and to identify the common risk factors associated with stroke. **Methods**: A total of 200 patients presented at the department of Radiodiagnosis from emergency or ward within six months of study period from 18th of September 2015 to 17th of March 2016 with clinical diagnosis of stroke. Brain CT scan was done within 14 days of onset. **Results**: There were 200 patients with stroke (124 males and 76 females), aged 19 to 92 years in which infarction was more common than hemorrhage (57% Vs 41.5%) clinically. Hypertension was the commonest risk factor noted in 59% cases followed by Diabetes Mellitus in 39%. Middle cerebral artery (MCA) territory infarction was the most common site of infarction. Clinical and CT localization of hemorrhage and infarct was correct in 153 cases (75%) which was statistically significant. **Conclusion**: Infarction is more common than hemorrhage as the type of stroke. Hypertension is the commonest risk factor followed by diabetes mellitus.

Keywords: cerebrovascular trauma • computed tomography • stroke

INTRODUCTION:

Cerebrovascular accident (CVA) is defined by abrupt onset of a neurological deficit that is attributable to a focal vascular cause.[1] The four major types of CVA are cerebral infarction, intracerebral hemorrhage (ICH), primary subarachnoid hemorrhage (SAH) and venous occlusion.[2] CVA is increasingly recognized as one of the leading causes of morbidity and mortality worldwide.[3] CVA is also is a major health issue in semi-industrialized countries like Nepal.[4] Hemorrhagic stroke constitutes a larger percentage of stroke subtypes on this side of the globe as seen in countries like Japan and China.[5] But in one study done in eastern part of Nepal, infarction constitute 58% of total stroke subtypes as seen in the western world.[6]

The role of immediate CT in the patient of stroke is two-fold: to diagnose or exclude intracerebral hemorrhage and to identify the presence of an underlying structural lesion such as tumor, vascular malformation, subdural hematoma etc. that can mimic stroke clinically.[2] Aggressive and promising new therapies for treating stroke place the CT examination at the forefront of stroke management.[7] CT scan is a widely available, affordable, noninvasive, and relatively accurate investigation in patients with stroke and is important to identify pathology and exclude stroke mimics.[8] This type of study is the first of its kind in western Nepal so as to obtain an initial data regarding the types of stroke in this region and the importance of specific risk factors.

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METHODS:

This was a cross sectional study done in the department of Radiodiagnosis in Lumbini Medical College Teaching Hospital from 18th of September 2015 to 17th of March 2016 for a period of six months. All cases coming to the department within 14 days of onset of stroke for brain CT were included in the study. Patients with past history of brain tumors and intracranial surgery were excluded from the study.

History about potential risk factors like smoking, hypertension, diabetes mellitus, obesity, anticoagulants use, past history of stroke/TIA, hypercholesteremia, and cardiovascular disease was obtained. Clinical diagnosis was noted from the case sheet. Informed consent was taken from all patients/patient's parties prior to the procedure. Then the patient was subjected to non-contrast CT scan of the head performed on Siemens Somadom Emotion in supine position by taking 10 mm axial section with 15-20 degree angulation of the gantry to make the canthomeatal line in position. Whenever required additional thinner cuts were taken. Repeat CT head was done after 24 hours of onset in cases who presented within 12 hours initially.

The data were tabulated and statistically analyzed using SPSS-16 and the clinical features and various risk factors were correlated with the CT findings. Descriptive statistics was presented as frequencies and percentage. Relationship between categorical data was analyzed with Chi-square test.

RESULTS:

There were 200 patients with stroke among which infarction was present in 114 (57%), hemorrhage in 83 (41.5%), and others in 3 (1.5%). Of hemorrhages, seven were sub arachnoid hemorrhage. Out of 114 infarcts, 14 were lacunar infarct and one was large as well as lacunar infarct. Among others, two were having both hemorrhage and infarct and one was normal. Excluding these three cases, Chi-square test of goodness of fit was applied and found that the rate of infarction and hemorrhage significantly differ ($X^2[N=197] = 4.9$, $p=.03$). Hence, infarction was more likely to occur among stroke cases.

There were 124 (62%) male and 76 (38%) female with M:F ratio of 1.63. Excluding the three cases of others category, Chi-square test of independence was applied to see the relation between gender and type of stroke. Among male, 51 (41.8%) had hemorrhage and among female, 32 (42.7%)

had hemorrhage. There was no significant relation between gender and type of stroke ($X^2[N=199, df=1] = .01$, p=1).

The age of the patients ranged from 19 - 92 years, with a mean age of 62.2 yr ($SD=12.7$). Patients were divided into two groups, those aged ≤ 40 (stroke in young) and those aged > 40 yr. Stroke in the young was seen in 38 (19%) and among >40 yr in 161 (80.5%) cases. This difference was statistically significant ($X^2[N=199, df=1] = 76, p<.001$). Stroke is more likely to occur in people more than 40 yr of age. In the younger group, 22 (57.9%) had infarction and in the above 40 yr group 92 (57.9%) had infarction. Chi-square test of independence was applied to see the relation between type of stroke and age group. There was no significant difference ($X^2[N=197, df=1] = 0, p=1$).

Out of 38 cases of stroke in young, 19 had a history of hypertension, 13 had a history of Diabetes mellitus (DM), three had a history of previous stroke, six had history of heart disease and two had history of anticoagulant therapy. Among 161 cases of stroke in older patients, aged 41 to 92 years, 99 had history of hypertension, 65 had diabetes, 13 had history of previous stroke, two had heart disease, and 13 had history of anticoagulant use.

Risk factors were present in 139 cases and absent in only 61 cases. This difference was statistically significant ($X^2[N=200, df=1] = 30.4$, p<.001). Hence, a patient with stroke is highly likely to have risk factor. Multiple risk factors were seen in 22 (11%) cases and more than three risk factors in 21 (10.5%) cases. Among the various risk factors included, the commonest was hypertension in 118 (59%) followed by DM in 78 (39%) cases, history of previous stroke in 16 (8%), underlying heart disease in eight (4%), use of anticoagulation therapy in 15 (7.5%) cases. Among multiple risk factors, a combination of hypertension and DM was present in 65 (32.5%) cases.

There were 101 cases diagnosed as having hemorrhage clinically. Of these, 70 (69.3%) were found to have hemorrhage by CT. Similarly, out of 96 clinically diagnosed as infarction, 83 (86.5%) were found to have infarction by CT. Chi-square test of independence was applied to see whether a relation exist between clinical diagnosis and CT findings and found that there was significant relation between the two ($X^2[N=197, df=1] = 62.8, p<.001$). CT finding of infarction was highly likely when the clinical diagnosis was infarction and vice versa.

Clinical presentation of a majority (n=154,

77%) of cases was hemiplegia; other presentation were loss of consciousness (17%), headache (12.5%), vomiting (12%), altered speech (11.5%), cranial nerve involvement (6.5%), and others (10.4%).

A total of 34 patients presented with loss of consciousness out of which 22 (64.7%) had hemorrhage. Hemorrhage was present in 61 (37.4%) among those who did not have loss of consciousness. Chi-square test of independence showed that the difference was significant ($X^2[N=197, df=1] = 8.6, p=.003$). Thus, hemorrhage was more likely if patient had loss of consciousness. Twenty-four patients presented with headache among whom 15 (62.5%) had hemorrhage. Hemorrhage was present in 68 (39.3%) among those who did not have headache. Chi-square test of independence showed that the difference was significant ($X^2[N=197, df=1] = 4.7, p=.03$). Thus, hemorrhage was more likely if patient had headache. Thirteen patients presented with cranial nerve involvement among whom nine (69.2%) had hemorrhage. Hemorrhage was present in 74 (40.2%) among those who did not have cranial nerve involvement. Chi-square test of independence showed that the difference was significant ($X^2[N=197, df=1] = 4.2, p=.04$). Thus, hemorrhage was more likely if patient had cranial nerve involvement.

One hundred fifty-two patients presented with hemiplegia among whom 94 (61.8%) had infarction. Infarction was present in 20 (44.4%) among those who did not have hemiplegia. Chi-square test of independence showed that the difference was significant ($X^2[N=197, df=1] = 4.3, p=.04$). Thus, infarction was more likely if patient had hemiplegia.

Twenty-three patients presented with vomiting among whom 14 (60.9%) had hemorrhage. Hemorrhage was present in 69 (39.7%) among those who did not have vomiting. Chi-square test of independence showed that the difference was not significant ($X^2[N=197, df=1] = 3.8, p=.053$).

Out of 200 patients, 15 were normal on first CT scan done within six hours of onset of stroke and later follow up scan done after 12 hours showed infarction, i.e. a positive detection of CT scan within 12 hours was 100%. Out of 114 cases of infarction, middle cerebral artery (MCA) territory was involved in 93 (81%) cases, anterior cerebral artery (ACA) in 19 (16.6%) cases, and posterior cerebral artery (PCA) territory in 17 (14%) cases (including basilar artery territory in 10 [8.7%]). Combined involvement was seen in 15 cases of which MCA and PCA was common.

Out of the 93 cases of MCA infarction, 20 cases (eight males and 12 females aged 40 to 80 years) presented within six hours of ictus. Left side was involved in eight cases and right side in 12 cases. In the first scan, obscuration of the lentiform nucleus was seen in three (15%) cases, 15 (75%) cases were normal and in two (10%) cases doubtful hypo-density was noted. Later follow up scan was done after 12 hours of onset in 15 cases, which were normal in first CT scan, showed MCA territory infarction.

DISCUSSION:

Stroke is a major public health burden worldwide and is responsible for a large proportion of disability, and ranks third in the causation of morbidity and mortality. The Jaya stroke foundation established by Nepalese doctors and family members of stroke patients estimates that each year approximately 50,000 people have stroke and 15,000 people die from stroke.[9]

Naik M. et al. studied 150 patients with stroke in eastern part of Nepal in and found that 104 were males and 46 were females, aged 7 to 91 years, in which infarction (58%) was more common than haemorrhage (42%) in both group of age (≤40 years and >40 years).[6] Shaik MM. did a study on burden of stroke in Nepal in 2012 and found that ischemic stroke is more common (63%) than hemorrhagic stroke (37%).[10] There were 200 patients clinically suspected of having CVA; 114 (57%) had infarction, 83 (41.5%) had hemorrhage, two had having both hemorrhage and infarct, and one had a normal scan. In this study infarction was common in both male and female as well as in both age groups (≤ 40 years and > 40 years). Both studies are comparable to this study.

Pathak V. et al. conducted a study on stroke: a case series study in Nepal Medical College Teaching Hospital, Kathmandu. Seventy two patients were diagnosed as having cerebrovascular accident. The mean age of the patients having stroke in their study was 61 years. The commonest (90.0%) symptom was unable to move one side of the body; other common symptoms were slurring of speech (33.0%), loss of consciousness (29.0%), headache (23.0%), and deviation of mouth (22.0%). Seventy (97.0%) patients had two or more symptoms. Smoking (61.0%), hypertension (60.0%), and atrial fibrillation (8.0%) were the commonest modifiable risk factors, while increased age (mean 61 years) was the commonest non-modifiable risk factor. Ischemic

stroke (68.0%) was common than hemorrhagic (32.0%) stroke. Most (81%) infarction occurred in the middle cerebral artery territory, 16.6% in the ACA territory, 14% in PCA territory, and 8.7 % in basilar artery territory.[11] In a study by Kazui et al., 75% cases had MCA infarction, 13% ACA, and 8% PCA which is comparable to our study.[12]

Weisberg LA. et al. found abnormal CT in 75% of 33 patients with pure motor hemiparesis (PMH). In 13 cases, lesions were detected in the capsular region; 10 were consistent with infarction, and three were of increased density consistent with hemorrhage. Seven had other vascular disorders, and four had nonvascular conditions. In this study, CT was abnormal in 100% of 154 patients with pure motor hemiparesis. In 23 cases, lesions were detected in capsular region; 19 were consistent with infarction and three were hemorrhage and one had both hemorrhage and infarct. Both studies are comparable.[13]

In the study done by Sotaniemi KA et al, the clinical picture did not agree with the CT localization of infarction in 11.7% of cases. The clinical picture and CT localization were compatible in 80 (94.1%).In this study, the clinical diagnosis of whether infarction or hemorrhage was incorrect in 44 cases (22.3%). In the 153 cases in which correct clinical localization of the lesion was made; 84 were infarctions and 69 were hemorrhage. Clinical differentiation between hemorrhage and infarction was possible in 77.6% which is statistically significant. Both studies are comparable.[14]

The visualization of an ischemic infarct on CT scan, depends greatly in the timing of the investigation. Hyper acute and acute infarcts could be missed by CT. So unenhanced CT performed approximately three days after infarction have been reported to be sensitive. The clearance of cerebro spinal fluid (CSF) affects the detection of SAH as time progresses after the onset.

CONCLUSION:

In this part of Nepal, infarction is more common than hemorrhage as it is elsewhere. Hypertension is the commonest risk factor followed by diabetes mellitus; smoking and alcohol intake could be an additional risk factor.

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