

Role of Computed Tomography in Evaluation of Cerebrovascular Accidents in a Tertiary Care Centre in Northern Kerala.

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ABSTRACT

Background: Cerebrovascular accident is one of the leading causes of death and disability throughout the world. It is the third most common cause of death after heart disease and cancer in India. Early diagnosis can improve the morbidity and mortality rates, as more advanced therapies are currently being instituted. Computed tomography imaging having wider availability, being cost effective and less time consuming, plays the role of first-line imaging modality. Many studies have been done all over the world to demonstrate the usefulness of computed tomography in management of cerebrovascular accident. Our study is aimed to establish the role of computed tomography in clinically suspected cases of cerebrovascular accident. The purpose of this study is to document the presence or absence of hemorrhage or infarcts, to find the location and reasonably assess the blood vessels involved and to spot the incidence of negative cases of clinically suspected stroke. **Methods:** A prospective study of 250 cases admitted to Academy of medical sciences, Pariyaram, Kannur with the clinical diagnosis of acute stroke were taken up for the study. **Results:** Out of 250 patients clinically suspected of CVA submitted for CT scan study of the brain. 150 patients i.e., 60% had infarcts. 70 patients i.e., 28% had haemorrhage, 5 patients i.e., 2% had S.D.H., 5 patients i.e., 2% had C.V.T., 5 patients i.e., 2% had tumor and 15 patients i.e., 6% had normal scans. Infarcts formed the major group of the CVA cases i.e., 60%, involving most commonly the R.M.C.A. territory in patients i.e., 33.34%. Hemorrhage formed the second major group of the CVA cases i.e., 28.5%, involving most commonly the R.M.C.A. territory in patients i.e., 28.5%. **Conclusions:** The study showed that there is a preponderance of ischemic over hemorrhagic CVA. There is also a male preponderance in the occurrence of both hemorrhagic and ischemic CVA. C.T. Scanning is the "Gold Standard" technique for the diagnosis of acute stroke. And management of stroke depends upon "accurate diagnosis". Hence, CT scan should be ideally done in all cases.

Keywords: Tomography, X-ray computed, Cerebrovascular accident, Cerebral infarction, Intracranial Hemorrhage, Hypertensive, Intracranial Hemorrhage, Venous thrombosis, Intracranial Embolism and Thrombosis.

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INTRODUCTION

Cerebrovascular accident or stroke is defined as an acute loss of focal and at times global (applied to patients in deep coma and those with subarachnoid hemorrhage) cerebral function, the symptoms lasting more than 24 hours or leading to death with no apparent cause other than that of vascular origin (WHO).^[1]

Cerebrovascular accidents are one of the leading causes of death after heart disease and cancer in the developed countries and one of the leading causes of death in India. The exact prevalence rate of this disease in the Indian population is not known,

although it accounts for about one percent of admissions to general hospital. The incidence rate and the death rate from stroke increases dramatically with age. About 15 to 30% of patients die with each episode of cerebral infarction and 16 to 80% with cerebral hemorrhage. Those who survive are usually left with permanent disability. Thus, stroke becomes a great medical and social problem. Accurate and early diagnosis may improve the morbidity and mortality rates in the future as newer and more effective therapies are currently being instituted.^[2] The advent of CT in early 1970s greatly facilitated the diagnosis and management of stroke and added significantly to our understanding of Patho physiological alterations in human brains. With the advent of CT imaging, it is now possible to non-invasively and reliably diagnose and distinguish between stroke due to cerebral infarction and stroke due to hemorrhage. In addition, other brain lesions, at times, may clinically present as stroke like syndromes such as primary or metastatic brain tumor

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or subdural hematoma that can usually be clearly differentiated by CT examination. However, it is a relatively new and scarcely available facility in rural population of developing country like India. Its use is further restricted by patient's economic status.

There are several reasons for performing Brain CT of patients with cerebrovascular accidents.³

1. To establish the diagnosis.
2. To identify types of stroke amenable by surgery.
3. To exclude intracranial hemorrhage.
4. To diagnose spontaneous subarachnoid hemorrhage.
5. To detect bone changes.

Thanks to the high spatial and density resolution capability of a CT, it is one of the most accurate methods available for identifying and localizing an infarction within the brain. Ischemic infarction, hemorrhagic infarction and intracerebral hematoma are usually differentiated. CT also permits identification of the acute and chronic sequence that may develop after a sequence of infarction. These include, in acute phase, brain swelling and conversion of a bland into hemorrhagic infarct and in chronic phase, cystic parenchymal change, cortical atrophy and focal ventricular dilatation.^[2]

Despite many improvements in MR technology, CT is still the method of choice for more of the patients being evaluated for cerebrovascular accidents because of its fast acquisition. CT is a good diagnostic instrument even in early phase of acute ischemic stroke. In combination with new helical CT technique (CT angiography) all- important decisions regarding early therapeutics can be answered.

Clinical approach to stroke has undergone many changes in the past few years. CT scan has become an essential and integral part of the assessment and has given a more objective basis to management and use of the IV contrast material. After non- contrast CT and the availability of follow-up studies in many instance significantly aids in the determination of the correct vascular etiology of the stroke, as does correlation of CT changes with patient's age, sex, history and neurological deficit.^[4,5]

Objectives

1. To detect the presence or absence of infarct or hemorrhage.
2. To determine the size, location, arterial territories involved and age of infarct with respect to onset of clinical symptoms.
3. To detect other causes simulating stroke.

Background

Role of CT In Cerebro-Vascular Accidents

Computed tomography is in clinical practice of utmost important for differentiating stroke from other diseases, which may mimic stroke, it also distinguishes one type of stroke from other. In a given case of suspected stroke, the CT add value to:

1. Establish the diagnosis of stroke.

2. Identify type of stroke amenable to surgery.
3. Exclude intracranial hemorrhage.^[2]
4. Identifies mimics of stroke.

CT can be used to distinguish between hemorrhagic strokes and stroke due to infarction.1CT scan is a dramatically new non-invasive technique that provides direct visualization of the intracranial contents without discomfort or risk to the patient (Radiation).CT helps to compare patterns of abnormalities with clinical profiles and pathologic anatomic findings at necropsy.3,4CT has proven to be of significant potential prognostic value in the evaluation of the acute stroke patient.^[6]

CT Findings in Infarction

CT changes in acute infarction evolve with time. Recent studies show that positive CT findings within the first 6 hours after onset vary from 56-92%. Positive CT findings have also been described in the first 2 hours after cerebral infarction (68%), the incidence increases to 89% in the third hours and to 100% thereafter.^[7]

Early findings of acute infarction on CT: The term "early" used in this context means within 6 hours of the onset of symptoms.

a. Hypo density of brain parenchyma: Parenchymal hypodensity in a vascular territory represents one of the most reliable CT findings of acute infarction.

Hypodensity at the early beginning corresponds to cytotoxic edema with extra cellular water shifting to intracellular space because of membrane ion pump failure. Simultaneously with increased pinocytosis, extra cellular edemadevelops, caused by ultra filtration of plasma. Studies have revealed that grey matter is more sensitive to a reduction in blood flow than the white matter, and the resultant cytotoxic edema progresses more rapidly in grey than in white matter. Vasogenic edema occurs late with cellular disruption and opening of blood brain-barrier to macro molecules.

Correlation between increase in water content of ischemic tissue and hypodensity has been established. A decrease of 2.5 to 2.6 Hounsfield units corresponds to 1% change in water content of the tissue. Increased hypodensity of CT after stroke thus directly shows the development of post-ischemic brain edema. Although brain edema means water uptake and thus increase in volume, early CT does not detect brain swelling in more than 50% of patients with parenchymal hypodensity. Immediately after blood brain barrier break down, extravasation of contrast medium in the extra cellular space can mask parenchymal hypodensity; for this reason, contrast medium must be avoided in the acute phase of stroke.^[2,8]

Parenchyma hypodensities include four signs:

Obscuration of lentiform nucleus is the earliest sign of cerebral ischemia, sometimes present one hour after onset. It appears as hypodensity of part or whole of lentiform nucleus and blurring of its

margins. It occurs mainly with proximal occlusion of middle cerebral artery.^[9]

Loss of insular ribbon is an early sign of ischemia in the middle cerebral artery territory. It appears as a loss of definition of grey-white interface in the lateral margins of the insula and reflects acute edema.^[10]

Effacement of cortical sulci or gyri reflects focal brain swelling due to edema and is recognized by comparing sulci and cisterns on both hemispheres. Its specificity is poor and is present in space occupying lesion near the cortex.^[2]

Loss of differentiation between grey-white matters must be carefully sought in small cortical infarcts and appears as a loss of cortical ribbon in avascular territory. It reflects edema and is similar to loss of insular ribbon.

b. **Hyperdensity of middle cerebral artery sign (HMCAS):** Spontaneous hyperdensity has been initially described at the level of the MCA but this sign can be found elsewhere including the basilar artery. Hyperdensity of middle cerebral artery sign is defined on non-contrast CT as a part of MCA denser than other parts of the vessel or its counterpart and denser than any visualized vessel of similar size non-attributable to calcification.^[11] It reflects either thrombotic or more frequently, embolic occlusion of the MCA or spontaneous dissection. CT in the very early phase after ischemic stroke detected HMCAS in 35-50% of patients which were angiographically proven.^[2]

MCA occlusion follow up studies on serial CT have shown that HMCAS disappears within one week when the origin of occlusion is embolic but remains where the origin is thrombotic. This sign is almost always associated with early appearances of parenchymal hypodensity, haemorrhagic transformation or with large MCA infarctions.^[12]

In the appropriate clinical setting of acute stroke, an artery visualized on non contrast CT scan as diffuse high density and higher in density than other visualized vessels should be suspected as acutely occluded by clot.^[13,14]

CT changes in sub-acute infarcts (24-48 hours):

Most sub-acute infarcts are visible on non-enhanced CT scan as wedge shaped area of decreased attenuation involving both grey and white matter in atypical vascular distribution.

Haemorrhagic foci can be detected in majority of medium and large sized sub-acute infarcts. Common locations are basal ganglia and cortex.

By this time there occurs disruption of blood brain barrier leading to contrast enhancement, which is typically patchy and gyral.^[2]

CT findings in chronic infarcts (>2 weeks):

Chronic infarcts are the end result of destructive process, focal areas of low attenuation or changes of encephalo-malacia are seen at the site of infarct.

Adjacent sulci become prominent and ipsilateral ventricles enlarge reflecting loss of central tissue

volume. Very rarely dystrophic calcification can be seen. Enhancement usually disappears after 8-10 weeks.^[2]

CT findings in Lacunar infarcts

Lacunar infarcts are deep central infarcts, which are usually located in the basal ganglia and thalamus. They are usually due to embolic, atheromatous or thrombotic episodes of lenticulo striate arteries.

Lacunar infarcts are common in elderly. They are often multiple and bilateral and are usually seen after acute stage has passed.^[2]

CT findings in Watershed infarcts

Watershed infarcts are seen as areas of decreased density located along the border zones between territories of major cerebral arteries. They are commonly seen in fronto-parietal regions (at middle cerebral-anterior cerebral borders) and posterior parietal regions (ACA, MCA, PCA borders). These constitute about 10% of all infarcts and are caused by carotid occlusion, hypotension, micro emboli and coagulation disorders.^[15]

An area of decreased density in the distribution of affected vessel appears with 12-48 hours after the onset of ischemic event. Initially the area has hazy margins and is wedge shaped with the apex pointing medially. Over the next 2-3 weeks the density decreases further and margins become sharper and after third week a sharply demarcated cystic area remains. Some dystrophic calcification can be seen.^[2]

Stroke in Specific Vascular Distribution

MCA Territory: Over 75% of all infarcts occur in MCA territory. MCA supplies most of the lateral hemisphere and anterior temporal lobe. If entire MCA distribution is affected, the basal ganglia, deep cortical white matter and much of the hemispheric cortex are involved. In such cases wedge shaped area extending from lateral ventricles to brain surface is typical with its apex pointing towards the ventricle. If the occlusion is distal to MCA bifurcation lentiform nucleus is spared. 2 Detection of MCA territory hypodensity on hyper acute CT is a sensitive, prognostic and reliable indicator of the amount of MCA territory undergoing infarction.^[16]

Posterior Cerebral Territory: Over 6% of all infarcts occur in this territory. PCA supplies posterior 1/3rd of convexity and most of the inferior temporal lobe. It also supplies occipital lobe and some part of posterior limb of internal capsule. Commoner sites of infarcts in this territory are calcarine cortex, thalami, midbrain and posterior limb of internal capsule.^[2]

ACA Territory: This group accounts for about 4% of the total infarcts. Infarction in ACA territory is rare because of good collateral circulation ACA supplies thin strip of cortical hemisphere over the anterior 2/3rd of convexity, septum pellucidum, anterior 2/3rd of corpus callosum, some supply to caudate nucleus and anterior limb of internal capsule.

Isolated ACA infarcts involve strip of cortex along anterior aspect of interhemispheric fissure.^[2]

Intracerebral Haemorrhage

Detection of blood depends on its radiographic density due to its high protein content, depending on its initial Hb level, dilution of extra cellular fluid and partial volume effect. The CT density of extravasated blood ranges from that of surrounding brain to about 100 HU. Commonest causes of intracerebral haemorrhage are hypertension, rupture of lenticulo striate artery and amyloid angiopathy.

The commonest sites of intracerebral haemorrhage in decreasing order are putamen, thalamus, cerebral lobes, cerebellum and pons. On CT haemorrhage appears as high density (80-100 HU) oval or rounded lesion. The size can vary from few millimeters to part of hemisphere. There is usually no edema around the fresh clot. After some time a fine rim of low density indicates clot retraction. The mass effect is mild but common cause of death in large bleed is brain herniation. Blood can leak into ventricles, which are seen as small collection in dependent occipital horns to a dense cast of whole ventricular system. No contrast enhancement is seen at this stage. After several days the density of haematoma decreases from periphery towards the center. Vasogenic oedema may develop in surrounding white matter and if intra-venous contrast is given, shows a halo of enhancement. This is because of breakdown of blood brain barrier in vascularized capsule that surrounds the haematoma. After several weeks, the CT density of haematoma equals to that of brain and the end result is a rounded zone or a cleft of density of CSF and focal atrophic changes may be evident. Sometimes high attenuation within a chronic haematoma is usually secondary to re-bleeding which is seen on CT as fluid-fluid level or a focal hyper dense lesion within low density collection.^[2]

Swirl sign - If the blood is accumulating rapidly, an unretracted semi liquid clot may be present. This results in hypo dense areas within the generally hyperdense acute haematoma – this is called swirl sign.^[2]

Substantial early haemorrhagic growth, in patients with ICH is common and is associated with neurological deterioration and can be detected well on CT.^[17,18]

CT features of Subarachnoid Haemorrhage

Acute subarachnoid haemorrhage appears as a high attenuation within subarachnoid space. As the blood mixes with CSF in subarachnoid space and spreads over the cerebral convexities, it appears as a high density feathered collection along interhemispheric fissure. Subacute and chronic subarachnoid haemorrhage is difficult to detect on CT as 90% of blood is cleared from cerebrospinal fluid within one week. If subarachnoid haemorrhage is seen on CT done after one week, it suggests rebleeding.^[2]

CT Features of Venous Occlusion:

- Hyperdense thrombus in the thrombosed dural sinus or veins.
 - Cord sign thrombosed cortical vein seen as linear high-density areas.
 - Cortical and sub-cortical haemorrhages adjacent to occluded sinus.
 - Thickened, enlarged, shaggy appearance of tentorium and falx
 - Empty delta sign on CECT.
- Secondary changes such as low density basal ganglia with or without associated petechial haemorrhages.^[2]

MATERIALS & METHODS

A prospective study of 250 cases admitted to Academy of medical sciences, Pariyaram, Kannur with the clinical diagnosis of acute stroke were taken up. The study was done between July 2015 to July 2017.

Patient Selection

Data for my study is collected by sampling referred cases with clinical history of stroke for a period of 24 months starting from July 2015 to July 2017.

250 Patients of the case study were subjected to computed tomography scan of the head using GE high speed Dual-slice spiral computed tomography scan. The imaging protocol consists of acquisition of contiguous axial sections with a maximum thickness of 5mm without intravenous contrast material administration. Images will be evaluated with brain window settings. Clinical details and the computed tomography findings of the case will be recorded as per the proforma. No attempt will be made to compare computed tomography with other imaging modalities like M.R.I, Angiography or Doppler.

Definition of study subject

The study subject would be considered as a case of cerebrovascular accident if he/she has an acute stroke which is defined as a focal or global deficiency of brain function lasting for more than 24 hours which had occurred within 2 weeks of the patient's presentation and which was considered on admission to have a vascular cause. Detailed clinical history was taken in patients admitted in our hospital as per the Proforma.

Inclusion Criteria

All patients with clinical diagnosis of acute stroke, admitted at Academy of medical sciences, Pariyaram, Kannur and took CT Brain were eligible for the study.

Exclusion Criteria

Patients with neurological deficiency due to obvious cause other than vascular, such as hypoglycemia, diabetic keto acidosis and traumatic cause were excluded in this study.

Plan of study

Details were noted down on proforma either immediately before or after the procedure was carried out depending upon the status of the patient.

RESULTS

Table 1:

CT Findings	No. of cases	Calculation for 50 cases
Infarcts	150	60%
Haemorrhage	70	28%
SDH	5	2%
Tumor	5	2%
CVT	5	2%
Normal	15	6%

AGE

In our study the age of the patient varied from third decade to ninth decade.

The youngest patient was 21 years old and oldest was 87 years.

Table 2: Infarcts: Number of cases 150

AGE	CASES
20-29 Years	5
30-39 Years	15
40-49 Years	15
50-59 Years	25
60-69 Years	35
70-79 Years	35
80-89 Years	20

Table 3: Haemorrhage: Number of cases 14

AGE	CASES
20-29 Years	5
30-39 Years	5
40-49 Years	10
50-59 Years	15
60-69 Years	15
70-79 Years	20
80-89 Years	0

It was observed that infarction was most common in the age group between 60-79 years and hemorrhage in the age group between 70-79 yrs.

SEX

Among the 250 cases included in the study: 165 patients were male, i.e., 66.66%

85 patients were female, i.e., 33.33% Infarction in males: 63.34% Infarction in females: 36.66%. Male: female ratio: 1.9:1.1. Hemorrhage in Males: 71.4% Hemorrhage in Females: 28.6% Male: Female ratio: 1.42 : 0.56

Risk Factors

Hypertension

Amongst the risk factors, past history of hypertension was given prime importance. 55 patients i.e., 22% had history of pre-existing hypertension, however many patients admitted that they were not tested for hypertension before the onset of stroke. 35 patients i.e., 63.6% with

hypertension showed cerebral hemorrhage. 20 patients i.e., 36.4% with hypertension showed infarct.

Diabetes Mellitus

In this study 24% of the patients had a history of Diabetes mellitus. Many patients were not tested previously for evidence of diabetes before the onset of stroke. Out of 250 patients 60 patients had diabetes.66.6% of the diabetic patients had cerebral infarction i.e., in 40 patients. 33.4% of the diabetic patients had cerebral hemorrhage i.e., 20 patients.

Involvement of vascular territory cerebral infarction

Out of 250 cases of CT evaluation of CVA, 150 cases of infarcts were diagnosed that accounts for 60%. 50 patients had infarct in right MCA territory accounting for 33.34%. 35 patients had infarct in left MCA territory accounting for 23.34%. 10 patients had infarct in right PCA territory accounting for 6.67%. 05patients had infarct in left PCA territory accounting for 3.34%. 05 patients had infarct in right ACA territory accounting for 3.34%. 15patients had infarct in MCA and PCA territory accounting for 10%. 10 patients had infarct in MCA and ACA territory accounting for 6.67%. 05patients had infarct in both MCA territory accounting for 3.34%. 15patient had infarct in vertebro basilar artery territory accounting for 10%. In this study right MCA is most commonly affected site.

Intracerebral haemorrhage

In our study of 250 cases of clinically suspected CVA, 70 cases were turned out to be intracerebral haemorrhage, which accounts for 28%. Out of 70 cases of intracerebral haemorrhage.15patients had intracerebral haemorrhage in right MCA territory accounting 28.5%.15 patients had intracerebral haemorrhage in left MCA territory accounting for 21.4%.05 patients had intracerebral haemorrhage in left PCA territory accounting for 7.14%. 10 patients had intracerebral haemorrhage in left ACA territory accounting for 14.28%.05 patient had intracerebral haemorrhage in right MCA and PCA territories accounting for 7.14%.05patient had intracerebral haemorrhage in right MCA and ACA territories accounting for 7.14%.05 patient had intracerebral haemorrhage in vertebro basilar artery territory accounting for 14.28%. In this study right MCA territory was the most commonly affected site.

Cerebral Venous Thrombosis

In our study, we had 5 cases of CVT out of 250 cases and the percentage calculation was 2.0%. the patient was non-diabetic and non-hypertensive.

Clinically Suspected CVA but Normal On CT Scan Of Brain

Out of 250 cases of clinically suspected CVA subjected to CT study, 15 cases turned out to be

normal accounting for 6.0%. This case was taken as negative case. There are technical problems to detect infarction but certainly the hemorrhage is ruled out in all cases.

Tumor

In our study stroke mimics – tumors deterred in 05 cases out of 250 cases of suspected CVA, which accounts for 2.0% of the total study. Signs and symptomatology of tumor were mimicking the signs and symptoms of stroke, hence clinicians suspected these cases as stroke, which turned out to be of tumorous pathology on computed tomography scanning. These patients presented with loss of sensory and/or motor functions on one side of the body mimicking stroke.

DISCUSSION

This study was done to evaluate the role of CT scan in patients who present with acute cerebro-vascular accident and also differentiating between hemorrhage, infarct and other causes of stroke. Before the advent of CT scan and in hospitals where CT scan was not available, physicians had to depend on the history, physical examination findings and the Allen's method of scoring system to distinguish between hemorrhage and infarct. Allen studied around 174 cases of acute stroke and was able to make an accurate diagnosis in almost 90% of cases.^[19,20]

However, the scoring system had few limitations as it is reliant on the history given by the bystanders of patients and many times they may not be able to give a clear account of signs and symptoms due to poor literacy level which directly correlates with the scoring system. 100% accuracy in differentiating hemorrhage from ischemic stroke based on history and clinical findings was not possible.^[21]

Previous studies have stated the usefulness of CT scan in patients suffering from stroke by its ability to differentiate between hemorrhage and infarct and also other causes of stroke and hence aiding in the clinical management. Oxfordshire Community Stroke project which assessed 325 consecutive patients of acute CVA focusing on the role of usefulness of CT scan.^[3,22]

Previously, CT was considered to be of low sensitivity in the evaluation of acute ischemic stroke patient; however, recently, detection of early CT findings has proved to be of good prognostic value in the evaluation and management of these patients. The application of CT along with early acute phase therapy of stroke- thrombolytic therapy has shown to have better outcome in the acute stroke patients. Brain CT is a mainstay in the emergency diagnostic work up of CVA patients and gives important information within a few hours after the ictus. Hans Peter Harring et al., found that in a recent set of patients with MCA territory infarctions, the incidence of positive findings was 68% in brain CT

scans performed within 2 hours of stroke onset increasing to 89% within 3 hours, thus emphasizing the significance of emergency brain CT scanning in acute stroke management, which is superior to MRI.^[12,23,24]

In the present study 50 patients of stroke were analyzed and of them 30 patients had infarct i.e., 60%, 14 patients had hemorrhage i.e., 28%, 1 patient had CVT i.e., 2%, 1 patient had tumor i.e., 2%, 1 patient had SDH i.e., 2% and 3 patients had normal scan i.e., 6%.

In studies done from India Mehta JK and Jacob reported an incidence of 60% infarcts and 30% hemorrhage, 8% subarachnoid hemorrhage in a case study of 50 patients. Ghosh SK and Row Chowhary in a study of 30 patients with stroke had reported an incidence of infarct in 33.3% of cases and intracerebral hemorrhage in 60% of cases. In this study that had a different experience in the severity, the incidence of hemorrhage is seen to be higher than that of infarction.^[25-27]

Out of 50 cases of clinically suspected CVA subjected to CT study, 3 cases turned out to be normal accounting for 6%. These cases are taken as negative cases. There are technical problems to detect infarction but certainly the hemorrhage is ruled out in all cases.

All the patients, except for one have presented after 24 hours following ictus. One patient who presented by 10 hours following ictus, showed obscuration of lentiform nucleus sign. Moha, Briton reported 3 patients with mass lesions (one subdural hematoma, one hydrocephalus and one metastasis) from 197 patients who had presented with acute stroke. In the Oxfordshire community stroke project five non-stroke lesions were detected by CT (2 gliomas, one metastasis, and 2 subdural hematomas) among 325 patients who were clinically diagnosed as having a definite stroke. In the present study of 50 patients, 1 case of tumour, 1 case of CVT, 1 case of SDH and 3 cases had normal scans in the patients presenting with acute stroke like symptoms.^[28-30]

CONCLUSION

CT scanning is the “Gold standard” technique for diagnosis of acute stroke as the rational management of stroke depends on “Accurate diagnosis” and should be ideally being done in all cases.

The results and factors obtained from our study correlates well with studies done in different parts of the world.

Since risk factors such as hypertension, diabetes and previous episodes of stroke play major role in the evolution of cerebrovascular accidents, it is suggested that.

1. Such patients should be investigated carefully.
2. Sudden onset of neurological deficit or unexplained headache should further be investigated for the possibility of CVA.

3. If treatment is given early some of the cases of CVA could be saved from life threatening problems.

Summary

250 patients who were clinically suspected of stroke were subjected to computed tomographic study. Among these 250 patients 60% of patients had infarcts, 28% patients had intracerebral hemorrhage, 2% patients had cerebral venous thrombosis, 2% patients had subdural hematoma, 2% of patients had tumorous pathology and 6% had normal scans. It was observed that both infarction and intracerebral hemorrhage were most common in the age group between 60-79 years. Men were affected commonly in stroke cases. Risk factors like hypertension and Diabetes mellitus plays major role in the evolution of stroke. Out of 55 patients who had history of pre-existing hypertension, 63.6% of them showed cerebral hemorrhage and 36.4% of patients showed infarction. Out of 60 diabetic patients, 66.6% of patients had cerebral infarction and 33.4% of patients had cerebral hemorrhage. Commonest territory affected was right middle cerebral artery territory in cases of cerebral infarction, which accounts for 33.34%. However, most of the large infarcts were noted involving more than one arterial territory. In cases of intracerebral hemorrhage putamen and external capsule were commonly affected i.e., in 50% of cases. 15 cases (6%) were turned out to be normal on brain scan through there were technical problems to detect infarction, certainly the hemorrhage is ruled out in all cases. 5 cases (2%) showed tumor mimicking stroke symptomatology.

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