Original Article

Clinical and Radiological Co-relation of Posterior Circulation Stroke in a Tertiary Care Centre in Southern India

Medicine Section

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ABSTRACT

Aim & Introduction: The present study has been undertaken at a tertiary care centre in rural India to know about the Clinical and Radiological (CT Scan) co-relation of Posterior Circulation Stroke as CT Scan is cheaper, easily available and faster compared to MRI.

Material And Methods: A total number of 25 cases were studied during the period from Jan 2010 to Dec 2010, from among those who were admitted to department of Medicine and Neurology in S.Nijalingappa Medical College and HSK Hospital & Research Center.

Detailed clinical history was taken in all patients with general physical examination, CBC, urine analysis, random blood sugar, blood urea, serum electrolytes, lipid profile, ECG, CXR, and CT scan were done. In some selected cases CSF analysis, EEG and ECHO were done.

Results & Conclusion: Infra tentorial infarcts (83.3%) were seen more frequently than supra tentorial infarcts (16.6%) in this study. CT scan was 100% positive in supra tentorial ischemic strokes and in both infra & supra tentorial hemorrhage. CT scan was only 43% positive in cases of infra tentorial ischemic infarct especially in brain stem infarct.

To summarize we recommend CT scan is the first option in critically ill, poor rural Indian population.

Key Words: Posterior circulation strokes, CT scan positivity, Infratentorial, Supratentorial

INTRODUCTION

The area of brain stem, cerebellum, occipital lobes and thalamus is supplied by two vertebral arteries, one basilar artery and two posterior cerebral arteries [1]. This circulation is called posterior circulation. The incidence of strokes in posterior circulation is about 10 to 15 % [2].

The Posterior circulation strokes ranges from fluctuating brainstem symptoms, multiple cranial palsies, cerebellar signs and visual disturbances to many syndromes like lateral medullary, medial medullary, locked in to top of basilar syndrome [3]. Many a times it mimics like anterior circulation strokes [4].

Brain imaging became possible in 1970 after introduction of computed tomography (CT) by Godfrey Hounsfield. CT proved useful for posterior circulation hemorrhage [5]. Magnetic resonance imaging (MRI) introduced in 1980's, permitted far superior imaging of brainstem and cerebellar infarcts [6,7]. Newer generation CT scans reveals cerebellar, posterior cerebral hemisphere and brain stem softenings. Cerebellar and pontine hemorrhages are almost always visible on CT.

The limited value of CT Scans for detecting ischemic lesions in the posterior fossa is related to the smaller size lesion (less than 2 cm) which are usually missed [8] and to the bone artifacts produced by sections through petrous bone. CT scan cannot precisely relate an infarct to a particular vertebrobasilar branch because of arterial distribution and extensive anastomoses [9].

CT appearances of the brainstem and cerebellar infarcts show 3 different stages.

(a) Acute stage (1 to 5 days): It causes low density in un-enhanced CT scan due to increased water content.

(b) Subacute stage (6 days to 3 weeks): It reveals a lesion of lower density or isodensity with less mass effect. Abundant neutral fats from myelin breakdown contained in microglia and phagocytes are responsible for this hypodensity. Isodensity in this stage is known as "fogging effect". Exact mechanism of this effect is not known. Some believe that this is due to capillary dilatation and the extravasation of macrophages. But this isodensity becomes hyperdense after contrast enhancement.

(b) Chronic stage (3 weeks or more): Cystic space filled with fluid of density similar to cerebrospinal fluid replaces the parenchyma as well defined areas of low density.

Various studies showed that only 50% to 60% of clinical diagnosed brain stem infarcts show consistent CT changes. Hemorrhagic infarctions are areas of increased density (40-90 HU) with indistinct margins, mottled appearance with little mass effect. Hemorrhages in posterior circulation are always picked by CT scan. Aneurysms of basilar artery are visualized on CT scan after enhancement in around 60% to 70% of cases. CT scan also helps in detecting AVM on contrast enhancement. Another usefulness of CT scan in posterior circulation strokes is to detect hydrocephalus which will be helpful in patient management.

This study was done to know the positivity of CT scan in posterior circulation strokes. Though MRI is the best tool but it is not widely available in this part of India [9]. CT scan is inexpensive and very useful in critically ill patients as it requires less time.

Hence we have decided to study incidence, types, distribution of lesions CT wise and the clinical and radiological (CT scan) co-relation in posterior circulation strokes.

MATERIAL AND METHODS

This study was conducted during the period from Jan 2010 to Dec 2010. During this period all posterior circulation strokes admitted to Neurology and Medicine departments of S.Nijalingappa Medical College and HSK Hospital & Research Centre were studied. This study consisted of total 25 posterior circulation strokes.

INCLUSION CRITERIA

All posterior circulation strokes were included during the study period. The diagnosis of posterior circulation was made when the patient had a clinical stroke syndrome compatible with involvement of posterior circulation territory with the help of clinical signs and symptoms and by means of classical syndromes like Claude's, Weber's, Balint's, Lateral medullary, Medial medullary, Locked in and top of basilar syndromes [3].

EXCLUSION CRITERIA

If CT scan showed recent infarction, haemorrhage in the anterior circulation and other non-vascular lesions and then they were excluded from the study sample.

CLINICAL STUDY

A detailed history was obtained from the patient or a close relative regarding the onset of stroke, risk factors and family history.

A detailed physical examination was done according to the proforma including vital signs and detailed examination of other systems. Optic fundus was examined in all the cases.

INVESTIGATION

All the patients were investigated for CBC, ESR, urine analysis, random blood sugar, blood urea, serum electrolytes, lipid profile, RA factor, VDRL, ECG and chest radiography. CT scan was done in all patients in the study whenever needed. CSF, EEG & ECHO was done.

OBSERVATION & RESULTS

In posterior circulation strokes, Infratentorial stroke was common in both ischemic and hemorrhagic strokes. They constituted 52.6 and 83.3% respectively.

The incidence of infratentorial lesion was more (83%) compared to supratentorial lesion (16%) in haemorrhagic strokes but both have an equal incidence (40% each) in case of ischemic strokes. In

	Infratentorial		Supratentorial		Both	
Type Of Stroke	No.	%	No.	%	No.	%
Ischemic	10	52.6	06	31.6	03	15.8
Hemorrhagic	05	83.3	01	16.6	–	–

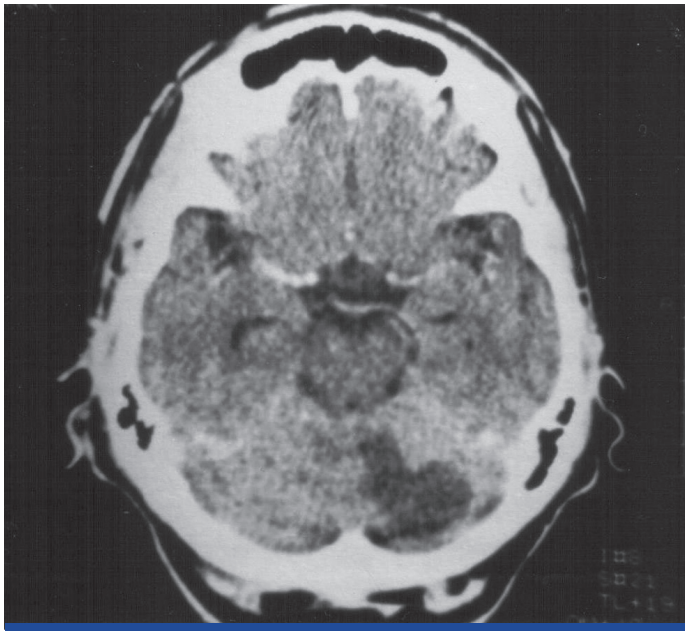
[Table/Fig-1]: Type of Stroke

	Ischemic Stroke		Hemorrhagic Stroke	
Site	No. Of Patients	%	No. of Patients	%
Infratentorial	06	40	05	83.3
1. Lateral Medulla	–	–	–	–
2. Pons	01	16.6	03	60
3. Mid Brain	–	–	–	–
4. Cerebellum	04	66.6	02	40
5. Brain Stem + Cerebellum	01	16.6	–	–
Supratentorial	06	40	01	16.6
1. Thalamic	01	16.6	–	–
2. Occipital	05	83.3	01	16.6
3. Thalamic-Occipital-Temporal	–	–	–	–
Infra & Supratentorial	03	20	–	–
1. Pons + Occipital	01	33.3	–	–
2. Cerebellum + Occipital	01	33.3	–	–
3. Cerebellum + Thalamic + Occipital	01	33.3	–	–
4. Cerebellum + Pons + Occipital	–	–	–	–
5. Extensive VA (Medulla to Occipital Lobe)	–	–	–	–

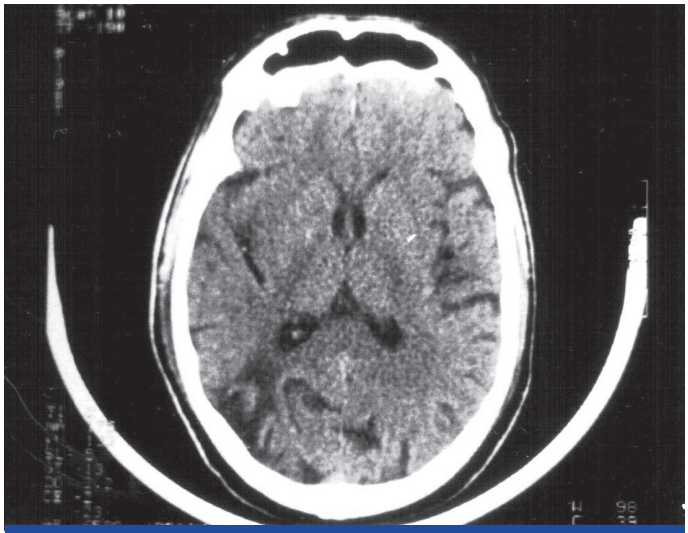
[Table/Fig-2]: Distribution of Lesions as per CT Scans [10]

		CT Scan Positive No. of Patients		CT Scan Negative No. of Patients	
Type Of Stroke	Total No. of Patients	No.	%	No.	%
Ischemic					
Supratentorial	09	09	100	–	–
Infratentorial					
Brain Stem	07	03	43	04	57
Cerebellum	07	07	100	–	–
Hemorrhagic					
Supratentorial	01	01	100	–	–
Infratentorial					
Brain Stem	03	03	100	–	–
Cerebellum	02	02	100	–	–

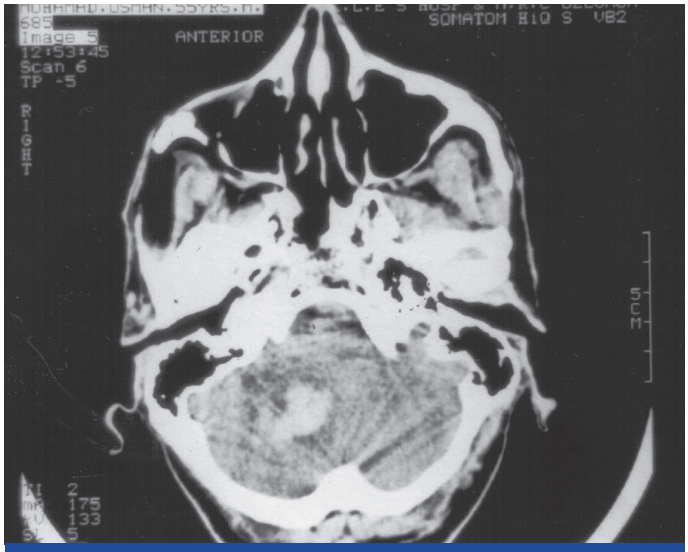
[Table/Fig-3]: CT Scan sensitivity



[Table/Fig-4]: Right Cerebellar Infarct

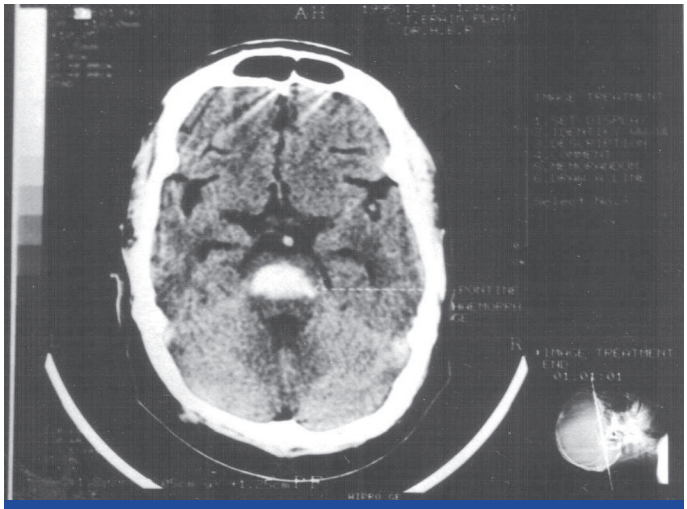


[Table/Fig-5]: Right Occipital Infarct



[Table/Fig-7]: Right Cerebellar Haemorrhage

ischemic stroke, incidence of occipital stroke (33.3%) was highest followed by cerebellar strokes (26.6%). In hemorrhagic strokes, highest incidence was of pontine hemorrhage (50%) followed by cerebellar hemorrhage (33%).



[Table/Fig-6]: Pontine Haemorrhage

[Table/Fig-8]: Pontine Infarct

CT scan positivity was 100% in the hemorrhagic strokes but in ischemic infratentorial lesion excluding cerebellum its positivity was 43%.

DISCUSSION

Twenty five cases of posterior circulation strokes admitted to Medicine and Neurology wards of HSK Hospital & Research Center during period of 12 months (From Jan 2010 to Dec 2010) were studied for incidence, types, distribution of lesions CT wise and CT Scan positivity. The incidence of posterior circulation stroke was 12.3% in the study, which was comparable with other studies conducted by Jones.et al [11] (17%) and Richard et al [2] (14.8%).

Incidence of infratentorial ischemic strokes was high (53%) compared to other sites in the present study. But the incidence of infratentorial strokes was less compared to Bogousslavsky et al study [12]. This can be explained on the basis that in our study we used only CT scan to identify infratentorial lesion which is a poor diagnostic tool compared to MRI [9] and magnetic resonance angiography which was used in their study [13,14].

CT scan positivity in the present study correlates well with the other studies [15]. This low sensitivity of CT scan is due to bony artifacts interference, computer ripple ("over shoot") artifacts and partial volume effects. The limited value of CT Scans for detecting ischemic lesions in the posterior fossa is related to the smaller size lesion (less than 2 cm) which are usually missed [8] The low positivity

Type of Stroke (Ischemic)	Bogousslavsky et al [12] %	Present Study %
Infratentorial	70	53
Supratentorial	15	31
Both	15	16

[Table/Fig-9]: Incidence of Different type of Strokes

Authors	CT Scan Positivity in Brain Stem infract (%)
Kingley et al (NHND, London) [14]	43%
E. Ratnavalli et al (NIMHANS) [15]	55%
Present Study	43%

[Table/Fig-10]: CT Scan Positivity

of CT scan is for only ischemic infratentorial lesion excluding cerebellum where it is 100% positive. Cerebellar detection in the present study is 100 %.Both supra & infra tentorial hemorrhages are always detected by CT scan and same in this study also. For detecting hemorrhagic, ischemic supra tentorial and cerebellar infracts CT scan is good.

Principle uses of CT scan in posterior circulation strokes are:

(a) To separate brainstem and cerebellar hemorrhage from occlusive diseases.
(b) To establish cerebellar infarction and posterior fossa pressure.
(c) To determine the presence and distribution of distal basilar artery infarction (occipital and temporal lobe) in patients with symptoms of brain stem ischemia.
(d) To visualize basilar artery aneurysm.

Hence we conclude still CT scan is first option in critically ill, poor rural Indian population.

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