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Study of Cerebro Vascular Accidents in Correlation with Ct Findings in North Costal Andhra Pradesh

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Abstrac*t: The incidence of stroke or cerebro vascular accident increases with age and affects many people in their 'golden years which is a rapidly growing segment of the population. The causes of cerebro vascular accidents are ischemia, infarction or intracranial hemorrhage. Ischemia and infarction constituting 85 to 90 percent of the total group in india while 10 to 15 percent are intracranial hemorrhages. With the advent of computerized Tomography Scan (CT Scan), this present study was done. Hundred patients were studied over one year period. This study was carried out in King George hospital , Visakhapatnam, during 2013-2014. The incidence is more in males (70%) than in females (30%) with peak incidence in 6th decade. Infarctions (76) are more common than hemorrhage (24).*
Key Words*: CVA, Ischemia, Infarction, CT scan, stroke.SAH .*

I. Introduction

[1]Stroke, after heart disease and cancer, is the third most common cause of death in india. Every year there are approximately 700,000 cases of stroke—roughly 600,000 ischemic lesions and 100,000 hemorrhages, intracerebral or subarachnoid—with 175,000 fatalities from these causes combined. Since 1950, coincident with the introduction of effective treatment for hypertension, there has been a substantial reduction in the frequency of stroke. [2]Developing countries like India are facing a double burden of communicable and non-communicable diseases. Stroke is one of the leading causes of death and disability in India. The estimated prevalence rate of stroke range, 84-262/100,000 in rural and 334-424/100,000 in urban areas. The incidence rate is 119-145/100,000 based on the recent population based studies . With the advent of computerized Tomography Scan (CT Scan), Magnetic Resonance imaging (MRI) coupled with carotid vascular Doppler, and angiography, evaluation of patient with stroke has been revolutionized. — Data compiled by the American Heart Association (AHA) show that the proportion of all strokes due to ischemia, intracerebral hemorrhage and subarachnoid hemorrhage is 87, 10, and 3 percent respectively[3].

AIMS OF THE STUDY**:** To evaluate the risk factors in cerebro vascular accidents. To correlate the clinical diagnosis with the CT scan findings in patients with stroke.

II. Materials And Methods

A proforma for detailed history, physical examination, risk factors and investigations were prepared. The presenting complaints, the mode of onset with particular reference to the existence of any prodromal symptoms, history of similar attack previously, hypertension, and diabetes mellitus were noted. A complete physical examination was done to evaluate the degree of neurological deficit, the presence of any respiratory and cardiovascular disease or any other associated diseases. Various risk factors like hypertension, diabetes, smoking, alcoholism, TIA, stroke, ischemic heart disease, and any drug intake were taken into consideration. Investigations including routine examination of blood for hemoglobin, WBC counts, ESR, blood sugar, blood urea, serum creatinine and cholesterol, routine examination of urine and VDRL were done. Fundus examination, ECG, chest Xray, echocardiography and CT scan brain were done in all cases.Treatment included the reduction of cerebral edema with mannitol or oral glycerol and nimodipine, antiplatelet drugs like aspirin, clopidogrel, and statins like atorvastatin. Where ever necessary supportive treatment was given to prevent complications like pneumonia, urinary tract infection, bed sores and physiotherapy was done.In this study stroke was classified as cerebral thrombosis or embolism causing infarction, cerebral hemorrhage and subarachnoid hemorrhage in the territories of anterior cerebral, middle cerebral or posterior cerebral arteries

CT SCAN DIAGNOSIS CT scan was performed with 3rd generation GE scanner with 5 mm slices in anterior circulation stroke and 2-5mm slices in posterior circulation stroke in all these cases within an average period of one week after clinical presentation. In evaluating the CT scan particular reference was given to the pathology of stroke, particular arterial territory or areas involved presence of surrounding cerebral edema, local mass effect, mid line shift, where ever necessary contrast study done.

III. Observation And Results

This study which was conducted for a period of one year from June 2013 to June, 2014 included total of one hundred cases of strokes affecting both sexes of all ages and those belonging to urban and Rural areas. Our study consists of cases of different types of strokes including Thrombotic (or) embolic infarction, spontaneous intracerebral and Subarachnoid hemorrhage. **Incidence of stroke** Total number of admissions in medical wards -. 9,286 .Total number of stroke cases : 780.Stroke account for 8.42% of total admissions.

SEX INCIDENCE : The male to female to ratio the present study was 70:30(7:3) .Table no: 1

sex	Number of cases	Percentage
Male	70	70%
Female	30	30%

Age Incidence: In present study the average age was years within a range of 25 yr to 86 years. Peak incidences (74) of cases were seen in fifth, sixth and seventh decade in both sexes. No cases were reported in first and second decades. The age related incidence in both sexes was tabulated below

Table no:2

t	Number of cases (n=100)	Males (n=70)	Females (n=30)
0-10	0	0	0
11-20	0	0	0
21-30	8	6	2
31-40	6	5	1
41-50	22	15	7
51-60	30	20	10
61-70	22	14	8
71-80	8	7	1
>80	4	3	1
		70	30

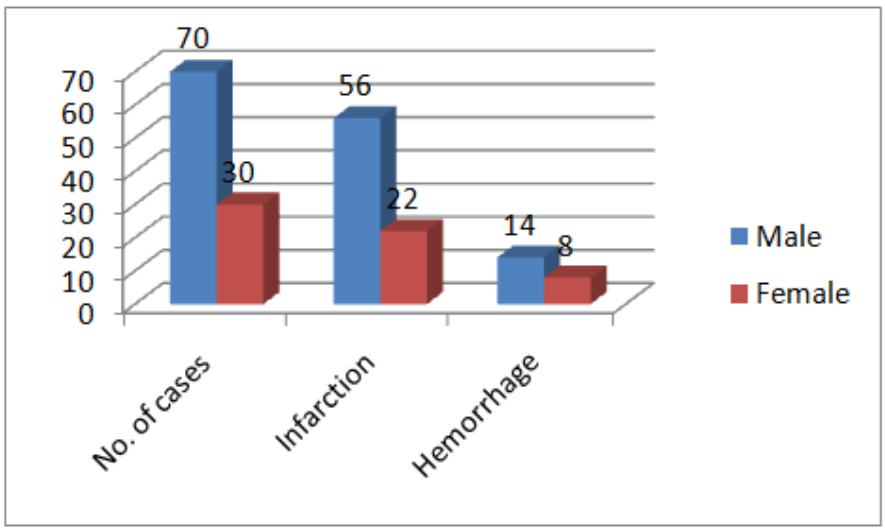
Pathological Types Of Stroke

Cerebral infarction was seen in 78% of patients of and 22% cases had cerebral hemorrhage. In males 56% had infarcts and 14% hemorrhages. In females 22% had infarction and 8% had hemorrhages, cerebral atrophy was seen in 18% cases of which 6 were male and 2 were female

Table no:3

Sex	No. of cases	Infarction	Hemorrhage
Male	70	56	14
Female	30	22	8

Diagram1:



IV. Incidence Of Risk Factors

No risk factor was present in 7 of cases of which 85.7% were infarcts and 14.3% were hemorrhages.

Table no:4

Risk factors	Total number of cases (n=100)	Infarction (n=78)	Hemorrhage (n=22)
No risk factor	7	6(85.71%)	1(14.3%)
Hypertension	82	62(79.48%)	20(90.90%)
Diabetes	40	33(82.50%)	7(17.50%)
Smoking	56	38(67.86%)	18(32.14%)
Alcoholism	30	21(70%)	9(30%)
Past h/o TIA	12	10(83.33%)	2(16.67%)
Past h/o stroke	10	8(80%)	2(20%)
H/o IHD	20	14(70%)	6(30%)
H/o Valvular disease	6	5(83.33%)	1(16.67%)
Hypercholetrolemias	24	19(19.16%)	5(20.84%)
Multiple risk factors	78	56(71.79%)	22(28.21%)

Hypertension was the most common risk factor in all types of strokes, seen in 82 of patients. In patients with hypertension, 79% had infarction and 91% had hemorrhages Diabetes mellitus was present in 40 stroke cases, of which 83% has infarction and 17% had hemorrhage. Alcoholism was present in 30 patients of which 70% had infarction and 30% had hemorrhage . Past history of transient ischemic attack was present in 12 patients of which 83% developed infarction and 17% developed hemorrhage. History of ischemic heart disease was seen in 20 patients in which 70% had infarction and 30% had hemorrhage . Valvular heart disease was present in 6 patients of which 78% had infarction and 21% had hemorrhage . Multiple risk factors were present in 78 of patients. Of them 72% were having infarction and 28% were having hemorrhage.

V. Sex Incidence Of Risk Factors In Cerebral Hemorrhage

Table no:05

Risk factor	Total no. of cerebral hemorrhage	Male (%)	Female(%)
No risk factor	1	0	1(4.54%)
Hypertension	22	15(68.18%)	5(22.72%)
Diabetes	7	5(22.72%)	2(9%)
Smoking	18	18(81.81%)	0
Alcoholism	9	9(40.90%)	0
Past h/o TIA	2	1(4.54%)	1(4.54%)
Past h/o stroke	2	1(4.54%)	1(4.54%)
H/o IHD	6	4(18.18%)	2(.09%)
H/o RHD	1	0	1(4.54%)
Hypercholestremia	9	6(27.27%)	3(13.64%)
Multiple risk factors	22	14(63.63%)	8(36.36%)

VI. Clinical Presentation

The various clinical presentations in patients with infarction and hemorrhage were tabulated

TABLE NO:06

Clinical feature	Total number N=100	Infarction	Hemorrhage
TIA	12	10(12.8%)	2(9.09%)
Conscious	74	66(89.12)	8(10.2%)
Unconscious	26	12(46.20%)	14(53.82%)
Aphasia	30	28(35.89%)	2(9.09%)
Rt.hemiplegia	54	44(56.41%)	10(45.45%)
Lt.hemiplegia	36	28(35.89%)	8(36.36%)
Headache	40	24(30.76%)	16(72.72%)
Vomiting	34	22(28.20%)	12(54.52%)
Convulsions	15	10(12.82%)	5(22.72%)
Gaze palsies	45	33(42.30%)	12(54.55%)
Bladder disturbance	55	43(55.12%)	12(54.55%)

VII. Clinical Diagnosis

Cerebral infarction was diagnosed in 78% of patients. The various

arterial territories involved were as follows.			
Anterior Cerebral Artery	-	6	(7.69%)
Middle Cerebral Artery	-	60	(76.92%)
Posterior Cerebral Artery	-	12	(15.34%)

In 5 cases (6.41%) infarction was due to embolism who had valvular heart disease with atrial fibrillation.

Primary intracerebral hemorrhage was diagnosed clinically in 20% of patients. In 2% Subarachnoid Hemorrhage was diagnosed clinically.

CT scan findings and correlation with clinical diagnosis

Table No:07

Clinical Diagnosis	**CT scan correlation**		
	Normal study	Infarction	Hemorrhage
Infarction(78)	8	66	4
Hemorrhage(20)	-	2	18
SAH (2)	-	-	2

In 78 patients with clinical diagnosis of infarction, 8 had normal CT scan study, infarction changes in 66 patients and hemorrhage was seen in 4 patients.

In 20 patients with clinical diagnosis of primary intracerebral hemorrhage, hemorrhage was seen in 18 patients and 2 showed infarction changes in CT scan. In 2 patients clinically sub-arachnoid haemorrhage was diagnosed and the same was confirmed in CT scan. Thus the clinical diagnosis in this study was correlated with CT scan findings are as follows.

Table no:08

Clinical diagnosis	**CT scan findings**	**Correlation**
Infarction(78)	Infarction(66)	84.62%
Hemorrhage(22)	Hemorrhage(20)	90.90%

CT scan in cerebral infarction : The various arterial territories involved in cerebral infarction according to CT scan were tabulated as below.

CT scan in cerebral infarctionTable no:09

Artery territory	**Number(n=68)**	**Percentage**
ACA	5	7.35%
MCA	52	76.47%
PCA	7	10.29%
Multiple infarcts	4	5.88%

Middle cerebral artery was most commonly involved in 76.5% of patients; posterior cerebral artery was involved in 10.3% cases and anterior cerebral artery in 7.35% cases. Multiple infarcts were present in 5.9% patients.

Thus in infarction cases the clinical diagnosis correlated with 84.62% of CT scan findings and in hemorrhages, the correlation of clinical diagnosis was with 90.90% of CT scan findings. Considering the normal CT scan study in infarction patients, it could be because of early CT scan from the period of onset of symptoms or might be due to posterior circulatory strokes which could be better diagnosed by MRI than by CT scan. Hence normal CT scan study patients were included in infarction cases.

Thus among 100 stroke cases cerebral infarction constituted 68% and Hemorrhage in 22%.

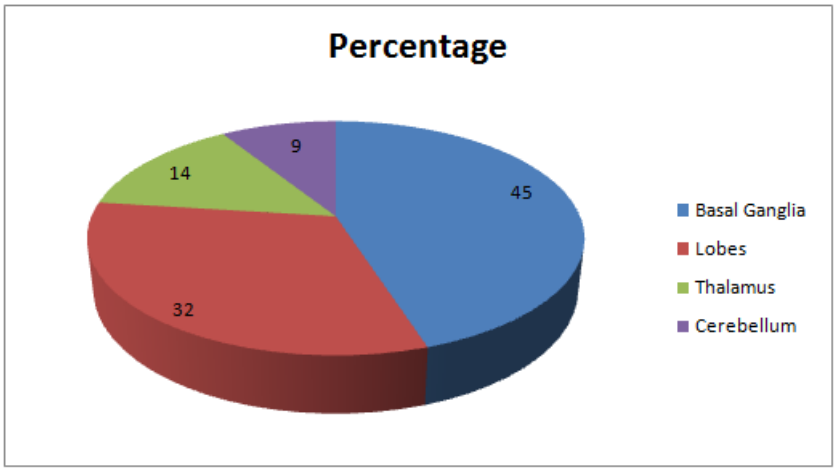
CT scan in cerebral hemorrhage: The various sites involved in intracerebral hemorrhage were tabulated below.CT scan in cerebral hemorrhage

Table no:10

Site	Number of cases (n=22)	Percentage
Basal ganglia	10	45.45%
Lobes	7	31.81%
Thalamus	3	13.64%
Cerebellum	2	9.09%

The most common sites of hemorrhage were basal ganglia (45.5%) and lobes (31.8%). Hemorrhage in thalamus was seen in 13.6% and cerebellar hemorrhage was seen in 9.09% of 22 cases of hemorrhages, and 2 cases had subarachnoid hemorrhage constituting 8.3% 0f total 24 cases.

Diagram 2: Sites Of Haemorrhages



VIII. Discussion

In present study, the incidence of stroke in our Hospital is 8.4% which is much higher than with 1.54% of Hospital admissions by P.M. Dalai (1998)[28].

Sex incidence

The incidence of stroke in both sexes in different studies is tabulated as below.

Table no:11

STUDY	Incidence	
	Males	Females
Present study	70%	30%
Framingham study[29]	49%	51%
Harrison T.G et al	45%	55%
Dalal,P.M(India)	61%	39%

The incidence in both males and females is consistent with the Indian study (P.M Dalal). All the studies are community based studies. But present study is a hospital based study including cases in which all were subjected to CT scan.

Age incidence: The incidence of stroke in different age groups are compared with studies as follows.

Table no:12

Age group in years	Incidence in percentage		
	Present study	Harrisons study	Dalal study
<40	14	16.08	13.35
41-60	52	48.94	37.06
61-80	30	34.98	49.59

The incidence in less than 40 years age group is only 14%, almost equal to other studies. Incidence is highest in 6th decade of life. compared to other studies but low in 7thdecade

Pathological types of stroke : As the CT scan is 100% diagnostic in Cerebral Hemorrhage (Ambrose), the incidence of different type of stroke in different studies where all the cases were subjected to CT scan is tabulated below. In most of the above studies. The incidence of infarctions more when compared to hemorrhages and is correlated with present study.

Clinical presentation:

The features of initial presentation in two types of strokes are compared with other studies as given below. Incidence of headache:

Table no:13

Study	Incidence	
	Infarction	Hemorrhage
Present study	30.76%	72.72%
Airing Merit	40	23
Harrison	43	56
Maj Hp Singh	30.82	54.5
Mohr J.P[32]	17	36

Incidence of headache more in hemorrhages than in infarction and is consistent with other studies.

Risk factors:

Age is the strongest risk factor for hemorrhage and infarction (Ban ford, Sander Cock, Dennis et al in 1990) [33.] The risk of stroke in people aged 75-84 years (14.3/1000/annum) is to 25 times the risk in people aged 45-54 years (0.57/1000/annum). In present study maximum incidence is seen sixth decade and risk increased with age.

Hypertension:

Increasing blood pressure is strongly associated with subsequent stroke risk, probably of all pathological types. The incidence of hypertension as compared with other studies is tabulated below Table no:14

Study	Incidence
Present study	82
Basker et al	60
Harrison M.T.G	55
Mohr J.P	62

Incidence of hypertension is higher when compared to other studies and is the most common risk factor in all types of stroke. Incidence of diabetes is higher when compared to other studies.

Transient ischemic attack: A patient with TIA has excess risk of stroke about 5-10 times greater than that of a normal patient of same age. In the present study H/O TIA was present in 12% of patients. The frequency of past H/O TIA's is much less. The frequency of past history of TIA's is much less ranging from 10% (Kannel and Wolff) [34] to 30% (Herman et al). It is in near correlation with Oxford Shire Community Project's incidence of 14%. In 24% patients, Hypercholestremic with fasting serum cholesterol of more than 200 mg/dl is seen. Both low levels of high density lipoprotein (HDL) cholesterol and a high total cholesterol to HDL ratio are risk factors for the development of carotid atherosclerosis. This association is already apparent in patients with asymptomatic carotid disease[35]. Nearly 78% of patients had multiple risk factors and correlated well with Oxford Shire Community Project. All the risk factors are compared with prevalence of risk factors in 244 patients with a first ever in a life time stroke due to cerebral infarction is the Oxford Shire Community Project (Sander Cock, Warlow, Jones and Starkey 1989).[36]

Arterial Territory Involvemen Table no:15

Arterial territory	Present study (n=100)	Barnet et al (n=800)
ACA Territory	7.4%	5%
MCA Territory	76.47%	62%
PCA Territory	10.29%	14%
Multiple infarcts	5.88%	5%

The present study is correlated well with Barnet et al study[. 37].

Middle cerebral artery was most commonly involved in 76.5% of patients; posterior cerebral artery was involved in 10.3% cases and anterior cerebral artery in 7.4% cases.

Diagnosis of hemorrhages:

In cerebral hemorrhage the incidence in various sites is compared with other studies.

Table no:16

Site of hemorrhage	Incidence		
	Present study	Mitra (Calcutta)	Bernet et al
Basal ganglia	45.45%	60%	37%
Cerebral lobes	31.81%	20%	42%
Thalamus	13.64%	14%	10%

The present study near correlates with Barnet's study. The most common sites of hemorrhage are basal ganglia and cerebral lobes. CT in evaluating the underlying cause for hemorrhage: The correlation between clinical diagnosis and CT scan findings in the present study is 88% when compared to 88% when compared to 75.5% and Von Arbin [38]and Mona Britton studies respectively. CT scan findings are well correlated with 85% infarctions and 91% of hemorrhages.

Mortality:

Mortality was seen in 24% of infarction cases and 66% of patients with hemorrhages. The stroke deaths were much more likely to be due intra cerebral hemorrhages than with cerebral infarction (Philips, Whisnat and Reagen, 1977).

IX. Conclusions

Hundred patients were studied over one year period. The incidence is more in males (70%) than in females (30%) with peak age incidence in 6th decade. Multiple risk factors are present in 78% of patients and no risk factors could be identified in 7. Hypertension is the most common modifiable risk factor present in 82% of patients among which 79% had infarction and 91% had hemorrhages followed by smoking,diabetes and alcoholism. Right hemiparesis is the most common presentation (54%). Signs of raised intra cranial tension are common for hemorrhage when compared to infarction. Infarctions (76) are more common than hemorrhage (24). In cerebral infarction, middle cerebral artery territory is most commonly involved (76%) multiple infarcts are seen in 6%.In cerebral hemorrhage, the most common site involved is basal ganglia (45%). Subarachnoid hemorrhage is present in 2 cases. In 85% of cerebral infarction cases and 91% of hemorrhages, clinical diagnosis is correlated with CT scan findings. Mortality was higher in patients with hemorrhages (66%) than infarctions(24%) In spite of good clinico radiological correlation of stroke with CT scan. CT scan Brain should be taken in all stroke cases as it decides the management of stroke. Early treatment or prevention of modifiable risk factors can reduce the mortality and morbidity of stroke .

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