Correlation of Clinico-Radiological Profile and Outcomes in Young Patients With Cerebrovascular Accident

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Abstract

Background: There is little information about stroke in young patients. This study was undertaken to evaluate the clinical, radiological and outcome profile of stroke cases among young adults admitted in a north Indian tertiary care centre.

Materials and methods: This study was undertaken in the Department of Medicine, Jawaharlal Nehru Medical College and Hospital, AMU, Aligarh, over a period of two years, and 171 young patients presenting with cerebrovascular accident were recruited in the study.

Results: From the Relationship between Mass Effect and Modified Ranking Scale at Presentation, with p value of 0.025 at 5% level of significant, it shows that mass effect correlates with mRS at presentation as well as at discharge.

Conclusion: Our study concluded that Large territory CVA, mass effect and high mRS score was present in 36% patients and was associated poor outcome**.**

Introduction

Stroke is defined as the clinical syndrome of rapidly developing clinical signs of focal or global disturbance of cerebral function for more than 24 hours or causing death with no obvious cause other than vascular one. (**Aho et al., 1980; Prasad et al., 2012**) There are 3 major stroke sub groups; ischemic stroke, intracerebral hemorrhage, and subarachnoid hemorrhage. They have differences with respect to survival and long-term disability. Stroke is less common in young adults than in older p eople but young age stroke have significant impact on the affected individuals, society at large as they are economically productive population. (**Bonita et al., 2014**). Stroke in young population varied from 10%-30% of all the stroke patients in India, in contrast to 3%-8.5% in Western countries. (**Kaul et al., 2009; Nagaraja et al., 2009; Nencini et al., 1988; Dash et al.,**)

There is little information about stroke in young patients. This study was undertaken to evaluate the clinical, radiological and outcome profile of stroke cases among young adults admitted in a north Indian tertiary care centre.

Materials And Methods: This study included adequate number of young patients presenting with cerebrovascular accident, with the following aims and objectives:

1. To evaluate clinical and radiological profile of young patients with CVA.

2. To analyze the outcomes of CVA in young patients at discharge.

Study Design: Hospital based Observational Study

Sample Size: study was a hospital based observational study and not a population based community study, therefore the number of subjects recruited were limited. We thus adopted a convenience method for sampling and 171 subjects were recruited in the study.

Inclusion Criteria

All patients between 18-45 years age group presenting with stroke

Exclusion Criteria

Patients above 45 years

Patients presenting with transient ischemic attacks,

Unexplained drop attacks/ syncope,

Loss of consciousness due to other causes

Study Method

Patients who presented with a clinical diagnosis of acute stroke were subjected to detailed history, physical examination, CT/MRI of brain. Data regarding patients clinical profiles, medical histories, complete blood counts, kidney function test, blood sugar levels, lipid profile, TSH, HbA1c, chest X-ray, ECG, serum homocysteine levels, ECHO and carotid Doppler ultrasonography was collected and Modified Rankin Scale scores at presentation and at hospital discharge were examined. Data collected from 171 randomly selected subjects was internally compared and statistically analysed by using descriptive and inferential statistics based on the formulated objectives of the study.

Statistical Analyses: Using SPSS version 20 statistical analysis was done. Results were expressed as mean ± standard deviation and percentage in case of continuous variables while proportions were expressed as count (percentages). Univariate analysis was performed using Chi Square test for categorical variables and Independent T test for continuous variables. ANOVA was used for comparison of mean between 3 or more groups. Non parametric tests were used where appropriate. To show correlation between variables Spearman's correlation coefficient (r) was used. To assess the independent contribution of variables statistically significant on univariate analysis in the prediction of outcome logistic regression analysis was used. Confounding factors included in regression analysis were age, sex, diabetes, hypertension, smoking, alcohol, CAD, AF, systolic and diastolic BP, TSH, BS(f), HbA1c, lipid profile and subtypes of stroke. A p value of less than 0.05 was considered statistically significant.

Observation and results: Mean age of the patients was 34.87 ± 8.322 years, minimum age was 18 years and maximum age was 45 years.

We divided all patients of young stroke into various age groups and percentage of patients in various age groups was found (Figure1). Maximum patients were in age group 35- 45 years.

**Figure 1: Age Distribution of Study Group (in years)**
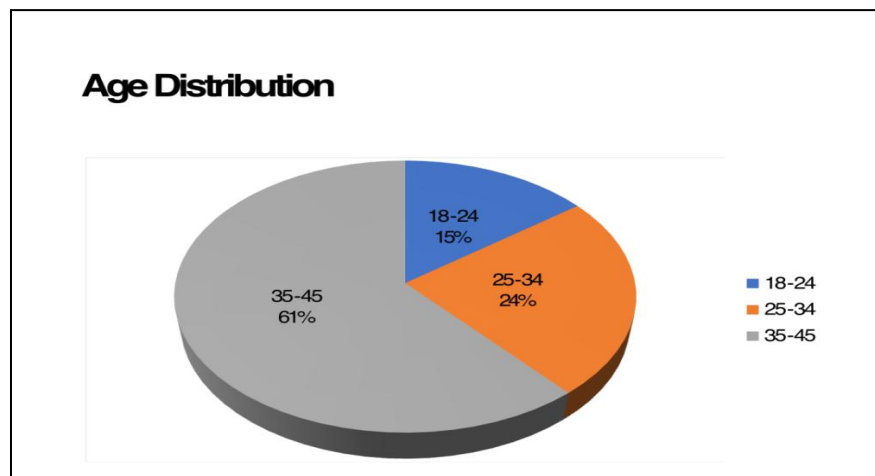
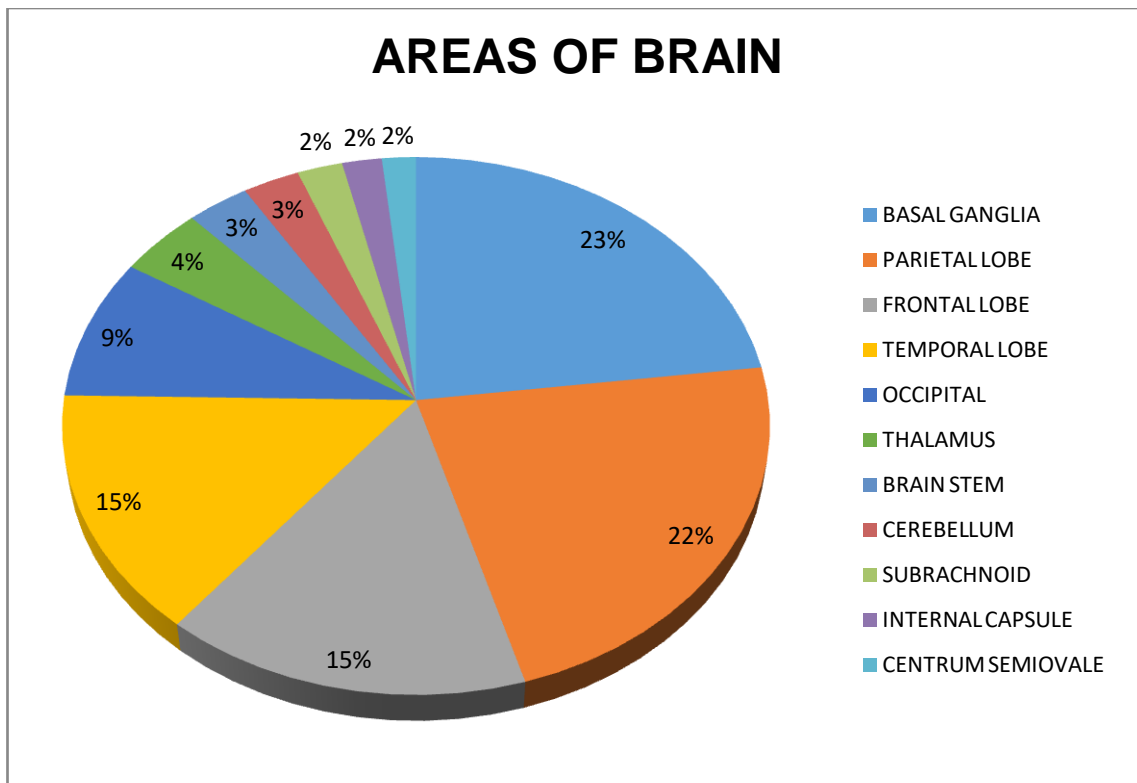We draw following conclusions based on our study:

1. **With increasing age, incidence of stroke increases** as maximum patients were in age group 35- 45 years and in the age distribution from 18-45 years there was no difference in outcome.

2. The number of males107 (63%) were more than 64(37%) females.

3. **Females presented with poor modified Rankin scale** but no difference in outcome the males and females.

4. 66% patients had ischaemic CVA and 34% patients had haemorrhagic CVA with **haemorrhagic CVA associated with poor outcome**.
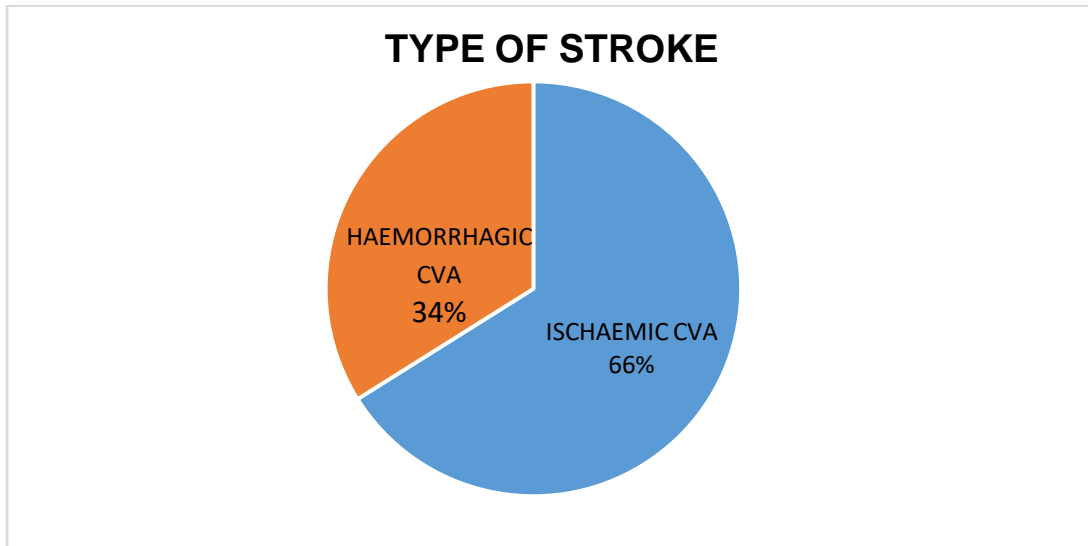
TYPE OF STROKE

Most of the patients 91% had arterial origin of stroke excluding ones with subarachnoid type, 5% had venous origin, and subarachnoid bleed was present in 4% of the patients, with type not showing effect on outcome.

TYPE OF STROKE
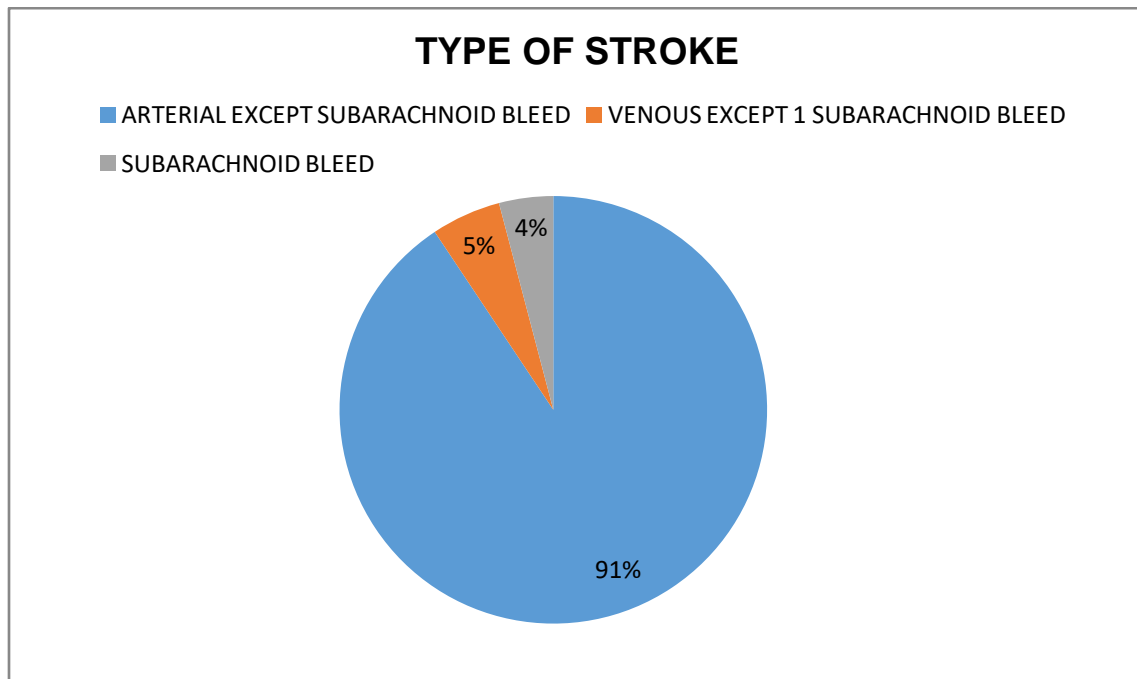
Basal Ganglia was the most common brain area involved (23%), followed by Parietal Lobe 22%, Frontal Lobe 15%, Temporal Lobe 15%, Occipital Lobe 9%, Thalamus 4%, Brain Stem 3%, Cerebellum 3%, Subarachnoid 2%, Internal Capsule 2% and Centrum Semiovale 2%. Involvement of parietal lobe, frontal lobe, cerebellum and internal capsule was associated with poor outcome.

AREAS OF BRAIN

Pie chart legend:
- BASAL GANGLIA
- PARIETAL LOBE
- FRONTAL LOBE
- TEMPORAL LOBE
- OCCIPITAL
- THALAMUS
- BRAIN STEM
- CEREBELLUM
- SUBRACHNOID
- INTERNAL CAPSULE
- CENTRUM SEMIOVALE

Values shown: 23%, 22%, 15%, 15%, 9%, 4%, 3%, 3%, 2%, 2%, 2%

In 25% patients mass effect was present on CT or MRI Brain of the patient. Of these haemorrhagic variety in 86% whereas ischemic type only in 14%. Presence of mass effect was associated with poor outcome.

MASS EFFECT

% of patients — ISCHEMIC: 5.3, 94.7; HAEMORRAGHIC: 63.8, 36.2
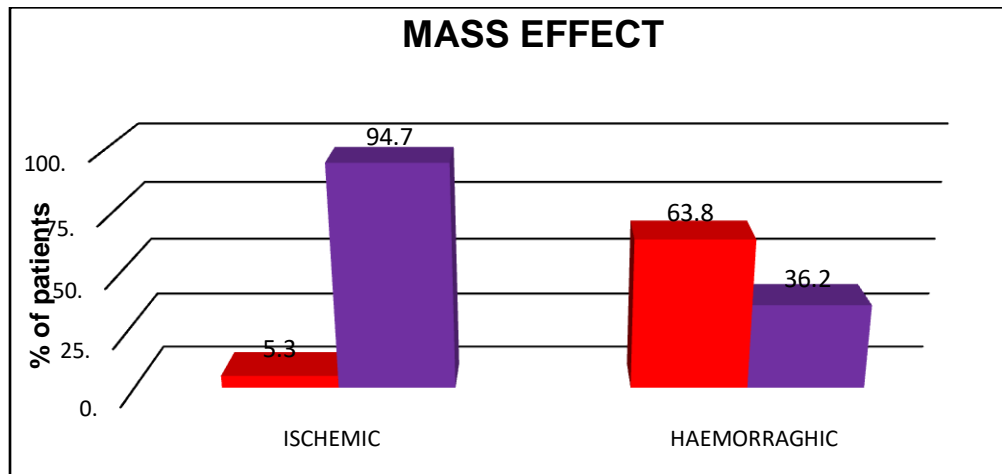
Modified Rankin Score At Presentation

Modified Rankin's Scale at Presentation has been 1 in 14 patients, 2 in 26 patients, 3 in 12 patients, 4 in 49 patients , and 70 patients has presented with very severe disability with score of 5.
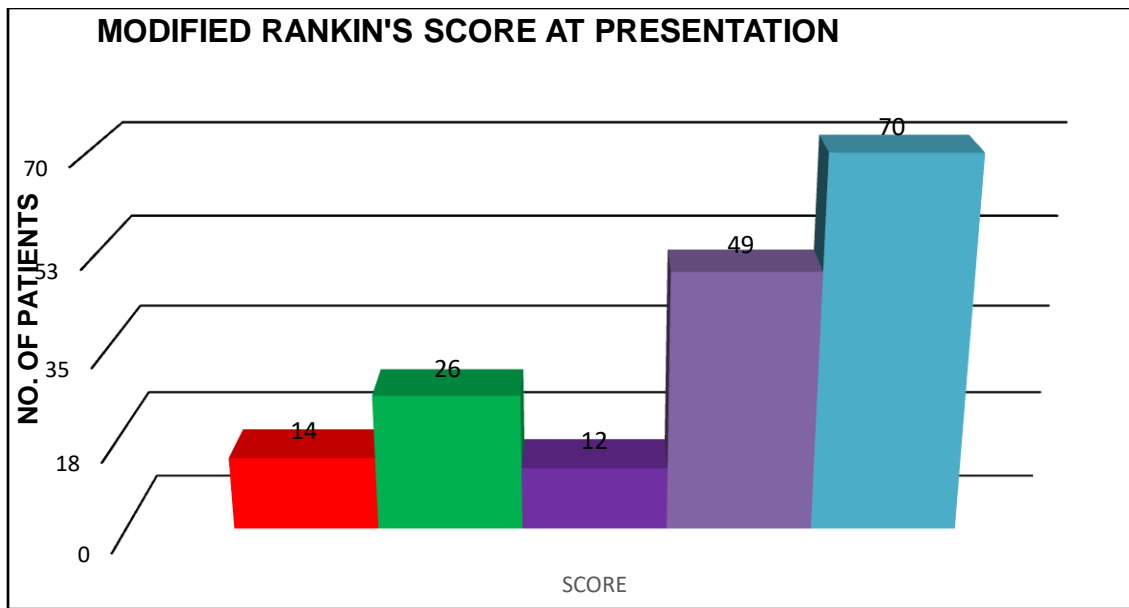
Figure 40 : MODIFIED RANKIN'S SCORE AT PRESENTATION
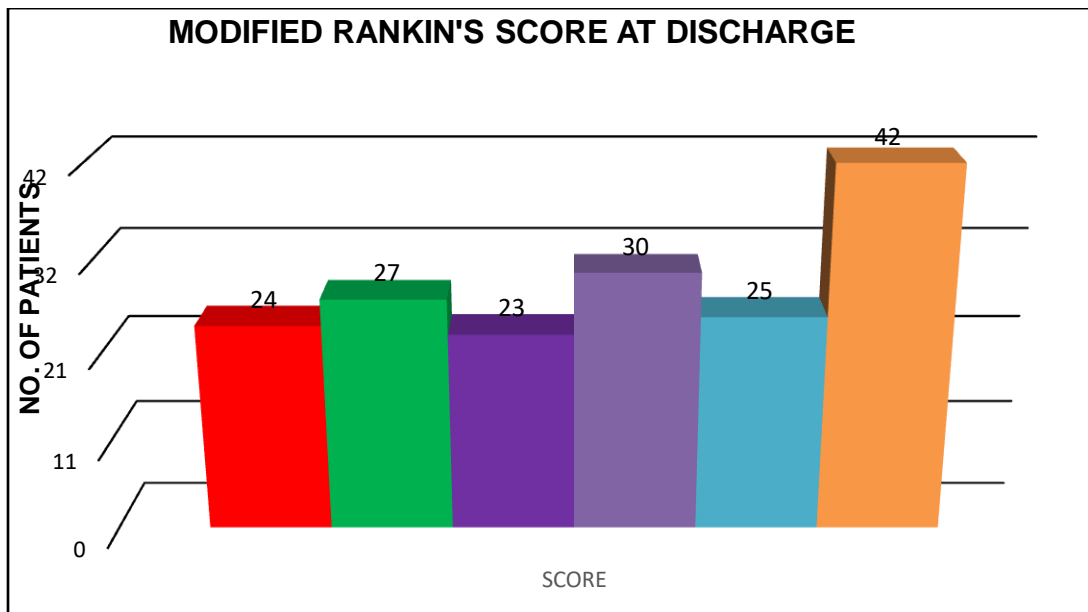
Modified Rankin Score At Discharge

Modified Rankin's Scale at Discharge has been 1 in 24 patients, 2 in 27 patients, 3 in 23 patients, 4 in 30 patients, and 25 patients had very severe disability with score of 5 and there had been mortality of 42 patients that is score of 6.

Figure : MODIFIED RANKIN'S SCORE AT DISCHARGE

Table : Relationship between S.Homocysteine and Modified Ranking Scale at Discharge

(S. Homocysteine lab reference cut-off = 16.2)

	Modified Ranking Scale at Presentation	Total	Chi-square	P value

		Good	Poor		value	
S. Homocysteine	=<16.2	0	10	10		
	>16.2	51	110	161		
Total		51	120	171	4.514	0.026

From the Relationship between S.Homocysteine and Modified Ranking Scale at Discharge, with p value of 0.026 at 5% level of significant, it shows that S.Homocysteine correlate with mRS at discharge.

Table : Relationship between Mass Effect and Modified Ranking Scales at Discharge

		Modified Ranking Score at discharge		Total	Chi-square value	P value
		Good	Poor			
Mass Effect	Absent	50	78	128		
	Present	1	42	43		
Total		51	120	171	20.755	0.000

From the Relationship between Mass Effect and Modified Ranking Score at discharge, with p value of 0.000 at 5% level of significant, it shows that **mass effect also correlates with mRS at discharge**

Table : Relationship between Type of Stroke and Modified Ranking Scales at Discharge

		Modified Ranking Scale at Presentation		Total	Chi-square value	P value
		Good	Poor			
Type of Stroke	ISCHEMIC	47	66	113		
	HAEMORRHAGIC	4	54	58		
Total		51	120	171	22.04	0.00

From the Relationship between Type of Stroke and Modified Ranking Scale at Discharge, with p value of less than 0.05 at 5% level of significant, it shows that **type of stroke correlates with mRS at discharge**

Table : Relationship between Type of Stroke and Modified Ranking Scales at Discharge

		Modified Ranking Scale at Discharge	Total	Chi-square	P value

		Good	Poor		value	
TYPE OF STROKE	ARTERIAL EXCEPT SUBARACHNOID	49	106	155		
	SUBARACHNOID BLEED	0	7	7		
	VENOUS	2	7	9		
Total		40	131	171	3.460	0.177

From the Relationship between Type of Stroke and Modified Ranking Scale at Discharge, with p value of 0.177 at 5% level of significant, it shows that type of stroke does not correlates with mRS at discharge.

Discussion

Stroke in young adults have different and more diverse etiologies in comparison to the observations in the elderly population. According to various geographical distribution etiological subtypes also may vary from each other region. Identification of causative factors in young stroke patients is very important to prevent possible recurrences .Despite greater socio-economic impact , literature regarding etiological sub-typing and risk factors is lesser about young stroke patients in India.(**Dash et al., 2014**)

Type Of Stroke

113(66%) patients had Ischaemic stroke and 58(34%) patients had Haemorrhagic stroke out of 171 patients under observation in the study.

Smajlović et al.,2013 found ischemic stroke in 61% and haemorrhagic stroke in 39% in young stroke study on 3864 patients between 18-45 years. **Marini et al 2001** in study on 4353 patients found ischemic stroke in 57.3% and in 42.7% haemorrhagic type in adults <45years of age.

Most of the patients 155(91%) have arterial origin of stroke excluding ones with subarachnoid type, 9(5%) have venous origin, and subarachnoid bleed was present in 7(4%) of the patients in our young stroke study population.

Outcomes in our study

From the Relationship between Type of Stroke Ischemic or Haemorrhagic and Modified Ranking Scale at Presentation, with p value of 0.346 at 5% level of significant, it shows that Type of Stroke Ischemic or Haemorrhagic does not correlate with mRS at presentation

From the Relationship between Type of Stroke Ischemic or Haemorrhagic and Modified Ranking Scale at Discharge, with p value of less than 0.05 at 5% level of significant, it shows that **Type of Stroke Ischemic or Haemorrhagic correlates with mRS at discharge**

From the Relationship between Type of Stroke according to Arterial or Venous supply and Modified Ranking Scale at Presentation, with p value of 0.663 at 5% level of significant, it shows that Type of Stroke according to Arterial or Venous supply does not correlates with mRS at presentation

From the Relationship between Type of Stroke according to Arterial or Venous supply and Modified Ranking Scale at Discharge, with p value of 0.177 at 5% level of significant, it shows that Type of Stroke according to Arterial or Venous supply does not correlates with mRS at discharge

Areas Of Brain Involved

Basal Ganglia was most common brain area involved 81(23% among area involved) in the study population, followed by Parietal Lobe 79(22%), Frontal Lobe 54(15%), Temporal Lobe 51(15%), Occipital Lobe 30(9%), Thalamus 15(4%), Brain Stem 11(3%), Cerebellum 10(3%), Subarachnoid 8(2%), Internal Capsule 7(2%) and Centrum Semiovale 6 (2%).

Ruíz-Sandoval JL et al., 1999 found lobar involvement 55%, basal ganglia/internal capsule in 22%, and others in 24%.

Outcomes in our study

From the Relationship between Areas of Stroke and Modified Ranking Scale at Presentation, with p value is more than 0.05 for the risk factors at 5% level of significant except p less than 0.05 for Parietal lobe , it shows there is no significant relationship between Areas of Brain involved **except Parietal lobe** and mRS at presentation.

From the Relationship between Areas of Brain Involved and Modified Ranking Score at discharge, with p value of more than 0.05 for the risk factors at 5% level of significant **except p value less than 0.05 for Parietal lobe, Frontal lobe and Cerebellum** , it shows there is no significant relationship between Areas of Brain involved **except Parietal lobe , Frontal lobe , Cerebellum and Internal Capsule and mRS at discharge**

Mass Effect In Ct Or Mrain Brain

In 43 (25%) patients out of 171 young stroke patients in the study mass effect was present on CT or MRI Brain of the patient. Of these 37 patients were of haemorrhagic variety whereas only 6 were of ischemic type.

Pullicino et al., 1997 concluded mass effect associated with poor outcome and early death.

Outcomes in our study

From the Relationship between Mass Effect and Modified Ranking Scale at Presentation, with p value of 0.025 at 5% level of significant, it shows that **mass effect correlates with mRS at presentation**

From the Relationship between Mass Effect and Modified Ranking Score at discharge, with p value of 0.000 at 5% level of significant, it shows that **mass effect also correlates with mRS at discharge**

MODIFIED RANKIN SCALE (mRS) AT DISCHARGE AND OUTCOME

120 (70%) patients had poor outcome (m RS >2) and 51 (30%)patients had good outcome (m RS ≤ 2) out of 171 patients under observation in the study.

Conclusion: We draw following conclusions based on our study:

1. **With increasing age incidence of stroke increases** as maximum patients were in age group 35- 45 years and in the age distribution from 18-45 years there was no difference in outcome.

2. The number of males107 (63%) were more than 64(37%) females.

3. **Females presented with poor modified Rankin scale** but no difference in outcome the males and females.

4. In our study 20% were smokers and 4% were alcoholic, smoking or alcoholism did not affected outcome than non smokers or non alcoholics.

5. Hypertension was present in 47% patients but no difference in outcome was found due to presence of hypertension.

6. Diabetes Mellitus was found in 13% patients and **poor glycemic control was associated with poor outcome** as exhibited by those with raised fasting blood sugar (>110mg/dL).

7. Dyslipidemia was found in 91.8% patients, most prominent being hypertriglyceridemia , and presence of dyslipidemia did not affect outcome.

8. In coronary artery disease, atrial fibrillation and rheumatic heart disease was present in 4%, 2% and 10% patients, and presence of these had no affect on outcome.

9. 21.6% patients had subclinical hypothyroidism and 1.2% had overt hypothyroidism, and hypothyroidism not shown to affect outcome.

10. Chronic Kidney Disease was found in 4% patients and S. creatinine was raised in 19% , and had no effect on outcome.

11. In our study stroke was athero-thrombotic type in 36.3% , 12.3% patients had cardio-embolic type, venous thrombosis was present in 5.8% patients , type was unknown in 45.6%.

12. Antiphospholipid Antibody Syndrome was seen 1 female patient with hemorrhagic venous infarct .

13. 5% of females affected with stroke were found using Oral Contraceptive Pills.

14. 8% patients presented with Generalized Tonic Clonic Seizures of which 11 were known case of seizure disorder. 8% patients had Vit.B12 deficiency,

15. 10.5% patients had infections. Most common being Tubercular Meningitis 42% of infections followed by Malaria(21%), other being Pulmonary Koch's(16%), Dengue(11%), both Tubercular Meningitis and Malaria(5%) and Acute Pyogenic Meningitis(5%).

16. Out of 64 females patients 8 were post partum in those stroke was arterial in 5 and venous type in 3 .

17. Hyperhomocysteinemia was seen in 94% patients and not shown effect on outcome.

18. 36% patients had **haemoglobin less than 12mg/dL associated with higher modified Rankin scale at presentation** and no effect on outcome.

19. Other risk factors : Abortion in 1patient, and Takasayu Arteritis in 1patient.

20. 66% patients had ischaemic CVA and 34% patients had haemorrhagic CVA with **haemorrhagic CVA associated with poor outcome**.

21. Most of the patients 91% have arterial origin of stroke excluding ones with subarachnoid type, 5%have venous origin, and subarachnoid bleed was present in 4% of the patients, with type not showing effect on outcome.

22. Basal Ganglia was most common brain area involved 23% among area involved, followed by Parietal Lobe 22%, Frontal Lobe 15%, Temporal Lobe 15%, Occipital Lobe 9%, Thalamus 4%, Brain Stem 3%, Cerebellum 3%, Subarachnoid 2%, Internal Capsule 2% and Centrum Semiovale 2% **involvement of parietal lobe ,frontal lobe ,cerebellum and internal capsule associated with poor outcome.**

23. In 25% patients mass effect was present on CT or MRI Brain of the patient. Of these haemorrhagic variety in 86% whereas ischemic type only in 14%. **Presence of mass effect associated with poor outcome**.

24. In 65% patients fundus examination was within normal limits . Of these 10% had hypertensive changes, 5% had hypertensive changes associated with pappiledema . Non Proliferative Diabetic Retinopathy in 1% . 18% had pappiledema excluding those with hypertension**. Fundal Changes were associated with high modified Rankin scale at presentation** but no effect on outcome.

25. **Large territory CVA was present in 36% patients and was associated poor outcome.**

26. Modified Rankin's Scale at Presentation was 1 in 8% patients, 2 in 15% patients, 3 in 7% patients, 4 in 29% patients ,and 41% patients has presented with very severe disability with score of 5.

27. Modified Rankin's Scale at Discharge was 1 in 14% patients, 2 in 16% patients, 3 in 13% patients, 4 in 17% patients , and 25 in 15% patients had very severe disability with score of 5 and there had been mortality in 25% patients that is score of 6.

28. 70% patients had poor outcome (m RS >2) and 30% patients had good outcome (m RS ≤ 2).

Limitations

1. Hospital based Observational Study at Tertiary Care Referral Centre.

2. Less Number of Patients with Shorter Duration and Observation.

3. Due To Time Constraint Many More Findings Could Not Be Drawn.

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