

Siriraj Score as a Tool for Clinical Diagnosis of Stroke

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Background: Siriraj stroke score is a diagnostic tool to differentiated ischemic from haemorrhagic stroke. This study was carried out to access SSS accuracy as compared to CT scan. **Methods:** This study was carried out in the Department of Medicine and Neurology of Mayo Hospital, Lahore. Thirty two patients were included in the study who had stroke SSS was applied as well as CT scan was done. Out of them 6% were misdiagnosed. Overall predictive accuracy was 87.5%. **Conclusion:** Siriraj stroke score is not 100% accurate. CT scan should be advised before starting definitive stroke therapy.

Key words: Siriraj stroke score, CT scan, ischaemic stroke, haemorrhagic stroke

Cerebrovascular accident or stroke is the third leading cause of death after ischemic heart disease and cancer. The annual incidence is two per thousand mostly affecting those under 65 years of age¹. Stroke can be classified pathologically as of hemorrhagic and ischemic type. Cases diagnosed as stroke turn out to be 80% ischemic and 20% hemorrhagic².

Intracerebral hemorrhage is sudden in onset, with signs and symptoms of headache seizures, vomiting and rapid loss of consciousness. All these features may not be present in every patient. Whereas, a definitive source of embolism, sudden onset neurological deficit, maximum at beginning promotes the diagnosis of ischemic (embolic) stroke. Stroke developing with history of evolution in hours and days is ischemic stroke due to thrombosis³.

The first medical contact of an acute stroke victim is often a non-neurologist. In majority of cases non-neurologist either GPs or Emergency service physicians can make a correct diagnosis with a validation of 91%⁴. In order to minimize the use of CT brain scan and to assist physicians in areas without access to CT brain scan to diagnose the pathological types of stroke accurately, scoring systems were devised namely Guy's hospital score or Allen score and Siriraj stroke score [1]e Allen score is calculated by clinical variables like conscious level, planter response, and onset of neurologic deficit, headache, diastolic blood pressure, angina and heart failure. This score is not easy to calculate on bedside. Latter scoring system i.e. Siriraj stroke score was developed in Thailand⁴. Its validation and prediction accuracy for infarction is 93.2% and for hemorrhage it is 89.3%³. Resident doctors in countryside in Thailand use Siriraj score card as a routine. It has various clinical variables as level of consciousness, diastolic blood pressure, atheroma markers as diabetes mellitus and ischemic heart disease. When the score is less than -1 it is ischemic stroke and when it is more than +1 it indicates hemorrhagic stroke. When equivocal, that is between +1 and -1 CT brain scan is indicated.

Developing countries like Pakistan are not only burdened with infectious diseases like tuberculosis, diarrhea, and malaria but also with non-communicable diseases like diabetes mellitus, hypertension, ischemic

heart disease and stroke. Highly sophisticated technologies are becoming available worldwide. Physicians in charge of acute stroke should not rely on clinical features alone. They should order investigations like CT brain scan and MRI where necessary⁵.

Objectives

The object of my study is to determine adequacy of Siriraj Stroke Score in diagnosis of stroke and to decide which patient should have priority for CT scan. This score can also be helpful in altering management like starting or omitting antiplatelet therapy in patients with acute stroke in areas where CT scan is not available.

Materials and methods

This prospective clinical study was conducted among patients admitted in West Medical Ward and Neurology Ward of Mayo Hospital, Lahore. The clinical study included 32 in all. Patients included presented in indoors of west Medical Ward and Neurological Ward of Mayo Hospital, regardless of their admission from OPD or emergency from August 2004 to December 2004. As per inclusion criteria only patient that had a CT brain scan within 30 days of acute stroke were included. A detailed history from patient or relatives with particular reference to the parameters like diabetes mellitus, hypertension, smoking, obesity, headache and vomiting will be taken. A meticulous examination will be carried out within first week of admission. Siriraj stroke score was applied thus formulating a clinical diagnosis

Inclusion Criteria

Patient were diagnosed as having stroke on criteria accepted by WHO "Rapidly developing clinical signs of focal (or global) disturbance of cerebral function with symptoms lasting 24 hours, or longer or leading to death with no apparent cause other than of vascular origin [10]. All patients should have had a completed stroke and must have a CT brain scan within 30 days.

Exclusion Criteria

Patients with transient ischemic attack or a focal neurological deficit due to space occupying lesion and infective causes were excluded.

Variables of Siriraj score

- a) Level of Consciousness
 - Alert 0 point
 - Drowsy / Stuporous 1 point
 - Comatosed 2 points
- b) Vomiting (within 2 hours of onset) 1point
No history of vomitting 0 point
- c) Headache (within 2 hours of onset) 1point
No history of headache 0point
- d) Atheroma markers 1 point
(Diabetes mellitus, H/O angina and intermittent Claudication)
1 point if any one or more than one atheroma marker is present.
- e) iastolic BP at presentation (in emergency department).

Formula: Formula for Siriraj stroke score = (2.5xconscious level) +2 (vomiting)+ 2 (headache) + .1 (Diastolic BP) -3 (atheroma markers) -12 score between +1 and -1 is equivocal and a CT brain scan is indicated

Results

A total of 32 patients were included in prospective study. 15/32 were male, out of which 6/13 and 9/19 were from hemorrhage and infarction group respectively. Whereas 17/32 were females, out of which 7/13 and 10/19 were from hemorrhage and infarction respectively. Age of the patients included ranged from 30 years to 80 years and above. The mean age was 58 years. The average age of hemorrhage was 55 years and for infarction was 61 years. Risk factors and important clinical features were studied uniformly, their correlations as cause and affect can easily be determined (Table 1).

Level of consciousness as alert, drowsy or comatose was considered. 16/32 (50%) patients were alert, 6/32 (18.8%) were drowsy and 11/32 (34.4%) were comatosed. Among hemorrhagic group 3/13 (23.1%) were alert, 4/13 (30.8%) were drowsy, 6/13 (42.2%) were comatosed. In infarction stroke group, 13/19 (68.5%) were alert, 2/19 (10.6%) were drowsy and 2/19 (10.6%) were comatosed (Table3).

Vomiting was present in 8/32 (25%) patients. All of the cases belonged to hemorrhage. Headache was complained by 15/32 (46.9%) patients 10/32 (31.3%) belonged to hemorrhagic stroke group. It shows significance of headache for hemorrhagic stroke.

Among atheroma markers (Diabetes mellitus only) was determined in 18/32 (73.7%) patients, 15/32 (46.9%) belong to ischemic group and 3/32 (9.73%) belongs to hemorrhagic group. This shows that atheroma markers are significant for ischemic stroke.

Siriraj stroke score was applied in all the 32 cases 11/32 (41%) were diagnosed as hemorrhage, 17/32 (59%) were diagnosed as infarction. 2/32 (6%) patients showed a equivocal score. 2/32 (6%) patients were having hemorrhage and were misdiagnosed as infarction by Siriraj

Stroke score. The overall predictive accuracy is 28/32 (87.5%) whereas predictive accuracy for hemorrhage is 11/13(84.6%) and for infarction is 19/21(90.5%).

Table 1: Risk factors observed

Risk factors	=n	Haemorrhage	Infarction
Diabetes mellitus	13(40.76%)	4(9.4%)	9(28.2%)
Hypertension	20(62.5%)	8(25.0%)	12(37.5%)
Obesity	5(15.7%)	1(3.2%)	4(12.5%)
Smoking	11(34.4%)	5(15.6%)	6(18.8%)

Table 2: Results of Siriraj stroke score compared with CT brain scan

Score	CT brain scan (Haemorrhage)	CTR brain scan (Inarction)	Total
Score>+1	11	02	13
Score<-1	0	19	19
Total	11	21	32

Table-3: Variables of Siriraj stroke score

Variable	=n	Haemorrhage	Infarction
Level of consciousness			
Alert	16(50%)	3(9.37%)	13(40.6%)
Drowsy	6(18.8%)	4(12.5%)	2(6.25%)
Comatose	11(34.4%)	6(18.7%)	5(15.6%)
Vomiting			
Present	8(25%)	8(25%)	00
Absent	22(68.8%)	5(15.7%)	19(59.3%)
Headache			
Present	15(46.9%)	10(31.3%)	5(15.6%)
Absent	17(53.2%)	3(9.4%)	14(43.7%)
Atheroma markers			
Present	18(56.3%)	3(9.37%)	15(46.8%)
Absent	14(43.8%)	10(31.3%)	4(12.5%)

Discussion

The management of acute stroke syndrome depends largely on the diagnosis of hemorrhage or infarction. It is mandatory to establish a correct diagnosis. 100% accuracy can only be obtained by investigating techniques.

As mentioned earlier in 1983, published a weight linear clinical score the "Allen Score" or "Guys Hospital Score' it was derived from multivariate analysis of clinical data of a large group of patients. The score for each patient is obtained by subtracting several clinical variables with a constant of 12.6. Namely, level of consciousness 24 hours after admission + 7.3 (drowsy) or + 14.6 (in arousable); bilateral extensor planters response +7.4; apoplectic onset (defined by the presence of any two, loss of consciousness at onset, headache within 2 hours or neck stiffness) +219; diastolic blood pressure after 24 hours + (BP x 0.17); aortic and mitral valve disease -4.3; cardiac failure -4.3; cardiomyopathy -4.3; atrial fibrillation -4.3; myocardial infarction within 6 months -4.3; angina claudication or diabetes -3.7; previous stroke or TIA'S -6.7; and history of hypertension -4.1. The score above +14 is considered as hemorrhage and below +14 considered as infarction. The higher the score, the higher the probability for hemorrhage.

In 1985, the validated Guys Hospital score has an overall predictive accuracy of 78% in Oxford and 82% in London¹. The validation of the Siriraj stroke score as compared to the diagnosis based on the results of computerized brain scan was performed in 1991 by Pongvarin et al⁷. The clinical diagnosis by Allen score and Siriraj stroke score was compared in Indian Population in 1993. The results thus formulated were in favor of Siriraj stroke score. In that series predictive accuracy of Siriraj stroke score stands at 83% for infarction and 80% for hemorrhage as compared to 69% for infarction and 66% for hemorrhage according to Guys Hospital score respectively.

In my study, a total of 32 patients were taken, 28/32 were correctly diagnosed 11 were correctly diagnosed as having haemorrhage and 17 were correctly diagnosed as having infarction, 2/32 patients were diagnosed as infarction and they turned out to be haemorrhage. In 2/32 patients clinical data formulated an equivocal score for which CT brain scan was required. Overall predictive accuracy was 28/32 (87.5%), for haemorrhage it was 84.61% and for infarction it was 89.3%. These findings are closer to Pongvarin et al than Allen CMC¹ and Daga et al⁸.

When my study is compared with the study of Siriraj stroke score by Daga et al in Indian population, that study showed overall predictive accuracy of Siriraj stroke score as 80%. In that study it was concluded that accuracy of Siriraj stroke score and Guy's Hospital score may be affected due to difference in prevalence of hemorrhagic stroke between the white and Indian population⁸.

In western countries only 10% patients with stroke tend to have haemorrhage^{6,7,8,9}. In my study there is also higher prevalence of ischemic stroke than hemorrhagic stroke. It is difficult to conclude whether it is due to better control of blood pressure or other factors are also responsible for that.

Diagnosis of stroke on the basis of clinical features and later on verified by CT scan showed a predictive accuracy of 78.9% in case of haemorrhage in our population. Four patients were misdiagnosed as thrombotic stroke. While CT scan showed haemorrhage. Predictive accuracy in the clinical diagnosis of infarction was 90.3% whereas, 3 patients were misdiagnosed. These results correspond well with my study, in which I have used a stroke system.

In the studies conducted on various stroke scores the variables are taken into account. In a study conducted by Daga et al (1994) for the comparison of Siriraj and Guys hospital stroke score, it was concluded that diastolic blood pressure and symptoms of headache and vomiting were important contributing factors for diagnosing stroke in Siriraj scoring system. In validation study of Guys Hospital score⁷, it was discussed that absence of few symptoms as headache, vomiting, loss of consciousness push the score towards infarction and their presence formulated

a score in favor of haemorrhage. In my study predictive accuracy for haemorrhage is 84.6%. Out of hemorrhagic group 8/13 had vomiting, whereas, 4/13 was drowsy, and 3/13 had atheroma marker. Out of infarction group no one had vomiting, 5/19 had headache, 2/19 were drowsy and 15/19 had atheroma markers. It can be visualized very clearly that vomiting headache and diastolic blood pressure and atheroma markers influence the Siriraj stroke score in over estimation leading towards infarction. Under estimation can tilting the score towards haemorrhagic type of stroke.

In my study the major risk factor was hypertension with prevalence of 62.5%. In all the hemorrhagic strokes hypertension was seen in (61.53%) 8/13. And in all the ischemic strokes hypertension observed in 12/19 (63.15%). It can be concluded that hypertension is major risk factor for both hemorrhagic and ischemic stroke.

The limitations of the scoring system should be understood. If a patient or a relative of patient cannot give a clear description of the symptoms, the score will tend to over-estimate the likelihood of infarction. Many of the symptoms used in the score as loss of consciousness headache and vomiting are discriminative for haemorrhage. If presence or absence of such symptoms is unknown they can be recorded as absent and the prior probability weighing given to infarction would then tend to place the patient in the ischemic group.

These scoring system can be used e.g. for data bank, which are very important in describing cerebrovascular disease. Hospital based studies show more severe strokes and those occurring in young whereas population based studies shown a different picture³. Using the assistance of a diagnostic score by a physician should be decided by themselves. These scoring systems should be left to epidemiological studies and first bedside screening test before ordering a CT scan in areas where CT scan is not available or far off. Anti-coagulants or thrombolytic, should only be reserved for patients having an infarction on CT scan.

Conclusion

Despite already mentioned limitations in my opinion some practical applications of Siriraj stroke score may be:

1. First bedside screening test to decide which patient should have priority for CT scan.
2. A retrospective analysis of stroke patients can be done by Siriraj Stroke score where CT scan is not available.
3. Scoring system can be adopted alternatively by attending physicians instead of diagnosing patients according to their clinical experience.

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