Thai Venous Stroke Prognostic Score: TV-SPSS

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Background and Objective: *Prognosis of cerebral venous sinus thrombosis (CVST) has never been studied in Thailand. A simple prognostic score to predict poor prognosis of CVST has also never been reported. The authors are aiming to establish a simple and reliable prognostic score for this condition.*
Material and Method: *The medical records of CVST patients from eight neurological training centers in Thailand who received between April 1993 and September 2005 were reviewed as part of this retrospective study. Clinical features included headache, seizure, stroke risk factors, Glasgow coma scale (GCS), blood pressure on arrival, papilledema, hemiparesis, meningeal irritation sign, location of occluded venous sinuses, hemorrhagic infarction, cerebrospinal fluid opening pressure, treatment options, length of stay, and other complications were analyzed to determine the outcome using modified Rankin scale (mRS). Poor prognosis (defined as mRS of 3-6) was determined on the discharge date.*
Results: *One hundred ninety four patients' records, 127 females (65.5%) and mean age of 36.6 $\pm$ 14.4 years, were analyzed. Fifty-one patients (26.3%) were in the poor outcome group (mRS 3-6). Overall mortality was 8.4%. Univariate analysis and then multivariate analysis using SPSS version 11.5 revealed only four statistically significant predictors influencing outcome of CVST. They were underlying malignancy, low GCS, presence of hemorrhagic infarction (for poor outcome), and involvement of lateral sinus (for good outcome). Thai venous stroke prognostic score (TV-SPSS) was derived from these four factors using a multiple logistic model.*
Conclusion: *A simple and pragmatic prognostic score for CVST outcome has been developed with high sensitivity (93%), yet low specificity (33%). The next study should focus on the validation of this score in other prospective populations.*

Keywords*: Venous Stroke, Cerebrovascular Disease, Prognosis*

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Cerebral venous sinus thrombosis (CVST) is an emergency condition requiring accurate diagnosis and prompt treatment to reduce its potentially serious consequences and mortality, which ranges from 5.5-30%[1-5]. Common causes of death are misdiagnosis and delaying in the management. It develops with severe brain edema accompanied by brainstem compression, status epilepticus, or systemic complications such as hospital-acquired infection and pulmonary embolism, etc CVST is common but usually delayed in diagnosis. With the improvement of non-invasive diagnostic tests such as magnetic resonance venography (MRV), and the better knowledge of potential risk factors, this detection is earlier, which results in decreasing the mortality. Anticoagulant therapy has been proven to have moderate benefit for these patients from randomized placebo-controlled trials[6,7]. In spite of these advances, the mortality of CVST is still as high as 5-10%[2,7].

In an acute phase, identification of poor prognostic factors are essential in order to select the best therapeutic strategy and management of modifiable factors to improve treatment outcome, and helps doctors for better counseling to patients and relatives[8]. Prognostic factors of CVST have been established in several previous studies including level of consciousness, neuroimaging finding, seizures, age, and neurological deficit[2,8-11]. However, the majority of the existing data on prognostic factors in patients with CVST relies on data from Western populations, and study concerning prognostic score has never been reported in Thailand. The objective of the present study was to establish prognostic score of this condition for early predicting outcome and determine treatment options. The authors are expecting that the present study will add more information and being generalized in the management of patients with CVST.

Material and Method

Study design

A retrospective multicenter hospital-based study.

Inclusion and exclusion

The authors retrospectively reviewed medical records of patients diagnosed as CVST from the eight neurological teaching centers in Thailand between April 1993 and September 2005, namely Siriraj Hospital, Ramathibodi Hospital, Prasat Neurological Institute, Chulalongkorn Hospital, Srinakarind Hospital, Chiang Mai Hospital, Pramongkutklao Hospital, and Rajvithi Hospital. The diagnosis of CVST had been documented by neurologists with the evidence of thrombosis in cerebral venous sinus on computerized tomography (CT scan) of the brain, magnetic resonance imaging (MRI) with MRV, conventional cerebral angiography, or autopsy. Reasons for exclusion of patients were cavernous sinus thrombosis and absence of outcome assessment on discharge data. The present study protocol was approved by individual institution ethics committee.

Prognostic variables and definitions

All clinical variables of individual medical record were evaluated by neurologists from each center. These included:

a) Demographic data: age, sex, residence.

b) Risk factor: intracranial infection (meningitis or abscess), paracranial infection (otitis media, mastoiditis, or sinusitis), systemic infection, puerperium/pregnancy, oral contraceptive usage, connective tissue disease (*i.e.*, systemic lupus erythematosus, systemic sclerosis, etc), malignancy (including hematologic malignancy), hematologic diseases, other specified causes and uncertain factors for patients without identified risk factors or results of investigation.

c) Clinical presentation:

i) disease onset that was categorized into three groups; acute onset (< 48 hours); subacute onset (2-30 days); and chronic onset (> 30 days)

ii) headache

iii) seizure.

d) Clinical signs: blood pressure, Glasgow coma score (GCS), papilledema, hemiparesis/plegia, meningeal irritation signs.

e) Neuroimaging: location of involving venous sinuses, presence of hemorrhagic infarction.

f) Laboratory investigations: opening pressure of cerebrospinal fluid, assessment of hypercoagulable state (protein C, protein S, antiphospholipids; lupus anticoagulant and anticardiolipin), and antinucleic acid.

The relevant parameters of treatment during hospitalization were recorded including anticoagulant treatment (unfractionated heparin, low molecular weight heparin, warfarin), osmotic agent, other medical treatment such as aspirin, antibiotics, diuretics, surgical treatment, duration of admission and complications during admission. The outcome at discharge was assessed with the modified Rankin Scale (mRS)[12], with the patients with mRS scores 0 to 2 being classified as independent survivors (good outcome), and patients

with mRS scores 3 to 6 being classified as dependent or dead (poor outcome). Causes of death were also recorded.

Statistical analyses

Univariable analysis was performed to categorize patients with good and poor outcomes. Unpaired t-test was used for quantitative data which were normally distributed (*e.g.* age, blood pressure), and Mann-Whitney U test for non-parametric data (*e.g.*, GCS, duration of headache and CSF pressure). For quantitative variables, Pearson's Chi-square test was employed. Multivariable analysis using multiple logistic regression models was performed to determine the effect of each predictor on developing poor outcome after adjusting for other predictors. Adjusted odds ratio (OR) with a 95% confidence interval (CI) and parameter estimates of the logistic model were applied.

From multiple logistic regression analysis, the prognostic assessment score for each patient was determined using statistically significant prognostic variables and their weight based on the parameter estimation. To predict further the probability of having poor outcome, the probability curve based on the logistic model was constructed. The validity of predicted probability against true outcome was assessed using sensitivity and specificity. A statistically significant difference was considered if the p-value was less than or equal to 0.05. All statistical analyses were performed using SPSS version 11.5.

Results

One hundred ninety four patients' records from eight neurological teaching centers were available for outcome predictor analysis (Table 1). One hundred twenty seven patients (65.5%) were female with age ranged from 4-75 years (mean 36.6 $\pm$ 14.4 years). Risk factors for CVST were uncertain in 73 patients (38%). Most common identifiable risk factors were contraceptive pill usage (45/192 [23.4%]), followed by connective tissue diseases (22/192 [11.5%]). Fifty-one of 194 (26.3%) patients were in the poor outcome group, and 143 of 194 (73.7%) patients were in the good outcome group. Most patients were subacute onset (150/193 [77.7%]), and headache was reported in 145 of 185 (78.4%) patients with the range from 1-365 days (mean 21.9 days, SD 51.6). Seizure related to CVST was found in 90 of 194 (46.4%) patients, mostly within one week. About 80% (151/181) had good consciousness on admission. Papilledema was noted in 71 of 166 (42.8%) patients, while increased intracranial pressure was documented in 86 of 97 (88.7%) with the mean pressure of 31 (SD $\pm$ 12.6 cmH_2O). Meningeal irritation sign was also observed in 20 of 183 (10.9%) patients. Table 2 shows comparison of baseline characteristics, clinical, laboratory and neuroimaging parameters between the two groups. The majority of the involved venous sinuses were superior sagittal sinus (149/192 [74.7%]), followed by lateral sinus (77/192 [41.4%]), sigmoid sinus (27/186 [15.1%], straight sinus (20/186 [9.7%]), inferior sagittal sinus (12/186 [5.1%]), great vein of Galen (15/186 [3.6%]), and cerebellar vein (1/186 [0.5%]).

Seventy-one patients (37.4%) had hemorrhagic infarction and nearly half (29/71 [40.8%]) of those were in the poor outcome group. Approximately three-fourths (146/191 [76.4%]) of patients received an anticoagulant, and 34 of 193 (18.9%) were given any type of osmotic agents. The mortality rate in the present study was 8.2% (16/194) and brain herniation (10/16 [62.5%]) was the most common cause of death followed by sepsis (5/16 [31.3%]) (Table 3).

From univariate analysis, only six parameters (malignancy, hemiparesis, lateral sinus, sigmoid sinus, presence of hemorrhagic infarction, and GCS on admission) were independently significant prognostic factors. Then these parameters were selected for multivariate analyses using a multiple logistic regression model. The purpose here was to obtain a parsimonious model for further predicting the probability of poor outcome. In Table 4, the four statistically significant predictors emerging from the multivariate analyses were displayed. They were GCS on admission, underlying malignancy, lateral sinus

Table 1. Number of patients from each neurological teaching center

Hospital	Number of patients	Percentage
Siriraj Hospital	52	26.8
Ramathibodi Hospital	48	24.7
Prasat Neurological Institute	33	17.0
Chulalongkorn Hospital	20	10.3
Srinakarind Hospital	14	7.2
Maharaj Chiangmai Hospital	12	6.2
Pramongkutklao Hospital	8	4.1
Rajvithi Hospital	7	3.6
Total	194	100.0

Table 2. Comparison of baseline characteristics between poor and good outcomes

Characteristics	Number or mean (percentage)		
	Poor outcome (n = 51)	Good outcome (n = 143)	p-value
Demographic data			
Age (year)	38.7 ± 15.4	36.0 ± 14.1	0.230
Male:female	1:2	1:1.9	1.000
Risk factors			
Intracranial infection	0/50 (0%)	3/142 (2.1%)	0.569
Paracranial infection	1/50 (2%)	8/142 (5.6%)	0.450
Systemic infection	2/50 (4%)	3/142 (2.1%)	0.607
Peurperium/pregnancy	2/50 (4%)	8/142 (5.6%)	1.000
Contraceptive agent usage	10/50 (20%)	34/142 (23.9%)	0.708
Connective tissue disease	2/50 (4%)	19/142 (13.4%)	0.118
Malignancy	6/50 (12%)	5/142 (3.5%)	0.037
Hematologic disorders	5/50 (10%)	6/142 (4.2%)	0.158
Other	6/50 (12%)	12/142 (8.5%)	0.572
Uncertain	17/50 (34%)	55/142 (38.7%)	0.671
Any risk factors	33/51 (64.7%)	87/143 (60.8%)	0.749
Clinical presentations			
Headache	34/49 (69.4%)	112/137 (81.8%)	0.108
Disease onset			
Acute	11/51 (21.6%)	16/143 (11.2%)	0.152
Subacute	37/51 (72.5%)	113/143 (79.0%)	
Chronic	3/51 (5.9%)	14/143 (9.8%)	
Seizure	27/51 (52.9%)	63/143 (44.1%)	0.353
Clinical signs			
GCS	13.6 ± 2.8	14.7 ± 1.2	0.015
Systolic BP (mmHg)	126.9 ± 16.9	124.1 ± 17.8	0.329
Diastolic BP (mmHg)	79.6 ± 11.9	78.7 ± 11.9	0.651
Papilledema	22/44 (50%)	50/122 (41%)	0.391
Hemiparesis/plegia	32/49 (65.3%)	56/142 (39.4%)	0.003
Meningeal irritation sign	8/46 (17.4%)	11/137 (8.0%)	0.093
Neuroimaging: location of VST			
Superior sagittal sinus	37/49 (75.5%)	102/137 (74.5%)	1.000
Inferior sagittal sinus	1/49 (2.0%)	11/137 (8.0%)	0.188
Lateral sinus	12/49 (24.5%)	65/137 (47.4%)	0.009
Deep vein of Galen and internal cerebral vein	4/49 (8.2%)	11/137 (8.0%)	1.000
Straight sinus	3/49 (6.1%)	17/137 (12.4%)	0.342
Cerebellar vein	0/49 (0%)	1/137 (0.72%)	1.000
Sigmoid sinus	2/49 (4.1%)	26/137 (19.0%)	0.023
Hemorrhagic infarction	29/50 (58.0%)	42/140 (30.0%)	0.001
Laboratory investigation			
CSF pressure (cmH_2O)	29.5 ± 11.8	31.1 ± 12.5	0.601
Hypercoagulable state			
Protein C	0/29 (0%)	3/99 (30.0%)	0.678
Protein S	2/29 (6.9%)	3/99 (30.0%)	
Antiphospholipid	1/29 (3.4%)	1/99 (1.0%)	
More than 1	1/29 (3.4%)	1/99 (1.0%)	
ANA	3/32 (9.4%)	22/106 (20.8%)	0.229

Table 2. Cont.

Characteristics	Number or mean (percentage)		
	Poor outcome (n = 51)	Good outcome (n = 143)	p-value
Treatment			
Anticoagulant	35/49 (71.4%)	111/142 (78.2%)	0.445
Antiepileptic	5/48 (10.4%)	23/142 (16.2%)	0.459
Osmotic agents	11/51 (21.6%)	23/142 (16.2%)	0.516
Corticosteroids	12/51 (23.5%)	32/141 (22.7%)	1.000
Other treatment	13/49 (26.5%)	23/142 (13.6%)	0.167
Surgical intervention	4/51 (7.8%)	5/143 (3.5%)	0.246
Duration of admission (day)	28.9 $\pm$ 29.5	19.3 $\pm$ 19.1	0.036

Table 3. Causes of death

Causes of death	Number of patients
Brain herniation	10/16 (62.5%)
Sepsis/severe infection	5/16 (31.3%)
Status epilepticus	1/16 (6.3%)
Bleeding complication	1/16 (6.3%)
Uncertain	1/16 (6.3%)

involvement, and hemorrhagic infarction. Underlying malignancy was the strongest risk factor (OR 6.35) followed by involvement of lateral sinus (OR 3.49).

Thai Venous Stroke Prognostic Score (TV-SPSS)

The prognostic score of outcome of patients with CVST was developed using the result of multiple logistic model. To obtain the TV-SPSS score, each patient must have all predictors present (Table 4). The score was then calculated by summing up all predictive values and their coefficients as shown in equation (1). To simplify, rounded coefficients were used (equation 2). The higher the coefficient would result in the greater the weight of prediction for poor outcome. After the TV-SPSS was obtained from the simplified equation (2), it was transformed to the probability of developing poor outcome (p) using equation (3) according to the logistic model (Fig. 1).

Original model:

TV-SPSS score (y) = 0.724 + 1.088 (Hemorrhagic infarction) + 1.249 (Lateral sinus involvement) + 1.848 (Underlying malignancy) - 0.226 (GCS) .....(1)

Where, Hemorrhagic infarction: if YES = 1; if NO = 0
Underlying malignancy: if YES = 1; if NO = 0
Lateral sinus involvement: if YES = 0; if NO = 1
GCS (Glasgow coma scale): determine on arrival, ranging from 3-15.

Probability of poor outcome (p) = exp (y)/[1+exp (y)] ..(2)

Table 4. Results of multiple logistic regression of poor outcome

Independent factors	Parameter estimate	Odd ratio (OR)	95% CI for OR	p-value
Constant	0.724			
GCS on admission	-0.226	0.798	0.659-0.966	0.021
Underlying malignancy	1.848	6.345	1.503-26.776	0.012
Lateral sinus involvement	1.249	3.488	1.412-8.618	0.007
Hemorrhagic infarction	1.088	2.969	1.378-6.395	0.005

GCS: Glasgow coma scale; OR: odds ratio

Simplified model:

TV-SPSS score (y) = 3 (Hemorrhagic infarction) + 6 (Underlying malignancy) + 3.5 (Lateral sinus involvement) + (15-GCS) .....(3)

The higher the TV-SPSS score will result in the higher the probability of poor outcome. The probability of the TV-SPSS score is also provided in the probability curve (Fig. 1). From the curve, a TV-SPSS of less than -1 indicates the very low probability (25%) of having poor outcome. On the other hand, a TV-SPSS score of more than 1 reflects the very high probability of poor outcome (70%) and if the score is 0, the probability of having poor outcome is around 50%. For scores between -1 to 1, the use of the probability curve in Fig. 1 is recommended to predict more accurately for outcome.

To determine the accuracy of the TV-SPSS score for predicting the discharge outcome, patients with the calculated probability (p) of less than or equal to 3 are predicted to have good outcome, whereas p > 3 is predicted for poor outcome. Cross-tabulation of the true outcome (good/poor) and the predicted outcome (good/poor) reveals a sensitivity of 93% and specificity of 33%.

Discussion

This is the first study ever published of CVST patients reporting prognostic factors and simple prognostic equation, using clinical and neuroimaging parameters at the time of admission to predict outcome. Four independent factors influencing outcome at discharge were identified, which were GCS on admission, presence of malignancy, hemorrhagic infarction, and involvement of lateral sinuses. Among these four factors, the first three factors were poor prognostic, but lateral sinus involvement was predicting a good outcome.

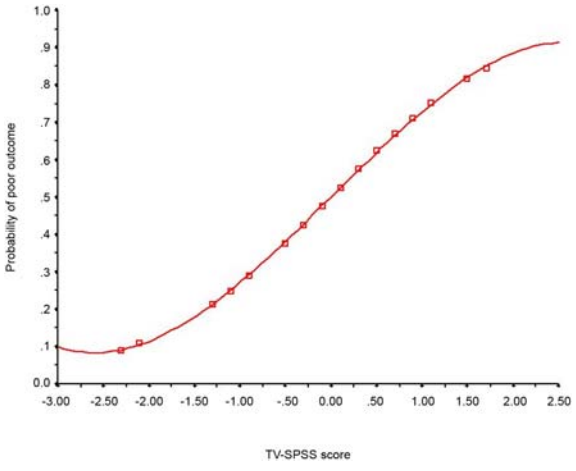

Fig. 1 The probability of the TV-SPSS score to determine the prognosis of patient with venous sinus thrombosis

The mean age of the presented patients was 36.6 ± 14.4 years with female preponderance, which was close to previous studies[11,13,14]. In addition, the presented study also revealed the similar results on location, percentages of the involved venous sinuses, and imaging on hemorrhagic infarction in comparison to the International Study on Cerebral Vein and Dural Sinus Thrombosis (ISCVT), the largest multicenter international study[13]. Thereby, this could be implied that CVST in Asian population was not different from other ethnicities. Except the risk of thrombophilia was much lower in the present study compared to Caucasians[13,14]. This was probably due to less extensive search for thrombophilic risk. However, genetic cause of thrombophilia was very rare for Thai population. The mortality rate in the present study was 8.4% mostly due to brain herniation (62.5%) and sepsis (31.3%). Fifty-one patients were in the poor outcome group (mRS 3-6; death or dependency). There have been numerous attempts to identify long-term predictors for CVST[8,13,15], yet not the outcome at discharge. Several clinical parameters had been identified for prognosis. Among these, alteration of consciousness and presence of intracranial hemorrhage had been the most robust, while other factors, such as age, male sex, malignancy, seizure, CNS infection, and deep venous system thrombosis have been reported in some studies[2,8-11,13,15]. The main disadvantage of these studies is the need for complex algebra equations to determine the outcome.

In the present study, with a large sample size (194 patients) from eight neurological training centers in Thailand, four independent prognostic factors of CVST were identified. The authors also developed a simple equation using clinical and neuroimaging parameters at the time of admission to predict poor outcome. The authors found that underlying condition of malignancy was the strongest risk factor for outcome (odd ratio 6.345). Other prognostic factors such as GCS on admission and presence of hemorrhagic infarction were similar to other studies. In the present study, the authors did not only determine the mortality as a poor prognosis but also included dependency, which is considered disability. Thus, the authors combined

death and dependency (mRS 3-6) in the poor outcome prognostic score. In the future, the authors aim to validate score of CVST, which most studies on prognosis base poor outcome as dependency or death. Hence, the authors selected the combination of mRS 3-6 at discharge as the poor prognosis.

Underlying malignancy seems to be a very powerful predictor of poor outcome, both in the present study and other studies[13,16]. This is because the stages of those malignancies are advanced and the patients are having higher chances to die. In addition, the patients may not be well-anticoagulated under ongoing thrombophilic processes of untreated malignancies.

Lateral sinus involvement is a very interesting finding in the present study. Patients with lateral sinus thrombosis seem to be significantly better on discharge outcome. This finding contradicts a result from ISCVT on predictors of outcome of patients with CVST and early intracerebral hemorrhage[17]. In that study, the right lateral sinus thrombosis has higher risk to develop poor outcome. They explained this by the drainage that was blocked by the other hypoplastic side or just a chance finding. However, the authors doubt that opinion because almost all transverse sinus flow gaps appear common in the left side[18]. The present study proposes another possibility; that the involvement of lateral sinus will get a lower chance to have poor outcome because the drainage can change to the other side. This is because not all cases of transverse sinus thrombosis occur in both sides, and there is a comparable rate of each affected side. Incidence of hypoplastic lateral sinus is not very high[18,19] or at least in the present study, the authors found only a small amount of hypoplasia of this venous sinus. Therefore, the chance of having poor outcome in case of lateral sinus involvement is less likely.

The in-hospital mortality rate in the present study was 8.4%, which was similar to other studies[2,7,13]. Anticoagulant therapy caused no differences between good and poor outcomes. This may be explained because this type of treatment has been proven to reduce the mortality rate[2,6,7]. However, it might not reduce dependency, which was nearly 70% of the poor outcome group. Other medical treatment including antiepileptic drugs, osmotic agents, corticosteroids, and surgical treatment did not change the patients' outcome.

The strength of the present study is the large sample size (194 patients) from different regions of Thailand, which diminishes potential inclusion bias. Besides, studied cases were collected from every department in each center. Thus, all types and all ranges of severity can be included into the study, even though they were admitted to intensive care units. Therefore, case ascertainment bias is unlikely in the present study.

The methodological limitation of the present study was the lack of central review of imaging. According to standard neuroimaging technique and criteria, the result of the presented cases were shown to have similar demographic and radiologic findings to other studies. Another methodological limitation was the absence of uniform etiological workup and treatment that gave rise to a large amount of unidentified risk factors. Lastly, due to its retrospective design, several data were missing.

To the authors' knowledge, the present study is the first large study that aimed to establish an equation to predict the outcome at discharge and rely mostly on clinical and neuroimaging parameters. With the proposed equation, the authors can determine whether patients are at risk to develop poor outcome at discharge. Therefore, based on the score, the authors may decide to treat with more aggressive treatment to improve the potential outcome. In practice, any clinical grading scale must be simple, reliable, easy to use, and need no special training. Neurologists in Thailand and other developing countries are limited in number. Most CVST patients are seen by general physicians. Hence, there is a real need for simple and pragmatic score that can be universally applied. Therefore, the present study is the first ever study to demonstrate independent prognostic factors with a practical score and probability curve for predicting poor prognosis in patients with CVST. This TV-SPSS score has high sensitivity but a low specificity.

The limitation of the present study was that a validation study of this equation has not been performed yet. The authors thus challenge validating the presented score in other centers. In the future, a study based on prospective design is essential to develop a score that predict the outcome in patients with CVST more accurately and with higher specificity.

Appendix

The TV-SPSS score can be calculated using simple hand calculator to predict whether any CVST patient will have good or poor outcomes.

Example 1: A 23-year-old woman presented to Siriraj Hospital with symptoms of severe headache with

nausea and vomiting for 4 days. She had been taking oral contraceptive pills for 1 year. The physical examination on admission revealed good consciousness with GCS of 15. She had no abnormal neurological signs. An emergency MRI with MRV of the brain was performed with the result showing an occlusion of left transverse sinus down to left internal jugular vein and absence of right transverse sinus, right sigmoid sinus, and right internal jugular vein (Fig. 2-4). The diagnosis of CVST bilateral transverse sinuses, bilateral sigmoid sinuses, and bilateral internal jugular veins was confirmed.

TV-SPSS score = 3 (Hemorrhagic infarction) + 6 (Underlying malignancy) + 3.5(Lateral sinus involvement) + (15-GCS)

Where, Hemorrhagic infarction: if YES = 1; if NO = 0
Underlying malignancy: if YES = 1; if NO = 0
Lateral sinus involvement: if YES = 0; if NO = 1
GCS (Glasgow coma scale): determine on arrival, ranging from 3-15.

TV-SPSS score = 0 + 0 + 0 + 0 = 0

Therefore, the probability of poor outcome is less than 50%. The probability of having good outcome is high due to the high sensitivity of the score to detect the patients with poor outcome if the score is over 0.

Then, anticoagulant therapy was given. During hospitalization, she recovered from headache without any medical and neurological complications. She was discharged at day 7th of admission with complete recovery.

Example 2: A 17-year-old man was admitted to Siriraj Hospital with a recent onset of severe headache and seizure for 2 weeks then he became comatose on the admission date after a repeated episode of generalized seizure. Physical examination revealed GCS of 3/15 and totally unresponsive. CT brain scan with contrast media showed a clot in bilateral internal cerebral veins and hemorrhagic infarction causing obstructive hydrocephalus and generalized brain edema (Fig. 5, 6).

TV-SPSS score = 3 (Hemorrhagic infarction) + 6 (Underlying malignancy) + 3.5 (Lateral sinus involvement) + (15-GCS)

Where, Hemorrhagic infarction: if YES = 1; if NO = 0
Underlying malignancy: if YES = 1; if NO = 0.
Lateral sinus involvement: if YES = 0; if NO = 1
GCS (Glasgow coma scale): determine on arrival, ranging from 3-15.

TV-SPSS score = 3 + 0 + 3.5 + (15-3) = 18.5

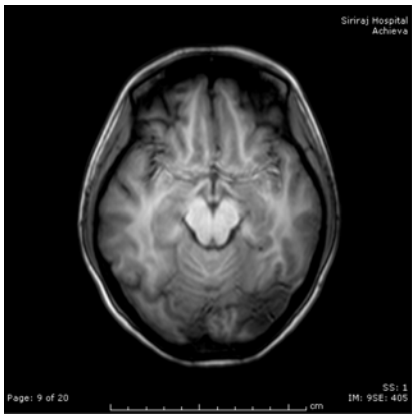

Fig. 2 T1W MRI showed hyposignal intensity left occipital area, not corresponding to the arterial territory

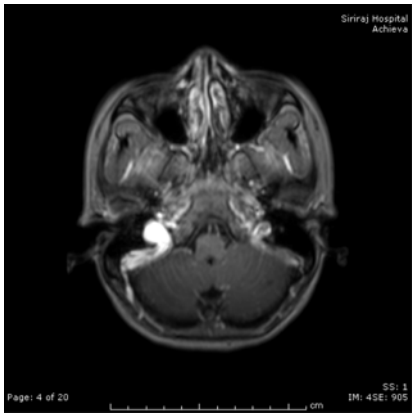

Fig. 3 T1W MRI with contrast showed filling defect of bilateral tranverse sinuses, bilateral sigmoid sinuses and left internal jugular vein

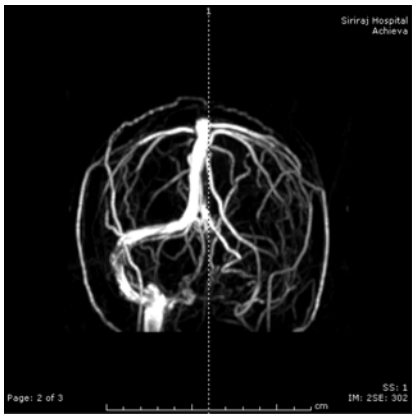

Fig. 4 MRV showed irregularity of right transverse sinus and right internal jugular vein, and absence of left transverse sinus, left sigmoid sinus and left internal jugular vein. These finding were consistent with thrombosis in those venous sinuses

Fig. 5 CT brain without contrast showed hyperdensity lesion in subarachnoid space consistent with subarachnoid hemorrhage. Obstructive hydrocephalus was also noted

Fig. 6 CT brain without contrast showed clot in bilateral internal cerebral veins

He was diagnosed as bilateral internal cerebral veins thrombosis. Supportive treatment was given with no surgical intervention and he died three days later with no autopsy.

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การพยากรณ์โรคในโรคหลอดเลือดดำสมองอุดตันโดยใช้ TV-SPSS Score

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ภูมิหลังและวัตถุประสงค์: *การพยากรณ์โรคของโรคหลอดเลือดดำสมองอุดตัน และวิธีการคำนวณแต้มง่าย ๆ เพื่อพยากรณ์โรคนี้ยังไม่เคยมีรายงานมาก่อนในประเทศไทย คณะผู้นิพนธ์จึงสร้างวิธีการคำนวณแต้มง่าย ๆ และเชื่อถือได้เพื่อการพยากรณ์โรคนี้*

วัสดุและวิธีการ: *ศึกษาย้อนหลังข้อมูลผู้ป่วยโรคหลอดเลือดดำสมองอุดตันจากสถาบันฝึกอบรมแพทย์ทางประสาทวิทยา 8 แห่ง ในประเทศไทยระหว่างเดือนเมษายน พ.ศ. 2536 ถึง กันยายน พ.ศ. 2548 ลักษณะทางคลินิกต่าง ๆ ได้แก่ อาการปวดศีรษะ อาการชัก ปัจจัยเสี่ยงโรคหลอดเลือดดำสมองอุดตัน กลาสโกว์โคม่าสเกล ค่าความดันโลหิตขณะผู้ป่วยถึงโรงพยาบาล ภาวะขั้วประสาทตาบวม อาการอ่อนแรงร่างกายครึ่งซีก อาการแสดงการระคายเยื่อหุ้มสมอง ตำแหน่งหลอดเลือดดำสมองอุดตัน การมีเลือดออกในสมอง ค่าความดันน้ำไขสันหลังขณะเปิด การรักษาต่าง ๆ ที่ได้รับ ระยะเวลาป่วยในโรงพยาบาล และภาวะโรคแทรกซ้อนต่าง ๆ ได้นำมาวิเคราะห์เพื่อประเมินผลการรักษาโดยใช้ค่าแรนกินสเกลที่ดัดแปลง โดยกำหนดค่าพยากรณ์โรคเลว เมื่อค่าแรนกินดัดแปลงระหว่าง 3 ถึง 6 ในวันจำหน่ายผู้ป่วยจากโรงพยาบาล*

ผลการศึกษา: *ผู้ป่วยทั้งหมดมี 194 คน เป็นเพศหญิง 127 ราย (ร้อยละ 65.46) ค่าอายุเฉลี่ยที่ 36.6 ± 14.4 ปี ผู้ป่วย 51 ราย (ร้อยละ 65.5) อยู่ในกลุ่มที่มีการพยากรณ์โรคเลว (ค่าแรนกินสเกลที่ดัดแปลงแล้วที่ 3 ถึง 6) ผู้ป่วยเสียชีวิตร้อยละ 8.4 การวิเคราะห์ข้อมูลด้วย univariate และ multivariate โปรแกรม SPSS version 11.5 พบว่ามีปัจจัยเพียง 4 ชนิดที่สามารถบ่งชี้การพยากรณ์โรคนี้ คือ การมีโรคมะเร็งร่วม ค่ากลาสโกว์โคม่าสเกลต่ำ ภาวะเลือดออกในสมอง (สำหรับการพยากรณ์โรคเลว) และการมีหลอดเลือดดำ lateral sinus อุดตัน (สำหรับการพยากรณ์โรคดี) จากนั้นได้สร้างสมการคำนวณแต้มที่เรียกว่า TV-SPSS score โดยอาศัยปัจจัยทั้ง 4 ชนิดดังกล่าวโดยวิธี multiple logistic model*

สรุป: *คณะผู้นิพนธ์ได้สร้างสมการคำนวณง่ายๆขึ้นมาเพื่อพยากรณ์โรคในผู้ป่วยโรคหลอดเลือดดำสมองอุดตัน ซึ่งมีความไวสูง (ร้อยละ 93) แต่มีความจำเพาะต่ำ (ร้อยละ 33) การศึกษาเพื่อทดสอบความแม่นยำของสมการนี้สมควรดำเนินการในกลุ่มประชากรอื่นต่อไป*