Outcome Predictor of Spontaneous Intracerebral Hemorrhage Management: Ten-Year Neurosurgical Experience at Ramathibodi Hospital

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Objective: *To determine the one-year outcome predictor for spontaneous intracerebral hemorrhage (sICH) patient population admitted to the Division of Neurosurgery, Faculty of Medicine, Ramathibodi Hospital, Mahidol University, Bangkok, Thailand. This was also to provide a better understanding to assist physicians and caregivers in evaluating sICH survivors during this first year after treatment.*

Material and Method: *The authors reviewed brain computed tomographic films and medical records of all sICH cases admitted at Ramathibodi Hospital, Mahidol University between 1999 and 2009. One-year outcome predictors were determined using multiple logistic regression statistical analyses.*

Results: *There were 537 cases with sICH diagnosis between 1999 and 2009. However, 239 cases were collected after online medical record review and 138 completed medical record files were retrieved. Modified Rankin Scale (mRS) was used to determine the authors' outcome treatment and categorized into two groups. The crucial group (mRS 5 and 6) and the favored group (mRS < 5) were compared. Volume of sICH and Initial hospitalization Glasgow Coma Scale were the significant predictors of one year treatment outcome for all locations of sICH. Using two classifications of intracerebral hemorrhage volume (less than 30 cc, and more than 30 cc) and three categories of the Glasgow Coma Scale (13-15, 9-12, and 8 or less), one year treatment outcome was predicted correctly with odd ratio and 95% confidence interval.*

Conclusion: *Volume of sICH and initial hospitalization Glasgow Coma Scale is significantly influential to be one-year predictor in patients with sICH. The expectation of the treatment has to be discussed and planned for long-term management.*

Keywords: *Spontaneous intracerebral hemorrhage, One-year outcome predictors, Survival*

J Med Assoc Thai 2011; 94 (12): 1471-5
Full text. e-Journal: *http://www.jmat.mat.or.th*

In Thailand, the incidence of spontaneous intracerebral hemorrhage (sICH) is 30% of all strokes, while it accounts for 10 to 20% of all strokes in Western countries[1-8]. This incidence has a higher morbidity and mortality than cerebral infarction[6,9,10]. Around 30 to 50% of sICH patients expire in the first month[6,11]. To date, there is no proven benefit of surgical treatment in sICH. Several observational studies reported various prediction models and scales for ICH outcome[7,12-27]. The accessibility of validated reliable grading or scale is used as predictive tools of long-term clinical outcome in the present study. Various grading or scales are expected to improve reliability in sICH treatment. In order to assess the optimal outcome during the first year after treatment, modified Rankin Scale (mRS) is for the purpose of one-year outcome assessment. The authors conducted a retrospective study of sICH patients who were treated and followed-up for one year outcome. The objective of the present study was to determine one-year outcome predictor of sICH treatment in the patient population who were admitted in the Division of Neurosurgery, Faculty of Medicine, Ramathibodi Hospital, Mahidol University, Bangkok, Thailand and were assessed by the modified Rankin Scale (mRS) at one year.

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Material and Method

After an institutional review board (IRB) approval, the authors reviewed the brain computed tomographic films and medical records of all sICH cases in Ramathibodi Hospital, Mahidol University. The inclusion criteria are including patients age ≥ 18 years

old who were hospitalized with sICH in Ramathibodi Hospital during 1999-2009. There were including the patients with hypertensive and coagulopathic conditions. The patients with end stage renal disease were excluded. From Table 1, the clinical predictors of sICH were proposed by several studies particularly in Thailand[1]. One-year outcome predictors were determined using multiple logistic regression statistical analyses. There were 537 cases with sICH diagnosis during 1999-2009. However, 239 cases were collected after online medical record review and 138 completed medical record files were retrieved. One year after treatment modified Rankin Scale (mRS) was used to determine outcome treatment. sICH patient were categorized into two groups. The crucial group (mRS 5 and 6) and the favored group (mRS < 5) were compared in each following issue as shown in Table 1. Descriptive statistics in term of mean, standard deviation (SD), frequency and percentage were used. Comparison between two groups was employed by Chi-square test for categorical variables and unpaired t-test for continuous variables. A p-value of less than 0.05 was considered statistical significant difference. Odds ratio (OR) with 95% confidence interval (95% CI) were performed to present the risk factors.

Results

There was no significant difference between the two groups including sex, age, underlying diseases, presenting symptoms and definite treatment as shown in Table 1. However, two issues (initial hospitalization GCS and hematoma volume) were significantly different. In the crucial group (after one year mRS = 5 and 6), there were 18.9% in mild level of initial hospitalization GCS, 35.1% in moderate level of initial hospitalization GCS and 45.9% in severe level of initial hospitalization GCS. For the favored group (after one year mRS < 5), there were 76.2% in mild level of initial hospitalization GCS, 17.8% in moderate level of initial hospitalization GCS and 5.9% in severe level of initial hospitalization GCS. Whereas some patients in both groups were on anticoagulants, there was no significant difference ($p > 0.05$). Moreover, concerning the hematoma volume in the crucial group (after one year mRS = 5 and 6), there were 54% for hematoma less than 30 cc and 46% for hematoma

Table 1. Description's of patient characteristics between mRS 5-6 and mRS < 5

Factor	mRS 5-6 (n = 37)	mRS < 5 (n = 101)	p-value
Sex			
Male	23 (62.16)	61 (60.40)	0.851
Female	14 (37.84)	40 (39.60)	
Age, mean (SD)	54.46 (3.11)	57.84 (1.68)	0.158
Hypertention			
No	3 (8.11)	8 (7.92)	0.607
Yes	34 (91.89)	93 (92.08)	
Anticoagulant-associate ICH	23 (22.77)	10 (27.03)	0.604
Symptoms			
Alteration of consciousness	33 (89.19)	85 (84.16)	1.000
Weakness	4 (10.81)	13 (12.87)	
Dysphasia	0 (0)	1 (0.99)	
Headache	0 (0)	1 (0.99)	
Seizure	0 (0)	1 (0.99)	
GCS			
Mild (13-15)	7 (18.92)	77 (76.24)	<0.001
Moderate (9-12)	13 (35.14)	18 (17.82)	
Severe (≤ 8)	17 (45.95)	6 (5.94)	
Surgery			
No	27 (72.97)	78 (77.23)	0.604
Yes	10 (27.03)	23 (22.77)	
Volume			
< 30 CC	20 (54.05)	81 (80.20)	0.002
≥ 30 CC	17 (45.95)	20 (19.80)	

more than 30 cc. For the favored group (after one year mRS < 5), there were 80.2% for hematoma less than 30 cc and 19.8% for hematoma more than 30 cc.

The risk factor for disability or death regarding to sICH is shown in Table 2. By using multiple logistic regression, two classifications of intracerebral hemorrhage volume (less than 30 cc and more than 30 cc) and three categories of the initial hospitalization Glasgow Coma Scale (13-15, 9-12 and 8 or less) were compared and predicted correctly with odds ratio and 95% confidence interval. Concerning the intracerebral hemorrhage volume, the patient who had intracerebral hemorrhage more than 30 cc are at risk of disability or death rather than who had hematoma volume less than 30 cc but there is no significantly different (p = 0.594). While the patient who had severe deterioration in the initial hospitalization GCS are also at significantly increased risk of disability or death (p < 0.001) as shown in Table 2.

Table 2. Risk factor of disability or death: multiple logistic regression

Factor	OR (95% CI)	p-value
GCS		
Severe	36.83 (9.35, 145.02)	<0.001
Moderate	9.16 (2.82, 29.72)	<0.001
Mild	1	
Volume		
≥ 30 CC	1.35 (0.45, 4.01)	0.594
< 30 CC	1	

Discussion

Amongst ten-year medical record reviews, nearly 74% of all cases could not be retrieved because about 50% of these had been eradicated along the hospital policy and the rest could not be contacted. Finally, 138 cases were recruited. Two groups were categorized (the crucial group (mRS 5 and 6) and the favored group (mRS < 5)) and anticoagulant-associated ICH became common in both groups without statistical significant difference. All cases were reviewed after one year of treatment and assessed with mRS. Concerning the long term predictors for sICH patients, several reports noted that the level of GCS, hematoma volume, amount of blood in the ventricles, age, fever, presenting symptoms, location of hematoma and high blood pressure had been the significant evidence in many models[1,6,9,11-13,18,20,22,24,28-36]. The present study reveals the concordant verification of the long-term prediction for the outcome of treatment in sICH particularly the level of GCS and hematoma volume. The purpose of the present study was to validate sICH outcome prediction to test various individual patient outcome treatment. The authors propose that the specific ability of this sICH outcome prediction is significant for clinical decision making and common expectation of patient, family and physician team. Because these outcome predictors were developed from specific populations of patients, so they just could provide general probabilities of a specific treatment outcome. These significant risk factors of disability or death have natural uncertainty with wide confidence intervals that might be caused by a small number of subjects in the present study. Prognostication of outcome predictor for individual patients can lead to better understanding and caregiver expectation in patients with sICH.

Conclusion

Volume of sICH and initial hospitalization Glasgow Coma Scale are significant predictors for one-year treatment outcome for all locations of sICH. Among physicians, caregivers and sICH patient's family, the expectation of the treatment has to be discussed and planned for long-term management.

Potential conflicts of interest

None.

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ปัจจัยทำนายผลการรักษาผู้ป่วยโรคเลือดออกในสมองที่ไม่ได้เกิดจากอุบัติเหตุ: ประสบการณ์การรักษาผู้ป่วยในหน่วยประสาทศัลยศาสตร์โรงพยาบาลรามาธิบดีในช่วงเวลาสิบปีย้อนหลัง

ประเสริฐ ศัลย์วิวรรธน์, สรยุทธ ชำนาญเวช

วัตถุประสงค์: *เพื่อศึกษาปัจจัยทางคลินิกที่สามารถทำนายผลการรักษา ผู้ป่วยโรคเลือดออกในสมองจากความดันโลหิตสูง หลังได้รับการรักษาไปแล้วหนึ่งปี เพื่อให้เกิดความรู้ความเข้าใจแก่แพทย์ทั่วไป ครอบครัวของผู้ป่วย และผู้ให้การดูแลผู้ป่วยโรคเลือดออกในสมองจากความดันโลหิตสูงในการให้การดูแลผู้ป่วยในระยะยาวต่อไป*

วัสดุและวิธีการ: *ทบทวนข้อมูลจากเวชระเบียนของผู้ป่วยโรคเลือดออกในสมองจากความดันโลหิตสูงที่ได้รับการรักษาที่หน่วยประสาทศัลยศาสตร์ โรงพยาบาลรามาธิบดี ระหว่างปี พ.ศ. 2542 ถึง พ.ศ. 2552 โดยศึกษาข้อมูลย้อนหลังของผู้ป่วยจำนวน 138 ราย โดยแบ่งกลุ่มผู้ป่วยออกเป็นสองกลุ่มโดยอาศัย modified Rankin Scale (mRS) ประกอบด้วยกลุ่มที่เจ็บป่วยพิการรุนแรงจนอาจเสียชีวิตได้ (mRS = 5-6) และกลุ่มที่เจ็บป่วยพิการ (mRS < 5) ได้วิเคราะห์ข้อมูลโดยอาศัยตัวแบบถดถอยพหุคูณโลจิสติค*

ผลการศึกษา: *โดยทบทวนข้อมูลจากเวชระเบียนของผู้ป่วยโรคเลือดออกในสมองจากความดันโลหิตสูงจำนวน 138 ราย และแบ่งเป็นสองกลุ่มด้วย mRS ปริมาตรของเลือดที่ออกในสมองและระดับความรู้สึกตัวของผู้ป่วยเมื่อแรกรับ (Glasgow Coma Scale) มีความสำคัญทางสถิติอย่างมีนัยสำคัญในกลุ่มผู้ป่วยทั้งสองกลุ่ม ผู้ป่วยที่มีปริมาตรเลือดออกในสมองมากกว่า 30 มิลลิลิตร มีความเสี่ยงสูง 1.35 เท่าของผู้ป่วยที่มีปริมาตรเลือดออกในสมองน้อยกว่า 30 มิลลิลิตร แต่ไม่มีความแตกต่างอย่างมีนัยสำคัญ ในขณะที่ผู้ป่วยที่มีระดับการรู้สึกตัวต่ำเมื่อแรกรับมีความเสี่ยงสูงถึง 37 เท่าของผู้ป่วยที่ระดับการรู้สึกตัวที่ดีกว่า*

สรุป: *การศึกษาพบว่าปริมาตรของเลือดที่ออกในสมองและระดับความรู้สึกตัวของผู้ป่วยเมื่อแรกรับ (Glasgow Coma Scale) เป็นปัจจัยสำคัญทางคลินิกที่สามารถทำนายผลการรักษาผู้ป่วยโรคเลือดออกในสมองจากความดันโลหิตสูงหลังได้รับการรักษาไปแล้วหนึ่งปี นอกจากนี้ปัจจัยทั้งสองสามารถนำไปให้เป็นข้อมูลในการแนะนำ และพยากรณ์ผลการรักษาผู้ป่วยโรคเลือดออกในสมองจากความดันโลหิตสูงสำหรับแพทย์ทั่วไป และครอบครัวผู้ป่วยต่อไป*