# Chronic Subdural Hematoma: Drainage vs. No Drainage

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***Objective:*** *To compare the result of chronic subdural hematoma (CSDH) treatment by burr hole with and without closed system drainage in 143 Thai patients at Ramathibodi Hospital.*
***Material and Method:*** *A retrospective study of 143 patients with CSDH treatment at Ramathibodi Hospital between 2002 and 2008 was performed. They underwent burr hole with or without drainage according to the preference of the attending neurosurgeons. The authors compared the result of the two CSDH methods by using CT or MRI of brain post-operatively, complications, recovery condition, mortality rate, and recurrence.*
***Results:*** *Ninety-seven patients were treated with closed system drainage and 46 were treated without drainage. There was no statistical significant distribution in the clinical profiles of both groups. The coagulopathy in both groups might contribute for the recurrence of CSDH while there was no correlation of the recurrence to the other clinical profiles. Fifteen patients (16%) in the drainage group had CSDH recurrence while there were 12 patients (26%) in the no drainage group.*
***Conclusion:*** *Concerning the complete neurological recovery and the recurrence rate of CSDH treatment, there were more complete neurological recovery cases and a lower recurrence rate of CSDH cases in the drainage group but there was no statistical significant difference.*

***Keywords:*** *Chronic Subdural Hematoma (CSDH), Drain and no drain, Recurrence rate*

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In 1656, chronic subdural hematoma (CSDH) was firstly described by JJ Wepter[1]. There is an old collection of blood and blood breakdown products between the surface of brain and the covering dura[1]. CSDH is one of the frequent lesions that the neurosurgeons treat in the variety of methods including craniotomy[2,3], twist drill craniostomy[4], craniectomy[5], percutaneous tapping[6,7], endoscopy[8] and burr hole with or without closed system drainage[9]. Acceptable satisfactory results were also achieved. These several techniques were indicated by the re-bleeding in the subdural space, hematoma density, age, bleeding tendency, atrophy of brain and depend on the attending neurosurgeons' preference particularly to drain or no drainage. The present study intends to compare the outcome of CSDH treatment in the aspect of recurrence and the neurological recovery status of the patients who were treated by burr hole craniostomy with or without closed system drainage.

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## Material and Method

The medical records of all patients with CSDH at Ramathibodi Hospital between 2002 and 2008 were reviewed after the IRB approval. One hundred seventy two patients were retrieved by using keywords of chronic SDH and burr hole. Twenty-nine patients were excluded due to the insufficient data of CT, operative details, follow-up data, and non-retrievable medical record. One hundred forty three patients were included in the present study. The pre and post-operative conditions were graded according to the Markwalder grading system[10] as shown in Table 1. The clinical characteristics of the patients including age, gender, clinical presentation, coagulation status, and previous cranial surgery are shown in Table 2. The surgical procedure was burr hole craniotomy, evacuated the subdural blood by repeated irrigation with physiologic saline solution. Group 1 had closed wound with drainage while group 2 had closed wound without drainage. Ninety-seven patients were included in group 1, and 46 in group 2. The statistical analysis

was determined by the Chi-square test to evaluate significant differences between both groups. P-value of less than 0.05 was considered significant.

## Results

The preoperative statuses of the patients are shown in Table 2. The clinical features of both groups (drainage and no drainage) were not significant different in distribution. Mean age of group 1 was 60.5 (SD = 20.1) and group 2 was 64.5 (SD = 14.7). Forty-one (42%) and 21 (46%) patients used anticoagulant for some underlying diseases, respectively. The average thickness of CSDH was 2.1 cm and 2.0 cm respectively. The density of hematoma from brain CT scan were 37 (38%) and 16 (35%) of hypodensity, 41 (42%) and 20 (43%) of isodensity, 19 (20%) and 10 (22%) of mixed density, respectively. The operative methods in both groups were chosen by the preference of attending neurosurgeons without considering the clinical characteristics. From Table 3, there was no statistical significance of the clinical characteristic distribution in both groups.

The outcome of treatment in group 1 and group 2 is shown in Table 4. In group 1, 15 patients (16%) had recurrent hematoma while 12 (26%) had in group 2. Seventy-nine patients (81%) in group 1 and 32 (70%) in group 2 had good recovery. The mortality rate was two cases (2%) and one case (2%) respectively.

**Table 1.** Markwalder grading system

| | |
|---|---|
| Grade 0 | Absence of neurological symptoms or deficit |
| Grade 1 | Mild symptom with or without mild deficit |
| Grade 2 | Drowsiness or disorientation with variable deficit |
| Grade 3 | Stuporous, severe focal deficit |
| Grade 4 | Coma with decorticate or decerebrate or no response |

**Table 2.** Summary of clinical characteristis of 143 patients with CSDH

| | Number (%) |
|---|---|
| Age | |
| Mean (SD) | 61.8 (18.6) |
| Gender | |
| Male | 96 (67) |
| Female | 47 (33) |
| Clinical presentation | |
| Headache | 43 (30) |
| Hemiparesis, Drowsy | 79 (55) |
| Stuporous to semicoma | 21 (15) |
| Bleeding tendency | 62 (43) |
| Previous cranial surgery | 36 (25) |

## Discussion

There were several CSDH controversial points about the pathogenesis[11,12], and about the method of choice for the treatment[9,13-15]. 6%-25% of mortality and morbidity have been reported[16,17].

Tsutsumi et al reported about the rate of recurrence of which there were 3.1% for drainage and 17% for no drainage[18]. Lind et al showed a recurrent rate of 10% and 19% while Wakai et al reported a recurrent rate of 5% and 33% respectively[19,20]. These two studies are consistent with a positive effect of drain in prevention of recurrence.

**Table 3.** Surgical methods of drain and no drain in the patients related with clinical characteristic

| | Drain | No drain | p-value |
|---|---|---|---|
| No. of patients | 97 | 46 | |
| Age | | | |
| Mean (SD) | 60.5 (20.1) | 64.5 (14.7) | 0.223 |
| Gender | | | |
| Male (%) | 66 (68) | 30 (65) | 0.737 |
| Female (%) | 31 (32) | 16 (35) | |
| Bilateral CSDH (%) | 21 (22) | 10 (22) | 0.990 |
| Bleeding risk + (%) | 41 (42) | 21 (46) | 0.703 |
| Size of hematoma, cm (median range) | 2.1 (1.2-4.2) | 2 (1.2-4) | 0.399 |
| Density of hematoma (%) | | | |
| Hypodensity | 37 (38) | 16 (35) | 0.915 |
| Isodensity | 41 (42) | 20 (43) | |
| Mixed density | 19 (20) | 10 (22) | |

**Table 4.** The relationship between drain and no drain groups with outcomes

| | Drain | No drain | p-value |
|---|---|---|---|
| Patient-number | 97 | 46 | |
| Complete recovery | 79 (81) | 32 (70) | 0.111 |
| Complications | 2 (2) | 1 (2) | 0.965 |
| Severe deficit | 3 (3) | 3 (7) | 0.339 |
| Died | 2 (2) | 1 (2) | 0.965 |
| Recurrence hematoma | 15 (16) | 12 (26) | 0.129 |

**Table 5.** Risk factors for poor recovery, multiple logistic regression (odd ratios larger than 1 indicate increased risk)

| | Odd ratio (95% CI) | p-value |
|---|---|---|
| Age (per year increase) | 0.973 (0.943-0.999) | 0.040 |
| Density | | |
| Hypodensity | 1 | NA |
| Isodensity | 0.527 (0.163-1.70) | 0.285 |
| Mixed density | 3.84 (1.10-13.4) | 0.034 |
| Bilateral hematoma | 3.62 (1.17-11.2) | 0.025 |
| Previous cranial surgery | 2.35 (1.04-5.32) | 0.040 |

**Table 6.** Factors associated with recurrence

| | Odd ratio (95% CI) | p-value |
|---|---|---|
| Age (per year increase) | 0.978 (0.954-1) | 0.085 |
| Gender (men-women) | 2.99 (0.996-8.96) | 0.051 |
| Bleeding tendency | 6.21 (2.24-17.2) | <0.001 |
| Density of hematoma | | |
| Hypodensity | 1 | NA |
| Isodensity | 3.01 (0.920-9.87) | 0.069 |
| Mixed density | 7.10 (2.06-24.4) | 0.002 |

The authors explained our CSDH treatment with burr hole craniostomy with and without closed system drainage in patients. There were no statistical significant differences in the recurrence aspect. There were 15 patients (16%) in group 1 being recurrent and 12 patients (26%) in group 2. However, there was a favorable recovery outcome in the group 1. Furthermore, there was still no significant difference in comparison with group 1 as shown in Table 4. There was no statistical significance between the risk factors and recovery condition as shown in Table 5. The authors noted that bleeding tendency and mixed density of the hematoma tended to increase the recurrent rate of CSDH according to multivariable GEE logistic regression test as shown in Table 6.

## Conclusion

Concerning the complete neurological recovery and the recurrent rate of CSDH treatment, there were more complete neurological recovery cases and lower recurrent rate of CSDH cases in the drainage group (group 1) but there was no statistical significant difference.

## Potential conflicts of interest

None.

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## *ภาวะเลือดคั่งใต้เยื่อหุ้มสมองแบบเรื้อรัง: เปรียบเทียบการรักษาแบบใส่สายท่อน้ำเลือดกับการไม่ใส่สายระบาย*

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***วัตถุประสงค์:*** *เพื่อศึกษาเปรียบเทียบวิธีการรักษาผู้ป่วยที่มีเลือดคั่งภายใต้เยื่อหุ้มสมองแบบเรื้อรังโดยวิธีการผ่าตัดเจาะกะโหลกศีรษะแล้วใส่สายท่อน้ำเลือด กับการไม่ใส่สายระบาย*

***วัสดุและวิธีการ:*** *ศึกษาข้อมูลย้อนหลังของผู้ป่วยที่มีภาวะเลือดคั่งภายใต้เยื่อหุ้มสมองแบบเรื้อรังที่มารักษาที่โรงพยาบาลรามาธิบดี จำนวน 143 ราย ระหว่างปี พ.ศ. 2545 ถึง พ.ศ. 2551 ผู้ป่วยทั้งหมดได้รับการรักษาโดยวิธีผ่าตัดเจาะกะโหลกศีรษะ ล้างเลือดที่คั่งอยู่ออกและแบ่งเป็นสองกลุ่ม กลุ่มที่ 1 ใส่สายระบายเลือดออกเวลาปิดแผล กลุ่มที่ 2 ไม่ใส่สายระบายเลือดออกเวลาปิดแผล เปรียบเทียบผลการรักษาของผู้ป่วยทั้งสองกลุ่ม โดยดูจากภาพเอกซเรย์คอมพิวเตอร์หรือคลื่นแม่เหล็กไฟฟ้าของสมองหลังผ่าตัด ปัญหาแทรกซ้อน ภาวะการฟื้นตัวของระบบประสาท อัตราการเสียชีวิต และอัตราการเกิดเลือดคั่งซ้ำซ้อน*

***ผลการศึกษา:*** *ผู้ป่วย 97 ราย ได้รับการรักษาโดยวิธีเจาะกะโหลกศีรษะและใส่สายระบายเลือด ขณะที่ผู้ป่วยอีก 46 ราย ได้รับการรักษาแบบเดียวกันแต่ไม่ใส่สายระบาย คุณสมบัติต่างๆ ทางคลินิกของผู้ป่วยทั้งสองกลุ่มไม่มีความแตกต่างกันอย่างมีนัยสำคัญทางสถิติ จากการศึกษาพบว่าผู้ป่วยที่มีความผิดปกติทางการแข็งตัวของเลือดอาจมีส่วนทำให้เกิดมีเลือดคั่งซ้ำซ้อน ซึ่งคุณสมบัติทางคลินิกอื่น ๆ ไม่มีส่วนเกี่ยวข้อง สำหรับการเกิดเลือดคั่งภายใต้เยื่อหุ้มสมองซ้ำพบว่า ผู้ป่วยกลุ่มที่ใส่สายระบายมีอัตราการเกิดซ้ำ 16% อีกกลุ่มหนึ่งมีอัตราการเกิดซ้ำ 26% โดยที่ทั้งสองกลุ่มมีผลการรักษาด้านอื่นไม่แตกต่างกันทางสถิติอย่างมีนัยสำคัญ*

***สรุป:*** *ไม่มีความแตกต่างกันทางสถิติอย่างมีนัยสำคัญของอัตราการเกิดภาวะเลือดคั่งภายใต้เยื่อหุ้มสมองเรื้อรังแบบเกิดซ้ำ และการฟื้นตัวของระบบประสาทของผู้ป่วยทั้งสองกลุ่ม*