OPTIMAL DIAGNOSIS AND MANAGEMENT OF CHRONIC SUBDURAL HAEMATOMAS

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Resume. The aims of this study were to review the surgical outcomes of patients with **c**hronic subdural haematoma **(**CSDH) and assess the risks of antiplatelet in their surgical management.
We retrospectively analyzed 112 consecutive patients with CSDH treated by one burr hole surgery at our institution. Among them, 16 patients had been on antiplatelet therapy. We analyzed the association between recurrence and patient characteristics, including history of antiplatelet or anticoagulant therapy; age (< 70 years or > 70 years); side; and previous medical history of head trauma, infarction, hypertension and other diseases. Recurrence occurred in 10 patients (8.9%). Univariate analysis showed that only the presence of bilateral haematomas was associated with increased recurrence rate while antiplatelet or anticoagulant therapy did not significantly increase recurrence risk. However, multivariate analysis revealed that previous history of cerebral infarction was an independent risk factor for CSDH recurrence.
Our overall data support the safety of early surgery for patients on the preoperative antiplatelet therapy without drug cessation or platelet infusion. Patients with a previous history of infarction may need to be closely followed regardless of antiplatelet or anticoagulant therapy.
Key words: chronic subdural haematoma, surgery, outcome, recurrence.

ОПТИМАЛЬНЫЕ МЕТОДЫ ДИАГНОСТИКИ И ЛЕЧЕНИЯ ХРОНИЧЕСКИХ СУБДУРАЛЬНЫХ ГЕМАТОМ

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Резюме. Целью исследования являлось изучение результатов хирургического лечения хронических субдуральных гематом (ХСГ) и оценка риска противосвертывающей терапии в хирургическом лечении ХСГ.
Нами проведен ретроспективный анализ результатов хирургического лечения 112 пациентов с ХСГ путем наложения одной фрезеотомии. Среди них 14 больных получали противосвертывающую терапию. Мы анализировали ассоциацию между рецидивом и характеристикой пациентов, включая антикоагулянтную терапию, возрастом пациентов (< *70* лет или > 70 лет); стороной локализации гематом, наличием в анамнезе черепно-мозговой травмы, гипертензии и других заболеваний.
Рецидивы гематом отмечены у 10 пациентов *(*8,9%). Анализ показал, что лишь наличие двухсторонних гематом имеет ассоциацию с высоким риском рецидивов, тогда как получение антикоагулянтной терапии не показало значимого повышения риска рецидива. Однако, мультивариационный анализ обнаружил, что инфаркт головного мозга явился независимым фактором риска для развития рецидива гематом.
Полученные результаты подтвердили наши наблюдения, где ранняя хирургия без отмены антикоагулянтной терапии является безопасной. Пациенты с наличием инфарктов головного мозга требуют пристального внимания независимо от приема антикоагулянтной терапии.
Ключевые слова: хроническая субдуральная гематома**,** хирургия, исходы, рецидив.

ХРОНИКАЛЫК СУБДУРАЛДЫК ГЕМАТОМАЛАРДЫ АНЫКТООНУН ЖАНА ДАРЫЛООНУН ОПТИМАЛДЫК ЫКМАЛАРЫ

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Корутунду. Изилдөөнүн максаты хроникалык субдуралдык гематомаларды (ХСГ) дарылоонун жыйынтыктарын талдоо жана антикоагулянттык терапиянын хирургиялык дарылоодо тобокел фактор катары баа берүү.

ХСГларды бир фрезеотомиялык хирургиялык жол менен дарылоонун 112 бейтаптардагы жыйынтыктарына ретроспективдик анализ жасалган. Алардын арасында 16 бейтап антикоагулянттык терапия алышкан. Биз ХСГ рецидивдери менен бейтаптардын мүнөздөмөлөрүнүн ортосундагы ассоциацияны талдадык. Аларга антикоагулянттык терапия, бейтаптардын курагы (< 70 жаш же > 70 жаш); гематоманын жайгашкан тарабы, баш мээ жарааты, гипертензия ж.б. ооруулар кирген.
Гематомалардын рецидивдери 10 бейтапта (8,9%) кездешкен. Эки тараптуу гематомалардын рецидивдер менен жогорку тобокелдик ассоциациясы бар экендиги айкын болду. Антикоагулянттык терапия тобокелдик фактор катары маанилүү эмес экендиги аныкталды. Бирок, мультивариациялык анализ мээ инфаркты көз каранды эмес тобокел фактор экендигин көрсөттү.
Алынган жыйынтыктар антикоагулянттык терапияны токтотпой эрте жасалган хирургиялык дарылоо коркунучтуу эмес деген биздин ишенимди бекемдеди. Мээ инфарктынан жапа чеккен бейтаптар антикоагулянтнтык терапияга карабастан өзгөчө көнүл бурууну талап кылаары такталды.
Негизги сөздөр: хроникалык субдуралдык гематома, хирургия, акыбети, кайталануу.

Introduction. Chronic subdural haematoma (CSDH) is one of the most common types of intracranial haemorrhage, especially among the elderly [1]. Although surgical treatment, including burr hole surgery, has been widely accepted as the most effective method to treat CSDH, the recurrence rate after surgery ranges from 9.2% to 26.5% in the recent literature [2-7]. While numerous factors are considered to be associated with CSDH recurrence [4, 6, 8-17] there appears to be no established consensus. Background information of patients needs to be carefully collected because previous studies have suggested that patient characteristics contribute to predicting recurrence, and information on these characteristics may lead to better postoperative follow-ups in patients with a high recurrence risk. In addition, some investigators have noted that patients treated with antiplatelet or anticoagulant therapy exhibited a higher risk than those having no bleeding tendencies [10, 18, 19]. Despite the widespread use of drugs that potentially increase the risk of haemorrhage, optimal management of patients with CSDH on them remains to be elucidated. Here, we retrospectively analyzed our surgical outcome of one burr hole surgery for CSDH to seek for the optimal management for patients on antiplatelet or anticoagulant therapy.

Materials and methods

Patient selection and data collection

We retrospectively analyzed 112 consecutive CSDH cases treated by one burr hole opening and irrigation at the Department of Neurosurgery, National Hospital of the Kyrgyz Republic, for the period of time 2005 to 2017. Diagnoses were made based on computed tomography (CT) in all cases. Thus, all surgeries of 112 patients with CSDH were included in this study. We reviewed patient characteristics including age (<70 years or > 70 years); side; previous history of head trauma; history of antiplatelet, anticoagulant therapy; and previous history of infarction, hypertension, diabetes mellitus, haemodialysis, seizure, cancer, or liver cirrhosis.

Treatment protocol

Our surgical protocol included trepanation of a single burr hole and irrigation of the haematoma with saline solution under general anaesthesia. A closed drainage system with a silicone tube was placed in the haematoma cavity except in patients whose haematoma cavities were too narrow for the tube to be inserted. Our treatment strategy for bilateral CSDH cases was to first treat only the symptomatic side. If patients with bilateral CSDHs presented with nonfocal deficits, such as severe headache or disturbances of consciousness, irrigation was performed on both sides. Those treated with antiplatelet therapy were instructed to stop therapy on admission, and surgery was performed within 0-2 days after admission depending on the severity of symptoms. If patients were treated with anti-coagulation therapy, the effect of warfarin was reversed with vitamin K2 or fresh frozen plasma and surgery was postponed until the prothrombin time/ international normalized ratio was within the normal range.

Neurological examinations were performed daily during admission and at discharge. Postoperative CT scans were obtained immediately after surgery or on day 7. Antiplatelet or anticoagulant therapy was reinitiated when no further blood accumulation was observed. The follow-up regarding CSDH was censored by neurosurgeons at our institution on an outpatient basis when any concerns of haematoma reaccumulation in terms of radiological and neurological examination were denied. Then, the follow-up was continued by local general practitioners. We also utilize the follow-up data from the charts if the patients had physiological or neurological check-ups at our institution. The surgical outcome was determined using Glasgow Outcome Scale (GR, good recovery; MD, moderate disability; SD, severe disability; PVS, persistent vegetative state; D, death) when the patients were discharged from our hospital.

We defined recurrence as a subsequent symptomatic increase in haematoma volume of the ipsilateral subdural haematoma, not including a contralateral symptomatic CSDH requiring surgery. When patients had the second or third recurrence, we analyzed data only from their first recurrence.

Statistical analysis

We performed Fisher's exact test for univariate analysis and multiple logistic regression analysis for calculation of odds ratios to determine the characteristics associated with increased recurrence risk. $p < 0.05$ was considered statistically significant.

Results

A total of 112 patients (122 surgeries) were included in this study. Among them, 78 were men (70.1%) and 34 were women (29.9%) and had an age range from 19 to 77 years (average age, 61.1 years). The average length of follow-up was 42.1 months (median: 27 months, 95% confidence interval 38.2-46.1). The information on the surgical outcome was lost for one patient. The follow-up data were collected for all 112 patients. One hundred-two patients (91.1%) returned to independent living without symptoms. While eight patients (7.2%) ambulated with minor disabilities, only 2 patients (1.6%) were regarded as SD.

Ten patients (8.9%) experienced at least one recurrence of CSDH during the study period. Of these, 9 patients (95.0%) underwent one reoperation, one patient (2.5%) had two, and one patient (2.5%) had three. An univariate analysis of the associations between CSDH recurrence and each risk factor was done. CSDH recurrence was significantly associated with bilateral haematomas ($p = 0.009$). Previous history of infarction and an episode of seizure at the onset approached significance ($p = 0.07$). We could not find any significant differences between CSDH recurrence and antiplatelet, anticoagulant therapy or previous history of hypertension or cancer.

Multivariate logistic regression analysis revealed that bilateral CSDHs (odds ratio, 2.55; 95% confidence interval, 1.24-5.14; $p = 0.009$) and previous history of cerebral infarction (odds ratio, 5.01; 95% confidence interval, 1.27-18.4; $p = 0.016$) were independent risk factors for CSDH recurrence (Table II).

Antiplatelets were discontinued on admission for all 16 patients on antiplatelet therapy. One burr hole opening and irrigation was conducted within 2 days for 13 patients (87.9%), within 5-7 days for two (3.4%), and 8 days or more after surgery for five (8.6%). There was no significant difference in the recurrence rate between early (0-2 days from admission) and elective (5 days or more after admission) surgery ($p = 0.59$).

Antiplatelet therapy was recommenced within 7 days after surgery for 4 patients (25.9%), within 2 months for 4 patients, and 3 months or more after surgery for 3 patients (24.1%). Antiplatelet therapy was terminated after surgery for six patients. Excluding eight patients whose information regarding drug recommencement could not be obtained, no significant difference in the recurrence rate was observed between the group of early recommencement (within 7 days or earlier after surgery) and that of late recommencement (8 days or more after surgery) ($p = 0.34$).

Discussion

Risk factors for CSDH recurrence are generally divided into radiological findings, especially CT findings, surgical strategies, and patient characteristics. Radiological findings, such as multiplicity of haematomas and high or mixed densities on preoperative CT, and surgical strategies, such as a large amount of residual air in the postoperative haematoma cavity, an upright posture soon after surgery, and drainage location, were found to be correlated with CSDH recurrence in previous studies [8,12,15-17]. In this study, we primarily focused on patient characteristics to simply evaluate the risks resulting from antiplatelet or anticoagulant therapy. Those who undergo surgery for CSDH are often followed by local primary physicians. Therefore, information regarding risk factors associated with recurrence regarding patient background would be beneficial for health care providers.

In previous studies, several risk factors such as advanced age, bilateral haematomas, previous history of head trauma, anticoagulant therapy, hypertension, diabetes mellitus, seizures, brain atrophy, and alcohol abuse have been reported to be associated with CSDH recurrence [4,6,9-11,13,14,16,17]. Our statistical analysis showed that bilateral lesions and previous history of cerebral infarctions were associated with CSDH recurrence, but there was no association between CSDH recurrence and antiplatelet or anticoagulant therapy. However, the validity of the findings on anticoagulant therapy is limited because only 18 patients on anticoagulant therapy were included in this study. Torihashi et al. reported that the presence of bilateral haematomas was significantly associated with a high recurrence rate [6]. The existence of haematomas on both sides may indicate the presence of prolonged brain atrophy in these patients, which may lead to a poor brain reexpansion rate and a higher recurrence rate after surgery [14, 16]. We could not evaluate the correlation between the bilaterality and the presence of brain atrophy because we focused on patient characteristics in this study. Another possible explanation for the high recurrence risk in bilateral cases was our treatment strategy. We

first attempted to treat the haematomas only on the symptomatic side for bilateral cases and observed the contralateral haematoma. Consequently, these patients were less able to tolerate small reaccumulations and were more symptomatic on the treated side than patients with unilateral CSDH.

The odds ratio of previous cerebral infarctions was high (~5.0) in our study. Some previous studies found no association between history of stroke and CSDH recurrence [6, 12, 17], but they included both cerebral infarction and haemorrhage cases. To the best of our knowledge, no study has examined cerebral ischemia separately from cerebral haemorrhage. Those with previous history of infarction may have problems with walking due to motor weakness or imbalance, leading to an increase in the risk of fall and another episode of head injury. In addition, these patients with previous history of infarction may have significant brain atrophy, which may increase the recurrence risk [16-20]. Interestingly, treatment with antiplatelet therapy was not a statistically significant risk factor in our study, despite the popular belief that it would increase the possibility of bleeding. Optimal management of patients with CSDH and bleeding has not been analyzed well in spite of the recent increased use of these drugs. Early surgery (within 2 days after admission) was performed in 87.9% of patients on antiplatelet therapy. The timing of drug recommencement has not been discussed enough in the literature. In this study, the recurrence rate was not affected by whether the medication was resumed within 7 days or not. However, this should not be simply acknowledged because antiplatelet agents were recommenced arbitrarily depending on the patients' condition in this study. Based on this result, however, it certainly seems worth of reassessing the necessity to discontinue the antiplatelet agents in the perioperative period.

There are some limitations that are inherent to this type of retrospective study. We cannot eliminate the small possibility that some patients had recurrence and underwent surgery at other institutions, although our institution covers a large area as a local referral centre for neurosurgical patients. We were unable to analyze the effect of alcohol consumption because, for some patients, the information on the exact amount of the alcohol was missing in their charts. We did not examine the possible correlation between radiological features of haematoma and patients' characteristics. However, none of previous studies on the recurrence of CSDH has analyzed all the risk factors collectively, implying the methodological difficulty. We believe that a large prospective study with a good follow-up rate is desirable.

Conclusions

Bilateral haematomas and previous cerebral infarctions were independent risk factors for CSDH recurrence. Patients with previous history of cerebral infarction may need to be monitored closely, even after uneventful surgical treatment. Our data also demonstrated that antiplatelet therapy before onset was not associated with an increased risk of recurrence. For patients on antiplatelet therapy, no significant difference in the recurrence rate was identified between early surgery and elective surgery. Based on our data, one burr hole opening and irrigation for CSDH might be safe and feasible even for patients on antiplatelet therapy without a cessation of antiplatelet agents.

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