Can Recurrent Chronic Subdural Hematomas Be Predicted? A Retrospective Analysis of 136 Cases

Bekir Tuğcu, Osman Tanrıverdi, Serhat Baydın, Ömür Günaldı, Ender Ofluoğlu, Bülent T. Demirgil

Bakırköy Prof. Mazhar Osman Research and Training Hospital for Psychiatry, Neurology and Neurosurgery, 2nd Neurosurgery Clinic

DOI: 10.5350/DAJPN2010230107t

ÖZET

Tekrarlayan kronik subdural hematomlar önceden öngörülebilir mi? 136 olgunun retrospektif analizi

Amaç: Kronik subdural hematom, özellikle yaşlılarda en sık saptanan intrakranyal kanama çeşididir. Genel kabul gören "burr-hole" ile hematom boşaltılması operasyonu sonrası, seyrek denilmeyecek bir ölçekte tekrarlama izlenebilir. Bu çalışmada, tekrarlamayı kolaylaştıran nedenlerin ortaya konması amaçlanmaktadır.

Yöntem: Retrospektif olarak 136 olgu değerlendirilerek klinik parametreler, anamnez özellikleri, koagülasyon inhibitörleri kullanımlarının tekrarlama üzerine etkisi hem tek değişkenli hem de çok değişkenli testlerle araştırıldı.

Bulgular: 136 olgunun, 27'sinde en az ikinci bir operasyon gerekmişti. Yapılan tek değişkenli ve çok değişkenli analizler sonucunda, hematomun bilateral olduğu hastalarda, tek taraflı olanlara göre, tekrarlamanın daha sık olduğu saptandı (sırası ile, %37, %11). Buna karşılık, cins, yaş, anamnezde hipertansiyon ya da diyabet mevcudiyeti, travma öyküsü ve süresi, antiagregan kullanımı gibi etkenlerin tekrarlama üzerinde etkisinin bulunmadığı izlendi.

Sonuç: Çalışmamızda incelenen etkenlerden yalnızca hematomun bilateral olmasının tekrarlamayı etkilediği saptanmış olup, altta yatan muhtemel beyin atrofisi, koagülopati gibi nedenlerin buna yol açtığı düşünülmüştür.

Anahtar kelimeler: Kronik subdural hematom, tekrarlama, risk etkenleri

ABSTRACT

Can recurrence of chronic subdural hematoma be predicted? a retrospective analysis of 136 cases

Objective: Chronic subdural hematoma is the most common intracranial hematoma effecting especially elderly population. There is a substantial recurrence rate after evacuation by burr-hole surgery. In this study, we aimed to determine predictors associated with recurrence.

Methods: We retrospectively analyzed 136 consecutive patients with chronic subdural hematoma. Clinical parameters, anamnesis, previous anticoagulant drug use have been evaluated with univariate and multivariate analyses to determine predictors associated with recurrence

Results: At least a second surgery was needed in 27 patients of 136. We showed that recurrence rate was significantly higher in patients with bilateral subdural hematoma, after univariate and multivariate analyses (37% versus 11%). We did not find any significant relationship between recurrence and age, gender, hypertension and/or diabetes mellitus in anamnesis, preceding head trauma and time interval, anticoagulant and/or antiaggregan therapy.

Conclusion: After analysis of all evaluated factors, only bilateral hematoma was found correlated with high recurrence rate, probably due to previous brain atrophy or existing coagulopathy.

Key words: Chronic subdural hematoma, recurrence, risk factors

Address reprint requests to:
Bekir Tuğcu, Sırpsındığı Sok. Köksal Apt., 31/5 Merter 34010 İstanbul - Turkey

Phone: +90-212-543-8667

E-mail address:
bekirtugcu@superonline.com

Date of acceptance:
February 05, 2010

INTRODUCTION

Chronic Subdural Hematoma (CSDH) is the most common type of intracranial hematoma seen in the practice of brain surgery. Particularly in populations of older individuals, it has emerged as a typical head injury. A common treatment for hematoma drainage is the burr-hole method, safely used for nearly 30 years in CSDH cases.

As the number of old population increases, CSDH is seen more frequently. In order to better understand the development process of this condition, it is important to determine and define the risk factors for chronic subdural hematoma, as well as the predisposing factors

for recurrence. CSDH managed with the burr-hole method recurs at a rate of approximately 9.2- 26.5% emerging a need for a second attempt (1-7). In recurring subdural hematoma cases, different factors are reported as independent risk factors. These factors may include age, antiagreggant or anticoagulant treatment, recurrent traumas and certain biochemical parameters (1-4,6). In this study, our objective is to determine the predisposing factors in recurring subdural hematomas that occur after a surgical drainage procedure using the burr-hole method in CSDH patients.

METHOD

The 136 chronic subdural hematoma cases that had operations between June 1999 and December 2008 in the 2nd Neurosurgery Clinic of our hospital were evaluated retrospectively. Cranial computerized tomography (CT) had been applied to all CSDH cases before the operation. In some cases, cranial magnetic resonance imaging (MRI) had also been performed before the operation.

Demographic data and the personal histories of all patients were accessed through their files. As a surgical method, all patients underwent hematoma drainage with the burr-hole method under local anesthesia and irrigation of subdural distance. The patients who had a craniotomy were excluded from the study. A closed drainage system was placed in subdural distance after irrigation. For all cases, control cranial CT was available within 24 hours after operation. Drainage systems were terminated within 2 to 4 days. All of the patients were managed in accordance with cranial CT clinic protocol, on the first day, first week and first month after the operation. For the radiological aspect, the patients who were not managed before and after the operation, or whose radiological surveys were not accessible, were excluded from the study.

The patients who were receiving anticoagulant treatment were taken into surgery when their "International Normalized Ratio" (INR) blood values reached normal values. In our clinic, the following procedure is used for patients whose INR values are high and who require an operation: Medications being taken by patients are stopped before the operation in order to decrease INR values; vitamin K and/or fresh frozen plasma (FFP) is given to patients until their INR values are within the normal limits, and then daily INR controls are evaluated.

For patients who are taking antitrombocytic treatments, these medications are stopped before the operation and an additional survey of hemorrhage diathesis is not made. Current treatments of all patients using an antiagreggant were resumed on the seventh following the surgery.

In this study, the presence of head trauma, the period between head trauma and surgical intervention, and the interval between the head trauma and surgery for the patients taking and not taking anti-trombocytic/ antiagreggant medication were recorded for all patients by scanning hospital records.

In this study, single-variate analysis was used to study whether age, gender, unilateral or bilateral existence of subdural hematoma, the period between head trauma and surgical procedure, and the patient's history of using an antiaggregant and/or anticoagulant have an effect on the recurrence of subdural hematoma.

Statistical analysis was prepared using the SPSS 13,0 program (SPSS Inc, Chicago; IL). While an "independent sample T" test was applied on numerical values, Chi-square test was used for nominal values. Statistically significant parameters were taken into multivariate analysis with logistic regression analysis and independent predisposing factors were researched. In all applied statistical analysis, the significance value was accepted as $p<0.05$.

RESULTS

In this study, 136 cases who had surgical procedures in our clinic due to CSDH and who fulfilled the criteria of the study were included. When bilateral cases were taken into consideration, there were operations on 182 lesions.

In total, operations were successful in 80.2% of the cases (109 of 136 patients) after the first surgery. In 27 cases (19.8%), at least a second operation was required. The recurrence rate was 14.8% (27/182) when it was

Table 1: Results of single-variate analysis

Factor	Recurrence (+) N=27 n (%)	Recurrence (-) N=109 n (%)	x^2	t	p
Factor					
male	22 (81.4)	76 (69.7)	1.48		0.22
female	5 (18.6)	33 (20.3)			
Age ± S.S.	61.7 ± 16.4	60.6 ± 18.6		0.28	0.77
Hypertension					
yes	16 (59.2)	68 (62.3)	0.09		0.7
no	11 (40.8)	41 (37.7)			
Diabetes mellitus					
yes	3 (11.2)	14 (12.8)	0.59		0.8
no	24 (88.8)	95 (87.2)			
Use of alcohol					
yes	0 (0)	3 (2.8)			
no	27 (100)	106 (97.2)			
History of trauma					
yes	16 (59.2)	72 (66)	0.43		0.5
no	11 (40.8)	37 (34)			
Use of antithrombocytic					
yes	6 (22.3)	31 (28.4)	0.42		0.5
no	21 (77.7)	78 (71.6)			
Use of anticoagulant					
yes	2 (7.5)	3 (2.8)	1.32		0.25
no	25 (92.5)	106 (97.2)			
INR (Average)	1.21	1.04		0.99	0.32
aPTT (Average)	34.2	30.8		1.4	0.16
Hematoma localization					
unilateral	10 (37.1)	80 (73.3)	12.78		0.001
bilateral	17 (62.9)	29 (26.7)			
Period between trauma and surgery	44.4 gün	50.1 gün		0.52	0.43

x^2: Pearson Chi-Square Test, t: Student T Test, S.S.: Standard Deviation

Table 2: Results of multivariate analysis

	Odds Ratio	%95 Confidence Interval	p
Gender	0.09	0.12-1.31	0.32
Hypertension	0.16	0.38-1.6	0.16
Diabetes mellitus	0.01	0.35-1.36	0.97
History of trauma	0.06	0.19-1.3	0.64
Use of Antithrombocytic	0.35	0.23-1.3	0.79
Use of Anticoagulant	0.58	0.62-1.8	0.33
INR	0.44	0.03-1.84	0.33
aPTT	0.03	0.04-1.1	0.07
Hematoma localization	0.36	1.61-1.91	0.006

evaluated in terms of lesions. Information about the cases and the one-way analysis results are shown in Table 1, and the multi-factor analysis results are shown in Table 2.

Of 136 cases, 98 were male (72.1%) and 38 were female (27.9%). Minimum age was 3 and maximum age was 96 (the average age is 60.8). The effect of age and gender on recurrence was not statistically significant.

While 84 of the patients (61.8%) had a history of hypertension, 17 patients (12.5%) had diabetes mellitus. Subdural hematoma recurred after the operation in 16 of the patients with hypertension (19.1%) and in 3 of the patients with diabetes (17.6%). For cases without hypertension and diabetes, subdural hematoma recurred in 11 (21.1%) and 24 (20.2%) cases respectively. Observations indicated that the absence of hypertension or diabetes of patients does not affect recurrence of subdural hematoma (p=0.8 and p=0.7 respectively).

Alcohol use was present in only 3 of the cases and recurrence was observed in one of these cases. A statistical study could not be made due to the scarcity of cases.

There was a distinct head trauma in the history of 88 cases (64.7%). The period between head trauma and admission to the hospital was an average of 48.7 days. While the recurrence rate was 18.2% (n=16) in patients with head trauma, it was 22.9% (n=11) in patients without head trauma. It was determined that a history of head trauma does not have any effect on recurrence (p=0.5). Observations indicated that the period between trauma and surgical treatment does not have effect on recurrence of hematoma (p=0.43).

While 37 of the cases (27.2%), were taking an antiaggregant, only five cases (3.7%) were receiving anticoagulant treatment at the time of admission to the hospital. Incidents of recurrence were present in 6 patients (16.2%) who were taking an antiaggregant, and it was present in 21 patients (21.2%) not taking the medication, but the difference was not statistically significant (p=0.5). While recurrence was observed in 2 patients who were taking an anticoagulant, the recurrence was present in 25 patients (19.1%) who were not on an anticoagulant treatment. We can mention a tendency towards recurrence although this is a small number of cases and not statistically significant (p=0.25).

While unilateral subdural hematoma was present in 90 of the cases (66.2%), 46 of them (33.8%) showed bilateral subdural hematoma and were treated with surgery. While a second operation was required in 17 of the cases (36.9%) previously treated with surgery due to bilateral SDH, operations were required for only 10 of the patients (11,1%) due to unilateral SDH. This difference was statistically significant(p<0,01). A greater number of bilateral SDH was observed in the patients who had an extended period of coagulation.

DISCUSSION

While CSDH is generally known as a curable condition, usually it does require repeated surgical treatment; frequencies varying from 2.7-33% were reported in the literature for repeated surgical treatment in CSDH (1-7). There is not a standard consensus about the surgical treatment method. For the last twenty years, the most frequently used surgical techniques have been burr-hole drainage, irrigation and closed drainage.

Although it has been suggested that removal of the membrane has an effect on preventing the recurrence, there is debate on this matter. In a study conducted by Lee et al, it was found that the recurrence rate was lower in the patients whose membranes were not removed than those whose membrane was removed partially or completely (7). They suggested that the crucial factor in CSDH pathogenesis is activation of current blood products and fibrinolysis; therefore, the existing clot and blood must be eliminated rather than removing the membrane. This situation is partially valid for the early stage CSDH known as the proliferative phase. In advanced forms, partial or total membrane removal should be added to treatment. In 60-80% of the patients with CSDH, quality of life standards pre- condition can be restored by means of surgical treatment. In many studies, the factors that cause recurrence after an operation in CSDHs are defined. These factors include age, history of alcohol use, diabetes, presence of brain atrophy, bilateral state of hematoma, hemorrhage diathesis or use of anticoagulant medicines, condition after operation and technical differences in the surgery. In our study, the objective is to define the factors that lead to recurrence in CSDH independently.

Age: The literature states that the risk of CSDH recurrence increases with age. This may be associated with atrophy. In our study, no difference was observed

between the average ages of the patients with recurrent and non-recurrent SDH (p=0,7). These results are consistent with the literature (2-4,6,7).

Gender: In general, the male/female rate in CSDH is 2/1 and a similar result was seen in our study (1-4,6,7). The research suggests that males are more inclined to trauma, which could explain the prevalence for males. An examination of the literature does not show a difference between males and females in terms of recurrence of SDHs, and this was also consistent with our study.

Hypertension: There are an inadequate number of studies in the literature on whether hypertension affects recurrence in patients with CSDH. A recent study showed that hypertension does not have any effect on recurrence (1). In a study conducted by Weigel et al, recurrence after an operation was seen to occur less often in the patients using angiotensin converting enzyme inhibitors (6). Treatments that affect angiogenesis should be evaluated in terms of CSDH recurrence.

Diabetes: Diabetes may have an effect on hemorrhage for several reasons. A well known pathology in diabetic patients is capillary vasculopathy. Particularly for patients with CSDH, there is a sufficient capillary network on the outer membrane and the vasculopathy here may lead to a growth or recurrence in hematoma. However, Yamamato et al. showed that diabetes is an independent predisposing factor in recurring CSDH cases (8). Torihashi et al. also speculated that viscosity increases in diabetic patients, an osmotic increase will trigger coagulation and decrease the risk of hematoma; however, they could not determine diabetes as an effective factor in their studies (1). In our study, no association was found between diabetes and CSDH recurrence in both one-way and multivariate statistical analyses.

Trauma: Trauma, in our and other studies, is the most important etiological factor in patients with CSDH (1-3,5,9). The average period between trauma and surgery is 48.7 days. In the analyses made taking 50 days as the limit value, the recurrence rates do not vary. Stanisic et al. considered 60 days as the basis and showed that a tendency of recurrence in patients who had a trauma history of less than 60 days is more common (3). Nakaguchi and his colleagues explained this situation through the existence of a limited hematoma organization at an early stage with immature fibrosis in new membranes (10). These new membranes are unstable in periods of laminar and the resolved form of SDH and hyperfibrinolitic activity is higher. Intervention during these periods will be accompanied with more recurring hemorrhage. In the late trabecular period, large fibrosis components are placed and the tendency towards hemorrhage is lowered. In our study, 50 days were taken as the basis as a value closest to the average period of trauma-surgery; however, such a relationship was not observed.

Bilateral Chronic Subdural Hematoma: In our study, the bilateral hematoma rate is compatible with the studies in the literature (1,7,11). In previous studies, bilateral CSDH became a risk factor for recurrence. It is expected that brain reexpansion after surgical drainage of SDH will close the SDH distance. In patients with bilateral CSDH, the rate of atrophic brain detection is high. As there is no expansion in atrophic brain after the surgery, it is probable that recurrence will be higher (12). Again, in patients with bilateral CSDH, duration of coagulation is longer (13). The limited coagulation capacity after surgery may be a risk factor for recurrence. In our study, localization of hematoma was determined as the factor mostly associated with recurrence (Table 2) we observed a correlation between time of coagulation and bilateral state of hematoma and it is thought that brain atrophy that plays the most significant role in this association.

Use of antitrombocytic and anticoagulant medicines: Except for many surgical modalities, the use of anantiagreggant or anticoagulant increases the difficulty of brain surgery. Prescription of antitrombocytic and/or anticoagulant medicines does gradually increase, especially in aging populations. In the patients without a trauma history, the most frequent predisposing factor is treatment with these medications (4,14,15). While Lindvall et al found the rate of using an antiagreggant and/or anticoagulant was 18% in the patients with trauma history, this rate

was 71% in those without trauma (9). There was no association between antiagreggants/anticoagulants and recurrence (1,3,9). On the contrary, Rust et al. reported that the rate of recurrence requiring another surgery is higher in the patients taking an antiagreggant treatment (14). Again, Lee et al. showed that the rate of recurrence in patients with coagulopathy is distinctly higher (7). Torihashi et al, as an interesting situation, determined that PT/INR value was adequate in 1/3 of the patients using anticoagulants in non-recurrent cases (1). In our study, no relation was found that recurrence is higher in patients taking antiagreggant treatment. The number of patients using anticoagulant was low, thus, it was not possible to reach a distinctive statistical result.

There are also some limitations in our study. Some factors such as condition after operation and the presence of brain atrophy, which have been discussed as a cause of recurrence independently, particularly in recent periods, were not evaluated in our study because of retrospective design (4,12,16,17).

REFERENCES

1. Torihashi K, Sadamasa N, Yoshida K, Narumi O, Chin M, Yamagata S. Independent predictors for recurrence of chronic subdural hematoma: a review of 343 consecutive surgical cases. Neurosurgery 2008;63:1125-1129.
2. Baechli H, Nordmann A, Bucher HC, Gratzl O. Demographics and prevalent risk factors of chronic subdural haematoma: results of a large single-center cohort study. Neurosurg Rev 2004;27:263-266.
3. Stanisic M, Lund-Johansen M, Mahesparan R. Treatment of chronic subdural hematoma by burr-hole craniostomy in adults: influence of some factors on postoperative recurrence. Acta Neurochir (Wien) 2005;147:1249-1256.
4. Abouzari M, Rashidi A, Rezaii J, Esfandiari K, Asadollahi M, Aleali H, Abdollahzadeh M. The role of postoperative patient posture in the recurrence of traumatic chronic subdural hematoma after burr-hole surgery. Neurosurgery 2007;61:794-797.
5. Ramachandran R, Hegde T. Chronic subdural hematomas; causes of morbidity and mortality. Surg Neurol 2007;67:367-373.
6. Weigel R, Hohenstein A, Schlickum L, Weiss C, Schilling L. Angiotensin converting enzyme inhibition for arterial hypertension reduces the risk of recurrence in patients with chronic subdural hematoma possibly by an antiangiogenic mechanism. Neurosurgery 2007;61:788-792.
7. Lee JY, Ebel H, Ernestus RI, Klug N. Various surgical treatments of chronic subdural hematoma and outcome in 172 patients: is membranectomy necessary? Surg Neurol 2004;61:523-528.
8. Yamamoto H, Hirashima Y, Hamada H, Hayashi N, Origasa H, Endo S. Independent predictors of recurrence of chronic subdural hematoma: results of multivariate analysis performed using a logistic regression model. J Neurosurg 2003;98:1217-1221.
9. Lindvall P, Koskinen LO. Anticoagulants and antiplatelet agents and the risk of development and recurrence of chronic subdural haematomas. J Clin Neurosci 2009;16:1287-1290.
10. Nakaguchi H, Tanishima T, Yoshimasu N. Factors in the natural history of chronic subdural haematomas that influence their postoperative recurrence. J Neurosurg 2001;95:256-262.
11. Robinson RG. Chronic subdural hematoma: surgical management in 133 patients. J Neurosurg 1984;61:263-268.
12. Mori K, Maeda M. Surgical treatment of chronic subdural hematoma in 500 consecutive cases: clinical characteristics, surgical outcome, complications, and recurrence rate. Neurol Med Chir (Tokyo) 2001;41:371-381.
13. Oyama H, Ikeda A, Inoue S, Shibuya M. The relationship between coagulation time and bilateral occurrence in chronic subdural hematoma. No To Shinkei 1999;51:325-330.
14. Rust T, Kiemer N, Erasmus A. Chronic subdural haematomas and anticoagulation or anti-thrombotic therapy. J Clin Neurosci 2006;13:823-827.
15. Wintzen AR, Tijssen JG. Subdural hematoma and oral anticoagulant therapy. Arch Neurol 1982;39:69-72.
16. Nakajima H, Yasui T, Nishikawa M, Kishi H, Kan M. The role of postoperative patient posture in the recurrence of chronic subdural hematoma: a prospective randomized trial. Surg Neurol 2002;58:385-387.
17. Amirjamshidi A, Eftekhar B, Abouzari M, Rashidi A. The relationship between Glasgow coma/outcome scores and abnormal CT scan findings in chronic subdural hematoma. Clin Neurol Neurosurg 2007;109:152-157.