



Research Article

Comparison of Burr Hole Irrigation and Closed System Drainage Methods After Burr Hole Irrigation in The Treatment of Chronic Subdural Hematoma

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Summary

Objective: Comparison of evacuation of hematoma through burr hole irrigation (BHI) and closed system drainage (CSD) after burr hole irrigation in the treatment of chronic subdural hematoma (CSDH) in terms of relapse.

Materials and Methods: 32 patients who were operated with CSDH diagnosis between 2001 and 2008 were retrospectively evaluated with respect to clinical features, etiologic factors, surgical technique and recurrence. Of the 5 recurrent cases in BHI group, 2 (20%) received tap and 3 received excision of hematoma via craniotomy. No pathology requiring additional surgery was detected in the follow-up of the patients who underwent BHI-CSD.

Conclusion: Closed system drainage through burr hole irrigation in CSDH cases is a simple and reliable method which reduces the risk for recurrence and reoperation and enables evacuation of anticoagulants such as plasminogen and thrombomodulin, products of impaired coagulation- anticoagulation balance.

Key words: Chronic Subdural Hematoma, Burr hole craniostomy, closed system drainage, recurrence, irrigation

Kronik Subdural Hematom Tedavisinde Burr Hole Irrigasyon ile Burr Hole Irrigasyon Sonrası Kapalı Sistem Drenaj Yöntemlerinin Karşılaştırılması

Özet

Amaç: Kronik Subdural Hematom (KSDH) tedavisinde burr hole irrigasyonla (BHİ) hematom boşaltılması ile burr hole irrigasyon sonrası kapalı sistem drenajı (BHİ-KSD) uygulanmasının nüks açısından karşılaştırılması.

Gereç ve Yöntem: KSDH tanısı ile 2001-2008 yılları arasında opere edilen 32 olgu klinik özellikleri, etyolojik neden, uygulanan cerrahi yöntem ve rekürrens açısından retrospektif olarak değerlendirildi. BHİ grubunda nüks gelişen 5 olgunun (%20) 2'sinde tap, olguların 3'ünde kraniotomi ile hematom eksizyon yapılmıştır. BHİ-KSD uygulanan olguların takiplerinde ek cerrahi gerektirecek patoloji saptanmamıştır.

Sonuç: KSDH olgularında burhole irrigasyon ile kapalı sistem drenaj uygulanması bozulmuş olan koagülasyon – antikoagülasyon dengesinin ürünü olan plasminojen ve trombomodulin gibi antikoagulanların boşaltılmasını sağlayarak nüks ve reoperasyon riskini azaltacak basit ve güvenli bir metottur.

Anahtar Kelimeler: Kronik Subdural Hematom, Burr hole kraniostomi, Burr hole kraniostomi- kapalı sistem drenaj, Rekürrens, irrigasyon

INTRODUCTION

Chronic Subdural hematoma (CSDH) is one of the most common conditions encountered in routine neurosurgery practice and leads to a mortality rate of 13%⁽¹⁵⁾. Although in the past, drainage of hematoma through craniotomy was a common practice, in recent years, burr hole craniostomy has become popular because of high rates of morbidity (12.3%) and mortality (30%) with craniotomy^(4,15). Nevertheless, various additional procedures have been proposed due to a recurrence rate as high as 20% with burr hole drainage. In some of these methods, various numbers of burr holes (one or two), irrigation, drainage, and if drainage is applied, the area of drainage (frontal, temporal, or parietal), the style of drainage, and the position of the head postoperatively have been focused^(1,11,12,14,15).

In this study, drainage of hematoma through burr hole irrigation (BHI), and closed system drainage (BHI-CSD) after burr hole irrigation were compared for recurrence in the treatment of chronic subdural hematoma.

MATERIAL AND METHODS

Thirty-two patients with chronic subdural hematoma were diagnosed with computer tomography (CT) and operated between 2001 and 2008. Two patients had a history associated with chronic alcohol consumption; 2 patients, antiagregan drug use; 7 patients, fall from a high place; 1 patient, head-trauma with a falling wood piece. The complaints upon presentation

were hemiparesis in 18 (56.25%), mental changes in 7 (21.87%), and hemiparesis and mental changes in 7 (22.47%) patients. Twenty patients who were performed BHI and 12 patients who were performed closed system drainage (CSD) for 24-48 hours after drainage through BHI were compared. In 5 patients, in whom bilateral hematoma was diagnosed, bilateral surgery was performed in the same session. Six patients in BHI group and 3 patients in BHI-CSD group were operated while under local anesthesia. In the first group, only one burr-hole was opened in 6 patients and in the second group, 2 burr holes were opened in all the patients. The clinical characteristics of the patients according to surgical procedures applied are shown in Table 1.

On presentation, 4 patients were evaluated as grade I; 26 patients, as grade II; 2 patients, as grade III, and on discharge, 25 patients were evaluated as grade 0; 3 patients, as grade I; 3 patients, as grade II, and 1 patient, as grade III by Markwalder scale[3]. No pathologies were observed during the follow-up period in the patients of BHI-CSD group that required additional surgery.

During the follow up period, recurrence was observed in 5 patients (15,6%) who were treated by BHI method. Two of 5 patients (20%) with recurrence from BHI group were performed tap, and 3 were performed craniotomy for excision. No pathologies requiring additional surgery were determined in the BHI-CSD group. (Chi-square - 3.56; p= .0594).

Table 1: The distribution of the characteristics of the patients according to surgical groups

	Burr-hole with drainage		Without drainage	
n=32	12		20	
Age	72.33		69.55	
Sex				
F	3		7	
M	9		13	
Complaint(s)				
Headache	10		17	
Neurologic deficit	8		12	
Loss of consciousness	2		5	
Predisposition				
Trauma	3		5	
Coagulopathy	1		1	
Alcoholism	1		1	
Other	7		13	
Markwalder	Preop	Post-op	Per-op	Post-op
Classification				
Grade 0	0	10	0	15
Grade 1	1	1	3	2
Grade 2	11	1	15	2
Grade 3	0	0	2	1
Grade 4	0	0	0	0
Recurrence	0		5	

DISCUSSION

Recurrence in patients with chronic subdural hematoma (CSDH) is basically evaluated on the bases of characteristics of the patient, pathogenesis of CSDH, and surgical procedure applied. Symptomatic recurrence has been noted in 8%–37% of postoperative patients^(3,14). Recurrence has been associated with patient characteristics such as age, alcoholism, coagulation disorders, and atrophic brain structure, the characteristics of pseudo membrane, and features of hematoma^(2,5,7,8,13). Additional manipulation was usually required after the pseudo membrane was removed, irrigation, and/or drainage. In this study, hematoma was discharged through a burr hole, and the area was irrigated. The rate of recurrence was 15,6% and lower in the patients that were applied drainage after hematoma discharge than in the patients that were not applied drainage.

In symptomatic cases with CSDH, Putnam and Cushing removed the outer membrane through craniotomy in 1925, and the method was used for many years⁽¹⁵⁾. However, the mortality and morbidity rates of the method were nearly 30 %. Therefore, studies were conducted to determine safer methods. McKissock et al were the pioneers in reducing the mortality through simple burr hole drainage⁽⁶⁾. Although burr hole drainage has been popular, Markwalder has determined reaccumulation, insufficient brain expansion, and solid hematoma as indications for craniotomy⁽⁴⁾.

Despite wide-spread use of burr hole method, higher incidence of CSDH and brain atrophy in older individuals constitute a risk for recurrence. In such patients, persistence of dead space in the subdural area due to insufficient expansion is the main risk factor for recurrence. On the other hand, coagulation in the hematoma mass and disordered fibrinolysis mechanisms have been reported to play a role in recurrence. With their anticoagulant

activity, plasminogen and thrombomodulin expressed by sinusoidal veins in the outer membrane of a subdural hematoma increase the volume of the hematoma. By irrigation of the hematoma area with saline after complete discharge and drainage of the hematoma, the unity of which is destroyed, the anticoagulant mechanism explained above will be interrupted^(9,10).

In this study, when the surgical technique used was evaluated with respect to recurrence, it was determined that all of the 5 patients (20%) with recurrence were in the group that did not receive CSD intervention, and thus, use of one burr hole only was considered an important risk factor for recurrence. In the study by Tausky et al, recurrence and the number of burr holes were evaluated, and the highest recurrence rate was determined in the patients with one burr hole among the patients who were performed CSD⁽¹²⁾. Six patients in the BHI group of our study were treated through one burr hole, while 2 patients in the BHI-CSD group were treated through 2 burr holes. In both groups, irrigation was continued until clear fluid was received. All of the 5 patients with recurrence were in BHI group; however, no recurrences were observed in the patients in BHI-CSD group. Similarly, Wakai et al found a significantly reduced rate of recurrence with drainage method⁽¹⁶⁾. A drain applied in the subdural area for a few days postoperatively may aid in re-expansion of the brain⁽¹⁷⁾.

In conclusion, combination of irrigation through a burr hole and removal of anticoagulants, such as plasminogen and thrombomodulin, in the coagulation-anticoagulation balance by closed system drainage is a safe and simple method in reducing the recurrence and reoperation risks in the treatment of patients presenting with chronic subdural hematoma.

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