Subgalial Suction Drain versus Subdural Drain in Chronic Subdural Hematoma

OSAMA M. ABD EL-WAHAB, M.D.* and AHMED S.K. ABD EL-WAHED, M.D.**
The Department of Neurosurgery, Faculty of Medicine, Beni-Suef* and Cairo** Universities, Egypt

Abstract

Background: Chronic Subdural Hematoma (CSDH) is a common type of intracranial hemorrhage predominantly seen in the elderly. Urgent burr hole evacuation and closed drainage is the most accepted method for treatment. Both subgialial suction and subdural drains were widely used.

Objectives: This study aimed to compare subgalial suction, and subdural drains in treatment of chronic SDH regarding the clinical and radiological outcomes.

Patients and Methods: Medical records of twenty two patients with chronic SDH admitted to Cairo University Hospital during the period from July 2014 to June 2015 were collected, patients were divided into two groups; Group I: Twelve patients where a suction subgalial drain was used, Group II: Ten patients, where a subdural drain was used, all patients were followed-up for a minimum of 3 months period, and were retrospectively reviewed as regard details of clinical presentation, surgical aspects, clinical and radiological outcomes.

Results: There were thirteen males and nine females with mean age 64.8 years, range (49-81 years). The main presentation was weakness in seventeen patients (77%), followed by headache, which was associated with weakness in thirteen patients (59%), alone in three patients (13.6%), two patients (9%) presented with disturbed level of consciousness. Twenty one patients (95%) showed clinical improvement. Radiological evidence of recurrence occurred in one patient from Group I, which was asymptomatic, with no further operation needed during 3 months follow-up period. Morbidity occurred in one patient from Group II in the form of superficial wound infection, which responded to conservative management. A single mortality case in this series from Group II didn't survive due to his bad chest condition.

Conclusion: Subgialial and subdural drains are both safe and effective methods for drainage after evacuation of CSDH, with no statistical difference in clinical outcomes. Subdural drain could be associated with less radiological recurrence.

Key Words: Chronic subdural hematoma – Subgalial drain – Subdural drain.

Introduction

THE modern history of CSDH dated back to 1657, when the Swiss pathologist Johann Wepfer discovered a large sac filled with blood underneath the dura as a cause of death in a postmortem study of a cerebrovascular victim. D’Errico and German described this as the first attested case of CSDH [1]. Based on another postmortem study of cases with no obvious history of trauma, Virchow in 1857 assumed that the condition is inflammatory in origin, and he introduced the term Pachymeningitis haemorrhagica interna [2]. The first successful neurosurgical intervention was reported in 1883 by Hullke [3], and the traumatic etiology of CSDH was emphasized for the first time in 1914 by Trotter [4]. In 1925, the condition has gained its nowadays nomenclature; CSDH as a result of further description of pathology and surgical treatment achieved by Putnam and Cushing [5].

Five per 100.000 is the annual estimation of new cases among general population, but the incidence is obviously higher in people aged 70 years and older [6]. Despite being poorly recognized in up to half of cases, trauma is still considered important in development of the condition. Other factors playing a role are coagulation defects, alcohol abuse, in addition to sudden decrease in the intracranial pressure secondary to lumbar puncture [7-9]. Headache, mental status alteration, focal neurological deficits, and seizures are the common presentations of CSDH [10-12]. Conservative watchful management could be advocated for small hematomas, while different techniques for surgical evacuation has been described including twist drill craniostomy, craniotomy, and endoscopic percutaneous tapping, the widely accepted surgical method is the burr hole evacuation with closed system drainage [13-16].

Correspondence to: Dr. Osama M. Abd El-Wahab, E-Mail: osama76@med.bsu.edu.eg.
Used drains could be placed in subgaleal or subdural space, and both has been widely practiced based mainly on the surgeon’s preference with no evidence indicating superiority of one over the other. This study aims to find any significant differences regarding complications and recurrence rates between subgaleal and subdural drains used following evacuation of CSDH.

Material and Methods

Twenty two adult patients with symptomatic CSDH, admitted to Cairo University Hospitals over one year period from July 2014, to June 2015, have been surgically treated using burr hole evacuation, and drainage. The medical records of the patients were collected and retrospectively analyzed. Patients were divided into two groups; whether a subgaleal drain was used in twelve patients operated by the first author (Group I), or a subdural drain in ten patients operated by the second author (Group II). Detailed medical history was obtained from patients and their relatives with especial stress on history of head trauma, anticoagulants, antiplatelet medications, fits or symptoms of increased intracranial tension. Clinical examination was performed in order to detect alteration in conscious level or neurological deficits. Preoperative CT brain was done for all patients, while MRI study was done for selected patients. Postoperative CT brain was routinely done on the first postoperative day, then after one week for all patients. Postoperative MRI brain was obtained only in selected patients. All patient were followed up for three months minimum.

Surgical technique:

All patients have been operated under general anesthesia, two curvilinear 5cm skin incisions was fashioned to allow extension for craniotomy if needed. Burr holes made, two for unilateral and four for bilateral hematomas. Dura was cauterized and incised in a cruciate manner. Collection was gradually allowed to escape in order to avoid sudden decompression. Blunt ended Nealton catheter (Fr 10) connected to a syringe filled with lactated Ringer solution adjusted to body temperature was used for gentle irrigation. Catheter was redirected in different directions to drain all loculations, and irrigation was kept till output was cleared off. In case of subgaleal drain Fig. (1), the catheter was tunneled under the skin over both burr holes to be fixed through separate stab, then connected to a closed suction system. While in case of subdural drains Fig. (2), the catheter was passed anteriorly through the posterior burr hole under vision into the subdural space, transfixed to the skin, then connected to a closed non suction system. Lowering the head as an attempt to reduce postoperative pneumocephalus was routinely practiced in all patients.

Postoperative care:

Postoperatively, all patients were admitted to the Intensive Care Unit during the first 24 hours for close monitoring of vital signs and neurological status. Bed rest with mild head elevation (30 degrees) was favored, while free mobilization was encouraged after removal of drains (48-72 hours). Thromboembolism stockings have been applied to all patients. Decision to resume postoperative anticoagulants and antiplatelets was individualized according to each patient condition and with collaboration with hematologist, and cardiologist.

Results

The study included twenty two adults with symptomatic CSDH, operated with burr hole evacuation and drainage. According to the drainage used, cases were divided into two groups; twelve patients, where a subgaleal suction drain was used (Group I), and ten patients where a subdural drain was used (Group II).

Mean age of patients at time of operation was=64.8 years, ranging from 49 to 81 years. The mean age for each group was=64.5 years (49 to 81 years), and 65.2 years (55 to 76 years) for Group I, and II respectively. Group I included eight males, and four females. While Group II included five patients for each sex. Twelve patients were harboring left side hematoma, in eight patients, hematoma was on the right side, and bilateral in two patients. Out of twenty two patients, only seven (31.8%) were able to recall a past history of head trauma (from three weeks to four months prior to presentation) four of them were in Group I. Preoperatively, one patient from Group I was on warfarin, while two patients from Group II were on antiplatelet medication (Table 1). Arachnoid cyst was associated with one patient from Group II Fig. (3). The main presentation was weakness in seventeen patients (77%), followed by headache, which was associated with weakness in thirteen patients (59%), alone in three patients (13.6%), two patients (9%) presented with disturbed level of consciousness Fig. (4). Postoperative improvement was recorded in twenty one patients, radiological evidence of recurrence occurred in one patient from Group I, which was asymptomatic, with no further operation needed.
during 3 months follow-up period. Morbidity occurred in one patient from Group II in the form of superficial wound infection, which responded to conservative management. A single mortality case in this series from Group II didn't survive due to bad chest condition.

Fig. (1): Female patient, 68 years old, (Group I) (A) Preoperative CT scan showing left frontoparietal CSDH. (B) Follow-up CT scan on next day postoperative showing complete evacuation with drain in the subgial space. (C) Follow-up after 1 week showing mild recurrence. (D) No further progression after 3 months scan.

Fig. (2): Male patient, 58 years old, (Group II) (A) Preoperative CT scan showing left frontoparietal CSDH. (B) Follow-up CT on next day postoperative showing complete evacuation with drain in the subdural space. (C) Follow-up after 1 month showing no recurrence.
Fig. (3): Female patient, 57 years (Group II). (A) Preoperative CT scan showing left frontoparietal CSDH. (B) Preoperative MRI scan showing associated left temporal arachnoid cyst. (C) Day one postoperative CT with drain in the subdural space. (D) One month postoperative MRI scan showing complete evacuation and left temporal arachnoid cyst.

Fig. (4): Patients distribution according to their clinical presentation.

Fig. (5): Patients distribution according to age.
Table (1): Patients characteristics.

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<td>Recurrence</td>
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*Rt = Right & Lt = Left & DCL + Disturbed conscious level.

**Discussion**

CSDH is one of the common neurological diseases frequently seen in older populations. The condition is well known to develop secondary to trauma, coagulopathy, anticoagulants, or antiplatelet medications [17-19]. Different treatment options has been described ranging from medical conservative management to bedside twist drill craniostomy to craniotomy. Burr hole evacuation has been accepted as the treatment of choice in many neurosurgical centers with the ability to achieve the balance of low recurrence rates recorded in twist drill craniostomy and lower mortality and morbidity following craniotomy. Closed system drainage after burr hole evacuation has been standardized as a class I evidence in 2009 after Santarius et al. which concluded a lower rate of recurrence, mortality and better outcome for patients underwent burr hole evacuation and drainage in their randomized controlled study [20]. Both subdural and subgialal drains are widely practiced, and the drainage system selection is based only on individual preference and experience. In the current study, the authors retrospectively studied twenty two patients underwent burr hole evacuation, with two different types of drainage used; subgialal in twelve patients, and subdural drain in ten patients in order to find any difference in rates of complications or recurrence.

The safety of subdural drain has been questioned by some authors regarding possible brain injury, epilepsy, or deep wound infection. Therefore they have presented the subgialal drain as a less invasive method with lower rate of complications [21,22].

Our results did not support the previous mentioned risks related to the use of the subdural drain, as only one patient had a superficial wound infection with good response to repeated dressing, and none of the studied cases had brain injuries or postoperative epilepsy. Mortality occurred in one patient from the subdural group in a 76 years old male who died three weeks postoperative. This patient was having a chronic chest disease necessitated mechanical ventilation, and mortality was attributed to his unresolved ventilation associated pneumonia. On the other hand, we reported one case of radiological evidence of recurrence in the group of subgialal drains in a 68 years old female who was on regular warfarin, and her International Normalized Ratio (INR) has been properly adjusted perioperatively using low molecular weight heparin as per cardiologist recommendations. The postoperative scans confirmed complete evacuation on the first postoperative day, then radiological recurrence was detected after one week, and remained stationary in the following scans for three months. The patient was presenting with headache and right side weakness, her symptoms markedly improved postoperatively, and no further complains during the follow-up period. These results are matching with the results of Bellut, et al. who compared both methods of postoperative drainage in their retrospective study in 113 patients and noticed tendency for lower mortality rate in subgialal drain, and a lower recurrence rate in subdural drainage after six moths, but they did not detect difference in clinical and radiological outcomes at discharge and after three months [23].

The results are mismatching those of Kaliaperumal, et al. who prospectively studied 50 patients equally divided in both groups, and found no recurrence in both groups after 6 months follow-up, but with a significant difference in outcome measured using the modified Rankin scale, emphasizing better outcome in the subgialal group after 6 months [24], and this could be explained by the longer duration of the follow-up period of the Kaliaperumal C., et al., study which was 6 months.

**Conclusion:**

Both subgialal and subdural drains used following burr hole evacuation of CSDH are effective methods, the subdural drain has an equal high safety index, with a lower rate of recurrence. A
multicenter wide scale prospective study is needed to better address any statistical difference between both methods.

Disclosure:

The author has no personal, financial or institutional interest in any of the drugs, materials, or devices described in this article.

References

مقارنة بين نظام التصريف تحت فروة الرأس ونظام التصريف تحت الأم الجافية بعد التفريغ الجراحي لحالات التجمع الدموئي المزمن تحت الأم الجافية

مقدمة: التجمع الدموئي المزمن تحت الأم الجافية من أكثر الاعراض ندرة شيوعا خاصة في كبار السن. ويعتبر التفريغ الجراحي بواسطة ثقب الجمجمة وضع نظام تصريف مغلق سواء تحت فروة الرأس أو تحت الأم الجافية من أكثر الطرق فعالة.

أسلوب البحث: تم عقد مقارنة النتائج الالكليتية ونتائج التصوير بالأشعة بين نظامي التصريف في عدد (22 مريضا) حيث تم تركيب نظام تصريف تحت فروة الرأس في عدد (12 مريضا) ونظام تصريف تحت الأم الجافية في عدد (10 مرضى).

النتائج: أظهرت النتائج الالكليتية تحسن عدد (21 مريضا), بينما سجلت وفاة مريض واحد من مجموعتي التصريف تحت الأم الجافية. وأظهرت نتائج التصوير بالأشعة حدوث إرتعاج خالي من الأعراض للتصريف الدموئي في مريض واحد من مجموعتي التصريف تحت فروة الرأس.

الخلاصة: كل من نظامي التصريف يعتبر آمن وفعال، ويمكن اعتبار نظام التصريف تحت الأم الجافية أقل قابلية للإرتعاج.