

## Surgical Treatment Of Chronic Subdural Hematoma- Single Burr Hole: Clinical Characteristics And Outcome

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### ABSTRACT:

**Objective:** To evaluate the clinical characteristics and outcome of single burr-hole evacuation in chronic subdural hematoma(CDHs).

**Materials and Methods:** A total of 67 consecutive cases who underwent single-burr hole drainage for CSDH were included in this study. We analyzed patients with CSDH admitted at PNS SHIFA Hospital from 31st Dec 2013 to 1st Nov 2014. Single burr-hole evacuation was done in all cases. Age, sex, clinical feature, etiology, clinical outcome, and recurrence were reviewed.

**Results:** There were 45 (67.16%) male patients, 22(32.83%) female patients. The age range was 30-82 years. The principal presentation was with headache (60%) followed by hemi-paresis (35.8%) and cognitive disturbances (19.4%). Most patients were admitted with history of trauma (60 cases, 89.55%). Recurrence was observed in only 4 cases.

**Conclusion:** Chronic subdural hematoma is a common neurosurgical problem. Most of the patient presented with headache and hemi-paresis. Single burr-hole evacuation has excellent outcome with minimal complications.

**Keywords:** Chronic subdural hematoma, surgical treatment, Single -Burr hole, Complications, outcome.

### INTRODUCTION:

A chronic subdural hematoma (CSDH) is a gradually evolving collection of blood and its products sited in between the subdural cavity. A CSDH is the product of injuring of the bridging veins of cerebral convexity, generally created by trauma, and other causes include brain atrophy or concomitant use of anticoagulant drugs. Moreover, according to the CT scan brain findings and on the basis of the density of hematoma, chronic subdural hematoma can also be defined as a hypo dense subdural hematoma when compared with brain parenchyma, which usually presents after 21 days.<sup>1,2</sup> It is also known as one of the common type of traumatic intracranial hemorrhage.<sup>3,4</sup>

Surgical management has been recognized as one of the most efficient way to treat CSDH. There is overall consonance that indications for surgical management exists, however the optimal technique has not been agreed upon as yet<sup>5,6,7</sup>. The three main surgical methods used for treatment of CSDH includes burr hole with or without irrigation which may or may not be with drainage system, twist drill trephination and craniotomy<sup>8</sup>. Burr hole is the most commonly used technique for management of CSDH. The burr hole method is

comparatively less invasive with better cure percentage, even for elderly or high-risk patients. Nevertheless, some patients had been reported as cases of recurrence after surgical management, with an incidence varying from 3.7 to 30%<sup>8,9</sup>. At PNS -SHIFA, single burr hole with irrigation is the surgical treatment of choice in such cases. Present study was designed to evaluate clinical characteristics and outcome of single burr-hole evacuation in patients having chronic subdural hematoma.

### MATERIALS AND METHODS:

This prospective study was conducted at PNS-SHIFA hospital from 31<sup>st</sup> December 2013 to 1<sup>st</sup> November 2014. 67 patients with CSD were analyzed. On admission, neurologic examination was performed using the Glasgow Coma Scale score. History was collected from patient or their family members, of trauma, symptoms or use of anticoagulant drugs. Coagulation profile, Liver function tests, blood biochemistry was undertaken in all patients.

CT scan brain was performed in all patients to diagnose CSDH before the surgical procedure (Single burr hole) that showed hypo-dense or iso-dense or mix dense hemispheric collection of blood layered over the cerebral convexity. In some selected patients MRI was also done. Decision of surgery was made based on clinical findings of CT scan and coagulation profile.

A single burr hole was made at the site of its maximal hematoma thickness under local anesthesia. Local anesthesia was used because it has fewer complications and is safe especially in elderly patients with comorbid. Perioperative antibiotic cover was also given with 2<sup>nd</sup> generation cephalosporin Inj. Cefuroxime 1.5gm IV. Once dura mater was exposed and the outer membrane of the hematoma, the collection of blood was evacuated under its own tension and by suction, and irrigation was performed using saline solution until clear fluid came out. Dura and burr hole was left open to allow any residue leftover to seep into subcutaneous tissue. Wound was closed in layers without inserting any drain in the hematoma cavity.

Patients were discharged as soon as symptoms related to the CSDH had disappeared and a follow-up CT scan (within 48hrs) had shown a total or significant reduction in the thickness of the CSDH.

Age, sex, the presenting signs and symptoms, causes, site

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of hematoma (unilateral or bilateral), density of hematoma, post-operative complications and the recurrence of CSDH for each patient were recorded. When the neurological status did not improve after the surgery or new neurological symptoms developed CSDH recurrence was confirmed with the help of CT scan/MRI brain showing re-accumulation of a subdural hematoma.

**RESULTS:**

There were a total of 67 patients included in the study out of which, 45 were men (67.16%) and 22 were women (32.83%). Age of patients varied from 30 to 82 years. The characteristics and clinical findings of 67 patients are shown below. The causes of CSDH in these 67 cases were, 60 cases (89.55%) had history of head trauma, 2 cases (2.89%) had coagulopathy and 5 cases (7.4%) used an anticoagulant therapy (Table 1a).

Table: 1a  
Clinical Findings of Patients  
N=67

Sex	
Male (%)	45(67.16%)
Female (%)	22(32.83%)
Range of age	30-82 years
Causes	
Head Trauma	60(89.55%)
Anticoagulant Therapy	5 (7.4%)
Coagulopathy	2(2.89%)

The most common presentation was with headache 40 cases (60%), which was followed by altered behavior in 4 cases (5.9%) and hemiparesis in 24 cases (35.85%). The frequency of the presenting symptoms is shown in Table 1b.

Table: 1b  
Presentation of Patients with CSDH  
N=67

Headache	40(60.0%)
Hemiparesis	24(35.85)
Cognitive disturbances	14(19.4%)
Altered behavior	4(5.9%)
Seizures	2(2.9%)

Upon preoperative CT unilateral chronic subdural hematoma were reported in 53 cases (79.10%), while 14 cases (20.89%) were reported to have bilateral chronic subdural hematoma (CSDH). Hematoma classified according to size, there were 19 cases (28.36%) of hematoma with size of 1-1.5 cm, while rest 48 cases (71.64%) had hematoma of more than 1.5 cm. According to CT scan preoperatively, CSDH was classified into three groups according to density of hematoma, Iso-dense hematoma were found in 38 cases (56.72%), in 22 cases (32.83%) it was mix density hematoma, while only in 7 cases (10.45%) high density hematoma was found (Table 2).

Results of post-operative CT scan brain done after 48 hours of burr hole, showed residual hematoma in total 4 cases: 2 cases (3.77%) were reported in patients which had preoperatively unilateral hematoma and 2 cases (14.29%) were also reported in patients who had preoperatively bilateral hematoma, while in other patients hematoma resolved completely irrespective from the fact whether they had unilateral or bilateral hematoma preoperatively. (Table 3)

Table: 2  
Preoperative CT Scan Findings

Hematoma location	
Unilateral	53(79.10%)
Bilateral	14(20.89%)
Size of hematoma	
1-1.5cm	19(28.36%)
>1.5cm	48(71.64%)
Hematoma Density	
Iso	38(56.72%)
High	7(10.45%)
Mix	22(32.83%)

Table: 3  
Post-operative CT Scan after 48 hours

Hematoma location	Residual hematoma	Complete resolution
Unilateral	2(3.77%)	51(96.23%)
Bilateral	2(14.29%)	12(85.71%)

Post-operative complications: reoccurrence occurred only in 4 cases (5.97%), neurological deficit in 2 cases (1.49%), pneumonia 4 cases (5.97%), UTI 7 cases (10.45%), seizures 5 cases (7.46%) (Table 4)

Table: 4  
Post-operative Complications

Reoccurrence	4(5.97%)
Neurological deficit (Fresh)	2(1.49%)
Pneumonia	4(5.97%)
UTI	7(10.45%)
Seizures	5(7.46%)

**DISCUSSION:**

CSDH arises in between subdural cavity which is sited between the layers dura mater and the arachnoid<sup>10</sup>. Formation of CSDH mainly includes membrane formation around the hematoma and further enlargement of the hematoma, which occurs due to recurrent micro hemorrhages taking place in hematoma or due to abnormal increase in permeability of vessels, which are said to be part of neo- capillary system of outer layer<sup>11</sup>. This study showed male dominance (67.16%), one explanation for male dominance could be that men generally have a more exposure to injuries as compared to female population<sup>12</sup>. Meanwhile trauma was found to be one of the leading cause of CSDH. The history of trauma was attained

in 89.55% of patients. This is similar to many studies that demonstrate an average of 60.4-71% of CSDH patients had history of trauma<sup>13</sup>.

Patients on anticoagulants are also at increased risk for developing CSDH. It has been anticipated that use of anticoagulant drugs causes a process of producing asymptomatic microbleeds which leads to the evolution of symptomatic hematoma<sup>14</sup>. Generally ageing population is the one who is on anticoagulant therapy, which multiplies the risk of development of CSDH by as far as 42.5 times. Our results showed only 7.4 % of CSDH patients were on anticoagulant drugs and only 2.89% had coagulopathy history. This is in contrast to a study done in Switzerland that showed 41% of CSDH patients admitted in a local neurosurgical center were on anticoagulant therapy<sup>15</sup>.

In our study common symptoms with which patients presented were headache and hemiparesis and these same were also common in related studies.<sup>16,17</sup>

Computed tomography is the most valuable diagnostic tool of CSDH. It helps in revealing the site, size, midline shift and the density of hematoma. The density of CSDH in CT scan brain reveals the extent of fresh blood clots in a hematoma cavity. High density indicates that there is fresh bleeding going on in CSDH. This means blood vessels are dynamically nurturing into the membrane of CSDH leading to raise number of fresh blood clots in hematoma<sup>18</sup>. As CT scan brain was done in all the patients included in the study; in 79.10 % unilateral hematoma was found while rest 20.89 % had bilateral CSDH. Meanwhile majority of hematomas were Iso-dense 56.72%, rest were mix-density 32.83% and high density 10.45%.

The treatment of chronic subdural hematomas has significantly progressed over time<sup>19,20</sup>. There are several types of management for CSDH which includes both conservative and surgical treatment. At present, conservative management is used for asymptomatic patients with a small hematoma. Generally studies have supported surgical treatment for CSDH<sup>21</sup>. Burr-hole is the most common procedure out of all procedures which are being used for treatment of CSDH<sup>22,23</sup>. It is a commonly known procedure because it is simple with morbidity of 0 to 9%<sup>24,25</sup>. Single- burr hole is usually drilled and hematoma is spontaneously evacuated. The hematoma is repeatedly irrigated with saline until the irrigation returns become clear.

In our study urinary tract infections, seizures followed by reoccurrence of hematoma or pneumonia were common post-operative complications. The overall recurrence rate in our present series was 5.97%.

Craniotomy, as compared to burr hole is more invasive procedure with greater morbidity, however there is no significant difference in postoperative recurrence incidence<sup>26</sup>. Nonetheless, craniotomy as a management in CSDH is indicated in a large solid hematoma or multiple recurrences<sup>26</sup>. Twist drill craniostomy is also an option for treatment of CSDH. It is a bed side procedure that can be performed on patients with multiple co-morbid, but however there are chances of contamination<sup>27</sup>. In comparison to these

two procedures overall, Burr-hole evacuation is a safe and effective method of treatment for chronic subdural hematoma and the recovery is complete in majority of patients.

#### **CONCLUSION:**

Chronic subdural hematomas are quite common in neurosurgical practice, associated with significant morbidity and mortality. In our study, headache and hemiparesis were the most frequent signs and symptoms of CSDHs. A single-burr hole evacuation is a simple, effective and safe way of treating CSDH, and it has a low incidence of complications.

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