

SURGICAL TREATMENT OF CHRONIC SUBDURAL HEMATOMA: RETROSPECTIVE STUDY

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Abstract:

Background: Chronic subdural hematoma (CSH) is a common disease of the elderly, most of the patients being above fifty. It usually follows minor head trauma, and is bilateral in 25% of cases. Although surgical treatment is successful in most cases, it still involves high rates of mortality and recurrence.

Objective: To propose a new surgical technique and evaluate its efficacy in reducing the Incidence of complications and recurrence.

Methods: Twenty-four consecutive cases with CSH were diagnosed with computerized tomography and MRI and surgically treated using double burr hole evacuation and irrigation using small catheter manipulated inside the hematoma cavity.

Results: The patients were 21 males and 3 females; the average age was 56 years. Progressive

hemiparesis was the most common presentation, followed by headache and mental confusion. All patients except one made excellent neurological recovery, and were back to their pre-morbid condition. There was no mortality or recurrence.

Conclusion: The surgical method used in this study offers simple way for slow and effective evacuation of CSH, and reduces recurrence.

Key words: Chronic, intracranial hematoma, subdural hematoma, surgical treatment.

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Introduction

Chronic subdural hematoma (CSH) is a subdural collection of blood, which presents more than 3 weeks following a mild trauma. Its incidence is estimated to be 1-2/ 100000 / year^[1]. Most of the patients are above the age of 50, and 5:1 male preponderance has been reported^[1,2]. However no age is exempted, it has even been reported in utero^[3]. Predisposing factors include alcohol abuse, epilepsy and coagulopathies. It can also complicate polycystic kidney disease, arachnoid cyst, leukemias and other malignancies of the brain. CSH has also been seen following shunting of large ventricles in hydrocephalus^[1,4-9]. We have also witnessed one complicating ruptured aneurysm. CSH

is usually supratentorial, and is bilateral in 20-25 % of cases^[4].

Hemorrhage usually occur from a torn bridging vein or cortical artery^[10]. Small amount of bleeding into the Subdural space may fail to produce symptoms, especially in the presence of cerebral atrophy. Within 3 weeks the hematoma is completely encased by a vascular membrane. By this time the hematoma liquefies and become progressively more hypodense on CT. In some patients there is gradual resorption of the hematoma, in others the hematoma enlarges. It is now believed that this is due to recurrent bleeding into the cavity^[1].

Histopathological studies and electron microscopy, showed the proliferation of a network of macro and micro capillaries and veins connecting the dura to the outer membrane. Superselective angiography of the ipsilateral middle meningeal artery in cases of CSH showed dilatation of the artery, and visualization of the vascular network. These vascular structures, which have very thin walls and

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abundant endothelial junctions, are suggested to be the site of recurrent leaks of blood^[1,11-14].

Presentation of patients with CSH is variable. Impaired level of consciousness and hemiparesis are most common, and may be mistaken for CVA. Hemianopsia and cranial nerve abnormalities are less common, and papilledema is seen in less than quarter of patients^[1]. Older patients may present with confusion and impaired mentation, and may be misdiagnosed as dementia^[1,15]. Bilateral CSH may present as progressive paraparesis^[4]. A quarter to one-half of patients gives no history of trauma, and the clinical picture may fluctuate. A high degree of suspicion is necessary to investigate such cases.

Initially on CT. CSH appears hyperdense. In 2-3 weeks it become Isodense to the brain, and may be missed, especially if there is no shift or the hematoma is bilateral. In such cases contrast enhancement is needed to see the membrane. Occasionally a long standing CSH may become calcified, especially in cases of shunting for hydrocephalus^[16,17]. On MRI CSH appears brightly hyper intense on T2 images, and can demonstrate acute hemorrhage inside the hematoma. In this respect MRI is more sensitive and more specific in diagnosing and follow up of CSDH than CT^[1,18].

CSH has been managed medically in selected group of patients, using rest, diuretics and steroids. However present opinion overwhelmingly support surgical treatment^[1]. CSH has been evacuated using craniotomy, burr holes, and twist drill aspiration. Various closed system drainage and reservoir has been used in refractory cases^[1,19-23].

Surgical treatment is very successful, with less than 10% mortality in most large series. Eighty percent of patients return to normal function. The results largely depend on the patient preoperative clinical condition and associated systemic diseases. ⁽¹⁾ Complications include, recurrence, infection, and seizures^[1,15,24-26].

Aims: To propose a new surgical technique and evaluate it's efficacy in reducing the Incidence of complications and recurrence.

Methods Twenty-four consecutive patients with CSH were admitted and surgically treated in The Nursing Home Hospital and Al-Kadhimiya Teaching Hospital (T) between Jun 1997 and October 2003. The cases were studied regarding Age, Gender, duration of symptoms, history of trauma, Predisposing factors, diagnosis, surgical treatment, complications, and outcome.

Diagnosis:

Computerized axial tomography (CT) was done in all patients, and was the main diagnostic tool. Magnetic resonance imaging (MRI) was done in seven cases. The indications for doing MRI included Isodense hematoma on CT and young age to exclude vascular lesion.

Surgical technique:

The aim of surgery is to evacuate the hematoma slowly and completely, and to break any fibrinous septa dividing the hematoma cavity into partitions. Preoperative preparation includes adequate hematological evaluation to exclude coagulopathy. The Hematoma is evacuated through two burr holes; the 1st. is a standard frontal bur hole, and the 2nd. Is placed over the parietal eminence. The dura is opened in the anterior burr hole first; the hematoma membrane is cauterized and opened.

The hematoma fluid is allowed to drain freely (Figure 1). The dura and membrane are opened in the posterior bur hole, and the remaining hematoma is evacuated. The hematoma cavity is intensively irrigated with normal saline, using a small catheter mounted on a syringe. The catheter is manipulated into the corners of the cavity to wash out any clots and insure free communication of all parts of the cavity. When the irrigation fluid is clear, the posterior bur hole is closed. The hematoma cavity is partially filled with normal saline through the anterior bur hole. Finally the anterior bur hole is closed. The procedure

takes about 30 minutes. Recent hyperdense hematomas were treated by craniotomy, and excision of the outer membrane. Anticonvulsant therapy is administered pre operatively and continued for one month.

Recurrence is defined as recurrence of symptoms and re accumulation of subdural hematoma with mass effect demonstrated on CT.



Figure 1: Operative view CSH escaping under high pressure from a burr hole

Results

Age and gender: The patients were 21 males and 3 females (M:F = 7:1) Age ranged between 20 and 83 (average 56 years) (Figure 2). Progressive hemiparesis

was the most common 1st symptom, (42%) Followed by headache (29%) and mental confusion, drowsiness and impaired cognition (17%) (Figure 3).

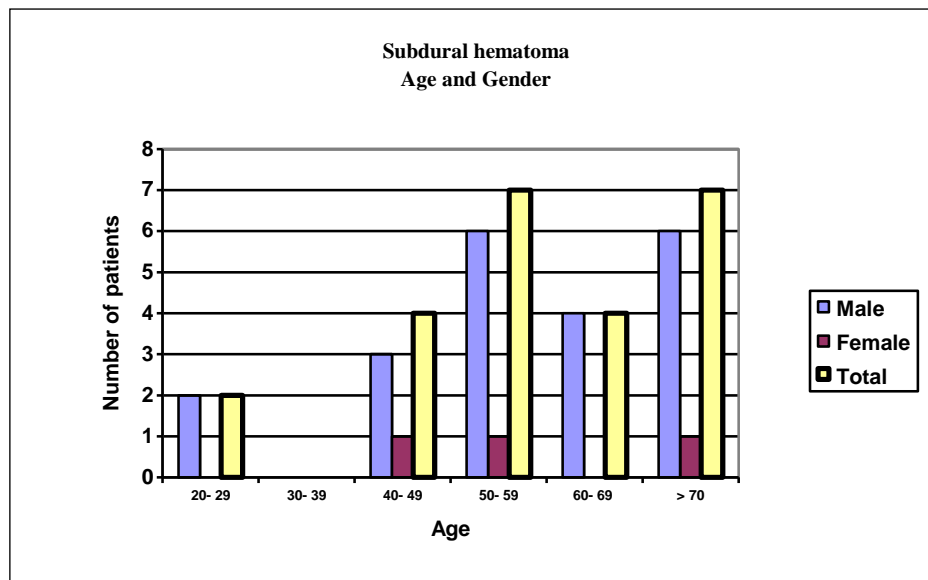


Figure 2: Age and gender distribution of the patients

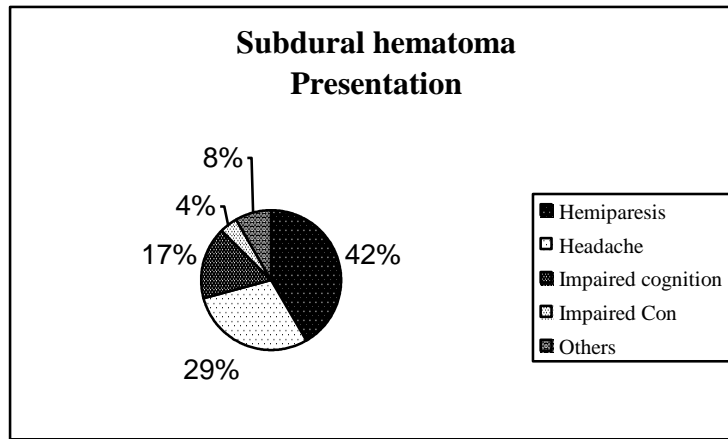


Figure 3: The presenting symptoms

One patient had urinary incontinence, and another had diplopia, only one patient presented with impaired consciousness. The duration of symptoms ranged from 4 days to 2 months (average 27 days). Fourteen patients gave history of

trauma (58%) six days to 4 months before presentation. One patient was diabetic, one was hypertensive and one had decreased platelets count. There were no alcoholics. All symptoms and neurological findings are listed in (Table 1).

Table 1: Symptoms and signs

Symptom or sign	No. of patients	Percent
Hemiparesis	10	41%
Headache	11	46%
Impaired cognition	5	21%
Vomiting	2	8%
Incontinence	1	4%
Diplopia	1	4%
Epilepsy	3	13%
Papilledema	9	38%
Dysphasia	1	4%
Impaired consciousness	1	4%

Brain CT. was done in all patients. Results are shown in (Table2). The

thickness of the hematoma ranged from 1.5 to 4 cm (Figure 4-6).

Table 2: CT. Findings

CT. Findings	No. of patients	Percent
Hyper dense	2	8%
Hypo dense	13	54%
Isodense	8	33%
Mixed density	1	4%
Mass effect	22	92%
Rt.	14	58%
Lt.	8	33%
Bilateral	2	8%

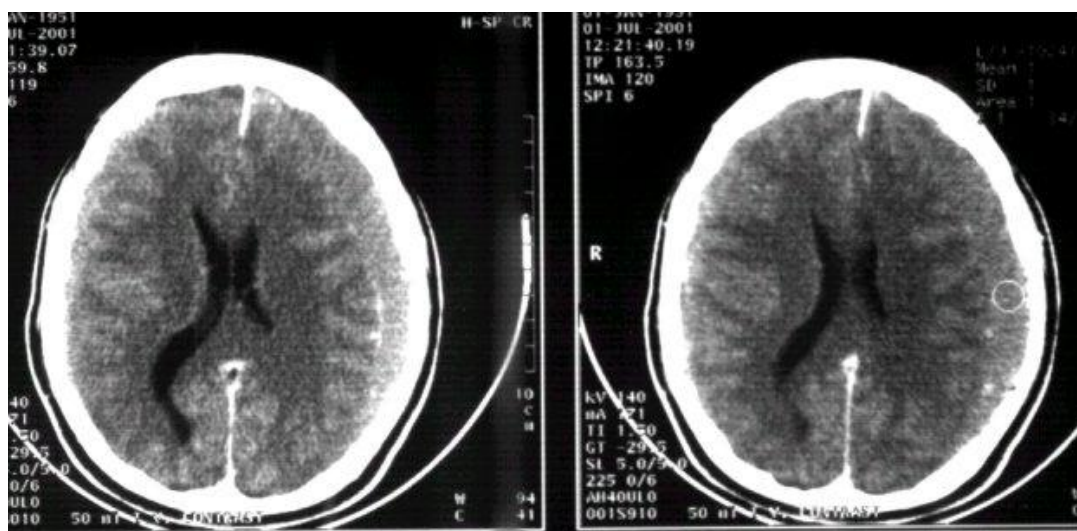


Figure 4: Axial CT. Lt. CSH Isodense to the brain

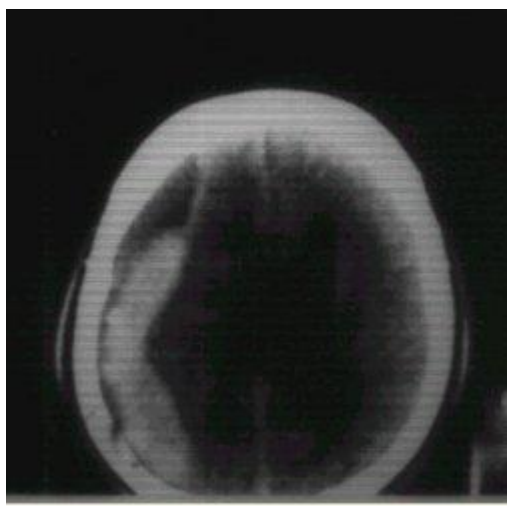


Figure 5: Axial CT. Rt. CSH hyper-dense to the brain

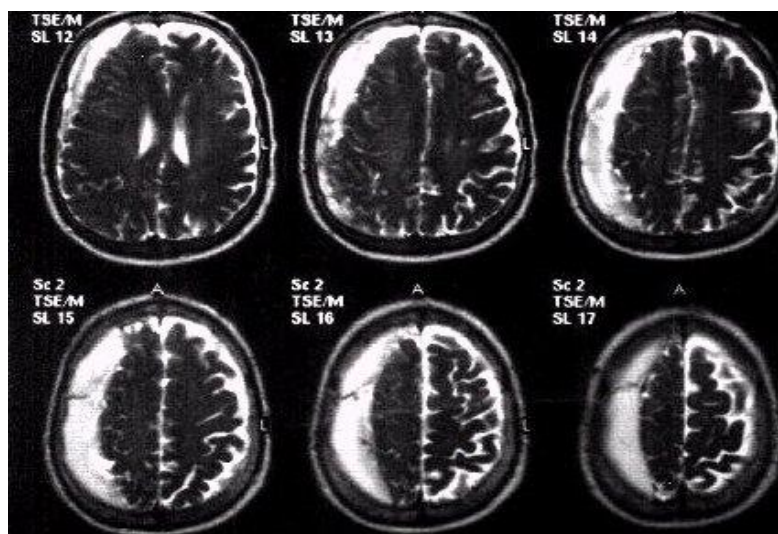


Figure 6: MRI of the brain, showing Rt. CSH with brain atrophy and minimal shift of midline

All patients were surgically treated, 22 by double burr hole. The hematoma was encased in a well-formed vascular membrane under very high pressure. Two patients with hyperdense recent hemoatomas had craniotomy. All patients made rapid and full recovery except one 83 years old patient who did not have useful

neurological recovery. There was no recollection or mortality. A part from one case of subdural air collection which was relieved by tapping under local anesthesia there were no complications. All patients returned to their pre morbid neurological state, or work. Table 3 showed some of the complications developed after surgery.

Table 3: Complications of surgical treatment

Author	Year	No. Of patients	Method	Recurrence And complications	Ref. No.
Benes-J	1999	92	B.H +drain	13 patients: 14%	19
			Craniotomy	40 patients: 46%	
Emonds-N Suzuki	1999	86	Hollow screw	22 patients: 11%	20
	1998	186	Closed drainage	3.2%	21
Ernestus-RI	1997	104	Burr hole	18.5%	29
			Craniotomy	12.5%	
Zumkeller-M	1997	314	Burr hole +drain	15%	31
Matsomoto-K	1999	121	Burr hole	8.3%	32

There was no long-term follow up for most of the patients, however for over 6 years no patient returned with symptoms or radiological evidence of recurrence.

Discussion

This benign condition affects a still active group of society, who with adequate treatment can return to full employment, or preoperative activity. Although the proposed surgical treatment is simple, the relatively high rate of complications and mortality warrant great attention to details in order to achieve best results. The incidence of CSH is reported as being 1-2/100000/year, it increases steadily with age to reach 17/100000/year above 80 years^[15]. The incidence further increases with the presence of risk factors such as alcoholism, epilepsy and coagulopathy^[1,5,27].

We do not know the true incidence of CSH in Iraq due to lack of proper epidemiological studies, and inadequate records. However 24 cases in 6 years are too few and do not reflect the true incidence. The age range of patients in this study was

20-83 years (Average 56 years) 25% of patients were below 50, and another 25% were above 70 years. (Figure 1). As expected males predominated the number of patients, 7:1 ratio in this study is even higher than the reported M:F ratio of 5:1 among 2300 patients^[2], this is probably due to the fact that males are more prone to trauma.

More than half the patients in this study presented typically with progressive neurological deficit, and or impaired cognition, which is in agreement with most reports^[1,15,28], however, 46% of patients complained of headache and sometimes vomiting, and there was also high incidence of papilledema 38%, while Samudrala and Cooper in a summary of several large series of CSH report an incidence of 24%^[1]. Both these observations are probably due to the low average age in this study. Generally headache was seen in young patients with recent trauma, while most patients with confusion and impaired mentation were above the age of 70 years.

Although present opinion overwhelmingly supports the operative treatment of CSH^[1,28], the extent and type of surgical treatment is still controversial^[29], due to the still significant rates of mortality, morbidity and recurrence^[1,19-21,29-33]. Table shows summary of the recurrence and complication rates in several recent series (Table 3).

Craniotomy and membranectomy for CSH has long been considered unnecessary except for multiple compartment, recent solid and recurrent CSH^[1,29]. Various techniques of drainage still involves 5-10% mortality^[1,29,31,33] and up to 45% of recurrence^[1]. Many risk factors for outcome and recurrence are recognized; Severity of the clinical condition, the degree of mass effect, hematoma thickness of more than 20 mm, drainage volume and diabetes^[32-34] Ogasawara-K et al; using single- photon emission computerized tomography (SPECT) to measure cerebral blood flow before and immediately after rapid decompression of CSH, demonstrated areas of cortical hyperemia beneath the hematoma^[35].

This may contribute to recurrent bleeding after rapid decompression. Further more inadequate evacuation of CSH may be due to the presence of fibrinous septa dividing the hematoma cavity into compartments or loculi^[1,36]. It is against these two factors that the method used in this study is directed, slow and thorough evacuation of the hematoma. There was no recurrence or mortality. Although the method used is essentially a standard technique, the small differences proved effective, and show the importance of attention for details in this apparently simple but intricate pathology.

Conclusion

Burr-hole evacuation of CSH with irrigation is a simple procedure, it is suitable for use in old and generally unfit patients, it can be done under local anesthesia. It has the advantage of offering the opportunity for

repeating the procedure in case of recollection, and for inserting a drain if necessary. Slow and thorough evacuation as described in this study, is an effective method in reducing the rate of complications and recurrence.

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