ORIGINAL ARTICLE

Surgical Outcome of Organised Chronic Subdural Hematoma with Internal Septae in a Tertiary Care Hospital

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ABSTRACT

Objective: *This study presented the surgical outcome of craniotomy and membranectomy (outer membrane excision) for the organized Chronic Subdural Hematoma (OCSDH) which have already developed thick internal septations.*

Materials and Methods: *We retrospectively reviewed a series of consecutive patients operated via.craniotomy method for OCSDH in Neurosurgery Department Hayat Abad Medical Complex. Patients with both genders and all ages diagnosed as OCSDH with septae either diagnosed preoperatively via imaging CT/MRI or intraoperatively while getting operated by single burhole drain or two burhole wash method were enrolled in the study and operated via craniotomy/outer membranectomy method. All cases were followed for 6 months.All data was recorded in pre-formed Performa and demographics, clinical data analysed to quantify outcomes statistically.*

Results: *Total 30 patients were operated in the 3 years study duration. Post-operative Recurrence of symptomatic hematoma was seen in only one patient, i.e., 3.33% and hence 29 (96.66%) had excellent outcome and remained symptom free at 6month followup visit. Out of 30 cases, we operated 27 (90%) were males and 3 (10%) were females, most of the cases were in the elderly age group (sixty five years was the mean age). Six cases (20%) had postoperative new onset seizures, all these patients were seizures free at 1month follow-up. Our three patients (10%) had a superficial wound infection.*

Conclusion: *Craniotomy and outer membranectomy is a safe procedure for the management of OCSDH offering good results and fewer/no recurrence, unless the adherent inner (cortical) membrane removal is attempted, which may result in new onset seizures and neurological deficits.*

Abbreviations: *OCSDH: Organized Chronic Subdural Hematoma. CSF: Cerebrospinal Fluid. GCS: Glaucoma Outcome Scale. CT: Computed Tomography. MRI: Magnetic Resonance Imaging. CSDH: Chronic Subdural Hematoma.*

Keywords: *Organized chronic subdural hematoma (OCSDH), Membranectomy.*

INTRODUCTION

The objective of this study was to evaluate craniotomy/membranectomy as a treatment option for the organized chronic subdural hematoma (OCSDH). Chronic subdural hematoma is the condition of elderly population, which was termed "Pachymeningitis Hemorrhagica Interna" by Virchow in 1857. Average age quoted 63 years, excluding, subdural collections of infancy. Head trauma is the major cause of CSDG in 50% (more often trivial trauma cause these lesions). Other potential causes include: alcohol abuse, GTC seizures, VP shunt over drainage, bleeding disorders and therapeutic anticoagulation, (e.g., cardiac patients stroke patients). CSDHs may be bilateral in 25% of patients. The thickness of hematoma is often more in elderly patients owing to low brain mass andlarger

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subdural room available for the hematoma to collect.[1-4] Typically, CSDHs is a dark "motor oil" consistent fluid without clots.If the subdural collection is clear (e.g., CSF), it is named as subdural hygromas, which is common in infancy. Sometimes older chronic subdural hematomas develop membranes on its outer as well as inner surface and septae in between at this stage chronic subdural hematoma is called organized chronic subdural hematoma (OCSDH).[5-9]

The formation of membranes is a complex mechanism which is postulated asall CSDH started as acute subdural hematoma due to associated causes. Collection of blood below duratriggers an intense inflammatory reaction. In a few days, fibroblasts transmigrate and invade the collected blood, to make membranes on the inner (adjoining brain cortex) and outer (adjoining dura) lining. It is immediately invaded by neovasculature, trigger of enzymes mediated fibrin degradation, andhence clottedblood isliquefied. Moreover, fibrin degradation byproducts are added into the new clotted bloodfrom the neocapilaries exudates, which inhibit hemostasis. There is always a continuous addition as well as absorption of the hematoma and the size of CSDH is determined by the balance of this process.[18-21]

Patients with CSDH usually present with trivial symptoms of headache, confusion, low GCS, hemiplegia, or fits (GTC or focal fits). Often, the diagnosis may be incidental on imaging for nonspecific symptoms.Surgical treatment is offered in all symptomatic lesions or asymptomatic subdural with maximum greater than 1 cm thickness or progressively increasing in size on serial imaging (CT).[10-14] Surgery has excellent results in surgically indicated cases. Burr-hole wash method and Bur hole drain method has long been debated and are the most commonly performed procedures but neither of these two options discussed are curative for organised hematomas with thick membranes and septae for such cases there is a surgical option of craniotomy and external membrane excision, usually diagnosis of membrane is made per op but we have started recognising membranes and septae of OCSDH in preoperative CT scan as well as MRI (T1/T2) both hyperintense hematomas with interposed hypointense thick septae.[22]

MATERIAL AND METHODS

Study Design

We retrospectively reviewed a series of consecutive patients operated via craniotomy method for OCSDH in neurosurgery department Hayatabad Medical Complex, Peshawar from 1st Jan. 2016 to 31 Dec 2018. A prior approval of the study was taken from the ethical committee of Hayatabad Medical complex Peshawar.

Inclusion Criteria

Cases with both genders and all ages diagnosed as OCSDH with septae either diagnosed preoperatively via imaging CT/MRI or intraoperatively while getting operated by single burrhole drain or two burrhole wash method were enrolled in the study and operated via craniotomy/outer membranectomy method.

Exclusion Criteria

Those patients with clotting disorders or with grievous comorbid were not enrolled, to avoid bias in the results.

Data Collection Procedure

Written informed consent was taken from each enrolled patient.

All the study cases were admitted to the in-patient facility and after adequate preoperative preparation were operated by consultants of various level of expertise either in an emergency department or elective OT list.

Postoperative CT scan was performed on postoperative day1 in all patients. In addition, any time during course of post operative period CT scans were repeated if the patients showed neurological deterioration. All cases were clinically and radiologically followed and documented while, admitted in in-patient facility, all of them were followed at one and six months postoperatively.All data was recorded in pre structured Proforma, which clearly mentioned patient's demographics, preoperative clinical and radiological findings as well as intraoperative findings and postoperative course.

Data Analysis

Data analysis was performed, percentages calculated.

RESULTS

Gender Distribution

Gender distribution was predominantly tilted toward

male gender, i.e., 27 males vs. 3 females in the study sample (Table 1).

Table 1: *Gender Distribution.*

Gender	Cases	Percentage
Male	27	90%
Female	3	10%

Age Incidence

Most of our patients were from elderly population group (mean age 66 years).

Clinical Features

All of our cases had variety of clinical conditions. The most common of which was chronic headache. Disturbed memory was the second most common reason for Neurosurgical consultation. In most of the cases, one patient had multiple symptoms.The spectrum of clinical conditions with which our patients had presented are listed below in tabulated form.

Table 2: *Clinical presentations of our study population.*

No.	Signs/Symptoms	No. of Patients	Percentage
1.	Headache	27	90%
2.	Disturbed memory	26	86.66%
3.	Altered consciousness	16	53.33%
4.	Fits	10	36.66%
5.	Behavioural disturbance	9	30%
6.	Motor deficits	9	30%
7.	Dysphasia	4	13.33%

Operative Findings

An intraoperative finding of cerebral atrophy was noted in 25 (83.33%) cases. Five cases (16.66%) which were previously operated via burrhole method and had symptomatic recurrence were also having pneumocephalus. Scattered thick calcifications on outer membranes were noted in 5cases (16.66%).In the majority of our cases, i.e., 22 cases (73.33%) we noted tough outer membrane and irregular septae connecting it to the inner/cortical membrane (Fig. 1 – 4).

Outcome

30 cases were registered and operated in study duration of three years. Postoperative recurrence of symptomatic hematomas was seen in only one patient, i.e., 3.33% and hence 29 (96.66%) had excellent outcome and remained symptom free at 6th month follow-up visit.

Complications

Transient postoperative/new onset fits were recorded in 6 (20%) patients. All these cases were fits free at one year follow-up visit. Three patients (3%) had a superficial wound infection, but none developed meningitis or subdural empyema.

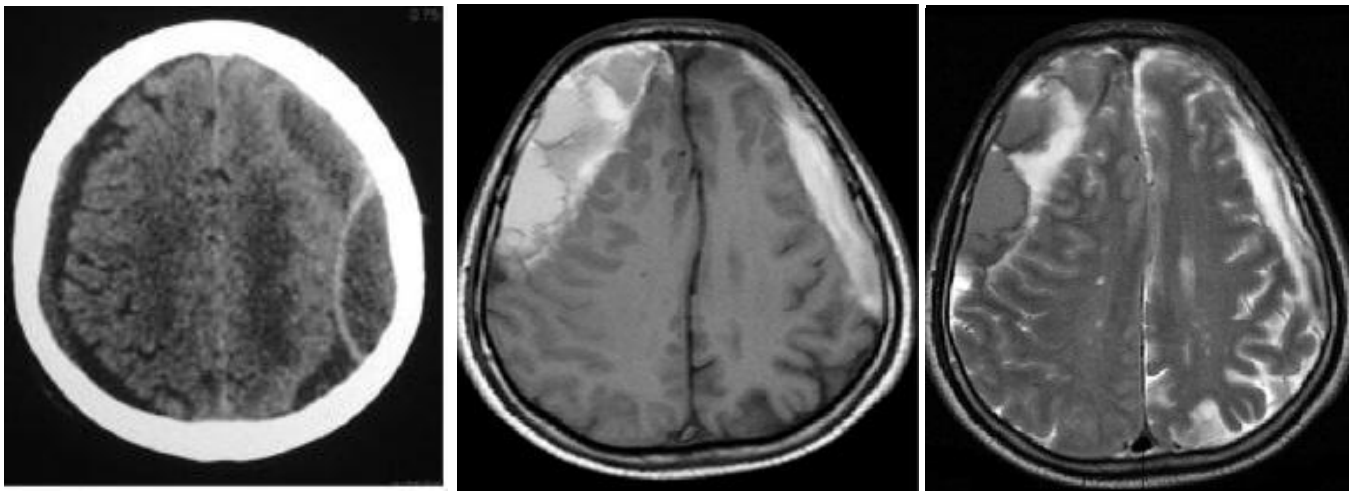


Fig. 1: *Pre op CT Brain of OCSDH.* *Pre-op MRI T1WI.* *Pre-op MRI T2WI.*

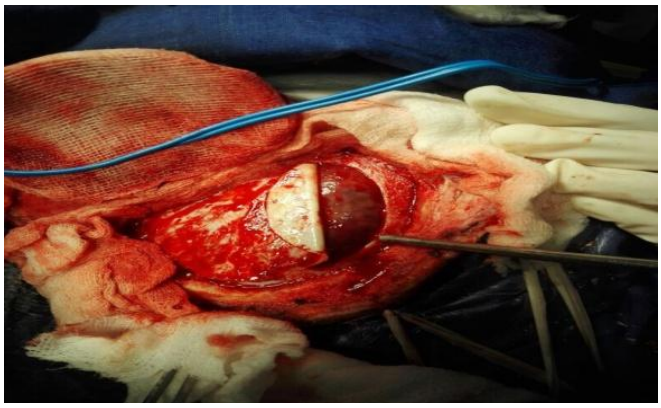


Fig. 2: *Dural opening and flap elevation.*

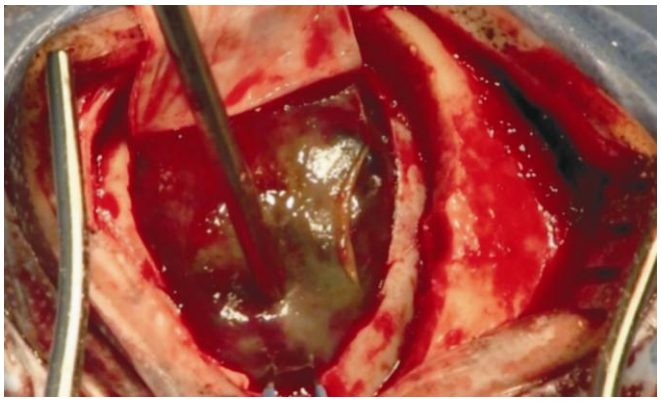


Fig. 3: *Removal of outer membrane.*

Fig. 4: *Brain after removal of membrane.*

DISCUSSION

Chronic subdural hematoma with thick membrane formation as well as interposing septae is a challenging case to treat and often recur with all surgical options offered, i.e., twist drill craniostomy, single bur hole drain method,two bur hole wash method, or limited craniectomy. The only promising results in terms of recurrence rate are offered by craniotomy and membranectomy but this procedure has relatively higher complication rates than the other surgical options discussed. The membranectomy in itself is not standardized most of experts advocate removing outer membrane only, but there are some studies advocating cortical membrane hydrodissection if it is not adherent to the cortex, even with extreme careful removal of inner (cortical) membrane exposes patients to higher rates of post-operative seizures and neurological deficits.[18.23,24].

We studied data of 30 cases operated for OCSDH via. craniotomy and membranectomy (outer membranectomy with only single case of inner/cortical membranectomy) in 3 years. The Mean age is 65 years in our study. The only single patient in which we did perform cortical membranectomy had unique presentation of focal fits of average 20-25 episodes/ day, which didn't alleviate with outer membranectomy, so we did operate him again within the same admission to do membranectomy of inner (cortical membrane), surprisingly the cortical membrane in this patient was free floating over straw colored fluid on underlying brain, it had some points of attachments to cortical vessels which were left untouched. This patient's focal fits vanished post operatively to the frequency of zero/day at 3rd post operative day and remained free from fits till last.

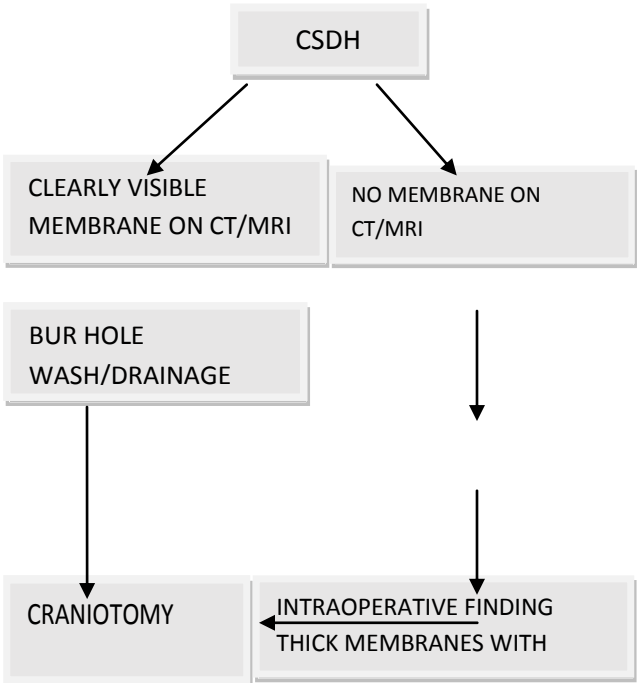
Firsching et al., (1989) conducted a similar study and in his study the age distribution summed up at the mean age of sixty years. Reason behind the condition being observed in the older population isprobably the atrophy of the brain and more vulnerability to falls due to co-morbidities and physical disabilities in the older population as well as lack of ability to self-care as compared to younger age groups.[18,24]

Most of our patients were male, which is in accordance of general trends of traumatic brain injury, i.e., vulnerability of the male gender to various insults, assaults and accidents due to their higher demanding outdoor activities/work. A study conducted by Ali et al., also found male population was suffering CSDH several folds more than the female counterparts. Western populations showing trends of narrowing gape or trend towards equal distribution among both genders in the published literature.[23]

Craniotomy for chronic subdural hematoma are less favored generally due to the higher risk of post-operative new onset seizures.Our findings were not much different, but the seizures we noticed in 6 (20%) patients were self-limiting and transient, i.e., from one

week post operative to the maximum one month.In all of the patients who had presented with seizures were having preoperatively thick and complex septae and intra-operatively inner/cortical membrane was much organised and very tightly adherent to the cortical surface. Though, we did not attempt to remove these cortical membranes, but excision of outer/dural membranes and septae was enough manipulation to cause cortical irritation leading to seizures.

Apart from post-operative fits three of our patients had suffered superficial wound infection, which didn't develop into grievous consequences i.e., meningitis or subdural empyema. The main rewarding result of craniotomy in organized chronic subdural hematoma that we found in our results was the lack of recurrence which is a big troublesome condition in such cases.



Only one of our patients had recurrence of hematoma. The results of our study pointed towards the safety and efficacy of outer/cortical membranectomy as a primary procedure for the organized chronic subdural hematoma having internal septae. These results are not much different from other reference studies.[25] We followed the following algorithm for decision making regarding OCSDH surgical management.

The major limitation in our study was inability to follow patients for longer periods of time to know long term results of the procedure. The randomised control trials in multicentric settings are required to further validate the results of our study.

CONCLUSION AND RECOMMENDATION

Craniotomy and outer membranectomyis safer procedure for the management of OCSDH offering good results and fewer/no recurrence, unless the adherent inner (cortical) membrane removal is attempted, which may result in newonset seizures and neurological deficits. The sample size was however smaller, which bares to generalise the results of this study, further multicentric trials are required to further elaborate the dilemma under discussion.

ROLE OF AUTHORS

Muhammad Nawaz Khan and Dr. Muhammad Ali Noman Surgeries and literature review.
Dr. Shahid Ayub: Data Collection, Paper Writing.
Dr. Riaz-ur-Rehman: Paper Editing and Results Writing.
Dr. Rizwanullah Khattak and Dr. Mushtaq: Data analysis.

Additional Information

Disclosures: Authors report no conflict of interest.
Human Subjects: Consent was obtained by all patients/ participants in this study.

Conflicts of Interest:
In compliance with the ICMJE uniform disclosure form, all authors declare the following:
Financial Relationships: All authors have declared that they have no financial relationships at present or within the previous three years with any organizations that might have an interest in the submitted work.
Other Relationships: All authors have declared that there are no other relationships or activities that could appear to have influenced the submitted work.

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