

Original Article

Post-Operative Complications of Surgery for Chronic Subdural Hematoma (SDH) and Prevention

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ABSTRACT

Objective: The study aimed to determine the rate and type of complications during surgery for treatment of chronic subdural hematoma and assess ways for their prevention.

Material and Methods: A total of 50 patients of chronic SDH were selected from the Neurosurgery Department of Bahawal Victoria Hospital. Patients were treated surgically with a single burr hole evacuation under local anesthesia, introduced a subdural drain, nursed in a head-down position for 24 hours, and given plenty of fluids orally and intravenous route. The surgical technique involved a formation of a single burr hole at the point of maximum density.

Results: Out of 50, 43 patients recovered smoothly postoperatively and discharged on the 7th postoperative day. Two patients were re-operated due to inadequate evacuation or reaccumulation. One patient developed subdural empyema post-operatively and expired in spite of good antibiotic cover. In one patient subdural drain penetrated the brain parenchyma resulting in dysphasia. Another patient formed an intracerebral hematoma due to irrigation of the cavity with pressure. One patient with GCS 4/15 developed seizures postoperatively and expired after one hour. One patient developed gross subdural tension pneumocephalus after removing the subdural drain was re-operated and recovered.

Conclusion: Single burr hole evacuation of chronic SDH under local anesthesia is the most accepted surgical treatment. Using proper aseptic surgical techniques, the introduction of the minimum necessary length of the subdural catheter to avoid penetration into the brain parenchyma, followed by careful irrigation of the subdural cavity can help prevent complications.

Keywords: Chronic Subdural Hematoma, Burr hole, Complications, GCS, Local Anaesthesia, Prevention.

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INTRODUCTION

Chronic subdural hematoma is one of the most commonly occurring diseases a neurosurgeon comes across¹ incidence being 1–5.3 cases per 100000 populations annually.² The singular most important factor affecting progression and clinical outcome is neurological status at presentation.³ Chronic subdural hematoma may present with headache, vomiting, personality changes symptoms related to focal deficits for example altered consciousness, hemiplegia, dysphasia, seizures.⁴ An increase in size may occur over time implying that acute re-bleed is not the only cause. By definition, chronic SDH is the accumulation of old liquefied blood between the dura and arachnoid layers surrounded by a capsule". Traditionally, SDH is categorized in relation to the time of occurrence as acute, sub-acute, or chronic. Hematomas that become clinically apparent within 72 hours of injury are labeled as acute. If symptoms are delayed to 3 weeks, the hematoma is subacute. Symptoms of chronic SDH become apparent 3-weeks after injury. A duration of 4-5 weeks is usually observed in admitted cases of chronic SDH.⁵⁻⁶

Seemingly trivial head trauma which might be overlooked by the patients might also cause CSD.⁷⁻¹³ Most cases of chronic SDH are 50 years of age or older due to brain atrophy and stretching of vessels traversing the subdural space, although younger patients including children might also be victims. CSDH is bilateral in 11 – 35% of cases.^{14,15} Simultaneous treatment of bilateral hematomas is recommended as the evacuation of only one of the two hematomas may precipitate magnification of the contralateral untreated hematoma.¹⁶ CT Scan brain is the investigation of choice for diagnosis of SDH, appearing as hypodense lenticular collections under the dura. Nevertheless, due to recurrent bleeding from the vascular membrane, a chronic SDH can appear as a mixture of hypo and hyperdense material.¹⁷ The lesions may also be

isodense, sometimes not readily distinguishable on a CT film, such cases prompt further investigation using MRI to identify chronic SDH.¹⁸⁻²² A variety of management options have been proposed for chronic SD.²²⁻²³ The use of primary craniotomy for resection of hematoma along with its membranes carries 30% mortality rate. This method is recommended only for repeated recurrence or solid consistency of hematoma.²³

McKissock and Richardson mastered simple burrhole drainage for the chronic SDH in the 1960s.²⁴ Mortality rates of < 2% have been reported with burr hole treatment in recent years.²⁵ We have chosen this topic because unawareness regarding the surgical outcomes results in rising in the rate of complications post-operatively, most of which are preventable using simple methods such as minimal access and prophylactic antibiotic cover. This study determined the most commonly employed technique for drainage of chronic subdural hematoma. We assessed the efficacy of the surgical procedure and studied the improvement in clinical outcome by the use of postoperative antibiotics and hydration.

MATERIAL AND METHODS

Study Type & Setting

This prospective study included a follow up cases of surgically treated patients with chronic SDH, who were admitted to Neurosurgery Department of Bahawal Victoria Hospital. The duration of the study was from August 2020 to March 2021.

Sampling Technique & Sample Size

Random sampling was done. A total of 50 patients included.

Selection Criteria

Patients chosen had ages between 50 – 90 years

with a GCS not less than 4/15 having no comorbidity conditions acquired more than 5 years or having stood longer than 10 years. A similar criterion was used for all these cases and they remained under the care of one neurosurgeon and his team. Diagnosis relied on physical findings consistent with an appearance on CT-Scan brain.

Exclusion Criteria

Patients having comorbidity multiple trauma, GCS less than 4 who improved to a part of the study.

Data Collection

The presentation was within 7 to 90 days of the appearance of symptoms. The level of consciousness was considered for grading purposes. Routine hematological and biochemical investigations were done in all cases. Fresh frozen plasma/platelets were given in case of coagulopathy. All the procedures were performed under local anesthesia. For GCS calculations, the mild condition was considered under GCS level between 12 – 15, the moderate condition was considered under GCS level between 8 – 11 and severe condition was considered under GCS level between 4 – 7.

Surgical Operative Technique

The surgical technique involved a formation of a single burrhole at the point of maximum density. A cruciate incision given made to persist by using diathermy. A blackish-brown colored liquid poured out with pressure on opening the external membrane. Isotonic saline wash was used for rinsing to obtain a clear disease-free cavity.

Patients were asked to cough during the procedure which helped the evacuation of the clot. Dark brown fluid was seen oozing out upon coughing. A stab incision made at a distance was used to bring out the drain inserted in subdural space. Drain connected with a closed drainage

bag that remained in place for the next 2 – 3 days to observe any discharge.

Post-Operative Management & Follow-Up

Postoperatively, patients were nursed in head-down position for 24 to 48 hours and 5% D/water was given one liter 8 hourly and were advised to take plenty of oral fluids to help expand the brain. Perioperative antibiotics prophylaxis was used in all cases. Postoperative antibiotics were given to all patients for seven days.

A follow-up CT scan was done 5 days postoperatively. Most cases were discharged within 7 days because of clinical improvement.

Data Analysis

All data was processed in SPSS v.25. statistical analysis were performed.

RESULTS

Gender Distribution

There were 40 males and 10 females.

Age Distribution

Age range was from 50 – 90 years of age.

Recovered Patients

All patients were assessed post-operatively clinically and with a check CT Scan (brain) the next day.

At the discharge, 5 – 7 days after surgery, 43 patients were relieved of their symptoms. However, in all these cases on CT scan, a minute amount of fluid remained in the subdural space. Nevertheless, a reduction in the size of the effusion was observed accompanied by restoration of normal anatomy on the radiological study.

The subsequent follow-up investigations showed a complete resorption time ranging from 45 to 70 days.

Reopening

2 of 50 patients needed reopening after 3 days due to lack of improvement both clinically and radiologically. CT revealed large subdural collection, perhaps due to poor surgical evacuation or re-accumulation. After second evacuation they exhibited signs of improvement and were discharged one week later.

Further Non-Surgical Treatment

1 of 50 patient developed subdural empyema and expired two weeks after the surgery in spite of giving good antibiotic cover.

Figure 1 (included with the consent of the patient) shows intracerebral hematoma which resolves with conservative treatment.

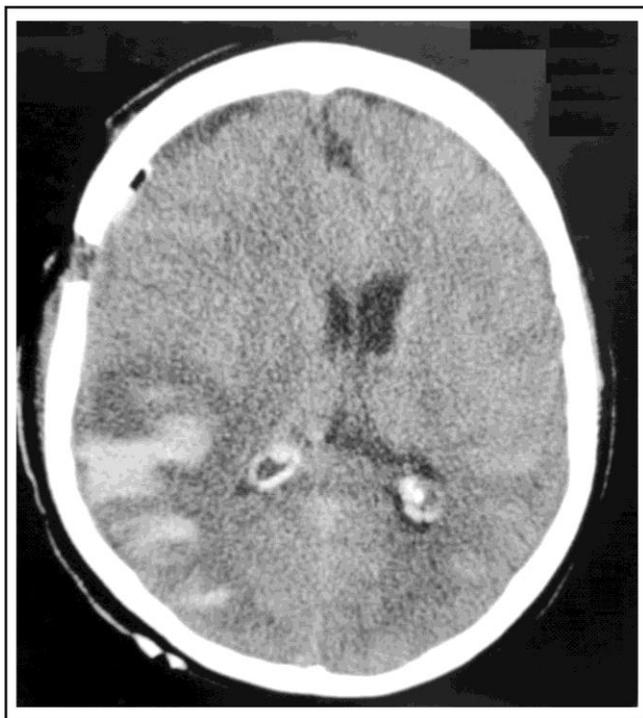


Figure 1: CT SCAN – Postoperative intracerebral clot.

The patient recovered completely and was discharged after five days. One patient had developed dysphasia and right upper limb weakness post-operatively. CT scan showed a small intracerebral hematoma in the left parietal lobe suspected to have occurred due to heightened saline pressure during subdural space irrigation causing injury to the brain parenchyma. The patient improved two weeks later.

Another patient developed dysphasia postoperatively. When CT Scan showed a drain catheter penetrating the brain matter on the left side. After three weeks' patient was improved but had a slight disability in the third month after discharge from the hospital.

Table 1: Complications.

Sr #.	Complications	Number of Patients
1	Reaccumulation	2 (4%)
2	Subdural empyema	1 (2%)
3	Seizures	1 (2%)
4	Penetration of drain in brain parenchyma	1 (2%)
5	Brain injury due to irrigation	1 (2%)
6	Intracerebral haematoma	1 (2%)
Total		7 (14%)

DISCUSSION

In chronic SDH, subdural space has dark brown to a black colored fluid which produces a mass effect on the brain which results in different types of neurological deficits. Chronic subdural hematoma sometimes develops due to coagulopathies but in most cases, it develops in old age people due to mild head injury. It has been documented earlier as well that chronic SDH happens most commonly in the 50s and 60s with a mean 56 – 63 years of age.²⁶⁻²⁸ In our series, at Bahawal Victoria Hospital, the age range was 50-90 years. In the current study, half of the patients did not remember any head injury/trauma history while no one had drug addiction of any type.

Untreated chronic SDH may prove fatal but with proper evacuation, 80 to 90% of patients recover to the normal. CT scan (brain) is the best investigation for chronic SDH that can disclose the size/site/density of the clot, along with its formation and severity. Sometimes MRI brain is helpful in cases where hematoma is isodense. In our series at Bahawal Victoria Hospital, we found the CT scan (brain) the most useful diagnostic modality. Evacuation using burr holes has been the most employed treatment of chronic SDH for more than 50 years.²⁹⁻³³ A single burr hole is usually sufficient, although two are sometimes useful. The residual hematoma is quite common regardless of the operative technique used.

True reaccumulation of the hematoma is reported to occur as often as 45 percent of the time in some series and probably result from fresh bleeding from the vascular membranes. The possibility of reaccumulation should be evaluated in those who get worse or do not get better after the operation. CT Scan will confirm the reaccumulation. Infectious complications include subdural empyema, brain abscess, and meningitis, these complications are uncommonly occurring in less than one percent of patients. Seizures are noted in around 10% of cases hence, prophylactic anticonvulsant treatment is recommended in all CSDH cases prior to operation. Medication may be discontinued one month postoperatively if the seizure has not occurred.³⁴⁻³⁶ Less than 10% mortality is reported after the treatment of chronic SDH whereas a large number (> 80%) get to normal life.³⁰ The outcome correlates most closely with the neurological status at the time of treatment. McKissock and colleagues reported 13 percent mortality in patients who were comatose or stuporous at the time of operation and 5 percent mortality who were alert or drowsy.³⁷

In our series of 50 patients with chronic subdural hematoma who were managed at Bahawal Victoria Hospital, we tried to note the incidence of complications and how to avoid these complications. All the patients included in

the study were managed with burr hole evacuation of clot, irrigating the subdural cavity with isotonic saline, introducing a subdural drain, and nursing the patients in head-down position for 24 hours and giving them plenty of oral and intravenous fluids which helped to re-expand the brain. Forty-three patients were asymptomatic after 48 hours and were discharged after 7 days from the hospital. Two patients developed reaccumulation and re-operated. One patient developed emphysema and expired after 2 weeks in spite of good anti-biotic cover. In one patient subdural drain penetrated the brain parenchyma and the other got intracerebral hematoma due to pressure irrigation of the subdural space. These patients improve with the passage of time. One patient who had GCS 4/15 severe cardiac disease at the time of treatment, developed seizures post-operatively and could not survive. One patient developed gross tension pneumocephalus after removing the subdural drain and deteriorated. He re-operated and the subdural cavity irrigated with saline and he recovered to normal neurological status.

Burr hole procedure has been proposed for chronic SDH in many studies done around the world with low complication rates as was seen in our study.³⁸⁻⁴¹ In the present study, epidural hematoma took place in 1 case after the evacuation of chronic SDH which could be due to as extradural hemostasis was not secured correctly prior to closing the wound as has been seen previously.⁴²

CONCLUSION

Evacuation of hematoma with single burrhole was found to be the favorable treatment of chronic SDH at the site of maximum thickness of hematoma under local anesthesia, irrigating the cavity with isotonic saline, introducing the subdural drain and nursing the patient in head-down position and giving plenty of intravenous and oral fluids, for 24 hours at least. If the patient

deteriorates post-operatively immediate CT Scan must be obtained which can detect any re-accumulation, intracerebral injury, or pneumocephalus which can be managed accordingly.

LIMITATIONS

The study did not include data from other departments or hospitals. This was a single-centered study. Only the cases presenting in the emergency department were chosen and not those from the out-patient department.

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Additional Information

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Ethical Review Board Approval: The study was conformed to the ethical review board requirements.

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.

AUTHORS CONTRIBUTION

Sr.#	Author's Full Name	Intellectual Contribution to Paper in Terms of:
1.	Shahid Smajja	Study design and methodology.
2.	Sajjad Noor, Feroze Nawaz	Paper writing, referencing, data calculations and
3.	Habibullah	Data collection and calculations
4.	Faisal Bokhari	Analysis of data and interpretation of results etc.
5.	Mumtaz Ahmed	Literature review and manuscript writing.
6.	Noor Fatima	Analysis of data and quality insurer.