A Prospective Clinical Study on Chronic Subdural Hematoma with Special Reference to Its Surgical Management at a Tertiary Care Hospital in North-East India

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ABSTRACT

BACKGROUND

Chronic subdural hematoma (CSDH) is one of the commonest disease that affects elderly people. Presentation mimics many other diseases of elderly. Timely diagnosis and prompt surgical intervention is the key to favourable outcome. This study was done to obtain baseline data on its various modes of presentation and management in a tertiary care hospital in north east India.

METHODS

This prospective observational study was conducted at Assam Medical College and Hospital, Dibrugarh, Assam from June 2016 to end of May 2017. All radiologically confirmed patients with CSDH were included fulfilling the inclusion and exclusion criteria. All patients underwent surgical intervention as per indication. All patients were evaluated in regard of presenting clinical features, radiological findings, treatment received, peri-operative complications, outcome and other clinical variables during hospital stay and follow up.

RESULTS

A total of 52 patients were included in the study. Male and female ratio was 3: 1 and 73.08 % patients were aged more than 50 years. Headache was the most common symptom followed by altered sensorium, limb weakness, intermittent vomiting, convulsions and others. History of recent trauma was found in 67.31 % and chronic alcoholism in 28.85 % of patients. Most of the patient (63.46 %) had Glasgow coma scale (GCS) score 13 - 15. Pure CSDHs were found in 19.23 % and mixed density CSDHs in 80.77 % of patients. Burr hole was done in 48 patients (92.30 %) and craniotomy in 7 (13.46 %). Electrolyte imbalance was observed in 17.31 % of patients followed by seizures, pulmonary complications and others. Four patient had moderate disability at the time of discharge and at the end of one month all discharged patient had good recovery.

CONCLUSIONS

Chronic subdural hematoma is one the common benign disease of old age which requires high level of suspicion for diagnosis and early radiological investigation. Timely surgical intervention carries minimal risk of complications with good recovery for most of the patients. Burr hole is the preferred surgical procedure for CSDHs with craniotomy reserved for some selected cases.

KEYWORDS

Chronic Subdural Hematoma, Surgical Management, Burr Hole, Craniotomy

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BACKGROUND

Chronic subdural hematoma is one of the commonest disease that affects primarily the elderly population. According to a study conducted in Finland, the incidence of chronic SDH in the society was 1.72 – 5/100,000/year in the average population, the incidence increased steeply with advancing age up to 7.35/100,000/year in the age group of 70 - 79 years.[1,2] Indian data suggests incidence rate as about 5/100000/year in the general population.[2] A male predominance of the disease has also been notice.[3] Presentations of CSDH mimics many other diseases of elderly and it varies from no symptoms to minor headaches, dementia, behavioural changes, limb weakness to unconsciousness. Computed tomography (CT) scan is the investigation of choice and due to increased use of CT scan for evaluation of cranial symptoms, CSDH is being more readily diagnosed now a days.[4] CT scans have classified various subdural collections into different types i.e. acute, sub acute, chronic and mixed density subdural hematomas. The type of intervention also changes accordingly with the nature and attenuation of collection. Timely diagnosis and prompt surgical intervention is the key to favourable outcome. It ranges from trephination by the Neolithic man to large craniotomies. Burr hole with closed drainage being most frequently used and has become intervention of choice.[5] Although burr hole and evacuation of hematoma is preferred type of surgical intervention; there is lack of uniformity regarding use of drain, irrigation, craniotomy and membranectomy.

The neurosurgery department at Assam Medical College and hospital, Dibrugarh is still in its infancy, manned by only one neurosurgeon for which all neurosurgical patients are treated in general surgery wards. It caters patients of upper Assam and adjacent parts of Nagaland and Arunachal Pradesh.

This prospective study was undertaken for better understanding of demographic profile, different modes of presentation, radiographic findings, and various interventions executed for the CSDH and its outcome in this part of country.

Objectives

1. To study the common presentation in cases of chronic subdural hematoma.
2. Pattern of distribution with reference to risk factors and radiological findings.
3. To study various modes of surgical management in cases of chronic subdural hematoma and its outcome.

METHODS

This prospective observational study was conducted at Assam Medical College & Hospital, Dibrugarh, Assam on diagnosed patients with CSDH fulfilling the predetermined inclusion and exclusion criteria. The study period was from June 2016 to end of May 2017. Ethical clearance was obtained from the Institutional Ethics Committee (H) of Assam Medical College & Hospital, Dibrugarh.

Inclusion Criteria

- Age above 12 years
- All radiologically (CT/MRI) confirmed cases of chronic and mixed density SDH (chronic component mixed with sub acute or acute component).

Exclusion Criteria

- Patient expired before surgical intervention,
- Patients with other radiological finding such as tumour or cerebro-vascular accident,
- Patients in whom cerebrospinal fluid (CSF) diversion procedure was done and
- Patients with history of previous cranial surgery for other causes.

Demographic parameters such as age, sex, history of trauma, alcohol abuse, drug usage or abuse, and clinical signs and symptoms were recorded. The preoperative neurological assessment and GCS score were recorded. Plain CT scan of head was used for diagnosis of CSDH. Magnetic resonance imaging (MRI) of brain was advised where hematoma margin was blurred due to sub acute component. The side, type of CSDH, mass effect/midline shift etc were recorded.

All the surgical procedures were performed by one single neurosurgeon in the department of general surgery. Operative procedure for each case was decided according to the standard neurosurgical indications based on radiological findings and patient condition. Two burr holecraniostomy of size approx. 15 mm to 20 mm, one in fronto-temporal junctional region anteriorly preferably underneath the temporalis muscle and one in posterior parietal region was used for hemispheric CSDHs/CSDHs involving more than one region. Bilateral SDHs were treated in one setting. After evacuation of SDH, the space was filled with normal saline. Craniotomy was used for recurrent SDH, SDH with multiple loculations and CSDH with large organized clot. After craniotomy, all the loculations and most of the outer and inner membrane were resected. Then the subdural cavity was filled with normal saline. Local anaesthesia was used for unstable patients (patients who were on inotropic support or having multiple co-morbidities like coronary artery disease (CAD), chronic kidney disease (CKD) where general anaesthesia could not be administered or in cases who are gasping or low GCS where immediate surgery was needed. In rest of the cases, general anaesthesia was used as it makes the whole process of surgery smooth with lower risk of intra-operative complications due to sudden movement of head while doing surgery in conscious/semiconscious/irritable patients. Intra-operative findings were recorded. In all cases, a subdural drain (infant feeding tube of size 7 F) was placed after evacuation of hematoma. The closed drainage system was connected to a soft collection bag that was kept in dependent position and the patient was

kept in supine position for 48 to 72 hours. The drain was removed after doing a CT scan of brain after 48 - 72 hours of the surgical intervention.

During post-operative period, patient was assessed for neurological improvement and complications. After discharge from hospital, patients were followed up at 7 days, 1 month and 3 months for assessment of their clinical status (OPD and/or telephonically). During follow up, patients and their relatives were asked about their activity of daily living and mobility status. Outcome was assessed according to the Glasgow Outcome Scale (GOS) at the time of discharge from the hospital. Peri-operative mortality was defined as mortality within 30 days after surgery.

Statistical Analysis

Data were presented in terms of mean ± SD and percentages. Diagrams and charts were added wherever necessary. Statistical analysis was done using Microsoft Excel 2010.

RESULTS

Age and Sex Distribution

A total of 52 patients were included in the study, 39 (75.00 %) were males and 13 (25.00 %) were females. Male and female ratio was 3: 1. The age group with highest incidence of chronic SDH was between 60 - 69 years (38.46 %) Table-1.

Clinical Symptoms

Headache was the most common symptom followed by altered sensorium, limb weakness, intermittent vomiting, convulsions and others (Table-2). History of recent trauma in 35 (67.31 %) and chronic alcoholism was found in 15 (28.85 %) patients. Associated diseases found were hypertension in 12 (23.08 %), diabetes mellitus in 5 (9.25 %) and chronic renal disease in 3(5.7 %) patients. History of taking anti-platelet drug was found in one (1.92 %) patient.

GCS Score at Presentation

GCS score at the time of presentation was between 13 - 15 in 33 (63.46 %) patients, 9 - 12 in 12 (23.08 %) and 3 - 8 in 7 (13.46 %) patients.

Side and Type of CSDHs

CSDHs were found in right side in 19 (36.54 %), left side in 18 (34.62 %) and bilateral in 15 (28.85 %) patients. Pure CSDHs were found in 10 (19.23 %) patients and mixed density CSDHs in 42 (80.77 %) of patients.

Mode of Treatment

All patients underwent surgery. Most common procedure performed in our study was two burr hole craniotomy with closed drainage system. Burr hole was done in 48 patients (92.30 %), craniotomy in 7 (13.46 %). In 3 (5.77 %) patients with bilataeral CSDHs, both the procedure were performed, one side craniotomy and in one side burr hole in same sitting. We had transfused 6 units of random donor platelet concentrate (RDPC) preoperatively before doing burr hole evacuation in one patient who was on antiplatelet.

Complications in Post-Operative Period

Electrolyte imbalance was observed in 17.31 % patients. Pulmonary complications were found in 9.62 % and seizures in 11.54 % patients. Recurrent CSDH was found in one case Table 3.

Outcome

One patient expired due to pulmonary complication during the hospital stay. Four patient had moderate disability at the time of discharge and at the end of one month all patient had good recovery. Table 4.

Age Group (in years)	Number (n)	Percentage (%)
< 20	0	0.00
20 - 29	2	5.00
30 - 39	3	5.77
40 - 49	9	17.31
50 - 59	13	25.00
60 - 69	20	38.46
≥ 70	5	9.62
Total	**52**	**100.00**
Mean ± S.D.	54.46 ± 11.67 years	

Table 1. Age Distribution

Symptoms	Number (n)	Percentage (%)
Headache	34	65.38
Intermittent vomiting	14	26.92
Convulsion	5	9.62
Brief loss of consciousness	8	15.38
Altered sensorium	20	38.46
Blurring of vision	5	9.62
Hemi paresis/Limb weakness	14	26.92
History of recent trauma	35	67.31

Table 2. Symptoms at Presentation

Postoperative Parameter	Number(n)	Percentage (%)
Cranial nerve palsy	0	0.00
New neurological deficit	0	0.00
Seizure	6	11.54
Electrolyte imbalance	9	17.31
Recurrent SDH	1	1.92
Wound infection/ Dehiscence	0	0.00
Pulmonary complications	5	9.62
Meningitis	0	0.00
Empyema	0	0.00

Table 3. Complications in Post-Operative Period

GOS Score	At D/A	1 Month	3 Months
Death	1	0	0
Vegetative state	0	0	0
Severe disability	0	0	0
Moderate disability	4	0	0
Good recovery	47	51	51

Table 4.GOS Score at Discharge and Follow up

DISCUSSION

Chronic subdural haematoma is an encapsulated collection of old blood with neomembrane, located between the dura

mater and arachnoid. The first authentic report of CSDH was given by Johannes Wepfer. CSDH is one of the common clinical entities encountered in daily neurosurgical practice which is also now considered a disease of elderly and senile.[6,7,2,8] Senile changes or the atrophy of the brain is a pre requisite for the development of chronic SDH. With aging, the mass of the brain decreases leading to an increase in the space between the brain and the skull from 6 % to 11 % of the total intracranial space. This causes stretching of the bridging veins and the greater movement of the brain within the cranium makes these veins vulnerable to trauma. Tear of a bridging vein and subsequent bleeding into the subdural space following a direct or indirect trauma to head is usually the initiating event in the development of CSDH. In our study, the age group with highest number of incidence was 60 - 69 (38.46 %) years followed by 50 - 59 years (25 %) and the mean age is 52 years in the present study. These results are in accordance with almost all the previous studies conducted both in India and abroad.

In more than 50 % of the CSDH patients are male.[2,3,9,8] Reason for this gender bias may be due to the fact that males are more exposed to trauma and alcohol abuse/dependency.[3] In our study, the male patients (75 %) outnumbered the females (25 %) providing us with the male : female ratio of 3 : 1. This trend is very similar to the other noted studies.

Common presentation of this disease entity ranges from a simple refractory headache to other serious neurological symptoms.[9] Headache was one of the common symptom in various studies conducted inside India and abroad.[2,8,10,11,12] Most of the patient presents with more than one symptoms, we found headache as the most common clinical presenting symptom (65.38 %).

Altered sensorium is also found in many patients with CSDH.[2,8,13] Patients may present with confusion, varying degrees of drowsiness or unconsciousness. Sometimes, patients may present with acute delirium which is very difficult to differentiate from other behavioural or psychiatric diseases. We found altered sensorium as the second most common symptom (38.46 %).

Hemi paresis is one of the important element for clinical diagnosis of CSDH. Other two important elements are focal deficit (mainly the motor deficits and the speech disorders) and psychical symptoms.[14,15,16,10,17,18,13] Hemi paresis is a common presentation in the unilateral CSDH which is comparatively less commonly found in the bilateral lesions.[19] Neurological deficits are most commonly seen on the contra lateral side. Direct pressure on the cerebral hemisphere is thought to be the underlying mechanism. We have also found hemi paresis as one of the important symptoms (26.92 %). Bilateral lesions may sometime present with paraparesis or quadriparesis.

One of the striking features in our study was the presence of history of generalized seizure (9.62 %), which was found in lower in frequency in other previous studies. Ramachandran et al.[8] recorded seizures in 7 % of the cases. Sousa et al.[10] Mori et al.[15] and Krupp et al.[13] have provided us with a range of 2.5 to 6 %. Seizures usually occur in the presence of a large haematoma associated with focal neurological deficit.

Other symptoms found in CSDH are intermittent vomiting, brief loss of consciousness, gait disturbances,[2] memory disturbances, personality or intellectual changes[20] emotional outbursts, altered behavior,[8,10] lack of concentration, sleep disturbances, speech problems, maniacal and depressive states.[3,9]

Trauma is probably the most important risk factor for the development of CSDH, with two thirds of CSDH patient remembers sustaining some type of minor trauma[9] prior to presentation. History of head trauma is found in more than 50 % of cases, may vary from 56 % to 79 %.[2,8,20,15,10,21,11] Indirect trauma to head is also an important risk factor for development of CSDH. Elderly patients are more susceptible to falls and that's the reason that we get history of falls more frequently in this group of patients. The duration between the trauma and presentation is typical which may vary from weeks to months.[22] In our study, the recent history of trauma was found in 67.31 % of the cases. Majority had history of minor trauma from one to six weeks prior to presentation.

Increased incidence of CSDH is seen in chronic alcoholic patients.[2,23] Although exact mechanisms are not known precisely, but the propensity of alcohol dependent individuals to experience trauma is much higher than the normal individuals.[9] In our study, 15 (28.85 %) out of 52 patients had history of chronic alcoholism.

As CSDH affects the elderly people, many other diseases of old age are also frequently encountered. Most common diseases found are hypertension and diabetes mellitus and CAD. Simultaneous good management of these diseases helps to decrease morbidity and mortality. Hypertension is found in 14 % to 52 % of cases.[2,15,19,24] We have found hypertension in 23.08 % of our patients. Diabetes mellitus may also be found in more than twenty percent of patients.[2,15,19,23] We found diabetes mellitus in 9.62 % of our patients. Patients with CAD often take anti-platelet and other anticoagulant medications and many a times we require to transfuse platelet concentrates and require to correct coagulation profile before undertaking operative intervention. Coagulopathy and chronic anti-platelet intake are also associated with increased risk for development of CSDH.[13] Protocol is to transfuse 6 units of RDPCs to the patient patients who are on anti-patelet medications irrespective of type of anti-platelet drugs and platelet count and to transfuse 4 units of FFP (Fresh Frozen Plasma) to the patients who are on anticoagulation medications irrespective of type of drugs and INR level. Vit K (10 mg IV stat) should also be given to the patients who are on anticoagulation. Post operatively anti-platelet/anticoagulation should be restarted after two weeks in high risk group and in low risk group it should be restarted after 6 weeks of surgery.

Impaired higher mental function is seen in many patients with CSDH. However, GCS remains more than 13 in most patients.[2,8,10,25,26] In our study, 63.46 % patients presented with GCS more than 13.

Unilateral CSDH is more common than bilateral. Almost all previous studies showed slightly increased incidence on right side.[2,10,24,26,27] In our study, the most common side of

hematoma presentation was towards the right (36.54 %), followed by left (34.62 %). Bilateral hematoma was detected in 28.85 % of our patients. Patients having bilateral CSDHs may develop sudden progression of symptoms and deterioration and therefore operative intervention should be undertaken as early as possible.

In our study, the most common lesion turned out to be of mixed density (80.77 %). The mixed density lesions had majority of hypo dense attenuation with some hyper dense part highlighting the pathophysiology of recurrent haemorrhage from the neomembrane. There are some reports that showed hypo dense lesions as the common type.[2,28,29,26,30]

Hypo dense lesions were detected in 19.23 % of our patients. There are some reports which suggests isodense lesions are more common.[31,32,33,34] There are also some reports which suggests mixed density CSDH is the common variety which ranges from 16 % to 63 % of CSDH.[31,35,33,36] It may be due to variety of classification methods used for describing CSDHs.

All patients underwent surgical intervention. Burr hole with closed drainage was done in 48 (92.31 %) cases and craniotomy was done in 7 (13.46 %) cases. Burr hole craniotomy is one of the safest procedure. More than 90 % patients with CSDH underwent burr hole procedure and rest underwent craniotomy in almost all previous studies.[8,10,19]

In most of the previous studies, subdural drain placement for 48 to 72 hours was done following burr hole procedure. Placement of subdural drainage reduces the risk of recurrence which was observed in our study also.

In our study, the complications were uncommon, recovery in more than 90 % patients uneventful. The most common complications we encountered were electrolyte imbalance (17.31 %), seizures (11.54 %) and pulmonary complications (9.62 %).The elderly patients are more prone for electrolyte imbalance which is correctable. Most of them have also been using diuretics for treatment of hypertension. One patient presented with symptomatic recurrent subdural collection where craniotomy was performed. Thus the recurrence rate in our study was of 1.92 %. Recurrence following burr hole is one of the common complication. It varies from 2 % to 21 %.[2,8] Shameem et al.[2] had similar experience, the most common post-operative complication was electrolyte imbalance (12 %) followed by fever (5 %) and seizures (4 %). Bhuyanet al.[26] also reported electrolyte imbalance in 15 % patients and seizures in 6 % of patients. M. Gelabert-Gonzalez et al.[30] had found epilepsy as the most common complication (6.2 %). All these complications were comparable to our study, however we have lowest recurrence rate which may be due to regular use of subdural drain.

Almost all previous investigator had observed good outcome following surgical management of CSDH.[2,15,16,10,18,28] This is reassuring that CSDH is a benign disease of elderly, in which timely intervention have favourable prognosis. Mortality rate remained less than 6% in most the studies.[8,20,15,21] More than 95 % of the patients completely recovered at the time of discharge with GOS 5. Only one patient expired due to pulmonary complication in our study (1.92 %). Although the patient population is elderly, surgical intervention in patients with CSDH carries very low morbidity and mortality.

CONCLUSIONS

Chronic subdural hematoma is one of the commonest neurosurgical diseases of elderly with symptoms mimicking many other diseases of old age. If not treated urgently, it carries high morbidity and mortality. High level of suspicion and early radiological investigation is the key for diagnosis of chronic subdural hematomas. Burr hole with closed-system drainage is a simple, safe, and efficient method for the treatment for most of the chronic subdural hematomas, which carries minimal risks of complications and recurrence. Craniotomy is reserved for recurrent cases and some selected patients of chronic subdural hematomas with multiple loculations and large organized clot.

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