Chronic Sub-Dural Hematoma- An Institutional Experience

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Abstract:

Introduction: Chronic Subdural Hematoma (CSDH) is one of the most commonly encountered neurosurgical conditions, is predominantly a disease of the elderly and has varied clinical presentations. The objective of this study is to analyse the clinical features, radiological findings and different surgical techniques of management, in relation to outcome and recurrence in patients with CSDH. Methodology: This is a prospective observational study conducted in 150 patients admitted in the department of neurosurgery of Sri Ramachandra Institute of Higher education and research with the diagnosis of chronic subdural hematoma between 2018 and 2021. They were grouped into four categories based on the density of CSDH found on CT based on Nomura's classification (1) as hypodense, isodense, layering and mixed types. Surgical decisions were based on imaging features and patient conditions. Post-operative improvement was assessed and condition on discharge was noted. Results: Mixed density pattern of CT scan was seen in 62 patients (41.3%), followed by hypodense in 35 patients (23.3%). There was not much difference between layering (n=27) and isodense (n=26) types. The average thickness on axial imaging was 18.8mm while the mean Mid line Shift was 9 mm. In this cohort of 150 patients who underwent surgical intervention for CSDH, 21 patients (14%) had recurrence. 14 of them had mixed type of CSDH, 6 had layering and one patient had isodense type of CSDH. The recurrence rate was highest in patients who underwent evacuation through a single burr-hole (19.2%) followed by those with double burr-holes (9.3%). Mini craniotomy (7.1%) had the least recurrence. However, we weren't able to establish a statistically significant association.Conclusion: Chronic Subdural Hematomas are amenable to surgery and often offer good results even in the elderly patients and in the presence of comorbidities but are notorious for recurrences. Imaging offers a clue to which bleeds are at a risk for recurrence- the mixed type and the layered type- which may prompt the surgeon to choose the right therapeutic intervention.

Key Words: Craniotomy, Neurosurgery, Chronic Sub Dural Hematoma, Recurrence

Introduction :

Chronic Subdural Hematoma (CSDH) is one of the most commonly encountered neurosurgical conditions, is predominantly a disease of the elderly and has varied clinical presentations. Definite history of trauma is present in a majority of cases but some cases may be secondary to abnormalities in coagulation.

There is no consensus regarding surgery of choice. Surgical options to evacuate the clot range from a twist drill craniostomy to a craniotomy due to the variation in the degree of liquefaction of the clot as well as occurrence of membranes. Subdural hematomas are notorious for their propensity to recur even after surgical evacuation. Rates of recurrence range between 2% to 37%. Risk factors for recurrence can be related to the patient, type of CSDH or surgical technique.

The objective of this study is to analyse the clinical features, radiological findings and different surgical techniques of management, in relation to outcome and recurrence in patients with CSDH.

Methodology:

This is a prospective observational study conducted in 150 patients admitted in the department of neurosurgery of Sri Ramachandra Institute of Higher education and research with the diagnosis of chronic subdural hematoma between 2018 and 2021.

The demographic profile, clinical presentation and baseline blood investigations were recorded for the 150 patients. They were grouped into four categories based on the density of CSDH found on CT based on Nomura's classification (1) as hypodense, isodense, layering and mixed types. Surgical decisions were based on imaging features and patient conditions. Post-operative improvement was assessed and condition on discharge was noted.

Recurrence was considered when the patients required re-surgery within 3 months. Follow up was done on an OPD basis. All data analysis was performed using Statistical Package for Social Science (SPSS, version 17) for Microsoft windows.

Results:

Of our study population of 150, 84.7% were male (n=127). The mean age of our study group was 64 years. Sixty six percent of the patients had history of trauma (n=100).

Motor weakness was the most common presenting symptom (61.3%), followed by headache (45.3%) and altered sensorium (38%). Seizures were the least common presenting

symptom (2%). A statistically significant trend of increase in incidence of motor weakness with increase in age was noted.

Comorbidities like diabetes (45.3%), hypertension (46%), CAD (20%), CKD (3.3%) and malignancies (2.7%) were noted. No statistically significant association of these comorbidities with recurrence or outcome was found.

Of the 150 patients, 29 (19.3%) were on anti-platelet medications and 3 (2%) were on anticoagulants. No transfusions were done prior to intervention except for one patient, on anticoagulants, who was administered Fresh Frozen Plasma prior to a mini craniotomy. The drugs did not affect the recurrence rate or outcome.

On admission, 76% had GCS between 13 and 15 (n=114). Eight patients had GCS <8 while the others had GCS between 9 and 12. Hemiparesis was present in 51.3%, speech disturbances in 11.3%, anisocoria in 4% and cranial nerve deficits in 2%. There was overlap of symptoms as well. No statistically significant relationship between admission GCS and recurrence or outcomes were found.

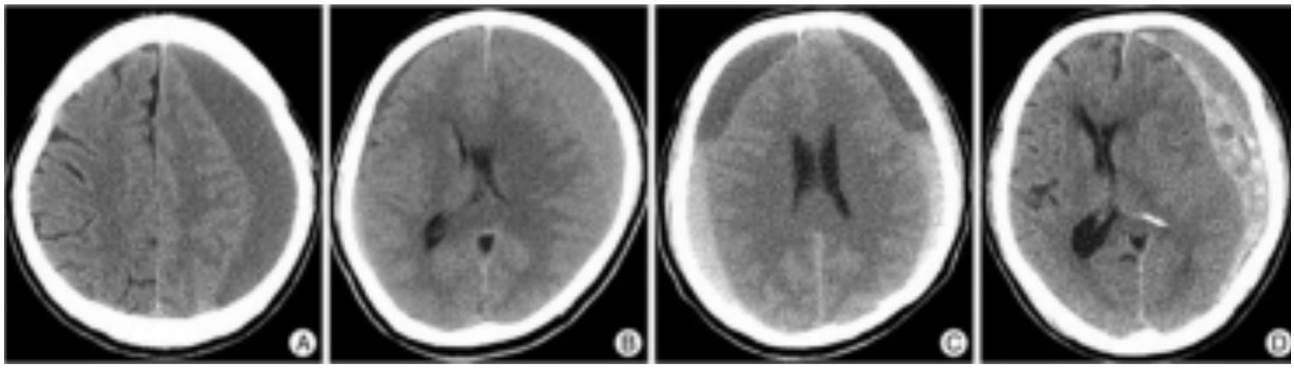

Figure 1: Types of CSDH A) Hypodense B) Isodense 3) Layered 4) Mixed

Mixed density pattern of CT scan was seen in 62 patients (41.3%), followed by hypodense in 35 patients (23.3%). There was not much difference between layering (n=27) and isodense (n=26) types. The average thickness on axial imaging was 18.8mm while the mean Mid line Shift was 9 mm.

There was a statistically significant correlation between the radiological type and recurrence. The rates of recurrence were 22.6% in the mixed density group , followed by 18.5% in layering type, 3.8% in isodense and 2.9% in hypodense groups. The p value was 0.08.

TABLE 1: Radiological Subtypes and Recurrence Rates

Type	Number (n=150)	Recurrence(n=21)	Percent of Recurrence
Hypodense	35	1	2%
Isodense	26	1	3.8%
Layering	27	5	18.5%
Mixed	62	14	22.6%
Total	150	21	14%

The choice of surgical approach was based on clinical status of the patients and type of CSDH. About 52% of patients underwent evacuation through a single burr-hole (n=78) and 28.7% patients with 2 burr-holes (n=43) while 18.7% patients underwent mini-craniotomy (n=28). There was a trend of increasing age being associated with a single burr holes due to the inherent comorbidities- all patients with CAD and CKD underwent single burr hole evacuations as did Twenty Four of the 29 patients on anticoagulants/anti platelet agents. The mean age for patients undergoing single burr hole evacuations was 72.5 yrs.

TABLE 2: Distribution of Procedures

Procedure	Numbers	Recurrences	Percentage of recurrence
Two Burr Holes	43	4	19.2%
Single Burr Hole	78	15	9.3%
Mini Craniotomy	28	2	7.1%
Twist Drill Craniostomy	1	0	0
Total	N=150	21	14%

Of the 28 patients that underwent mini craniotomy, mixed and layered types were present in 26 patients. The presence of a membrane and loculations predisposed the decision to take up the patients for mini craniotomy. The average age for the patients undergoing mini craniotomy was 56.35yrs.

In this cohort of 150 patients who underwent surgical intervention for CSDH, 21 patients (14%) had recurrence. 14 of them had mixed type of CSDH, 6 had layering and one patient had isodense type of CSDH. The recurrence rate was highest in patients who underwent evacuation through a single burr-hole (19.2%) followed by those with double burr-holes (9.3%). Mini craniotomy (7.1%) had the least recurrence. However, we weren't able to establish a statistically significant association.

Of the 21 patients, 18 underwent craniotomies to evacuate the bleed while two patients underwent evacuation through the burr hole while one patient didn't consent for surgery. Membranes were noted in 15 of those that underwent craniotomies.

There were 2 deaths in this study. Both of them were aged above 80 yrs. Their admission GCS were E1V1M4 and E1V1M5. One had a mixed type of bleed and the other had isodense type of CSDH. One person underwent twist drill craniostomy and the other had a single burr hole evacuation.

At discharge, 146 patients had symptomatic improvement and were independently functioning during follow up. Motor symptoms showed better recovery-85% compared to 75% improvement in cases with cranial nerve involvement. Apart from the two patients that expired, a couple of patients needed support to carry out their daily activities.

Discussion:

In 1857, Rudolph Virchow published a description of pachymeningitis hemorrhagica, and hypothesised that the condition is caused by the dura's generalised and chronic inflammatory response followed by fibrin and capillary proliferation [2,3].

According to Bartek et al, Baechli et al and other recent studies, the incidence of CSDH increases with age [4,5,6,7]. We find that CSDH was most common in the 60-80 age group. The mean patient age was 64.

In a Chinese study by Ou Y et al involving 1307 patients, about 61.6% had history of trauma with the mean age of 66± 16 years. [8]. In our study, about 66% of the patients had history of trauma. The average age of our study population was also similar

Almost all the studies done till date on CSDH show a male predominance [9,10,11] as did our study. This may be due to the presence of factors such as alcoholism and trauma being

more common in men. There was no statistically significant correlation between gender and recurrence in our study although Kim J et al suggested so.

De Bonis et al report that a prior medication history with anti-coagulants and anti-platelets are risk factors for CSDH and recurrence. Though most studies conclude them as risk factors [12,13,14,15], there are some studies such as those by Honda Y et al and Nathan S et al contradicting this[16,17]. We had 29 patients (19.3%) on antiplatelets and 3 patients (2%) on anticoagulants. We did not see any effect on the recurrence rate or outcome due to these medications.

Studies by Young Il Kim et al among others have stated that headache, motor weakness and altered sensorium were the most common presenting complaints while seizures and urinary incontinence were the least common presentation [18,19]. In our study, motor weakness was the most common presenting symptom (61.3%), followed by headache (45.3%) and altered sensorium (38%). Seizures were the least common presenting symptom with only 2%. A statistically significant trend for increase in incidence of motor weakness with increase in age was noted.

Based on the examination findings, 51.3% of patients had hemiparesis, 4% had anisocoria, 11.3% had speech disturbances and 2% had cranial nerve deficits. On admission, most of the patients had GCS of 13 -15 (76%). There was no direct relation between admission GCS and recurrence, contradicting multiple studies which suggest that lower the admission GCS worse the outcome [19,20,21]. The lower proportion of patients with low GCS in our study could be the reason for the contradictions.

Nomura et al proposed a system [1] where CSDH was classified based on CT imaging as isodense, hypo dense, mixed dense and layering types of hematoma. A meta -analysis done by Miah et al where 22 studies were identified involving 5566 patients, mixed density was the strongest prognostic factor of recurrence. Layered type also revealed higher recurrence rates [22]. Our study also had similar findings, with statistically significant increase in recurrence rates in the mixed density group, followed by layering group. Hypodense group had the least recurrence rates.

The series reported by Markwalder et al in 1981 (2) showed Burr Hole Craniostomy as a first-line treatment of CSDH, and surveys in the United Kingdom, Canada, and the Netherlands suggest that this is the most popular technique currently in use [21,22,23]. It seems to provide the best balance between maximal efficacy and minimal invasiveness [23]

In our study, patients underwent either a burr hole evacuation (one or two holes) or a mini craniotomy except for one case of Twist drill craniotomy. The recurrence rate was highest in patients who underwent single burr-hole (19.2%) followed by double burr-holes (9.3%) compared to mini craniotomy (7.1%) respectively, although this difference was not statistically significant, similar results where mini craniotomy has the least recurrence rates were described

by Sudha et al, [19] in 2020 where mini craniotomy was the only procedure done in their series, the reported recurrence rate was 4.3%.

Recurrence rates after surgical evacuation was placed between 5 to 30% by Cofano et al. In our study recurrence rate was 14% with a preponderance of mixed and layered types of CSDH. Risk factors for recurrence are still debated and there is no universal consensus regarding the best surgical technique or optimal pre - and postoperative management [24].

According to the study done at NIMHANS in 2007 involving 647 cases, mortality rate was 5%. It was seen that statistically significant factors determining mortality were age, GCS at presentation, and associated illnesses like cardiac and renal failure [25]. There were 2 deaths in this study due to respiratory failure and atrial fibrillation. The latter underwent a bed side twist drill craniotomy.

There are not many studies that define the outcome of patients who undergo surgery for CSDH. In our study a significant proportion of them had a good outcome(n=146). We found 94.7% of patients had a discharge GCS of 15. More than 85% had improvement of their motor functions. Cranial nerve deficits showed improvement in 70% of the study population.

Conclusion:

Chronic Subdural Hematomas are amenable to surgery and often offer good results even in the elderly patients and in the presence of comorbidities but are notorious for recurrences.

Imaging offers a clue to which bleeds are at a risk for recurrence- the mixed type and the layered type- which may prompt the surgeon to choose the right therapeutic intervention.

Mini Craniotomies offer the advantage of less recurrence and in our study, with no significant increase in risk of adverse outcomes.

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