CHAPTER 4

4.1 DISCUSSION

Chronic subdural haematoma is often considered to be a rather benign entity, ignoring its relatively high mortality and morbidity. The outcome has improved over the past 50 years, following better understanding of the pathophysiology, the introduction of modern imaging methods and refinement of operative techniques. The mortality and morbidity of chronic subdural haematoma still up to 13 % and 25 % respectively in the contemporary literature.

The clinical presentation of chronic subdural haematoma is varied and non- specific. In this study trauma accounts for 44.6%, with assault as leading cause 49%.The above factor may account for the higher incidence of chronic subdural haematoma in males in the age group 31 – 60 years as shown in figure 2.1, 2.2 and 2.4.Only 2 patients presented with bleeding disorder, demonstrating 1.3% incidence, as compared to 2-9% in most large clinical series. The low incidence could be related to small number of patients with anticoagulant therapy in the community. There is a clear difference in the clinical presentation of patients below and above 60 years of age as noted in most studies. Patient's age at the time of diagnosis influenced the clinical picture. Age above 60 years usually presenting with hemi- syndrome and cognitive dysfunction rather than features of raised intracranial pressure, which was commoner in the age group below 60 years. The reason for this shift in elderly could be due to brain atrophy and increased intracranial capacity in the age group above sixty years allowing for larger haematoma collection and more cortical and deep brain stem compression over long period of time leading to focal neurological deficit and cognitive dysfunction However, the younger patients are more likely to present with signs of increased intracranial pressure due to larger volume of brain and less available free space in the cranium. This allows pressure to increase rapidly as the haematoma forms.

All the cases in this study were diagnosed with CT brain. Others have used MRI brain to study internal architecture of haematoma and membrane covering. Various methods of surgical treatment of chronic subdural haematoma have been reported. In this study three techniques were used to drain the haematoma. Burr hole drainage were considered for the age below sixty years because of the fact that brain in this group will expand and occupies the haematoma cavity. Subtemporal crainectomy were used in the age group above sixty was because of poor brain expansion and high incidence of recollection. This technique will allow fluid to be absorbed by temporalis muscle. Craniotomy was used in multiple recurrences or when haematoma is hyperdense.

A total of nine prognostic indicators were examined to predict clinical outcome on discharge. These factors will be discussed for their statistical significance following surgery in these patients. At the time of hospital discharge 80% had good outcome, 4% were vegetative, with mortality of 9%.

4.1 AGE

Chronic subdural haematomas typically more common in the older population (10,11). Because of this tendency of increased incidence in the aged population, the influence of age on prognosis is important. The occurrence of chronic subdural haematoma in the aged population is result of several factors, an age related decrease in the brain volume, alcohol abuse leading to brain atrophy and hepatic coagulopathy and frequent falls. Older patients are also more likely to be on anti-thrombotic medication and associated co morbidity like hypertension, diabetes mellitus and cardiac diseases. Several factors have been shown to link with recovery and prognosis in the elderly. This includes poor brain compliance, decreased cerebral blood flow, severe neurological defecit, longer exposure of brain tissue to toxic products of haematoma, increased rate of recurrence and large postoperative pnemocephalus.

Age was not found to be a factor in predicting outcome in this study. It is generally held that those at the extremes of age are less likely to survive the complication of frailty and poor

mobility. In studies on age and outcome, older age was found to be a negative prognostic factor

(22,31). In contrast, other two studies on age over 80 years were not found to be a poor prognostic factor (12,13). Advanced age is probably not in itself an independent factor for bad prognosis but coexisting deep coma, persistent pupillary abnormality and co morbidity are bad prognostic factors. In this study 42 patients aged over sixty years, 12 patients who presented in poor neurological grade, only 3 patients had poor outcome. All these patients had two or more poor prognostic factors.

4.2 GENDER

A much larger population of the males than females develops chronic subdural haematoma. This imbalances has been shown in this study to be high as 4:1 male to female ratio. The reason for this imbalance may be that males are more prone for trauma and alcohol abuse, which increases the risk of subdural bleeds. This was noted in the present study (figure 2.4 & 2.5).Of the 28 females only four had trauma. Other reasons for imbalance is that fewer females seeking medical advice and theoretical possibility of protective effect of oestrogen on capillary arteries in the females.

There are no previous studies that show correlation between gender and poor outcome. In this study females were found to have worse outcome when compared to males. This was found to be statistically significant.. In this study poor outcome in females is associated with absence of trauma or minor trauma (24 vs. 4), poor neurological grade on admission and presence of co-morbidity (3 HIV, 3 hypertension).The reason for the poor outcome in female may be the following factors

1) delay in seeking medical advice 2) poor neurological grade on admission, study showed 53%

3) coexisting co-morbidity

4.3 DURATION OF SYMPTOMS AND TREATMENT

Often, the patients with chronic subdural haematoma are misdiagnosed as having another central nervous system condition like ischemic stroke or dementia. A study by Kotwica (23) demonstrated

that over fifty percent of patients with chronic subdural haematoma were misdiagnosed on admission. Rozzelle et al (38) found that presence of haematoma for longer duration is significantly associated with mortality. Previous studies have shown that early diagnosis and surgical evacuation has a positive effect on outcome (10,29).

In this study there is no significant statistical difference in outcomes in relation to duration of symptoms and treatment. This study also demonstrated varied time period between trauma and surgery. As there were only few patients in the sample where the duration of symptoms was more than two weeks, a conclusion cannot be drawn.

4.4 NEUROLOGICAL GRADE

In order to have a standardised evaluation scale at admission, permitting valid comparisons, Markwalder proposed a grading of clinical state which is adopted in this study. It has generally been believed that there is an important and close relation between mortality and depth of consciousness. Deep level of unconsciousness seems to be better predictor of mortality. Studies by Robinson et al (35) and Van Haven burg et al found that patients with good neurological grade on admission had good outcome following surgical evacuation.

In this study there was statistically significant correlation between pre-operative Markwalder grading and Glasgow outcome score: patient with good grade had a significant better chance of a good outcome than those present with poor grade ($P < 0.000$). The risk of postoperative complications is also increased in those who remain bed ridden or unconscious following surgery. They are prone for sepsis, aspiration pnemonia, pulmonary embolism, leading to poor outcome.

4.5 PUPILS

The patients with abnormal pupils found to have worse outcome than patient with normal pupils. This was statistically significant (Table 3.6). The persistence of the loss of pupillary reactivity rather than transient early observation of pupillary abnormality is important in the assessment of

outcome.

In this study 25 patients who showed pupillary abnormality, 40% had good outcome following surgery. Almost all patients with persistent pupillary abnormality had poor outcome on discharge. Those who had good neurological grade plus pupillary abnormality only 20 % had poor outcome but 70 % of the poor neurological grade plus pupillary abnormality had poor outcome. This show that good recovery is possible in patients who are still in good neurological grade even if they show pupillary abnormality. In patients whose pupils were bilaterally dilated and non reactive on admission the mortality and vegetative survival was 67%. Pupillary abnormality and poor neurological grade suggests advanced brain herniation causing significant disturbance of the vital functions of the brain stem and this will no doubt contribute to the high likelihood of poor outcome in these cases.

4.6 COMPUTERISED AXIAL TOMOGRAM FINDINGS

Various pre operative CT brain parameters were considered for prognostic indicators in previous studies (47,48,38) Van Havenburg et al study on outcome demonstrated no correlation of haematoma size, midline shift and outcome. A study by Rozzelle et al on elderly demonstrated that the presence of midline shift was not associated within increase in mortality.

In this study, preoperative parameters like intracranial pressure, midline shift, haematoma thickness and multiplicity of haematoma has not affected the clinical outcome. This was clearly demonstrated in previous studies. In this study it was interesting to note that incidence of poor outcome was higher when the thickness of haematoma was between 2 and 3 cm i.e.; 26% where as, it was 19% and 14% when the thickness was <2cm and >3cm respectively. In this group of sixty four patients with haematoma diameter 2-3 centimetres, forty one patients were below sixty years. The presence of infarct and finding of brain herniation has to be looked in future studies when correlating outcome with CT brain findings. In 22 cases of bilateral haematoma, only four had poor outcome. Although the utilization of CT brain in the diagnosis has greatly reduced

the mortality, the CT findings were not predictive of outcome.

4.7 TYPE OF OPERATION

Symptomatic chronic subdural haematoma invariably leads to death if not treated. Approach to the surgical treatment of chronic subdural haematoma varies in neurosurgical literature (6,10,14,3). The extent of surgery necessary for adequate treatment of chronic subdural haematoma is still a matter of debate. Up to now there are no prospective randomised studies to determine which surgical approach is most appropriate. Now the accepted method of treatment is burr hole drainage for the last 20 years. Main reason for the universal acceptance burr-hole is supported by its safety, minimal invasiveness and low recurrence. In this study, 73% of patients were treated by burr hole drainage with intraoperative irrigation but without post operative closed drainage system. The number of poor outcome was 20% in burr-hole group and 47% in subtemporal craniectomy group

In this study, there was difference in the outcome when the neurological grade was added to burr hole and subtemporal craniectomy groups as shown in the(table 4.1 & 4.2). Patients with good neurological grade had poor outcome when subtemporal craniectomy was done (22%) compared to (5%) in burr-hole group. In the past our unit had believed that by doing subtemporal craniectomy would reduce the incidence of recurrence in elderly by exposing residual fluid to temporalis muscle for absorption. This study did not showed the benefit of doing subtemporal craniectomy in elderly. Thus it can be concluded that burr-hole drainage has low risk of morbidity and mortality.

	Burr holes	**GOS 1,2&3**	**GOS 4&5**
Markwalder 1&2	77	4 (5%)	73 (95%)
Markwalder 3&4	36	15 (42%)	21 (58%)

Table 4.1

	Sub temporal craniectomy	GOS 1,2&3	GOS 4&5
Markwalder 1&2	18	4 (22%)	14 (78%)
Markwalder 3&4	10	5 (50%)	5 (50%)

Table 4.2

In this study, recurrence was 6% for burr holes without closed drainage system, which was similar to studies with postoperative subdural closed drain. The recurrence was slightly higher in subtemporal craniectomy group (10%).

4.8 RECURRENCE

The recurrence rate in the literature has varied from 5 to 33%. It is important to emphasize that recurrence means symptomatic collection of the subdural haematoma at the site of previous surgery. The incidence is higher in the 1st and 7th postoperative day and is rare after 6 months. Bleeding tendency, intracranial hypotension, haemorrhage from the neomembrane and poor reexpansion are well known risk factors for recurrence. Hiroshi Nakaguchi et al classified chronic subdural haematoma according to the internal architecture and intracranial extension and found that post operative recurrence of haematoma was higher in septated group and low with trabucular type. The trabucular type was defined as a haematoma containing two components of different densities with a clear boundary lying between them. The trabucular type was defined as a haematoma with inhomogeneous contents and a high density septum running between the inner and outer membrane.Tanikawa.M et al conducted a retrospective study using MRI and concluded

that chronic subdural haematoma on T2 weighted MRI which exhibited multilayered haematoma

recurred more frequently and treating with craniotomy had good recovery and significantly shorter hospital stay. Tsutsumi et al have shown that, in their prospective randomised study, the appearance of low intensity haematoma on a T1- weighted image MRI has high recurrence rate than high intensity group. This can be explained by the fact that in proliferative phase of haematoma formation the new microvessels of the neomembrane are more prone for rupture and rebleeding giving recent blood hypointensity on MRI.

In this study the recurrence rate was 7% at the time of discharge, all occurring during the first week following surgery. In a study by Markwalder, they showed that early (first 48 hours) recurrence was due to cerebrospinal fluid collection in the subdural space rather than micro-haemorrhage from the neomembrane (27).The present study confirms the higher incidence of recurrence in the older age group. This was found to be 70% in the age group above sixty years. The reason for this could be secondary to brain atrophy and delayed re-expansion of brain. It is not clear whether delayed re-expansion is due to reduced regional cerebral blood flow or increase elastance of the brain. In this study, all recurrence was seen in patients who presented in poor neurological grade. Whether this is due to delayed re-expansion secondary to reduced regional blood flow is not known. This needs further study. However, this study has not shown that recurrence affect the clinical outcome of the patients. There are two studies (47, 50) which compared the surgical results of burr-hole craniostomy with and without close drainage system. Both studies found higher recurrence rates in patients without postoperative closed drainage system. Sambashivan (38) reported a series of 2300 cases where he found low recurrence rate of 0.35% in patients who had subtemporal marsupialisation with 24 hours subdural drain. It is possible that high recurrence in this study in elderly can be reduced with the use of post operative closed drainage system

4.9 MORTALITY

The mortality associated with chronic subdural haematoma has continued to in the past decline

significantly 50 years. This is attributed mainly to CT imaging that allows earlier diagnosis and treatment and also from reduced operative mortality from use of less invasive surgical procedures. In the current literature the mortality ranges from 1.5% to 9%, which matches our mortality rate of 9%. In this study 8 deaths were related to delayed diagnosis and poor management from the referring hospitals. Most patients had Glasgow coma of 3/15 and all had unequal and fixed pupils on arrival. Two patients died from recurrence and these patients were comatosed and had unequal fixed pupil before surgery. It is interesting to note that three of the four known HIV positive died post operatively from infection. All had good neurological grade on admission. Four patients in the mortality group were hypertensive pre-operatively. From this study it is shown that three major factors for mortality

1) Deep level of unconsciousness
2) Pupillary inequality
3) Associated co morbid condition

4.10 CONCLUSION

Chronic subdural haematoma is a relatively common neurological condition that is still associated with significant morbidity and mortality. Early diagnosis of chronic subdural haematoma is of extreme importance so that measures can be initiated to diminish the risk of exhaustion of compensatory and adaptive mechanism, thick collagen capsule formation, brain atrophy and clinical deterioration.CT scan has unquestionably improved the diagnostic ability but its prognostic value, however, seems to be limited. The selection of patients for surgical intervention should be guided by morbidity and mortality data. Pre operative identification of prognostic factors would be helpful in this regard.

It has generally been accepted that the patient's neurological status is the most important factor in the outcome prediction. This has proved beyond doubt in this study, along with pupillary abnormality. These two variables should be added to the associated co morbidity like hypertension, infection and immunosuppression in predicting the outcome. The combination above

three factors results in poor survival of patients following surgery.

Higher incidence of recurrence in elderly is confirmed in the study. Low recurrence of 7% was achieved with simple irrigation following surgery, even if the entire neo-membrane is left in situ.The probable reason for this may be removal of anti-clotting factors by drainage and irrigation of the hemorrhagic fluid .This allows for haemostasis and fibrosis to occur. The present study was performed retrospectively and therefore the existence of bias and inaccuracies cannot be completely denied . To develop a definite criteria for selection of surgical procedure, a further study such as prospective, randomised, control trail is needed.