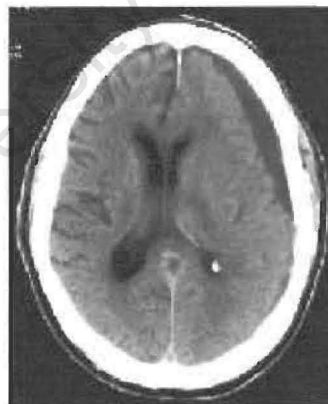


**UNIVERSITY OF CAPE TOWN**



**THE CLINICAL MANIFESTATIONS  
OF CHRONIC SUBDURAL HEMATOMAS  
IN THE WESTERN METROPOLITAN REGION**



**Dr Jacques Hendricks**

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**UNIVERSITY OF CAPE TOWN**

**Research Topic:**

**THE CLINICAL MANIFESTATIONS  
OF CHRONIC SUBDURAL HEMATOMAS  
IN THE WESTERN METROPOLITAN REGION**

**A Dissertation submitted to the**

**Faculty of Health Sciences**

**In partial fulfillment of the requirements of the Degree:**

**M. Phil in Emergency Medicine**

**By**

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**Student No.: HNDJAC007**

**August 2005**

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**External Supervisor: Dr Mouroed Manie**

## STATEMENT OF DECLARATION

### *THE CLINICAL MANIFESTATIONS OF CHRONIC SUBDURAL HEMATOMAS IN THE WESTERN METROPOLITAN REGION*

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.....  
**Jacques Hendricks**

**August 2005**

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## ABSTRACT

**INTRODUCTION:** Chronic subdural hematoma is a well-known neurosurgical entity. Although the availability of CT-scan has greatly facilitated doctors in making the correct diagnosis, unfortunately CSDH is frequently being misdiagnosed especially at secondary level hospitals.

**AIMS AND OBJECTIVE:** *a)* To study and evaluate the clinical manifestations of patients with chronic subdural hematomas, *b)* To determine the common risk factors associated with the disease and *c)* To identify errors made by emergency physicians in order to recommend better case management.

**METHODOLOGY:** A retrospective review of 79 reported cases of chronic subdural hematomas at Groote Schuur Hospital was conducted from 1 January 2000 to 31 December 2004. Information was derived from medical records and CT-scan or MRI confirmed cases. Details of the reported cases were recorded with respect to the history, risk factors, physical examination and outcome.

**RESULTS:** The peak incidence ranged from the fifth to sixth decade of life with a mean age of 53,9 years and an associated measure of variability of 16.9 years. The male-to-female ratio was found to be 2:1. A history of a fall or head injury was found in 54,43 % of cases. Headaches (59,49%) and an altered level of consciousness (65,82%) were the most common manifestations of chronic subdural hematomas. A diagnosis of subdural

hematoma prior to CT-scan was made in 35% of cases, whilst a saturated CT-scan booking system was the main reason for a time delay in diagnosis.

**CONCLUSION:** Although the study has identified specific risk factors associated with chronic subdural hematomas, it is evident that the lack of CT-scan facilities at medical centers delays the diagnosis resulting in subjective diagnosis to be the order of the day. An understanding of the risk factors and clinical presentation associated with chronic subdural hematomas is essential to enhance the clinical expertise of emergency medical practitioners and hence the timeous referral of such cases to appropriate facilities.

**Key words:** Chronic subdural hematoma, CT-scan, risk factors, headaches and altered level of consciousness

## INTRODUCTION

Chronic subdural hematoma (CSDH) is an encapsulated collection of old blood, mostly or totally liquefied and located between the dura mater and arachnoid of the brain.<sup>1</sup>

CSDH occurs in the elderly after a trivial injury without any damage to the underlying brain and there is usually a period of weeks to months before it becomes clinically evident. It should be differentiated from acute subdural hematoma that usually occurs in younger adults after major trauma often associated with structural brain injury and presents within 72 hours.

International studies reported different incidences of CSDH in various age groups. It has a peak incidence in the sixth and seventh decade of life.<sup>1</sup> Fogelholm and Waltimo<sup>2</sup> estimated an incidence of 1.72 / 100 000 per year, the incidence increasing steeply with advancing age up to 7.35 / 100 000 per year in the age group 70-79. In the United States of America the incidence appears to be the highest in the fifth through to seventh decades of life.<sup>3</sup> Sinson and Reiter<sup>4</sup> reported a higher incidence of CSDH in men, with a male-to-female ratio of 2:1.

It has long been recognized that the elderly are more likely to develop CSDH, particularly from minor trauma. Other predisposing factors include dementia, chronic alcoholism, epilepsy, platelet dysfunction, bleeding diathesis, patients with chronic renal failure, arachnoid cysts and cardiovascular disease such as hypertension and arteriosclerosis.<sup>4</sup>

The diagnosis of CSDH is usually not suspected at the time of initial presentation in the majority of cases. In a series of 194 cases in 1979, CSDH was suspected in only 28% of patients.<sup>5</sup> The diagnosis is normally made on CT-scan and the treatment is by surgical intervention, although small hematomas may resolve spontaneously.

The main aim of this study was to determine the clinical manifestations of CSDH, clinical signs and symptoms, to determine associated risk factors and to identify errors made by emergency doctors who are faced with this problem.

**Chapter 1** evaluates the statement of intent related to the problem under investigation; it's setting, starting with the parameters to be examined, followed by the appropriate hypotheses, including the underlying validity and value assumptions of the study. The chapter concludes with a brief statement of the significance of the study.

**Chapter 2** reviews related literature pertaining to CSDH in order to provide a theoretical and scientific basis for this study.

**Chapter 3** evaluates the type of data used in the study. All validity and reliability aspects of the study are discussed. The chapter ends with a brief explanation of the procedures for data analysis.

**Chapter 4** contains the results obtained by statistical analysis of the data collected during this study. The main features and trends of the data are interpreted and described with the aid of graphs and tables. The discussion of the results is found in **Chapter 5**.

**Chapter 6** concludes with final thoughts and suggestions for further exploration, which includes a suggestion to have CT-scan facilities available at secondary hospitals.

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# **CHAPTER 1**

## **THE PROBLEM AND ITS SETTING**

### **1.1 INTRODUCTION**

This thesis focuses on the clinical manifestations of CSDH. The goal of the research is stated in a clear statement of the problem, also including certain assumptions underlying the study. The specific statements of the sub-problems or parameters of interest follow this. Further explorations are presented in the development of specific hypotheses for each formulated sub-problem of interest.

Inclusion and exclusion criteria relevant to this study are outlined which provides a solid frame of reference. This chapter concludes with a brief explanation of the rationale for this investigation.

### **1.2 AIM**

The purpose of this study is to evaluate reported cases of CSDH within the Western Metropolitan region between 2000 and 2004 with reference to clinical manifestations, individual and socio-economic characteristics in order to determine the factors contributing to misdiagnosis and to enhance case management.

Certain assumptions underlying the study were made: It was assumed that the record keeping was correct and a true reflection of events that occurred in the patients included in the study and that a consultant radiologist reported all CT-scans correctly. It was also assumed that the data by Stats South Africa with regard to the total population of the western metropolitan area were correct and that a steady population growth of 5% per year was close to the real growth rate.<sup>18</sup>

## **1.3 PARAMETERS TO BE EXAMINED**

### **1.3.1 Parameter 1**

The first parameter is to assess the clinical manifestations of patients with CSDH in the western metropolitan region, in order to assist emergency doctors to identify the most common clinical signs and symptoms when they are faced with a confused patient.

### **1.3.2 Parameter 2**

The second parameter is to evaluate the demographic background and risk factors associated with patients with CSDH in order to understand the disease better.

### **1.3.3 Parameter 3**

To identify omissions made by emergency doctors relating to the diagnosis of CSDH in order to determine the factors contributing to misdiagnosis and to enhance case management.

## **1.4 HYPOTHESES FORMULATION**

### **1.4.1 Hypothesis 1**

It is hypothesized that the prevalence of CSDH will be different in males and females in the community. It is hypothesized that the clinical manifestations of CSDH reported by the medical practitioners amongst various specific age groups will be different.

### **1.4.2 Hypothesis 2**

It is hypothesized that headaches as a presenting complaint and chronic alcoholism will be more associated with the younger age group and dementia with the older age group.

### **1.4.3 Hypothesis 3**

It is hypothesized that the analysis of the various key findings contributing to CSDH will favour the identification of the disease, in order to enhance case management.

## **1.5 INCLUSION AND EXCLUSION CRITERIA**

All patients who had a diagnosis of a CSDH confirmed on CT or MRI scans were included in the study. The period of the study ranged from 1 January 2000 to 31 December 2004. The study was limited to patients reporting to public hospitals in the western metropolitan region, whilst those in the private sector were excluded.

The records of all patients older than thirteen years were examined. The Western Metropolitan Region referred to the drainage area of Groote Schuur Hospital, which included

patients from GF Jooste Hospital (GFJH), Victoria Hospital (VIC), New Somerset Hospital (NSH), Brooklyn Chest Hospital (BCH), Conradie Hospital (CH) and False Bay Hospital (FBH). It included all people northwest of the N7 and west of the N2 of the Cape Metropole. Patients with a diagnosis of acute subdural hematoma were excluded from the study (patients presenting within 72 hours).

## **1.6 SIGNIFICANCE OF STUDY**

Due to a lack of CT-scan facilities at secondary level hospitals emergency doctors often rely heavily on clinical features of CSDH, which may lead to an erroneous diagnosis. This study would help determine those clinical symptoms, signs and risk factors associated with CSDH with a view to enable doctors at secondary level hospitals to set up protocols and guidelines when dealing with these kinds of patients and ultimately decrease the mortality and morbidity rate of CSDH.

## CHAPTER 2

### REVIEW OF LITERATURE

#### 2.1 INTRODUCTION

Subdural hematoma is bleeding or a collection of blood between the dura mater and arachnoid of the brain usually as a result of a tear in the bridging veins that cross this space. It can be classified into acute, chronic, and subacute.

Acute refers to symptoms which manifest before 48 hours post injury, subacute are those manifesting between 48 hours and 2 weeks, whilst chronic to those manifesting after 2 weeks<sup>6</sup>. Acute cases usually present immediately after trauma and often the victim is unconscious. However, CSDH may present in the elderly or alcoholic patients with vague complaints or change in mental status.<sup>7</sup>

Virchow first described it in 1857 as “pachymeningitis hemorrhagica interna”. Later <sup>8</sup>Trotter put forward the theory of trauma to the bridging veins as a cause of what he named “Subdural Hemorrhagic Cyst”. Since then trauma has been recognized as an important factor in the development of CSDH.

CSDH is commonly associated with cerebral atrophy. The cortical bridging veins are thought to be under greater tension as the brain gradually shrinks from the skull, even minor trauma may cause one of these veins to tear. Slow bleeding from the low -pressure venous system often enables large hematomas to form before clinical signs appear. Small subdural hematomas often resorb spontaneously. Large collections of subdural blood usually organize

and form vascular membranes that encapsulate the subdural hematoma. Repeated bleeding from small, friable vessels<sup>3</sup> within these membranes may account for the expansion of some CSDH's.

### **2.1.1 Prevalence**

It has a peak incidence in the sixth and seventh decade of life.<sup>1</sup>

In a study of 64 cases Fogelholm and Waltimo<sup>2</sup> estimated an incidence of 1,72 / 100 00 per year, the incidence increasing steeply with advancing ages up to 7,35 / 100 000 per year in the age group 70 –79 years. In the United States of America the incidence of CSDH peaks in the fifth through to seventh decade of life.<sup>3</sup> The male-to-female ratio is 2:1.<sup>4</sup>

The morbidity and mortality rates associated with surgical treatment of CSDH have been estimated at 11% and 5% respectively.

## **2.2 PATHOPHYSIOLOGY**

CSDH is associated with a number of situations in which the intracranial pressure is low or where there is a fair amount of slack space within the skull, thus, CSDH are more common in situations where there is cerebral atrophy such as old age, dementia or alcoholism. These are conditions that may also be associated with impaired coagulation of the blood and a propensity to repeated minor head injuries. In younger persons without generalized cerebral atrophy the focal cerebral atrophy associated with an arachnoid cyst is a common predisposing condition. Conditions that drop the intraventricular pressure and thus tend to open up the subdural space also predispose patients to CSDH. Amongst these are ventricular, lumbar drains and lumbar punctures.<sup>9</sup>

The initial trauma to the bridging veins results in hemorrhage in to the subdural space. A day after the hemorrhage, the outer surface of the hematoma is covered by a thin layer of fibrin and fibroblasts. Migration and proliferation of the fibroblasts leads to formation of a membrane over the clot by the fourth day. The outer membrane progressively enlarges and the fibroblasts invade the hematoma and form a thin membrane during the next two weeks. Liquefaction of the hematoma occurs due to the presence of phagocytes. Then the hematoma may either resorb spontaneously or slowly increase in size resulting in a CSDH. This theory is more generally accepted rather than the osmolality theory first put forward by Gardner<sup>10</sup> in 1932.

### **2.3 RISK FACTORS**

As previously mentioned dementia and alcoholism causes cerebral atrophy, which causes an increase in the space between the brain and the skull, stretching the bridging veins and making them more vulnerable to trauma. Advancing age especially in the fifth and sixth decade of life will also contribute to this phenomenon. Other risk factors include a head injury, anticoagulants or antiplatelet drugs (aspirin), bleeding tendencies, epilepsy and patients with chronic renal failure. It is reported by Adhiyaman *et al* that as many as 24% of patients with CSDH are on warfarin.<sup>1</sup> Conditions such as shunts<sup>11</sup>, which may cause low intracranial pressure, hypertension and arteriosclerosis, may also indirectly contribute to the illness.

## **2.4 CLINICAL MANIFESTATIONS, SIGNS AND SYMPTOMS**

The following clinical signs are commonly present with CSDH

### **2.4.1 Altered mental state**

The most common presentation in the elderly (50% - 70%) is an altered mental state.<sup>1</sup> It may manifest as varying degrees of confusion, drowsiness or coma. Acute delirium may be very difficult to differentiate from behavioural or psychotic symptoms. Some patients are even considered to be suffering from major psychiatric illness because of depressive and paranoid symptoms. Also the diagnosis may be very easy to overlook in patients with psychiatric or neurological illnesses in whom any change in behaviour or functional state is usually attributed to their pre-existing illness.

### **2.4.2 Focal neurological deficit**

Weakness of the limbs is usually mild but drowsiness is out of proportion to the degree of neurological deficit. Mostly the deficit is contralateral but there are reports of ipsilateral symptoms. Focal signs can be extremely subtle and variable.

### **2.4.3 Headache**

The incidents of headaches vary and have the following characteristics. The headache is typically of sudden onset, severe, associated with nausea, vomiting, and exacerbated by coughing, straining or exercise.

#### **2.4.4 Falls**

Recurrent falls is a significant risk factor of CSDH. In a study of 354 cases by Baechli, 77% of patients had a history of a fall.<sup>16</sup>

#### **2.4.5 Seizures**

Epilepsy is traditionally thought to be a rare presentation, however patients with epilepsy are more likely to have recurrent head injuries and develop cerebral atrophy much earlier in life.

#### **2.4.6 Other**

Luxon and Harrison<sup>5</sup> reported these signs (in decreasing order of frequency): Papilloedema, reflex asymmetry, extensor plantar response, dysphagia, neck stiffness, hemianopia and dysarthria. Meagher and Young<sup>3</sup> are of the opinion that a gait abnormality is another common sign of CSDH.

The following clinical signs are atypical (uncommon) presentations of CSDH:

#### **2.4.7 Isolated neurological deficits**

Patients presenting with vertigo and nystagmus, upward gaze palsy and isolated oculomotor palsy due to CSDH have been reported. Increase intracranial pressure causing uncal herniation and stretching of cranial nerves was thought to be the mechanism involved.

#### 2.4.8 Extrapyramidal syndromes

Parkinsonism is a well-recognized phenomenon.

#### 2.4.9 Rare neurological syndromes

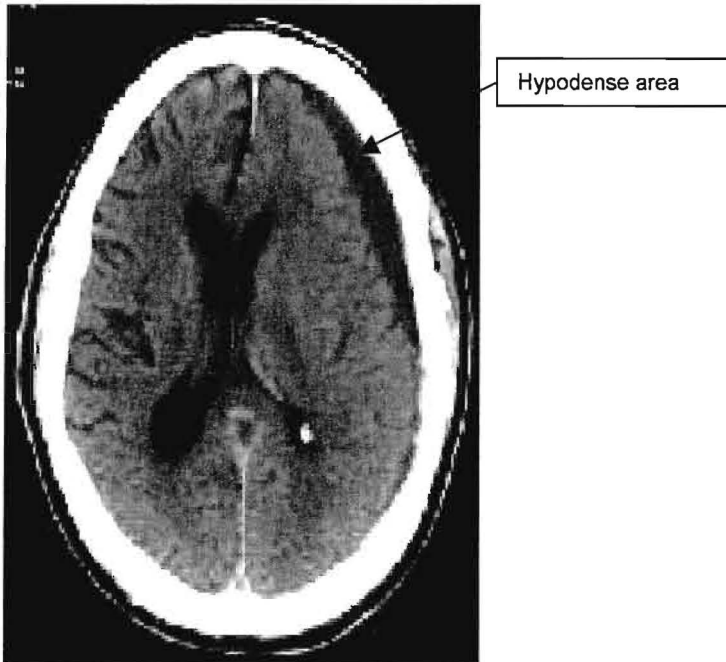
Gerstmann's syndrome (right-left disorientation, finger agnosia, agraphia and acalculia) and progressive quadriplegia<sup>1</sup> due to SDH has been reported in the literature. These patients made a good recovery after the evacuation of the hematoma.

Fogelholm *et al* have observed that while headaches and papilloedema were more frequently found in younger patients, older patients had a higher frequency of mental symptoms and hemiparesis.<sup>2</sup> Similarly, in the study by Liliang and Tsai<sup>11</sup> it was found that headaches and vomiting were more prevalent in the younger age group and mental symptoms in the older group.

### 2.5 DIAGNOSIS

CT-scan is the gold standard to make the diagnosis of CSDH. Prior to CT-scans, cerebral angiography was used. MRI can also be used especially to diagnose subacute and bilateral subdural hematomas.

The blood appears as crescent-shaped hyperdense lesions in acute SDH. Subacute SDH are isodense and more difficult to identify. CSDH appears hypodense, as the iron in the blood is phagocytised.<sup>7</sup>



CT-scan showing a chronic subdural hematoma<sup>3</sup>

## 2.6 TREATMENT

Without mass effect on imaging studies and no neurological symptoms or signs, CSDH can be followed up with serial scans and may resolve spontaneously. Liquefied CSDH can be treated with drainage through 1 – 2 burrholes.

A non-liquefied CSDH cannot be decompressed adequately by burrholes and must be done by craniotomy. Bilateral CSDH should be drained from both sides.<sup>4</sup>

Medical treatment includes supportive management and proper resuscitation of the patients.

## 2.7 OUTCOME AND PROGNOSIS

Medical or surgical complications occur in  $\pm 19\%$  of patients who have their hematomas drained surgically. Medical complications include seizures, aspiration pneumonia and other infections.

The outcome after drainage of CSDH correlates with the preoperative neurological state. Early diagnosis before significant neurological deterioration correlates with a favorable prognosis. The mortality rate within 30 days of surgery is 3,2 – 6,5%.<sup>4</sup> Eighty percent of patients will recover to their level of function existing prior to presentation.

## **CHAPTER 3**

### **METHODS AND MATERIALS**

#### **3.1 THE DATA**

Medical records of wards C14 and C15 of GSH were reviewed and all cases of CSDH were extracted for the period dated 1 January 2000 till 31 December 2004. These cases were then captured on a pre-determined data capture form as included in the appendices.

#### **3.2 RESEARCH METHODOLOGY**

##### **3.2.1 The research design**

A descriptive historical review was used for this study from 1 January 2000 to 31 December 2004. The population was identified and information collected from their medical records. There are analytical features of the study as well as qualitative and quantitative characteristics.

##### **3.2.2 Study population**

The study population consisted of adults over the age of 13 years in the Western Metropolitan region for the period ranging from 1 January 2000 to 31 December 2004. It included all races, different backgrounds and risk factors.

### **3.2.3 Ethics**

The study was approved by the Research Ethics Committee of the University of Cape Town, since the study was a historical, retrospective non-interventional type of study, which guaranteed patient privacy.

## **3.3 TREATMENT OF PARAMETERS**

Data were obtained from the folders for demographic analysis to answer the parameters of interest. The clinical signs and symptoms recorded by doctors according to folders were captured. A provisional or pre CT-scan diagnosis of the cases was formulated, using the information on the CT-request forms or where it was specifically stated in the clinical records.

Medical judgement errors were identified as a contributing factor in time delay of diagnosis and subsequent delay in treatment.

## **3.4 DATA ANALYSIS**

All data were captured on Microsoft Excel. The data were further exported to additional statistical analysis packages in order to facilitate more detailed statistical analysis. These specific statistical analyses were done using the statistical package STATA<sup>12</sup> Intercooled

Version 7 and SPSS Software package<sup>14</sup>. This data were extensively analysed in order to identify risk factors associated with the prevalence of CSDH.

Specific categorical variables were created in order to facilitate the calculations of associated risks and the identification of specific clinical features. The sampled patient records were divided into four age categories for the purpose of identifying the specific characteristics of the patients within the four distinct age categories. For the purpose of this exercise the researcher made use of the quartiles of the age variable and consequently the following age categories were identified: Category 1, all the ages 13-41 years; Category 2, all ages between 41 and <52 years; Category 3, all ages between 52 and < 69 years; Category 4, all >69 years.

In this study the age, gender, race, area of referral, trauma history, clinical signs and symptoms were included for analytical purposes. CT-scan results and treatment were analysed using the Pearson's chi-square ( $\chi^2$ ) or the Fischer's exact test<sup>13</sup> in view of their categorical nature. All statistical results were declared significant if probability was found to be less than 0.05, or insignificant if otherwise. Comparisons of the numeric variables in the study were also done using the t-test for the comparison of the means of the distinct distributions.

In the case where data were found to be normally distributed the results are depicted as mean  $\pm$  Standard Deviation (SD). All the statistical tests were performed at a 5% level of significance. Thus, an alpha of 0.05( $\alpha=0.05$ ) was used as the criteria for determining significance of relationships between variables.

## **CHAPTER 4**

### **RESULTS OF THE STUDY**

#### **4.1 INTRODUCTION**

In this section, the main features and trends in the data are presented. They are exhibited in the form of graphic displays and a series of specific summary statistics performed on the data. An effort is made to provide the prevalence of the disease, various outcomes, risk factors, and observed associations to support or disprove the formulated hypotheses.

#### **4.2 INCIDENCE**

An estimated average total population of 1 795 268 per year was retrospectively calculated at a 5% population growth rate per annum. The incidence was subsequently determined at 4,4/100 000 population per year.<sup>18</sup>

## 4.3 DEMOGRAPHIC CHARACTERISTICS

The demographic characteristics of the sample population with reference to age, gender, and race are discussed in this section.

### 4.3.1 Sample Population

Data were collected from 79 patients diagnosed with CSDH according to CT-scan reports over the last five years (2000-2004) in the Western Metropolitan region. The ages of the subjects ranged from 22 to 86 years with the mean age of 53,9 years and the standard deviation (SD) of 16,95 years. Four categories were formulated to assess different variables in different age groups.

There were a total of 56 males and 23 females.

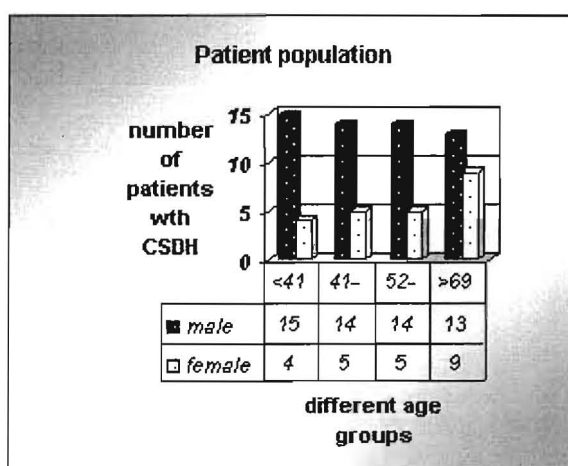
- In category 1 (age 13 to <41 years) there were 15 males and 4 females
- In category 2 (age 41 to 52<sup>-</sup> years) there were 14 males and 5 females
- In category 3 (age 52 to 69<sup>-</sup> years) there were 14 males and 5 females
- In category 4 (age >69 years) there were 13 males and 9 females

The descriptive character of the age by gender is displayed in table 4.1 and read together with figure 4.1.

Table 4.1 Age distribution of specific age categories (years) given gender

	Age	No. of Males	%	No. of Females	%	Total No.
Category 1	13-41	15	26.79	4	17.39	19
Category 2	41-52	14	25.00	5	21.74	19
Category 3	52-69	14	25.00	5	21.74	19
Category 4	>69	13	23.21	9	39.13	22
Total		56	100.00	23	100.00	79

Figure 4.1 Patient population – various age groups



In the age group 13 to 41 years, the youngest patient was 22 and the oldest 40 with a SD of 5,59 and a mean of 32 years. In the age group 41 to 52 years, the youngest was 41 and the oldest 51 with a SD of 2,92 and a mean of 46 years. In the age group 52 to 69 years, the youngest was 52 and the oldest 58 with a SD of 5,00 and a mean of 57 years whilst the age group > 69 years had a SD 5,15 and a mean of 76 years, with the youngest patient being 69 and oldest 86 years.

Figure 4.2 Graph of age in years

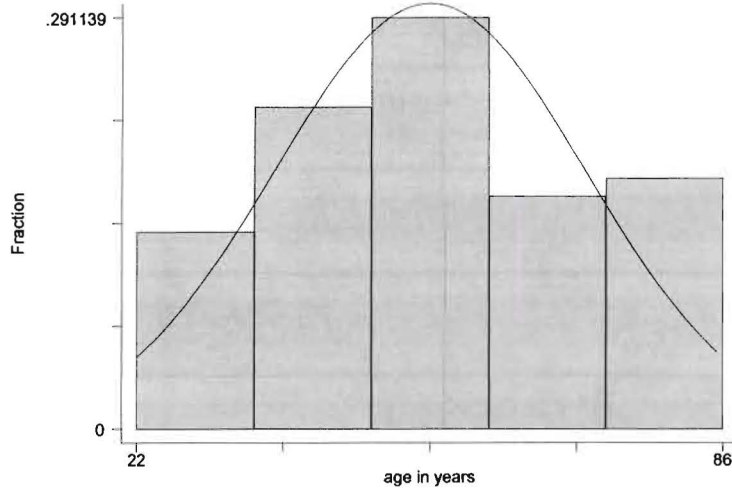


Figure 4.2 displays that most of the patients were found to be in the middle age group. The spread of patients can also be appreciated in this bimodal distribution of age displayed in the histogram set below.

Figure 4.3 Histogram of age distribution

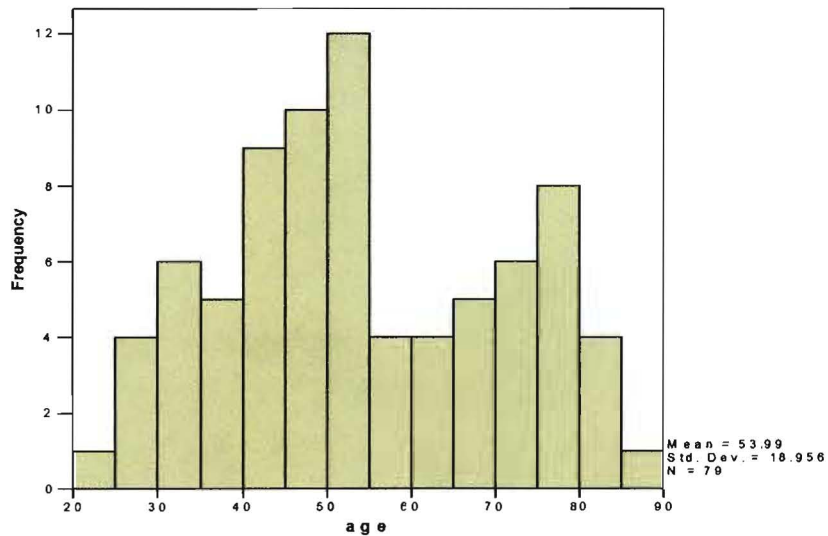
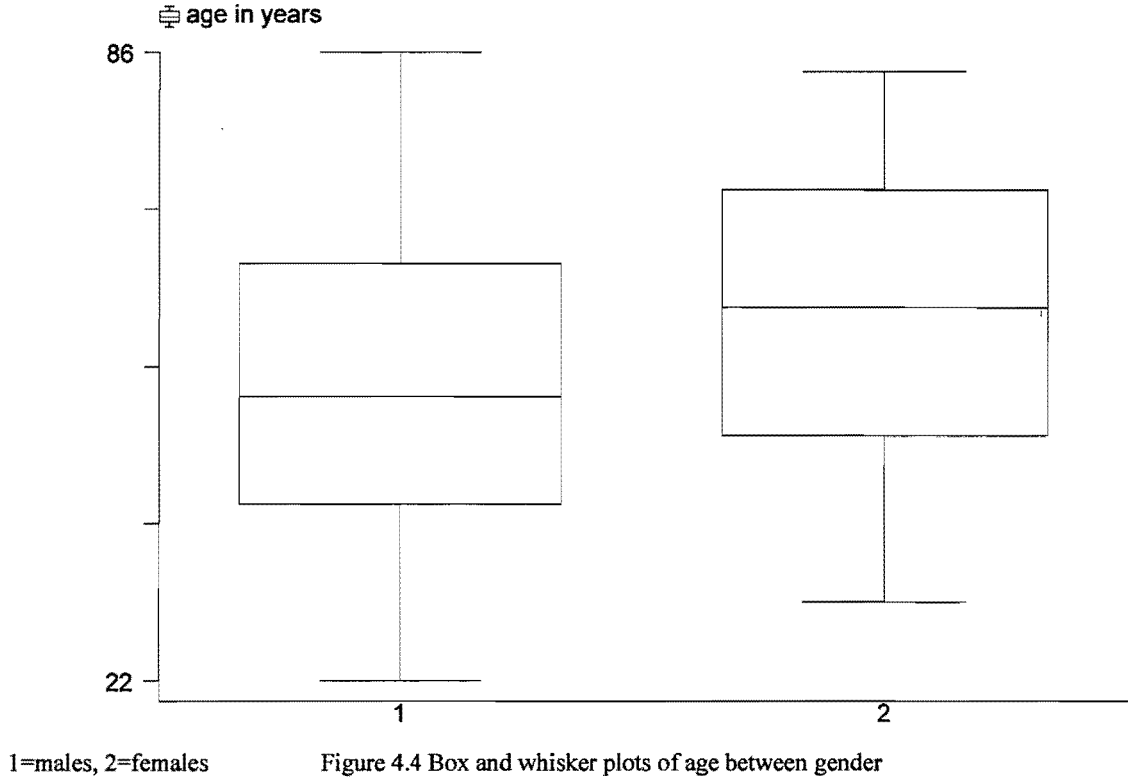


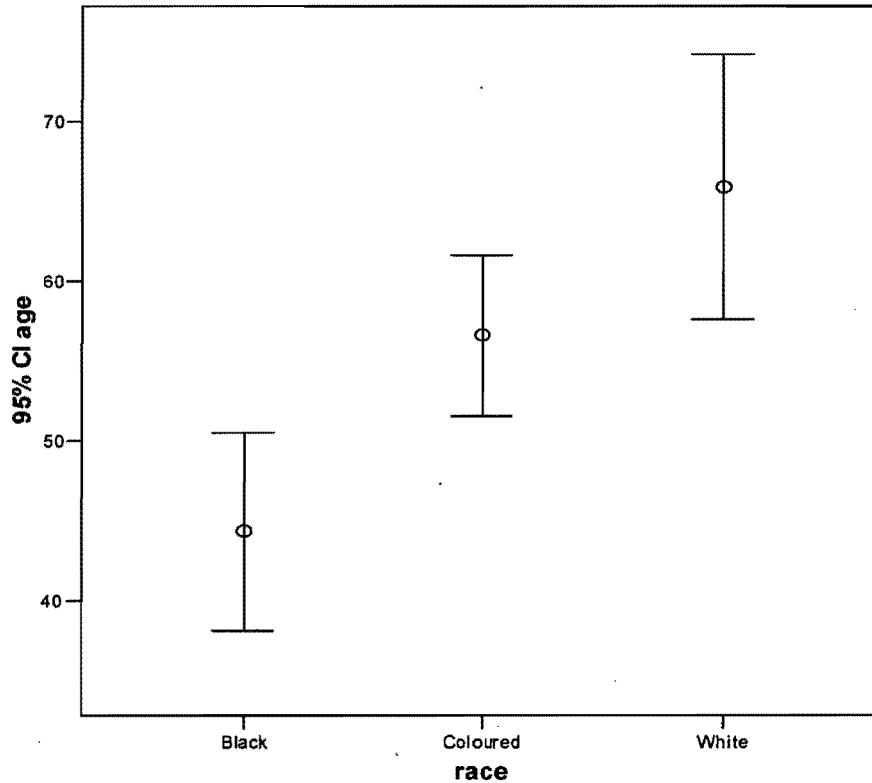
Figure 4.4 is a comparative box and whisker plot of age between genders. There was no significant difference in the mean age of males and females.



Furthermore the Shapiro- Wilk test for normal data confirms no significance between the age spread and normal data. The t-test confirmed the insignificance ( $p > 0,05$ ) between ages of respective gender with a mean of  $51,9 \pm 17,16$  and  $59 \pm 15,67$  years for males and females respectively as seen in figure 4.4.

Figure 4.5 describes the 95% confidence interval of age for the respected racial groups.

Figure 4.5 95% Confidence interval of age for respective racial groups



Of the studied patients, forty-one were coloured, twenty-six black and twelve white. It is evident from Figure 4.5 that there is a significant difference in the 95% confidence interval of age for the respective racial groups. There was a significant age difference between the white and black patients as well as the coloured and black group but an insignificant difference between the white and coloured group in the study. Generally the black patients were younger than the rest.

Table 4.2 Year of presentation

Year of presentation	N=79	%
2000	13	16.46
2001	16	20.25
2002	15	18.99
2003	22	27.85
2004	13	16.46
Total	79	100.00

Table 4.2 and the line chart in figure 4.6 shows the different years in which patients presented. Interestingly there was a trend during 2000 till 2002 and 2004. In contrast, 2003 had a higher number of patients with CSDH presenting to hospitals. See discussion.

Figure 4.6 Year of presentation

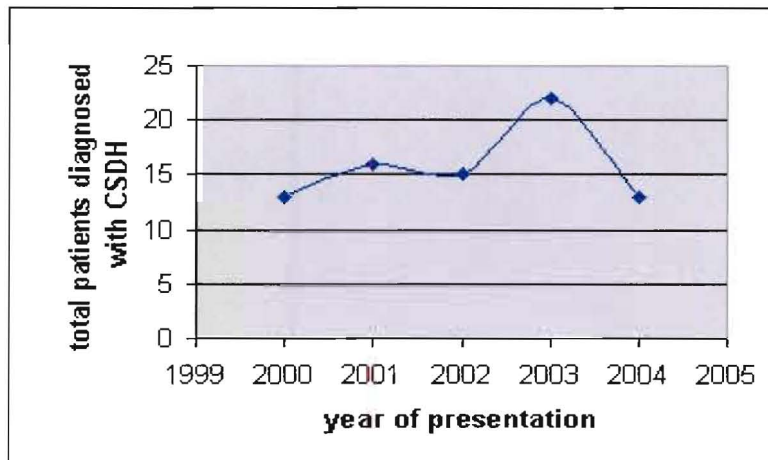
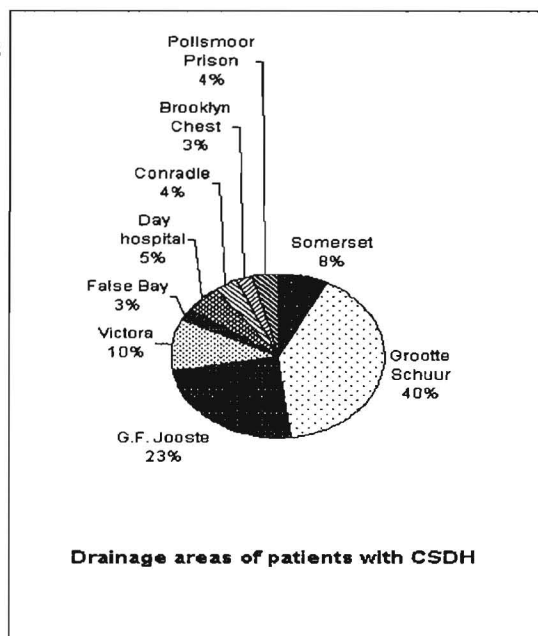


Table 4.3 Drainage areas of patients with CSDH found in study

Drainage areas of patients with CSDH	N=79	Percentage
Somerset Hospital	6	8%
Groote Schuur Hospital	32	40%
G.F. Jooste Hospital	19	23%
Victoria Hospital	8	10%
False Bay Hospital	2	3%
Day Hospital	4	5%
Conradie Hospital	3	4%
Brooklyn Chest Hospital	2	3%
Pollsmoor Prison	3	4%
Total	79	100%

The following findings were significant with regards to the referral areas: the bulk of the patients were primarily seen at GSH (32), where their first contact was an emergency doctor. Secondly GF-Jooste referred 19 and the rest were evenly spread throughout other institutions as shown in Table 4.3 and read with figure 4.7

Figure 4.7 Pie chart of Different drainage areas



#### 4.4 RISK FACTORS ASSOCIATED WITH CSDH

In this study medical practitioners recorded that 7,90% of patients used warfarin and 2,53% of patients were on chronic aspirin. Forty percent of the patients using warfarin had abnormal INR tests, although no association could be identified between the usage of this drug and mortality. It is also reported that 54,43% of patients had a history of a fall or head injury prior to medical care.

Alcohol abuse was found in a substantial percentage of patients (20,25%), whilst 6,33% of patients had a history of epilepsy.

The results also show that dementia was reported in 15,19 % cases.

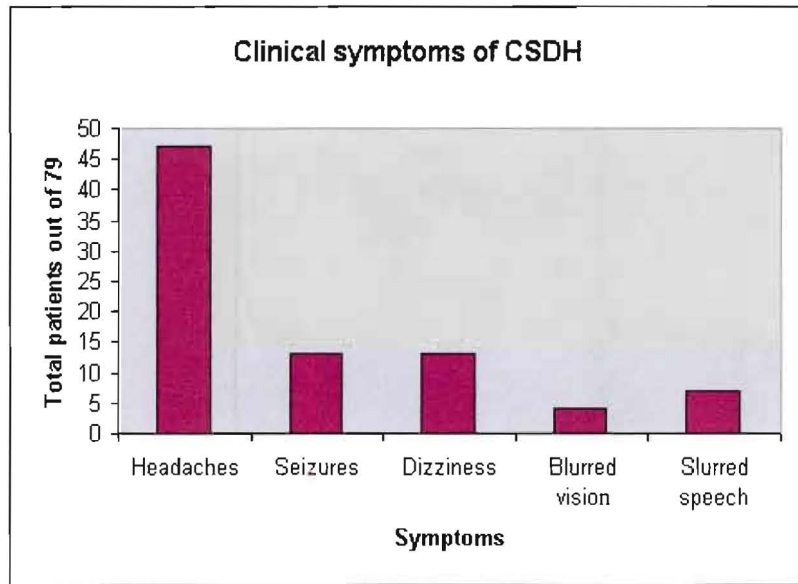
## 4.5 CLINICAL SYMPTOMS OF CSDH

Amongst the records available for review 59,49% of patients complained of headaches, a history of seizures was recorded in 16,46% of cases, whilst dizziness was reported in 16,46% patients. Additionally the study also revealed that blurred vision occurred in 5,06 % of patients whereas 8,86% of patients had slurred speech. (Table 4.4 and Figure 4.8)

Table 4.4 Clinical symptoms of CSDH

Symptoms found in patients with CSDH	N=79	%
Headaches	47	59.49%
Seizures	13	16.46%
Dizziness	13	16.46%
Blurred vision	4	5.06%
Slurred speech	7	8.86%

Figure 4.8



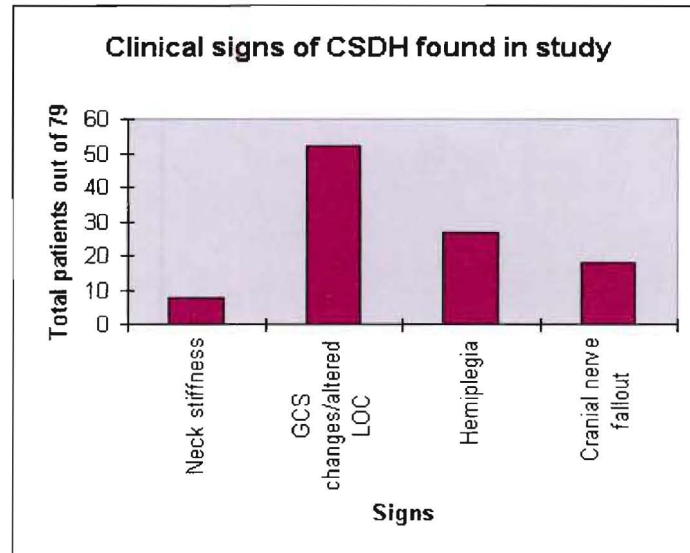
## 4.6 CLINICAL SIGNS OF CSDH

Neck stiffness was noted in 10,13% of cases and an altered level of consciousness was reported in 65,82% of cases. Furthermore results in table 4.5 exhibited that 34,18% of patients had focal signs with hemiplegia or weakness, whilst 22,78% had a cranial nerve abnormality on examination. (Table 4.5 and Figure 4.9)

Table 4.5 Clinical signs of CSDH

Signs found in patients with CSDH	N=79	%
Neck stiffness	8	10.13%
GCS changes/ altered LOC	52	65.82%
Hemiplegia	27	34.18%
Cranial nerve fallout	18	22.78%

Figure 4.9



## 4.7 ATYPICAL CLINICAL MANIFESTATIONS OF CSDH

Seven patients were detected to have behavioural changes, four had an ataxic gait and one patient complained of hallucinations. Other symptoms of hearing loss and syncope were

found in one patient each. The atypical signs and symptoms observed had no association with regard to race or gender, however it was statistically significant ( $\chi^2$ , p =0,002) with regard to the time delay in diagnosis. This meant that emergency personnel found it difficult to diagnose CSDH in patients who had atypical signs.

#### 4.8 ASSOCIATIONS BETWEEN AGE, GENDER, RACE AND DIFFERENT CLINICAL MANIFESTATIONS

As previously mentioned new categorical groups were created to establish if there would be significant associations with regard to gender, age, risk factors, clinical symptoms and signs.

Table 4.6 describes the association of the different age groups with regard to their risk factors and clinical manifestations.

Table 4.6: Association between age and risk factors or clinical features

	13-41 years	41-<52years	52-<69years	>69years	P- value
Male /Female	15/4	14/5	14/5	13/9	NS
Alcohol	5	6	3	2	NS
Epilepsy	2	0	0	1	NS
Dementia	0	0	4	8	0,002
Headache	13	15	11	8	0,036
Head injury	14	9	8	12	NS
Seizures	7	3	0	3	0,022
Dizziness	2	4	2	5	NS
Neck stiffness	1	3	4	0	NS
Slurred speech	1	1	2	3	NS
GCS changes	11	11	15	15	NS
Headaches & seizures	3	2	0	0	NS
Headaches and dizziness	2	4	2	2	NS
Dizziness and seizures	1	0	0	0	NS

There was a strong association between age and dementia ( $\chi^2$ , p=0,002) as well as headaches ( $\chi^2$ , p =0.036). There was however no statistical significance between age and alcohol or head injury. The presence of seizures as a clinical symptom in association with age was significant ( $\chi^2$ , p =0,022). (Table 4.6)

Table 4.7: Association between race and clinical features

	White	Coloured	Black	P-value
Alcohol	2	12	2	0,095
Epilepsy	0	3	0	NS
Dementia	3	8	1	NS
Headache	21	20	6	0,026
Head injury	6	24	13	NS

There was an association between headache and race ( $\chi^2$ , p =0,026). It was more evident in the white and coloured participants. The other features were non-significant with regards to race.

Table 4.8: Association between gender and risk factors / clinical signs

	Male	Female	P-value
Alcohol	13	3	NS
Epilepsy	2	1	NS
Dementia	9	3	NS
Headache	34	13	NS
Head injury	35	8	0,025

There was a significant association between gender and head injury ( $\chi^2$ , p =0.025) predominantly found in the male patients. Although headache and alcohol abuse was more prevalent in the male group, it was not statistically significant.

## 4.9 DIAGNOSIS AND OUTCOME

### 4.9.1. Working diagnosis

The pre-CT scan diagnosis recorded were as follows:

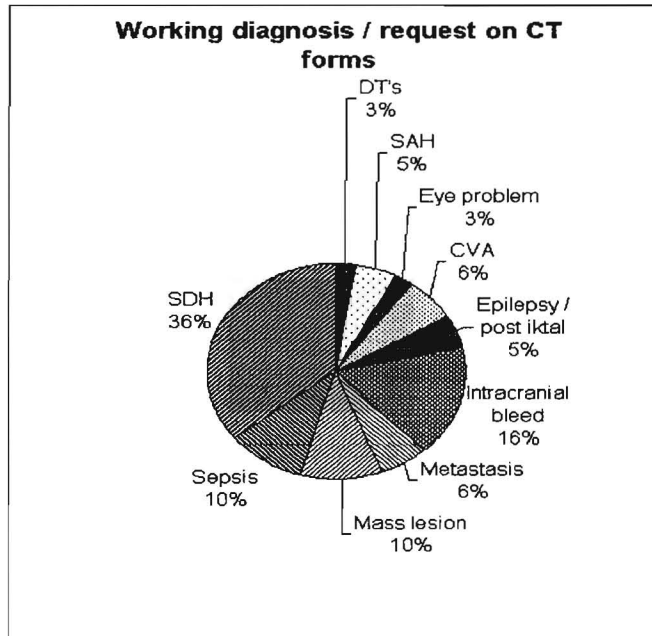
SDH was considered in 35 % of cases, IC-bleed in thirteen cases and the rest as seen in Table 4.9 and read with figure 4.10.

See Pie chart below with all different types of diagnosis

Table 4.9: Working diagnosis / Request on CT form

Diagnosis	N=79	%
DT's	2	3%
SAH	4	5%
Eye problem	2	3%
CVA	5	6%
Epilepsy / post iktal	4	5%
Intracranial bleed	13	16%
Metastasis	5	6%
Mass lesion	8	10%
Sepsis	8	10%
SDH	28	35%
Total	79	100%

Figure 4.10  
Pie chart of  
working  
diagnosis



#### 4.9.2.Treatment

Sixty-five patients underwent surgery of which two were conducted under local anesthetic.

The rest were treated conservatively (14) either due to a poor prognosis or a small subdural.

#### 4.9.3. Mortality

Eight of the 79 patients died (10,12%) and two out of the eight patients (25%) that died were treated conservatively since they had a poor prognosis. There was a significant association between patients with focal neurology (hemiplegia or cranial nerve fallout) and mortality (Fisher's Exact test,  $p = 0,043$ ).

#### 4.9.4. Summary and time delay

The average hospital stay was  $6,64 \pm 5,83$  days. Twenty seven of the total patients studied had a delay in the making of their diagnosis. This refers to the time from initial contact with an emergency doctor, until a performance of a CT-scan. The average time delay was  $15,7 \pm 3$  days. Table 4.10 shows the time delay per area.

Table 4.10 Time delay per area

Institution	Patients seen per area	Number of delays	Percentage	Average time delay (days)
GF Jooste	19	11	58%	15,4
GSH	32	12	37,5%	16,2
NSH	6	2	33%	8,5
CHC	4	2	50%	21,5

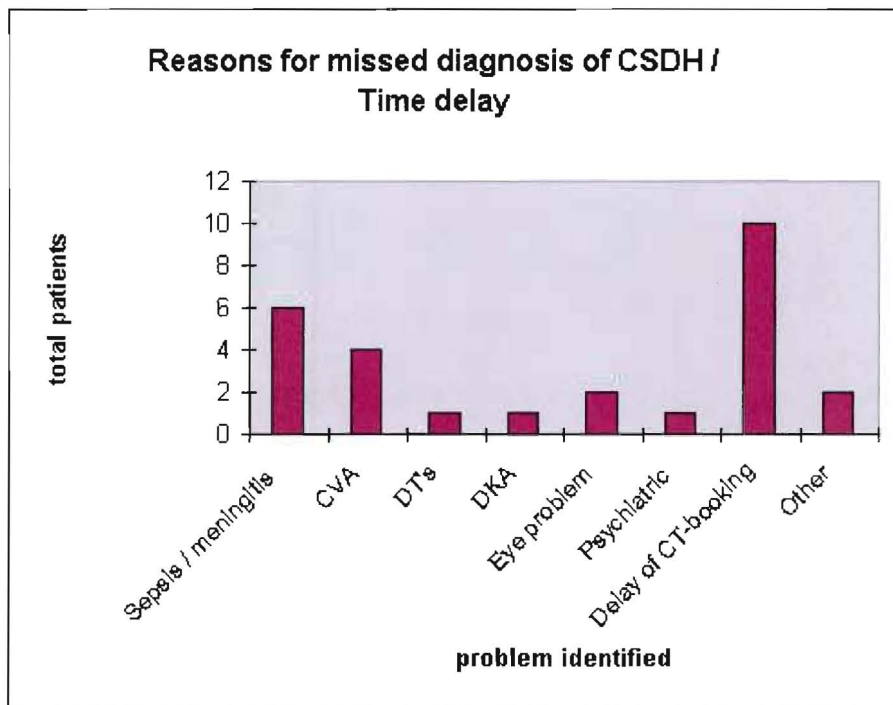
It is noted that GF Jooste Hospital had the highest number of time delays (58%). However the CHC had the longest average time delay (21,5 days). Medical judgement errors were identified as a contributing factor in time delay of diagnosis and subsequent delay in treatment.

The reasons for the delay varied from a long waiting period for a CT-scan to the wrong diagnosis as shown in table 4.10 and figure 4.11.

Table 4.11: Reasons for Missed Diagnosis / Time Delay

Reasons for Missed Diagnosis / Time Delay	
Reasons	No.
Sepsis / meningitis	6
CVA	4
DT's	1
DKA	1
Eye problem	2
Psychiatric	1
Delay of CT-booking	10
Other	2
<b>Total</b>	<b>27</b>

Figure 4.11



Four patients were diagnosed as having a CVA but did not respond to treatment. Even though they had a decreased level of consciousness, a CT-scan was only considered later. One patient was admitted to the Psychiatric unit for days before routine work up showed a CSDH on CT-scan. Also see discussion.

## **CHAPTER 5**

### **DISCUSSION**

#### **5.1 INCIDENCE**

The study by Adhiyaman reported an estimated incidence of 1.72/100 000 per year, the incidence increasing steeply with advancing age up to 7.35/100 000 per year in the age group 70-79.<sup>1</sup> In comparison this study had an incidence of 4.4/100 000 population with the highest number of cases found through the fifth through sixth decade of life.

#### **5.2 DEMOGRAPHIC CHARACTERISTICS OF CSDH**

CSDH is typically encountered in the aged population. The mean age in some studies ranges from 56–63 years.<sup>11</sup> In this study the mean age was 53,9 years with an associated standard deviation of 16.9 years. The lower mean age could be due to a more violent society or to the fact that the life expectancy is less in developing countries. The highest number of patients was found in age category 4 (>69 years of age), which was anticipated, as this is a disease of the aged.

There was a significant difference in the 95% confidence interval of age between the white and black group as well as the coloured and black participants as seen in figure 4.5.

A difference in the socio economical background between the various racial groups could account for the age difference.

This study reveals that males outnumbered the females at a ratio of 2,4:1. A study by Shiron and Tukuji<sup>15</sup> of 174 patients also had a 2,41:1 ratio of male-to-female distribution. Locally we find ourselves in a male dominated society where males engage in more robust physical activity and therefore are prone to injury. They also develop vascular problems much earlier in life than females. Alcoholism can be seen as a contributing factor since it is more prevalent amongst males.

With regards to time of presentation, most patients presented in 2003 and this could be accounted for by changes in drainage areas of the Cape Metropole. The availability of CT-scan facilities could also have aided doctors in making the correct diagnosis, however under reporting due to a lack of experience and knowledge of the disease could also have contributed to these findings.

An alternative explanation for the higher recorded number of cases in 2003 is a history of sporadic violence in the community. The changes in the political climate in Cape Town have brought changes in the attitudes of people relating to sports activities, alcohol patterns and health awareness campaigns.

### 5.3 RISK FACTORS

7,9% of patients were on warfarin and only two on chronic aspirin. This is found to be much less than the 41% in a study of 354 patients mentioned by Anthea Bechli<sup>16</sup> in an article published in Springer. However in a study published in the British Medical Journal 2001<sup>17</sup> only 11,8% was on warfarin. Four of the ten cases in this study had an abnormal INR-test. This is most likely due to poor monitoring and follow up, as in our local setting these tests are frequently not well controlled at community health centre level. In developed countries however, special clinics and educational programmes exist to conduct proper INR monitoring.

In the literature in general,  $\pm$  32% have a history of a fall or head injury. In this study 54,43% patients had a fall or head injury. It was also more common in males ( $\chi^2$ ,  $p = 0.025$ ).

A history of alcohol usage was found in 20,25% of cases. The study of 273 cases by Liliang<sup>11</sup> et al published in the journal Injury, reported alcoholism in 25% amongst the younger group of patients and 4% in their older group.

Dementia was only recorded in 15,19% of cases, which could be due to a lack of required patient information.

## 5.4 CLINICAL SIGNS AND SYMPTOMS

The most common symptom shown in this study was headache (59%). In certain studies headache<sup>1</sup> ranged from 14% to 80%. Headaches were also more common in the younger group of patients. The most common sign was an altered level of consciousness (65%), higher than the 58% reported in the Postgraduate Medical Journal 2002.<sup>1</sup>

Seizures were reported in 16,46% of cases and were statistically significant ( $\chi^2$ ,  $p = 0,022$ ) with regards to the association with age. It was more common in the younger group of patients. However, this finding could have been greater in number since patients fail to disclose whether they have epilepsy. It is a well-known fact that patients with epilepsy develop cerebral atrophy and have a history of frequent falls.

## 5.5 DIAGNOSES AND OUTCOME

35% had a provisional or pre CT-scan diagnosis of SDH. The bulk of patients, however were seen primarily at GSH. This amount should probably have been higher as GSH have more specialists and CT-scan facilities. Two patients treated at the CHC had a significant time delay with their diagnosis after they presented with cranial nerve fallout. The diagnosis was thought to be of an ophthalmologic nature suggesting the lack of specialist expertise at that level.

Early diagnosis is of major importance, as CT-findings had no influence on the outcome of CSDH. The important feature was the neurological condition at the time of presentation and treatment.<sup>4</sup>

The mortality of 10,12% over a period of five years included two patients who were treated conservatively as their prognosis was poor.

A high number of patients (82%) were treated surgically.

The average hospital stay of 6,64 days shows that CSDH does not require a lengthy hospital stay provided that the diagnosis is made early. In our study twenty seven patients had a delay in their diagnosis. The lack of CT-scan facilities in the Cape Metropole region is the most important contributory factor in this time delay. According to this study 7,9% of patients had a delay in CT-scan booking due to the lack of these facilities at secondary level and district level hospitals.

There was a borderline insignificance pertaining to the history of delay and drainage area and this can be explained by the fact that Groote Schuur Hospital received the bulk of patients. (Fisher's Exact test,  $p = 0,056$ ).

The second most common reason for a delay was an incorrect diagnosis, despite clues such as pre-disposing factors of a fall or dementia. This is clearly linked to medical judgement errors, which consequentially led to a delay in CT-scans being performed. Certain aspects could have contributed to this such as lack of expertise at district hospitals, excessive workload and lack of continuous professional development. There was however no association between the length of time prior to making the diagnosis or mortality and morbidity.

## **5.6 LIMITATIONS OF STUDY**

Record keeping was a problem to contend with. Although this was a retrospective review of cases, it became an arduous task, as no computerized database of illnesses was available to access speedily.

Certain folders and notes were difficult to obtain and were in some cases not accessible at all.

Documentation prepared by doctors have been inadequate.

Various doctors with various skills examined the patients, resulting in sub optimal care of some cases.

## CHAPTER 6

### CONCLUSION AND RECOMMENDATIONS

This study concludes that the mean occurrence of CSDH is more or less similar to other studies in the literature of  $\pm 54$  years of age. Warfarin usage was a common drug in patients with CSDH and abnormal clotting profiles were associated with this because of sub optimal monitoring in our setting.

No single factor could be identified as diagnostic of the disease. A history of head injury is an important risk factor but as in other studies could be absent in half of the cases. An altered level of consciousness and focal neurological signs is the most common presentation. Thus, patients with a history of trauma, warfarin usage, who present with an altered level of consciousness, should have a CT-scan to exclude a CSDH.

Patients with risk factors such as old age, dementia, and those complaining of persistent headaches should alert the clinician to the possible diagnosis. Younger patients with seizures should also be regarded as a significant clinical manifestation. Given the above findings, emergency doctors should have a low threshold to consider chronic subdural hematomas as part of their working diagnosis.

The lack of CT-scan facilities at secondary level and district hospitals had an adverse impact on the diagnostic timing of the cases, which resulted in sub optimal patient care. Although the process of CT-scanning is expensive, an assessment should be made to establish whether it would not be cost effective to have this facility at these hospitals. When assessing the cost effectiveness of acquiring a CT-scanner, factors such as transport costs, duplication of work, the availability of paramedics and the inconvenience of transporting sick patients should be considered.

An additional consideration is the HIV pandemic with its accompanying higher rate of neurological complications.

Finally, in line with the vision of healthcare 2010, which seeks to upgrade district hospitals with special equipment and access to expertise of specialists such as neurosurgeons, it appears appropriate to include CT-scans as part of this planning.

## **Areas for further exploration**

- A prospective study would give a different dimension to investigate this disease since this study was limited to the record keeping of emergency staff.
- An improved qualitative dimension is likely to enhance the study
- Interviewing family and friends by the means of questionnaires would provide important information pertaining to their risks factors and social background.
- As previously indicated a study into the financial feasibility of CT-scans at regional hospitals is highly recommended.
- Short courses, outreach and the generation of CPD specifically directed to doctors in the periphery to decrease medical judgement errors.
- Selective usage of private CT-scan facilities.

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- 
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# CLINICAL PRESENTATION OF CHRONIC SUBDURAL HEMATOMA

## APPENDIX A

Hospital \_\_\_\_\_ Ward \_\_\_\_\_  
 Patient \_\_\_\_\_ Gender 

M	F
---	---

 Age \_\_\_\_\_

Brought in by \_\_\_\_\_ Date and time of presentation \_\_\_\_\_  
 Special circumstances \_\_\_\_\_ Date and time of discharge \_\_\_\_\_  
 \_\_\_\_\_ Date and time of death \_\_\_\_\_

Medical history

Diabetes   
 Hypertension   
 Epilepsy   
 Previous head injury   
 Unknown / other

Specify : \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

Risk factors

Alcohol   
 Trauma   
 Dementia   
 Drugs

Specify : \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

Treated by

Doctor (level) 

--

  
 Specialist 

--

  
 Supervision Yes  No

History \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

Clinical picture / initial presentation

General assessment	
Breathing pattern	
Observations	BP: _____ Hb: _____
	P: _____ Hgt: _____
GCS / Fluctuation	
Pupils	
Motor fallout	
Sensation	
Reflexus	
Other observations	

Special investigations

LP   
 Bloods   
 CXR   
 CT-scan   
 MRI   
 Angiogram   
 Other

Specify : \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

Treatment: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

# CT / MRI HEAD SCAN REPORT COPY FORM

## APPENDIX B

Radiology report copy	
Name of patient: _____	
Folder number: _____	
Type of imaging used (tick off): <input type="checkbox"/> CT scan <input type="checkbox"/> MRI scan	
Date of imaging: _____	
Report copy: _____ _____ _____ _____ _____	
Reported by : _____	
Copied by: _____	
Date : _____	Signature: _____

## **ABBREVIATIONS-APPENDIX C**

<b>AF</b>	Atrial fibrillation
<b>BCH</b>	Brooklyn Chest Hospital
<b>CHC</b>	Community Health Centre
<b>CI</b>	Confidence Interval
<b>CSDH</b>	Chronic subdural hematoma
<b>CT</b>	Computerized tomography
<b>CVA</b>	Cerebro vascular accident
<b>DKA</b>	Diabetic keto-acidosis
<b>DM</b>	Diabetes Mellitus
<b>DT's</b>	Delirium tremens
<b>FBH</b>	False Bay Hospital
<b>GCS</b>	Glasgow coma scale
<b>GFJH</b>	GF-Jooste Hospital
<b>GSH</b>	Groote Schuur Hospital
<b>HI</b>	Head injury
<b>HT</b>	Hypertension
<b>IC</b>	Intracranial
<b>LOC</b>	Level of Consciousness
<b>MRI</b>	Magnetic resonance imaging
<b>NSH</b>	New Somerset Hospital
<b>SAH</b>	Subarachnoid hemorrhage
<b>VIC</b>	Victoria Hospital
<b>INR</b>	International normalized ratio

## GLOSSARY OF TERMS-APPENDIX D

<b>Subdural hematoma</b>	Bleeding between the dura and arachnoid of the brain.
<b>CSDH</b>	Chronic subdural hematoma. Bleeding between dura and arachnoid of the brain that occurs after 2 weeks following most cases of head injury and typically seen as hypodense collections on CT-scan.
<b>Burrhole</b>	Surgical procedure to evacuate a clot in the subdural space of the brain.
<b>CT-scan</b>	Machine used to diagnose problems in the brain.
<b>Acute Subdural</b>	Bleeding which occurs less than 72 hours of injury usually due to an obvious history of a penetrating or blunt assault to the head.
<b>Manifestations</b>	Clinical presentation including history, associating factors, symptoms and signs.
<b>Chi-square</b>	Significance test for comparing two or more proportions from independent groups.
<b>Fisher's exact test</b>	Significance test for comparing proportions when the total sample size is too small.
<b>Shapiro-Wilk test</b>	Significance test used to assess departures from a normal distribution for numeric variables.
<b>T- test</b>	Significance test used to compare the means of two different groups.
<b>P-value</b>	Represents the probability that a given difference is observed in a study sample when in reality such a difference does not exist in the relevant population.