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Profile and outcomes of patients admitted with chronic subdural hematomas - A single center report from an Academic Hospital in Pretoria, Gauteng, South Africa

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A B S T R A C T

Aim: Chronic subdural hematomas are a relatively common condition defined as an abnormal collection of blood and its break down products in the subdural space. We aimed to determine the significance of pre-operative clinical and operative variables in predicting outcome in 128 patients admitted over a 5 year period with chronic subdural hematomas whom went for operative intervention.

Methods: Retrospective data analysis of 128 patients admitted with chronic subdural hematomas from January 2009 to December 2013 was performed. Medical records were analyzed for patient demographics, presenting symptoms, co-morbid medical conditions including history of non-steroidal anti-inflammatory drug use, presence of a ventriculo-peritoneal shunt, use of adjunctive steroids, type of operative intervention, and Glasgow Outcome Score. Management involved burr holes with or without a subdural drain or craniotomy.

Results: Considering all of the variables, significance was demonstrated between the presenting Glasgow Coma Score and outcome ($p = 0.002$), as well as between the presenting Markwalder Score and outcome ($p = 0.003$). Further significant variables demonstrated included chronic subdural hematomas occurring secondary to an over-draining ventriculo-peritoneal shunt ($p = 0.008$) and when the presenting symptoms included a seizure ($p = 0.009$). Neither a pre-morbid history of hypertension, diabetes mellitus, ischemic heart disease, non-steroidal anti-inflammatory drug use, nor alcohol abuse, demonstrated significance. In terms of management neither the use of adjunctive steroids nor the type of surgery performed demonstrated significance.

Conclusion: Considering patients with chronic subdural hematomas our study demonstrated that the significant variables predicting outcome are chronic subdural hematomas occurring secondary to an overdraining ventriculo-peritoneal shunt, a history of seizures, and a low level of consciousness measured by either the Markwalder or the Glasgow Coma Score. Interestingly all of these variables are determined prior to the patient arriving at hospital. Our study highlights the need for early presentation prior to clinical deterioration as the major determinant of outcome.

1. Introduction

Chronic subdural hematomas are a relatively common condition defined as an abnormal collection of blood and its break down products in the subdural space, usually accompanied by a history of preceding mild head trauma [1]. It is most commonly diagnosed in the elderly populations with an average age of 80 years and a male to female ratio of 3:1. The pathogenesis involves an age related reduction in brain volume and a corresponding increase in the subdural space which increases vulnerability to the disease [2]. Surgical management remains the mainstay of treatment but this does not preclude adjuvant medical treatment [3].

In terms of prognosticating outcome several studies have explored this and significant findings on history predicting an adverse outcome are co-morbid medical conditions such as ischemic heart disease, hypertension, and diabetes mellitus [4–6]. At presentation factors predicting an adverse outcome are firstly seizures [7], and in terms of chronic subdural hematomas occurring secondary to an overdraining ventriculo-peritoneal shunt, a favourable outcome could be predicted by burr-hole drainage of the subdural collection with concomitant transient obstruction of the distal ventriculo-peritoneal shunt catheter [8]. With regards medical management the use of adjuvant steroid therapy is significantly associated with a favourable outcome [9].

Considering the type of surgery performed several studies support burr hole drainage with the use of a subdural drain as significantly associated with a favourable outcome and warn of the unfavourable outcomes associated with craniotomy [10,12]. Another study supports mini-craniotomy as significant in predicting a favourable outcome [11].

With considerable debate surrounding the issue of chronic subdural hematomas we analyzed 128 patients taken for operative intervention with regards patient demographics, presenting symptoms, co-morbid medical conditions, including history of non-steroidal anti-

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inflammatory drug use, history of alcohol abuse, presence of a ventriculo-peritoneal shunt, presenting Glasgow Coma Score, use of adjunctive steroids, type of operative intervention, and Glasgow Outcome Score at a single neurosurgical unit situated in the province of Gauteng, South Africa over a 5 year period.

This is the first study of its kind specifically conducted in a rural context in Southern Africa and as such it provides valuable information not known at this point in time. The study provides an African perspective where patients commonly present late in the course of the disease having already suffered significant neurological deterioration. As such our study provides valuable insight as an African perspective of the consequences of late presentation in patients with chronic subdural hematomas.

2. Method and materials

This is a retrospective chart review of 128 patients with chronic subdural hematomas who underwent operative intervention presenting to the Department of Neurosurgery at Dr. George Mukhari Academic Hospital located in Pretoria, Gauteng, South Africa. The study period was from January 2009 to December 2013. The study was granted approval by the Medical Research Ethics Committee of Sefako Makgatho Health Sciences University, reference number MREC/M/304/2014:PG.

The data captured and analyzed in this study included patient demographics, presenting symptoms, co-morbid medical conditions including history of non-steroidal anti-inflammatory drug use, history of alcohol abuse, presence of a ventriculo-peritoneal shunt, presenting Glasgow Coma Score; use of adjunctive steroids, type of operative intervention, and Glasgow Outcome Score.

All statistical procedures were done on SAS (SAS Institute Inc., NC, USA), Release 9.4 or higher, running under Microsoft Windows. All statistical tests were two-sided and *p*-values less than or equal to 0.05 were considered significant.

3. Results

A total of 128 patients were admitted to our unit with chronic subdural hematomas that were taken for formal operative intervention from January 2009 to December 2013. The mean age was 43.6 ± 26.5 years. The youngest patient was 3 months old and the oldest was 98 years old. Considering our sample 19.5% (25) were pediatric patients and 80.5% (103) were adults [Fig. 1]. No significance was demonstrated between patient age and outcome (p = 0.28).

Considering medical co-morbidities 61.7% (78) patients had a history of pre-existing hypertension however no significance was demonstrated with outcome (p = 0.33). Seven percent (9) patients had diabetes mellitus however this did not demonstrate significance (p = 0.17). Five percent had a history of ischemic heart disease

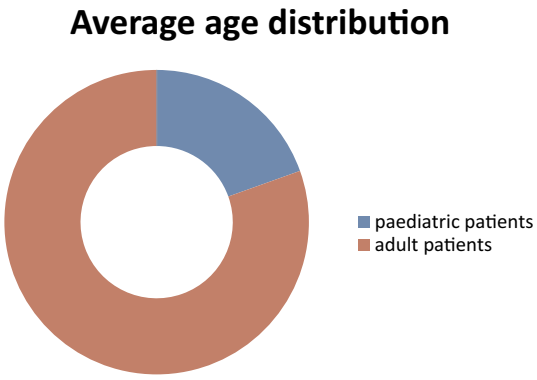

Fig. 1. Graph of age distribution between adults and pediatric patients.

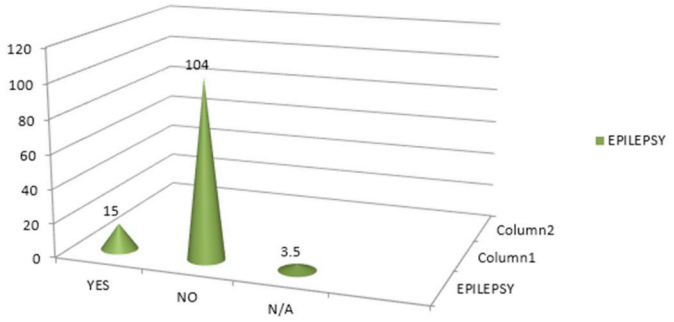

Fig. 2. Graph of adult onset seizure at presentation (p = 0.009).

however this was not significant (p = 0.37). A history of non-steroidal anti-inflammatory use was recorded in 8% (10) subjects which did not demonstrate significance (p = 0.78) and a history of alcohol abuse was admitted in 16% (20) subjects however this was not significant (p = 0.33).

Twelve percent (15) patients gave a history of having had an adult onset seizure prior to presentation and significance was demonstrated between this and outcome (p = 0.009) [Fig. 2].

Sixteen percent (20) subjects had a venticulo-peritioneal shunt in situ at presentation and this was significantly associated with outcome (p = 0.008) [Fig. 3].

In terms of presenting Markwalder score 4% (5) were neurologically normal (score = 0); 34.4% (44) were alert and orientated with mild symptoms or mild neurological deficit (score = 1); 48.4% (62) were drowsy or disorientated or had a significant neurological deficit such as hemiparesis (score = 2); 10.2% (13) were stuporous but responding to noxious stimuli or had several focal signs such as hemiplegia (score = 3); and 3% (4) were comatose with absent motor responses to painful stimuli (score = 4) [Fig. 4]. Significance was demonstrated between the presenting Markwalder score and outcome (0.003).

Considering the Glasgow Coma Score (GCS) at presentation 35% (45) were GCS 15/15, 24% (31) were GCS 14/15; 8% (10) were GCS 13/15; 7% (9) were GCS 12/15; 9% (11) were GCS 11/15; 8% (10) were GCS 10/15; 4% (5) subjects had a GCS of 9/15 and 5% (7) subjects had a GCS of 8/15 or less. Significance was demonstrated between the presenting GCS and outcome (p = 0.002).

Considering adjuvant steroid use 45% (57) subjects had no steroids administered in the peri-operative period and 55% (70) received steroids. No significance was demonstrated between the use of peri-operative steroids and outcome (p = 0.60).

Considering surgical intervention 84% (107) subjects had burr holes performed without the use of a subdural drain and 9% (12) had burr holes performed with the use of a subdural drain. No significance was demonstrated between the use of a subdural drain and outcome (p = 0.56). Seven percent (9) subjects had a craniotomy performed however no significance was demonstrated with outcome (p = 0.56) [Fig. 5].

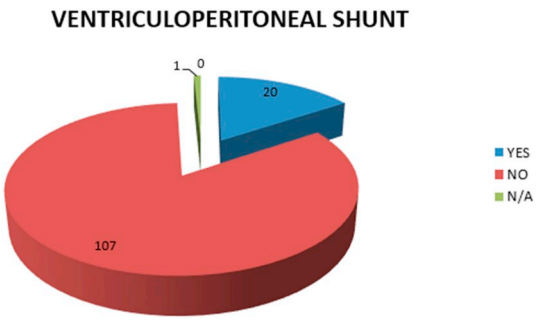

Fig. 3. Chart of ventriculo-peritoneal shunt in situ at presentation (p = 0.008).

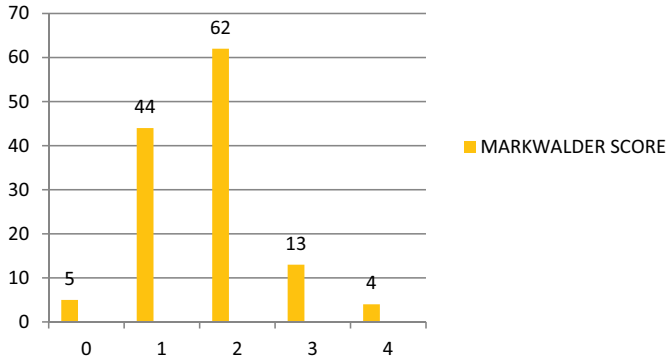

Fig. 4. Graph of Markwalder score at presentation (p = 0.003).

SURGICAL MANAGMENT	NUMBER	PERCENTAGE
BURRHOLES WITH SUBDURAL DRAIN	12	9%
BURRHOLES WITHOUT SUBDURAL DRAIN	107	84%
CRANIOTOMY	9	7%

Fig. 5. Table of operative management.

In terms of outcome 59% (75) subjects resumed normal life post discharge with/without some minor symptoms (GOS 5). Thirty two percent (41) of our patients were discharged being able to take care of themselves and work in a sheltered environment however needed some assistance with advanced activities of daily living for example driving (GOS 4). Two percent (3) subjects were discharged needed daily support due to a physical disability (GOS 3), and 7% (9) subjects demised.

4. Discussion

The mean age of presentation in our study was 43.6 years. This is considerably lower than the mean age of presentation in several other studies [2,13,14]. With regards the unusually high proportion of pediatric patients presenting with chronic subdural hematomas in our study, namely 19.5% (25) subjects, this is explained by almost all of these occurring secondary to an over-draining ventriculo-peritoneal shunt. This is a different etiologic pathophysiology in the pediatric population that might need to be addressed in future studies and what those studies might need to address is firstly whether there a delay in presentation in our pediatric population below 3 years of age due to an inability to communicate early symptoms of a chronic subdural hematoma such as increasing headache, and secondly the issue of over drainage.

With regards pre-operative medical co-morbidities in our study almost two thirds of subjects (62%) had a history of hypertension; 8% of subjects admitted to non-steroidal anti-inflammatory use; 7% of subjects had diabetes mellitus and 5% of subjects had ischemic heart disease. While these percentages are relatively small no significance was demonstrated in predicting outcome as opposed to their significance demonstrated in other studies [5,15,16].

Considering social history 16% of subjects in our study admitted to abusing alcohol. Several studies note a history of alcoholism in a significant proportion of their subjects presenting with chronic subdural hematomas and conclude that alcohol abuse is the main risk factor for their development in the elderly population and is associated with a poor outcome [17,18]. In our study a history of alcohol abuse was given in less than a fifth of subjects and was not significantly associated with outcome.

Regarding presenting symptoms in our study adult onset epilepsy was the presenting symptom in 12% of subjects which is similar to one study which found epilepsy to be the presenting symptoms in 6% of subjects [19]. In our study having adult onset seizures as the presenting symptom was significantly associated with a poorer outcome.

Considered the concomitant presence of a ventriculo-peritoneal shunt and a chronic subdural hematoma this was seen in 16% (20) of our subjects. Looking at the age distribution in our study all 20 (100%) of these occurred in pediatric patients. In terms of chronic subdural hematomas occurring secondary to an overdraining ventriculo-peritoneal shunt several studies report a favourable outcome could be predicted by burr-hole drainage of the subdural collection with concomitant transient obstruction of the distal ventriculo-peritoneal shunt catheter [8,20]. Despite this being our standard of care, in our study the presence of a ventriculo-peritoneal shunt together with a chronic subdural hematoma demonstrated significance in predicting an adverse outcome.

Considering the Markwalder score at presentation in total 83% of our subjects were either fully conscious with symptoms (score 1) or drowsy with neurological signs (score 2). Only 13% of our subjects were stuporous or comatose at presentation. One study which specifically utilized the Markwalder score noted that a pre-operative Markwalder score of between 0 and 2 was associated with a good outcome [21]. Another study which utilized the Glasgow Coma Score similarly found significance between the pre-operative Glasgow Coma Score and outcome. In our study both the Markwalder score and the Glasgow Coma Score demonstrated significance in predicting outcome.

With regards to medical management approximately half of our subjects received adjuvant steroid therapy however this did not demonstrate significance in predicting outcome. This is in contrast to the study which determined adjuvant steroid therapy to be significantly associated good outcome [9].

In terms of surgery 84% (107) of our subjects had burr hole drainage without a subdural drain and 9% (12) subjects had burr hole drainage with placement of a subdural drain. Only 7% (9) subjects had a craniotomy. Several studies that considered choice of surgical technique concluded burr hole drainage to be the most efficient choice with a lower morbidity than craniotomy in the management of subdural hematomas [10,12,22,23]. In our study the type of surgery performed did not demonstrate significance in predicting outcome.

In conclusion considering patients with chronic subdural hematomas our study demonstrated that the significant variables predicting outcome are chronic subdural hematomas occurring secondary to an overdraining ventriculo-peritoneal shunt, a history of seizures, and a low level of consciousness measured by either the Markwalder or the Glasgow Coma Score. Interestingly all of these variables are determined prior to the patient arriving at hospital. Our study hence highlights the need for early presentation prior to clinical deterioration as the major determinant of outcome.

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Declaration of Competing Interest

None of the authors listed below have any financial nor personal relationships with other people, or organizations, that could inappropriately influence (bias) their work, all within 3 years of the beginning the work submitted.

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