Neurosurg Rev (2004) 27: 263–266
DOI 10.1007/s10143-004-0337-6

ORIGINAL ARTICLE

H. Baechli · A. Nordmann · H. C. Bucher · O. Gratzl

Demographics and prevalent risk factors of chronic subdural haematoma: results of a large single-center cohort study

Received: 13 November 2003 / Revised: 25 March 2004 / Accepted: 26 March 2004 / Published online: 18 May 2004

Abstract Chronic subdural haematoma (CSDH) is a typical disease in elderly patients and encountered frequently in neurosurgical practice. With an increasing number of elderly people in the general population, there is a need to investigate risk factors (age, falls, anticoagulant or antithrombotic therapy) which could be pertinent to the development of this disease. We reviewed 354 patients undergoing surgery for CSDH over a period of 7 years (1996–2002), the occurrence being equally distributed over these years. CSDH occurred more often in elderly (≥65 years) than in younger people (69 vs 31%), and in men than in women (64 vs 36%). Falls were reported in 77% of patients. There was a trend towards a higher risk of falls in the elderly. Antithrombotic or anticoagulant therapy was present in 41% of patients, 32% of them having had falls. Overall postoperative mortality was 0% and overall recurrence rate 13.6%. CSDH in the elderly population, especially in men, is frequently associated with falls and anticoagulation or antithrombotic therapy. The indication for these medications, especially in elderly patients at risk for falls, should be carefully evaluated and controlled.

Keywords Chronic subdural haematoma · Falls · Anticoagulation or antithrombotic therapy · Male preponderance · Ageing

These data were presented at the 8th EMN Congress, 21–24 May 2003 in Graz, Austria

H. Baechli (✉) · O. Gratzl
Department of Neurosurgery, University Hospital Basle,
Spitalstrasse 21,
4031 Basel, Switzerland
e-mail: hbaechli@uhbs.ch
Tel.: +41-61-2657522
Fax: +41-61-2657138

A. Nordmann · H. C. Bucher
Department of Medicine/Basle Institute for Clinical Epidemiology, University Hospital Basle,
Basel, Switzerland

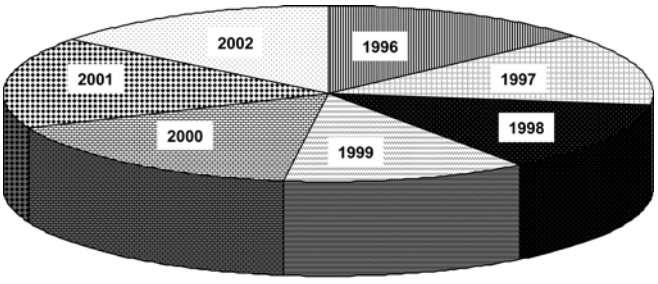
Introduction

Chronic subdural haematoma (CSDH) is a common disease in neurosurgical practice. During the past 20 years burr hole followed by drainage or irrigation craniostomy is the commonly performed procedure [16]. This surgical procedure can be carried out safely, also under local anaesthesia. CSDH is predominantly a disease of the elderly [13, 15]. In the year 2000, 21% of the population in Basle was older than 65 years. For a variety of reasons, the elderly are much more mobile and take part in many leisure activities (Swiss speciality of picking cherries leads to many falls). As the population is ageing, we have to expect more cases of CSDH in the future. The aim of this study was to find out if there is an increasing incidence over the years, and to evaluate potential risk factors (age, gender, falls and anticoagulation/antithrombotic therapy) that could play an essential role in the development of CSDH.

Material and methods

We reviewed the charts of 354 consecutive patients with CSDH operated in our neurosurgical department from 1996 to 2002. Diagnosis was based on computer tomography scanning or magnetic resonance imaging. Surgical treatment consisted of one or two burr hole craniostomies and closed subdural drain for 48 h. Three potential risk factors were assessed: gender, falls (defined as occurring 2 months or less before hospitalisation) and anticoagulation/antithrombotic medication (warfarin, aspirin and its derivatives).

Stata 7.0 software (Stata Corporation, TX, USA) was used for statistical analysis. To describe frequency distributions of age, gender, falls and number of patients on anticoagulant or antithrombotic therapy we used the one sample test of proportion. To identify risk factors for the development of CSDH we calculated relative risk ratios (RR) and corresponding 95% confidence intervals (CI).



years	Σ	m	f
1996	48	28	20
1997	47	31	16
1998	47	34	13
1999	43	29	14
2000	58	41	17
2001	60	34	26
2002	51	31	20

Fig. 1 Annual incidence (1996–2002) of CSDH in 354 patients operated in the Neurosurgical Clinic, Basle

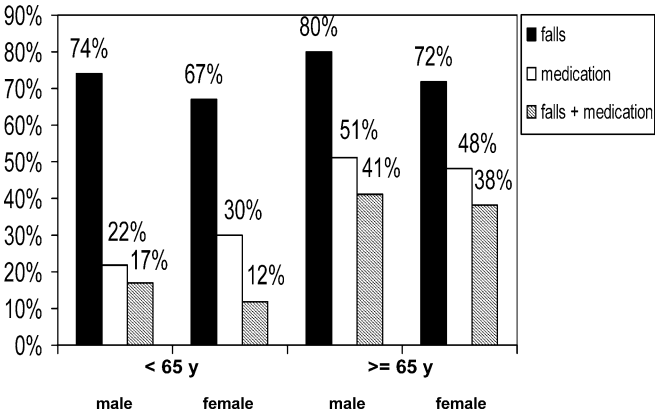


Fig. 2 Risk factors for CSDH in 354 patients subdivided according to age and gender and percentage of patients with each risk factor

Results

Patients' age ranged from 2 to 94 years, with a mean of 68.3 years (SD±17.0). For this study patients were divided into two groups: (1) younger than 65 years and (2) 65 years and older. The cases of CSDH were equally distributed over the 7 years (Fig. 1). Postoperative mortality was 0%.

Age

Age ≥65 years was associated with a higher incidence of CSDH: 69% (n=245) of the patients were ≥65years, whereas 31% (n=109) were younger (p<0.0001) (Table 1).

Gender

CSDH was seen more frequently in men than in woman (64 vs 36%, p<0.0001). There was a significant male preponderance in both elderly and younger patients (Table 1). In patients younger than 65 years, 70% of patients were men and 30% women (p<0.0001); in patients 65 years and older, 62% were men and 38% women (p<0.0001).

Falls

Two hundred seventy-two patients (77%) reported having falls preceding CSDH. Men and women were equally likely to have experienced a fall preceding the development of CSDH (78 vs 75%, p>0.1). There was a trend towards a higher risk of falls in elderly patients, but this trend failed to reach statistical significance (RR 1.11, 95% CI 0.96–1.27, p=0.12) (Fig. 2).

Anticoagulant and antithrombotic drug therapy

One hundred forty-four patients (41%) were taking anticoagulant (20%) or antithrombotic (21%) drug therapy. Elderly patients were significantly more likely to have taken anticoagulant or antithrombotic therapy than younger patients (RR 1.75, 95% CI 1.24–2.49, p=0.0005). There were no differences between men and women in the use of this medication (Fig. 2). Of these 144 patients, 92 (64%) had fresh haemorrhages in the CT with an onset of symptoms only few days previously. One hundred and fifteen patients (32%) had both preceding falls and were taking anticoagulant or antithrombotic medication. There were significantly more elderly than younger patients (85 vs 15%, p<0.0001, one sample test of proportion) and significantly more men than women (66 vs 34%, p<0.0001) having experienced falls while being on anticoagulant or antithrombotic therapy (Fig. 2).

Figure 3 shows the age and gender distribution in patients with falls who were on anticoagulant or antithrombotic therapy. There is a peak in the number of cases in the age group between 75 and 79 years.

Table 1 Age and gender distribution in 354 patients with chronic subdural haematoma operated in the Neurosurgical Clinic, Basle 1996–2002

Patients, n (%)	Gender (%)	Age, n (%)	Gender, age, n (%)
n=354 (100) range 2–94 years	Male, 228 (64)	<65 years, 109 (31)	Male*, <65 years, 76 (21) female, <65 years, 33 (9)
	Female, 126 (36)	≥65 years, 245 (69)	Male*, ≥65 years, 152 (43) female, ≥65 years 93 (26)

*p<0.0001 vs female, Chi squared test

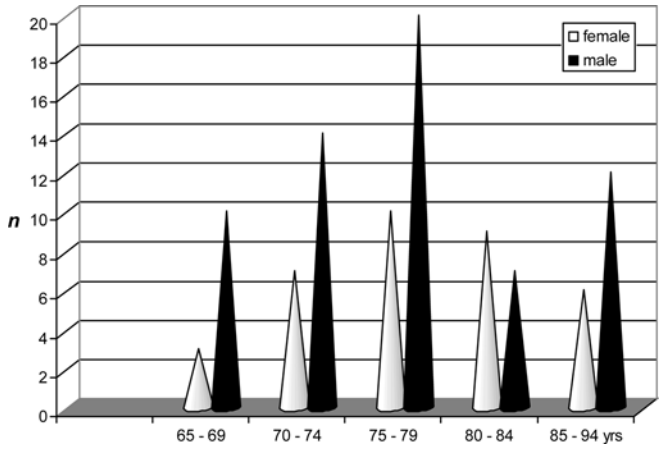


Fig. 3 Peak incidence of falls and medication for males and females at 75–79 years

Bilateral CSDH

Twenty-two percent of all CSDH were bilateral. There were significantly more elderly than younger patients (86 vs 14%, $p<0.0001$), and more men than women with bilateral CSDH (73 vs 27%, $p<0.0001$) (Fig. 4).

One hundred thirty-eight patients, 65 years and older had one burr hole and 106 patients had two burr holes. The corresponding numbers <65years are 72 and 38.

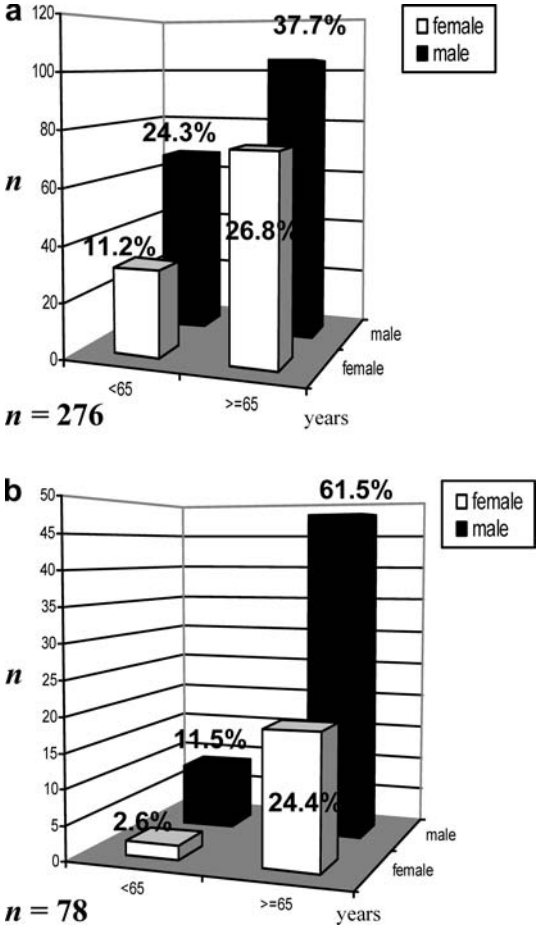


Fig. 4 a,b Preponderance of elderly patients in monolateral and bilateral CSDH

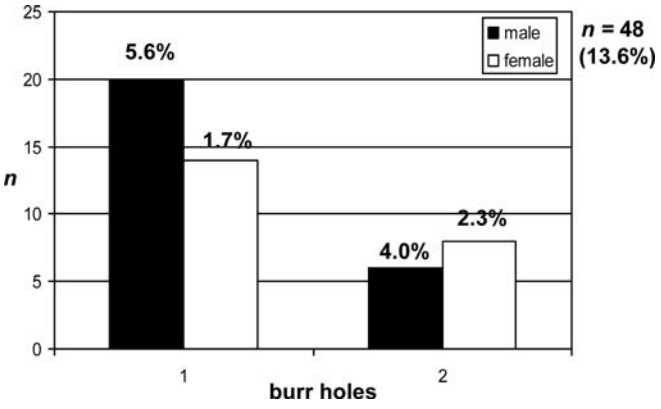


Fig. 5 Recurrence rate of CSDH and number of burr holes

Recurrence

We defined recurrence as follows: in patients whose symptoms failed to improve or got worse, a CT was performed. If there was a recurrence of mass effect, a further surgical intervention was carried out. Using these criteria, the overall recurrence rate was 13.6% (n=48) and was independent of the number of burr hole craniostomies used at the time of the first neurosurgical intervention (Fig. 5). Five patients needed a third operation. In total four secondary craniostomies were performed. The average time of the second intervention was about 4 weeks.

Discussion

As confirmed in our results, CSDH is a typical disease of elderly patients [1, 6, 15]. Brain atrophy and decreasing brain volume allow greater movements of the brain [6] and older people also have a predisposition to trivial trauma. These factors could also explain our finding that more elderly patients have bilateral CSDH than younger ones (Fig. 4).

We could show that there are almost twice as many men with CSDH as women. This male preponderance has already been described [13]. One study reports that male preponderance diminishes with age [14]. This tendency can be seen also in our results (2.3 times more men than women in the younger group, 1.6 times in the older one (Table 1)). One reason for male preponderance could be that men have a greater exposure to injuries generally. In medical practice multimorbidity in the elderly is found more frequently in men than in women. Our study shows that falls were associated with CSDH in 72% of the patients, men and women being equally likely to report falls (Fig. 2).

Our data demonstrate that of the patients with falls, older patients reported significantly more use of anti-thrombotic or anticoagulant medication than younger patients. Therefore, a critical evaluation is needed in elderly patients before antithrombotic or anticoagulant therapy is initiated.

The outcome of patients with CSDH with coagulopathy is often complicated with an increased recurrence rate, which deserves attention [5]. The excess mortality

associated with high international ratio (INR) supports the use of less intensive treatment and more preventive action to avoid episodes of high INR [9]. CSDH can mimic transient ischemic attacks and should be excluded before initiating anticoagulation therapy [18].

The risk of this therapy for causing haemorrhage should not be underestimated. Already in 1992, Reymond et al. reported that aspirin is a risk factor for haemorrhage in patients with head injuries [12]. In contrast to other surgical fields, aspirin could make neurosurgical procedures impossible. Therefore, exact evaluation of coagulation parameters is required before operation. In patients with proved platelet dysfunction, surgical intervention in our clinic was postponed if possible.

Before starting this study, we asked ourselves whether the incidence of CSDH is increasing, because of widespread prescribing of antithrombotic or anticoagulant therapy. In our study the frequency of CSDH remained stable over the years 1996–2002 (Fig. 1). However, the number of patients with CSDH taking antithrombotic or anticoagulant therapy may be higher than suggested by our study; we had to extract information about antithrombotic or anticoagulant therapy from charts where information might have been incomplete. A lot of patients could not remember their medication and forgot to mention especially antithrombotic therapy, which they often took to reduce headache or influenza symptoms.

In our study, the patients consisted of a selected subgroup of all patients seen in the hospital with CSDH since all our patients underwent surgical procedures. For example, many patients with smaller CSDH who refused an operation were not seen in our neurosurgical clinic. Therefore, the findings of our study cannot be generalised to patients not undergoing surgical therapy. There is one prospective study with 43 elderly patients, which showed that only patients with midline shift had a poor outcome without surgery [4]. However, in that study the number of patients was too small to draw general conclusions. In our study, the postoperative mortality was 0% and the recurrence rate was 13.6%, which is within the reported range of 7.5–31% for burr hole craniostomies [3, 10, 11]. Interestingly, in the literature we cannot find an exact definition of recurrence. In most cases diagnosis is made clinically or radiologically.

Recurrence rate, complications and factors related to these problems, especially in the elderly, are not completely understood [7, 8] and have not improved substantially over the past 20 years [16]. Therefore it is important to reduce the risk factors in developing CSDH. Another point of view is the new theory that CSDH might be an angiogenic disease with specific patterns of growth factors, which play a causative role in the pathogenesis of CSDH [17]. This could offer new anti-angiogenetic treatment options in the future.

Conclusions

The risk for surgically treated CSDH in the elderly population especially in men, appears to be higher in patients with falls and anticoagulation/antithrombotic therapy. Therefore the indication for this medication should be carefully evaluated and controlled, especially in elderly patients with risk for falls. Further prospective studies are needed to quantify the real incidence of CSDH in combination with anticoagulation/antithrombotic medication.

Acknowledgement We would like to thank Dr Helen Langemann for assistance with manuscript preparation.

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