ORIGINAL ARTICLE

Effect of Head Positioning on Outcome after Burr Hole Craniostomy for Chronic Subdural Haematoma

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ABSTRACT

Objective: To determine the effect of position of the patient's head after burr hole craniostomy on the outcome of chronic subdural haematoma, in terms of haematoma efflux, hospital stay and recurrence rate.

Study Design: Quasi experimental.

Place and Duration of Study: Combined Military Hospital, Rawalpindi, from February 2007 to February 2008.

Methodology: Sixty patients were divided in two equal groups of 30 patients each. Group A patients were kept flat after the burr hole craniostomy and group B patients were kept with head end of bed elevated by 30°. The results were statistically analysed through software SPSS 14.

Results: The mean age was 59.98±13.7 years. There was predominance of males (M:F=3.2:1). The location of haematoma was frontoparietal in majority (72%), right sided in 31 (51.6%), left sided in 20 (30%) and bilateral in 9 (15%) patients. Average daily output was 152 ml in group A and 142 ml in group B. Haematoma efflux was found to be sufficient in 26 (86.6%) patients of group A and 27 (90%) of group B. Wound infection occurred in 2 patients of group A and 1 in group B. Seizures occurred in 2 patients of group A and 3 of group B. Although, there was longer hospital stay for group A vs. group B (p=0.002), recurrence rate was insignificant amongst the two groups as 10% vs. 13% (p=0.688).

Conclusion: Assuming a 30° head up position soon after operation in cases of chronic subdural haematoma does not significantly affect the outcome and recurrence.

Key words: *Chronic subdural haematoma. Craniostomy. Head position.*

INTRODUCTION

Chronic Subdural Hematoma (CSDH) is generally defined as a collection of blood or blood breakdown products between the brain and dura that has been present for at least 21 days.[1]

CSDH can usually be recognized and its duration determined by Computerized Tomography (CT) imaging. Initially acute blood appears hyperdense on CT scan, it evolves to isodense and then hypodense over a period of several weeks. Risk of developing a chronic subdural haematoma is higher in warfarinised patients and those on aspirin.[2,3]

CSDH is an entity commonly managed by the neurosurgeon by a variety of techniques.[4] One of the most commonly used method of treatment is burr hole craniostomy with closed system drainage. This method of evacuation is considered to be the least invasive form of surgical management and has been described frequently in literature.[5-7] Although, this intervention has a long track record of effectiveness, little is known of the result of head position (flat vs. reverse Trendelenburg) on the efficacy of the procedure and ultimate patient outcome.

CSDH are commonly associated with cerebral atrophy and the associated increase in potential space in the subdural area. Some neurosurgeons place the patient's head and the head end of bed flat during treatment in an attempt to decrease this potential space and encourage drainage. In contrast, a second group of neurosurgeons prefers to elevate the patient's head end of bed during treatment for several reasons. A tenet of treating acute subdural haematomas is to elevate the head end of bed in an attempt to decrease intracranial pressure. The same principle is applied to the patients with CSDH.

In addition, one mechanism thought to explain the growth of CSDH is increased oncotic pressure within the encapsulated space secondary to partial clot liquefaction.[6] Although, this theory is arguable, raising the patient's head end of bed could possibly reduce this pressure gradient. A second hypothesis suggests that recurrent bleeding accounts for the expansion of CSDH. The recurrent hemorrhage appears to originate from dilated, abnormal vessels contained in the outer membrane of the haematoma.[8] Exudation from macro capillaries in the outer membrane of CSDH probably

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plays an important role in the pathophysiology and the growth of CSDH.[9] If this is the case, elevation of the head end of bed could decrease this source of hemorrhage. The aim in this study was to find out whether there was any difference on outcome after burr hole craniostomy, if the patient's head is kept flat or 30° elevated.

METHODOLOGY

In this interventional quasi experimental study, 60 patients of CSDH were included. Patients were selected from Neurosurgical Ward/Intensive Care Unit of Combined Military Hospital, Rawalpindi, from February 2007 to February 2008. Patients were divided in two equal groups of 30 patients each, by random numbers table. Group A patients were to be kept flat after burr hole craniostomy and group B patients to be kept with head end of bed elevated by 30° i.e. reverse Trendelenburg position. A comprehensive proforma was used to record the relevant information and coagulopathic population identified. It comprised of those patients who had prothrombin time/partial thromboplastin time outside the reference ranges established by the hospital's laboratory. They were taking anticoagulants such as warfarin or antiplatelet like aspirin. Coagulation profile was brought to normal after stopping the antiplatelet/anticoagulants, transfusing fresh frozen plasma and/or injecting vitamin K.

All the patients underwent burr hole craniostomy. Outcomes were then evaluated with regards to amount of drainage, complications, recurrence and length of hospital stay. Patients were monitored for postoperative complications such as infection, seizures, pneumocephalus, acute subdural haematoma or intraparenchymal hemorrhage. Plain CT scan of head was done in all patients on second postoperative day for assessing the adequacy of drainage of chronic subdural haematoma. Reduction of subdural collection was divided into 3 groups. Group 1 had reduction by 100%, group 2 had incomplete resolution with reduction of more than 50% and group 3 had reduction by less than 50%. The last was considered to be insufficient haematoma efflux. The length of hospital stay was defined as the number of days in the hospital after the procedure. Recurrence was defined as reappearance of neurological symptoms and increase in haematoma volume on CT scan, within 3 months of operation. Recurrence was managed with either repeat burr hole washout or craniotomy.

Student t-test was applied for numerical variables like age, amount of fluid drained and length of hospital stay. Categorical variables like coagulopathy, improvement in neurological status, completeness of fluid removal, presence or absence of any complications were analyzed by Chi-square test. Statistical significance was defined as a probability value less than 0.05. Data was analysed by using the Statistical Package for Social Sciences (SPSS 14.0).

RESULTS

The mean age was 59.98±13.7 years, ranging from 30-97 years. Patients were predominantly males (M:F=3.2:1). The initial Glasgow Coma Scale (GCS) was more than 12 in 22 patients of group A and 20 in group B, with only 8 patients having GCS of < 12 in group A and 10 in group B. The location of haematoma was frontoparietal in majority of the patients i.e. 43 (72%) of the cases, right sided in 31 (51.6%), left sided in 20 (33.3%) and bilateral in the rest (15%). Coagulopathy was present in 6 patients (20%) of group A and 8 (26.6%) of group B.

Single burr hole was done in majority of cases (47 patients) of both groups. Two burr holes were done in those patients who had septated haematoma or deranged coagulation profile i.e. 6 (20%) patients of Group A and 7 (23.3%) of Group B. Improvement in GCS was recorded in all cases except 4 patients in Group A and 5 in Group B. There was average daily output of 152 ml in group A and 142 ml in group B. On the second day postoperative CT scan, haematoma efflux was found to be sufficient in 26 (86.6%) patients of group A and 27 (90%) of group B. In the majority of patients i.e. 46 (76.7%), drain was removed in 4 days or less. Postoperative CT scan was repeated in 4 patients of group A and 3 of group B patients, for symptoms of headache and failure in improvement in weakness of the contralateral limbs. Reinsertion of drain or second burr hole craniostomy was done in these patients and resulted in improvement in all. Two patients of group A and 1 in group B developed wound infection postoperatively, which were successfully treated with antibiotics. Seizures occurred in 2 patients of group A and 3 of group B.

Four patients of group A and 3 of group B had recurrence of symptoms within a mean time of 2 months and their CT scan revealed reaccumulation of subdural collection. Repeat burr hole washout was done in all of them. All patients except one of the group A, improved neurologically. Craniotomy with excision of chronic subdural membrane was done in the remaining patient of group A and he also recovered.

Table I: t-test analysis of quantitative variables.

Characteristic	Group	Mean	Std. deviation	p-value
Age	A	61.9	14.3967	0.283
	B	58.0667	12.94	
Fluid drained	A	152	26.704	0.186
	B	142.3333	29.206	
Hospital stay	A	4.0333	0.8899	0.002
	B	3.2667	0.9444	

Table II: Comparison of pre- and postoperative variables amongst the two groups.

Groups	Group A	Group B	p-value
Number	30	30	
Patients with coagulopathy	6	8	0.542
Improvement in GCS	26	25	0.718
Completeness of fluid removal	G1:20 G2:6 G3:4	G1:22 G2:5 G3:3	0.848
Postoperative complications	4	4	1.00
Recurrence and intervention	4	3	0.688

GCS = Glasgow coma scale

DISCUSSION

CSDH is generally considered a disease of elderly population. Mean age in this study was 59.98±13.7 years, which was younger than patients of Gelabert *et al.* (72.7 years) and Gastone *et al.* (76.4 years).[10,11] However, male to female ratio of 3.2:1 in this study was higher than 1.68:1 and 1.7:1 respectively in the above series. This might be explained in terms of relatively less access of females to health care facilities in our society, as evidenced in two local studies by Khan *et al.*[12] and Khalid *et al.*[5] who had male to female ratio of 4:1.

Anticoagulants and antithrombotic medication is considered a risk factor in CSDH. Rust *et al.* found 42.5 times higher incidence of CSDH in patients with coagulopathy.[2] Baechli *et al.* had a similar experience, with 41% patients of CSDH having history of anti-thrombotic or anticoagulant therapy.[3] In this study, coagulopathy was the underlying cause in 20% (n=6) of group A and 26.6% (n=8) of group B patients.

Successful neurosurgical treatment of CSDH was first reported by Hulke in 1883. Putnam and Cushing in 1925, focused on surgery as the treatment of choice for CSDH.[13] Since then, neurosurgical approaches have become smaller and less invasive. Many neurosurgeons in France use corticosteroids in order to improve outcome after burr hole craniostomy, with a multivariate analysis claiming three-fold reduction in mortality.[14] It has not been a practice in the local setup to use adjuvant corticosteroids or prophylactic anticonvulsants with surgery. There was resolution/marked improvement of neurological symptoms after treatment in both groups, 86.6% (n=26) in group A and 83.3% (n=25) of group B. Taussky *et al.* concluded that treating patients of CSDH with one burr hole is associated with a significantly higher postoperative recurrence rate, longer hospitalization and increased wound infection rate.[15] Single burr hole was found sufficient for removal of chronic subdural haematoma. In this context, this study is in agreement with Gastone *et al.* who had good results with a single burr hole.[11]

Head positioning after evacuation of CSDH had no effect in terms of the completeness of removal of haematoma (86.6% vs. 90%). Although patients with postoperative flat position in bed had higher amounts of drainage (152 vs. 142 ml), this figure did not reach statistical significance ($p > 0.05$). There was significant longer hospital stay for patients in group A as compared to group B i.e. 4 vs. 3 days ($p < 0.05$), which could be the result of relatively elderly patients in group A with slower postoperative recovery.

Abouzari *et al.* showed that assuming an upright posture soon after burr hole surgery was associated with increased incidence of recurrence (19% vs. 2.3%) but not other postsurgical complications.[16] There was no difference in postoperative complications ($p > 0.05$) and recurrence rate amongst the two groups ($p > 0.05$) in the present study. These results match those of Nakajima *et al.* whose patients when nursed in sitting position after the operation had no significant increase in recurrence rate.[17] However, in elderly patients assuming an upright posture soon after burr hole surgery would be helpful in preventing postoperative complications like atelectasis, decubitus ulcer etc.

CONCLUSION

There is no effect of head position, flat versus head raised by 30°, on the outcome and recurrence in patients of CSDH treated by burr hole craniostomy. Raised head end position of the patient is considered to be advantageous as it decreases the chances of postoperative complications such as pulmonary atelactasis.

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