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Original Research Article

Comparative Study on Preoperative and Postoperative Radiological Findings in Chronic Subdural Hematoma

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Abstract

Introduction: Chronic Subdural Hematoma (Chronic SDH) is one of the most common clinical entities faced by neurosurgeons in their day to day practice. It is more common in old age where brain atrophy with increased space between the brain and skull facilitates of Chronic SDH. Burr hole craniostomy is accepted as the most common treatment especially in the older patients with pulmonary and cardiac complications and the aim will be minimal intervention with minimal anesthesia.

Aim of the Study: To Evaluate Pre –Operative And Post Operative Radiological Findings in Chronic Subdural Hematoma Patients Who Under Gone Burr-Hole Surgery.

Materials and Methods: We selected 100 cases with chronic subdural hematoma who were admitted in Emergency head injury ward of Department of Neurosurgery, Government Mohan Kumaramangalam Medical College, Salem and all underwent double burr hole craniostomy. Based on the CT scan findings, persistent midline shift of 5 mm and/or residual hematoma thickness +10 mm was considered an indication for reexploration. All the patients were followed up with a CT scan of the brain taken on the 4th postoperative day. The CT scan was perused for residual hematoma and midline shift.

Results: There was a significant reduction in the midlan line shift with a standard deviation of 3.39 in patients who underwent evacuation of CSDH with drain whereas the other group yielded a standard deviation of 3.14 with a significant p-value of less than 0.033. the clot thickness prior to and after surgery in patients who underwent without drain was 5.22 and 3.79 with a p-value of equal to 0.001 thus proving the former the better and statistically significant. Out of 52 of those who underwent surgery with drain, 10 developed pneumocephalus of which 2 were of moderate severity. On the other hand, out of 48 of those who underwent surgery without drain, 27 marked an incidence of pneumocephalus, which is almost more than 50% thus establishing the superiority of the drains over no drains in terms of preventing recurrence.

Conclusion: The reduction in the hematoma thickness and midline shift was also marked and the difference was statistically significant in those with drains than in the other. The recurrence rate was markedly less and the difference was statistically significant in those with drains than in the other. The rate of occurrence of pneumocephalus was definitely very low and was statistically significant in those with drains than in the other.

Keywords: Pneumocephalus; Chronic Subdural Hematoma; Midline Shift; Clot Thickness.

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Introduction

Hemorrhage occurring in the dura-arachnoid interphase produces subdural hematomas. Chronic SDHs are usually more than 3 weeks old. The annual incidence of chronic SDH is about 1-2 per 100000 populations [1]. Most patients are 50 years of age or older. Between one quarter and one half have no

history of head injury and in those with a history of trauma, the injury was often a mild one [2]. A significant proportion of patients are predisposed to SDH by chronic alcoholism, epilepsy and coagulopathies. Chronic SDHs are encountered in 10% of elderly patients with head injuries. In patients older than 50 years, the mass of the brain is reduced by approximately 200g, which results in increased dead space of up to 11%. Small amounts of hemorrhage into the subdural space or larger hematomas in patients with brain atrophy may fail to produce any symptoms [3]. Within one week, the hematoma is covered by another membrane beneath the Dura, and by three weeks an inner membrane forms between the hematoma and the arachnoid surface over the brain, thus completely enclosing the hematoma [4]. During this period the hematoma liquefies and becomes more hypodense on the CT. The subdural space is a closed space. Its outer wall is Dura mater that consists of a dense fibrous membrane with poor vascularization, and its inner wall is the vascularized arachnoid with no capillary bed [5].

The inner layer of the dura mater has a very high reaction potential for cellular organization and contains a very fine network of interconnected capillaries. When an acute hematoma is limited to subdural space without an arachnoid tear, the hematoma dissects within the layer of dural border cells [6]. All surfaces of all serous cavities normally absorb any foreign material when contact is made. Accumulation of blood, fibrin, and Fibrin Degradation Products (FDP) within the subdural space may lead to either cellular organization with resorption of the subdural collection or to the development of a gradually enlarging SDH [7]. The fibrin used up for the formation of geomembrane is degraded to fibrin degradation products (FDP), which is markedly increased in chronic SDH, so the subdural hematoma fluid does not usually clot. FDP's are also well known to have anticoagulation properties and produce a vasodilator effect [8]. The management of an extensively calcified CSDH may be difficult. Many surgeons have recommended no treatment for this condition because of the symptoms if any are probably caused by cerebral atrophy [9]. Some patients may benefit from surgery. If the patient has either a progressive or an acute problem attributable to the calcified Chronic SDH, surgery should be considered .Chronic seizures disorders have been reported to sometimes improve with excision of calcified Chronic SDH. Surgical intervention usually requires a craniotomy. Successful burr hole evacuation of calcified Chronic SDH has been reported [10].

Materials and Methods

We selected 100 cases with chronic subdural hematoma randomly who were admitted in Emergency head injury ward of Department Of Neurosurgery, Government Mohan Kumaramangalam Medical College, Salem and all underwent double burr hole craniostomy. Based on the CT scan findings, persistent midline shift of 5 mm and/or residual hematoma thickness +10 mm was considered an indication for reexploration. All the patients were followed up with a CT scan of the brain taken on the 4th postoperative day. The CT scan was perused for residual hematoma and midline shift.

Inclusion Criteria: Patients age 18 years and above with Symptomatic CSDH proven by CT scan for burr hole drainage. Referred from a private institution with the CT scan diagnosis of Chronic SDH. Admitted in the medical wards with a headache or weakness of limbs with CT scan revealing a chronic subdural hematoma. Patients with small acute subdural hematoma treated conservatively and in whom the hematoma evolved into CSDH.

Exclusion Criteria: Patients with ipsilateral hematomas who had been treated within 6 months of presentation with a shunt for cerebrospinal fluid diversion in situ, and those in whom surgery other than burr-hole evacuation was indicated. Those in which the operating surgeon judged drain insertion unsafe. Patients with brain completely surfaced after BHD of CSDH. Patients who had other associated life-threatening co-morbid conditions. As per the above exclusion criteria, a total of 10 patients were excluded from the study group and 100 patients qualified to undergo the study. Bleeding time, clotting time, prothrombin time, and INR were done; complete blood count and liver function test were done for all the patients and recorded. All the patients were operated on an emergency basis under general anesthesia after obtaining proper consent. Glasgow coma scale and Mark Walder chronic subdural hematoma scale which takes into account the symptoms such as a headache, vomiting, as well as signs such as weakness and altered sensorium. Based on the CT scan findings, persistent midline shift of 5 mm and/or residual hematoma thickness +10 mm was considered as an indication for reexploration. These patients underwent second surgery with the same operative technique they were subjected to in the first surgery. The second surgery was also done as an emergency. The second surgery was followed up in the same manner, a fourth day CT

scan of the brain was done after the second surgery and was analyzed for midline shift, the thickness of the residual hematoma and pneumocephalus. All the patients were discharged one day after suture removal and followed up periodically every four weeks for a total period of six months. A detailed history regarding aspirin intake, coagulation disorders, and comorbid conditions such as hypertension, diabetes mellitus, and alcoholism was recorded.

Results

Table 1: Age distribution

Age group	Double burr hole with drain	Double burr hole without drain	Total
40	2	11	13
40 – 60	23	33	56
60	27	4	31
Total	52	48	100

Table: 1 shows Mean age being 56.5 years with the minimum being 25 years and maximum being 88 years of age with the most commonly affected side being left (59%)

Table 2: History of trauma in days

Days	No.of cases	Drain	Without Drain
No Trauma history	37	24	13
14-30 days	34	13	21
31-90 days	22	11	11
90 days	7	4	3

There was a significant history of trauma noted in the majority of cases whereas, in more than one-third of the cases, the history remained unknown (Table 2).

Table 3: Clot thickness in double burr hole with drain

Thickness	Mean	N	SD	P value
Before surgery	18.85	52	4.07	
After surgery	4.15	52	2.24	+0.001 Sig

As per table 3, the SD of the clot thickness prior to and after surgery in patients who underwent with drain was 4.07 and 2.24 with a p-value of less than 0.001. Similarly, the SD of the clot thickness prior to and after surgery in patients who underwent without drain was 5.22 and 3.79 with a p-value of equal to 0.001 thus proving the former the better and statistically significant.

Table 4: Reduction in midline shift

Reduction	Mean	N	SD	P value
With drain	8.56	52	3.39	0.033
Without Drain	7.14	48	3.14	Significant

There was a significant reduction in the midline shift with a standard deviation of 3.39 in patients who underwent evacuation of CSDH with drain whereas the other group yielded a standard deviation of 3.14 with a significant p-value of less than 0.033 in Group 1 as depicted in table 4.

Table 5: Pneumocephalus

Pneumocephalus	No.of cases	Drain	Without Drain
Minimal	32	8	24
Moderate	4	2	2
Large	1	0	1
Nil	63	42	21
Total	100	52	48

There was a significant difference in patients who did receive surgery with drain to those who did not, in terms of incidence of pneumocephalus, which is an indirect predictor of recurrence, thereby warranting a revision surgery. Out of 52 of those who underwent surgery with drain, 10 developed pneumocephalus of which 2 were of moderate severity. On the other hand, out of 48 of those who underwent surgery without drain, 27 marked an incidence of pneumocephalus, which is almost more than 50% thus establishing the superiority of the drains over no drains in terms of preventing recurrence (Table 5).

Discussion

Chronic Subdural hematoma is a common clinical entity faced by neurosurgeons in their daily practice. The increase in the subdural space in older people as a result of decreased brain mass is one of the important reasons for the problem. Improvements in medical technology have given rise to an increasing population of older people and hence the incidence of chronic subdural hematoma is increasing. [11] Elderly people also suffer from comorbid medical problems such as hypertension, diabetes, ischemic heart disease, and pulmonary complications and hence the goal of management in these patients should be minimizing the anesthetic and operative risk. [12] Various treatment modalities have been adopted for the treatment of chronic subdural hematomas, namely burr-hole craniostomy with or without drain, twist drill craniostomy, craniotomy and excision of the membrane and currently middle meningeal artery

embolization for recurrent hematomas. [13] Burr hole craniostomy is a simple, safe and effective procedure with results equal to that of craniotomy but with reduced morbidity and mortality and has been most widely advocated in the literature. It has a morbidity of 0.9% [14]. But the procedure of burr hole craniostomy has not been standardized and questions arise regarding the number of burr holes used, whether to irrigate or not, whether to keep a drain or not and how to prevent postoperative pneumocephalus and recurrence [15]. A total of 100 patients were enrolled in the study, out of which 78% were males and 22% were females with the mean age being 56.5 years with the minimum being 25 years and maximum being 88 years of age with the most commonly affected side being left (59%) [16]. 52 patients underwent double burr hole with drain and 48 without a drain. There was a significant history of trauma noted in the majority of cases whereas, in more than one-third of the cases, the history remained unknown. Factors analyzed were: Postoperative improvements in the Mark Walder CSDH scale and Glasgow Coma Scale, post-operative reduction in the thickness of the chronic hematoma, reduction in the midline shift, presence or absence of pneumocephalus and recurrence [17]. As per Table 3, the SD of the clot thickness prior to and after surgery in patients who underwent with drain, was 4.07 and 2.24 with a p-value of less than 0.001. Similarly, the SD of the clot thickness prior to and after surgery in patients who underwent without drain was 5.22 and 3.79 with a p-value of equal to 0.001 thus proving the former the better and statistically significant. There was a significant reduction in the clot size with a standard deviation of 3.14 in patients who underwent evacuation of CSDH withdrawn whereas the other group yielded a standard deviation of 3.19 with a significant p-value of 0.032 as depicted in. There was a significant reduction in the midline shift with a standard deviation of 3.39 in patients who underwent evacuation of CSDH with drain whereas the other group yielded a standard deviation of 3.14 with a significant p-value of less than 0.033 in Group 1 as depicted in the table 4 [18]. As in Table 4, the SD of midline shift in patients who underwent evacuation of CSDH with drain prior to and after surgery was 3.43 and 1.49 with a p-value of less than 0.001 whereas the SD of midline shift in patients prior to and after surgery was 3.99 and 2.59 with a p-value of equal to 0.001 in the other group [19]. There was a significant difference in patients who did receive surgery with drain to those who did not, in terms of incidence of pneumocephalus, which is an indirect predictor of recurrence, thereby warranting a revision surgery. Out of 52 of those who underwent surgery with drain, 10 developed pneumocephalus of which 2 were of moderate severity. On the other hand, out of 48 of those who underwent surgery without drain, 27 marked an incidence of pneumocephalus, which is almost more than 50% thus establishing the superiority of the drains over no drains in terms of preventing recurrence [20].

Conclusion

The improvement in Glasgow Coma Scale and Mark Walder CSDH Scale was marked and the difference was statistically significant in those with drains than in the other. The reduction in the hematoma thickness and midline shift was also marked and the difference was statistically significant in those with drains than in the other. The recurrence rate was markedly less and the difference was statistically significant in those with drains than in the other. The rate of occurrence of pneumocephalus was definitely very low and was statistically significant in those with drains than in the other. The results of this study clearly indicate that the usage of drains predisposes to decrease the incidence of postoperative complications thereby preventing recurrence these drains can routinely be coupled up with the double burr-hole craniostomy in the evacuation of CSDH.

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