Original Research Paper

Volume-8 | Issue-8 | August-2018 | PRINT ISSN No 2249-555X

Neurosurgery

SURGICAL MANAGEMENT OF CHRONIC SUBDURAL HEMATOMAS: COMPARISON BETWEEN SINGLE BURRHOLE CLOSED DRAIN TECHNIQUE AND CONVENTIONAL DOUBLE BURRHOLE TECHNIQUE.

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ABSTRACT

Objective: To compare the efficacy of Single burrhole with closed drain with the routine double burrhole technique in the surgical management of Chronic Subdural Hematoma.

Materials and Methods: A total of 96 patients were operated and observed during a three year period. The patients were subjected to single and double burrhole techniques in a nonrandom fasion. Clinical factors were analysed as per Mark Walders Chronic SDH grading scale. Radiological factors such a thickness and density of the SDH and midline shift were compared. The patients were followed up for six months.

Results: The study showed that both the techniques were equally effective with no significant differences in respect of clinical and radiological parameters and that single burrhole technique can be used in old and morbid patients with equal effect.

KEYWORDS : Chronic SDH, single burrhole, closed drain technique

INTRODUCTION

Chronic Subdural Hematoma (CSDH) is one of the common clinical entities faced by neurosurgeons in their day to day practice. The incidence of CSDH is 1 to 2 per 100000 cases per 100000 population per year. It is more common in old age where brain atrophy with increased space between the brain and bone facilitates the formation of chronic SDH. There are many surgical techniques for CSDH; one or two burrhole craniostomy, twistdrill craniostomy, craniotomy and excision of subdural membranes, percutaneous needle trephination, reservoir shunting for continuous irrigation and drainage. Burrhole craniostomy is accepted as the most common procedure especially in older patients with pulmonary and cardiac complications. Hence the aim in such patients will be to reduce the time taken to operate and with minimal aneasthesia. In this study, an attempt has been made to compare the efficacy of single burrhole closed drain technique with the routine double burrhole technique. The use of closed drain helps in reducing the incidence of pneumocephalus

Materials and Methods: This study was conducted over a three year period at the Institute of Neurology, Rajiv Gandhi Government General Hospital, attached to Madras Medical College, Chennai.

The geographical area of distribution of the patients was North Tamilnadu and Southern Andhra Pradesh.

All the patients admitted with the diagnosis of chronic subdural hematoma (SDH) were included in the study. The total number of patients treated during the study period was 107. Patients with Bleeding disorders and coagulopathy, Bilateral chronic subdural hematoma, Patients who had other associated life threatening co-morbid conditions were not included in the study. 11 patients were excluded from the study group and 96 patients qualified to undergo the study. Detailed history regarding aspirin intake, coagulation disorders, and co morbid conditions such as hypertension, diabetes mellitus, and alcoholism were recorded. The study group was examined and analysed based on the clinical features and radiological imaging findings

Clinically patients were categorized using

1. The Glasgow Coma Scale (GCS) and
2. The Markwalder Chronic Subdural Hematoma Scale.

Markwalder Chronic Subdural Hematoma Scale :

Grade 0	Patient neurologically stable
Grade 1	Patient alert and oriented; mild symptoms, such as headache; absent or mild symptoms or neurological deficit such as reflex asymmetry
Grade 2	Patient drowsy or disoriented with variable neurological deficit, such as hemiparesis
Grade 3	Patient stuporous but responding appropriately to noxious stimuli; severe focal signs, such as hemiplegia
Grade 4	Patient comatose with absent motor response to painful stimuli; decerebrate or decorticate posturing

Diagnosis was confirmed with the plain Computerised Tomography of the brain. Factors analysed were Thickness of the hematoma, Midline shift, Density of the hematoma, whether iso, hypo, hyper or heterodense with layering, presence of pneumocephalus were noted. 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 anaesthesia after obtaining proper consent. Selection of the patients for single or double burrhole technique was non randomized and was left to the neurosurgeon's preference.

Single burrhole technique : One burrhole to be made over the point of maximum thickness of the hematoma. Dura was cauterized and opened widely. Immediately after opening the dura No. 12 silastic catheter which was already tunneled subcutaneously was inserted into the subdural space and connected to a closed drain (Intercostal Drainage bag). No subdural wash was given. The catheter was secured to the skin and wound closed in layers.

Double burrhole technique : Two burrholes are placed. The frontal burrhole was made in the midpupillary line half an inch in front of the coronal suture. The parietal burrhole was placed just posterior and inferior to the parietal eminence. The incisions were made in such a way that they can be incorporated in a craniotomy flap if needed. Dura was cauterized and opened widely, the subdural hematoma was allowed to drain spontaneously. A thorough wash of the cavity was done from both burrhole with normal saline. A latex rubber drain was placed in both the burrholes, tunneled subcutaneously and brought out through a separate incision. Both drains were secured to the skin and wounds closed in layers.

Patients were nursed in the supine position for three days and adequately hydrated with oral as well as intravenous fluids to facilitate expansion of the brain. Routine antibiotics were given one hour before surgery. Anticonvulsants were used in all the patients and continued postoperatively for a period of 3 months. Drains were removed on the 2nd postoperative day. Follow up CT scan of the brain were taken on the 4th postoperative day. The CT scan was perused for residual hematoma and midline shift. The findings were recorded. Presence of pneumocephalus was categorized as Nil when no air is seen, Minimal when a few air pockets < 1cc is persent, Moderate when significant air is seen but without mass effect and Severe when significant air with mass effect is seen. Clinically the patients were analysed with Glasgow

coma scale and Mark Walder chronic subdural hematoma scale which takes into account the symptoms such as headache, vomiting, as well as signs such as weakness and altered sensorium.

Based on the CT scan findings, persistant midline shift of > 5 mm and /or residual hematoma thickness >10 mm was considered as indication for reexploration. These patients underwent second surgery with the same operative technique as 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 and was analysed for midline shift, 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 proforma including all the aspects of preoperative status, operative technique, postoperative events and follow up findings was prepared for each and every patient separately. Based on the proformas, a master chart was prepared including all the patients and relevant findings The master chart was subjected to a detailed statistical analysis using the student t-test and chi-square test using SPSS software (version 12.0; SPSS Inc). Results with a p-value of < 0.05 was considered significant.

RESULTS

A total of 96 patients underwent the study, out of which 7 were females and 89 were males. 46 patients underwent surgery with single burrhole technique (group 1) and 50 patients underwent the double burrhole technique (group 2). The average age of patients in group-1 was 58.48 years and that of group-2 was 58.25 years.

The average preoperative GCS score in group-1 was 13.04 and in group-2 was 13.06. while the average Markwalder grade was 1.82 in group- 1 and 1.81 in group- 2. 88% of the total number of patients were above 40 years of age

Comparing Mark Walder scales for single and double burrhole techniques :

Markwalder				
Type	**N**	**Mean**	**Std. Deviation**	**Std. Error Mean**
Single	46	0.76	0.82	0.12
Double	50	0.80	0.95	0.13

Independent Samples Test

t-test for Equality of Means					
Mark walder	**t**	**Df**	**P – value**	**95% Confidence Interval of the Difference**	
				Lower	Upper
Equal variances assumed	-.215	94	.830	-.39994	.32168
Equal variances not assumed	-.217	93.682	.829	-.39781	.31955

P-value was 0.830 (< 0.05), there was no significant difference between the two procedures.

Comparing Glasgow Coma Scales between single and double burrhole techniques:

Glasgow Coma Scale				
Type	**N**	**Mean**	**Std. Deviation**	**Std. Error Mean**
Single	46	14.456	1.471	0.22
Double	50	14.14	2.507	0.35

Independent Samples Test

t-test for Equality of Means					
GCS	**t**	**Df**	**P – value**	**95% Confidence Interval of the Difference**	
				Lower	Upper
Equal variances assumed	0.746	94	0.458	-0.526	1.159
Equal variances not assumed	0.761	80.29	0.449	-0.511	1.144

P- value was 0.458 (< 0.05), showing no significant difference between the two techniques.

Reduction in hematoma thickness after surgery:

Reduction in thickness(mm)	Type		Total
	Single	Double	
4	0	1	1
5	0	2	2
6	2	2	4
7	0	4	4
8	4	3	7
9	6	2	8
10	5	4	9
11	4	6	10
12	6	6	12
13	3	3	6
14	2	2	4
15	3	5	8
16	3	2	5
17	1	2	3
18	3	1	4
19	0	1	1
20	2	3	5
21	1	1	2
23	1	0	1
Total	46	50	96

Chi-Square Tests			
	Value	df	P-value
Pearson Chi-Square	13.744	18	0.746

Comparing the difference in thickness of the hematoma before and after single and double burrhole techniques, P- value =0.746 (< 0.05), showing no difference between the two procedures.

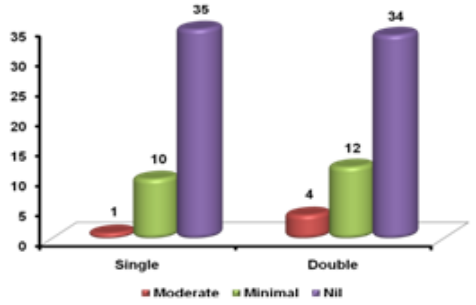
Reduction in midline shift after treatment:

Reduction in midline shift (mm)	Type		Total
	Single	Double	
0	0	3	3
2	4	4	8
3	6	2	8
4	2	2	4
5	4	8	12
6	3	3	6
7	4	1	5
8	1	7	8
9	5	2	7
10	6	8	14
11	3	3	6
12	7	4	11
13	1	2	3
14	0	1	1
Total	46	50	96

Comparing the reduction of midline shift between single and double burrhole techniques P- value was 0.237 (< 0.05). No difference between the two procedures.

A p-value of 0.903 (< 0.05) indicates that there is no statistically significant difference between the two procedures.

Pneumocephalus



t-test for Equality of Means					
Pneumo cephalus	t	df	P - value	95% Confidence Interval of the Difference	
				Lower	Upper
Equal variances assumed	.118	94	0.906	-.220	.248
Equal variances not assumed	.118	91.8	0.907	-.221	.249

Retapping

Type	Yes	No
Single	4	42
Double	4	46

Independent Samples Test

t-test for Equality of Means					
Retapping	T	df	P - value	95% Confidence Interval of the Difference	
				Lower	Upper
Equal variances assumed	0.122	94	0.903	-.106	.120
Equal variances not assumed	-.122	92.6	0.903	-.107	0.120

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 most important reasons for the problem. Improvements in medical technology has given rise to increasing population of older people and hence the incidence of chronic subdural hematoma is increasing. Elderly people also suffer from co-morbid medical problems such hypertension, diabetes, ischaemic heart disease and pulmonary complications and hence the goal of management in these patients should be minimising the anaesthetic and operative risk.

Various treatment modalities have been adopted for the treatment of chronic subdural hematomas, namely – burrhole craniostomy with or without drain, twist drill craniostomy, craniotomy and excision of membrane and currently middle meningeal artery embolisation for recurrent hematomas.

Burrhole 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%. But the procedure of burrhole craniostomy has not been standardized and questions arise regarding the number of burrholes to be used, whether to irrigate or not, whether to keep a drain or not and how to prevent postoperative pneumocephalus and recurrence.

It is usually thought that single burrhole is less efficient to evacuate the hematoma, especially in cases of separated type of chronic subdural hematoma and in thick hematoma. But Yamamoto et al.29 demonstrated that the irrigation with one burrhole is usually sufficient to wash out the hematoma in multiple cavities. They concluded that in most cases of chronic subdural hematomas, multiplicity did not mean multiple closed cavities and that all hematoma cavities were continuous with relatively wide connections. In their study of 180 patients comparing one vs two burrhole craniostomy, Hong-Joon Han et al.8 have demonstrated that burrhole craniostomy with one burrhole would be sufficient to evacuate chronic subdural hematoma with lower recurrence rate. In their study he results were analysed in relation to the recurrence rate following single burrhole drainage. The overall postoperative recurrence was 5.6%. The recurrence rate after one burrhole and two burrhole craniostomy was 1.89% and 6.82% respectively. Patients treated with two burrhole craniostomy had a higher recurrence rate than those of one burrhole craniostomy although this was statistically not significant.

CONCLUSION

1. The improvement in Glasgow Coma Scale and Mark Walder Chronic Subdural Hematoma Scale was the same in both the groups and there was no statistically significant difference between the two groups.
2. The reduction in hematoma thickness and midline shift was also similar between both the groups and statistically insignificant.
3. The recurrence rate was the same (4%) between the two groups and statistically insignificant.
4. The rate of occurrence of pneumocephalus was definitely less with single burrhole technique even though it was statistically insignificant.
5. Since the single burrhole closed system drainage is as efficient as double burrhole irrigation and drainage, with no increased risk of recurrence and pneumocephalus, the single burrhole closed system drainage may be used routinely in the management of chronic subdural hematoma

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