

Original Research Paper

Neurosurgery

CHOICE OF OPERATIVE APPROACH IN THE TREATMENT OF CHRONIC SUBDURAL HEMATOMA-AN INSIGHT.

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ABSTRACT The management of chronic subdural hematoma in the adult patient is approached with a variety of different surgical t echniques. The trend in recent years has been toward treatment with burr holes or twist-drill holes rather than craniotomy. The rationale for this has been based on the assumption that burr holes and twist-drill holes offer equivalent efficacy and lower morbidity and mortality. In a review of 121 patients presenting over 1-year period (2015-16) with chronic subdural hematomas, 13 underwent twist drill craniostomy and 108 underwent burr-hole craniectomy treatment. The recurrence of hematomas, requiring another operation, occurred in 3.3%; operative mortality was 2.48% at hospital discharge and 1.65% at follow-up. There was no significant difference in the incidence of postoperative complications, hematoma recurrence, or operative mortality among the different surgical groups. Previous reports concerning the superiority of burr holes over craniotomy are substantiated by this review.

KEYWORDS : Subdural Hematoma, Single Burr Hole Crainectomy technique, , Twist drill Craniostomy.

Introduction:-

Chronic subdural haematoma is a common condition primarily affecting the elderly.¹ It is a cause of major morbidity and mortality, yet it is treatable by relatively simple techniques and the majority of patients improve rapidly following surgical intervention. The incidence of CSDH in those aged over 70 years is 58 per 100,000 per year compared to 3.4 per 100,000 per year in those under 65⁻² As the proportion of people aged 65 and over is expected to double worldwide between years 2000 and 2030, a considerable rise in the incidence of CSDH is to be expected. CSDH arises in the layer of loose dural border cells, an innermost layer of dura surrounded by firmly adherent dura cells on one side and arachnoid cells on the other.⁴ Traversing veins, firmly anchored at their pial and dural ends, are being increasingly stretched by the shrinking brain until enough momentum can be generated by only a small force to cause rupture through stretching or shearing. The mechanisms behind the maintenance of the chronic state of CSDH are still poorly understood, but in essence, the subdural space is not well equipped to reabsorb the ensuing haematoma. Currently, three techniques are most commonly employed in the treatment of CSDH: twist drill craniostomy (less than 5mm in diameter), burr hole craniectomy (5-30mm in diameter) and craniotomy⁵. A meta-analysis by Weigel et al showed that all three techniques have approximately the same mortality (2-4%)⁵ Craniotomy is associated with a significantly higher morbidity (12 % versus 4% for craniostomies) and twist drill craniostomy has significantly higher recurrence rate (33% versus 12% and 11% for burr hole craniostomy and craniotomy). Not surprisingly, burr hole craniectomy, an evacuation via one or two burr holes drilled over the site of the haematoma, is the most

popular surgical technique world-wide. 5-7. The recurrence of CSDH after the initial drainage procedure ranges from approximately 5 to 30%.5 Re-operation carries the peri-operative risks associated with a second operation. Therefore, developing management strategies that are practical, safe and carry minimal risk of recurrence has been the focus of clinical research in CSDH. The central issue in the debate about minimising the recurrence rate is whether post-operative drainage should be used in conjunction with burr hole craniectomy.⁷ Since Laumer's prospective study $^{\rm s}$, when no difference was found between recurrences in patients with and without post-operative drainage, there has been a growing body of evidence suggesting that post-operative drainage of the subdural space is associated with significantly lower recurrence rates 64 Although being prospective and randomised, the studies by Wakai et al and Tsustumi et al were not formal controlled trials and as such are open to a range of bias.^{5,7,11} Hence, The aim of this study was to determine choice of treatment procedure in the management of CSDH treated with Single Burr hole Crainectomy or Twist drill Craniostomy.

Material and methods:-

Hospital and office records were reviewed to collect data of Chronic Subdural Hematomas operated in the institute. The cases that were diagnosed with chronic subdural hematoma was selected for the purpose of the study. This series includes 121 cases. Their clinical evaluation was done and based on which the line of treatment was determined. All the 121 cases were evaluated based on their GCS Score at the time of admission to the hospital along with several other demographic features such as age, sex and clinical findings

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such as if any H/O trauma, hemiparesis, pupillary reaction, headache, vomiting, altered sensorium, hypertension, diabetes mellitus, coronary artery disease conditions and cerebrovascular accident (infarct) as they may play a role in the formation of cSDH or its recurrence. Also, patients on Ecosprin and Warffarin were recorded and their coagulation profile value evaluated. Surgical intervention was carried in patients based on their clinical conditions from either of the two that is Single Burr Hole Carniectomy or Twist Drill Craniostomy. Twist Drill Craniostomy was carried out amongst patients who presented low GCS or with those who were on anti platelet drugs and had low GCS as they require immediate decompression which is easily feasible with this technique. Its outcomes were evaluated and documented.

Results:-

Amongst the 121 cases that had been selected for the purpose of the study majority of the patients with cSDH belonged to the 6th decade which is 47.93% followed by 21.48% belonging to 8th decade approximately 18.18% in the 7th decade and only 13.22% belonging to the 5th decade (Table 1). cSDH was predominantly seen in males as compared to females that is approximately M:F ratio was 3:1.(Table 2)



TABLE NO.2:- MALE :FEMALE RATION IN CSDH PATIENTS

On clinical examination a GCS score (glasgow coma scale) of E4V4M6 in 73.55%, E4V5M6 in 9.9%, E3V3M6 in 4.9%, E2V2M5 in 4.9%, E2V2M4 in 4.13% E2V1M4 in 0.83% and E1V1M2 in 0.83% of cases. On enquiring whether the patients had any history of trauma 49.6% mentioned trivial whereas, 33.88% had a history of significant trauma the remaining 16.5% gave no history of trauma. On evaluation of the pupil 4.13% exhibited anisocoria. Hemiparesis was observed in 78.5% at their time of admission along with headache in 74.38% of cases while vomiting occurred in only 24.79% of them. Altered sensorium was seen in 90.08% of the patients. As the study included elderly subjects 25.62% had diabetes, 35.53% had hypertension along with 10.74% suffering from coronary artery

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disease whereas, 6.61% had cereberovascular accident (infarct). 29.75% had habit of drinking alcohol since a long duration that is approximately 20-30 years. Amongst the subjects 14.05% of them were on anti-platelet drug /anticoagulant drugs (Ecosprin or Warffarin). Based on the above findings the choice of treatment for these individuals was determined that is taking into consideration their GCS score, whether patient is on anti platelet or anticoagulant drugs, coagulopathies or multiple organ dysfunction (due to any habits) because of which patient is not considered fit for general anesthesia. They were subjected to operative procedures. Amongst the 121 cases selected for the study 89.26% were operated by single burr hole craniectomy technique whereas, the remaining 10.74% were operated by twist drill craniostomy technique.(Table 3)



On evaluation Post operatively it was seen that those patients that had been treated with single burr hole craniectomy technique and twist drill craniostomy the results were almost equivalent with 90% of cases showing neurological and functional improvement while approximately 10% required rehabilitation amongst those patients that had been subjected to the procedure and survived. Three patients amongst the 121 subjects expired post operatively; amongst which two was operated by BHC technique while the other was operated by twist drill craniostomy. On follow-up of the subjects post-operatively within 2 months another 2 patients expired who had each been treated with BHC and Twist drill craniostomy respectively. Hence, it was observed that the mortality rate was higher amongst the patients treated with twist drill craniostomy that is 15.38% as compared to BHC which was 2.78% reason being the fact that those selected for TDC technique when admitted already presented with low GCS and critical condition which was a major factor that contributed to the mortality

Discussion:-

Surgical drainage is well recognized as an effective treatment of CSDH. Drainage can be achieved via craniotomy, burr hole craniectomy (BHC; 5-30 mm in diameter according to Weigel et al) or twist drill craniostomy (TDC; , 5 mm in diameter). General or local anesthesia can be used, and the procedure can be performed in the operating theater or at bedside. Numerous variations of each technique have been developed and are practiced (see also recent reviews by Weigel et al and Lega et al.¹²

The most widely practiced treatment is evacuation via burr holes.^{13,14,15,16} Both the systematic review by Weigel et al and the decision analysis model based on the previously published data by Lega et al¹² have identified BHC as the most efficient choice to treat an "uncomplicated" CSDH because it balances a low recurrence rate against morbidity and mortality better than craniotomy and TDC. Recurrence rates of subdural hematomas treated either with single or double burr holes were not significantly different. Thus, the number of burr holes does not affect the post-operative recurrence rate of chronic subdural hematomas. Both techniques are equally effective treatments.¹⁷

Hamilton et al18 reported no significant difference regarding the

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incidence of post-operative complications or hematoma recurrence requiring subsequent surgery between the groups who underwent burr hole craniectomy or twist drill crainostomy with or without drain. Possible factors responsible for these discrepancies include, failure to recognize and treat properly multiloculated CSDH, too aggressive a surgical approach towards persistant CT demonstrated but asymptomatic subdural residual or recurrent collections¹⁹

Until the mid-1960s, craniotomy was the prevailing technique used to evacuate CSDH.²⁰²¹ In 1964, Svien and Gelety²¹ published a series of 69 patients with primary CSDH effectively treated with craniotomy than BHC. Future studies of imaging in the selection of the optimal surgical technique will likely define the role of craniotomy in the management of CSDH. In the meantime, most surgeons would agree with the statement from Markwalder²² in a 1981 review that craniotomy should be considered in those instances in which the subdural collection reaccumulates, there is solid hematoma, or the brain fails to expand and obliterate the subdural space.

In a recent paper, Rughani et al²³ reviewed the literature concerning TDC. The authors identified 16 articles published in English.²³⁻²⁶ Weigel et al⁵ have found that although the morbidity and mortality of TDC were similar to those of BHC, the recurrence rate was significantly greater than that of either BHC or craniotomy. The main advantage of TDC, however, is the possibility of performing it at bedside, which may be a consideration as the costs of operating theater time continue to rise.

The pathogenesis and recurrence of CSDH has been controversial for more than a century and still remains obscure. The most widely accepted theory is that is the result of repeated bleeding from the outer membranes of the hematoma. Many causes for the repeated bleeding are explained ^{27:30}. The histological and histochemical changes are also responsible for recurrence. Sarkar et al ²⁹ observed infiltration of eosinophils in the vascularised and hynalised granulations tissue of the subdural membrane. Yamashima²⁰ postulated that the eosinophils in the outer membrane may contribute to the development of local hyperfibrinolysis and recurrent subdural bleedings; probably there is liberation of eosinophilic granules might provoke local hyper fibrinolysis, liquifaction and expansion of subdural clot.

Benzel et al³¹ suggested recurrence rate depends on the removal of the residual semisolid subdural hematoma component and the removal, dilution and inactivation of endogenous fibrinolytic agents. More removal of CSDH although leaving the entire outer membrane intact, are almost always effective in treating these lesions. However it has never been explained why these procedures stop the repeated hemorrhage from the outer membrane. Weir³² proposed that the removal of CSDH brings about hemostasis and fibrosis by stopping the selfperpetuating cycles in the subdural neocapillaries by removal of hemorrhagic fluid that probably contains anticlotting factors. Yamashima³³ on ultra structural studies, showed gap junctions in the endothelial cells of the outer membranes, which indicate the high permeability of capillary walls. The distinctive feature of the thin or absent basement membrane among these macro capillaries indicates that these vascular structures are fragile and have characteristics of easy bleeding. Once the pressure within the inner cavity of the hematoma becomes reduced following hematoma drainage, a hydrostatic pressure gap from the capillary pressure will develop. Therefore, exudation can occur along the opened endothelial gap junctions of the vessels, with this gap as a driving force.³⁴ Yamashima33 explained this phenomenon by the mechanism of formation of such a gap junction where neighboring endothelial cells were separated as the intraluminal hydrostatic pressure became increased. As the intraluminal pressure drops following surgical hematoma drainage, the separations between endothelial cells become reduced. Thus a reduction of gap junctions in turn decreases membrane permeability gradually after the surgery. It is likely that there is a balance between the influx and efflux of blood (components) in the vessels

within the outer membrane. When efflux exceeds influx because of local hyperfibtrinolysis the hematoma enlarges; conversely, when influx exceeds efflux because of decreased fibrinolysis the hematoma shrinks.³⁵

Summary:-

Surgical drainage is a relatively safe and effective treatment for CSDH. BHC being the treatment of choice for an uncomplicated primary CSDH. Craniotomy and TDC also play a role in the management of CSDH, but more clinical research is needed to refine their specific indications. Many other technical variations have been described, but they have largely been driven by tradition, hypotheses, personal or departmental experience, or case series. A similar level of evidence exists for nonsurgical management that, most would agree, is best reserved for patients who either are asymptomatic or have a high perceived operative risk. In addition to steroids, ACE inhibitors may also play a role in the management of CSDH. A one-for-all management strategy is clearly not appropriate. Creating rational bases for the selection of an ideal treatment strategy for an individual patient should, in our opinion, be one of the targets in the process of improving the management of patients with CSDH. This can be achieved through better understanding of the nature of the condition through systematic basic science research, ascertaining the merits of different surgical techniques in well-designed and rigorously executed clinical trials, using advances in imaging techniques to classify CSDH.

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