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Burr-hole versus Mini-craniotomy and (fenestration) membranectomy in management of membranous forming CSDH - Sirte experience

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A B S T R A C T

Objective: The best way to treat (membranous forming) chronic subdural hematoma is unknown. Thus, the purpose of this study was to compare single burr-hole drainage with mini-craniotomy in the treatment of (membrane forming) chronic subdural hematoma, taking into account complication and recurrence rates. Method: (7) patients with (membrane forming) CSDH who underwent surgery between January 2018 and June 2022 had their clinical and radiologic records extracted. They account for 2,5% of all CSDH patients (18) treated during the same time period. The cases undergoing various types of surgery were compared in terms of clinical and radiological outcomes. Result: These (7) patients were divided into two groups: group A (4) patients underwent a single burr-hole trepanation, (3) patients underwent mini-craniotomy and (fenestration) membraneotomy, during all procedures, subdural drainage was placed and removed three days later. All patients recovered completely, with only one case in group A having a rest subdural collection and no complications in group B .Conclusion: When compared to burr-hole evacuation, the mini-craniotomy with (fenestration) membraneotomy technique may be superior for the treatment of (membranous forming) CSDH. More subdural space visibility is made possible by the mini-craniotomy, which also enables more aggressive fluid evacuation, better irrigation of the area, the safe fenestration of any membranes that are accessible. Despite the evident limitations of this study, an upcoming effort to evaluate this technique may be merited.

1.0 Introduction

Chronic subdural hematoma is a common complication in neurosurgery, and the majority of cases are surgically treated. Although the condition is more common in the elderly, it can also be found in young and middle-aged people. It has usually reached surgical margins at the time of symptom onset, with chambers separated by membranous structures developing within the hematoma. There is widespread agreement that a combination of clinical and radiographic findings indicating a CSDH with mass effect necessitates surgical intervention. (J.W. Burke et al. , M.M. Cameron) A some authors guide the usage of minimal invasive intervention (burr-hole or twist-drill holes) due to the fact those strategies offer equivalent efficacy to

craniotomy with lower mortality and morbidity and a shorter working time and hospital stay (T. Becker et al. However, the outcome of burr-holes varies greatly, with reoperation rates ranging from 3% to 37%.These failures are primarily caused by residual thick hematoma membranes.(Giovanni Rocchi MD et al.).

The level of hematoma organization must determine the surgical method used to treat CSDHs. For CSDHs that are largely liquid and not septated, a burr-hole and drainage are required. On the other hand, the best practical method for CSDHs structured in a solid structure and septated is mini- craniotomy with (fenestration) membraneotomy. Epidemiology: The epidemiology of cSDH has not been well researched despite being one of the most prevalent disorders in neurosurgery. However, a number of papers published in recent years have provided insight into its prevalence in specific regions. Men are more commonly affected than women, accounting for at least two-thirds of all patients.(Rauhala et al., 2019; Toi et al., 2017; Kudo et al., 1992; Nayil et al., 2012; MORI and MAEDA, 2001) The incidence of CSDH is estimated to be between 8.2 and 14.0 per 100,000 person-years. (Cousseau et al., Ducruet et al.,).The increased use of antithrombotics, as well as the aging population, are driving these trends. Pathophysiology: It is largely agreed upon that the bridging veins that cross the dural cell layer of the dural border are what cause the initial hemorrhage in CSDH. Traumatic occurrences, structural alterations that cause cranio-cerebral disproportion (such as age-related brain shrinkage), intracranial hypotension, or anatomical manipulation can all lead to this.(Macdonald and Winn, 2017). These bridge veins are prone to bleeding because of their thin vessel walls, which are thought to be the thinnest in the dural cell border layer and are only protected by one endothelial cell layer .(Macdonald and Winn, 2017; Yamashima and Friede, 1984) The resulting hematoma from vein shearing is thought to create a potential space within the dural cell border layer because it is made up of flattened, elongated cells with comparatively weaker junctions that provide a natural cleavage plane of membrane separation. (Macdonald and Winn, 2017; Holl et al., 2018). Given that the bleeding originates from low-pressure venous blood and that this collection forms in a potential space, the hematoma takes time to form, which explains why many patients experience symptoms weeks after the initial injury. An inflammatory response is elicited, which causes clot fibrinolysis, granulation tissue creation, and the release of angiogenic factors, ultimately leading to the formation of "neo-membrane.(Stanisic et al., 2012; Edlmann et al., 2017).This keeps the inflammation going, and it's believed that the granulation tissue it produces has a high concentration of immature, fragile, leaky blood vessels that are vulnerable to microbleeds. Together, the neo-membrane and chronic inflammatory response increase hematoma size and prevent normal coagulation.(Gandhoke et al., 2013) Ageing, a history of falls, a minor head injury, the use of anticoagulants or antiplatelet medications, bleeding diatheses, alcohol (which causes hepatogenic coagulopathy, globalized brain atrophy, and increased risk of falls), epilepsy, low intracranial pressure states, and haemodialysis are risk factors that increase the likelihood of developing CSDH. The main risk factor for rising CSDH incidence is the use of anticoagulant and antiplatelet medications. Because of their extensive usage, it is impossible to quantify the risk, but research has indicated that they increase the prevalence of both recurring CSDH and "atraumatic" CSDH, in which the trauma is so small that it is not remembered.(Lindvall et al., 2009).

2.0 Materials and Methods

Between January 2018 and June 2022 (18) patients were treated for chronic subdural haematoma in Neurosurgery department at Ibn sina hospital, Sirte, Libya.

(7) patients with (membrane forming) CSDH, the current study's focus is on this particular patient population. In this work, the clinical symptoms were headache, changed level of awareness, paresis, aphasia, disorientation. Postoperative computed tomography as well as postoperative clinical outcome were assessed. These seven patients were split into two groups as follows: group A included (4) patients who underwent a single burr-hole trepanation and (3) patients who underwent a mini-craniotomy and (fenestration) membraneotomy, one case with bilateral hematoma underwent right side mini-craniotomy and burr-hole for other side, during all procedures, subdural drainage was placed and removed three days later.

3.0 Results

(7) surgical procedures were completed on patients with persistent subdural hematoma over the time period as mention before. Patients ranged in age from 46 to 92. The average age was 73. All males. (2) cases bilateral. (3) received antiplatelet therapy. The most frequent signs were aphasia and hemiparesis. followed by change of level of consciousness and headache. Operative time for the procedure was measured, This was ca. 60 min for burr-hole unilateral, and 78 min for mini-craniotomy, the total operative time was divided by two when a patient had bilateral burr-hole or mini-craniotomies. Following the cSDH's evacuation, the average stay was 5.3 days. During the 6-month follow-up period, there were no radiographic or symptomatic recurrences of cSDH in group B mini-craniotomy and fensteration, Whereas in group A, one case had a residual hematoma that was detected radiologically but showed no major symptoms, indicating that should be managed conservatively.

4.0 Discussion

For neurosurgical practice, a variety of surgical options are available. The two surgical treatment options burr-hole versus mini-craniotomy were employed in this small series. In this current study, the mean age was found to be 73 years, with a range of 46-92 years. The average age at onset of CSDH is between 56 and 63 years (Sambasivan, 1997), however, patients over the age of 70 are more likely to be affected (Ko et al., 2008) and Yamamoto et al., 2003) which is consistent with the current study, Observe that all patients in our study are men, which is different from other studies, we think this due to the small number of cases in our study. Thus, chronic subdural hematoma can be considered a disease of the seventh decade of life that primarily affects male patients (Yvonne et al., (2009) The most frequent presenting symptom in our study was aphasia and hemiparesis (5) cases, followed by altered level of consciousness and headache (4). Several neurosurgical centers have examined a variety of surgical approaches to the surgical therapy of CSDH. Generally, complicated and recurrent chronic subdural hemorrhages are treated with a craniotomy. Recurrence is strongly predicted by the type of persistent subdural hemorrhage, Separated CSDH type is linked to recurrence(Ohba et al., (2011), Gelabert-Gonzalez et al., (2005) Nakaguchi et al., (2001) and Oishi et al., (2001), whereas the trabecular type (Yamamoto et al., 2003; Stanisic et al., (2005) Nakaguchi et al., (2001). The modified Rankin score (mRS) and Glasgow outcome scale score (GOS) were used to assess patients' recovery. At the 6-month follow-up.

Table1:Change in the patients' mRS scores from the time of discharge to six months later who had a chronic subdural hematoma

Modified Rankin scale score	At 6 month (no.7)
0 (No symptoms)	2 (28,5%)
1 (No significant disability)	3 (42,8%)
2 (Slight disability)	1 (14,2%)
3 (Moderate disability)	1 (14,2%)
4 (Moderately severe disability)	0 (0%)
5 (Severe disability)	0 (0%)
6 (Dead)	0 (0%)

Table 2: Change in the patients' GOS scores from the time of discharge to six months later who had a chronic subdural hematoma

Glasgow outcome scale score	At 6 month (no.7)
1 (Death)	0 (0%)
2 (Persistent vegetative state)	0 (0%)
3 (Severe disability)	0 (0%)
4 (Moderate disability)	1 (14,2%)
5 (Mild or no disability)	6 (85,7%)

The most serious complication of CSDH is recurrence, which necessitates reoperation. Recurrence rates in the literature range greatly from 0 to 76% (Ducruet et al., (2012), but the current agreement is that the reoperation rate is between 10% and 20% (Stanisic et al., (2012). In our study, no recurrence of CSDH was observed in group B, which was treated with mini-craniotomy and (fenestration) membraneotomy. There are three common surgical techniques for treating chronic subdural hematoma. Various systemic reviews have compared the outcomes of twist drill craniotomy, burr hole craniotomy, and craniotomy (Vikram et al., (2018), Weigal et al), there was no difference in cure rates or mortality between the three techniques, but TDC had a significantly higher rate of recurrence (33.0%) than BHC (12.1%, P 0.001) or craniotomy (10.8%, P 0.001).

Furthermore, morbidity after craniotomy was higher (12.3%) than after TDC (3.0%, P 0.001) or BHC (3.8%, P 0.001). However, (Ducruet et al.) discovered that while BHC had a higher rate of complications (9.3%) than TDC (2.5%, P 0.001) and craniotomy (3.9%, P 0.005), it also had a lower rate of recurrences (11.7%) than TDC (28.1%, P 0.001) and craniotomy (19.4%, P = 0.002). Hence, TDC is recommended by (V. Mehta et al. (2018) as the first-line option, and craniotomies are recommended for patients who have considerable membrane formation.

5.0 Conclusion

The mini-craniotomy with (fenestration) membraneotomy approach may be more effective than burr-hole evacuation for the treatment of (membranous forming) CSDH. More subdural space visibility is made possible by the mini-craniotomy, which also enables more aggressive fluid evacuation, better irrigation of the area, the safe fenestration of any membranes that are accessible. Despite the evident limitations of this study, an upcoming effort to evaluate this technique may be merited.

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