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Surgical Management & Clinical Outcome of Severe Brain Trauma due to Acute Subdural Hematoma.

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Abstract

Acute subdural hematoma (ASDH) is a collection of clotting blood that forms in the subdural space & it remains one of the most difficult tasks faced by neurosurgeons because of the high mortality and morbidity of the disease. The usual mechanism of an acute subdural hematoma is a high-speed impact to the skull. This causes brain tissue to accelerate or decelerate relative to the fixed dural structures, tearing blood vessels. The aim of our study was to examine the clinical outcome of patients managed by urgent surgery with traumatic ASDH, Efficacy of urgent surgical intervention & to identify factors contributing to outcomes. It is a cross sectional Study. Starting from November 2012 to October 2013. This is a study of 78 operated cases of traumatic acute subdural hematoma. Patient admitted in Khoula hospital MOH Muscat Oman with moderate to severe TBI and acute SDH were selected. Statistical analysis was performed to detect the effects of the of age, Glasgow Coma Scale (GCS) score on arrival, time interval between the trauma and surgery, CT scan findings and the importance of change in the pupil reaction. In this study Results obtained, out of 78, Favourable outcome in 39 (50%)patients, while 12 (15%) patients survived with unfavourable outcome. Results are discussed and compared with the related current literature. The overall mortality in 78 patients was 34.6%. An acute subdural hematoma due to trauma, with significant size of bleeding & midline shift in CT findings, Low GCS, if the intracranial pressure is greater than 20 mmHg, & with abnormal pupil requires immediate surgical intervention.

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The important determinants of the prognosis are on arrival GCS, timing of the operation, and the patient's age. Preoperative with severe brain swelling, Decompressive craniectomy with dural-stabs is the quicker, safer and effective procedure.

Keywords: Acute subdural hematoma; midline shift; Glasgow Coma Scale.

1. Introduction

Acute subdural hematoma (ASDH) is a collection of clotting blood that forms in the subdural space & it remains one of the most difficult tasks faced by neurosurgeons because of the high mortality and morbidity of the disease. ASDH has been recognised as a devastating injury. In patients with severe TBI due to acute SDH, mortality rates of 60% and more, depending on GCS scores [1]. Subdural hematomas are usually characterised on the basis of their size and location and the amount of time elapsed since the inciting event. When the inciting event is unknown, the appearance of the hematoma on imaging studies can help determine when the hematoma occurred. These factors, as well as the neurologic and medical condition of the patient, determine the course of treatment and may also influence the outcome [2]. Presentation varies widely in acute subdural hematoma. Many of these patients are comatose on admission. However, approximately 50% of patients with ASDH who require emergency neurosurgery present with head injuries that are classified as moderate or mild (GCS scores 9-13 and 14-15, respectively).Rapid decision making is required to treat this life threatening condition. The majority of patients with acute subdural bleeding present in a severe clinical condition, and immediate surgical management is required [3].

The aim of our study was to examine the clinical outcome of patients managed by urgent surgery with traumatic ASDH, Efficacy of urgent surgical intervention, selection of surgical approach & to identify factors contributing to outcomes.

2. Materials & Methods

This cross sectional study comprised 78 patients who were operated due to traumatic ASDH between November 2012 to October 2013. All patients included in the study admitted in Khoula hospital under Ministry of health, Muscat Oman, With moderate to severe TBI and acute SDH underwent surgery following a diagnosis with the assistance of computerised cranial tomography (CCT) (Figure 1).

The patients were divided into three groups according to their on arrival to the hospital GCS scores. The patients with GCS scores between 3-8 were classified in Group I, 9-12 in Group II and above 13 in Group III. The records were analysed for demographic characteristics such as gender, age, GCS on admission, pupil abnormalities, mechanism of injury, and time elapsed from accident to surgery on the basis of peripheral referral centre or rescue team reports. Vital parameters analysed included initial GCS, blood pressure and O2 saturation.

The hematoma was completely evacuated with craniotomy in 48cases. In 30 patients decompressive craniectomy with either the 'dural-stabs' incisions or dural opening & grafting by artificial dura obtained because of severe acute brain swelling.

All survived patients were followed up for six months, The results were quantified according to the Glasgow Outcome Scale (GOS) as: 1- dead; 2- vegetative state; 3- severe neurological impairment; 4-moderate impairment; 5-no impairment.

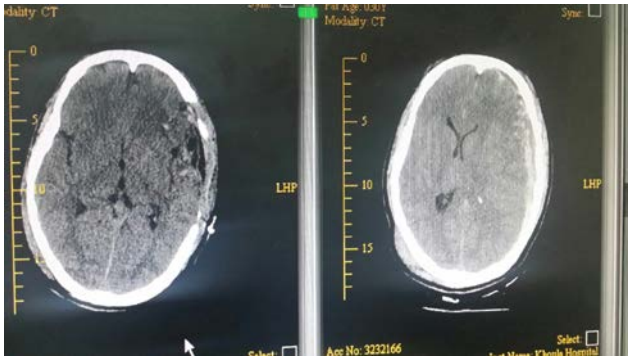

Figure 1: Patient with Acute SDH, severe brain swelling & midline shift. Decompressive craniectomy.

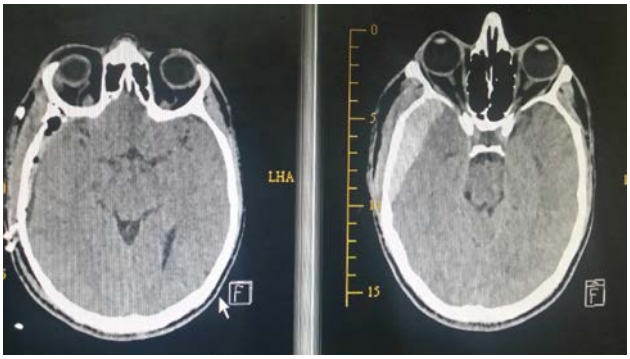

Figure 2: Patient with Acute SDH, Craniotomy and complete evacuation of hematoma.

3. Results

In our study out of 78 patients, Fifty nine patients (76%) were male and 17 (24%) female. The demo- graphic characteristics are summarised in table 1. The median age was 37 years. The mechanisms of injury included road traffic accident RTA (63%), falls from height (28%), assaults (7%), others 2%. About 33% patients had symmetrical reactive pupils, 13 % with pin point. 39% with unequal pupils and 15% dilated non-reactive pupils. The median time elapsing from accident to surgery was 4 hours. Perioperative ICP probes were inserted in 11 patients (15%). craniotomy and complete hematoma evacuation done in 48 patients, while decompressive craniectomy with dural-stab incisions in 13 patients and conventional wide craniectomy with open dural flap performed in 17 patients.

Initial GCS was an important predictor of outcome in our study results, of the 31patients with GSC 13 & above, Only 1 patient had bad outcome. 13 patients with GCS 8-12 survived, And 7 patients survived with GCS between 3-7. Out of 78 patients 27 (35%) were died.

Regarding surgical procedures, Out of 48 patients with craniotomy and complete hematoma evacuation 25 patients survived with no neurological impairment, 4 with moderate impairment, 7 with severe impairment, 2 with vegetative state and 11 died. And 13 patients managed with decompressive craniectomy with dural-stab incisions 8 patients died, 2 with moderate neurological impairment and 1 survived with vegetative state. 17 patients managed with conventional wide craniectomy with open dural flap, 9 patients died, 3 with vegetative state, 3 with severe neurological impairment, & 2 patients survived with moderate impairment.

Age appeared to be associated with outcome, with 48% of patients below 30 having a favourable outcome (GOS 4 and 5), and only 11 out of 57 (19%) dying. Conversely, in the group of patients aged 30-60 or over, 76 % mortality , and only 14% a favourable outcome (GOS 4 and 5). (Table 1).

Table 1: Mortality and outcome rates according to age group

Age	0-20	20-30	30-60	above 60
Number of patients	17	40	16	5
Death	4	7	13	3
Favourable outcome	11	27	2	1

Significant association to be appears between time to surgery and outcome. Results for time to surgery are almost identically distributed with respect to unfavourable (GOS 1 and 2) and favourable (GOS 4 and 5) outcome. 70% of patients out of all operated within 3 hours after accident shows favourable outcome.

4. Discussion

Acute subdural hematoma is one of the most lethal of all head injuries, & it remains one of the most difficult tasks faced by neurosurgeons because of the high mortality and morbidity of the disease. This study comprised 78 patients who were operated due to traumatic ASDH between November 2012 to October 2013. All patients included in the study admitted in Khoula hospital. Khoula Hospital is an integral part of Oman's Ministry of Health and takes the roles assigned to it by the Ministry. Khoula is a Tertiary care National referral hospital which provides specialised services.

According to official reports of the Ministry of Health (MoH) in Oman, RTA problem is the number one cause of inpatient deaths and the leading cause of serious injury, disability and premature death among adults (MoH, 2009). The World Health Organization (WHO) has ranked Oman at fourth place in the Arabian Gulf Co-operation Council (GCC) states and 57th worldwide as far as the occurrence of traffic accidents and resulting injuries and deaths are concerned [4]. As our study indicates that the mechanisms of injury in 63% patients was road traffic accident.

Wilbergerr reported that the time interval between the operation and trauma and control of intracranial pressure were the most important factors among the variables (age, sex, neurological examination on admission, etc.) that can affect mortality in traumatic ASDH [5]. Seelig et al reported a mortality of 30% for comatose patients treated less than 4 hours after injury versus 90% mortality for those treated after 4 hours [6].

But Stone and colleagues reported no significant difference between the results of the operations carried out in the first four hours following the trauma and those performed beyond this time [7]. In this study 70% of patients out of all operated within 3 hours after accident shows favourable outcome, So study demonstrates that in patients with ASDH, the prognosis is affected by the timing of the operation. There is a strong correlation between the GCS score on admission and prognosis of ASDH,With regard to factors influencing outcomes, the impact of GCS scores has been studied most frequently. The most detailed analysis of the effects of GCS scores on outcomes after severe TBI was done in the IMPACT (International Mission for Prognosis and Analsysis of Clinical Trials in TBI) study. It was shown that the GCS score at hospital admission was strongly related to the GOS score at 6 months after trauma [8].

In the acute subdural hematoma guideline published in 2006 by Bullock and colleagues, It is stated that patients with hematomas thicker than 10 mm or who have midline shift greater than 5 mm should be operated without considering the GCS [9]. Our study supported IMPACT theory, Initial GCS was an important predictor of outcome in our study results, of the 31patients with GSC 13 & above, Only 1 patient had bad outcome. Aykut Karasu recommend of an emergency Craniotomy, If a decline of 2 points occurs in the GCS score, if the intracranial pressure is greater than 20 mmHg, or if an abnormal pupil reaction is detected, despite a thickness of hematoma greater than 10 mm and midline shift less than 5 mm [10,11]. The high mortality of acute subdural hematoma is largely explained by its frequent association with primary brain damage consisting of contusions and brain swelling.It was observed that conventional (open dural flap) surgery in controls to re- move subdural clot in presence of coexisting injuries and edema, even though early, could not avoid pouting and laceratin of brain and vessels despite substantial amount of decongestion. This lead to poor outcome in 81.6% of the patients in controls (open dural flap). However dural- stabs group had all favourable outcome [12]. In patients with severe brain swelling our study supported these ideas.

5. Conclusions

An acute subdural hematoma due to trauma, With significant size of bleeding & midline shift in CT findings, Low GCS, If the intracranial pressure is greater than 20 mmHg, & with abnormal pupil requires immediate surgical intervention. The important determinants of the prognosis are on arrival GCS, timing of the operation, and the patient's age. Preoperative with severe brain swelling, Decompressive craniectomy with dural-stabs is the quicker, safer and effective procedure.

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