Original Article

Evaluation of Early Decompressive Craniotomy in Patients with Postraumatic Acute Subdural Hematoma

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ARTICLE INFO

ABSTRACT

Background: Decompressive craniotomy (DC) is an effective method of managing rise in intracranial pressure (ICP). Acute subdural haematoma (SDH) is associated with increase in compartmental as well as generalized ICP. Objective: Evaluating the timing of surgical evacuation and decompressive craniotomy in patients with acute subdural hematoma. Patients & Methods: Sixteen patients with unilateral subdural hematoma and midline shift more than 5 mms were operated in a year period with a large DC and duroplasty with hematoma evacuation. All had immediate post-operative scans and monthly for the 1st 3 months. Results: Results regarding age, Glascow Coma Score (GCS), Timing of surgery, complications, intensive care unit (ICU) stay, Hospital stay and Glascow Outcome Score (GOS) were reported and evaluated. Conclusion: Decompressive craniotomy is an effective method to control the raised ICP. Combining the surgical evacuation of SDH with DC helps to control the anticipated increase in intracranial pressure. It helps also to reduce the midline shift and subfalcine herniation. Controlling both the midline shift and intracranial pressure (ICP) improves the surgical outcome of acute SDH. Early surgery reduces the time during which the brain is subjected to high intracranial pressure. Thus early surgery within first twenty four hours further improves the outcome.

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INTRODUCTION

Acute SDH occur in approximately 11% of head injured patients with an age range of 30 to 50 years. Its overall mortality ranges from 50 to 90%. This is the highest mortality rate of all traumatic brain injuries. The poor outcome results from associated parenchymal injuries such as brain contusions, edema and diffuse axonal injuries. The mass effect of the blood, which accumulates early, causes brain edema and herniation.

Outcome of acute SDH is affected by many factors including age, GCS, neurological status, comorbidities and timing of surgery.1,2

In acute subdural hematoma, the extent of primary underlying brain injury is more important than the subdural clot itself in dictating outcome; therefore, the ability to control ICP in combination with early surgery is more critical to outcome.13,14

PATIENTS AND METHODS

This study included sixteen patients, in a year period from September 2012 to September 2013, operated in Kasr el Aini University Hospitals. All patients had unilateral subdural hematoma and/or midline shift more than 5 mms regardless of their conscious level (Fig. 1). Patients were operated as soon as possible by hematoma evacuation and decompressive craniotomy. A bone flap measuring approximately 12X10 cms extending from just above midpupillary line frontally, 2-3 cm from midline superiorly, 2-3 cm behind the parietal eminence posteriorly and just above the zygomatic arch inferiorly. The bone flap was left attached to the temporalis muscle. The dura was then opened and the subdural haematoma evacuated. Duraplasty was done using the pericranial patch. The bone flap was deposited base on the temporalis muscle and left flail to allow for cerebral expansion. Perioperative dehydration was used. The patient was monitored postoperatively using the Glasgow coma scale (GCS). Post-operative CT scans were done (Fig. 2). After six months, clinical and radiological evaluation of fusion of the bone flap was carried out. In case of nonunion of the bone flap, an operation was done to fix it.

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RESULTS

In our study we operated sixteen patients with SDH and midline shift the youngest was sixteen years the oldest 55 years with mean age of 37.8 years. Lowest GCS reported was 3 while the highest was 8. Nine patients had GCS of 6 and above (56%) while seven patients had GCS below 6 (44%). Nine patients had unequal pupillary reflex 56% and 7 were normal 44% (Table1). Patients were operated on at various times after onset of trauma the shortest was 10 hours and the longest was 48 hours with a mean time of 17.35 hours. The GCS improved in thirteen patients after surgery with all of them reaching GCS 15 during the follow up period. Three patients died. In nine cases, the craniotomy bone flap fused spontaneously. In the remaining three (23%), the flap remained flail six months after surgery and an operation was done to fix it. In our study, two patients (12.5%) had postoperative seizures (13%) and were controlled medically, two patients (12.5%) developed weakness and three patients died (18.75%). The shortest ICU stay was 2 days and the longest was 10 days with an average of 3.8 days. The shortest hospital stay was 5 days and the longest was 14 days with an average of 7.15 days. GOS of 5 was found in fifty% of patients had a, 12.5% had a GOS of 4, 6.25% had a GOS of 3, 12.5% had a GOS of 2, 18.75% had a GOS of 1. This correlated with the timing of surgery as patients with GOS 5 were operated in a median time of 12.5 hours, patients with GOS 4 were operated in a median time of 16 hours, patients with GOS 3 were operated in a median time of 16 hours, patients with GOS 2 were operated in a median time of 24 hours, and patients with GOS 1 were operated in a median time of 27 hours. The earlier the surgery, the better the outcome was. In our study 62.5% of patients had favorable outcome (GOS 5 and 4) while 37.5 had an unfavorable outcome (GOS 3-2-1) (Table 2)

Table 1: Presentation of patient:

<table>
<thead>
<tr>
<th></th>
<th>PERCENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>GCS ABOVE 6</td>
<td>56.25</td>
</tr>
<tr>
<td>GCS BELOW 6</td>
<td>43.75</td>
</tr>
<tr>
<td>EQUAL PUPILS</td>
<td>56</td>
</tr>
<tr>
<td>UNEQEUAL PUPILS</td>
<td>44</td>
</tr>
</tbody>
</table>

Table 2: Correlation of timing of surgery to GOS:

<table>
<thead>
<tr>
<th>Percent</th>
<th>GOS</th>
<th>Median Time to Surgery</th>
</tr>
</thead>
<tbody>
<tr>
<td>50</td>
<td>5</td>
<td>12.5</td>
</tr>
<tr>
<td>12.5</td>
<td>4</td>
<td>16</td>
</tr>
<tr>
<td>6.25</td>
<td>3</td>
<td>16</td>
</tr>
<tr>
<td>12.5</td>
<td>2</td>
<td>24</td>
</tr>
<tr>
<td>12.5</td>
<td>1</td>
<td>27</td>
</tr>
</tbody>
</table>

DISCUSSION

Decompressive refers to the removal of an area of skull bone with the aim of converting the ‘closed’ intracranial compartment into an ‘open’ one. DC craniotomies vary principally in location, size and shape of the bone defect as well as the management of the dura. Numerous studies have shown that DC can consistently reduce intracranial pressure (ICP), and a significant number of patients with increased ICP can achieve a good long-term functional recovery. In this study, DC was used in association with surgical evacuation of subdural hematoma to control the anticipated increase of ICP and thus improves the outcome.
The indication of surgery in this study was CT findings of sizeable ASDH (more than 1 cm in thickness) and/or midline shift more than 5 mm. The operated patients had GCS 12 or less, some had weakness, unequal pupillary reflex and/or lost corneal reflex. Various workers have based their decision to operate on different premises. Reddy et al based their decision to perform DC on the presence of mass effect with midline shift on neuroimaging and the impairment of consciousness to Glasgow Coma Scale (GCS) of 12 and below. 16

Azbah’s et al. on the other hand, performed early DC (within 24 hours) among their patients, if they had a GCS score of less than 6 and showed clinical signs of cerebral herniation (which were correlated with abnormalities on computed tomography scan, such as the presence of hematoma or brain swelling). 3

In our study, all patients undergone a large DC extending from just above midpupillary line frontally, 2-3 cm from midline superiorly, 2-3 cm behind the parietal eminence posteriorly and just above the zygomatic arch inferiorly. Duraplasty was done using the pericranial patch in all patients. The practice of primary duraplasty with either pericranium or a dural substitute has been suggested to lower the risk of complications such as subdural hygromas, CSF leak, infection, and neurologic injury from scalp adhesions to underlying brain. It is also suggested to make cranioplasty both safer and easier. However, no conclusive data exists to prove this and it will often come down to individual surgical preference. 4

In our study, three patients died (18.75%). The favorable total outcome was 56.25% (GOS 5). This is better than that reported by Kalayci et al. In their series, the first-month mortality rate was 38.2% and the mortality after six months was 47%. Their favourable outcome in twelve (25%) patients and unfavourable in twenty two (75%) patients. 13

The result in this study is also better than that of Azhari et al. In their series of seventy four patients suffering from acute subdural hematoma, they had mortality in 73% of cases. Good to moderate recoveries were seen in 23% and severe disability or a vegetative state in 4% 2. Guerra et al. reported that up to 65% of their patients who underwent DC made a good recovery at one year. 8

Li et al. 15 reported that 50% of patients had a GOS of 5, 12.5% had a GOS of 4, 6.25% had a GOS of 3, 12.5% had a GOS of 2 and 18.75% had a GOS of 1. The favorable outcome in the last two studies correlates with the result in this study (56.25%).

In this study, two patients (12.5%) had postoperative seizures and were controlled medically, while two patients (12.5%) developed weakness. In Kalayci et al. series, they had complications in seven patients (20.6%). Their complications were: cerebral abscess in one (2.9%), hydrocephalus in another (2.9%), and superficial wound infections in five (14.7%) patients. 13

Stiver had complications including expansion of underlying contusions, external herniation and subsequent venous infarction and subdural hygromas in 25% of cases. 19

In this series, Patient had GOS or 5,4,3,2, and 1 were operated upon in a median time of 12.5, 16, 16, 24 and 27 hours respectively. Albanese et al. performed early DC (within 24 hours) among their head-injured patients. 1

Reddy et al. performed early DC within 6 hours of the initial presentation of trauma with good recovery (GOS 4,5) 16. Li et al. had GOS 4&5 for patients operated at the first 24 hours of the injury. These results correlate with the results of the current study. 15 The earlier the surgery, the better was the outcome.

CONCLUSION

Decompressive craniotomy is and effective method to control the raised ICP. Combining the surgical evacuation of subdural hematoma with DC helps to control the anticipated increase in intracranial pressure. It helps also to reduce the midline shift and subfalcine herniation. Controlling both the midline shift and ICP improves the surgical outcome of acute subdural hematoma. Early surgery reduces the time during which the brain is subjected to high intracranial pressure. Thus early surgery further improves the outcome regardless of the GCS.

REFERENCES


