Ultra Early Microsurgical Treatment of Hypertensive Putaminal Hemorrhage

The objective of this study is to analyze the outcome and prognosis of hypertensive putaminal hemorrhage. The prognostic factors have also been evaluated.

This study included the patients who underwent open craniotomy as a life saving procedure. Total 36 patients admitted in our hospital from October 2006 to July 2008 because of hypertensive putaminal hemorrhage were retrospectively analysed. Patients were divided into two groups. Patients, 17 in number, who underwent transylvian approach were grouped as A. Patients, 19 in number, who underwent transcortical approach were grouped as B. Mortality rate, Glasgow Outcome Score (GOS) and activities of daily life (ADL) score were analyzed using statistical method.

Mortality rate of transylvian group is 17.65% and transcortical group is 36.85%. Average Glasgow outcome scale (GOS) score of transylvian group and transcortical group 6 months postoperatively are 2.82 and 2.26 respectively. Average ADL score of transylvian group and transcortical group 6 month postoperatively are 3.35 and 3.74 respectively.

The short term outcome of intracerebral hemorrhage (ICH) is determined by the severity of bleeding as measured by clinical conditions, the hematoma size, the presence of intraventricular hematoma and the long term outcome depends mainly on age.

Surgical intervention increases the chance of survival or prolongs the surviving period, despite remaining severe neurological deficits.

Key Words: outcome, putaminal hemorrhage, sylvian fissure approach

There are several controversies regarding the ideal treatment of hypertensive putaminal bleed. Several studies have shown that surgical treatment have no significant benefit as compared to the conservative management.

There are specific indications for surgical and conservative management of hypertensive putaminal bleed.
bleed. Surgical indications include large size of hematoma that is very near to the cortex, sharp fall in GCS, signs of herniation etc. At present there are different surgical methods for hypertensive putaminal hemorrhage. For example- microscopic transylvian approach, transcortical approach, sterotactic aspiration, external ventricular drain, burrhole aspiration, fibrinolytic therapy, endoscopic techniques etc.

This study is a retrospective study that is conducted in Zhejiang number 2 hospital (affiliated with Zhejiang University) from 2006 September- 2008 June. Total 36 Hypertensive putaminal bleed patients were evaluated.

### Materials and Methods

#### Basic Materials

This research includes 36 patients who were operated for hypertensive putaminal bleed between 2006 September and 2008 June. The patients were divided into 2 groups (Table 1)

**Group A** includes 17 patients who underwent microscopic transylvian removal of the hematoma. The mean age at the time of ictus was 56±10.4 years, mean preoperative GCS was 8±0.7, mean time interval between ictus and surgery 8.1±1.6 hour, amount of hematoma 43.2±12.6 ml.

**Group B** includes 19 patients who underwent transcortical evacuation of clot. Altogether 19 patients with mean age 58.0, GCS7.5±1.3, mean time interval between ictus and surgery 7.5±1.9 hour, hematoma amount 51.8±15.0ml. Average ICH score was 3 in both groups.

There was no significant difference between 2 groups as long as age, mean time interval between ictus and surgery, preoperative GCS, hematoma amount, ICH was compared. *P value >0.05.*

#### Inclusion Criteria

1) history of hypertension. 2) CT- putaminal bleed. 3) time interval between ictus and surgery <10 hours. 4) age 35-75. 5)average preoperative GCS 6-9. 6) no previous significant surgical or medical illness.

#### Exclusion Criteria

1) underlying cause like aneurysm or arteriovenous malformation. 2) traumatic cause. 3) those who cant be followed up 4)interval between ictus and surgery >10 hours. 5)nonputaminal hemorrhage. 6)GCS <6 or >9.

#### Surgical Technique

In a transsylvian approach, distal sylvian fissure was opened from lateral to medial direction, using the microsurgical technique. Early identification of M3 branches within the fissure provided reference for further proximal dissection to M2 divisions and insular cortex. A small insular cortex incision was made parallel to

<table>
<thead>
<tr>
<th>Number of patients</th>
<th>GROUP A transsylvian group</th>
<th>GROUP B transcortical group</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>17</td>
<td>19</td>
</tr>
<tr>
<td>Mean age(year)</td>
<td>56.0±10.4</td>
<td>58.0±9.8</td>
</tr>
<tr>
<td>Preoperative GCS</td>
<td>8±0.7</td>
<td>7±1.3</td>
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<tr>
<td>Time interval between ictus and surgery(hour)</td>
<td>8.1±1.6</td>
<td>7.5±1.9</td>
</tr>
<tr>
<td>Hematoma amount (ml)</td>
<td>43.2±12.6</td>
<td>51.8±15</td>
</tr>
<tr>
<td>ICH score</td>
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<td>3</td>
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*Table 1: Demographic data of two groups*

<table>
<thead>
<tr>
<th>ADL score</th>
<th>I</th>
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<th>III</th>
<th>IV</th>
<th>V</th>
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<tbody>
<tr>
<td>Transcortical group</td>
<td>0</td>
<td>0</td>
<td>12</td>
<td>0</td>
<td>7</td>
</tr>
<tr>
<td>Transsylvian group</td>
<td>0</td>
<td>3</td>
<td>8</td>
<td>3</td>
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</table>

*Table 2: Comparision of ADL score between the two groups*
sylvian fissure. Splitting the insular cortex resulted in the exposure of hematoma on putamen. Hematoma evacuation was performed using suction and bipolar cautery. In the transcortical approach, about a 2 cm cortical incision was made along the thinnest cortex to hematoma. Hematoma evacuation was done in a similar manner to that of the transsylvian approach.

Prognosis Measurement

Postoperatively 6 months both the groups were followed up and statistical difference between mortality, ADL score and GOS score was measured. Preoperative datas were statistically measured using chi square test. Follow up datas were statistically measured using four square method and results were calculated using WINDOWS SPSS 13.0 software. P<.05 indicates statistical significance.

Results

In the microsurgical transsylvian approach group, and ADL (Activities of daily life) score was as follows: 3 patient had grade II, 8 had III, and 3 patients had grade V. 6 month postoperatively GOS score was as follows: 3 patients had score 1, 11 patients had score 3 and 3 patients had score 4 (Table 2). ADL score of transsylvian group was lower than the transcortical group.

In the transcortical group, 6 month postoperative ADL score was as follows: 12 patients had grade III and 7 patients had grade V. 6 month postoperatively GOS score was as follows: 7 patients had score 1 and 12 patients had score 3 (Table 3). GOS score of transcortical group was lower than the transsylvian group.

Mortality rate of transsylvian group is 17.65% and transcortical group is 36.85% (Table 4). Average GOS score of transsylvian group and transcortical group 6 month postoperatively are 2.82 and 2.26 respectively. Average ADL score of transsylvian group and transcortical group 6 month postoperatively are 3.35 and 3.74 respectively. The transsylvian approach was associated with a higher mortality rate than the transsylvian approach (36.85% versus 17.65%). However, the difference was not statistically significant between two groups (p<0.05). Functional survival rate was higher in the transsylvian group than the transcortical group, but the difference did not reach statistical significance (p<0.05).

Discussion

Putamen is the most common location of a spontaneous intracerebral hemorrhage (ICH), which constitutes nearly 48-67% of all spontaneous hypertensive ICH. A large number of patients could be managed conservatively, but in selected patients who had significant amount of ICH, surgical evacuation of hematoma could be beneficial by volume reduction and lowering ICP. Despite recent improvements in the surgical treatment of ICH, it is still unclear whether surgical evacuation of ICH will improve the outcome. Of the four randomized clinical trials of surgical treatment, three showed that surgical treatment had little advantage over conservative treatment. Broderick et al. recommended that: 1) no clear evidence at present indicates that ultraearly craniotomy improves functional outcome or mortality rate, 2) operative removal within 12 hours, particularly when performed by less invasive methods, has the most supportive evidence, and 3) very early craniotomy may be associated with an increased risk of recurrent bleeding.

<table>
<thead>
<tr>
<th>GOS score</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
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<tbody>
<tr>
<td>Transcortical group</td>
<td>7</td>
<td>0</td>
<td>12</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Transsylvian group</td>
<td>3</td>
<td>0</td>
<td>11</td>
<td>3</td>
<td>0</td>
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</table>

Table 3: Comparision of GOS between the two groups

<table>
<thead>
<tr>
<th>Total number</th>
<th>Mortality</th>
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<tbody>
<tr>
<td>Transcortical group</td>
<td>19</td>
</tr>
<tr>
<td>Transsylvian group</td>
<td>17</td>
</tr>
</tbody>
</table>

Table 4: Comparison of mortality between the two groups
At present there are different surgical methods for hypertensive putaminal hemorrhage. For example, microscopic transylvian approach, transcortical approach, stereotactic aspiration, external ventricular drain, burrhole aspiration, fibrinolytic therapy, endoscopic techniques etc.\(^7,8,11,12\)

But some surgeons have reported that the transylvian approach for removal of putaminal bleed is the better one.\(^2,3\) Advantages of this process are that the procedure is less invasive, trauma to the brain is less, the bleeder can be searched correctly and the chance of rebleeding is much less but it has some disadvantages such as increased risk of surgically induced trauma to the frontal and temporal lobe due to retraction, vasospasm due to manipulation of perisylvian vessels, hemodynamic change due to major vessel injury, sacrifice of cortical and sylvian vein, continuous seepage of small amount of blood into basal cisterns and damage to the hypothalamus and this procedure requires experienced neurosurgeons who are expert in vascular surgery with microscope which may not be available in all the hospitals.\(^2,3,4,20\)

The advantages of transcortical approach is that this procedure can be done easily by neurosurgeons, procedure is directly done under vision and chances of rebleeding is less. Even though the transylvian approach for removal of hypertensive putaminal hemorrhage is much better than the transcortical in terms of less invasiveness, but various research have shown that the result of both the surgical procedure are same as far as long and short term of the patients prognosis is concerned.\(^2,3\)

Dong et al retrospectively analysed 45 patients who underwent surgical removal of hypertensive putaminal bleed, 25 of which were through transcortical approach and 20 through transylvian approach. Follow up showed that among the 15 patients who had preoperative GCS <6, only 1 can manage to survive emphasising that preoperative GCS directly affect the result of surgery. Among the patients with amount of hematoma 30-60ml, 61-90ml and >90ml, the functional survival rate was 31.3%, 55.6%, 18.2%, which again showed that the amount of hematoma can’t directly affect the functional outcome of the patient.\(^7\) GCS score, quadrigeminal cistern, age, sex, hypertensive and diabetic history, left sided bleeding are the influencing factor of funtional outcome postoperatively. Even though the transcortical craniotomy group the mortality was 40% as compared with the transylvian approach which had the mortality is 20, but there is no stastical significance(P>0.05). Transylvian approach group had functional survival rate 45% as compared to craniotomy group which is 32% but still there is no statistical difference between the 2 groups(P>0.05).\(^7\)

Fen yue et al has analysed 99 patients who underwent different surgical procedure for hypertensive putaminal bleed and reported that the mortality of the transylvian group and craniotomy group is not statistically significant, which are respectively 14.6% and 14.4%, but the functional outcome postoperative rehabilitation of the transylvian group is better that that of transcortical group.\(^8\)

Ding Hao et al performed surgery in 165 patients of hypertensive putaminal bleed and analysed the prognostic factors, and results have shown that GCS at the time of admission, whether there are signs of brain herniation, and early surgery are the main factors affecting the mortality of the patient after 1 month postoperatively.\(^6\) Preoperative signs of brain stem herniation, surgery timing, surgery method etc are the main factors affecting the long term recovery of the patient postoperatively.\(^10,16,17\)

H.M.Fernandes et al reported that neurosurgeons did not agree about the optimal time for evacuation of haematoma, but the majority did concur with the belief that delayed evacuation (>48 h) could be beneficial to the patient. Overall most neurosurgeons expressed pessimism, doubt, uncertainty and inconsistency about their treatment choices with these patients, but at the same time felt that surgical evacuation was helpful both in terms of mortality and morbidity.\(^13\)

Conclusions

Mortality rate of transylvian group is 17.65% and transcortical group is 36.85%. Average GOS score of transylvian group and transcortical group 6 month postoperatively are 2.82 and 2.26 respectively. Average ADL score of transylvian group and transcortical group 6 month postoperatively are 3.35 and 3.74 respectively. The short term outcome of ICH is determined by the severity of bleeding as measured by clinical conditions, the hematoma size, the presence of intraventricular hematoma and the long term outcome depends mainly on age.

Surgical intervention increases the chance of survival or prolonged the surviving period, despite remaining severe neurological deficits. However, because the ICHs were significantly more severe in patients who received surgery than in those who did not, the lack of a statistically significant difference in outcome might indirectly indicate that evacuation of the hematoma is effective in reducing the mortality rate.

References

Vaidya et al.


