The surgical strategy of hypertensive thalamus hemorrhage

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Preface

- Spontaneous Intracranial hemorrhage (SICH)
- Spontaneous thalamus hemorrhage---Hypertensive thalamus hemorrhage in main land of China

- Hypertensive thalamus hemorrhage (HTH) was treated as a forbidden area for surgery for long time because of the high mortality and morbidity.
The thalamus derives its blood supply from four arteries including the polar artery (posterior communicating artery), paramedian thalamic-subthalamic arteries, inferolateral (thalamogeniculate) arteries, and posterior (medial and lateral) choroidal arteries.
Categorization--bleeding sites

- Traditional:
  - Medial---ventricle
  - Lateral---basilar ganglion

- Our categorization:
  - limited thalamus hematoma (LTH)
  - thalamic-ventricular hematoma (TVH)
  - thalamic-basilar ganglion hematoma (TBH)
  - thalamic-mesencephalic hematoma (TMH)
  - mixed thalamus hematoma (involving three or more than three sites) (MTH)
limited thalamus hematoma

M, 52Y.O., admission for R limb numbness for 6h, without LOC, Diag: Left LTH, Conservative treatment and recovered well.
thalamic-ventricular hematoma

M, 46Y.O., Admission for LOC for 4h, Diag: Left TVH
F, 55Y.O., admission for sudden headache and LOC for 5h. Diag: left TVH
M, 67Y.O., admission for sudden left paralysis and LOC for 3h. Diag: right TBH
M, 57Y.O., admission for LOC for 6h.
Diag: right TBH
M, 60 Y.O., admission for seizure and LOC for 3h. Diag: right TMH

thalamic-mesencephalic hematoma
mixed thalamus hematoma (involving three or more than three sites)

M, 57Y.O., admission for LOC 6h. Diag: left MTH
We retrospectively analyzed the cases of HTH from Jan 2014 to Jan 2017 in our department, compared the conservative and surgical treatment, and discuss the surgical strategy for HTH.
Method

- 160 cases were collected from Jan 2014 to Jan 2017

- The diagnosis was consistent with the guidelines for the management of spontaneous intracranial hemorrhage of America.

- The cases were sent to our department for emergency with a clear hypertensive history. The CT scans confirmed the bleeding originally came from thalamus or thalamic area.

- All Cases $\text{GCS} \geq 4$ when admitting.
87 males and 73 females with the age ranged from 38 to 82 years (mean 59.3±1.1 years) were collected in our data.

There were 115 cases with a systolic pressure more than 180 mmHg, 37 cases with a systolic pressure more than 200 mmHg. The average systolic pressure in our cases was 185±7 mmHg and the average diastolic pressure was 107±5 mmHg.
Our cases were categorized into five subtypes according to the bleeding sites and also into giant and moderate group according to the size of the hematoma.

- LTH
- TVH
- TBH
- TMH
- MTH

- size ≤30ml
- ≥30ml
Results

- There were 89 cases in the moderate group (size ≤30ml, LTH and TVH). The size of hematoma ranged from 30 to 5ml (mean 12.5±1.8ml) in moderate group. There were also 27 cases (30.0%) with the ventricular hematoma and 22 cases with obstructive hydrocephalus in moderate group.

- On the contrary, the giant hematoma group (more than 30ml in size, mainly MTH) had 71 cases. The size of hematoma ranged from 70 to 35ml (mean 42.3±3.1ml). There were 59 cases (83.1%) with the ventricular hematoma and 35 cases with obstructive hydrocephalus in giant group.
61 cases accepted conservative treatment and 24 cases accepted surgery in moderate group.

In giant group the data for conservative and surgical treatment were 21 and 53 cases.
<table>
<thead>
<tr>
<th></th>
<th>Moderate (n)</th>
<th>Giant (n)</th>
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</thead>
<tbody>
<tr>
<td>Conservative Tr.</td>
<td>61</td>
<td>18</td>
</tr>
<tr>
<td>Surgery</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Burr hole Dr.</td>
<td>21</td>
<td>2</td>
</tr>
<tr>
<td>Evacuation</td>
<td>3</td>
<td>51</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>89</strong></td>
<td><strong>71</strong></td>
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\( n = \text{number of cases} \)
The mortality in surgery group (9.4%) was much better than conservative group (61.1%) for giant thalamus hemorrhage.

For moderate thalamus hemorrhage the mortality was no difference between conservative and surgery group.
# 1 M.O. mortality after treatment

<table>
<thead>
<tr>
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<th>Moderate</th>
<th>Giant</th>
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<tbody>
<tr>
<td>Conservative Tr.</td>
<td>1.6% (1/61)</td>
<td>61.1% (11/18)</td>
</tr>
<tr>
<td>Surgery</td>
<td>7.1% (2/28)</td>
<td>9.4% (5/53)</td>
</tr>
</tbody>
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* p=0.01
Discussion

- **HTH:** Controversial  Surgery or Conservative tr.

- Enthusiasm for surgical evacuation of thalamic and pontine ICH has been limited. (America ICH guideline)

- Many Studies: STICH

  - *
  - *
  - *

  No Conclusion
Based on the situation → Reviewed observation

More RCT

Many Difficulties

Class I, Level A evidence
Diagnostic standard for HTH

- Typical hypertensive history, BP(S/D) $\geq 180/110$ mmHg
- With positive risk factors
- Typical HTH site and size in CT scan
- Clinical manifestations: LOC(GCS), Paralysis etc.
- Excluding other cerebral vascular diseases (Aneurysms, AVM, CM) by DSA, CTA and MRA, hemopathies, tumor apoplexy and toxication.
Categorization

- Moderate group (size $\leq 30$ml, mainly LTH and TVH).
- Giant group ($\geq 30$ml in size, mainly MTH)
Management

- **LTH, TBH, TMH**
  
  Size ≤30ml, GCS >12 --- Conservative Tr.
  
  Size >30ml, GCS < 8 --- Evacuation

- **TVH, MTH**:
  
  Size≤30ml, GCS >12, no hydrocephalus --- Persistent LPD (Con Tr.)
  
  Size≤30ml, GCS < 12, hydrocephalus --- Burr hole drainage
  
  Size≤30ml, GCS < 8, mostly cast of ventricle --- Evacuation
  
  Size>30ml, GCS < 8 --- Evacuation or Con tr. (old, passive or scattered)

- **Size >30ml, GCS =3, no breath, bilateral light reflex disappear---Con Tr.**
Operative nuances

- The size of the hematoma for HTH is relatively a less important factor than the Elevated ICP and mass effect when the choice of surgery or medication will be done.
- Gentle and careful!
- Intracavity manipulation.
- Evacuating but protecting the contusive and edematous brain tissue surrounding the hematoma.
Operative nuances

- Using Microscope! Minimally invasion.

- Combined with navigation, electrophysiological monitoring, and endoscope if possible.

- Find out the main responsible bleeding artery during the surgery if possible.

- Less using bipolar in thalamic area and avoiding heat injury.
Peri-operative administration

- BP control
- Infection prevention
- Temperature control
- Balance of serum electrolytes
- Nutrition support
- Rebleeding and embolization prevention
- Other complications
Cases presentation
M, 90Y.O., admission for sudden left limb numbness for 6h. No LOC, Diag: R LTH. Cons tr. And recovered well.
M, 65Y.O., admission GCS:10, CT revealed a TVH. After 8 days persistent LPD, hematoma was absorbed.
F, 46Y.O., CT showed a left TVH. After 7days burr hole dr., the hematoma almost disappeared.
TVH – Cast of ventricle

F, 73Y.O., admission for sudden LOC for 3h. LTVH cast. Evacuating the hematoma by trans-parietal sulcus approach.
Patient recovered 5 days after surgery
TVH — Evacuation
TBH — Evacuation

M, 62Y.O., admission for left limb paralysis and LOC for 8h.
Diag: R TBH
M, 74Y.O, admission for LOC for 4h. Diag: R MTH
The family refused surgery and the patient died after a 3days cons. tr.
F, 50Y.O., admission for sudden headache and followed LOC for 7h. Diag: L MTH. Recovered after a 10 days burr hole dr.
MTH — Evacuation
MTH — Evacuation

before

after
MTH — Evacuation

before

after
MTH — Evacuation

before

after
Our limitations

- Retrospective analysis
- No long term follow-up ($\geq 2$ y) and survival analysis
- Lots of lost to follow-up
- No morbidity analysis
- Only reviewed observation

- Multi-center RCT is in process now
Conclusion

- Surgery decreases the mortality and might be a very effective treatment for the giant hypertensive thalamus hematoma. At least, it gives the hope to the severe HTH patients.
Thanks for attention!