Contralateral interhemispheric surgical approaches for ruptured intraventricular AVM-associated aneurysms

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Disclosures

- No disclosures
Introduction

- Aneurysms associated with brain arteriovenous malformations (AVMs) represent a hemorrhage risk in addition to that of the AVM nidus
- In high-risk or unresectable AVMs, targeted treatment of an aneurysm causing hemorrhage may effectively decrease future bleeding risk
- The contralateral interhemispheric approach has seldom been described in addressing AVM-associated intraventricular aneurysms
Methods

- Retrospective review of prospectively collected database of cases performed by senior author (AAA) in which an intraventricular aneurysm rupture was responsible for hemorrhage of an AVM
- In each case, aneurysm was excluded surgically via an interhemispheric approach – including transcallosal, transchoroidal or transcingulate corridors
- IRB approval obtained prior to data collection
Results

- Patient, AVM and Aneurysm Characteristics

Table 1. Patient, AVM and Aneurysm Characteristics

<table>
<thead>
<tr>
<th>Patient</th>
<th>Age</th>
<th>Aneurysm Location</th>
<th>Aneurysm Relation to AVM</th>
<th>AVM Location</th>
<th>Spetzler-Martin Grade</th>
<th>Presentation mRS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>51</td>
<td>Left Thalamus/3V</td>
<td>Pre-nidal</td>
<td>Left Thalamus</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>2</td>
<td>74</td>
<td>Left Caudate/LV</td>
<td>Pre-nidal</td>
<td>Left hemispheric</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>3</td>
<td>17</td>
<td>Left Putamen/GPe</td>
<td>Intra-nidal</td>
<td>Left putamen/GPe</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>4</td>
<td>55</td>
<td>Left Caudate/LV</td>
<td>Remote</td>
<td>Left parietal</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>5</td>
<td>3</td>
<td>Left Caudate/LV</td>
<td>Remote</td>
<td>Left insula/BG</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>6</td>
<td>11</td>
<td>3rd ventricle</td>
<td>Peri-nidal</td>
<td>Right Orbit/optic chiasm/3V</td>
<td>5</td>
<td>2</td>
</tr>
</tbody>
</table>
## Results

### Treatment Approach and Outcomes

Table 2. Treatment Approach and Outcomes

<table>
<thead>
<tr>
<th>Patient</th>
<th>Approach</th>
<th>Aneurysm Treatment</th>
<th>AVM Treatment</th>
<th>Follow-up mRS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Contralateral transcallosal transchoroidal fissure</td>
<td>Resected*</td>
<td>Resected</td>
<td>4</td>
</tr>
<tr>
<td>2</td>
<td>Contralateral trans-cingulate trans-callosal</td>
<td>Resected*</td>
<td>No treatment</td>
<td>3</td>
</tr>
<tr>
<td>3</td>
<td>Contralateral trans-cingulate trans-callosal</td>
<td>Resected*</td>
<td>Resected</td>
<td>3</td>
</tr>
<tr>
<td>4</td>
<td>Contralateral trans-cingulate transcallosal</td>
<td>Resected*</td>
<td>No treatment</td>
<td>6</td>
</tr>
<tr>
<td>5</td>
<td>Contralateral trans-cingulate transcallosal</td>
<td>Resected*</td>
<td>No treatment</td>
<td>0</td>
</tr>
<tr>
<td>6</td>
<td>Ipsilateral transcallosal transchoroidal fissure</td>
<td>Clip*</td>
<td>No treatment</td>
<td>1</td>
</tr>
</tbody>
</table>

* All patients had angiographic confirmation of complete obliteration of the aneurysm (all) and AVM (if applicable)
Results

- 74yo M p/w RUE weakness and IVH (A), and CTA demonstrating a SM4 AVM located on left motor strip hypertrophied, irregular left lateral lenticulostriate artery that was felt to be the cause of the hemorrhage (CTA B, C; DSA, D)
Results

- Contralateral trans-cingulate, trans-callosal approach
- Callosotomy (E), intraventricular aneurysm with overlying platelet plug at rupture point (F), and underlying lateral lenticulostriate artery (G)
- Aneurysmal segment excluded with AVM clips and resected (H).
Results

- Postoperative angiogram (I, J) demonstrates position of the clips with no further filling of the lateral lenticulostriate AVM feeder.
- The patient made good recovery with improvement in right sided strength and dysarthria
Discussion

- AVM-associated aneurysms are a common phenomenon
- In cases of ruptured AVM-associated aneurysms, we favor treatment with a goal of permanent exclusion of the aneurysm. Clipping can be effective when endovascular techniques are limited by accessibility
- Interhemispheric approaches to intraventricular aneurysms represent a versatile set of surgical approaches for these aneurysms, which often require resection rather than clip reconstruction
Summary Points

- The present series highlights the potential application of the transcallosal trans-cingulate and trans-choroidal approaches to clipping of ruptured intraventricular aneurysms which were not endovascularly accessible.
- A targeted treatment approach to ruptured aneurysms associated with AVMs represents a safe strategy to reduce future hemorrhage risk, even in cases in which the risk associated with AVM resection precludes subsequent surgical or interventional management.