New Stroke Interventions

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Agenda

• Clot Retrieval Devices
  – Merci
  – Penumbra

• Stent Retrievers
  – Solitaire
  – Trevo

• New Technology
  – Funnel
  – ReCover
MERCI Retriever (2004)

- Mechanical Embolus Removal in Cerebral Ischemia
- Nitinol corkscrew-shaped wire through thrombus
- Retrieval device pulled back with clot ensnared
- Within 8 hours
- In patients ineligible for tPA:
  - 48% recanalized
  - 7.1% procedural complications
  - 7.8% ICH

Penumbra (2007)

• Aspiration catheter
• Removes thrombus with separator wire
• In Penumbra patients:
  – 81.6% revascularization rate vs. 48.2% control
  – 3.2% procedural adverse events vs. 7.1% control
  – 11.2% symptomatic ICH
  – 57.8% improvement > 4 points in NIHSS
  – 25% of patients mRS < 2
http://www.youtube.com/watch?v=ajcgsAr6K2A
II. Stent Retrievers
Solitaire

- Stent retriever deployed into occlusive thrombus
- Stent entraps thrombus within stent cells
- Stent withdrawn with enmeshed thrombus
- Higher recanalization compared with Merci

Trevo Pro

- Stent retriever w/ flexible stent device
- Deployment within clot by unsheathing from microcatheter and integrating clot in stent
• http://www.youtube.com/watch?v=uG9eDdOEC4U
Stent retrievers have created tremendous growth in acute stroke therapy…

- Tremendous growth
- Good recanalization rate
- Better than older technology
- Easy to use

BUT…
Stentrievers successfully remove clot...but fragmented
Fragments can embolize...
III. New Devices
Funnel

- Self-expanding “funnel”
- Proximal (guide catheter) and Distal design
- Instead of transporting clot 20cm until secured
- Distal funnel provides enclosure and protection in 2-5cm
Funnel w/ Solitaire Pre & Post Procedure
Device extended outside Funnel to show captured thrombus

- Neither balloon guide nor aspiration were used.
- Thrombus was protected in Funnel during retrieval
- No occurrence of embolization
Clinical Summary – Funnel

- N=6 cases
- MCA (M1, M2) and ACA (A1) locations
- Devices used:
  - 5.2F DAC and 6F Fargo for access
  - 018 microcatheter and 4x20 Solitaire FR
- Funnel placed in distal ICA and M1 locations
- Min=1 pass; Max=3 passes
- All emboli retrieved without incident
  - No loss of emboli once thrombus brought into Funnel (5/6)
  - 1 incident of emboli prior to encasement with Funnel (1/6)
  - Balloon guide not used in any of the cases
- No occurrence of complications or device-related SAEs
Clinical Summary – Funnel

• Conclusions:
  – Combination of Solitaire and Funnel
  – Protection against embolization is feasible and useful
  – Protection offered from Funnel (i.e. physical containment of thrombus) may be more comprehensive than proximal flow occlusion or aspiration
  – Protection seems to be most desirable when located as close to obstruction site as possible
  – Only disadvantage… an extra step/device is needed
ReCover

- **Single component** stentriever with integrated funnel-based protection
- Deliverable through 0.021 inch ID microcatheter
- Used with 6F Guide
- Entire stent length is radiopaque
- Covered protection is automatic – no handle mechanisms or additional steps
- Can be reused within same patient
ReCover
# ReCover – Swine Model

## Safety Summary

<table>
<thead>
<tr>
<th>Device</th>
<th>Procedures</th>
<th>Clot Placed</th>
<th>Number of Passes</th>
<th>Angiographic Assessment</th>
<th>Histologic Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Solitaire</td>
<td>6</td>
<td>no</td>
<td>1,2,3</td>
<td>No perforation or dissection</td>
<td>No perforation or dissection</td>
</tr>
<tr>
<td>Recover</td>
<td>6</td>
<td>no</td>
<td>1,2,3</td>
<td>No perforation or dissection</td>
<td>No perforation or dissection</td>
</tr>
</tbody>
</table>

No discernible differences between any vessels on blinded histology
### ReCover – Swine Model

<table>
<thead>
<tr>
<th>Device</th>
<th>Procedures</th>
<th>Timi w/ stent open (avg)</th>
<th>Final Recan</th>
<th>Distal Emboli</th>
<th>Max Number of Passes Required</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Timi II</td>
<td>Timi III</td>
<td></td>
</tr>
<tr>
<td>Solitaire</td>
<td>8</td>
<td>0.6</td>
<td>4/8</td>
<td>4/8</td>
<td>1/8</td>
</tr>
<tr>
<td>Recover</td>
<td>11</td>
<td>1.3</td>
<td>-</td>
<td>11/11</td>
<td>0/11</td>
</tr>
</tbody>
</table>

- No evidence of perforation or dissection per angiography or histology
- No discernible differences between any vessels on blinded histology
ReCover – Swine Model

- Large clot captured by stent and protected with Funnel covering
ReCover – Swine Model

Solitaire

ReCover
Conclusions

• ReCover and Funnel are new and unique concepts that integrate stentrieviing and protection into a single integrated device
Case

53 yo male

R MCA stroke Syndrome

NIHSS 13
Case
Case
Case
Thank You