Comparison of Clinically Used Embolic Agents with GPX in Domestic Swine

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Disclosure

Speaker name:

I have the following potential conflicts of interest to report:

☐ Consulting
☐ Employment in industry
☐ Stockholder of a healthcare company
☐ Owner of a healthcare company
☐ Other(s)

☒ I do not have any potential conflict of interest
Introduction to GPX

- GPX: polymer-based technology consisting of a polycation, polyanion, and tantalum (radiopacity) premixed in a syringe
- The oppositely charged polymers remain dissolved in water at high salt concentrations, resulting in a flowable liquid
- The interaction strength between the oppositely charged polymers increases as GPX is injected into the blood stream and salt dissipates, forming a gel-like solid
- Viscosity is determined by polymer concentration and can be tailored for a variety of applications
  - Low viscosity for deep embolization and use with small ID microcatheters
  - High viscosity for occluding larger vessels and proximal occlusion with larger microcatheters

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Introduction to GPX
**Objectives**

- Evaluate occlusion with low viscosity GPX
  - Acute follow-up
  - 30 day follow-up
  - 90 day follow-up
- Examine handling characteristics including:
  - Material characteristics
  - Handling attributes
  - Catheter entrapment
  - Reflux
  - Distal penetration
- Compare with clinical controls
  - Coils
  - NBCA
  - Onyx
  - PVA
Handling and Usage Survey Results 
\[(n=2)\]

- Usage surveys were performed immediately after the initial embolization and acute angiogram.
- All liquids rated similar in Ability to Occlude (Not statistically significant), Accuracy of Delivery, and Radiographic Visualization.
- Compared to other liquids, GPX Achieved higher scores (statistically significant) in Ease of Preparation, Ease of delivery, and Overall Ease of Use.

<table>
<thead>
<tr>
<th>Agent</th>
<th>Ease of Preparation</th>
<th>Ease of Delivery</th>
<th>Accuracy of Delivery</th>
<th>Ability to Occlude Target Vasculature</th>
<th>Overall Ease of Use</th>
<th>Visualization after Delivery</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coils</td>
<td>4.33 (0.82)</td>
<td>3.83 (1.17)</td>
<td>4.67 (0.52)</td>
<td>4.33 (0.82)</td>
<td>4.17 (0.75)</td>
<td>4.83 (0.41)</td>
</tr>
<tr>
<td>GPX</td>
<td>4.82 (0.60)</td>
<td>4.82 (0.40)</td>
<td>4.64 (0.67)</td>
<td>5.00 (0.00)</td>
<td>4.55 (0.69)</td>
<td>4.73 (0.47)</td>
</tr>
<tr>
<td>NBCA</td>
<td>2.43 (0.79)</td>
<td>3.86 (0.69)</td>
<td>4.29 (0.49)</td>
<td>5.00 (0.00)</td>
<td>3.00 (0.58)</td>
<td>4.29 (1.11)</td>
</tr>
<tr>
<td>Onyx</td>
<td>3.00 (0.71)</td>
<td>3.40 (1.14)</td>
<td>4.20 (0.45)</td>
<td>4.80 (0.45)</td>
<td>3.20 (0.84)</td>
<td>4.20 (0.84)</td>
</tr>
<tr>
<td>PVA</td>
<td>3.57 (1.13)</td>
<td>3.57 (1.13)</td>
<td>2.86 (0.69)</td>
<td>3.93 (1.02)</td>
<td>3.21 (0.91)</td>
<td>1.00 (0.58)</td>
</tr>
</tbody>
</table>

Values: Average (Standard Deviation)  
Scale: 1=Very Unacceptable; 2= Unacceptable; 3=Neutral; 4= Acceptable; 5=Very Acceptable
Porcine Kidney Embolization

Results

- No adverse effects seen on the animals from any of the devices
  - Blood chemistry
  - Clinical signs
- GPX Produced Stable Occlusions at 30 and 90 days
  - 12/12 sites remained occluded at follow-up
  - No migration or off target embolization
- Partial to full recanalization seen with other devices:
  - Coils (5/6)
  - PVA (5/6)
  - Onyx (2/5)
  - NBCA (1/7)
Conclusions

- In porcine renal and hepatic arteries, GPX produces stable occlusions at 30 and 90 days.
  - May provide an advantage in terms of low recanalization, but further studies are needed.
- Additional pilot studies have been successful in:
  - Portal vein
  - Use in conjunction with a single coil
  - Porcine rete mirabile (AV malformations)
  - Rabbit aneurysms
- Based on the results of these studies, GPX displays promise in a variety of embolization situations.
- Further characterization will continue to examine technique and scenarios of use.
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