Trans arterial embolisation of non-variceal upper gastrointestinal bleeding: are liquid embolics equal to coils?

Poster No.: C-2703
Congress: ECR 2017
Type: Scientific Exhibit
Authors: M. A. Tipaldi, F. Laurino, F. B. Tagliaferro, S. Vagnarelli, G. Orgera, M. Rossi; Rome/IT
Keywords: Interventional vascular, Gastrointestinal tract, Catheter arteriography, CT-Angiography, Digital radiography, Embolisation, Acute, Blood
DOI: 10.1594/ecr2017/C-2703

Any information contained in this pdf file is automatically generated from digital material submitted to EPOS by third parties in the form of scientific presentations. References to any names, marks, products, or services of third parties or hypertext links to third-party sites or information are provided solely as a convenience to you and do not in any way constitute or imply ECR's endorsement, sponsorship or recommendation of the third party, information, product or service. ECR is not responsible for the content of these pages and does not make any representations regarding the content or accuracy of material in this file.

As per copyright regulations, any unauthorised use of the material or parts thereof as well as commercial reproduction or multiple distribution by any traditional or electronically based reproduction/publication method is strictly prohibited.

You agree to defend, indemnify, and hold ECR harmless from and against any and all claims, damages, costs, and expenses, including attorneys' fees, arising from or related to your use of these pages.

Please note: Links to movies, ppt slideshows and any other multimedia files are not available in the pdf version of presentations.

www.myESR.org
Aims and objectives

Non-variceal upper gastrointestinal bleeding (UGIB) is a serious medical emergency with significant morbidity and mortality; the incidence ranges between 50 and 150 / 100,000 adults per year and the mortality rate between 4 and 14% [1].

The first line approach is control under endoscopic visualization; nevertheless, this may not be effective all the times either due to the difficulty in detecting the exact source of bleeding either due to the inability to effectively control it. In such cases, endovascular embolization may offer an effective alternative for the management of these high-risk patients [2].

The majority of operators nearly exclusively perform embolization with coils. Coils are highly thrombogenic and after appropriate packing, they can lead a complete occlusion of the target vessel in most of the cases. Coil embolization is particularly effective when bleeding is taking origin from a single vessel and the vessel caliber is not very small. The performance of coils is lower when dealing with multiple and small diameter vessels, when bleeding is supplied by back flow or when clotting is deranged and, in such cases, liquid embolic agents could be considered an effective tool, representing a well-established endovascular option for other vascular territories.

However, many interventional radiologists are still reluctant to use liquid embolics in the treatment of non-variceal UBIB because they consider this as a high-risk approach.

Purpose of this article is to compare the results of the use of liquid embolics with the traditional approach of coils for the treatment of non-variceal UGIB in terms of safety, effectiveness, rate of bleeding recurrence and complications.
Methods and materials

We retrospectively reviewed all the embolization procedures that were performed in a single center in an eight-year period (2006-2014). Inclusion criteria where: a) a positive pathologic finding (extravasation or pseudoaneurysm) detected in the upper gastrointestinal (GI) tract in both a computed tomography (CT) and a digital subtraction angiography (DSA) and b) embolization performed with the use of either coils or liquid embolics. We excluded from the study: a) patients with bleeding from the lower GI tract, b) patients with non-variceal UGIB that were treated endoscopically, c) in whom bleeding was not confirmed with DSA, d) that were treated endovascularly but with other embolic material apart from coils and liquid embolics.

From a total of 292 patients that underwent DSAs for a query of GI bleed in the mentioned eight-year period, 159 patients met the inclusion criteria and were included in the study. One hundred and forty-one patients were treated with coils (Group A) while 18 patients were treated with liquid embolics (Group B). Mean age was 59.5 (range 31-88) years for Group A and 73.5 (range 55-92) for Group B (p>0.05).

In all patients endoscopy failed to control bleeding and a CT scan was performed prior to the DSA. The most common cause of bleeding was duodenal ulcer (38% for Group A and 50% for Group B). The rest of the causes are shown and the distribution in the two Groups is shown in Table 1.

Patients of Group A were treated with both pushable 0.018-0.035” inch (Helical or VortX, Boston Scientific Inc) and detachable (Ruby, Penumbra Inc) coils; patients of Group B were treated with both synthetic glue (Glubran; GEM Italia) and ethylene vinyl alcohol copolymer (Onyx-18; Micro Therapeutics Inc). For the period 2006-2010 only pushable coils were available. After detachable coils were introduced, the decision on which type of coil to use was made according to physician's preference. For the period 2006-2009 only synthetic glue was available as liquid embolic. After that point ethylene vinyl alcohol copolymer was the only liquid embolic agent used. In total pushable coils were used in 103 cases, detachable coils in 38, ethylene vinyl alcohol copolymer in 13 cases and synthetic glue in 5.

Technical success was defined as the cessation of contrast extravasation or the lack of contrast filling of the aneurysm/pseudoaneurysm in the final digital subtraction angiogram. Clinical success was defined as the normalization of the hemodynamic parameters within 36 hours post embolization. Procedure related complications were considered ischemic events that occurred in the embolised area at any time and were classified and minor and major according to the guidelines of the Society of Interventional Radiology (SIR) [3].

Patients' descriptive analysis was generated and group differences were investigated using Chi Square test for qualitative data. A p-value of less than 0.05 was considered
statistically significant. All statistical analyses were performed using the MedCalc Statistical Software version 14.8.1 (MedCalc Software bvba, Ostend, Belgium).
Table 1. Cause of bleeding among patients of the two Groups. The study revealed a non-significant difference between the two groups. (n.s.= non significant)

<table>
<thead>
<tr>
<th>Cause of bleeding</th>
<th>Group A (Coils)</th>
<th>Group B (Liquid embolics)</th>
<th>Total</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Duodenal ulcers</td>
<td>54</td>
<td>7</td>
<td>61</td>
<td></td>
</tr>
<tr>
<td>Iatrogenic injuries</td>
<td>33</td>
<td>4</td>
<td>37</td>
<td></td>
</tr>
<tr>
<td>Gastric erosions</td>
<td>19</td>
<td>3</td>
<td>22</td>
<td></td>
</tr>
<tr>
<td>Pancreatitis and/or tumors</td>
<td>14</td>
<td>2</td>
<td>16</td>
<td>n. s.</td>
</tr>
<tr>
<td>Gastric ulcers</td>
<td>11</td>
<td>1</td>
<td>12</td>
<td></td>
</tr>
<tr>
<td>Aneurysms</td>
<td>5</td>
<td>1</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>Traumatic lesions</td>
<td>5</td>
<td>0</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>141</td>
<td>18</td>
<td>159</td>
<td></td>
</tr>
</tbody>
</table>

Fig. 1: Table 1. Cause of bleeding among patients of the two Groups. The study revealed a non-significant difference between the two groups. (n.s.= non significant)

© Radiology, University La Sapienza "Sant'Andrea Hospital" - Rome/IT
Fig. 2: This is a case of a patient with gastric cancer presenting with hematemesis and melena. a) MDCT angiography shows blushing of contrast in duodenal lumen. b,c) The diagnostic DSA reveals direct signs of bleeding in the gut lumen and a pseudoaneurysm of the gastroduodenal artery. d) Trans arterial embolization with coils was performed using a sandwich technique to prevent the risk of retrograde bleeding from upper mesenteric branches. For the period 2006-2010 only pushable coils were available. After detachable coils were introduced, the decision on which type of coil to use was made according to physician's preference.

© Radiology, University La Sapienza "Sant'Andrea Hospital" - Rome/IT
Fig. 3: a) CT scan that reveals a very small post traumatic pseudoaneurysm of the territory of the GDA. b,c) Superselective angiogram confirms the finding as an area of contrast extravasation taking origin from a tine side branch. d) Successful embolization with Onyx-18 followed. For the period 2006-2009 only synthetic glue was available as liquid embolic. After that point ethylene vinyl alcohol copolymer was the only liquid embolic agent used.

© Radiology, University La Sapienza "Sant'Andrea Hospital" - Rome/IT
Results

There was no significant difference regarding the etiology and the site of bleeding between patients of Group A and B as shown in Tables 1 and 2. Technical success was 98.6% for Group A and 100% for Group B (p=0.54); clinical success was 95.7% for Group A and 94.4% for Group B (p=0.72) respectively without statistically significant difference between the two Groups for both of the examined parameters (Table 3).

In twenty-two patients of Group A (15.6%) and in two of Group B (11%), bleeding recurrence occurred in the first 36 hours (p=0.88). A second treatment was performed in all 24 cases using the same embolic agent and the arrest of the hemorrhage was obtained in 100% of the cases (Table 4).

Two cases of bowel ischemia that required surgical resection (SIR D; major complication) and two cases of non-symptomatic gastric ulcer detected by endoscopy at a later stage (SIR B; minor complication) were encountered in Group A. No minor or major complication occurred in Group B. There was no statistically significant difference in the complication rate between the two Groups (p=0.77).

Overall, within the first month, seventeen patients died in Group A and two in Group B from causes not related to the procedure (13 from multi organ failure and 4 from myocardial infarction in Group A and 2 from multi organ failure in Group B). The survival rate in the first 30 days was 88% for Group A and 89% for Group B, again without significant difference between groups (p=0.79).
Table 2. Site of bleeding among patients of the two Groups. The study revealed a nonsignificant difference between the two groups. (n.s.= non significant, GDA= Gastroduodenal artery, SMA= Superior Mesenteric Artery)

Table 3. Technical success and clinical success of embolization in Groups A and B. The study revealed a non-significant difference between the two groups. (n.s.= non significant)
<table>
<thead>
<tr>
<th></th>
<th>Group A (Coils)</th>
<th>Group B (Liquid embolics)</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Re-bleeding within 36 hours</td>
<td>22/141</td>
<td>2/18</td>
<td></td>
</tr>
<tr>
<td></td>
<td>15.6%</td>
<td>11%</td>
<td>n.s.</td>
</tr>
<tr>
<td>Second embolization session</td>
<td>22/141</td>
<td>2/18</td>
<td></td>
</tr>
<tr>
<td></td>
<td>15.6%</td>
<td>11%</td>
<td></td>
</tr>
<tr>
<td>Success of second</td>
<td>22/22</td>
<td>2/2</td>
<td></td>
</tr>
<tr>
<td>embolization session</td>
<td>100%</td>
<td>100%</td>
<td></td>
</tr>
</tbody>
</table>

**Fig. 6:** Table 4. Rate of re-bleeding within 36 hours in the two Groups, second embolization session and its success. The study revealed a non-significant difference between the two groups. (n.s.= non significant)

© Radiology, University La Sapienza "Sant'Andrea Hospital" - Rome/IT
Conclusion

The conclusion of this study is that liquid embolics and in particular ethylene vinyl alcohol copolymer offers comparable results to coils in the treatment of nonvariceal UGIB and may be used in the everyday embolization practice.

The main limitations of our study are the retrospective design, the single center data and the non-equal number of patients in the two compared Groups. As more centers begin to use this material in GI tract embolization larger series will be soon available.
References

