Embolization Therapy for non-traumatic bleeding

Peter Huppert
Professor of Radiology and Neuroradiology
Klinikum Darmstadt
Germany

Certified Vascular and Oncologic Center
Non-traumatic bleeding

**origin**
- Nasopharyngeal
- Pulmonary
- Upper/lower GI tract
- Renal/urinary tract
- Pelvic

**cause**
- Neoplasm
- Chronic inflammation
- Vascular malformation
- (pseudo-) aneurysm
## Bleeding of Nasopharyngeal Lesions

<table>
<thead>
<tr>
<th>Method</th>
<th>Material</th>
<th>Outcome/risks</th>
</tr>
</thead>
<tbody>
<tr>
<td>• flow-directed</td>
<td>• non-spherical PVA particles</td>
<td>• preoperatively, palliative</td>
</tr>
<tr>
<td>• super-selective embx.</td>
<td>• size &gt;100 μm</td>
<td>• temporary effect</td>
</tr>
<tr>
<td>• coaxial 2-3 F microcatheters</td>
<td>• liquids (Onyx®)</td>
<td>• ACE-ACI anastomoses</td>
</tr>
<tr>
<td>• flushing of guide catheter</td>
<td>• microcoils</td>
<td>• reflux into ACI</td>
</tr>
<tr>
<td>• stepwise occlusion</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**this case:** epistaxis caused by nasomaxillary sarcoma

**others:** carcinomas, M. Osler, spontaneous episthaxis

PVA particles 300-500 μm
Stepwise Embx. of Nasopharyngeal Lesions

- 1 Vial PVA 150-250 µm Contour™ + 20 cc NaCl + 20 cc CM (5-10 P/c)
- Detachable microcoil

Epistaxis caused by benign nasopharyngeal juvenile fibroma: embolization preoperatively
Bleeding of Pulmonary Lesions

Method
- flow-directed
- selective embx.
- 3F/5F coaxial catheter system
- stepwise occlusion

Material
- non-spherical PVA particles
- size >150 μm

Outcome/risks
- preoperatively, palliative
- temporary effect 3-4 weeks
- mediastinal anastomoses
- aortic reflux/spinal arteries

this case: hemoptysis caused by (mets.) bronchial carcinoma
others: chron. infections, tuberculosis, mucoviscidosis, M. osler

6 / 10 cc PVA particles 350-500 μm
Bleeding of Upper GI Tract Lesions

**Method**
- selective embx.
- closure of front & back door
- 3F/5F coaxial catheter system
- aggressive strategy
- empiric embx.

**Material**
- microcoils 2-6 mm
- detachable technique
- glue if needed (sandwich)

**Outcome/risks**
- emergency treatment
- clin. success >80% if complete
- low risk of ischemia
- high mortality of recurrence

**this case:** subacute pancreatitis causing pseudoaneurysm
**others:** peptic ulcers, pancreatic fistula, carcinomas

Platin-Mikrocoils 3-4/40-60 mm FIDC
Bleeding of Lower GI Tract Lesions

<table>
<thead>
<tr>
<th>Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>• as selective embx. as possible</td>
</tr>
<tr>
<td>• closure of terminal arteries</td>
</tr>
<tr>
<td>• 3F/5F coaxial catheter system</td>
</tr>
<tr>
<td>• non-aggressive strategy</td>
</tr>
<tr>
<td>• definitive or bridging trx.</td>
</tr>
<tr>
<td>• provocation tests (heparin)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Material</th>
</tr>
</thead>
<tbody>
<tr>
<td>• microcoils 2-6 mm ⊗</td>
</tr>
<tr>
<td>• pushable coils possible</td>
</tr>
<tr>
<td>• detachable coils more safe</td>
</tr>
<tr>
<td>• PVA particles &gt; 300 um in case of non super-selective embx</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Outcome/risks</th>
</tr>
</thead>
<tbody>
<tr>
<td>• emergency treatment</td>
</tr>
<tr>
<td>• clin. success &gt;90% if complete</td>
</tr>
<tr>
<td>• 10% risk of delayed ischemia in cases of non-selective embx</td>
</tr>
</tbody>
</table>

**this case:** acute diverticular bleeding of right colon  
**others:** AVM, colitis, benign and malignant tumors
Bleeding of Lower GI Tract Lesions

**this case:** acute diverticular bleeding of right colon
**others:** AVM, colitis, benign and malignant tumors

**Method**
- as selective embx. as possible
- closure of terminal arteries
- 3F/5F coaxial catheter system
- non-aggressive strategy
- definitive or bridging trx.
- provocation tests (heparin)

**Material**
- microcoils 2-6 mm
- pushable coils possible
- detachable coils more safe
- PVA particles > 300 um in case of non super-selective embx

**Outcome/risks**
- emergency treatment
- clin. success >90% if complete
- 10% risk of delayed ischemia in cases of non-selective embx.

Platin-Mikrocoils 3/30 mm FIDC
Bleeding of Lower GI Tract Lesions

Method
- as selective embx. as possible
- closure of terminal arteries
- 3F/5F coaxial catheter system
- non-aggressive strategy
- definitive or bridging trx.
- provocation tests (heparin)

Material
- microcoils 2-6 mm
- pushable coils possible
- detachable coils more safe
- PVA particles > 300 um in case of non super-selective embx

Outcome/risks
- emergency treatment
- clin. success >90% if complete
- 10% risk of delayed ischemia in cases of non-selective embx.

adapted from Gray’s anatomy
Bleeding of Lower GI Tract Lesions

**Method**
- as selective embx. as possible
- closure of terminal arteries
- 3F/5F coaxial catheter system
- non-aggressive strategy
- defenitive or bridging trx.
- provocation tests (heparin)

**Material**
- microcoils 2-6 mm
- pushable coils possible
- detachable coils more safe
- PVA particles > 300 um in case of non super-selective embx.

**Outcome/risks**
- emergency treatment
- clin. success >90% if complete
- 10% risk of delayed ischemia in cases of non-selective embx.

*these cases: AVM and diverticular bleeding*

Platin-Microcoils 2-3/20-30 mm
Renal/Urinary Tract Bleeding

Preoperative embx. in bleeding renal cell carcinoma
- total embx.: glue: butylcyanoacrylate-iodized oil 1:5
- metastatic advanced renal cell carcinoma and gross hematuria
- selective embx.: glue: butylcyanoacrylate-iodized oil 1:4

Method
- preoperative: total embx.
- palliative: selective embx.
- 3F/5F coaxial catheter system
- glucose flushing
- bridging to nephrectomy
- analgetic medication

Material
- butylcnoacrylate + iodized oil
- mixture determines speed of polymerization & level of occlusion

Outcome/risks
- mostly elective treatment
- clin. success >90% if complete
- catheter impactation „glueing“
- non-target embx.
- secondary infection
Bleeding of Malignant Pelvic Tumors

Method
- selective embx. of tumor feeding arteries, i.e. uterine
- usually bilateral embx.
- 3F/5F coaxial catheter system
- non-aggressive strategy
- palliative treatment

Material
- PVA non-spheric particles
- Vascular plug
- Glue in case of coagulation disorder and emergency

Outcome/risks
- temporary effect
- pain control management
- Non-target embolization: protective coiling technique

multiple vaginal bleedings from cervical cancer recurrency

PVA 350-500 um
Bleeding of Malignant Pelvic Tumors

Method
- selective embx. of tumor feeding arteries, i.e. uterine
- usually bilateral embx.
- 3F/5F coaxial catheter system
- non-aggressive strategy
- palliative treatment

Material
- PVA non-spheric particles
- Vascular plug
- Glue in case of coagulation disorder and emergency

Outcome/risks
- temporary effect
- pain control management
- Non-target embolization: protective coiling technique

multiple vaginal bleedings from cervical cancer recurrency

[Images of angiograms and embolization materials]
Summary

- Embx. treatment is safe and effective if proper techniques and materials are used.
- Advanced skills concerning knowledge of imaging and vascular anatomy, handling of microcatheters, preparing of embolics and on-table management of complications are necessary.
Embolization Therapy for non-traumatic bleeding

Peter Huppert
Professor of Radiology and Neuroradiology
Klinikum Darmstadt
Germany