Uterine Artery Embolization for the Treatment of Post-Partum Hemorrhage

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**Embolization: Definition**

- *Interventional radiology technique*
- *Occlusion of a vessel (artery)*
- *Embolic agent:*
  - Resorbable or not
  - Liquid (glue, onyx) / solid (coil, particles)
**Pelvic hemostatic embolization**

- Life-threatening pelvis trauma
- Utero-ovarian intractable cancer
- Obstetrical hemorrhage
- Post operative hemorrhage

- Goldstein. Radiology 1975;115:603-8
- Heaston. AJR 1979;133:152-4
Post partum hemorrhage
What are we talking about?

- 1 000 ml in 24 h post-partum
- 2 à 3 % of deliveries
- Medico-obstetrical treatment
  - Uterotonic drugs
  - Uterine revision…
Life threatening post partum hemorrhage

- # 1/1 000 deliveries
- 1st cause of maternal death in France
- Hemodynamical impairment
- Need of blood transfusion
- Inefficacy of medico obstetrical treatment
Is it predictable?? (Why always on Friday night ?!!)

- Major risk factors : 10 %
  Abnormal placentation, prior history of SPPH, uterine leiomyoma
- Minor risk factors : 10 %
  High parity, twinning, hydramnios
- No risk factor : 80 %
Life threatening Post Partum Hemorrhage
Obstetrical management

- Uterine, cervical, vaginal revision
- Uterotonic drugs: Sulprostone
- Blood transfusion

Embolisation

- Inefficiency
- Hysterectomy
- Transfert (sooner = better..)
Angiographic procedure

- Local anesthesia
- Unifemoral approach
- 5 French sheath
- Exploration/embolization of both sides
- ± Complementary aortic exploration
Uterine Artery
Ovarian Artery
Round Ligament Artery

Epigastric A.  
External Iliac A.  
External Iliac A.
Pelvic Arterial Anastomosis
Angiographic aspect

Uterine Atony
Angiographic Aspect

Extradation

After embolization
Embolic agent

Transient arterial occlusion needed

=> Resorbable agent

=> Gelfoam

Mitty. Radiology 1993;188:183-7
Technical Note: Treatment of Arterial Spasm

- Stop sulprostone in the angiographic room
- Problem of shock and vasoconstrictive drugs...
- Do not use local vasodilators
- No brutal catheterization!!
Spasm and Sulprostone: Stop and Wait....

Before

After
Embolization Technique

- **Bilateral**
- *Uterine Arteries if possible*
- *Anterior trunk of hypogastric artery, in case of spasm or difficult anatomy*
- *Do not occlude posterior trunk ++*
Arterial Spasm
# Efficacy of Embolization

## Table: Efficacy of Embolization

<table>
<thead>
<tr>
<th>Year</th>
<th>N. Pts</th>
<th>Primary success</th>
<th>Secondary success</th>
<th>Embolic agent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pelage</td>
<td>1999</td>
<td>27</td>
<td>89%</td>
<td>97%</td>
</tr>
<tr>
<td>Deux</td>
<td>2001</td>
<td>25</td>
<td>88%</td>
<td>96%</td>
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<tr>
<td>Vandelet</td>
<td>2003</td>
<td>15</td>
<td>73%</td>
<td>-</td>
</tr>
<tr>
<td>Salomon</td>
<td>2003</td>
<td>28</td>
<td>100%</td>
<td>-</td>
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</table>
Embolization in case of Arterial Ligature or Hysterectomy

- Anatomy is modified
- No access to the site of bleeding
- Difficult catheterization
- Embolization of collateral branches
- Slow flow ➡️ Risk of reflux of embolic agent
- Complications more frequent
Embolization after Arterial Ligature

Pre embolization

Post embolization
Persistent Bleeding after Hysterectomy

Embolization of residual hypogastric A. + Ovarian A.
# Efficiency of Uterine Embolization

## Placenta Accreta

<table>
<thead>
<tr>
<th></th>
<th>N. Pts</th>
<th>Success of embolization</th>
<th>Other treatment</th>
<th>Delayed hysterectomy</th>
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<tbody>
<tr>
<td>Mitty</td>
<td>5</td>
<td>3</td>
<td>2 curretage</td>
<td>0</td>
</tr>
<tr>
<td>Merland</td>
<td>1</td>
<td>1</td>
<td>-</td>
<td>1 (100%)</td>
</tr>
<tr>
<td>Pelage</td>
<td>2</td>
<td>2</td>
<td>-</td>
<td>1 (50%)</td>
</tr>
<tr>
<td>Descargues</td>
<td>7</td>
<td>5</td>
<td>2</td>
<td>2 (28%)</td>
</tr>
<tr>
<td>Lariboisiére</td>
<td>9</td>
<td>8</td>
<td>1 methotrexate</td>
<td>1 (14%)</td>
</tr>
</tbody>
</table>
24 H post gelfoam

24 H post 900-1200µ microspheres

Week 3  Week 7  Week 9
Percreta placenta with Bladder Invasion

embolization

12 months MRI
Efficiency of Embolization:
Coagulopathy

<table>
<thead>
<tr>
<th>N pts</th>
<th>Efficiency</th>
<th>%</th>
<th>Embolic agent</th>
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</thead>
<tbody>
<tr>
<td>Heffner</td>
<td>3</td>
<td>3</td>
<td>100% Gelfoam</td>
</tr>
<tr>
<td>Mitty</td>
<td>6</td>
<td>6</td>
<td>100% Gelfoam</td>
</tr>
<tr>
<td>Yamashita</td>
<td>5</td>
<td>5</td>
<td>100% Gelfoam + coils</td>
</tr>
<tr>
<td>Merland</td>
<td>11</td>
<td>11</td>
<td>100% Gelfoam</td>
</tr>
<tr>
<td>Pelage</td>
<td>20</td>
<td>20</td>
<td>100% Gelfoam + PVA</td>
</tr>
</tbody>
</table>
Pregnancy after Embolization for SPPH

- 1977-2002
- 28 patients embolized
- 2 hysterectomies for failure
- Follow up: 11.7 +/- 6.9 years
- 6 patients willing pregnancy
- 6 pregnancies at full term

Complications

- **Angiography**: dissection, hematoma...
- **Untargeted embolization**:
  - posterior trunk,
  - lower limbs
- **Bladder necrosis**
- **Uterine necrosis**: small particles (150-250 and 300-600 µm), gelfoam powder

Cottier. Obstet Gynecol 2002;100:1074-7
Hare. Radiology 1983;146:47-51
Untargeted Embolization

Lower limb ischemia

Transient sciatic paresis
Conclusion

Recommendations

- Indication for embolization should be decided by a pluri-disciplinary team:
  - Gyneco-obstetrician, ICU doctor, Radiologist
- Uterine revision, suture of cervix or vaginal wound, medical treatment should be done prior to embolization
- Embolization of uterine arteries, or anterior trunks, should be bilateral, using resorbable embolic agent (gelfoam), avoiding small fragments
- Organized medical circuits
Results of Angiography: Uterine Atony
Results of Angiography: Extravasation