Interventional Radiology in the Treatment of Obstetric Haemorrhage (PPH)

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History of Interventional Radiology

- Origins in diagnostic angiography
- Pioneered by Seldinger in early 1950’s
- Vascular techniques well developed by 1980
- Non-vascular applications develop in parallel
- Improved imaging techniques open new treatment options CT/US/MRI
IR in St James’s Hospital

- Three consultants
- Approx. 3000 cases per year
- >50% oncology related
- Vascular: arterial & venous
- Non Vascular
  - Hepatobiliary / Renal
  - Gynaecology / Obstetrics
  - Musculoskeletal
IR and Pelvic Embolization

- Diagnostic angiography well established in the 1970’s
- Embolotherapy developed from the early 1970’s
- Pelvic embolization for arterial bleeding in pelvic fractures first described in 1972*  
- Complex pelvic embolization is now routine due to development of Uterine Fibroid Embolization

Embolotherapy

• Occlusion of vessels by the introduction of foreign material

• Effect of embolization is organ specific

• Essentially two different goals to therapy
  – Control haemorrhage: GI, Bronchial, PPH
  – Tissue ablation: TACE, RCC, Fibroids
Embolization: Current Applications

• **Primary control of haemorrhage**
  – GI, Renal, Hepatic, Pulmonary & Pelvic

• **Tumour palliation**
  – Renal, Hepatic, ENT & Orthopaedic

• **Primary treatment of misc. conditions**
  – Uterine fibroids, Varicocoeles & Priapism

• **Treatment of AVMs**
  – Arterial / Venous / lymphatic
Materials for Embolization

• **Absorbable agents**
  – Autologous clot, gelfoam

• **Nonabsorbable agents**
  – Particulate agents: PVA & Embospheres
  – Injectable fluid agents: Cyanoacrylate (superglue)
  – Sclerosing agents: Alcohol
  – Nonparticulate agents: Coils
PVA (Polyvinyl Alcohol)

Irregular & Angular
Coil Embolization

Vascular Embolization Coil
Embozene; exact sized particles

The smaller the particle size, the more profound the embolization

Small 50-100 um

Large 700-1200 um
Embolization in the Treatment of PPH

- First described in the late 1970's
- Multiple subsequent articles
- Techniques have become very much more refined over past 21 years

- Transcatheter arterial embolization for control of persistent massive puerperal hemorrhage after bilateral surgical hypogastric artery ligation. Heaston D, Mireau D, Brown B et al. AJR 1979; 133: 152-154
Embolization in the Treatment of PPH

- Prospective studies into the efficacy and safety of embolization in the treatment of PPH (level 2)
- No prospective randomised data (level 1)
- Chances of ever getting RCT very slim
- Multiple review articles and retrospective studies into the techniques and results of embolotherapy in PPH (level 3 & 4)

Indications for Embolization: PPH secondary to...

• Atonic uterus +/- caesarean section
• Uterine tear at time of C-section
• Cervical or vaginal injury due to instrumentation
• Bleeding post hysterectomy
• Placenta accreta or placenta previa
Embolization in the Treatment of PPH

Technique

• Emergency cases
• Arterial puncture: Rt CFA or bilateral CFA
• +/- Initial balloon occlusion of CIA or IIA, depends on initial clinical status
• Embolic agent selection: gelfoam, large particles >700um, coils
Embolization in the Treatment of PPH

Technique

Bilateral CFA Puncture
Balloon occlusion CIA
Embolization in the Treatment of PPH Technique

CT scan showing extensive haemorrhage into the immediate post delivery uterus
Embolization in the Treatment of PPH
Technique

Vaginal artery active bleeding; pre and post
Embolization in the Treatment of PPH Technique

Post embolization
Embolization in the Treatment of PPH

• Arteries targeted
  – Anterior division of IIA
    • Uterine
    • Vaginal
  – Ovarian

• Materials for embolization
  – Gelfoam
  – Particles (larger >700 um)
Embolization in the Treatment of PPH: Uterine

Pre Rx

During Rx
Embolization in the Treatment of PPH: Ovarian
Ovarian Artery Embolization
Catheter Types

• Only one rule.....Whatever works
  – C 2: 4 or 5 Fr.
  – Regular or glide
  – Roberts / Lev / Sos
Catheters

C2 / Waltman Loop / Roberts
Co-axial or Not

- Multiple different types
- Co-axial are micro catheters < 3 Fr that telescope into larger 5-6 Fr catheters
- Cannot use larger particle sizes >900um
- In theory get better embolization
Micro Co-axial Catheters
Post Embolization

- Menses
- Fertility
- Pregnancy
- All appear to return to normal post Rx

Complications Post Embolization for PPH

• Uterine infarction: particle size crucial
• Local arterial trauma
• Renal toxicity
• Ovarian failure

Embolization in the Treatment of PPH

- Now accepted as a first line treatment option for the emergency treatment of PPH
- In UK there is a practice guideline document outlining the role of IR in the treatment algorithm (RCOG, RCR, BSIR June 2007)
The role of emergency and elective interventional radiology in postpartum haemorrhage

1. Purpose

The purpose of this guidance is to urge all obstetric units to consider early or prophylactic interventional radiology as an important tool in the prevention and management of postpartum haemorrhage. Arterial balloon occlusion and embolisation can prevent major blood loss, obviating the need for blood transfusion and hysterectomy. Potentially, this may reduce the need for intensive care and decrease maternal morbidity and mortality.¹⁻⁴
4. **Conclusion** **NHS trusts should have in place protocols that include the use of interventional radiology in the management of obstetric cases where postpartum haemorrhage is likely.** In addition, NHS trusts must have clear strategies for the management of unpredicted postpartum haemorrhage. In hospitals with an interventional radiology service, treatment algorithms must be drawn up which clearly identify the timing and place of interventional radiology in the management of postpartum haemorrhage. Where interventional radiology services are not available locally or where there is no continuous on-call interventional radiology service, hospital trusts should ensure that there is an agreed formal arrangement for the provision of these services either with a larger centre nearby or through formation of a network with surrounding trusts. This advice should be used alongside the existing RCOG guideline on management of placenta praevia and placenta accreta.5
IR in the Treatment of PPH

- In Ireland the IR cover to the stand alone Maternity hospitals is poor
- On call arrangements for IR cover is very poor
- Cases are organised on an individual basis
- Natural link between Coombe and SJH is underutilised
IR in the Treatment of PPH

- IR embolization is a **safe, reliable and effective treatment option** in the management of PPH.
- IR embolization often obviates the need for transfusion.
- The integration of IR into the treatment algorithm should be pushed by the major maternity units and the Faculty of Radiologists.
- *Should Maternity units remain as autonomous stand alone entities???