Session 8 – Obstetric haemorrhage
Surgical strategies to stop the bleeding...

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Director of Research & Innovation

Presentation

- Preparation & approach to surgery?
- Uterine compression
- Tamponade
- Systematic devascularisation
- Surgical adjuncts
- Hysterectomy

Protocols for Massive Haemorrhage

258 UK maternity units - 81% returns

- lack of agreement on definitions
- lack of agreement on interventions for massive PPH
- majority used oxytocin, ergometrine & carboprost as ‘1st line’
- hysterectomy – commonest surgical intervention


Protocols for Massive Haemorrhage

“There is an urgent need to identify protocols that will reduce the need for hysterectomy in women with major haemorrhage who are unresponsive to conventional medical therapy…”


Key Recommendations - Obstetric Haemorrhage

- Obstetricians must consider all available interventions (eg radical surgery, embolization and involving surgical or radiological colleagues)
- Planned high risk cases must involve anaesthetist & obstetrician
- Experienced consultant obstetric and anaesthetic staff must attend

Temporal trends in severe PPH
USA - 8.5 million deliveries 1999-2008

Kramer MS et al AJOG 2013;209:449.e1-7
Peripartum hysterectomy in the UK: management and outcomes of the associated haemorrhage

- 318 confirmed cases in 13 months
  - Incidence 4.1 per 10,000 (95% CI 3.6-4.5)

- Incidence in SE Thames 1997-8
  4.5 per 10,000 (95% CI 2.6-6.4)


Surgical strategies to consider in massive obstetric haemorrhage

Preparation & Approach to Surgery?

MBRRACE-UK Haemorrhage
17 deaths – mainly trauma & atony

Communication, Ownership, Leadership and Teamwork
Communication, ownership, clinical leadership and teamwork emerged once more as problematic areas in this review period. The main problems identified with communication involved:
- disagreements in estimated blood loss in three women
- lack of communication of concerns regarding blood loss in five women
- not escalating to a senior when their condition deteriorated in two women

Paterson-Brown S & Bamber M. MBRRACE 2014

A systematic approach - ‘HEMOSTASIS’
- Help
- Establish aetiology
- Massage uterus
- Oxytocin infusion and prostaglandins
- Shift to theatre
- Tamponade
- Apply compression sutures
- Systematic pelvic devascularisation
- Interventional radiology
- Subtotal/total hysterectomy

Varatharajan et al. JOG 2011

The Four ‘T’s

- Time
- Tears
- Tissue
- Thrombin

84%

Varatharajan et al. JOG 2011

NON-TECHNICAL SKILLS
- Clear leadership
- Ensure appropriate team
- Ensure team kept updated:
  - use ‘Checklists’
  - use ‘Safety Pauses’
- Clear decision-making
- Maintain situation awareness
PREPARATION....

- Jehovah’s Witness – sort out antenatally
- Cell Salvage – sort out pre-operatively
- Call in second opinion - earlier than you think
- Don’t forget the ‘Golden Hour’

LOOK AT YOUR PATIENT....

- Bodyweight (kg) / 12 = Blood volume (litres)
  eg 48 kg = 4 L
       84 kg = 7 L
- 40% blood loss causes severe shock
- Thus - 1.5L blood loss may cause mild shock in an 84kg woman but produce severe shock in a 48kg woman

THE GOLDEN HOUR

Probability of survival

Survival is related to severity and duration

Signs of decompensation in pregnancy appear late.....

- Class I 0-15% 750ml
- Class II 15-30% 750-1500ml
- Class III** 30-40% 1500-2000ml
- Class IV > 40% 2000ml

MOH - when to consider ‘aggressive surgery’?

- SBP < 70 mm Hg (especially if there is no diastolic component) → metabolic acidosis
- Cold pale extremities / pale conjunctiva
- Failure to raise BP despite infusion with crystalloids + blood
- Continuous blood loss despite medication
- Confused, coma, ‘air hunger’, ECG changes
- Poor urinary output (later feature)

Surgical strategies to consider in massive obstetric haemorrhage

**Uterine compression**
- bimanual & related techniques
  - compression sutures
Bimanual uterine compression

ALSO Provider Manual, AAFP, Kansas 2002

The PPH 'Butterfly'...
Prof Andrew Weeks, Liverpool

B-Lynch Brace suture

ANTERIOR VIEW

LATERAL VIEW

Lower segment incision

Uterine cavity

Inserting the B-Lynch Brace suture

The B-Lynch Brace suture secured

A minor modification...
Haemostatic Square Suture Technique
Retrospective review 24 cases – ‘No 1 CCG’
No failures
x1 ‘pyometra’
Ochoa M et al, Obstet Gynecol 2002

… and now multiple others
Li 2015 – ‘Funnel’
Matsubara 2015 – ‘Winding’
Zheng 2010

Complications of compression sutures
1. Intrauterine adhesions
2. Entero-uterine fistula
3. Uterine necrosis (Balloon + B-Lynch – the ‘uterine sandwich’)

Surgical strategies to consider in massive obstetric haemorrhage
Tamponade
- balloons & packs

Balloon Tamponade
PPH due to unresponsive uterine atony
PPH related to placenta praevia
Rusch Urological Hydrostatic Balloon
Johanson R et al, BJOG 2001

Balloon Tamponade (Bakri)
“Tamponade test” in the management of MOH

- Insertion of the Sengstaken-Blakemore tube as a diagnostic test
- 16 cases of intractable PPH:
  - 14 cases – ‘POSITIVE’ – bleeding settled
  - 2 cases – ‘NEGATIVE’ – laparotomy
- Mean duration of insertion: 26 (9 - 44) hours

Condous GS et al, Obstet Gynecol 2003

Subsequent series - St George’s, London

- 27 cases
- Bleeding arrested in 22 (82%) cases
- Tamponade failed in 5 (18%) cases:
  - 4 underwent a subtotal hysterectomy
  - 1 was managed with ‘Hemabate’ and misoprostol (concomitant use)

Stalios et al 2006

Balloon tamponade is also useful in:

- Bleeding from the placental bed
  - placenta praevia...
- Bleeding from cervical/vaginal tear
- Bleeding from pelvic sidewalls
- [Bleeding from cervical ectopic]

‘ebb’ Complete Tamponade System
- Belfort & Dildy

- Direct rapid fill & adjustment
- Dual balloon
- Internal traction
- Tip coverage
- Drainage port
- Infusion port

- Success in 50/51
- 23/51 required >500ml

A variant on pelvic packing....

‘Penrose’ drain

Awonuga AO et al, IJGO 2006
Surgical strategies to consider in massive obstetric haemorrhage

Systematic devascularisation

- ovarian pedicles
- uterine artery
- internal iliac ligation (IAL)

Systemic Devascularisation

UTERO-OVARIAN VESSELS

UTERINE VESSELS

Vaginal Uterine Artery Ligation

Retrospective review: 13 cases in 3.5 years
- x1 hysterectomy
  - ‘placenta percreta’
- ‘Easily learned’
- Further pregnancies ✓

Hebisch & Huch
Obstet Gynecol 2002

Good old fashioned pressure!

Surgical strategies to consider in massive obstetric haemorrhage

Surgical adjuncts

- Aortic compression (or clamping)
- ‘Maulik’ manoeuvre
- Haemostatic agents – eg ‘Floseal’

Gavin MacNab
“When 14 stone Mr Gavin MacNab, consultant obstetrician at Sunderland General Hospital, exerts all his weight on a bleeding point, not many vessels can resist the pressure and continue to bleed. Tracey D____’s pelvic circulation was the exception.”

...my standard textbook on obstetrics says that survival after a hysterectomy in these circumstances is unlikely “except in the hands of a most dextrous surgeon endowed with more than usually good fortune.”

**New options - ‘Floseal’**

- Haemostatic matrix
  - bovine-derived gelatin matrix
  - human-derived thrombin
  - 5ml or 10ml

**Surgical strategies to consider in massive obstetric haemorrhage**

**Subtotal/Total hysterectomy**

**Peripartum hysterectomy in the UK: management and outcomes of the associated haemorrhage**

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<table>
<thead>
<tr>
<th>Cause</th>
<th>Number of women (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Uterine atony</td>
<td>167 (53)</td>
</tr>
<tr>
<td>Placenta accreta/increta/percreta</td>
<td>121 (39)</td>
</tr>
<tr>
<td>Uterine rupture</td>
<td>26 (8)</td>
</tr>
<tr>
<td>Extension of uterine incision at delivery</td>
<td>20 (6)</td>
</tr>
<tr>
<td>Uterine infection</td>
<td>16 (5)</td>
</tr>
</tbody>
</table>

*100 women (32%) with 2 or more causes of haemorrhage
Risk Summary

<table>
<thead>
<tr>
<th>Category</th>
<th>Risk of Requiring Peripartum Hysterectomy</th>
</tr>
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<tbody>
<tr>
<td>Woman undergoing first delivery vaginally</td>
<td>1 in 30,000</td>
</tr>
<tr>
<td>Woman undergoing first caesarean section</td>
<td>1 in 1,700</td>
</tr>
<tr>
<td>Subsequent delivery in a woman with one previous caesarean section</td>
<td>1 in 1,300</td>
</tr>
<tr>
<td>Subsequent delivery in a woman with two or more previous caesarean sections</td>
<td>1 in 220</td>
</tr>
<tr>
<td>Placenta Praevia</td>
<td>1 in 32</td>
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Complications of Hysterectomy

- 67 (21%) women sustained other organ damage
  - 38 Bladder
  - 14 Ureter
  - 28 Ovaries
- 62 (20%) women required a second operation
  - 44 for further control of haemorrhage
  - 18 for repair of organ damage

Outcomes

- 2 maternal deaths 0.6% (95% CI 0-1.5%)
- 60 women with severe morbidity (19%, 95% CI 15-23%)
- 265 admitted to ITU (84%)
  - Median length of stay 2 days (range 1-26)

UKOSS – 2nd line therapies

<table>
<thead>
<tr>
<th>Prior balloon</th>
<th>As first 2nd line method</th>
<th>Success as first 2nd line</th>
<th>Hysterectomy rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compression sutures (n=199)</td>
<td>38</td>
<td>161</td>
<td>120 (75%)</td>
</tr>
<tr>
<td>Pelvic vessel ligation (n=20)</td>
<td>6</td>
<td>14</td>
<td>5 (36%)</td>
</tr>
<tr>
<td>Interventional radiology (n=22)</td>
<td>8</td>
<td>14</td>
<td>12 (86%)</td>
</tr>
<tr>
<td>rFVIIa (n=31)</td>
<td>15</td>
<td>16</td>
<td>5 (31%)</td>
</tr>
<tr>
<td>TOTALS</td>
<td>67</td>
<td>205</td>
<td>71 (26%)</td>
</tr>
</tbody>
</table>

Kaymen G et al. UKOSS. BJOG 2011

Surgical Issues

- Usually ‘subtotal’
- Timing of the decision is the difficult part!!
- Technically can be taxing....!!
- In some units – may need to call a gynaecologist.....

Placenta praevia – managing placental bed haemorrhage

1. Through and through ‘Figure of 8’ or transverse sutures - involve full thickness of uterine wall
2. Infiltrate placental bed with vasoconstrictors
3. ‘Hot packs’ AND pressure
4. Consider compression suture AND tamponade
5. Leave Rusch balloon inflated in lower segment
Placenta accreta – what to do with the placenta?

1. Know you have an accreta/increta
2. ‘Be prepared’ - ?IVR
3. Intraoperative:
   a) avoid delivering through placenta
   b) if adherent – close + leave vs close + hysterectomy
   c) if partially separated – partial removal & use other approaches as per MOH (expect major blood loss)
4. Monitor post-delivery (no real role for MTX)

RCOG Greentop No 27; January 2011

Triple- P procedure for placenta accreta

Three stage process
- Perioperative placental localization & delivery of the fetus via transverse uterine incision above the upper border of the placenta
- Pelvic devascularization
- Placental non-separation with myometrial excision & reconstruction of the uterine wall

“A safe & effective alternative to conservative management or peripartum hysterectomy.”

Chanhandran et al. IJOG. April 2012

Conclusion – surgical methods for haemostasis

- Adopt a systematic approach
- Ensure awareness & training in all conservative ‘surgical’ approaches
- Ensure a multidisciplinary team approach
- Maintain situation awareness – use the ‘Safety Pause’ intraoperatively
- Involve senior colleague support early
- ... and don’t leave the hysterectomy until it’s too late!!