MANAGEMENT OF MASSIVE OBSTETRIC HAEMORRHAGE

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INCIDENCE

- WHO (2000): 132,000 DEATHS
- NSW (2004): 7DIED / 85626 BIRTHS
- INCIDENCE: 6/1000 DELIVERIES
- CEMACH(UK): 17 DEATHS
  8.5 / MILLION MATURENITIES

LEADING CAUSES OF DIRECT DEATHS (CEMACH, 2000-02)

DEFINITION

- BLOOD LOSS FROM THE UTERUS OR GENITAL TRACT
  - >1500ml (with ongoing bleeding)
  - Acute transfusion > 5 units blood
  - Treatment for coagulopathy

ASSESSMENT

- BLOOD LOSS NOTORIously DIFFICULT TO ASSESS IN OBSTETRIC BLEEDS
  - May be concealed
  - Amniotic fluid makes estimation challenging
  - Hypotension is a late sign in the parturient
CVS ALTERATIONS IN PREGNANCY

<table>
<thead>
<tr>
<th></th>
<th>Cardiac Output</th>
<th>Heart Rate</th>
<th>Stroke Volume</th>
<th>Blood Volume</th>
</tr>
</thead>
<tbody>
<tr>
<td>+40%</td>
<td>7.5L/min</td>
<td>+12-20%</td>
<td>90mls</td>
<td>+35%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>85/min</td>
<td></td>
<td>7 litres</td>
</tr>
</tbody>
</table>

ASSESSING SEVERITY

<table>
<thead>
<tr>
<th>BP APPEARANCE</th>
<th>HEART RATE</th>
</tr>
</thead>
<tbody>
<tr>
<td>500-1000ml</td>
<td>15% Loss</td>
</tr>
<tr>
<td>Normal</td>
<td>Usually fast &gt;100</td>
</tr>
<tr>
<td>1000-1500ml</td>
<td>20-25% Loss</td>
</tr>
<tr>
<td>SBP 80-90</td>
<td>Pallor, sweating</td>
</tr>
<tr>
<td>&gt;100b/m</td>
<td>Tachypnoea</td>
</tr>
<tr>
<td>1500-2000ml</td>
<td>30-35%</td>
</tr>
<tr>
<td>SBP 60-80</td>
<td>Clammy, ao&lt;30</td>
</tr>
<tr>
<td>&gt;110</td>
<td>Tachypnoea</td>
</tr>
<tr>
<td>2000-3000ml</td>
<td>40%</td>
</tr>
<tr>
<td>SBP&lt;50 Anuria</td>
<td>Unconscious</td>
</tr>
<tr>
<td>HR&gt;120 or may be low Air hunger</td>
<td></td>
</tr>
</tbody>
</table>

RISK FACTORS (CEMACH)

- INCREASING AGE
- COMPLEX MEDICAL DISORDERS
- ASSISTED REPRODUCTION ➔ MULTIPLE PREGNANCIES
- INCREASING C-SECTION RATES
- PREV PPH

Massive Haemorrhage: Causes

- Retained placenta + atony
- Uterine atony
- Uterine rupture
- Placenta accreta/percreta
- Placental abruption
- Pre-eclampsia/eclampsia
- Inter-uterine foetal death
- HELLP
- Placenta praevia

Massive Haemorrhage: Type of Delivery

- Normal vaginal: 29%
- Instrumental vaginal: 8%
- Elective caesarean: 13%
- Emergency caesarean: 50%

Principles Underpinning Massive Obstetric Haemorrhage

- UTERUS GROWS 60g ➔ 1.2kg
- GRAVID UTERUS RECEIVES 15% OF MATERNAL CO (from 2%)
  - 60ml/min ➔ 600ml/min
  - Entire blood volume passes through in 10mins!!!
- LOW RESISTANCE PLACENTAL CIRCULATION LACKS AUTOREGULATION
- UTERINE MYOMETRIAL CONTRACTION PRIMARILY RESPONSIBLE FOR CESSATION OF BLEEDING

Extreme Haemorrhage: Type of Delivery
**DIFFERENTIAL DIAGNOSIS**
- EVALUATE PT
- BLOOD LOSS MAY BE:
  - ANTEPARTUM: AFTER 24/40 AND BEFORE DELIVERY
    - Placenta praevia
    - Abruptio placentae
    - Uterine rupture
  - POSTPARTUM
    - Uterine atony
    - Retained products
    - Genital tract trauma
    - Uterine inversion
    - Coagulation disorder

**PLACENTA PRAEVIA**
- ABNORMAL LOCATION OF PLACENTA, OVER OR VERY NEAR INTERNAL OS
- 1:200 PREGNANCIES
- RISKS
  - Previous C/S
  - Multips
  - Multiple pregnancies

**PLACENTA PRAEVIA**
- DIAGNOSED WITH U/S
- DOES PLACENTA COVER ANTERIOR LOWER SEGMENT?
- OFTEN PRESENTS AS SMALL, PAINLESS PVB
- PREM LABOUR, EXCESSIVE BLEEDING OR FD MAY NECESSITATE EMERGENCY C/S

**PLACENTA ACCRETA**
- DEFINITION: ABNORMALLY ADHERENT PLACENTA
- MORE COMMON WHEN PLACENTA IMPLANTS OVER A PREV SCAR
- INC RISING D/T INCREASING C-SECTION RATE
- 2/3 Will require caesarean hysterectomy

<table>
<thead>
<tr>
<th>Number of prior cesarean deliveries</th>
<th>Number of parturients with placenta previa n=256</th>
<th>Number with placenta previa and accreta n=3</th>
<th>Percent (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>214</td>
<td>12</td>
<td>5</td>
</tr>
<tr>
<td>1</td>
<td>20</td>
<td>7</td>
<td>34</td>
</tr>
<tr>
<td>2</td>
<td>15</td>
<td>3</td>
<td>20</td>
</tr>
<tr>
<td>3</td>
<td>5</td>
<td>4</td>
<td>40</td>
</tr>
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<td>3</td>
<td>2</td>
<td>40</td>
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**PLACENTAL ABRUPTION**
- Prem separation of normally implanted placenta with retroplacental bleeding
- 1 - 2% pregnancies
- Presents with pain + PVB
- Fetal compromise is common
- Inc risk of DIC and PPH
- Urgent C/S may be required

**UTERINE RUPTURE**
- Full thickness uterine wall defect
- 1:2000 term pregnancies
- Prev scars (1:100)
- Rapid spont delivery
- Excessive oxytocin
- CPD

**APPROACH TO SEVERE HAEMORRHAGE**
- Anticipate (Evaluate risk factors)
- Recognise and diagnose
- Prepare
  (Patient, theatre, equipment, monitors, transfer…)
- Communicate (Multidisciplinary team)
- Mobilise assistance
- Delegate

Vaginal blood loss often underestimates true maternal loss.
**SIMULTANEOUSLY....**

- EFFECTIVE RESUSCITATION
- MONITOR MOTHER AND FETUS
- CONTROL HAEMORRHAGE: treat cause and resultant complications

**BUT REMEMBER....**

- BLOOD LOSS CAN BE DIFFICULT TO ASSESS ACCURATELY AND IS EASY TO UNDERESTIMATE
- PREGNANT WOMEN TOLERATE BLOOD LOSS VERY WELL
  - Classical signs of hypovolaemia develop late
- COAGULOPATHY MAY PRODUCE AS WELL AS RESULT FROM MOH

**GET HELP !!!**

- MOBILIZE MULTIDISCIPLINARY TEAM;
  - ANAESTHETIC AND SENIOR OBSTETRIC STAFF, HAEMATOLOGISTS, RADIOLOGISTS, THEATRE, INTENSIVISTS, PORTERS...
- DELEGATE TASKS
  - COLLECTING SAMPLES/BLOOD PRODUCTS
  - SQUEEZING PUMP SET
  - DOCUMENTATION OF ORR AND INTERVENTIONS
  - CHECKING BLOOD PRODUCTS
  - ARRANGING POSTOP ICU/HDU OR HOSPITAL TRANSFER
  - GET CONSENT + FOR HYSTERECTOMY

**MASSIVE TRANSFUSION PROTOCOL**

(email to anaesthetic staff 9/08, 11/08 final)

**PROTOCOL**
- ACTIVATION OF MTP BY COMMUNICATION WITH BLOOD BANK
- BLOOD BANK SUPPLIES INITIAL 4U PRBC
- MTP PACK
  1. 4U PRBCs, 4U FFP, 4U PLATELETS (1 pooled)
  2. ALTERNATING WITH
  3. 4U PRBC, 4U FFP, 10U CRYO
  4. SUGGEST ADDITIONAL PRODUCTS IN CERTAIN CIRCUMSTANCES - rFVIIa

**MONITORING**

- ECG, NIBP, OXIMETRY AND HOURLY UO = MANDATORY
- A-LINE: ABGS, UNSTABLE OR NEED ICU...BUT INSERTION MUST NOT DETRACT FROM RESUS...SO DELEGATE
- CENTRAL LINE GOOD IF >>2L ONGOING BLOOD LOSS
- HAEMACUE HELPFUL

**RESUSCITATION**

A IM: RESTORE CIRCULATING BLOOD VOLUME AND PERFUSION

- A
  - DIFFICULT 3X RISK FAILED INTUBATION
  - ASPIRATION RISK
  - LOW RESERVE
  - AIRWAY ADJUNCTS
  - DRUGS
    - THIO 0.3-1mg/kg
    - KET/AMINE 1-1.5mg/kg
    - 5-hr RSI
- B O2 :10l/min
RESUSCITATION CONT.

- LEFT LATERAL TILT IF ANTEPARTUM
- ADEQUATE VENOUS ACCESS (2 x large bore IV)
- BLOOD SAMPLES (FBC, COAG, X-Match)
- FLUID RESUS (warm all fluids/products)
- LEVEL ONE OR PRESSURE BAGS
- CRYSTALLOID (3:1) OR COLLOID (1:1) UNTIL BLOOD AVAILABLE

PLATELETS

- NORMAL COUNT: (150 – 450 000/µl blood)
- ANTICIPATE <50 AFTER 2x CBV
- AIM >50 (OR >100 IF ABN FUNCTION)
- USUAL DOSE: 4U = 1 POOLED
- 1 UNIT WILL ↑ PLT COUNT BY 5-10, 1HR AFTER TREATMENT (70kg adult)
- GIVE VIA A STANDARD PLT GIVING SET

Management of major haemorrhage
(Mix of massive blood loss; a template guide: BA 2000, ASA recommendations)

CRYOPRECIPITATE

- USUAL DOSE 1-1.5u/kg (about 10u for 70kg)
- CONTAINS SIGNIFICANT FIBRINOGEN, F VIII, F XIII, vWF and FIBRONECTIN
- VOLUME 10-60 ml
- FIBRINOGEN FALLS FIRST TO A CRITICAL LEVEL OF 1g/L after 150% CBV is LOST
- AIM FOR FIBRINOGEN LEVELS >1g/L
- ALLOW 30mins THAWING AND USE IN 6hrs

FFP

- ALL COAGULATION FACTORS INCL. 200u of labile FV and FVIII
- USUAL DOSE: 12-15ml/kg (around 4U)
- EACH UNIT: 150 – 300ml SO BE CAUTIOUS WITH VOLUME
- AIM FOR PT and APTT<1.5 X NORMAL
- ALLOW 30 mins FOR THAWING. COMPLETE IN 4hrs

HELLSTERN et al RECOMMENDS FFP WHEN BLOOD LOSS EXCEEDING 150ml/min CONTINUES DESPITE FLUIDS AND AT LEAST 4 PRBC (Transfusion 2002)
AVOID THE DEADLY TRIAD

- HYPOTHERMIA
- Haemostatic cellular enzymes don’t work if patient hypothermic
- WARM IV FLUIDS
- FORCED AIR CONVECTION WARMER
- TURN TEMPERATURE UP IN THEATRE

ACIDOSIS
- RESTORE CO, MAINTAIN NORMOCARBA
- COAGULOPATHY

BEWARE HYPERKALEMIA

- MAY PRECIPITATE MALIGNANT ARRHYTHMIAS
- NEED FREQUENT ABG’s DURING MASSIVE TRANSFUSION

TREATMENT
- Calcium
- Na HCO₃
- Insulin/ Dextrose

STOP THE BLEEDING

A) PHARMACOLOGICAL CONT.

<table>
<thead>
<tr>
<th>DRUG</th>
<th>DOSE</th>
<th>SIDE EFFECTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Syntocinon</td>
<td>25U slow IV bolus; 30-40IU in IL titrated</td>
<td>Hypotension, Reflex tachycardia/arrhythmias, weak ADH like effect</td>
</tr>
<tr>
<td>Ergometrine</td>
<td>250mcg IM or 125mcg slowly IV</td>
<td>n/v (common), HT (can be severe), coronary spasm/ ischaemic pain</td>
</tr>
<tr>
<td>Carbopeptidase PG F2a</td>
<td>250mcg intramyometrially or 1M repeated to max 2mg</td>
<td>n/v/diarrhea, severe bronchospasm, hyposia (alter pulmonary shunt fraction)</td>
</tr>
</tbody>
</table>

MISOPROSTIL: PGE1 analogue
1mg (5 x 200mcg tabs) PR
Cheap, doesn’t require refrigeration.
S/E: Shivering and diarrhea.
5 RCTs show it is as effective as oxytocin and increases uterine tone within 3 minutes.

TRANEXAMIC ACID: synthetic lysine derivative antifibrinolytic.
Cheap, few side effects.
1G IV, repeated every 4 hours PRN.

B) SURGICAL

- EVACUATE RPOC, EMPTY BLADDER
- EXCLUDE LACERATIONS IN GENITAL TRACT
- TAMPOONADE
  - INTERNAL: DIMANUAL COMPRESSION, B-LYNCH SUTURES
  - UTERINE PACKING (Abies and relook lap)
- RUHSE BALLOON, SUCCESS RATE = 97%
- ARTERIAL LIGATION
  - BILATERAL LIGATION OF UTERINE OR INT ILLAC ARTERIES
  - COLLATERALS MAY MAKE THIS INEFFECTIVE, 95% SUCCESS RATE.
  - TEMPORARY AORTIC CLAMPING MAY BE HELPFUL
- HYSTERECTOMY (Partial/total)

RECENT ADVANCES

1) RECOMBINANT FVIIa

INTRODUCED IN 1980s AND LICENSED TO TREAT BLEEDING IN PATIENTS WITH HAEMATOLOGICAL DISORDERS

MECHANISM OF ACTION:
- Acts at site of tissue injury by binding to exposed TF and generating small amounts of thrombin activate platelets
- Activated platelet surface forms a template on which recombinant FVIIa can directly or indirectly mediate further activation of coagulation
- Need platelet count > 10x10⁹/L
rFVIIa BOOSTS THROMBIN GENERATION ON ACTIVATED PLATELETS

1) RECOMBINANT FVIIa
- Gene for human FVIIa cloned and expressed in baby hamster kidney cells
- Contains traces of hamster, bovine and mouse proteins
- Formulated as a freeze-dried preparation
  - Store at room temperature or refrigerate for up to 3hrs after reconstitution
- JW’s well accept it
- Used extensively for non-haemophilic bleeding, unresponsive to conventional therapy but it is not currently licensed in obstetric practice.

Massive Bleeding requiring rFVIIa:
Cases by Presentation

Total cases = 696
Position: Feb 2007
Obstetric: 4%

1) RECOMBINANT FVIIa
- We are reliant on multiple case reports (65), there is uncertainty about the optimal dose and conditions for use
- Standard dose 90 µg/kg
- Repeated 2ydf if bleeding ongoing (73% 1 dose)
- Plasma half life is ~2-3hrs
- Guidelines for use are institution specific
  - >15u PRBCs over 8hrs, or 20u/24hrs
  - Significant coagulation factors may be given first.

Typical “catastrophic bleeding” profile

- Blood products used in the 24 hrs prior to infusion (units)
  - Packed cells 30
  - Platelets 16
  - FFP 20
  - Cryoprecipitate 16
- Coagulation profile prior to infusion
  - Platelet count 83 x 10^9/L
  - INR 1.6
  - APTT 75 secs
  - Fibrinogen 2.3 g/L
- Mean dose/kg infused: 113 µg

1) RECOMBINANT FVIIa
- Causes of rFVIIa failure
  - Fibrinogen <0.8 g/L
  - Platelets <50 x 10^9/L
  - Low pH – acidemia
  - Low body temp
- In general F7A appears to at least decrease the bleeding
1) RECOMBINANT FVIIa

- EXPENSIVE ([1 EU/µg = 50 IU PRBC ~2/7 in ICU = embolisation])
- RELATIVELY SAFE:
  - 1.2% incidence of thrombotic complications based on published trial
  - Further evidence needed to establish cost benefit profiles, optimal dose, timing, safety and efficacy before rFVIIa can be established as a standard treatment for obstetric bleeding

2) ARTERIAL EMBOLISATION

- INTERVENTIONAL RADIOLOGY
- >150 CASES OF SELECTIVE ARTERIAL EMBOLISATION
- SUCCESS OF 97%
- PROPHYLACTIC USE IN ANTICIPATED LARGE BLOOD LOSS e.g. PLAC.PRAEVIA / ACCRETA OR
- IN EMERGENCY WHERE OTHER MEANS HAVE FAILED AND THERE IS LOCALISED ARTERIAL BLEEDING.
- TAKES ~1 hr.

2) ARTERIAL EMBOLISATION

- TECHNIQUE:
  - VASCULAR SCAFFOLD IN BOTH FEMORAL ARTERIES
  - CATHETER INTO THE INTERNAL ILIAC TO THE UTERINE ARTERIES
  - PERFORM AN ANGIOGRAM
  - BALLOON OCCLUSION OF THE INTERNAL ILIAC UTERINE ARTERIES
  - SELECTIVELY EMBOLISED
  - OCCLUDED BED RECANALISES AFTER 4 WEEKS
  - FERTILITY IS PRESERVED
  - NOT ALL CENTRES HAVE ACCESS
  - EFFECTIVE WITH TRANSFER OF UNSTABLE PATIENTS TO THE ANGIO SUITE

3) INTRAOPERATIVE CELL SALVAGE (IOCS)
3) INTRAOPERATIVE CELL SALVAGE

- ROUTINE IN CARDIAC, VASCULAR AND ORTHOPEDS
- CONCERNS ABOUT AFE BUT...
- 400 CASE REPORTS DEMONSTRATE SAFETY OF CELL SALVAGE IN OBSTETRICS
- EFFECTIVELY REMOVES AMNIOTIC FLUID, TF, LAMELLAR BODIES, FETAL SQUAMES
- EVEN IF SMALL QUANTITIES OF AMNIOTIC FLUID ESCAPED, THEY WOULD NOT CAUSE DAMAGE SINCE AFE IS NO LONGER RECOMMENDED AS EMBOLIC DISEASE.
- ALL WOMEN HAVE AMNIOTIC FLUID IN THEIR BLOOD POST DELIVERY AND REMAIN HEALTHY.
- AFE SYNDROME IS CONSIDERED AN ANAPHYLACTIC REACTION.
- THE EXACT TRIGGER IS UNKNOWN

REMOVED AND DISCARDED.
OTHER COMPONENTS ARE REMOVED AND DISCARDED.
PURE RBCS WITH HCT 55-88% ARE COLLECTED FOR RE-TRANSFUSION.

INTRAOPERATIVE CELL SALVAGE

- BLOOD SUCTIONED FROM SURGICAL SITE THROUGH HEPARINISED TUBING.
- PASSES VIA FILTER INTO RESERVOIR BOWL AND THEN INTO CENTRIFUGAL BOWL.
- RBCS ARE FORCED TO OUTSIDE OF THE BOWL AND WASHED WITH N/S.
- OTHER COMPONENTS ARE REMOVED AND DISCARDED.
- PURE RBCS WITH HCT 55-88% ARE COLLECTED FOR RE-TRANSFUSION.

3) INTRAOPERATIVE CELL SALVAGE

- A DISPOSABLE RESERVOIR, HEPARINISED SUCTION TUBING IN OT AT ALL TIMES
- COLLECT CELL SAVER WHEN NEEDED.
- 5 MINUTES TO SET UP
- 250 ml OF BLOOD AVAILABLE TO TRANSFUSE IN 3 MINS.
- FULLY AUTOMATED.

INTRAOPERATIVE CELL SALVAGE

- REDUCE AMNIOTIC FLUID CONTAMINATION
- SUCTION AFTER PLACENT AND PLACENT DELIVERED
- USE A PALL-RE LEUCOCYTE DEPLETION FILTER IN THE IV LINE FOR RE-INFECTION
- IF OTHERS AND SHOWN THIS FILTER REDUCED LEVELS OF PARTICULATE MATTER TO LOW IN PATIENT NORMALLY IN MATERNAL VENOUS BLOOD POST DELIVERY.

INTRAOPERATIVE CELL SALVAGE

- FETAL CELLS (2-19m) ARE RE-TRANSFUSED PROVIDE KLEIHUAER TESTING AND ANTI D (500-2500u) TO THOSE AT RISK OF RHESUS-IMMUNISATION.
- IN UK, OBSTETRICS CONSUMES 70 000 PRBC UNITS p/a.
- EXPECTED BLOOD LOSS
  - B00 - B00 ALLOGENIC T/F
  - CONSUMES SUPPLY.
- UNEXPECTED BLOOD LOSS
  - FOR USE THE NEXT UNIL (MORE) BANK BLOOD BECOMES AVAILABLE.
  - NB. REMOTE AREAS WITH LIMITED BLOOD BANK SERVICE.

STUDIES WHERE CELL SAVED BLOOD has been given to obstetric patients before 2000

- 1983 Keeling - 43
- 1988 Grimes - 2
- 1993 Jackson - 64
- 1997 Rebarber - 139
- 1998 Rainaldi - 34
- 1999 Porter - 7 (TEG & Sonoclot)
- ALL 283 PATIENTS HAD NO EVIDENCE OF AFE/DIC
- ALL MOTHERS AND BABIES WELL

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**INTRAOPERATIVE CELL SALVAGE**

- NO MORTALITY/MORTALITY REPORTED
- UNTIL...
- I/E PATIENT WITH HELLP DIED despite CELL SALVAGE
- PRE-OPERATIVELY BLED 66ml
- SHE ARRESTED DURING T/F OF 200ml CELL-SAVED BLOOD
- CAUSE OF DEATH “NOT ESTABLISHED”
- Hb AND COAGULATION AT TIME OF DEATH NOT KNOWN
- A LEUCOCYTE DEPLETION FILTER WAS NOT USED
- IMPOSSIBLE TO SAY WHETHER DEATH WAS RELATED TO IOCS.

**INTRAOPERATIVE CELL SALVAGE**

- USA: ASA PRACTICE GUIDELINES FOR OBSTETRIC ANAESTHESIA 2006
  - RECOMMEND IOCS
    - “IN CASE OF INTRACTABLE HAEMORRHAGE WHEN BANKED BLOOD UNAVAILABLE OR THE PT REFUSES BANDED BLOOD”

- UK: IOCS IN OBSTETRICS ENDORSED BY:
  1) CEMACH 2000-2002
  - A THEORETICAL TECHNIQUE WHICH WILL PROVE HELPFUL FOR MANAGING WOMEN WHO REFUSE BLOOD TRANSFUSION…
  - IOCS IS WIDELY USED IN OBSTETRICS ENDORSED BY; IN ANY CASE OF OBSTETRIC HAEMORRHAGE - INCL. WOMEN WHO ACCEPT BLOOD TRANSFUSION

**INTRAOPERATIVE CELL SALVAGE**

2) DAA/AAGBI GUIDELINES FOR OBSTETRIC ANAESTHETIC SERVICES 2005

- p 25 .... “An increasing shortage of blood and blood products, and growing anxiety about the use of donor blood, is leading to an increasing interest in the use of cell salvage in obstetrics. Staff will have to be suitably trained and equipment obtained and maintained.”

**INTRAOPERATIVE CELL SALVAGE**

3) N.I.C.E. GUIDELINES NOV 2005 IOCS:

- AN EFFICACIOUS TECHNIQUE FOR BLOOD REPLACEMENT
- USE WELL ESTABLISHED IN OTHER AREAS OF MEDICINE
- THEORETICAL: SAFETY CONCERNS IN OBSTETRICS

- N.I.C.E. RECOMMENDATIONS:
  - REPORT ANY COMPLICATIONS TO MHRA
  - PATIENTS SHOULD BE FULLY INFORMED
  - PERFORMED ONLY BY EXPERIENCED, MULTIDISCIPLINARY TEAMS WHO DEVELOP REGULAR EXPERIENCE OF ITS USE

**INTRAOPERATIVE CELL SALVAGE**

- 1) NO MORTALITY/MORTALITY REPORTED

- 2) IOCS IS BEING WIDELY USED IN UK
- A DEDICATED AUDIT DATABASE IS NEEDED

**INTRAOPERATIVE CELL SALVAGE**

- THINK:
  - Cell salvage!

- YES - even in obstetrics!
ANAESTHETIC CONSIDERATIONS

**REGIONAL ADVANTAGES:**
- Avoid risks of GA
- Blood loss, transfusion requirements
- Maternal preferences, bonding
- Fetal BR exposure
- Avoid Volatiles (hypotension & uterine relaxation)
- Consider RA if:
  - Stable
  - Fluid resuscitated
  - No coagulopathy
- Cautious top-ups may be appropriate if epidural in situ
- Consider CSE to allow for long surgery
- prep and counsel for conversion to GA

**RCOG:**
- "In elective cases where massive blood loss is anticipated the choice of anaesthetic is up to the individual anaesthetist’s discretion”.
- Majority of anaesthetists agree that a GA may be necessary but is no longer mandatory.
- make provisions for HDU/ICU postop

**CONCLUSION**

- Anticipate
- Diagnose and recognize
- Prepare/ Transfer
- Communicate with multidisciplinary team
- Get help
- ABCs
- Monitor
- Document
- Stop bleeding (drugs, surgery, recent advances
  - Embolisation
  - I&O
  - correct coagulopathy
  - Avoid RA if hypovolaemic/suspect ABN coags
  - HDU/ICU
- Local protocol

**REFERENCES**

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- Association of Anaesthetists of GB & Ireland: implications of anaesthetic management of massive obstetric haemorrhage - Anaesthesia 60(2005)248-252
QUESTIONS

MANAGEMENT OF MASSIVE OBSTETRIC HAEMORRHAGE

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