Managing PPH at Caesarean Section: What do we know, where do we go from here?

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Conflicts of interest to declare

- Arri Coomarasamy - none
- John Varallo - none
Outline

- Epidemiology
- Detection and diagnosis
- Management
  - Prevention at Caesarean Section (CS)
  - Treatment during and after CS
- Where do we go from here?
- Key Takeaways
Epidemiology: Global prevalence of PPH

- Average global prevalence of **PPH (> 500 ml)** is 6%, and that of **severe PPH (> 1000 ml)** is 1.86% of deliveries\(^1\)
  - Higher than global average in LMIC settings
- Risk of severe PPH is higher with CS than with vaginal birth\(^2\)
- Risk of PPH is 2.9x higher with emergency CS vs elective; 5.2x higher in 2\(^{nd}\) stage\(^3\)

Source:
Epidemiology: CS Mortality

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- Maternal death after cesarean delivery is 50-100x more in LMICs than in high-income countries\(^3,4\)
- Maternal deaths driven primarily by peripartum hemorrhage\(^3,4\)

Source:
Epidemiology: CS Mortality

25% of all women who died in LMICs had undergone a CS

32% of all maternal deaths following CS was attributed to PPH; 19% to pre-eclampsia/eclampsia and 22% to sepsis

Source:
Detection of haemorrhage at CS

• **Measures and outcomes for detection vary** and may include: estimated or measured volume of blood loss, physiological changes and the need for intervention.\(^5\)

• **Visual method** of estimating blood loss is **imprecise** and hindered by **subjectivity** and **does not** always **match** the **clinical status** of patients.\(^6\)

• **Objective methods** such as measured blood loss by the use of graduated collecting drapes and weighing of swabs are increasingly being used.\(^7\)

Evidence on their use is evolving.

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**Source:**


Common Causes of Severe PPH at CS

Do the **traditional 4 Ts** still apply to CS?

- **Tone - Atony** (due to, e.g., prolonged/obstructed labor, overdistended uterus, chorioamnionitis, placental abruption)
- **Tissue - Abnormal placentation** (e.g., placenta previa, placental abruption, placenta accreta/increta/percreta)
- **Trauma** (e.g., lacerations/tears, uterine rupture)
- **Thrombin - Abnormal coagulation** (e.g., severe preeclampsia/eclampsia, placental abruption, hypofibrinogemia, DIC)
Developing algorithms for managing haemorrhage during and after caesarean section
Bleeding At Caesarean Section

**Prevention intra-op**
- 2.5iu oxytocin IV over 30 seconds after delivery of baby, + 7.5 IU in drip.
- Repeat 2.5iu IV if poor uterine contraction
- Delivery of placenta by cord traction
- Good surgical technique

 NB: alternatives for intra-op prevention would be im oxytocin 10iu or 1 amp syntometrine im

**Prevention post-op**
Run oxytocin infusion (20IU per litre for 8 hours) and/or im syntometrine (at risk for PPH)

**Management**
- Call for more senior help (if available or telephonic advice)

**Diagnosis**
- Visual estimation
- Blood loss in suction bottles >500ml
- LBP & ↑HR as detected by anaesthetist

**RESUS / early Rx (anaesthetist)**
- Second IV line
- Maintain BP with fluids and blood
- 20iu oxytocin in 1 litre infusion
- Tranexamic acid 1 gm iv
- Convert to GA

**ARREST HAEMORRHAGE**
- (surgeon)
- **StAH**

**Atonic Uterus**
- Continue Oxytocin infusion
- Ergometrine 0.2mg IV (not hypertensive/cardiac); not x1
- (or im 0.5mgs ergometrine or im / amp syntometrine)
- Repeat tranexamic acid x1
- Misoprostol 400 to 600μgms sublingually
- Uterine compression suture +/− balloon tamponade
- Subtotal hysterectomy (STAH)

**Tears**
- Lateral tears
- Uterine artery ligation
- Inferior tears
- Secure apex & suture (check ureters are lateral to tear)
- Rupture
- Repair or Subtotal Hysterectomy (STAH)

**Placental Site Bleeding**
- Mattress suture
- Compression sutures
- Balloon tamponade
- Stepwise uterine devascularisation
- Subtotal Hysterectomy*

*** Proceed immediately to StAH if: Uterine rupture (irreparable)
- Placenta percreta

* If still for StAH not available, apply uterine tourniquets and refer And-shock garment (NASG) if available

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Bleeding After Caesarean Section

Prevention & Early Detection
- Haemostasis at initial Caesarean Section
- Regular post-op monitoring (EWC)
- Monitoring of at risk women who bled intra-op in high care area (if available)

Management

Resuscitate / Early RX
- 2nd IV line + fluid resus
- Maintain BP: fluids/blood
- Oxytocin 20iu in 1 litre infusion
- Tranexamic acid 1gm iv slowly

Diagnosis
- Excessive pv bleeding (revealed PPH)
- \( \text{BP} + \text{HR} + \text{abdominal distension} + \text{pallor} \) (concealed bleeding)

If ongoing bleeding

Uterus Atonic
- Massage / remove clots
- 20iu oxytocin in 1 litre as infusion
- Ergometrine 0.5 mgs im (not hypertensive cardiac) or syntometrine 1 amp im
- Misoprostol 400 to 800mug sublingual

LAPAROTOMY (Lloyd Davis position)

Uterus Well Contracted

Suspected Placental Site Bleeding
- Balloon tamponade
- Stepwise uterine artery devascularisation
- NB: Proceed immediately to STAH if patient very unstable

Atonic Uterus
- Compression sutures +/- Balloon tamponade
- Subtotal Hysterectomy

* If lack of skill for STAH, apply uterine tourniquet and refer. Anti shock garment (NASG) if available

Bleeding from Uterine Incision
- Single bleeding vessel
  - Haemostatic sutures
  - Stepwise uterine artery devascularisation
  - Subtotal Hysterectomy (STAH)
- Bleeding along whole incision
  - Open uterine incision, explore for bleeders and resuture
  - Stepwise uterine artery devascularisation
  - Subtotal Hysterectomy
Importance of Anticipation, Early Recognition and Active Management of Haemorrhage

Prevention of PPH at CS

Uterotonics for prevention of PPH at CS:8,9

▪ **Oxytocin**

▪ **Ergometrine + Oxytocin**

▪ Consideration for **Carbetocin**, especially where quality of oxytocin is a concern
  - more effective than oxytocin

Is there a role for **prophylactic TXA**? For all CS or for those at high risk?

▪ Blood loss, massive hemorrhage, transfusion requirements, and need for additional uterotonics all markedly reduced10

Source:
Surgical Management of PPH at CS

- When medical management of uterine atony fails
- When other causes are present (e.g., trauma - ruptured uterus/tears; abnormal placentation)

Note: Evidence for medical management of PPH at CS tends to be of higher quality than that for surgical management
PPH at CS due to Uterine Atony

Assess and Resuscitate
- Monitor vital signs
- Measure blood loss
- IV fluids
- Blood transfusion as needed

Medical Treatment
- Uterotonics
- TXA
- Uterine massage

Surgical Management
- **Uterine compression sutures** (e.g., B-Lynch)
- **Uterine devascularization**
  - Uterine artery (O’Leary stitch)
  - Utero-ovarian artery
  - Hypogastric artery
- **Hysterectomy**
Keys to Successful Surgical Management of PPH at CS

▪ Anticipation
▪ Early identification and management according to cause
▪ Use of CS adapted WHO Surgical Safety Checklist
▪ Situational awareness in the OT, teamwork and communication
  ➢ These non-technical skills have been shown to be essential for improved team performance and improved outcomes
▪ Early decision to use compression sutures (e.g. B-Lynch) for uterine atony PPH
▪ Post-op care and monitoring

Source:
Why B-Lynch Suture?

- Fast to perform: < 2 minutes
- Easy to learn – easy to practice on simulator
- Does not require special equipment or supplies
- Effectiveness: generally 75 – 90%\(^{13,14}\)
- Most studied method (compare to Cho, Hayman, other modifications)
- No apparent impact on infertility

Considerations:

- Do not use permanent suture – risk of bowel herniation/strangulation
- Some concerns regarding risk of uterine necrosis if combined with devascularization sutures

Source:
Haemorrhage during and after caesarean section: Where do we go from here?

Program of work with the Gates Foundation

➢ E-MOTIVE study – CS arm
  • Develop a strategy for early detection and management of PPH at CS (bundles + algorithms)
  • Develop a strategy for implementation

➢ Where and why project
  • Developing a very powerful tool to understand the epidemiology of CS at provincial and district level
Key Takeaways

- CS is a significant risk for haemorrhage and maternal mortality
- It is essential that PPH programs include surgical management of PPH and managing haemorrhage at CS
- Evidence is building for the most appropriate CS PPH bundles and algorithms, but more research is needed
- Successful implementation requires non-technical competencies
- B-Lynch uterine compression suture is an attractive surgical method to include in any program that provides CS services, especially where non-specialists work
Thank You!!

Questions?