

Advances in management of PPH

Dr Othiniel Musana

Gynae-oncologist

President-AOGU

Physiology of pregnancy

- Extracellular fluid (ECF) volume increases by 30 to 50 %
- Maternal blood volume (MBV) increases by 45% (Between 1,200 – 1,600ml)
- Plasma volume (PV) increases by more than 50 to 60% (critical to maintaining circulating blood volume, Blood Pressure, and Uteroplacental Blood flow)

| Normal weight range female | Non Pregnant | Pregnant |
|----------------------------|---------------|--------------|
| Plasma volume (ml/kg) | 65 – 85 ml/kg | 90–200 ml/kg |

- The higher the increase in body mass, the higher the rise in plasma volume

Anatomy of blood (what do you actually lose?)

1. Cellular components

| Component | Function | Consequence of loss |
|-----------|------------------|---------------------------------------|
| RBCs | Transport Oxygen | Hypoxia (low oxygen saturation) |
| WBCs | Fight infection | Increased Risk of infection |
| Platelets | Coagulation | Increased risk of continuous bleeding |

2. Non cellular components

| Component | Function | Consequence of loss |
|-----------|--|--|
| Plasma | Perfusion (Carry blood components to organs) | Hypo-perfusion/Shock, Hypothermia, Hypoxia, Acute Kidney Injury (AKI), Multi-organ dysfunction |
| Protein** | Clotting factors | Continued bleeding |

Special mention: Sheehan's syndrome

SHEEHAN'S SYNDROME

(POSTPARTUM PITUITARY GLAND NECROSIS)

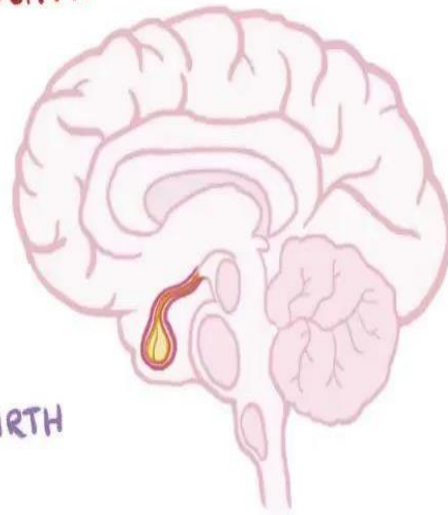
MOTHER WHO GIVES
BIRTH TO INFANT

GLAND IN
BASE OF BRAIN

DEATH

~ DISORDER WHERE CELLS IN
PITUITARY GLAND OF A NEW
MOTHER START TO DIE

↳ EXCESS BLOOD LOSS DURING CHILDBIRTH



SHEEHAN SYNDROME

* SUSPECTED in THOSE WHO JUST GAVE BIRTH and PRESENT with:

~ FAILURE to LACTATE
&
~ ABSENT MENSTRUATION



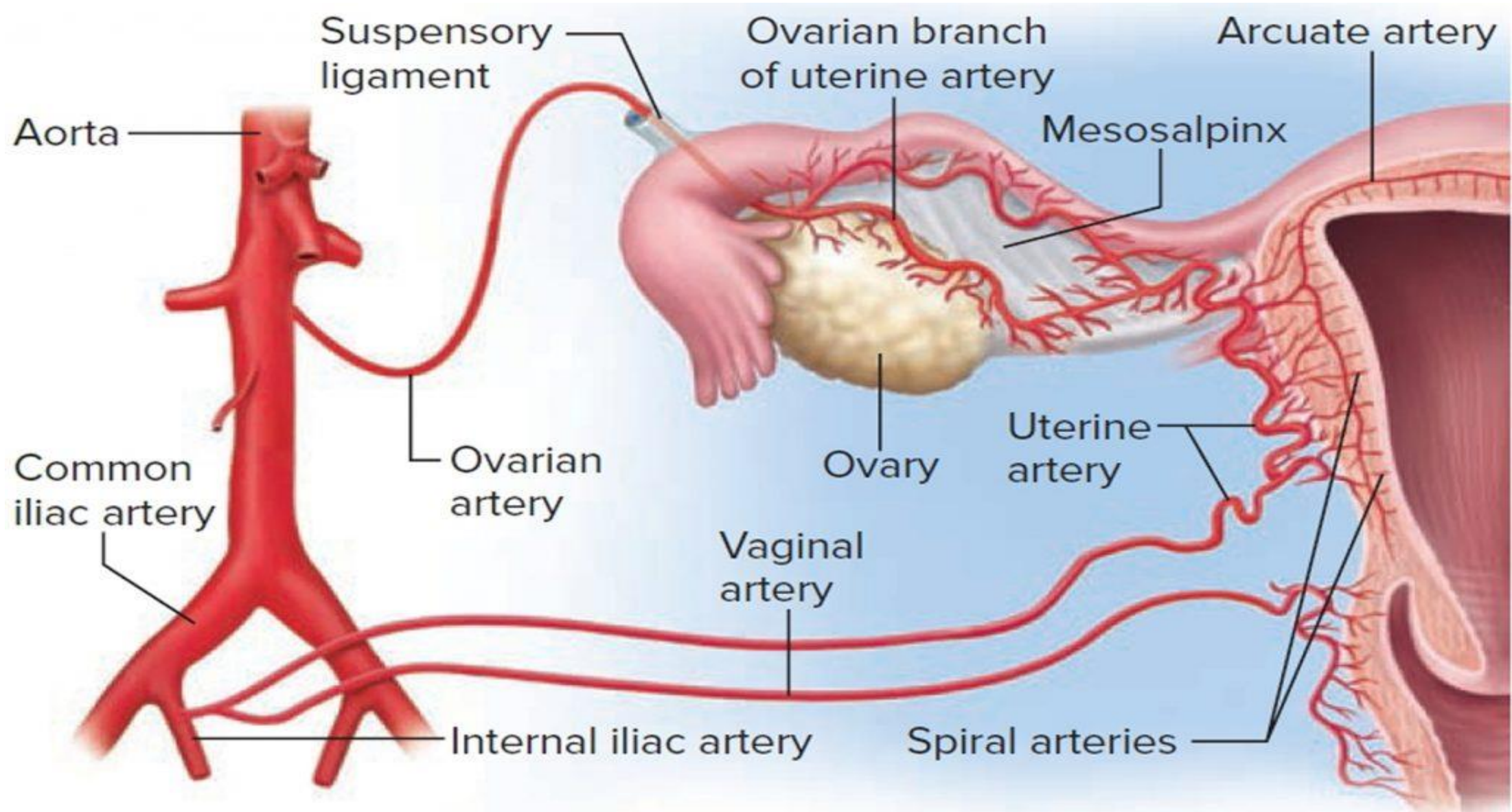
PROLACTIN DEFICIENCY

* FEATURES of HYPOPITUITARISM

~ HYPOTHYROIDISM
OR
~ CORTISOL DEFICIENCY



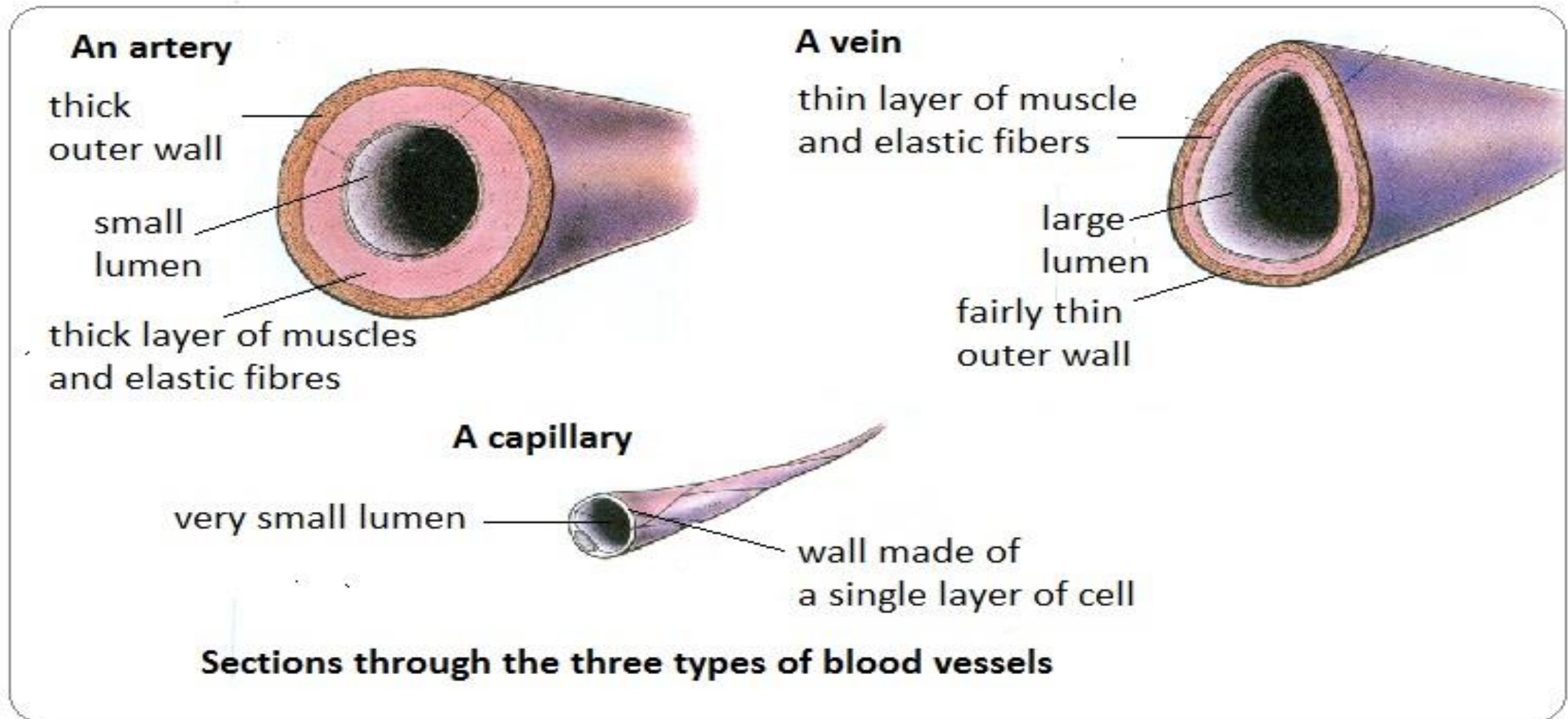
DEPENDENT on EXTENT
of NECROSIS



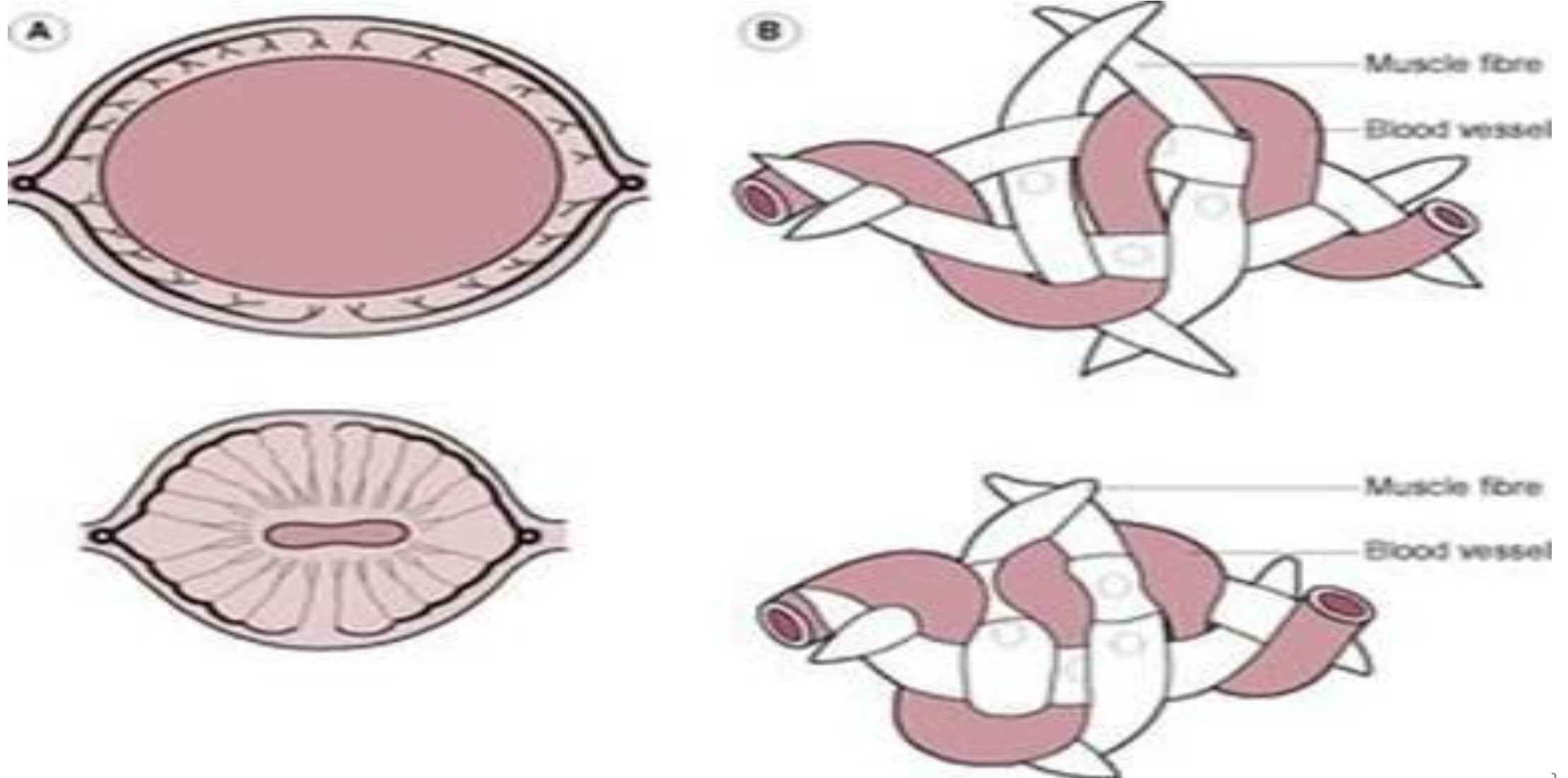
How does the uterus control bleeding?

- There are Physiological mechanisms to stop bleeding
- We manipulate the 4 mechanisms above to manage PPH as we shall see

Mechanism 1: Uterine Arterial constriction



Mechanism 2: Uterine muscle contraction



Mechanisms 3 and 4 of Hemostasis in the Uterus

1. Formation of the Platelet plug
2. Activation of the coagulation cascade that leads to the fibrin plug/final clot

Why do our women die?

The case for proper Haemostatic resuscitation in obstetric patients

Think on these things

1. Approximately 700mls of blood flows through the placental bed at term in one minute?
2. How soon can a woman lose 25%, 50%, 75% or 100% her blood volume assuming no control of blood loss in PPH (Mean blood volume is 5000ml or 5L at term)

| | |
|--------------------------|----------|
| 25% blood loss (1250 ml) | 1.78 min |
| 50% blood loss (2500mls) | 3.5 min |
| 75% blood loss (3750 ml) | 5 min |
| 100% (5000 ml) | 7 min |

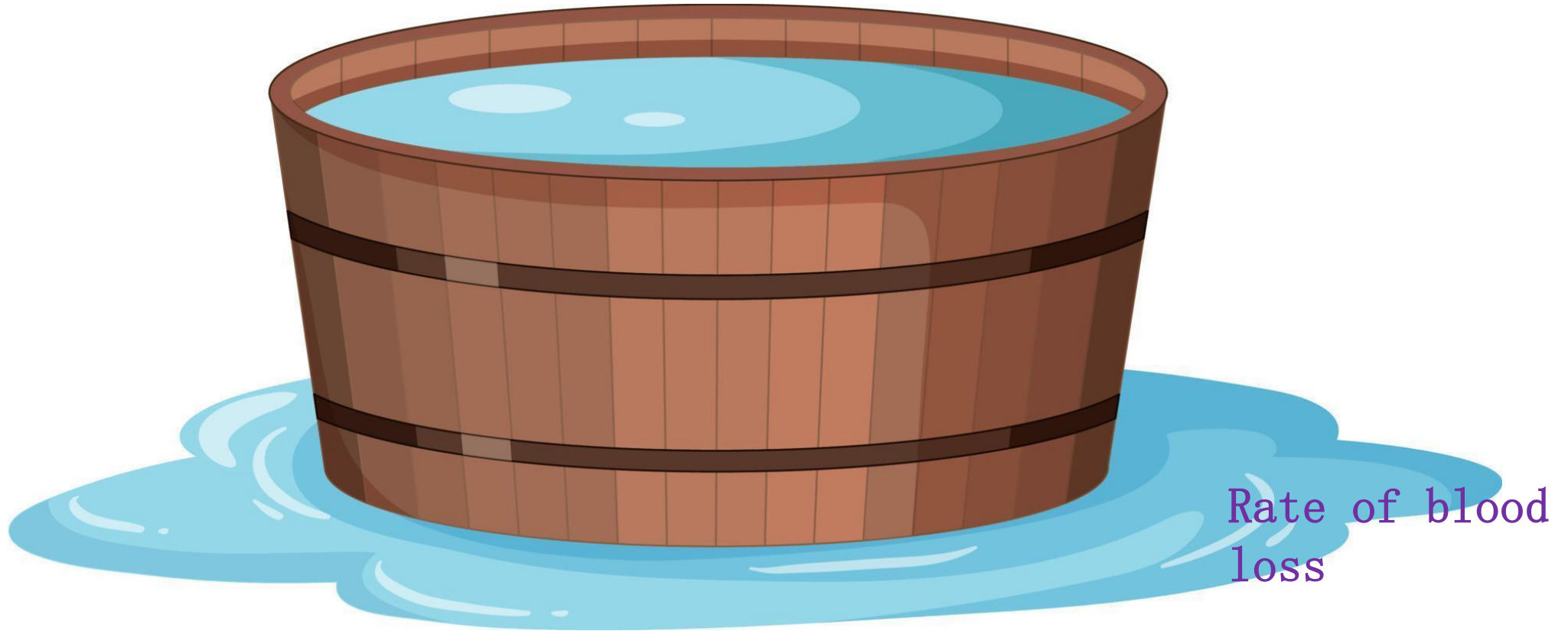
3. How can we accurately estimate blood loss given
 - Never

Tools matter: Replacement should match loss in real time!

Small bore
cannula



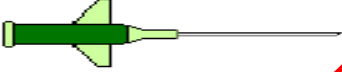

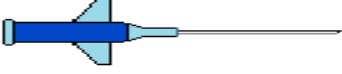

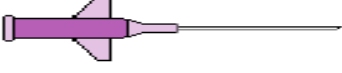


Large bore
cannula



Rate of blood
loss

Do the health workers understand their choice of tools

| Color | Gauge Size | External Diameter (mm)* | Length (mm)* | Water Flow Rate (mL/min)* | Recommended Uses |
|---|------------|-------------------------|--------------|---------------------------|---|
|  Orange | 14G | 2.1 mm | 45mm | ~240 mL/min | Trauma, Rapid blood transfusion, Surgery ¹ |
|  Gray | 16G | 1.8 mm | 45mm | ~180 mL/min | Rapid fluid replacement, Trauma, Rapid blood transfusion ¹ |
|  Green | 18G | 1.3 mm | 32mm | ~90 mL/min | Rapid fluid replacement, Trauma, Rapid blood transfusion ¹ |
|  Pink | 20G | 1.1 mm | 32mm | ~60 mL/min | Most infusions, Rapid fluid replacement, Trauma, Routine blood transfusion ¹ |
|  Blue | 22G | 0.9 mm | 25mm | ~36 mL/min | Most infusions Neonate, pediatric, older adults Routine blood transfusion ¹ |
|  Yellow | 24G | 0.7mm | 19mm | ~20 mL/min | Most infusions Neonate, pediatric, older adults, Routine blood transfusion, Neonate or Pediatric blood transfusion ¹ |
|  Purple | 26G | 0.6 mm | 19mm | ~13 mL/min | Pediatrics, Neonate ¹ |

Delay by the healthcare teams

1. Lack of preparation (supplies and personnel) to prevent, detect and manage PPH
2. Lack of clinical pathways to detect & manage a woman with PPH
3. Delay in the detection of PPH
4. Delay to move to 2nd line treatment
 - When do we say 1st line treatment has failed
 - What guides the clinician to move to 2nd line treatment
5. Lack of actionable protocols despite presence of guidelines

PPH kit (Emergency obstetrics kit)

| Item | Specification | | Item | Specification |
|------------------------|----------------------------------|--|---------------------------------------|---------------|
| IV Cannula | 1 Grey & 1 Green | | 3 way connection | 1 |
| Blood sample bottles | 1 Pink, 1 Blue, 1 Red | | Oxygen mask | 1 |
| Syringes | 10ml (n=4), 5ml (n=2), 2ml (n=4) | | DRUGS | |
| Foley catheter | Size 16 (n=1) | | Oxytocin/ Carbetocin | 5 ampoules |
| Urine drainage bag | 1 | | Misoprostol 200ug tab | 3 |
| Distilled water (10ml) | 1 | | Carboprost | 1 ampoule |
| Infusion set | 1 | | Tranexemic acid | 2 vials |
| Blood set | 1 | | OTHER INSTRUMENTS AND SUPPLIES | |
| Sterile gloves | 1 pair | | Speculums | 3 |
| Cotton swabs | | | Sponge holding forceps | 4 |
| Pair of scissors | 1 | | Balloon tamponade | 1 |
| Ringers lactate | 1.0L | | Mops | 5 |

Protocols

- [Clinical findings in PPH guideline-version 2.pdf](#)

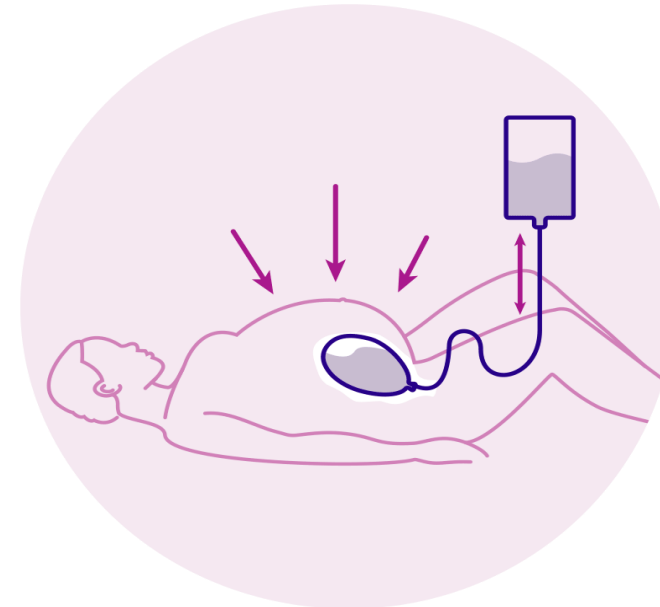
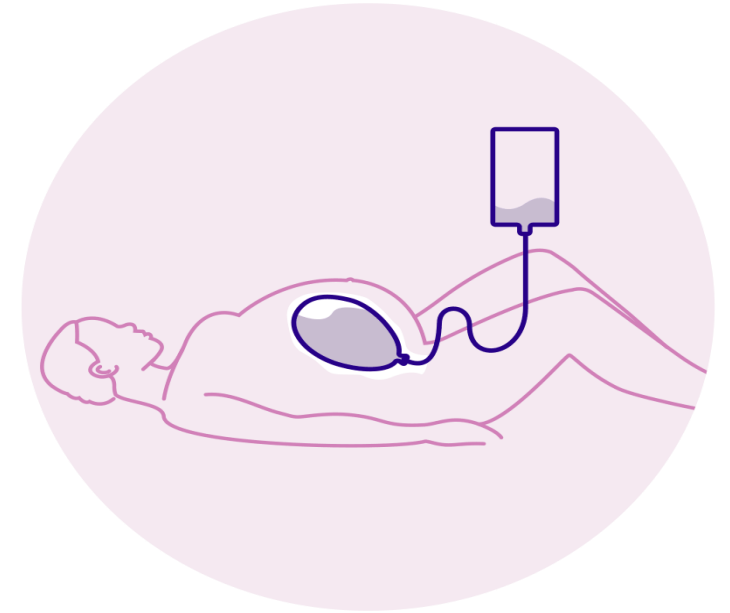
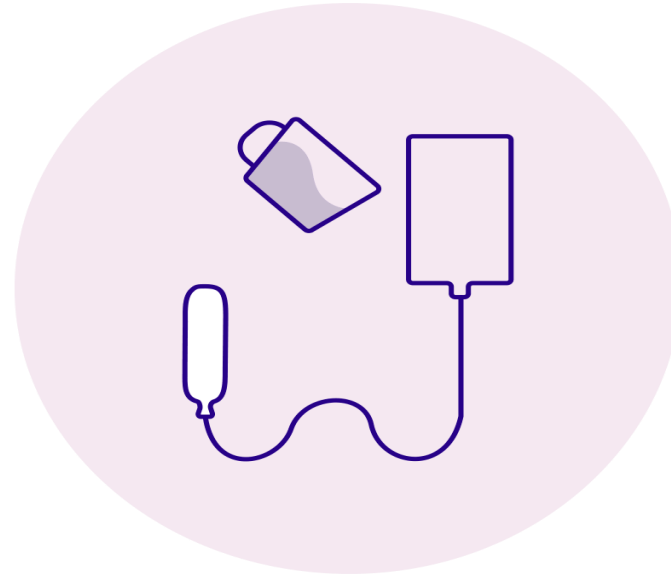


Advances in the field of PPH

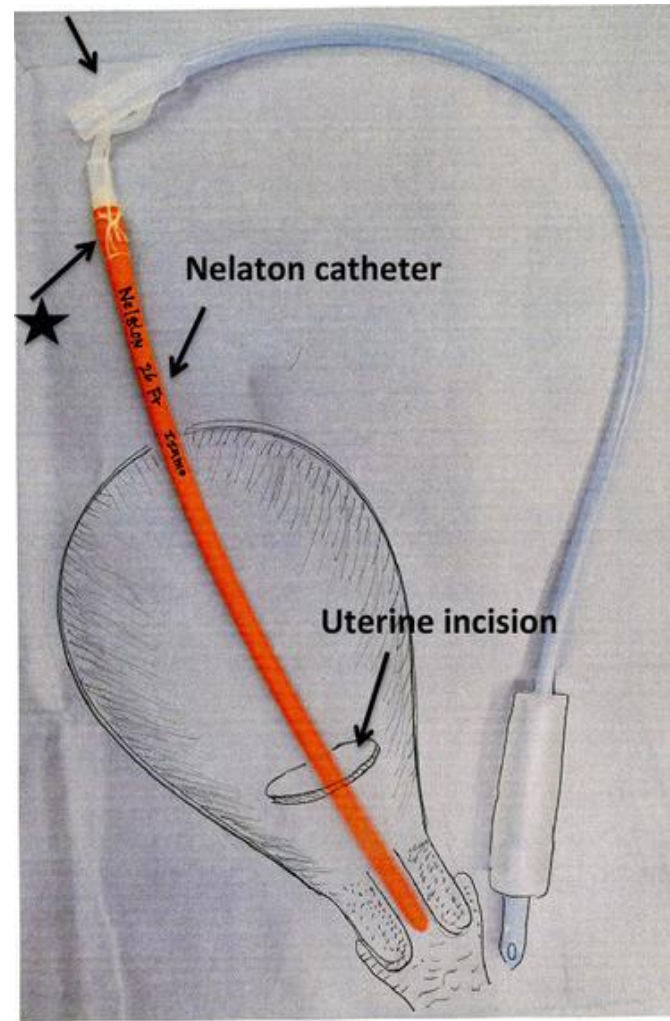
Conservative management using the positive Uterine Balloon Tamponade (UBT) for Atony

Most conservative methods for PPH aim to mimic the mechanism of Bimanual compression i.e. force the two walls of the uterine cavity together so they provide their own compression of the bleeding sites

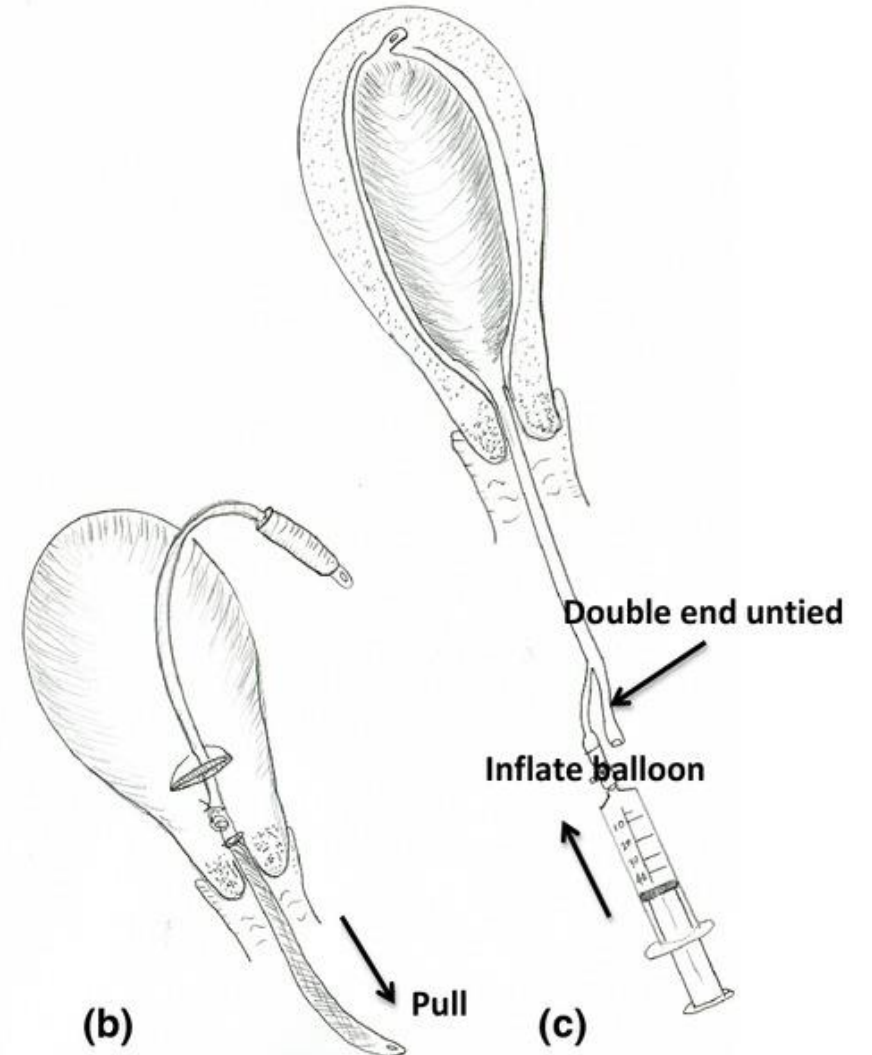
Ellavi Uterine Balloon Tamponade (SINAPI ~ 70,000 ugx)



Bakri UBT



(a)

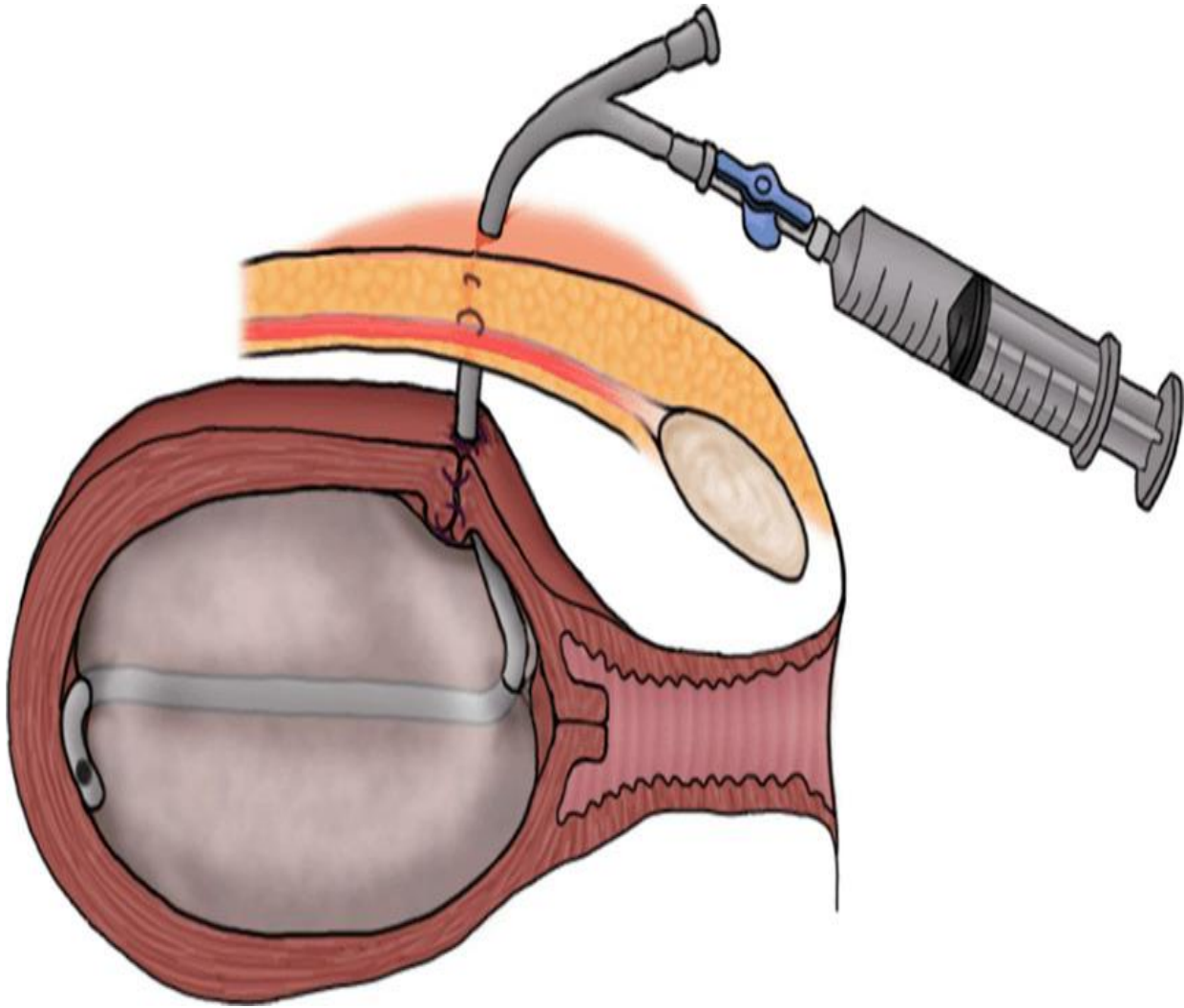


(b)

Inflate balloon

(c)

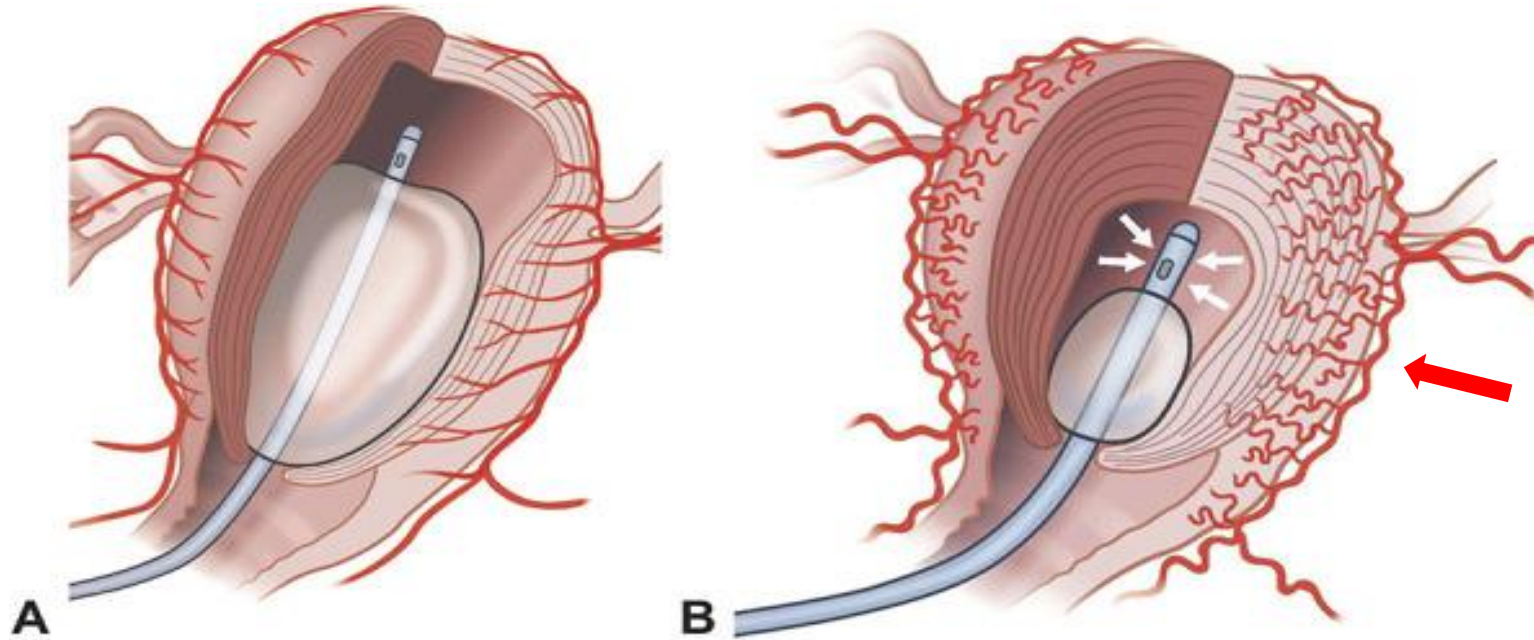
Transabdominal Bakri balloon tamponade approach



Yoong, W., Andersen, K., Adeyemo, A. and Hamilton, J. (2015), Novel transabdominal drainage of Bakri balloon following massive obstetric hemorrhage in a woman with cervical stenosis. *Acta Obstet Gynecol Scand*, 94: 1145–1146.

Makeshift UBT





Negative pressure tamponade

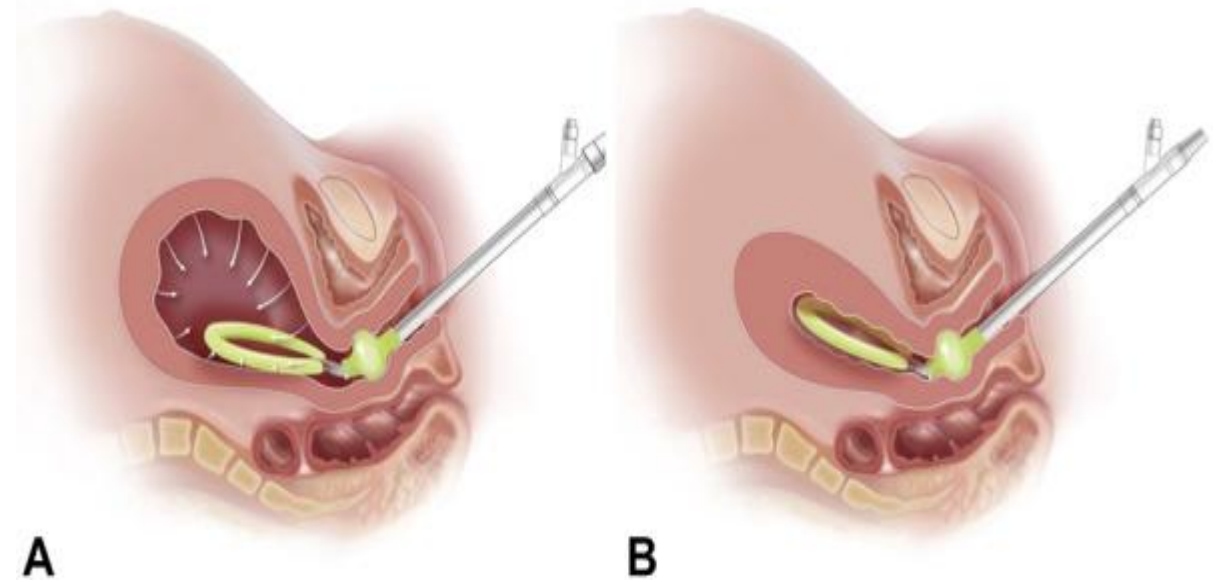
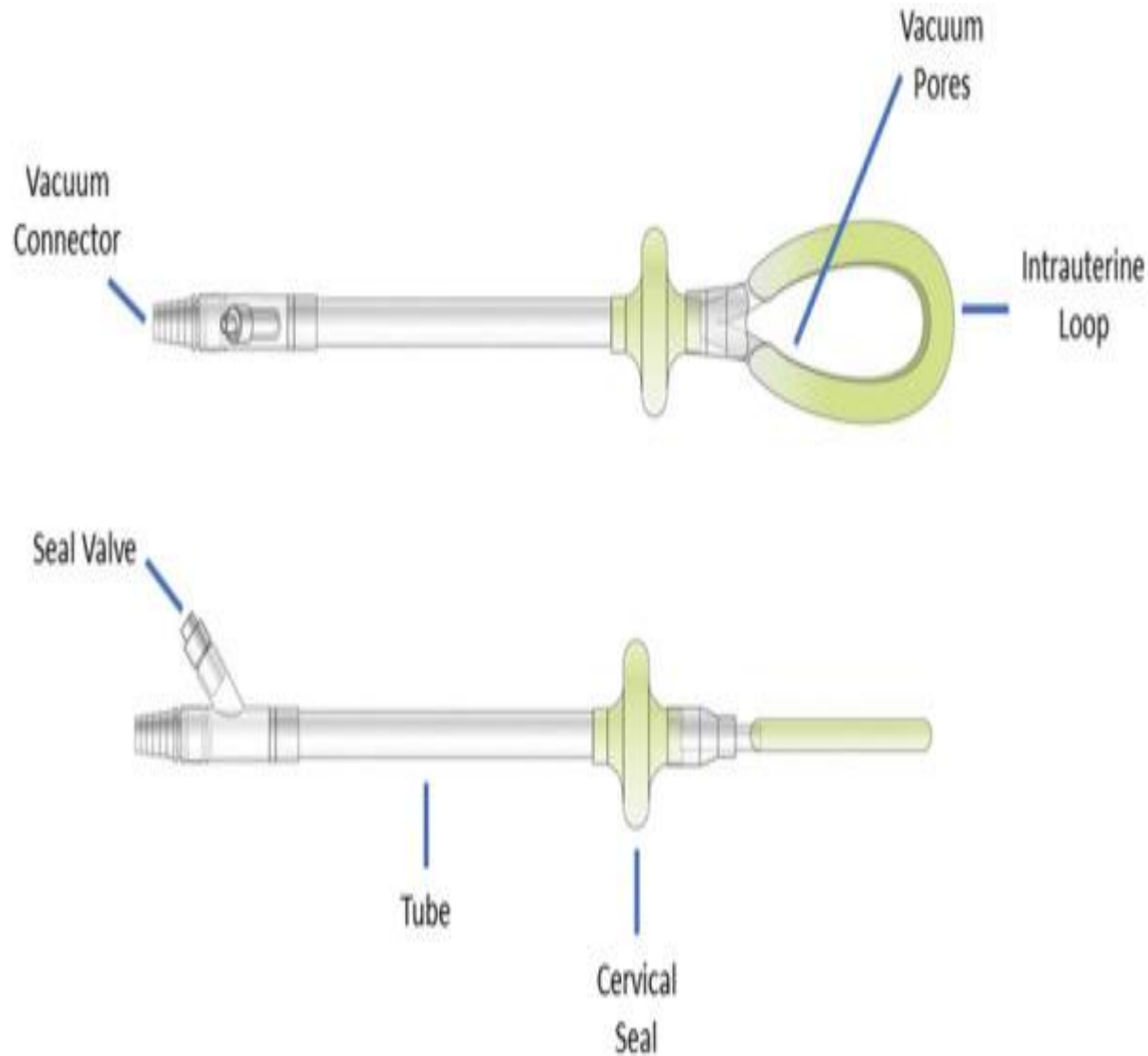
In contrast to positive pressure tamponade, Here blood is sucked out of the uterine cavity using a continuous vacuum.

The Uterine walls are sucked inward and collapse onto each other hence providing their own tamponade. This can be used for both atony and other causes like placental bed issues



- Haslinger C, Weber K, Zimmermann R. **Vacuum-Induced Tamponade for Treatment of Postpartum Hemorrhage.** *Obstet Gynecol.* 2021 Sep 1;138(3):361–365. doi: 10.1097/AOG.0000000000004510. PMID: 34352848; PMCID: PMC8366764.

Negative pressure Uterine tamponade



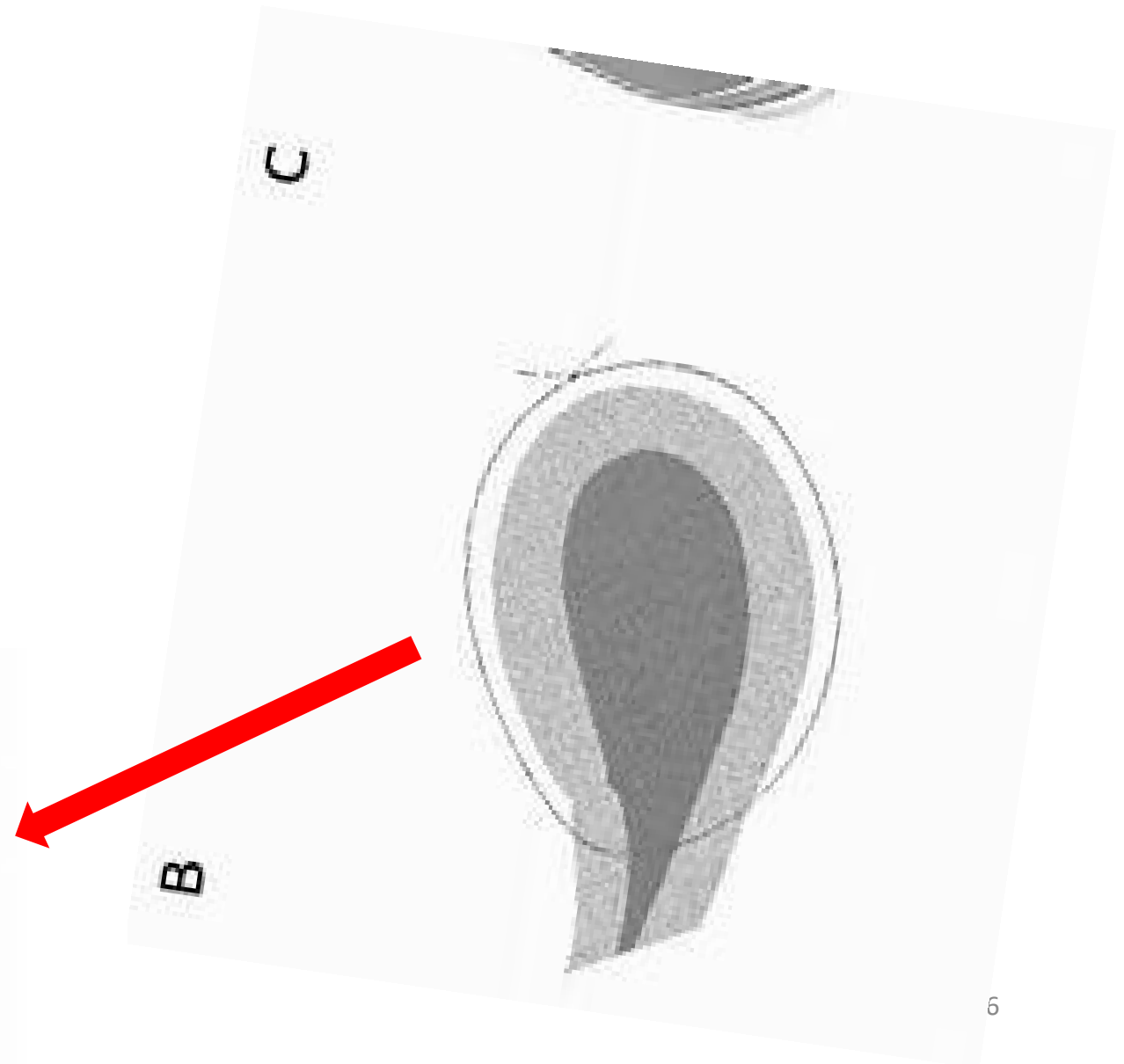
D'Alton ME, et al. Intrauterine Vacuum-Induced Hemorrhage-Control Device for Rapid Treatment of Postpartum Hemorrhage. *Obstet Gynecol.* 2020 Nov;136(5):882-891.

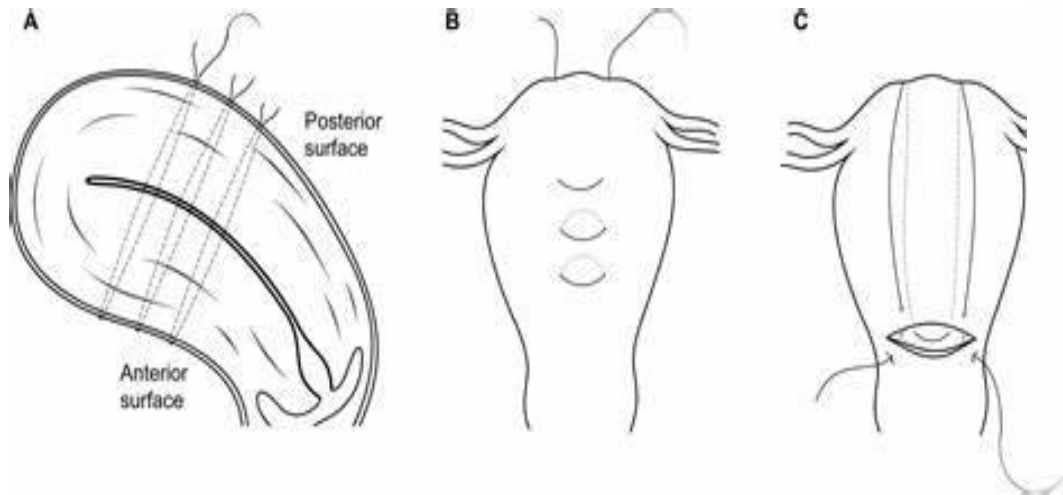
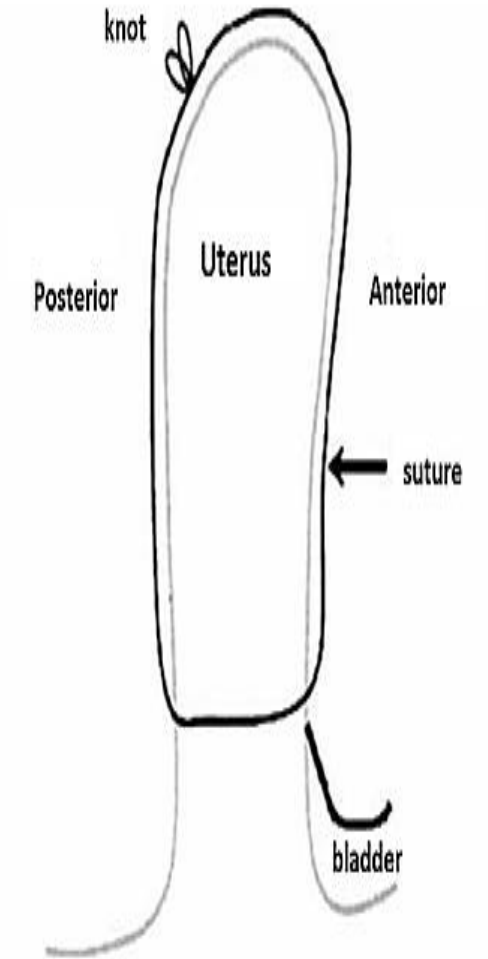
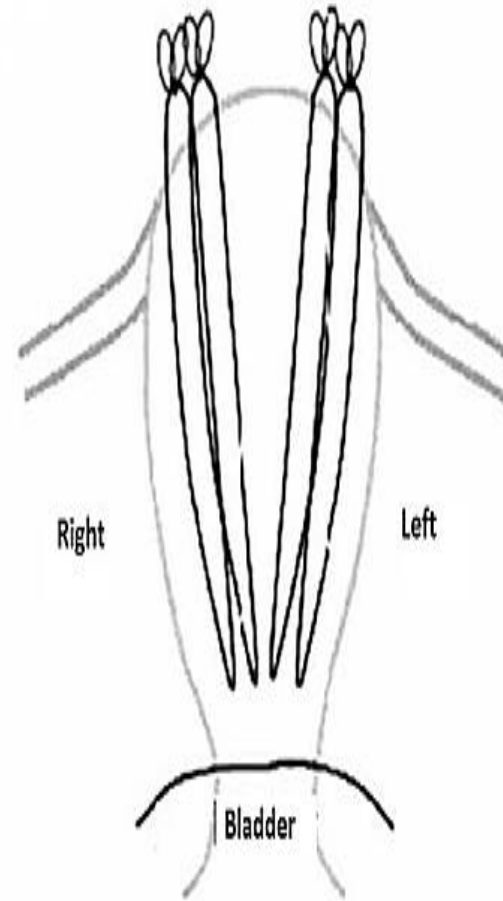
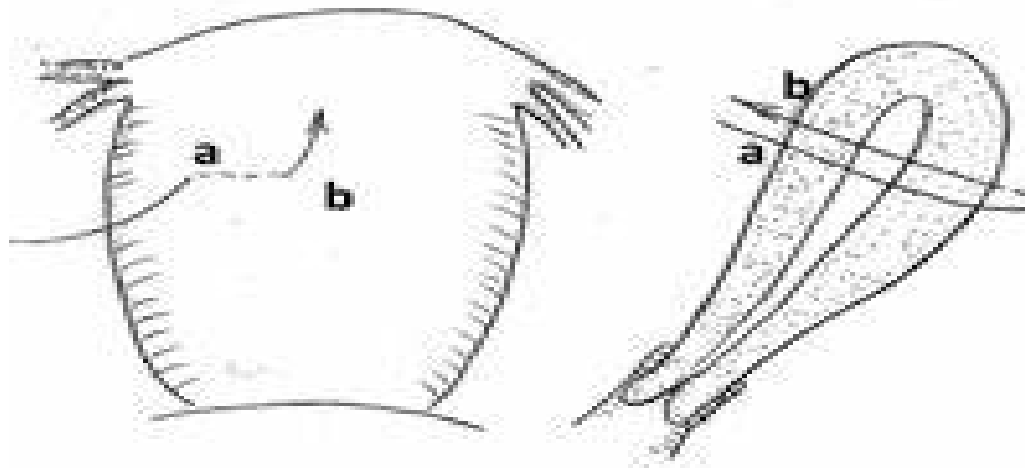
Advances in Surgical management of PPH

These are methods used to try and conserve the uterus especially in women where fertility is still desired at all costs

Uterine suture compression techniques (B Lynch brace suture)

- Simple to apply
- Life saving
- Safe
- Uterine saving & Fertility conserving
- Alternative to major surgical procedures to control pelvic arterial pulse pressure or hysterectomy.





Medicines for PPH

Medication has also changed recently and some is in the new guidelines

CARBETOCIN



CARBOPROST 250 mcg/ml

The clinical microsystem concept to management of PPH as QI tool

1. Group of people who work together on a regular basis to provide care and the subpopulation of patients who receive that care.
2. Must produces services and care that can be measured as performance outcomes e.g. reduction of maternal deaths

Clinical microsystems

- A clinical microsystem is the place where patients, families, care teams, and information come together.
- Whenever and wherever there is a patient who is being cared for by a clinician or a clinical team, there is a microsystem with that patient at its center.
- It is the place where quality, safety, outcomes, satisfaction, and staff morale are created.

Clinical microsystem

- A clinical microsystem consists of;
 1. a small group of doctors, nurses, midwives, anaesthetic officers and other clinicians;
 2. some administrative support;
 3. some information and information technology; and
 4. a small population of patients,
 5. all of which are interdependent and work together toward a common aim.
- **Local Maternity and Newborn Systems** (LMNS) is a larger version of the clinical microsystem

The 5Ps of Clinical Microsystems

1. **Purpose:** Clearly stated Quality Improvement purpose and mission
2. **Patients:** Clear information sharing about patients among team members to improve decision making
3. **Professionals:** There are no inferior jobs in any organization, no matter the assigned role/task - be a star at your role
4. **Processes:** review processes, systems, and steps to care for patients
5. **Patterns:** Does everyone in your microsystem meet regularly to discuss what patients want and need or to talk about care or the microsystem's quality, cost, and safety outcomes?

Questions?