Complications of 3rd stage of labor

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OBJECTIVES

- Enumerate complications of 3rd stage of labor
- Provide a definition of PPH
- Review the risk factors for PPH
- Understand the nature and importance of rapid diagnosis and treatment
- Discuss Retained placenta & uterine inversion

Complications of 3rd stage of labor

- PPH
- Retained placenta
- Uterine inversion
- Obstetric shock

POSTPARTUM HEMORRHAGE [PPH]

- **Definition:**
- More than 500 ml of blood loss following normal vaginal delivery of the fetus or 1000ml following Cesarean section.
- Clinically the amount of blood loss from or into the genital tract which will adversely affect the general condition of the patient
- Hemorrhage leading to fall in hematocrit by 10 %.
- Incidence – 1 %

Post Partum Hemorrhage - Definition

- **Major haemorrhage**

  is defined as an estimated blood loss of more than 2500 ml

  or the transfusion of 5 or more units of blood

  or treatment of coagulopathy

TYPES

- **Primary PPH (Immediate,Early)**

  Excessive vaginal bleeding within first 24 hours of childbirth.

- **Secondary PPH (Delayed,Late)**

  Excessive vaginal bleeding after 24 hours within 6-12 weeks post partum

- **Primary is two types:**
- A] Third Stage hemorrhage
- B] True Post Partum hemorrhage

- **Third Stage hemorrhage**:
- Bleeding occurs before the expulsion of placenta
- Example- Placenta accreta, retained placenta
- **True Postpartum hemorrhage:**
- Occurs after the expulsion of placenta

Normal Mechanism of Hemostasis

- ‘Living ligatures’ – Baskett 2000
- Intrinsic vasospasm
- Local decidual hemostatic factors including tissue factor & type 1 plasminogen activator inhibitor
- clotting factors (except I and XI)

Postpartum Haemorrhage (PPH)

Problems:

Blood loss is usually underestimated because:

- Visual quantification is difficult
- Blood is mixed with amniotic fluid or urine.
- Bleeding may occur slowly over several hours and may not be recognized until the woman suddenly enters shock.

Note: A woman with a normal haemoglobin level will tolerate blood loss that would be fatal for an anemic woman.

Magnitude of the Problem

- 529,000 maternal deaths each year globally
- 20-60% are due to PPH
- Many will suffer morbidity

Magnitude of the Problem (cont'd)

- 14 million cases of PPH per year
- Uterine atony accounts for an estimated 70 to 90 % of cases
- On average a woman will die within 2 hours after onset of excessive bleeding if she does not receive prompt treatment

Physiologic Response to Pregnancy

- Increased vascular volume
- Decreased systemic vascular resistance
- Increased maternal heart rate
- Increased cardiac output
- Placental blood flow 500-650 cc/minut

Physiology of Hemorrhage

- Increased
  - Systemic vascular resistance (SVR)
  - Arterial –Venous O2 (A-V O2) difference
  - Catecholamine release
  - Heart rate (HR)
  - Pulmonary vascular resistance (PVR)
  - Myocardial contractility
  - Platelet aggregation
    - Small vessel occlusion
    - impaired microcirculation
    - Micro-embolization to lungs

Physiology of Hemorrhage

- Decreased
  - Mean arterial pressure (MAP)
  - Central venous Pressure (CVP)
  - Pulmonary Capillary Web Pressure (PCWP)
  - Stroke Work (SW)
  - Stroke Volume (SV)
  - Cardiac Output (CO)
  - O2 Consumption
  - Mixed Venous O2 Saturation (MVO2)

Physiology of Hemorrhage

Adrenergic effect

- Constriction of venules and small veins

  Increased venous return (preload)
- Systemic hypotension
- Decreased capillary hydrostatic pressure
- Fluid mobilization
- Decreased blood viscosity

Physiology of Hemorrhage

Anaerobic metabolism

- Metabolic acidosis
- Hyperventilation

  Increased intra-thoracic pressure

  Incr. venous return
- Vasoconstriction

  Blood redistribution

Blood Loss Estimation

- All studies show gross underestimation of blood loss at delivery
- Visual estimation especially unreliable for small and large amounts of blood loss

***Incidence underestimated 90%

Blood Loss Signs & Symptoms

Blood Loss (%)	Blood Pressure	Signs & Symptoms
500-1000ml (10-15)	normal	Palpitations, dizziness, tachycardia
1000-1500ml (15-25)	Slightly low	Weakness, sweating, tachycardia
1500-2000ml (25-35)	70-80	Restlessness, pallor, oliguria
2000-3000ml (35-45)	50-70	Collapse, air hunger, anuria

>2500cc blood loss – 50% mortality if not managed urgently & appropriately

Impact of Hemorrhage

Maternal

- Hypotension
- Oliguria
- Acidosis
- Collapse
- Acute renal failure
- Shock liver, lung
- ARDS
- Pituitary necrosis

Fetal

- Blood flow redirects to Salvage brain, heart, adrenals
- Ultimately, fetal cerebral blood flow decreases

Etiology

4 T’s

-Tone

-Tissue

-Trauma

-Thrombin

Atonic PPH

- Contributes for 80 % of PPH
- Commonest cause of PPH
- Cause – Faulty retraction of the uterus
- Etiology:
- 1] Grand Multipara
- 2] Over- distension of uterus – Multiple pregnancy, Hydramnios, big baby
- 3] Anemia

- 4] Prolonged Labor
- 5] Anaesthesia – Halothane. Ether,
- Cyclopropane
- 6] Uterine fibroid
- 7] Precipitate labor
- 8] Malformations of uterus – septate uterus, bicornuate uterus
- 9] Ante partum hemorrhage
- 10] Initiation & augmentation of delivery with oxytocin

Traumatic PPH

- 1] Cervix – lacerations
- 2] Vaginal laceration
- 3] Perineum injury
- 4] Paraurethral injury
- 5] Uterine rupture

Coagulation defects

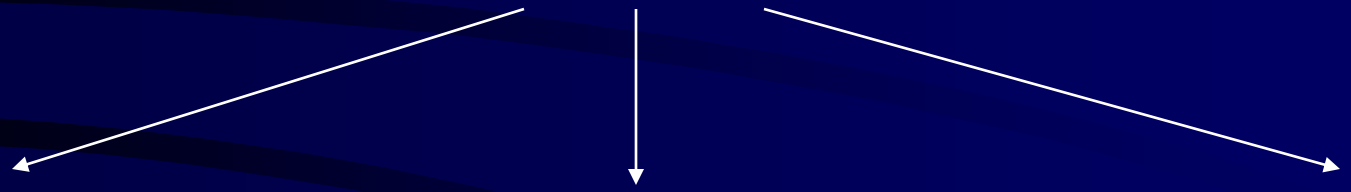
- Congenital :Von Will brand's disease
- Acquired
  - DIC(placental abruption, IUFD, sepsis)
  - Dilutional coagulopathy(fluid resuscitation/massive BT)
  - Hypoxia & acidosis
  - Severe PET/Eclampsia

Risk Factors in PPH

	Etiology Process	Clinical Risk Factors
Tone	Overdistended Uterus	Polyhydramnios, Multiple Gestation Macrosomia
	Uterine Muscle Fatigue	Rapid Labor, Prolonged Labor High Parity
	Intra Amniotic Infection	Fever, Prolonged ROM
	Functional/Anatomic Distortion of the Uterus	Fibroid Uterus Placenta Previa Uterine Anomalies
Tissue	Retained Products Abnormal Placenta	Incomplete Placenta at Delivery Previous Uterine Scar High Parity
	Retained Blood Clots	Atonic Uterus
Trauma	Lacerations	Precipitous or Operative Delivery
	Extensions at C/S	Malposition, Deep Engagement
	Uterine Rupture	Previous Uterine Surgery
	Uterine Inversion	High Parity, Fundal Placenta
Thrombin	Pre-existing	Coagulopaties, Liver Disease
	Acquired in Pregnancy	ITP, DIC
	Therapeutic Anti-coag	History of clots

Management of PPH

PostPartum Hemorrhage (PPH)



Predict ***Prepare*** ***Handle***

Prevention of PPH

Patients at risk

↓

1. *- Prepare for PPH*
2. *- Timing of Delivery*
3. *- Proper labor management*
4. *-Exploration of cervicovaginal canal*
5. *-Intense monitoring up to 2hr*
6. *- Increased postpartum/postoperative surveillance*

Prevention of PPH

1.- Prepare for PPH

Personnel

- -Nursing
- -Anesthesia
- - Surgical assistance

Drugs/Equipment

- -Oxytocin
- -Carbetocin
- -Methergine
- -Prostaglandins
- -Crystalloids
- -Blood/Bl.products
- -Surg. Instruments
- -Haemostatic balloons (Cook, S-B, Foley)

Prevention of PPH

2.- Timing of Delivery

- Placenta previa
- Previous classical cs
- Previous myomectomy
- Fibroid uterus

Elective C/S

↓

after completion of 37 weeks

Avoids uterine rupture
Avoids significant hemorrhage

Proper labor management

- Management of prolonged labor
- Slow delivery of baby
- Active management of 3rd stage

1. Administration of uterotonics (oxytocin 10U/Ergometrine 0.2mg IM)
2. Placental delivery by controlled cord traction
3. Uterine massage after placental delivery

HAEMOSTASIS algorithm

- H- ask for help
- A- assess (vitals, blood loss) & resuscitate
- E -

1. Establish etiology(tone,tissue,trauma,thrombine)
2. Ecbolics (syntometrine,ergometrine)
3. Ensure availability of blood

- M - massage the uterus
- O – oxytocin infusion & prostaglandin

- S-
  - shift to operating theatre
  - Bimanual compression
  - Pneumatic anti-shock garment
- T- Tissue & trauma to be excluded
- A-apply compression sutures
- S-systematic pelvic devascularisation
- I -interventional radiology
- S-subtotal/total hysterectomy

Identifying the Problem
Vaginal Bleeding After Childbirth

Symptoms and Signs	Probable Diagnosis	Caution
Immediate PPH		
❖Uterus soft, not contracted. ❖Uterus bigger than expected. ❖Placenta may be undelivered or delivered partially or completely.	**Atonic Uterus**	External bleeding may be light if a clot blocks the cervix.
❖Bleeding is bright red. ❖Complete placenta. ❖Uterus contracted.	**Tears of Cervix or Vagina or Perineum**	High vaginal or cervical tears may be difficult to visualize.
❖Placenta not expelled within 30 minutes after childbirth. ❖Uterus usually not well contracted.	**Retained Placenta**	Hastening placental separation by pulling on the cord may rupture the cord.

Identifying the Problem
Vaginal Bleeding After Childbirth (contd)

Symptoms and Signs	Probable Diagnosis	Caution
Immediate PPH		
❖Uterine fundus not felt on abdominal palpation ❖Slight or intense pain. ❖ Inverted uterus may or may not be seen at vulva.	Inversion of Uterus	There may be no bleeding with complete inversion. Shock may be out of proportion to the amount of blood loss.
Immediate or Delayed PPH		
❖Blood fails to clot	Bleeding due to Coagulation defect	This might be the cause or result of PPH
Delayed PPH		
❖Uterus softer and larger than expected. ❖May or may not have foul smelling discharge.	Retained products of conception. ± Infection	Treat early to prevent septicemia.

“The golden hour” of resuscitation

- Golden hour is the time by which resuscitation must be initiated to ensure better survival.
- “Rule of 30”-if SBP falls by 30mmHg,HR rises by 30beats/min,RR ↑to 30breaths/min, Hct drop by 30%,urine output <30ml/hr she is likely to have lost at least 30% of her bl vol&is in moderate shock leading to severe shock.
- Shock index-SBP/HR.normal value-0.5-0.7.with significant hge -0.9-1.1.better indicator for early acute bl loss.

Initial Management

- ABC's
- Call for help
- Mobilize team (staff, anesthesia, blood bank etc)
- IV access
- Fluid resuscitation
- Examine patient including fundal massage, dx trauma/ inversion/ other etiologies, and fundal massage
- Foley catheter
- Blood work (CBC, coag profile, cross match)
- Reverse coagulation abnormality

Intravenous fluids:

- CRYSTALLOIDS

SALINE	**Cheap, easily available**	**Disadvantage: hyperchloremic acidosis, some procoagulant effect.**
HARTMANN'S SOLUTION	No risk of anaphylaxis, minimal effect on base deficit, easily available.	Mildly hypotonic
5% DEXTROSE	No place in acute expansion of intravascular volume	Hypotonic, rapid distribution to intracellular & extracellular space
HYPERTONIC SALINE	Rapid expansion of intravascular space, beneficial effect on endothelial edema	Insufficient data.

COLLOIDS

GELATINS	**Largely remains in intravascular space for 2-4 hrs**	**Risks of anaphylaxis, no clear survival over crystalloids**
4% HUMAN ALBUMIN	More physiological than gelatin, remains intravascular for 12 hrs	Expensive, no clear advantage over crystalloids
HYDROXY ETHYL STERCH	Remains in intravascular space for 12-24 hrs	Risk of coagulopathy, renal injury

Uterine atony

- Uterine massage-manual(over funds) / bimanual

- Oxytocin-infusion(40U in 500ml NS@125ml/hr)

S/E- hypotension, volume overload(prolong use), ischaemic changes in echo.

- Ergot alkaloids-0.2mg methyl ergonovine IM

C/I: Hypertension, S/E:Hypertension,M.Ischaemia

- Prostaglandins-

✓ Carboprost /15methylPGF2∞:80-90% effective in refractory atony.0.25mg IM/intramyometrial, repeated every 15-90 min, max 8 times(2mg), C/I:Asthma, S/I:Diarrhoea,vomiting,fever,headache,flushing.

✓ Dinoprostone /PGE2:P/v gel(get washed out)/P/R suppositories(20mg).stored in 4°C.

- ✓ Misoprostol/PGE1:tab 400-600µg orally /800µg rectally have been tried.
- ✓ S/E- pyrexia, shivering. have a clear dose effect relationship

- ➢ However Recent Cochrane review(Mousa& Alfirevic,2007) concluded no benefit of misoprostol in comparison to standard therapy with oxytocin&ergometrine.(Cochrane database sys review 2007)

Blood replacement in PPH

- Indication: continuing bleeding, loss of >30% bl vol, hemodynamic instability,hct <30 vol%
- Compatible whole bl is ideal for Ac.hge
- Platelet transfusion is considered in a bleeding patient with PL<50,000/µL
- 1lt of FFP should be transfused with every 6U of bl to prevent dilutional coagulopathy/when fibrinogen level<100mg/dl.

- Recombinant activated factor vii/ novo seven: FDA approved 4 tx of bleeding in Hemophilia. Now it has been using for severe life threatening obstetrical hge without Hemophilia, bt these are “off label” use.

Blood products commonly transfused

product	Volume/unit	Contents/unit	Effects
Whole blood	500ml	RBCs, plasma, fibrinogen	Volume restoration ↑Hct 3-4 vol%
Packed RBCs	250ml	RBCs only	↑Hct 3-4 vol%
Fresh frozen plasma	250ml	Colloids & fibrinogen & all clotting Factors	Volume restoration Clotting factors supplementation
Cryoprecipitate	15ml	Fibrinogen, FcVIII, XIII, VWF, fibronectin	Restore fibrinogen
Platelets	50ml	Platelets only	Platelet supplementation

Coagulopathies :

- Coagulopathies are rare.
- Suspect if oozing from puncture sites noted.
- Work up with platelets, PT, PTT, fibrinogen level, fibrin split products, and possibly antithrombin III.

Recombinant Activated Factor VIIa

- Tx of bleeding disorders
- Dose up to 120mcg/kg q2h until hemostasis
- Promising but needs more studies
- $10,000/mg
- Risk thromboembolism

Treatment options for Atonic PPH

- Uterotonics
- Uterine compression
- Uterine packing or tamponade
- B Lynch Suture
- Vessel ligation
- Hysterectomy
- Radiological embolization

USE OF OXYTOCIC DRUGS TO TREAT PPH

Drugs	Oxytocin (Available as Syntocinon)	Ergometrine/ Methyl- ergometrine	15- methyl Prostaglandin F_{2a}	Misoprostol (Cytotec)
Dose and Route	10 units, I/M or slow I/V* I/V: Infuse 20 – 30 units in 1 L I/V fluids, at 60 drops per minute.	0.2 mg, I/M*	0.25 mg, I/M *	1000 mcg, (5 tablets of 200 mcg each), Orally /rectally
Continuing Dose	I/V: Infuse 20 -30 units in I L I/V fluids, at 40 drops per minute.	Repeat 0.2 mg, I/M, after 15 minutes if required. Repeat 0.2 mg, I/M or I/V slowly if required, every 4 hours.	0.25 mg, every 15 minutes	
Maximum Dose	Not more than 3 L of I/V fluids containing Oxytocin.	5 doses (Total 1.0 mg)	8 doses (Total 2 mg)	
Precautions/ Contraindications	Do not give as fast I/V bolus	Pre-eclampsia, Hypertension, Heart disease	Asthma	

*If this doesn't work, then same dose can be given directly in the myometrium

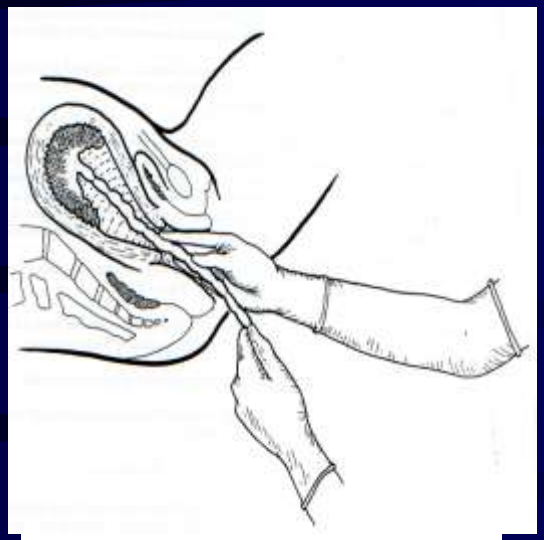
Drug Therapy For PPH

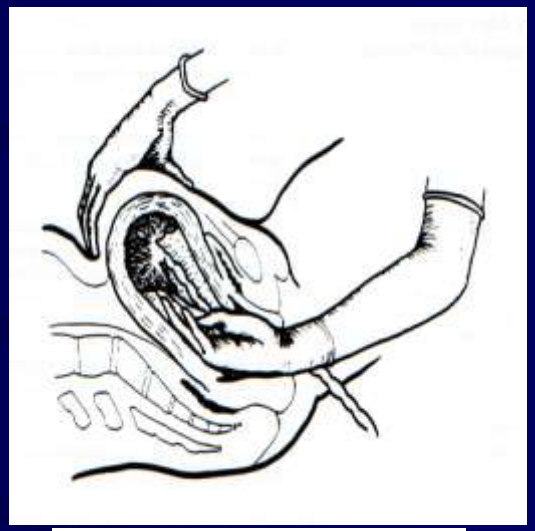
Drug	Dose	Side Effects	Contraindications
Oxytocin	10 IU IM/IMM 5 IU iv bolus 10-40 IU/L	-Usually none -ctx -N&V -water intoxication	-hypersensitivity
Ergot	0.25mg IM 0.125 mg IV Q5mins X 5 doses	-peripheral vasospasm -HTN -N&V	-HTN -peripheral disease -Raynauld's -hypersensitivity
Hemabate (PGF2α)	0.25 mg IM/IMM Q15mins X 8 doses	-flushing -diarrhea/N&V -O2 desats -bronchospasm -restlessness	-hypersensitivity -asthma -active cardiac, pulmonary, renal, or hepatic disease
Misoprostol (PGE1)	400-1000mcg PR/PV/PO X 1 dose	-pyrexia/flushing -N&V/diarrhea -abd pain -HA	-hypersensitivity -pregnancy
Vasopressin	20U/100ml saline Inject 1ml at bleeding site	-acute HTN -bronchospasm -N&V/cramps -HA, vertigo -angina -death if iv	-coronary artery disease -hypersensitivity

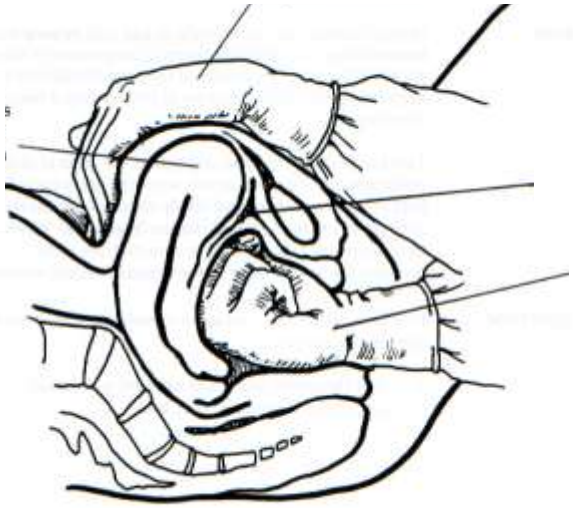
Surgical Management

- Curettage
- Embolization
- Tamponade (Balloon, packing etc…)
- Compression sutures
- Vessel ligation
- Hysterectomy

Manual Removal of Placenta

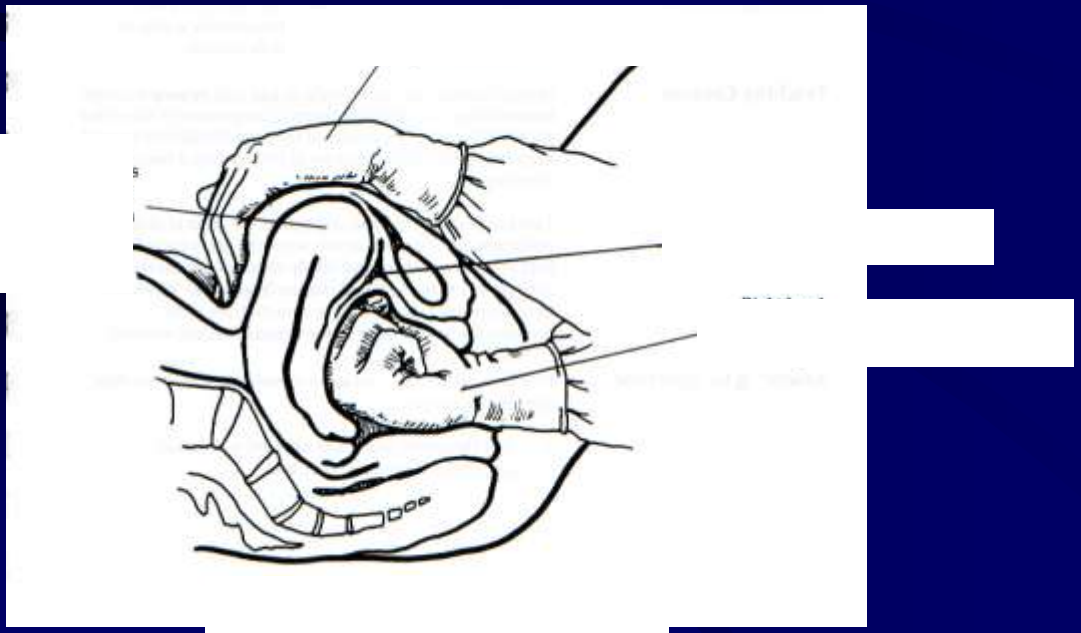






BIMANUAL COMPRESSION OF UTERUS

External Bimanual Compression



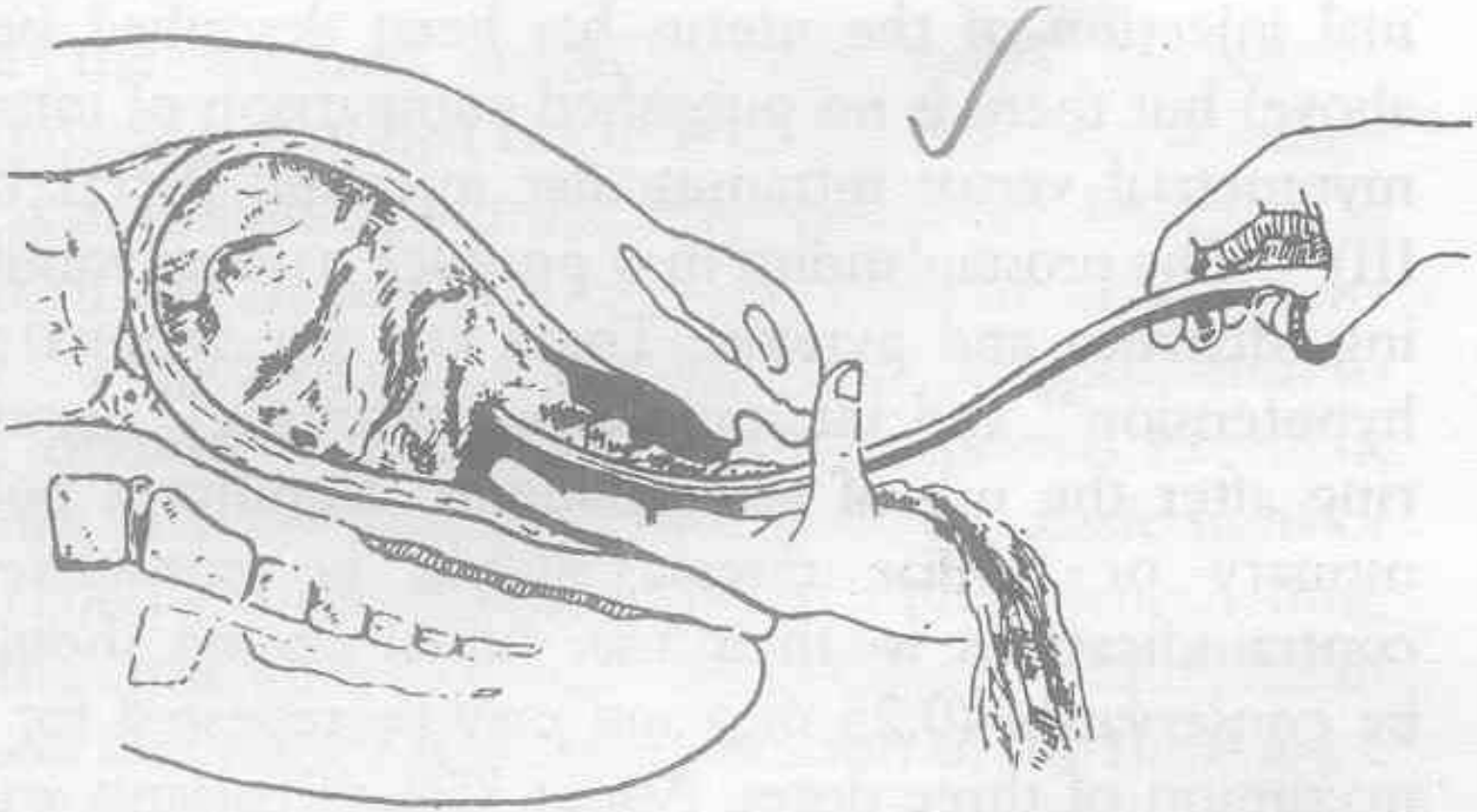
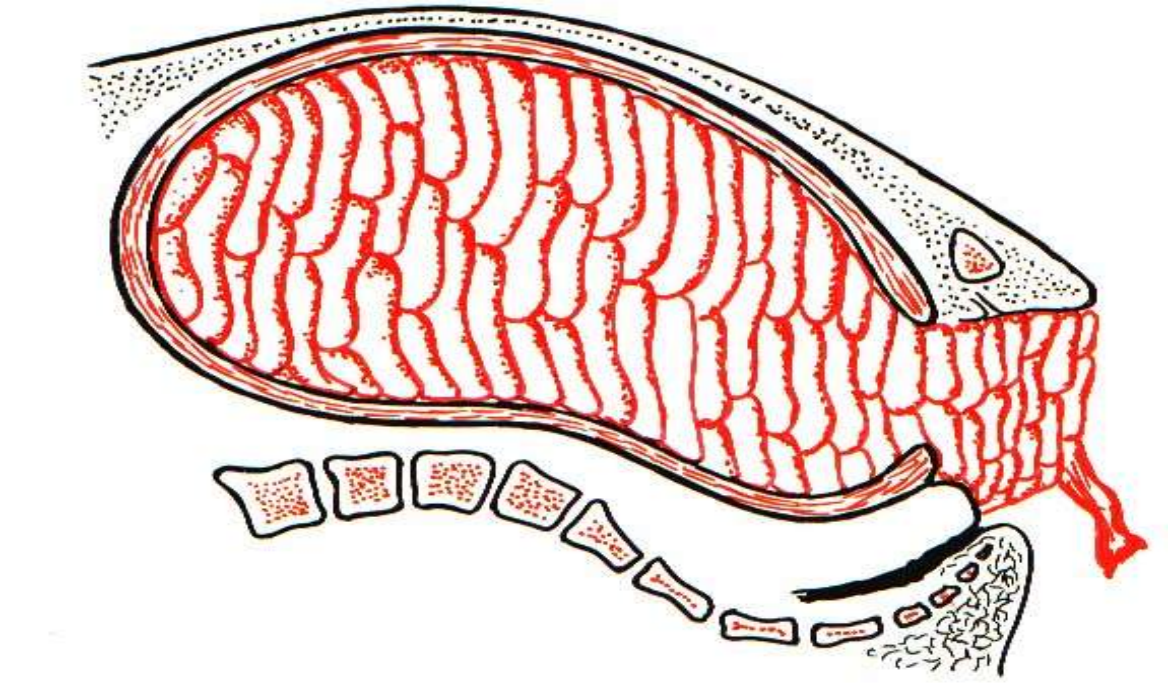


Fig. 69.4 Packing the uterus. The left hand serves as a cervical speculum, while the uterus is tightly packed with gauze with aid of forceps. Reproduced with permission from Cavanagh D, Woods RE, O'Connor TCF, Knuppel RA (1982) *Obstetric Emergencies*, 3rd edn. Philadelphia: Harper & Row.

Packing of Uterine Cavity



PACKING OF THE UTERUS

In JPMC

Uterine packing in 67 cases (of 362 cases of PPH)

Successful in 91%

Tamponade

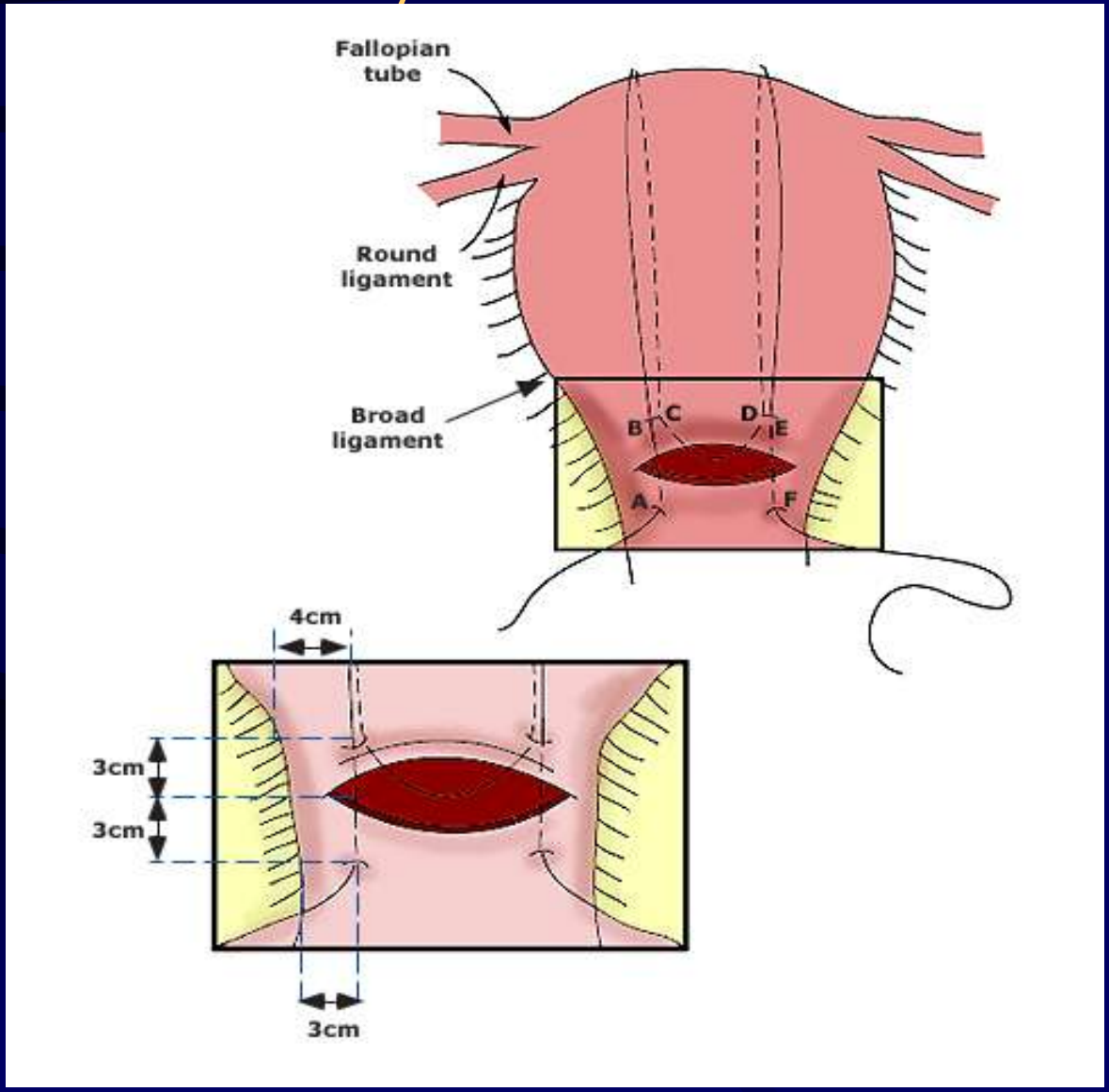
- **Bakri Balloon**
  - Silicone balloon - 500cc capacity
- Foley catheter with 30cc balloon
- Sengstaken-Blakemore Balloon
- Vaginal packing
- Saline filled glove

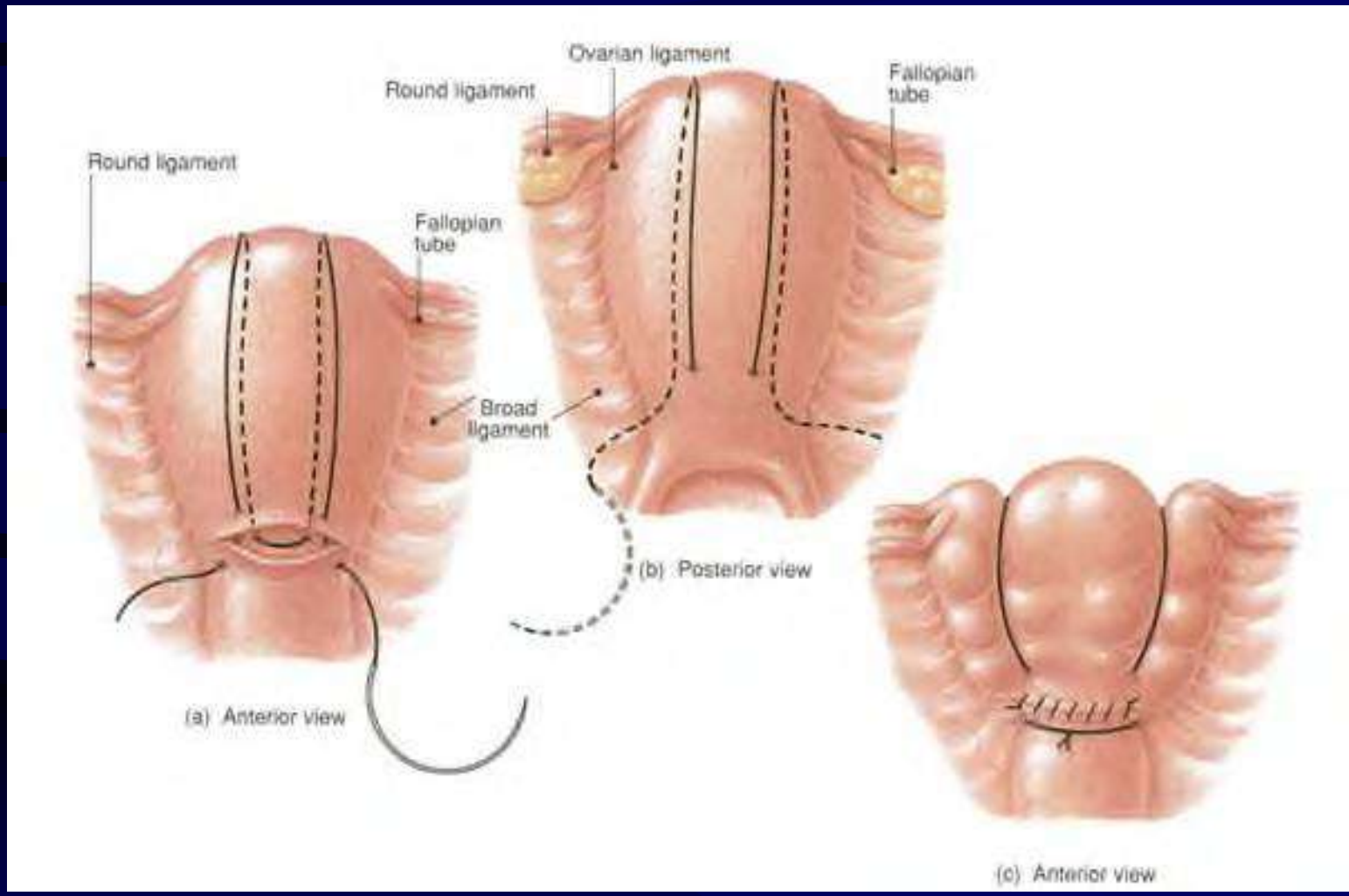
B-Lynch Suture
(Brace suture)

- First reported by B-Lynch et al (UK) in 1997
- Alternative to more complicated surgery
- 1300 successful operations

J.Obst Gynae 2005 Feb

B-Lynch Suture

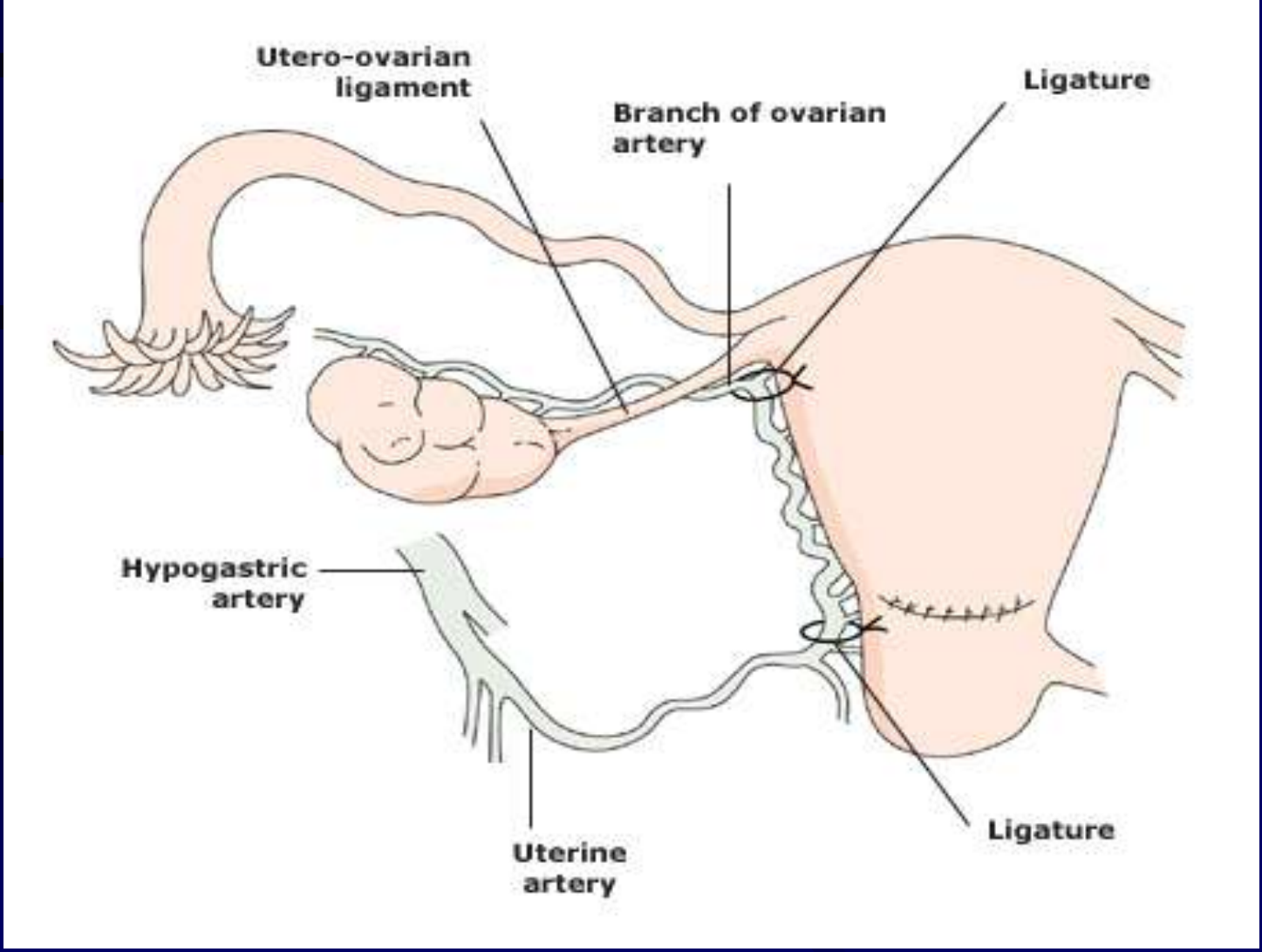



Ovarian ligament
Round ligament
Fallopian tube
Round ligament
Fallopian tube
Broad ligament
(b) Posterior view
(a) Anterior view
(c) Anterior view

Vessel Ligation

- Uterine
  - O'Leary Stitch
  - Chromic 0 passed through lateral aspect of lower segment as close to cervix as possible and then through broad ligament lateral to vessels
- Ovarian
  - distal to cornua by passing suture through myometrium medial to vessels

Vessel Ligation



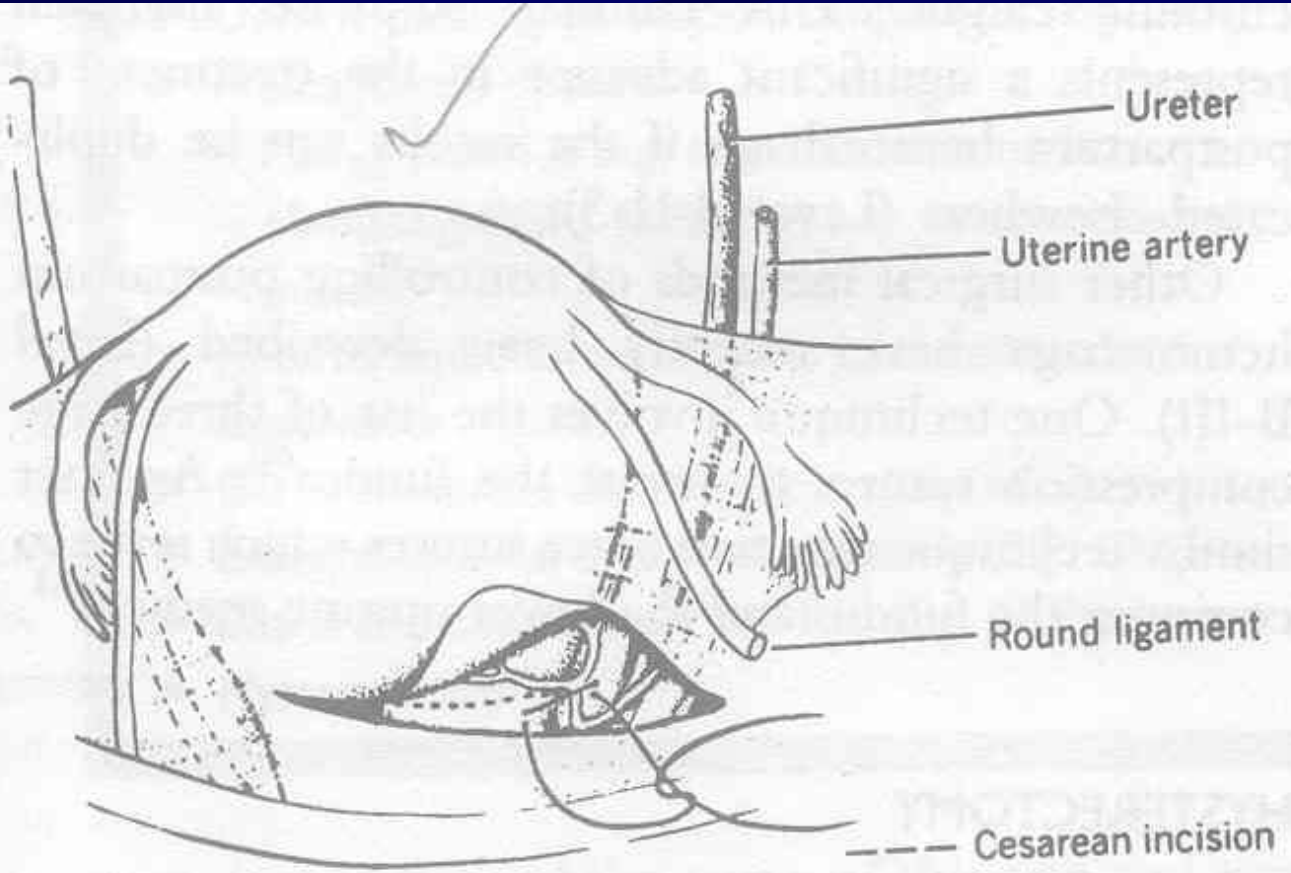


Fig. 69.5 Operative technique for uterine artery ligation. The vesicouterine fold of peritoneum has been incised transversely and the bladder mobilized inferiorly. A number 1 chromic catgut suture on a large smooth needle has been placed through the avascular space of the broad ligament and through the uterus. The suture includes the uterine vessels and several centimeters of myometrium. Reproduced with permission from Pauerstein C (1987) *Clinial Obstetrics*. New York: Wiley.

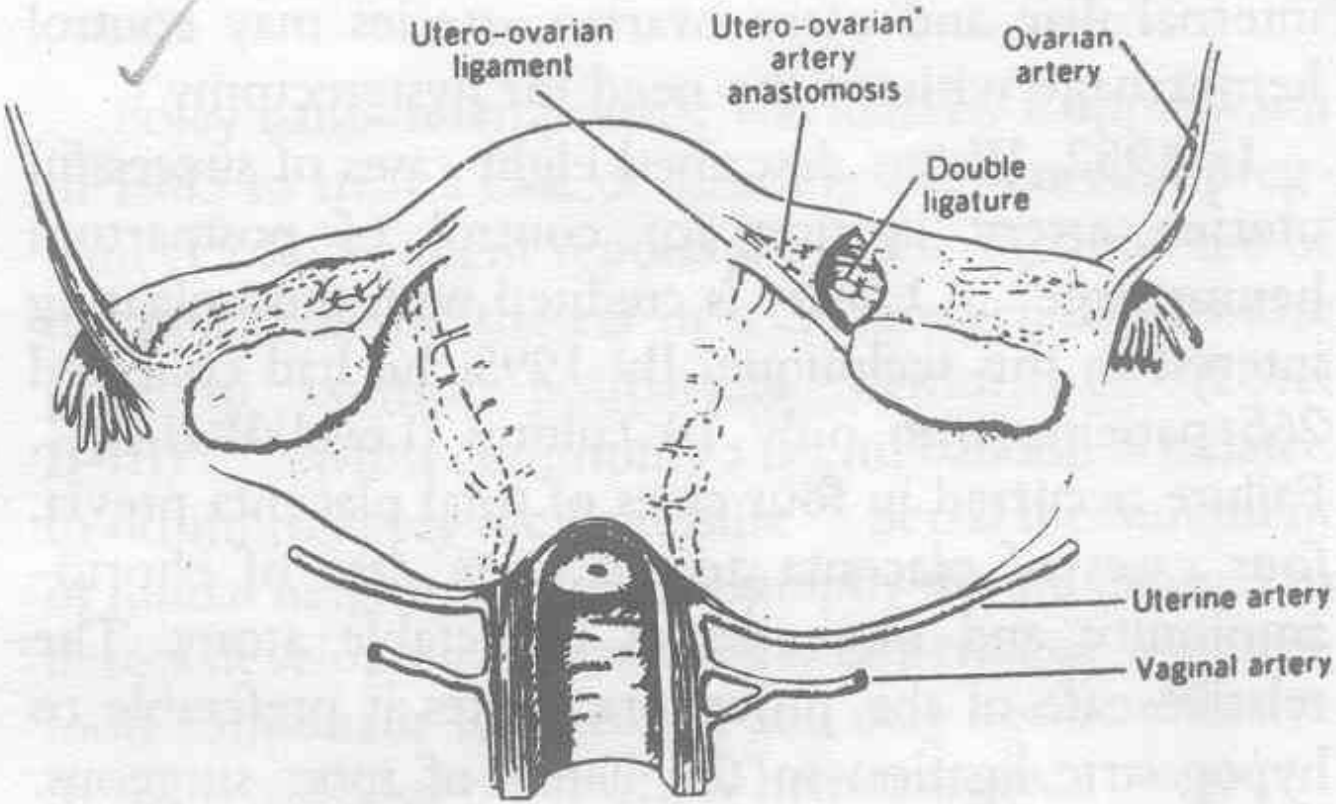


Fig. 69.7 Area for ovarian artery ligation. Two free ties of 2–0 silk suture are used to ligate the ovarian artery bilaterally near its anastomosis with the uterine artery. An avascular area of mesovarium near the junction of the utero-ovarian ligament with the ovary is the site chosen. Reproduced with permission from Pauerstein C (1987) *Clinical Obstetrics*. New York: Wiley.

Traumatic PPH
(Uterus well contracted)

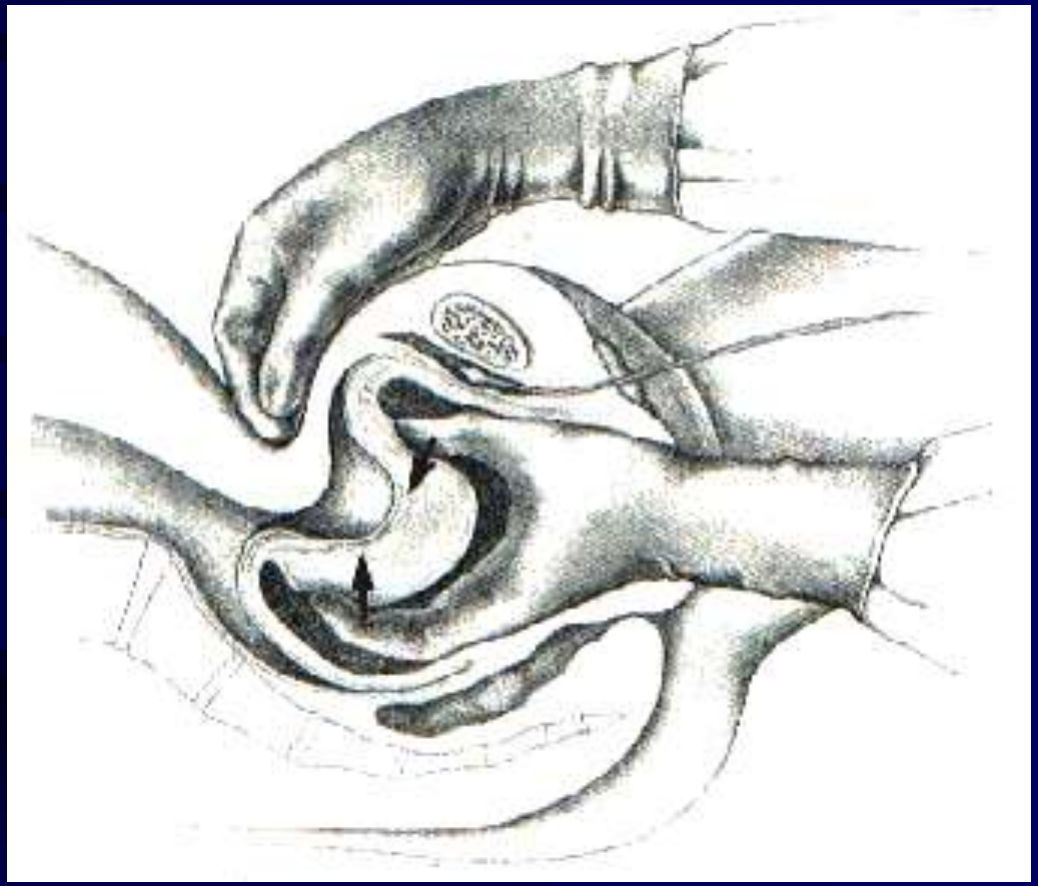
- Apply antiseptic solution to the vagina and cervix.
- Examine & Identify tears of perineum/ vagina &/or cervix
- Perform haemostatic suturing
- If the cervical tear apex is difficult to reach and ligate grasp with ring forceps
- Ruptured uterus requires
  - Repair/
  - Hysterectomy
- Refer if expertise &/or resources not available

Specific Management

Inversion of uterus

- Withhold oxytocics
- Do not remove placenta
- Immediate manual replacement/
- Hydrostatic replacement (O'Sullivan)/
- Manual replacement of uterus under general anesthesia/
- Laprotomy to correct inversion
- Once uterus replaced
  - Start syntocinon infusion
  - Manual removal of placenta followed by uterine massage

Manual Correction of Inverted Uterus



MANAGEMENT OF PPH

Step 1
Initial Assessment and Treatment

Resuscitation
- large bore IV (s)
- oxygen by mask
- monitor BP, P, R, U/O
+/– catheter
+/– oxygen saturation

Assess Etiology
- explore uterus *(tone, tissue)*
- explore LGT *(trauma)*
- review history *(thrombin)*
- observe clots

Laboratory Tests
- CBC
- coagulation screen
- group and cross

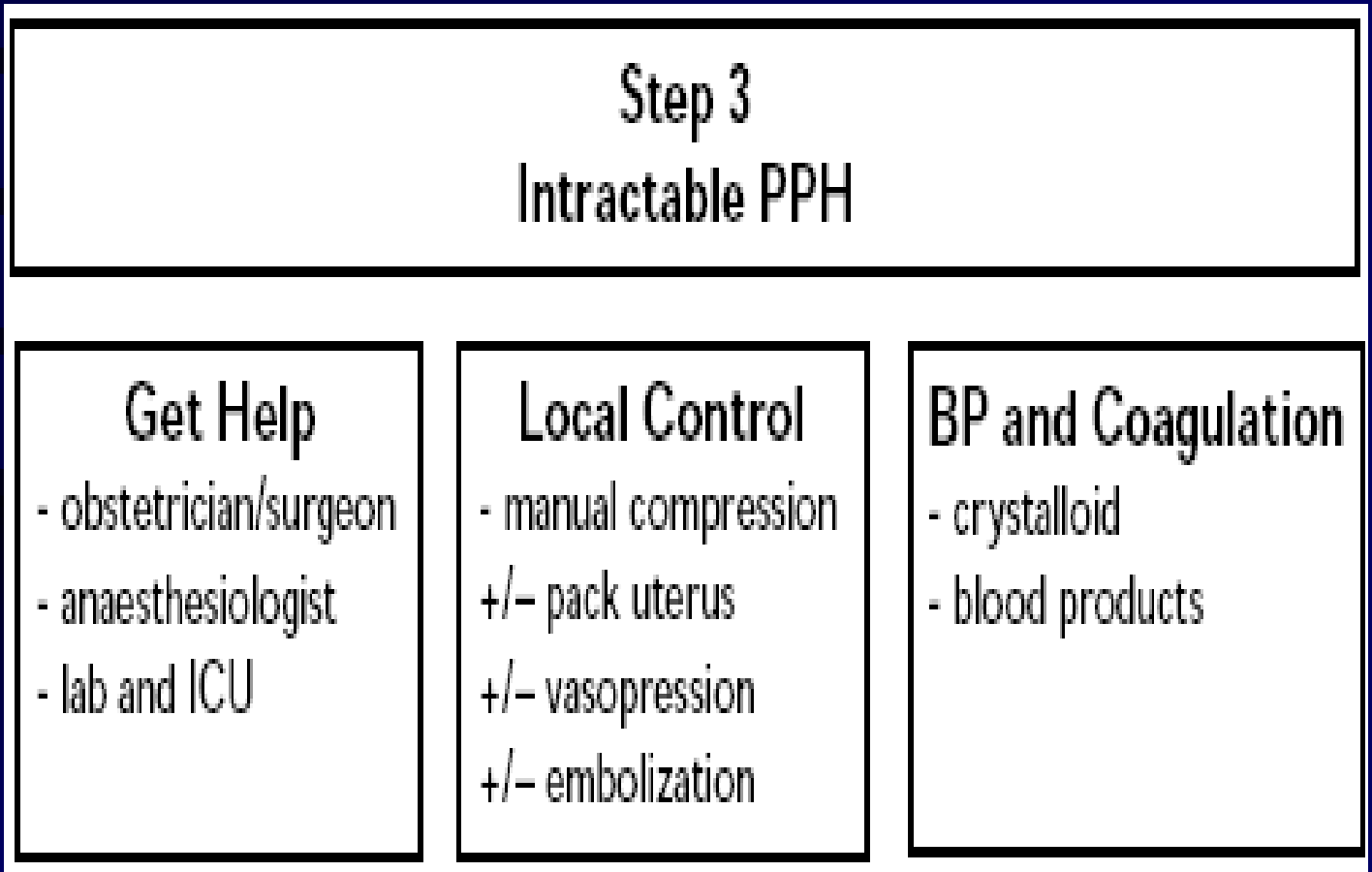
MANAGEMENT OF PPH

Step 2 Directed Therapy			
"Tone" - massage - compress - drugs * *See Table III*	*"Tissue"* - manual removal - curettage	*"Trauma"* - correct inversion - repair laceration - identify rupture	*"Thrombin"* - reverse - antiacoagulation - replace factors

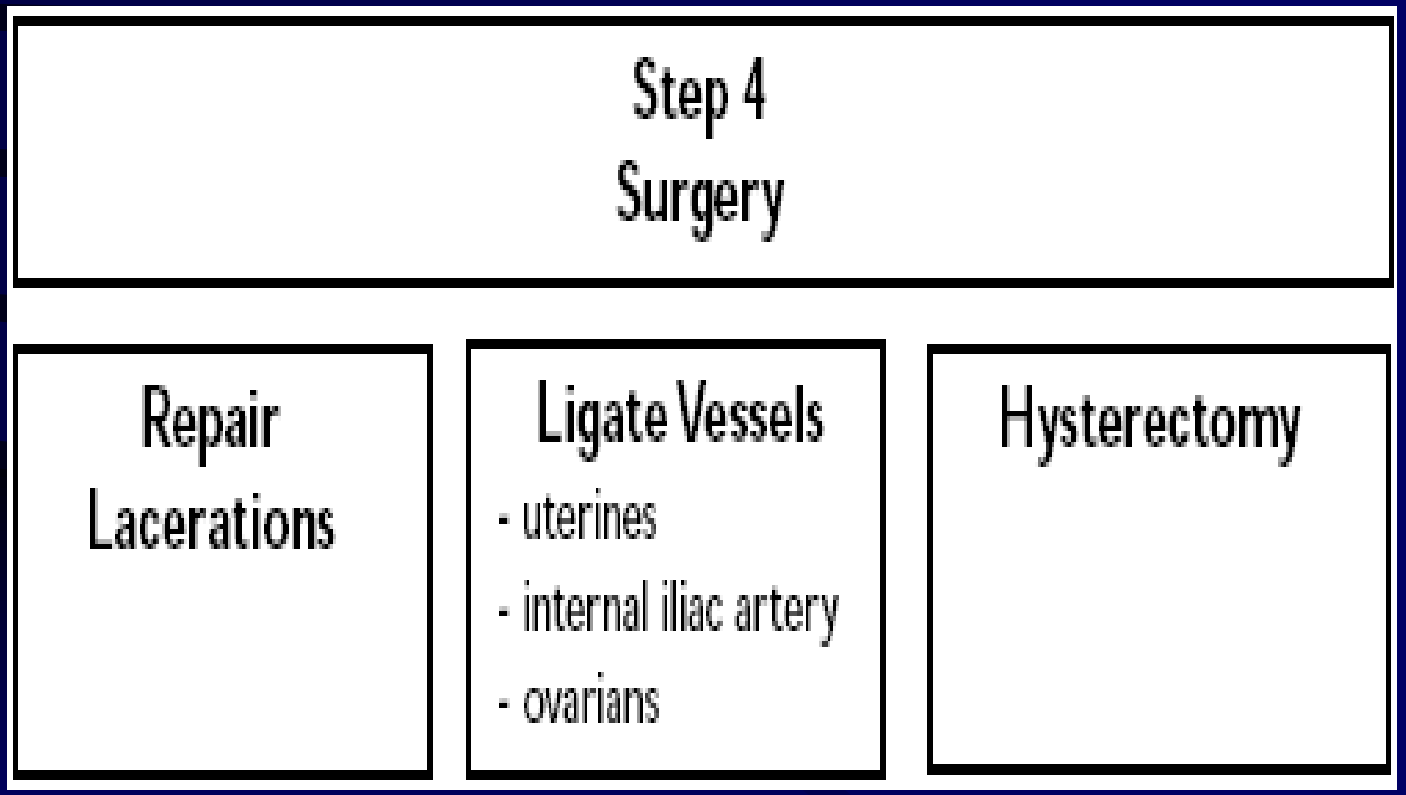
DRUG THERAPY FOR PPH

Drug	Dose	Side Effects	Contraindications
Oxytocin	10 units IM/IMM 5 units IV bolus 10 to 20 units/litre	Usually none painful contractions nausea, vomiting, (water intoxication)	hypersensitivity to drug
Methylergonovine maleate	0.25mg IM/0.125mg IV repeat every 5 mins as needed maximum 5 doses	peripheral vasospasm hypertension nausea, vomiting	hypertension hypersensitivity to drug
Carboprost (15-methyl PGF_2 alpha)	0.25 IM/IMM repeat every 15 mins as needed maximum 8 doses	flushing, diarrhea, nausea, vomiting bronchospasm, flushing, restlessness, oxygen desaturation	active cardiac, pulmonary, renal, or hepatic disease hypersensitivity to drug
Vasopressin	20 units diluted in 100 ml normal saline = (0.2 units/ml) inject 1 ml at bleeding site avoid intravascular injection	acute hypertension, bronchospasm nausea, vomiting, abdominal cramps angina, headache, vertigo death with intravascular injection	coronary artery disease hypersensitivity to drug

MANAGEMENT OF PPH



MANAGEMENT OF PPH



MANAGEMENT OF PPH

Step 5

Post Hysterectomy Bleeding

Abdominal Packing

Angiographic Embolization

Secondary PPH

1. Retained bits of placenta
2. Placental polyp
3. Sub involution of placental site
4. Endometritis
5. Infected sloughing from cervicovaginal wound
6. Puerperal inversion of uterus

Treatment of secondary PPH

sonographic evaluation

if retained product → Gentle suction & curettage

if cavity empty& patient stable → oxytocin/ergometrine

- Unnecessary curettage avoided, it may worsen PPH
- Proper antimicrobial coverage given if endometritis suspected
- If bleeding continues for prolonged period without definite cause-ßHCG estimation to rule out chorioCa

Specific Management
Secondary PPH

- Assess woman's condition (history & examination)
- Give Oxytocics (bolus & infusion)
- Treat sepsis
  - Take high vaginal swab for culture / sensitivity
  - Do ultrasound to check for retained products of conception (if available)
  - Give antibiotics
  - If required explore uterus and send curetting for histopathology
- Exclude / treat coagulopathy
- Check serum βHCG if trophoblastic disease is suspected
- Surgical intervention if required:
  - Uterine devascularization/
  - Hysterectomy

Uterine Inversion

Prolapse of the fundus to are through cervix so that the uterus is turned inside out.

- Potentianlly life threatening complication of childbirth.
- All most all cases occur after delivery/ C-Section.

EPIDEMIOLOGY

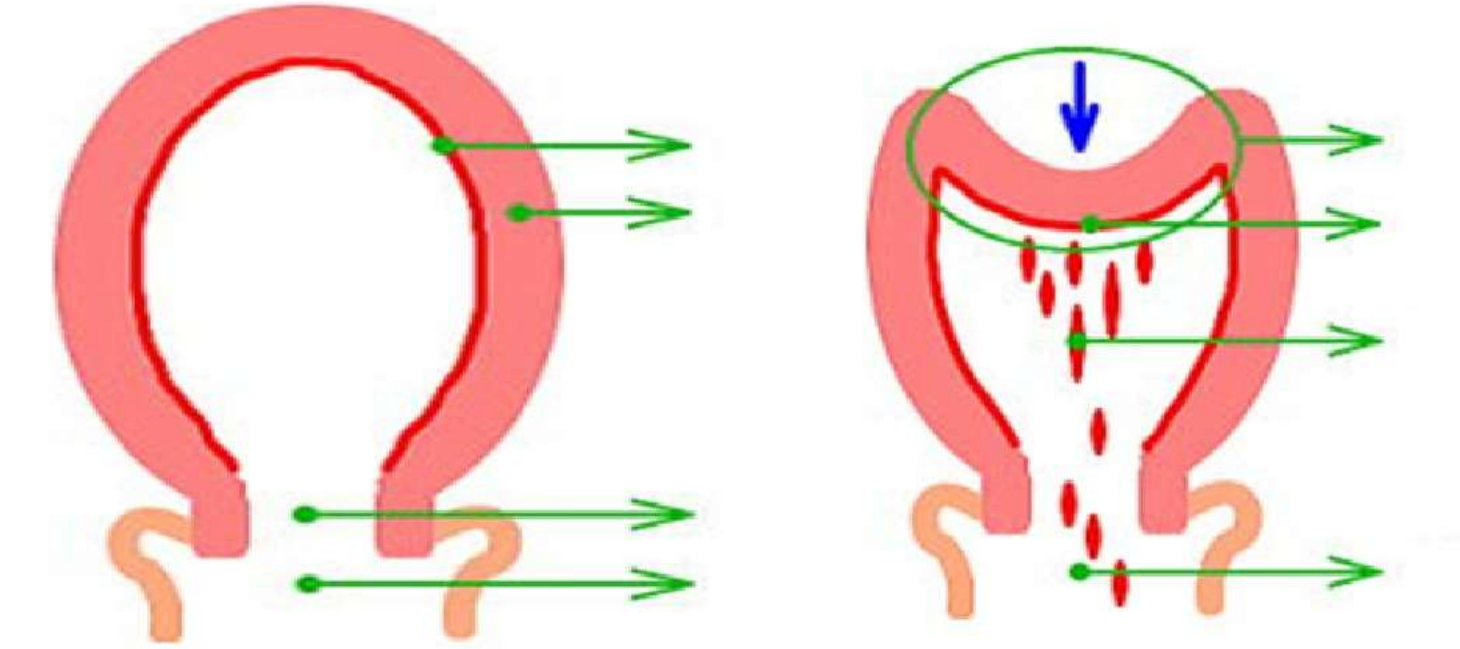
- Incidence varies widely.

  1:2,000 to 1:23,000 deliveries.

CLASSIFICATION

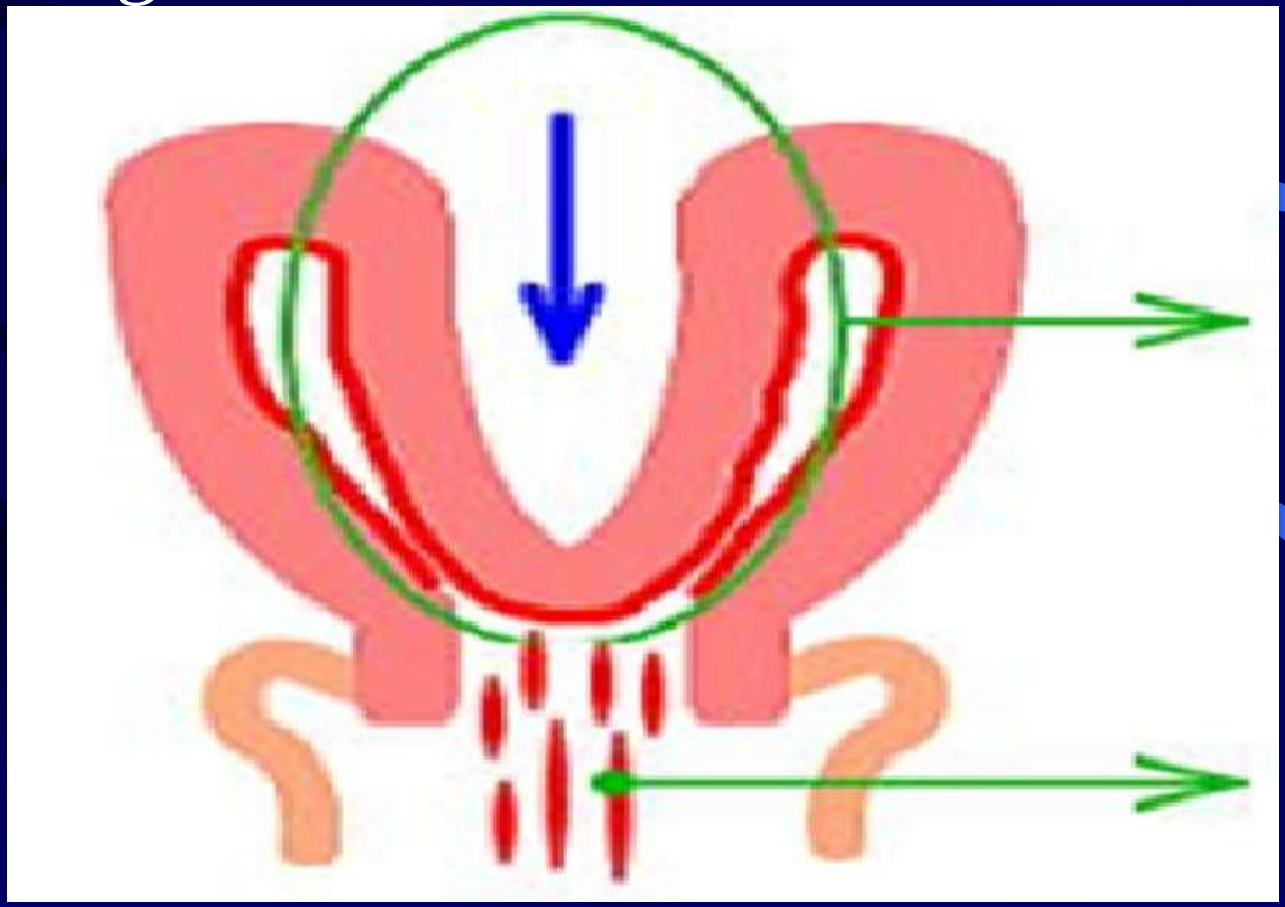
- 1st DEGREE

  The inverted fundus extend to but, not through the crevix.



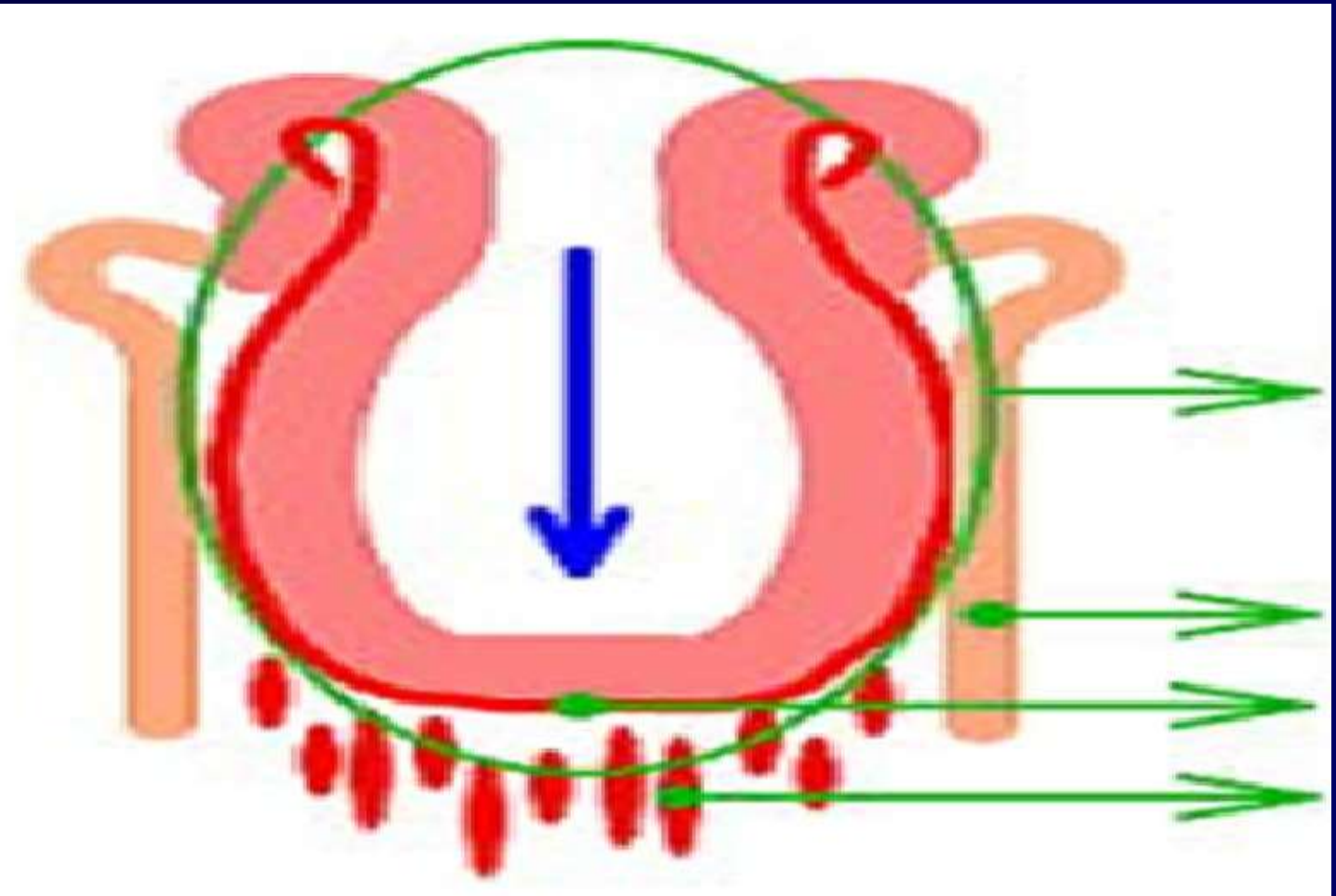
2nd DEGREE

The inverted fundus extend through crevix but remains in the vagina.



3rd DEGREE

The inverted fundus coming out from vagina.



PATHOPHYSIOLOGY

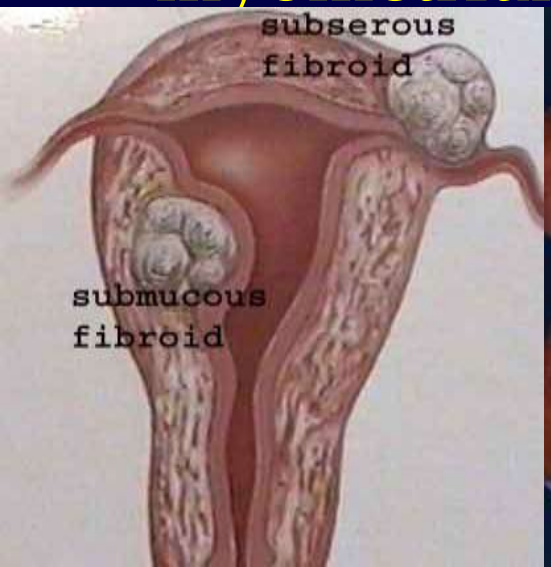
- Exact cause is unknown.
- Principle behind its occurrence:
  Cervix must be dilated.
  Uterine fundus must be relaxed.
- Many cases of acute uterine inversion results from mismanagement of third stage of labour in women who are already at risk.

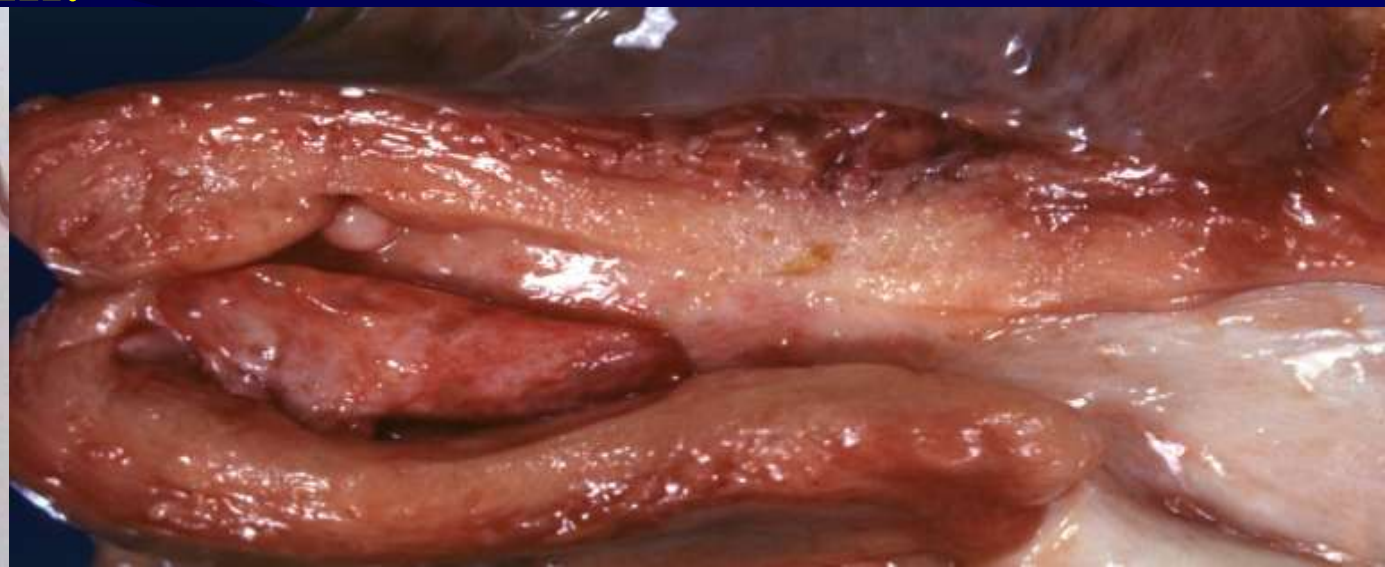
- In complete inversions once the fundus passes through the cervix, the cervical tissues function as a constricting band and edema rapidly forms.
- The prolapsed mass then progressively enlarges and increasingly obstructs venous and finally arterial flow, contributing to the edema.

RISK FACTORS

- Strong traction exerted on the umbilical cord due to adherent placenta.
- Strong fundal pressure.
- Fundal implantation of the placenta.

- Precipitated labour
- Prolong labour
- Tumors-submucuos myomas .
- Cervical incompetence.
- Uterine anomalies(e.g unicornuate uterus).
- Congenital or acquired weakness of the myometrium.





CLINICAL PRESENTATION

Uterine inversion may present:

ACUTE

within 24 hours of delivery.

SUB-ACUTE

After 24 hours and up the 30th postpartum day.

CHRONIC

More than 30 days after delivery.

THE CLASSIC PRESENTATION:

- Post-partum haemorrhage.
- Sudden appearance of a vaginal mass.
- C Cardiovascular collapse (varying degrees).

SYMPTOMS:

- Pain in the lower abdomen.
- Sensation of vaginal fullness with a desire to bear down after delivery of the placenta.
- Vaginal bleeding unless the placenta is not separated.

SIGNS

SHOCK

- More commonly Neurogenic due to traction on the peritoneum and pressure on the tubes, ovaries, may be the intestine.

- Parasympathetic effect of traction on the ligaments supporting the uterus and may be associated with bradycardia.
- May be Hypovolaemic due to postpartum haemorrhage.

ABDOMINAL EXAMINATION

- Cupping of the fundus in 1st & 2nd degree uterine inversion.
- Absence of the uterus in 3rd & 4th degree uterine inversion.

VAGINAL EXAMINATION

- Soft, purple (dark bluish-red) mass in the vagina or vulva.

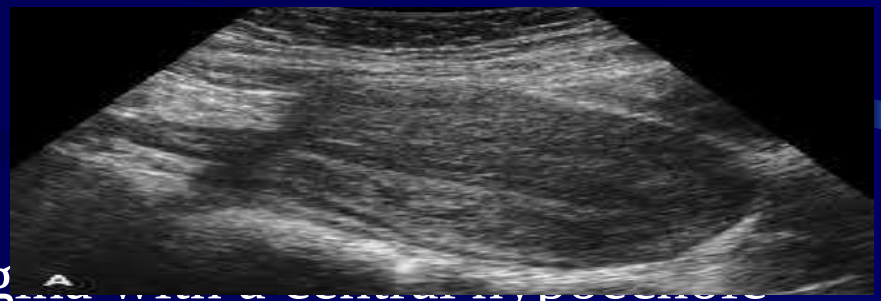
- Diagnosing a first degree inversion is much more difficult.
- Obesity can make diagnosis more difficult.
- Chronic cases are unusual and difficult to diagnose. They may present with spotting, discharge and low back pain. Ultrasound may be required to confirm the diagnosis.

INVESTIGATIONS

- Diagnosis is usually based on clinical symptoms and signs.

ULTRASOUND

- **Transverse image**:



A hypoechoic mass in the vagina with a central hypoechoic H-shaped cavity.

- **Longitudinal image:**

U-shaped depressed longitudinal groove from the unterine fundus to the centre of the inverted part.

- MRI is useful.

MANAGEMENT OF ACUTE & SUBACUTE UTERINE INVERSION

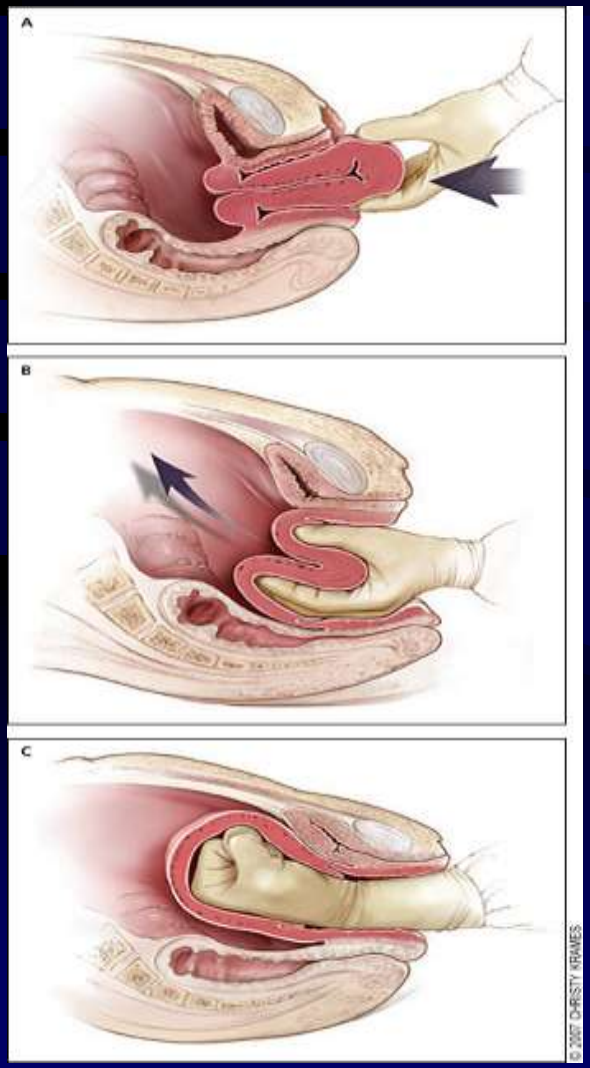
AIMS

1. Immediate treatment of Shock.
2. Replacement /repositioning of the uterus.

TREATMENT OF SHOCK

- Call for help.
- IV line with two large bore IV cannulae.
- Aggressive fluids replacement
- Start resuscitation with normal saline or hartmann's solution.
- Blood transfusion.
- Analgesics.
- Use warm sterile towel to apply compression while preparing for the procedure.
- Insert a urinary catheter.

REPOSITIONING OF INVERTED UTERUS



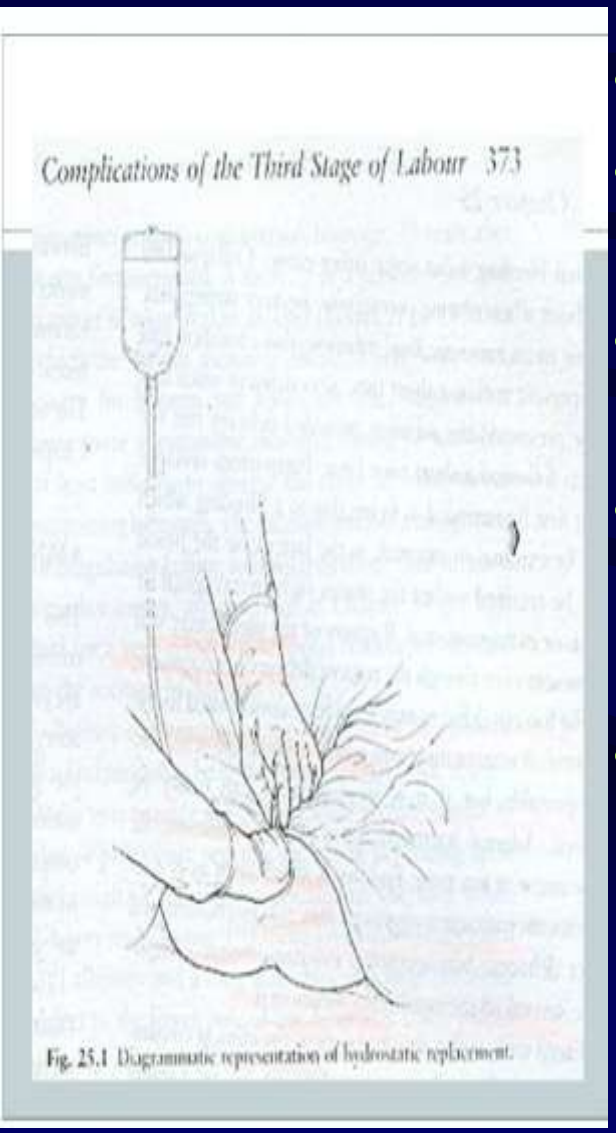
- **MANUAL REDUCTION.**

- Sterile procedure.
- **Form a fist** or grad the uterus and push it through the cervix of a lax uterus towards the umbilicus to its normal position.
- Use the other hand to support the uterus. **(Johnson maneuver)**

- Use of tocolytics to allow uterine relaxation.
- Nitroglycerin (0.25-0.5 mg) intravenously over 2 minutes.
- Terbutaline 0.1-0.25mg slowly intravenously.
- Magnesium sulphate 4-6 g intravenously over 20 minutes.
- Use of general anaesthesia: halothane.

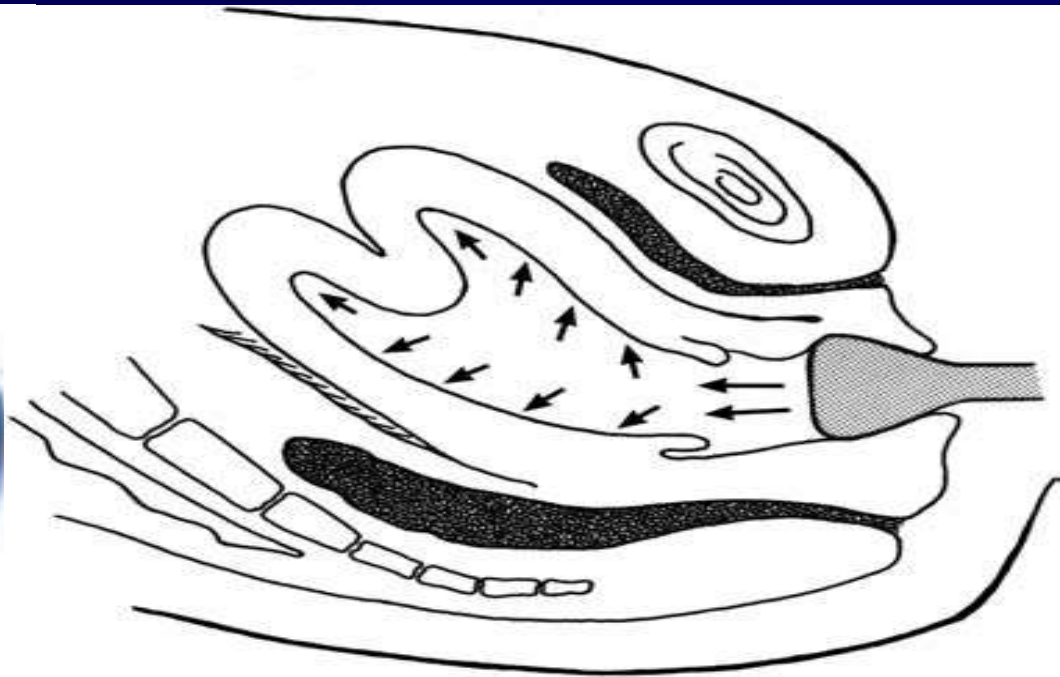
O'SULLIVAN HYDROSTATIC METHOD.

- **PRE-REQUISITES**
- An assistant
- Long tube(2m) with a large nozzle
- Water reservoir/warm saline(2-5l).



- **PROCEDURE**
- Trendelenburg position.
- Place the nozzle of the tube in the posterior fornix.
- An assistant start the douche with full pressure (at least 2m high)
- Fluid escape is prevented by blocking the introitus by using the labia and operator's hand.
- The fluid distend the vagina, relieves the mild cervical constriction and result in correction or replacement of the inverted uterus.

- **NEW TECHNIQUE** (ogueh and ayida)
- Attaching the IV tubing to silicone cup used in vacuum extraction. By placing the cup in the vagina, an excellent seal is created.



MANAGEMENT OF CHRONIC UTERINE INVERSION

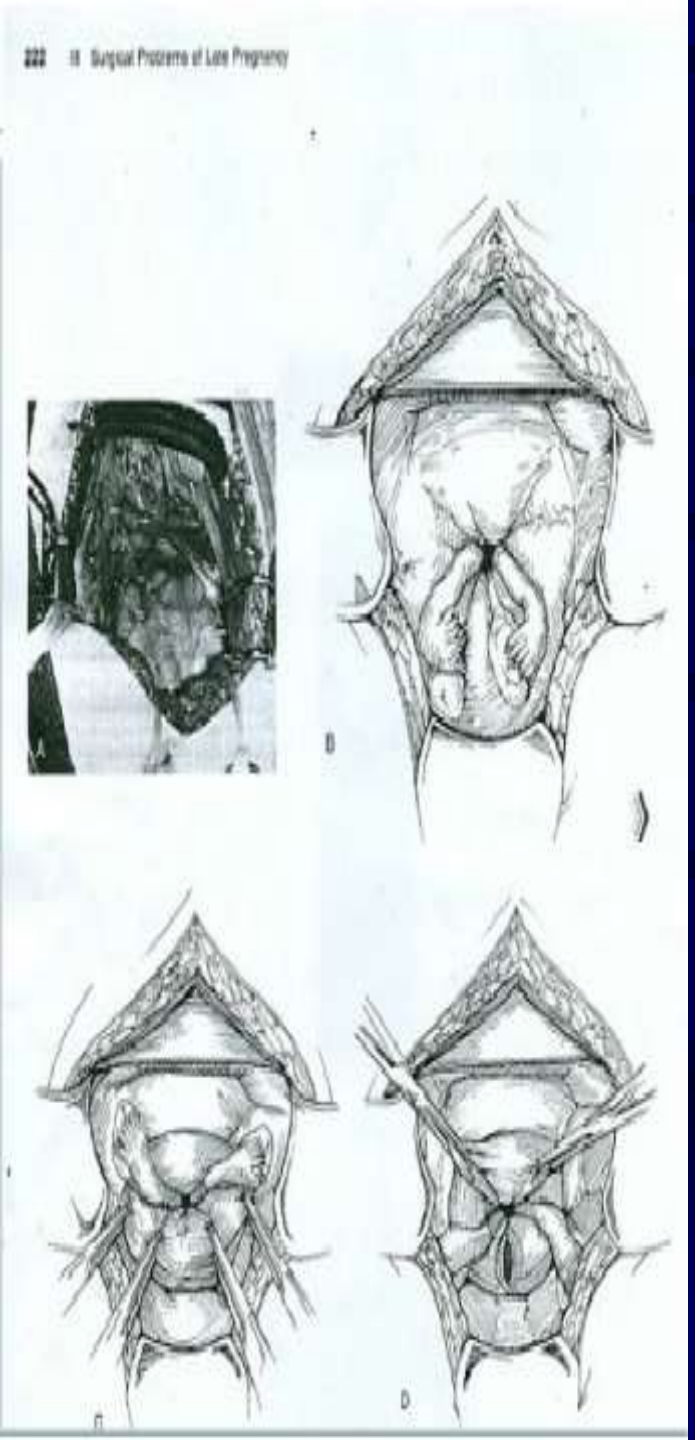
Surgical intervention.

Abdominal route

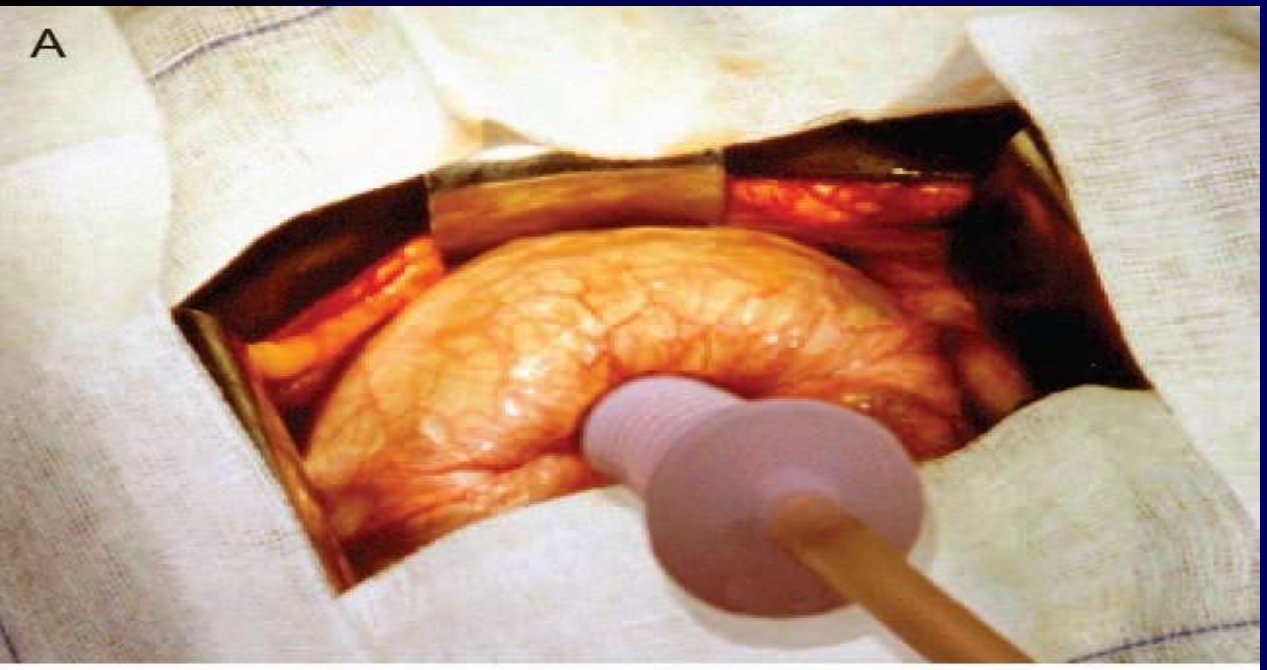
Vaginal route

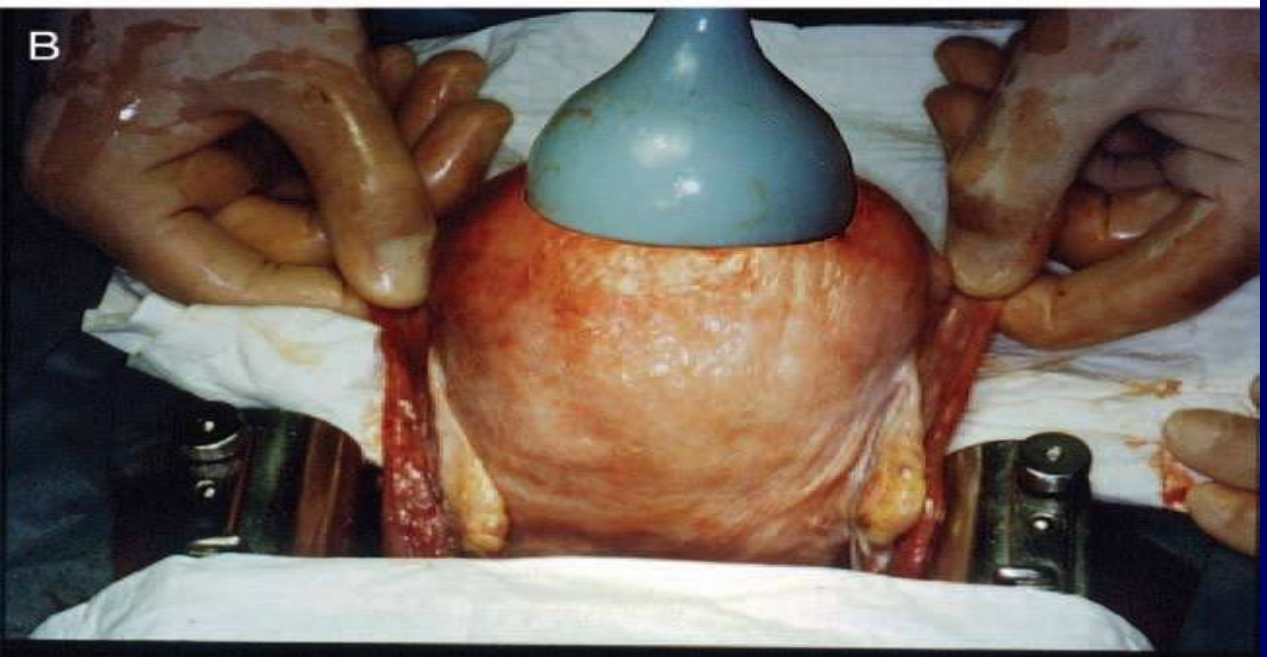
Abdominal route

- Huntington’s procedure
- Haultain's procedure



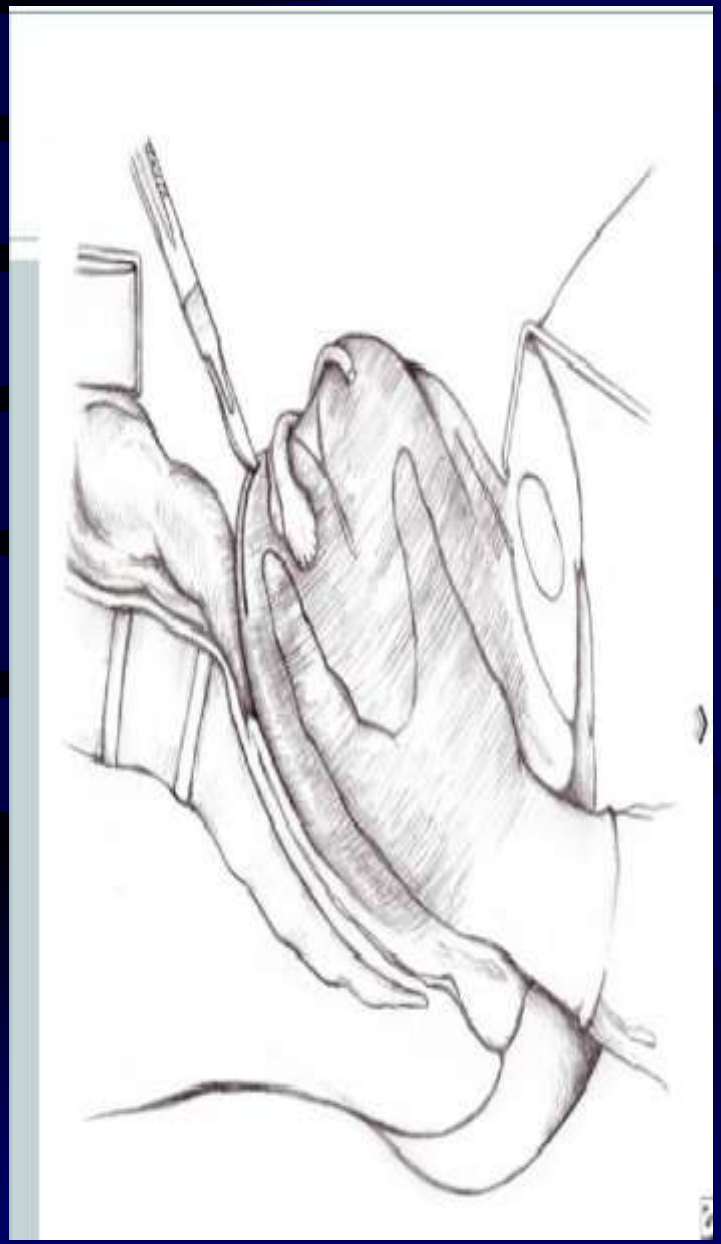
- **HUNTINGTON PROCEDURE**
- Locate the cup of the uterus formed by the inversion
- Dilate the constricting cervical ring digitally
- Stepwise traction on the funnel of the inverted uterus or the round ligament is given with Allis forceps
- Reapplied progressively as fundus emerges





(A) Obstetric ventouse applied on the inverted uterine fundus. (B) Reduction of the inverted uterus after traction with the ventouse.

Instead of allies forceps alternativelt vacuum cup can be used in **HUNTINGTON PROCEDURE**



- **HAULTAIN'S PROCEDURE**

- Incision is made in the posteriorly through the cervix, relieving cervical constriction to increase the size of the ring and allowing traction on the round ligament for the replacement of uterus with subsequent repair of incision from inside the abdomen

Vaginal route

- Spinellis's method:

Anterior Colpotomy is done and incision on the constricting cervical ring is given for the replacement of uterus.

- Kustner's method:

Posterior Colpotomy is done and incision of the cervix similar to that of spinelli's method.

- Hysterectomy:Failure of conservative surgury
- Family is completed - sepsis

COMPLICATIONS OF INVERSION OF UTERUS.

- Postpartum hemorrhage due to uterine atony.
- Hypovolaemic shock and all its consequence.
- Vasovagal shock (due to severe pain).
- Endometritis (sepsis).
- Infection of adnexa.
- Necrosis of adnexa (ovaries) due to compression of ovaries as they drawn inside.
- Damage to intestine / septic paralytic ileus.
- Chronic inversion.

- Recurrence of inversion.
- Increased risk of rupture of uterus in next pregnancy (when surgical procedure done for inversion).

  Increased risk of c-section in subsequent delivery.

- Chronic pelvic pain -> if chronic inversion is not treated.

MANEUVERS ARE TO BE AVOIDED

- Excessive traction on the umbilical cord
- Excessive fundal pressure
- Excessive intra-abdominal pressure
- Excessively vigorous manual removal of placenta.

Summary: remember 4 Ts

- “TONE”
- Rule out Uterine Atony

- Palpate fundus.
- Massage uterus.
- Oxytocin
- Methergine

Summary: remember 4 Ts

- “Tissue”
- R/O retained placenta
- Inspect placenta for missing cotyledons.
- Explore uterus.
- Treat abnormal implantation.

Summary: remember 4 Ts

- “TRAUMA”
- R/O cervical or vaginal lacerations.
- Obtain good exposure.
- Inspect cervix and vagina.
- Worry about slow bleeders.
- Treat hematomas.

Summary: remember 4 Ts

- “THROMBIN”
- Replacement with blood or Fresh frozen plasma or Platelet rich plasma.

Key Messages

- PPH is the single most commonest cause of maternal deaths in developing countries
- It can not always be predicted but can be prevented to a large extent & treated
- AMTSL reduces the risk of PPH

- Timely intervention & referral can save many lives.