

What's New in Post Partum Hemorrhage

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Definitions

- **Primary PPH= bleeding from genital tract of 500 cc or more in the first 24 hours following delivery of the baby(2-11%)**
- **Major >1000 cc blood loss (1-5%)**
- **Secondary PPH= abnormal or excessive bleeding from the birth canal occurring between 24 hours and 12 weeks postpartum (2%)**

Mrs. Everybody's Patient

- 24 year old G2P2 had an emergency uneventful routine cesarean section at 7.30 pm with blood loss of 500cc. Pre-operative Hb was 13 g/dl.
- In first 4 hours post-partum; patient stated to be stable but had pulses of 100-120 & BP of 90-70/60-50. Treated with pain medications and hydration.
- Had seizure at 11.33 pm, with obtundation, hemoglobin of 7 g/dl, to ICU & transfused.
- 1.30 am, labs show elevated cardiac & liver enzymes, DIC. MI & liver failure diagnosed

Mrs. Everybody's Patient

- 4.30 am, arterial embolization done because of continued bleeding.
- Glasgow score 7, Renal failure, Metabolic acidosis.
- 6.30 pm, uterine packing done.
- 2.20 am, hysterectomy done
- FLABBY UTERUS, no perforations or internal bleeding
- 2 days later flat line EKG
- **MULTIPLE MILLION DOLARS PAYMENT**

Etiology

- Uterine atony
- Genital tract lacerations
- Uterine rupture
- Retained placenta
- Morbidly adherent placenta
- Clotting disorders
- Uterine inversion

Risk factors

- First pregnancy
- High Multiparity
- Maternal obesity
- Large baby
- Previous PPH
- Multiple pregnancy
- Hydramnios
- Antepartum hemorrhage
- Preeclampsia

- Augmented labor
- Rapid labor
- Prolonged first of labor
- Prolonged third stage of labor
- Episiotomy
- Operative delivery
- Chorioamnonitis
- Use of uterine relaxing agents

Morbidity & Mortality

- Major cause of maternal mortality
 - $\frac{1}{4}$ of all deaths worldwide, top 4 in developed countries: Mainly avoidable deaths
- Hypo-volemic shock
- DIC
- Renal failure
- Hepatic failure
- ARDS

Irreversible Shock

- Early correction of the volume deficit is essential in hypovolemic shock to prevent the decline in tissue perfusion from becoming irreversible.
- In experimental animals, hemorrhagic shock can be reversed if the blood that has been removed is re-infused within two hours.
- There is only a transient increase in blood pressure if return of the shed blood is delayed for **four hours** or longer.
- A similar phenomenon appears to occur in humans.

•Zweifach, BW, Fronek, A. The interplay of central and peripheral factors in irreversible hemorrhagic shock. Prog Cardiovasc Dis 1975; 18:147

CLINICAL STAGING

Severity	Findings	%Blood loss
Mild	(<100 beats/min) Mild hypotension Peripheral vasoconstriction	15-20
Moderate	100-120 beats/min Hypotension(80-100mmhg) Restlessness Oliguria	25-35
Severe	120 beats/min Hypotension(<60mmhg) Altered consciousness Anuria	>25

Active management of third stage of labor

- Oxytocin or prostaglandin within 2 minutes of delivery
- Cutting & clamping of cord to enhance placental separation
- Placental delivery by controlled cord traction
- 2 trials compared active vs. natural management (5.9% vs. 17.9%; 6.8% vs. 16.5%)

Blood Replacement Products: Recommended Uses and Effects

Product (mL)	Contents	Uses and effects
Whole blood (1 unit = 500 mL)	All components	Should rarely be used. May be employed when there is massive bleeding and use of >5-7 units of packed red cells
Packed red cells (1 unit = 200-250 mL)	Red cells only	One unit increases hematocrit by 3 percentage points
Fresh frozen plasma (1 unit = 200-300 mL)	All clotting factors no platelets	Best used to correct deficiencies of multiple coagulation factors (eg, DIC, liver disease, warfarin overdosage). One unit FFP increases fibrinogen by 7-10 mg/dL. Usual dose is 10 to 15 mL/kg.
Cryoprecipitate (1 bag = 10-15 mL)	Fibrinogen, factors V, VIII, XIII, VWF	Ten bags of cryoprecipitate will raise plasma fibrinogen by 70 mg/dL in a 70 kg recipient
Platelets (1 unit = 50 mL)	Platelets	Six units will raise the platelet count by approximately 30,000/microL in an adult with a BSA of 2.0 square meters

Abbreviations: DIC: disseminated intravascular coagulation; FFP: fresh frozen plasma; VWF: Von Willebrand Factor; kg: kilograms; BSA: Body surface area

Medical management

- **Bimanual compression**
- **Empty bladder**
- **Oxytocin**
- **Ergometrine**
- **Misoprostol**
- **Caboprost**
- **Suturing**
- **Examination under anesthesia**

Recombinant Activated Factor VII

- **CASE:** A 30-year-old nullipara presented with major postpartum hemorrhage due to uterine atony and vaginal lacerations. Treatments with uterotonic drugs, suturing, ligation of internal iliac arteries, subtotal hysterectomy, packing of the pelvis, and blood transfusion failed to control diffuse pelvic and vaginal bleeding. Recombinant activated factor VIIa (60-microg/kg intravenous bolus injection) was given as a final attempt to control the bleeding. The bleeding was successfully controlled within 10 minutes after administration. No side effects were noted.
- **CONCLUSION:** Recombinant factor VIIa may be an alternative hemostatic agent in a patient with life-threatening postpartum hemorrhage unresponsive to conventional therapy. *Obstet Gynecol.* 2003 Jun;101(6):1174-6.

Retained placenta

- Trapped placenta
due to uterine contraction
- Adherent placenta
Deficiency in contractile force of myometrium under the placental site despite normal anatomy
- Uterine relaxation
- Controlled cord traction
- IV glyceryl trinitrate
- Expectant
- Uterotonic agents via umbilical cord
- 20 mg F2 α in 20 ml NS
- 30 IU oxytocin in 20 ml NS
- Manual removal

Placenta Accreta

• DIAGNOSIS

- No Hypo-echoic boundary between bladder & serosa
- Appears contiguous with bladder wall
- Sonolucent spaces in placenta adjacent to uterine wall
- Persistent Doppler flow between placenta & myometrium
- MRI for confirmation

• MANAGEMENT

- Elective cesarean hysterectomy
- Placenta in situ with removal when b-HCG is undetectable and no placental flow present
- Placenta in situ with methotrexate/ Folinic acid
- Uterine Compression suture
- Uterine devascularization
Undersuturing the placental bed
- Arterial embolization

Surgical Procedures

- **Undersuturing the placental bed**
- **Arterial embolization**
 - Prophylactic
 - Emergent
- **Uterine devascularization**
 - Bilateral internal artery ligation
 - Ovarian artery ligation
 - Uterine ovary ligation
- **Uterine Compression suture**
 - B-Lynch suture
 - Hayman suture
 - Cho suture
- **Uterine tamponade**
 - Uterine packing
 - Sterile saline-filled intrauterine balloons
 - Sengstaken-Blakemore tube , Rüsç balloon

Uterovaginal Packing With Rolled Gauze

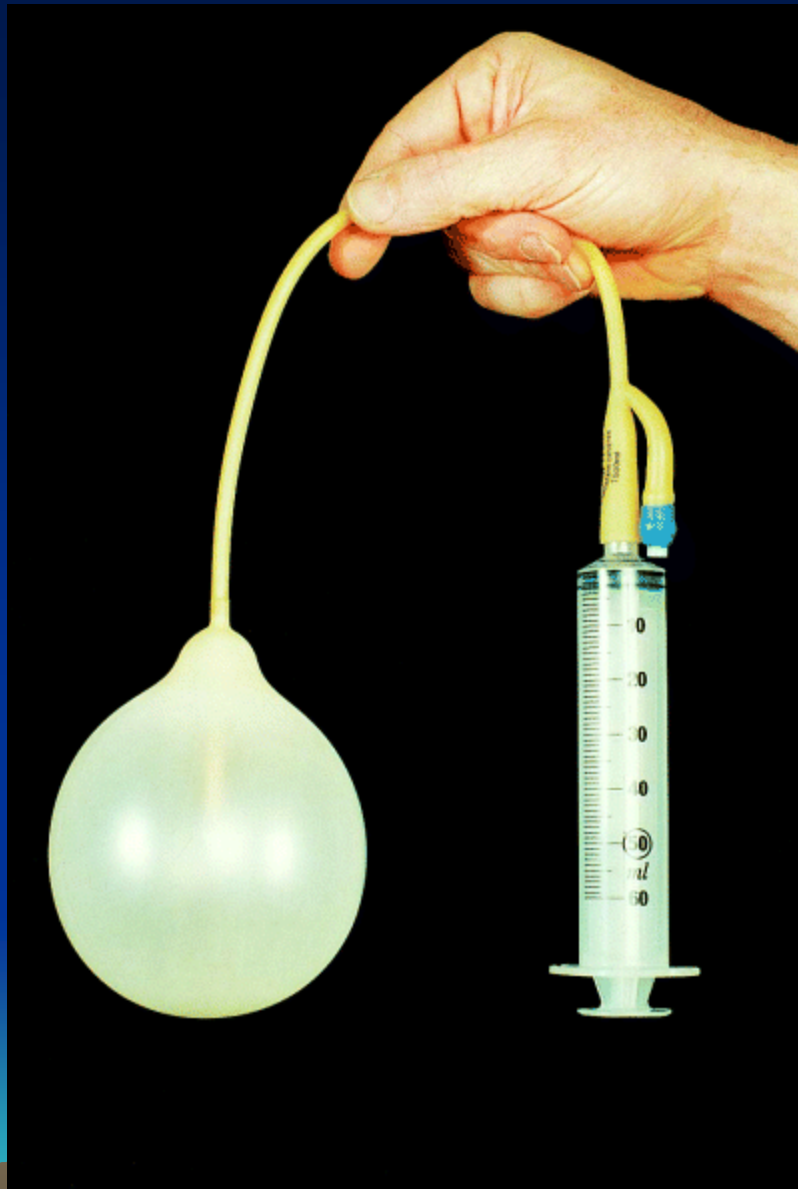
- Control bleeding by tamponade effect
- When medical therapy fails to control uterine hemorrhage
- Useful with uterine atony and placental site bleeding caused by placenta previa or placenta accreta
- May stabilize patient till surgery is arranged.
- May obviate the need for surgery altogether .

Uterovaginal Packing With Rolled Gauze

- Fear of infection and concealed hemorrhage
- Requires no special equipment or expertise
- Tight uniform packing of uterine cavity, vagina to the introitus to maintain a tamponade effect on the uterine sinuses and prevent concealed hemorrhage
- Remove in 5 -96 hours
- No reported cases of serious infections
- Successful outcomes of majority of **> 1000** reported cases of uterine packing for PPH
- May allow transport

Management of massive postpartum hemorrhage: use of a hydrostatic balloon catheter to avoid laparotomy

- Catheterize; weighted speculum for vaginal access & a good light source.
- Rüsç balloon into uterine cavity.
- 60 ml bladder syringe, inflate balloon, via the drainage port, with ↑500 ml of warm saline. Pressure required is = to when inflating Foley catheter balloon.
- The catheter is left in situ for 24 hours.
- Uterine contractions is by continued infusion of oxytocin.
- In failed medical therapy for PPH, further surgical interventions have been avoided

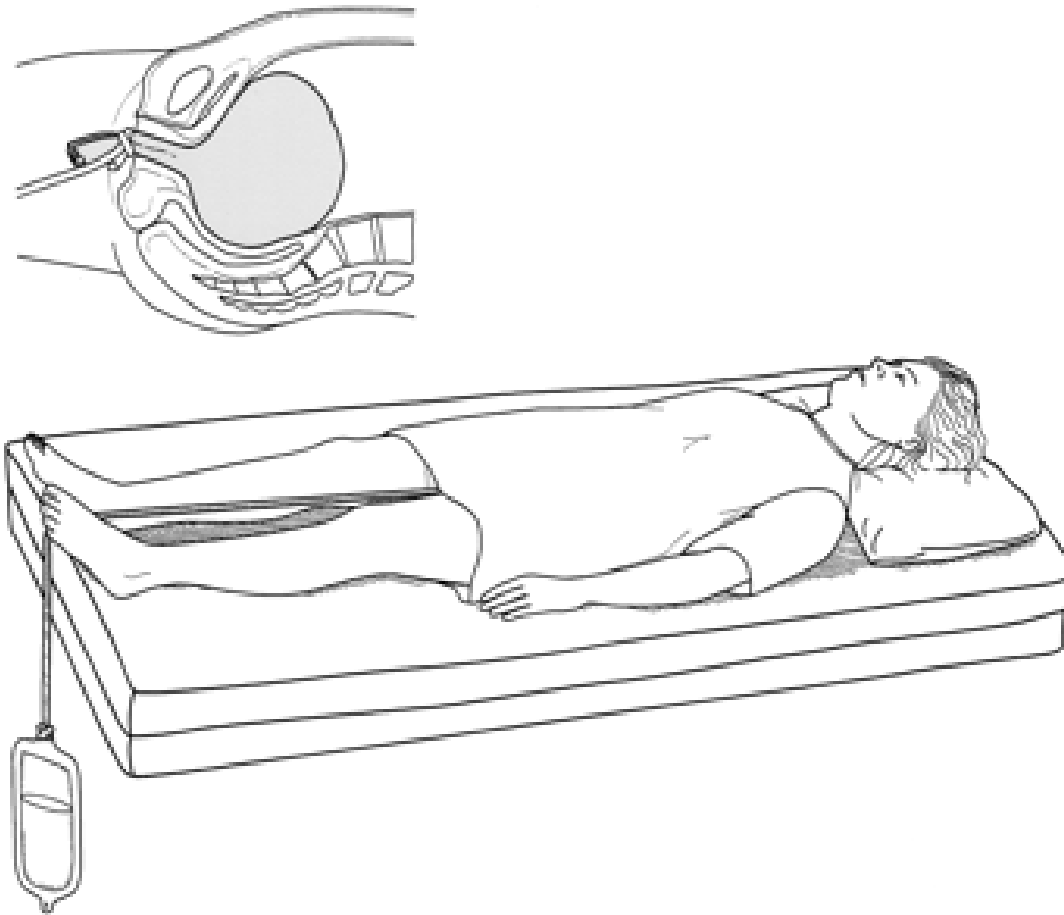


**Fig. 1. Inflated
Rüsch balloon
catheter.**

**Johanson R.J. Br J Obstet Gynaecol
108 (2001), pp. 420–422.**

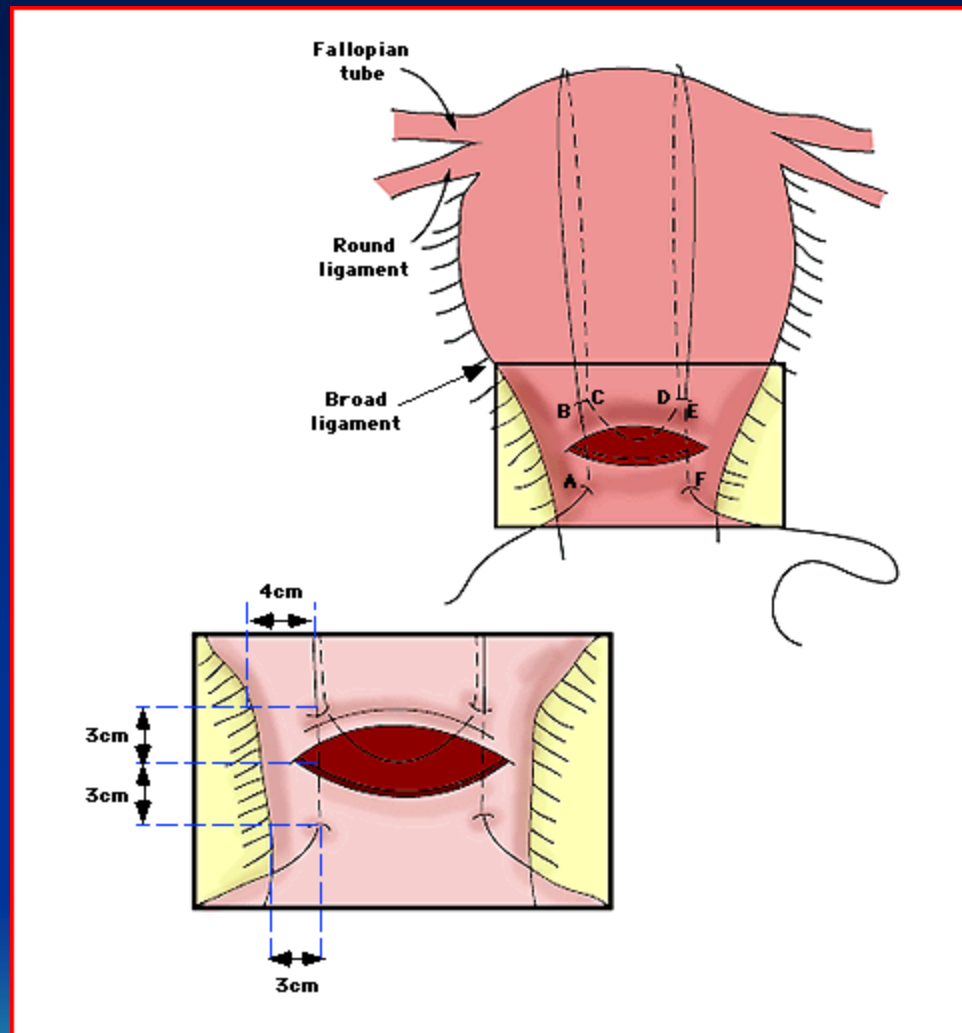
Pelvic Umbrella Pack for Refractory Obstetric Hemorrhage Secondary to Posterior Uterine Rupture

Howard RJ. Obstet Gynecol. 2002 Nov;100(5 Pt 2):1061-3.



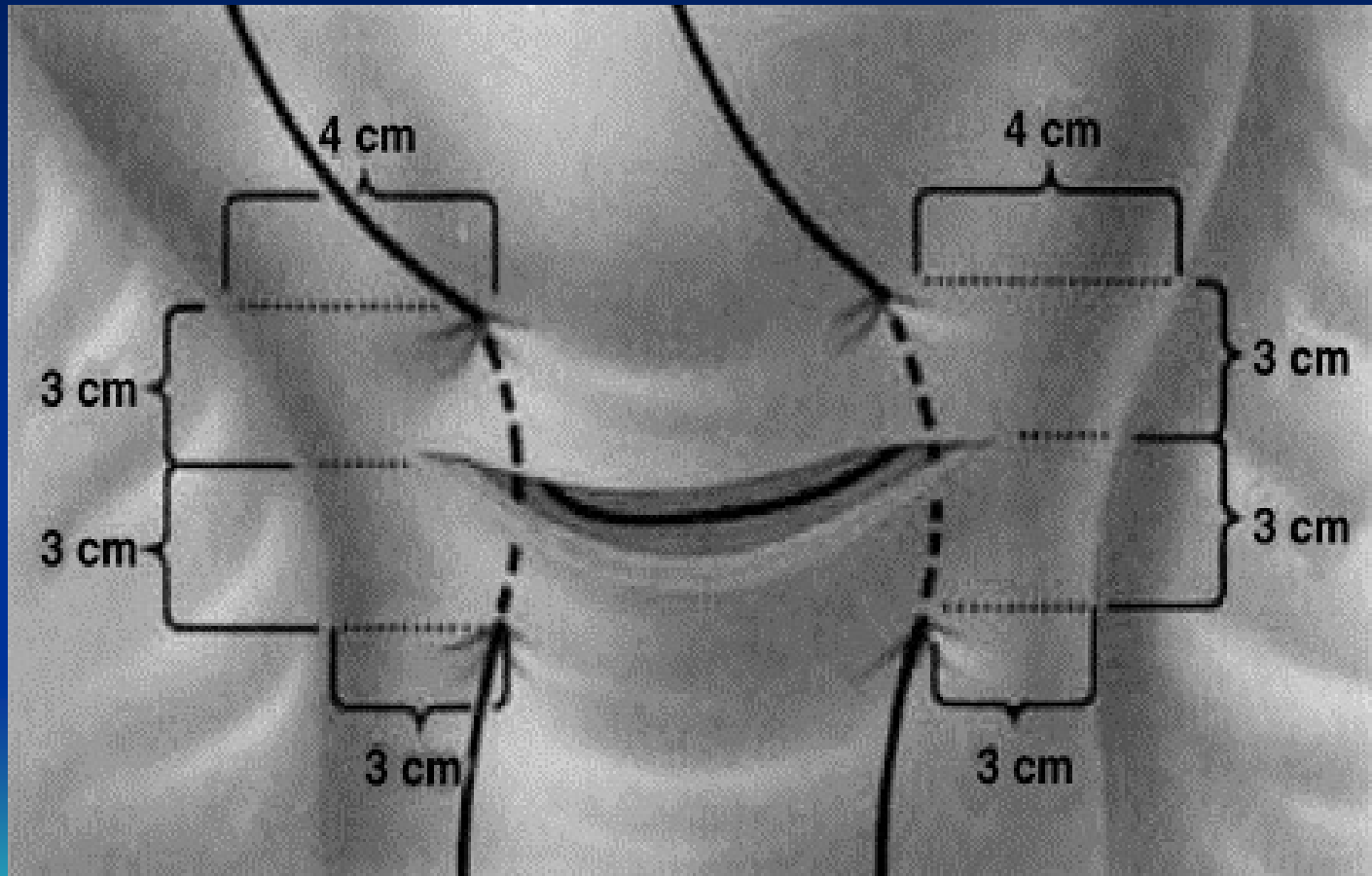
Uterine Compression suture

- **Brace suture first performed in 1989**
- **Simple, inexpensive, and quick procedure**
- **The suture aims to exert continuous vertical vascular compression**
- **> 1000 procedures have been performed worldwide, with only 7 failures reported**
- **The B-Lynch can preserve life and fertility**
- **Cases of refractory uterine atony**
- **Beneficial in cases of placenta accreta, percreta, and increta**
- **Case report of uterine necrosis**

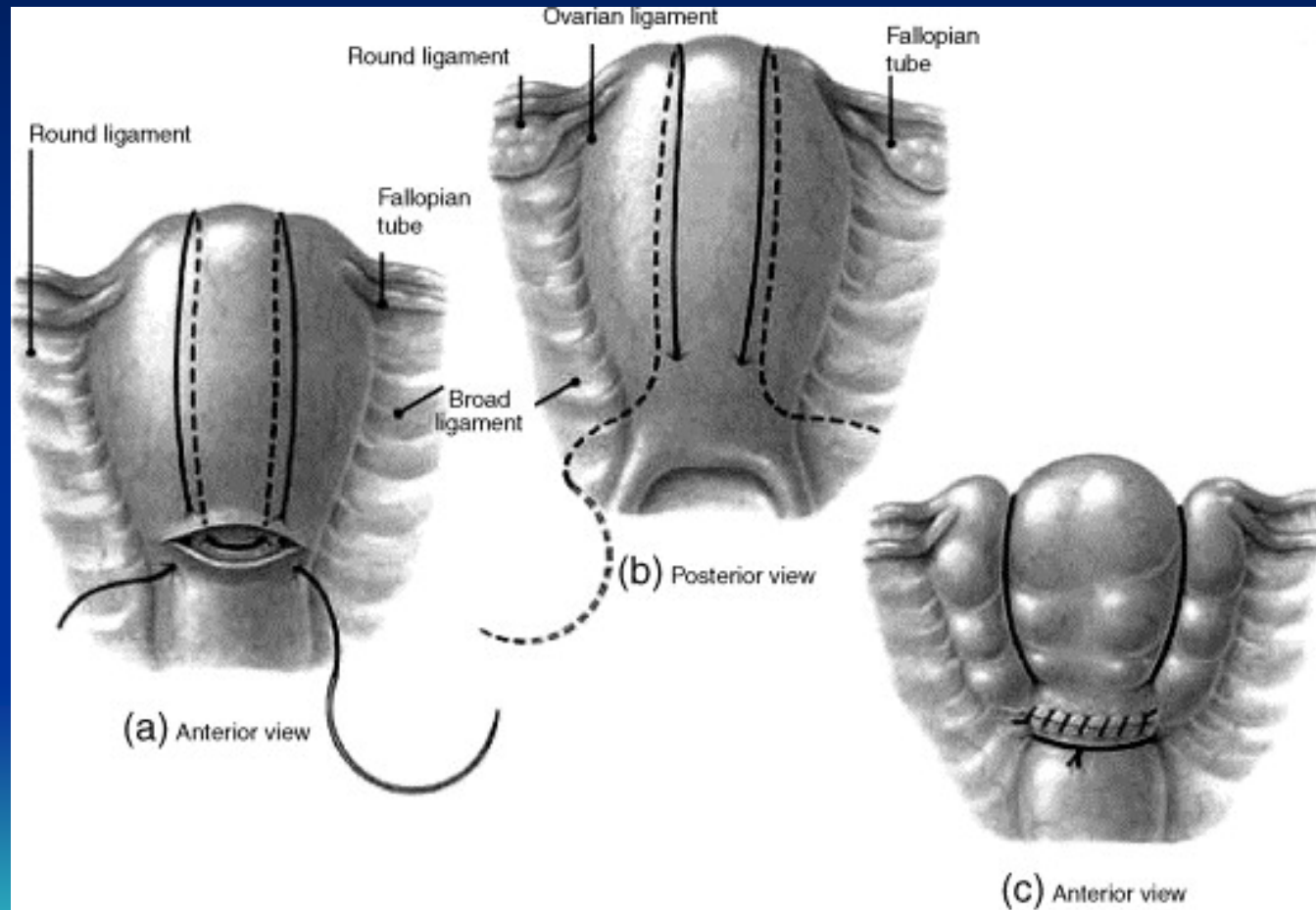


Anterior uterine wall with B-Lynch suture in place and an enlarged drawing (box) of lower uterine segment with B-Lynch suture in place Adapted from *Obstetrics & Gynecology Case Reports & Reviews*, Vol. 95, Num 6, June 2000.

The B-Lynch suture, anterior view



The B-Lynch suture, front view, back view, and knot



Bilateral internal iliac artery ligation

- Intractable bleeding in pelvic & obstetrical surgery.
- Can be life saving and also preserve uterus.
- Term pregnancies after procedure reported.
- Bleeding from the uterus ↓ because of no arterial pressure or pulsation in arteries after ligation & pressure becomes similar to the venous system.
- Vertical and horizontal pelvic anastomoses. Vertical anastomoses of iliolumbar, lateral sacral, uterine and middle rectal arteries activated upon ligation.
- Retroperitoneal anatomy, skills & experience.
- Injury to the ureters and other structures.
- Training & necessary expertise.
- More difficult in pregnancy & poor success (< 50%).
- Of 37 obstetrical cases, uterus was saved in 13(35%).

Bilateral uterine artery ligation

- Alternative with success rates of **80-100%**.
- Technically easier and safer to perform than internal iliac artery ligation.
- Less surgical skill; less ability & faster.
- If unsuccessful; additionally ligating ovarian arteries yielded 100% success.
- 1/6 cases with placenta accreta treated with bilateral uterine and ovarian artery ligation, required a hysterectomy. *
- *Theoretically, ovarian artery ligation may induce ovarian ischemia and possible early ovarian failure.
- Pregnancies have been reported after ovarian ligation but no long time follow-up studies to assess ovarian function.

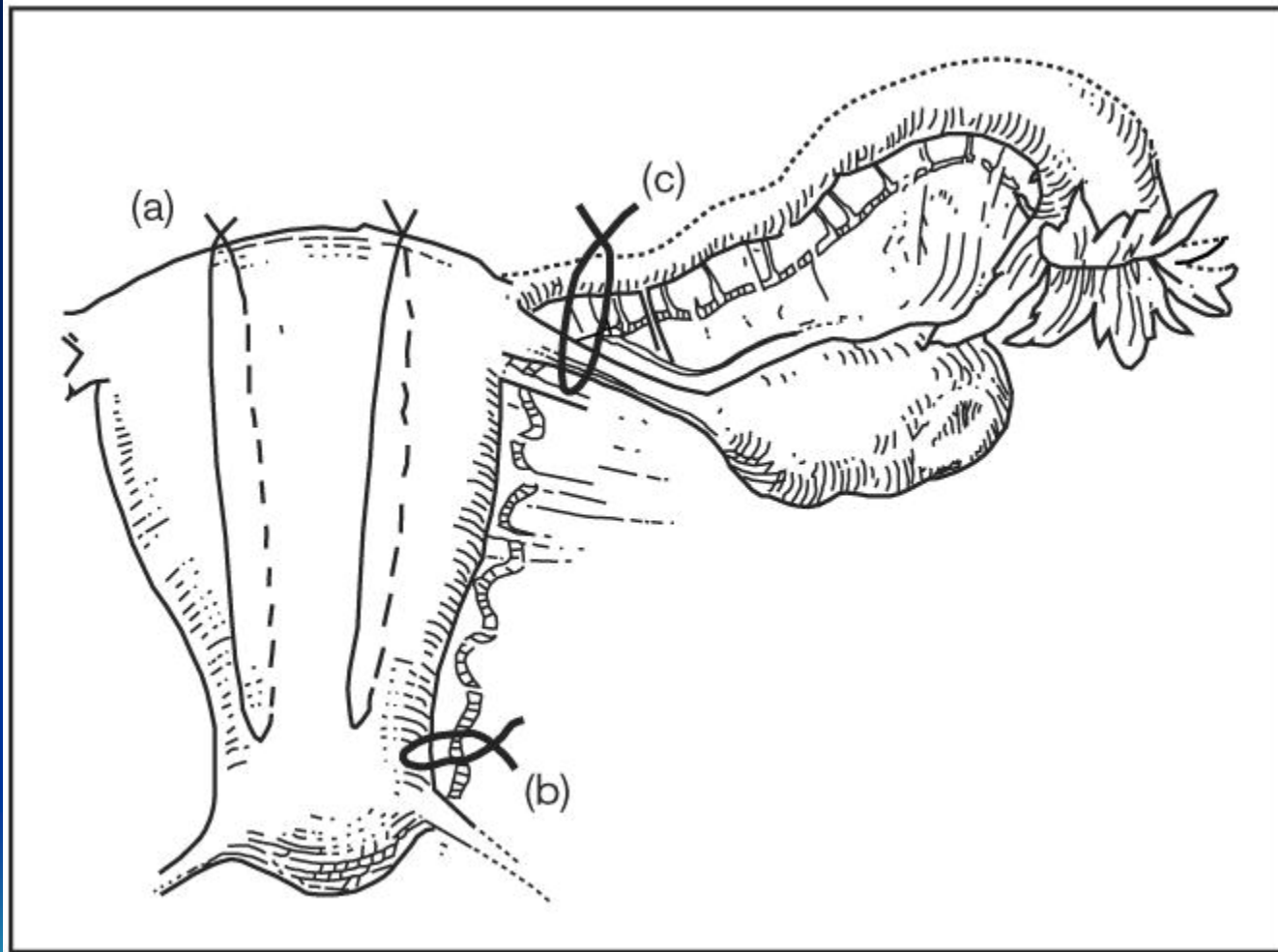
High risk pregnancy. 3rd ed. Saunders Elsevier;2005: 1559-1578.

*Verspyck E. Acta obstet gynecol scand 2005;84:444-7

Bilateral uterine artery ligation

- Because of the relative ease of performance and good success rates; uterine artery ligation has been proposed as the first line procedure to control persistent severe hemorrhage after failed medical therapy.
- A stepwise procedure with progressive ligation of the uterine and ovarian arteries can be an alternative to embolization and hysterectomy.
- Ligation of the ovarian and uterine vessels preserves the patient's life and uterus.

Uterine Artery Ligation



a) The placement of simple brace sutures; (b) the placement of uterine artery ligation; and (c) ligation of the infundibulopelvic Tamizian: Curr

Opin Obstet Gynecol, 13(2). 2001.127-13

Arterial embolization

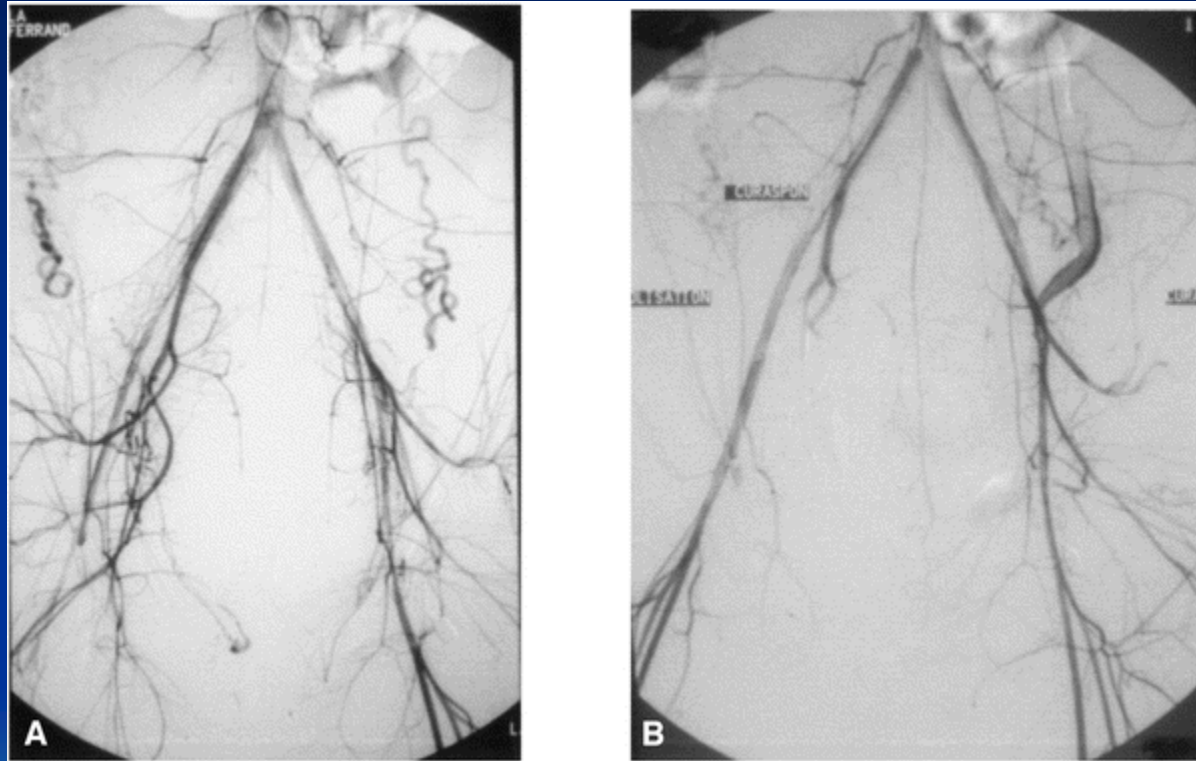
- First-line for PPH refractory to medication.
- Prophylaxis before elective C/S i.e.. antenatal abnormal placentation & anticipated bleeding.
- Experienced radiologist in angiographic, interventional skills, fluoroscopy; correct arterial catheters & embolic materials.
- Performed in angiography suite.
- Requires 1-2 hours.
- Femoral artery puncture & bilateral internal iliac artery catheterization under fluoroscopy .
- Angiography to identify bleeding sites.
- Embolization using gelfoam → temporary occlusion for Ω 4 weeks.
- Limited studies with success rate: 80-95%.
- 50% of failed cases → abnormal placentation .

Arterial embolization

- Complication rate reported is Ω 6-9%.
- Complications, if inadvertent embolization of adjacent vessels.
- Bladder, rectal, genital tract & lower limb necrosis are reported
- More common if permanent vascular occlusion (polyvinyl alcohol) particles used.
- Ovarian failure as a possible sequelae of ovarian vascular is reported.
- Fever, hematoma, pelvic abscess & artery perforation.
- For ongoing hemorrhage, arterial embolization is too long & can increase net blood loss.

contrast pooling (*arrows*) from branches of left uterine artery, consistent with active hemorrhage.





A Bleeding from the long vaginal artery. 1B. Same patient, after embolization.

Hysterectomy

- Hysterectomy is the last resort in the management of PPH due to uterine causes.
- Subtotal hysterectomy, is quicker, simpler, safer with less blood loss except:
- Bleeding cervical branch of the uterine artery for lower segment, placenta previa with accreta or tears in the lower segment.
- Hysterectomy when all other avenues available have been exhausted.
- When bleeding continues with a severely shocked patient.
- Coagulopathy in which no replacement blood products are available

Surgical management of severe obstetric hemorrhage: experience with an obstetric hemorrhage equipment tray

- The ready availability of an obstetric hemorrhage equipment tray on the labor ward facilitates prompt surgical management of severe obstetric hemorrhage, and may reduce the need for blood transfusion and hysterectomy.**

Organization

- L&D units **compile medications and instruments** that may be needed to manage PPH so that this equipment is readily available when needed (similar to a "code cart").
- The Joint Commission on Accreditation of Healthcare Organizations recommends that obstetrical staff periodically conduct clinical **drills** to help staff prepare for PPH, conduct debriefings to evaluate team performance, and identify areas for improvement .

THANK YOU

THE END