- Robert Cohen MD
- Medical Director - Placenta Accreta Program
- Medical City Dallas

Placenta Accreta Spectrum

A 10 YEAR JOURNEY

TOPICS

- 1) Placenta Accreta Spectrum
- 2) Treatment
- 3) Management outside Accreta COE

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- 2) Treatment
- 3) Management outside Accreta COE

- Definitions:
  - Placenta Accreta, Increta, Percreta
  - AIP (abnormally invasive placenta)
  - MAP (morbidly adherent placenta)
  - **PAS (Placenta Accreta Spectrum)**

Definitions:

Placenta Accreta: Placenta attaches superficially into the myometrium

Placenta Increta: Placenta attaches deeply into the myometrium

Placenta Percreta: Placenta invades through the uterine serosa and may involve other pelvic organs

Incidence

- 1970's-1980's:1/ 2,510 to 1/4017
- 2002: 1/533
- Current data: 1/272 to 1/333

- Why?? Largely felt to be due to the increasing C/section rate

Cause

- Thought to result from a defect in the endometrial/myometrial interface

- C/Section; uterine surgery; D&C; IVF

Biggest risk factor

- Prior C/section with placenta previa
  - 1st c/section + previa = 3% risk
  - 2nd = 11%
  - 3rd = 40%
  - 4th = 61%
  - 5th or more = 67%

Risks

- Generally requires Hysterectomy
- Hemorrhage: Uterine artery blood flow 750mL/min
- Bladder Injury
- Ureteral Injury
- GI Tract Injury
- Vascular injury

- 1) Placenta Accreta Spectrum
- 2) Treatment
- 3) Management outside Accreta COE

Placenta Accreta has a 4-7% mortality rate

Observational Study > Acta Obstet Gynecol Scand. 2021 Aug;100(8):1445-1453.
doi: 10.1111/aogs.14163. Epub 2021 May 24.

Lack of experience is a main cause of maternal death in placenta accreta spectrum patients

Albaro J Nieto-Calvache [1], Jose M Palacios-Jaraquemada [2], Gabriel Osanan [3], Rafael Cortes-Charry [4], Rozi A Aryananda [5], Vidyadhar B Bangal [6], Aziz Slaoui [7], Ahmed M Abbas [8], Godwin O Akaba [9], Zaman N Joshua [10], Lina M Vergara Galliadi [11], Alejandro S Nieto-Calvache [12], José E Sanín-Blair [13], Juan M Burgos-Luna [1]; Latin American group for the study of placenta accreta spectrum

Improved Outcomes

- Planned delivery at a center of excellence by a consistent multi-disciplinary Team with experience in PAS

Treatment Options

- Primary Hysterectomy
- Conservative surgery
- Delayed Hysterectomy
- Embolization

Conservative surgery

- Requires small lesion, generally less than 4cm
- Risk of greater blood loss vs hysterectomy
- Candidates are patients desiring maintenance of fertility

Delayed Hysterectomy

- Positive
  - Decreased EBL
- Negative
  - Infection, bleeding
  - Second operation

MVE: Multivessel embolization

- Positive
  - Decreased transfusion requirements vs IIA balloons or no balloons
- Negative
  - Lower 1 min apgar
  - Longer NICU stay
  - Time: 68 +/- 34 minutes after C/Section

Primary Hysterectomy

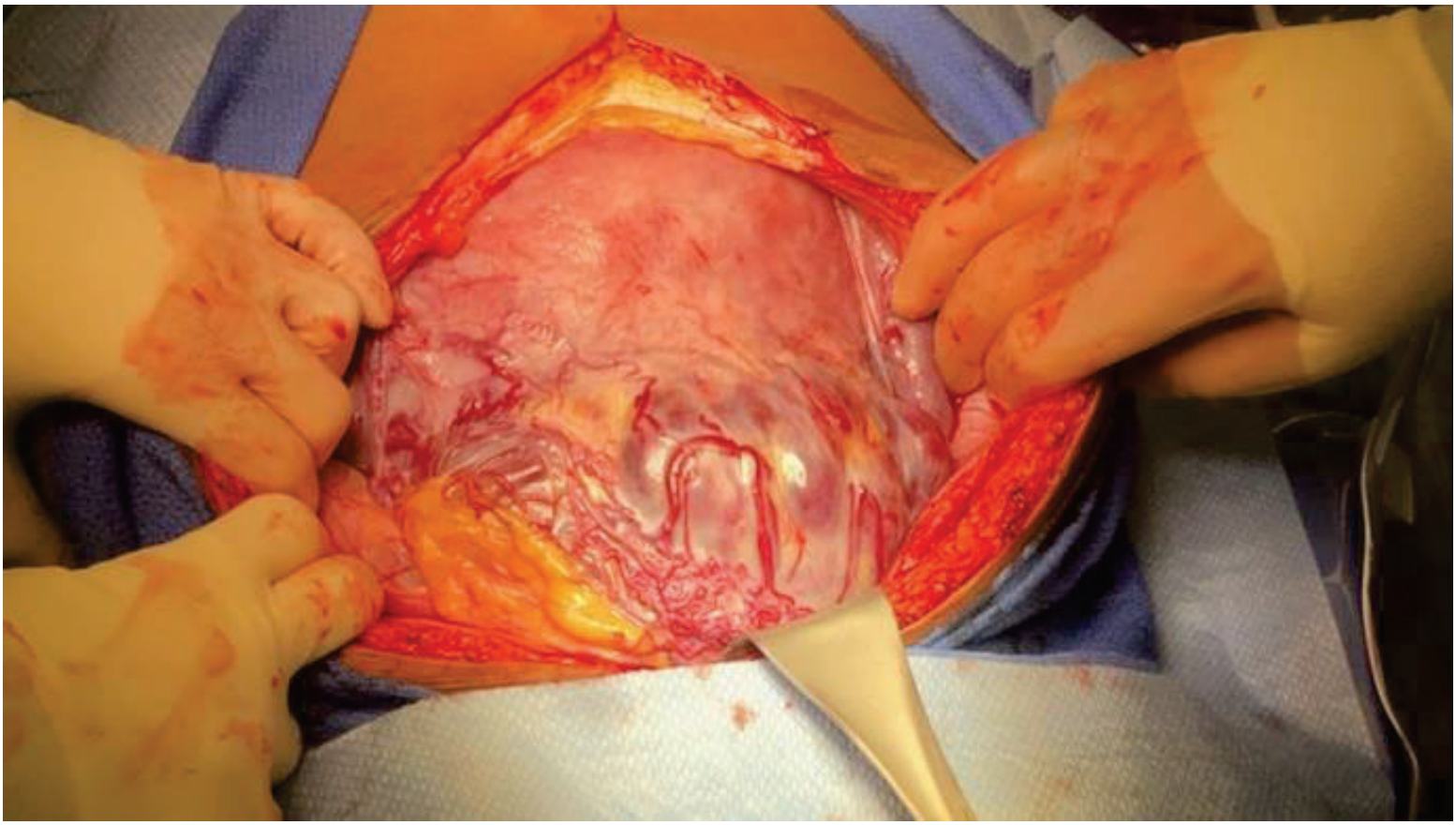
- Currently Standard of Care

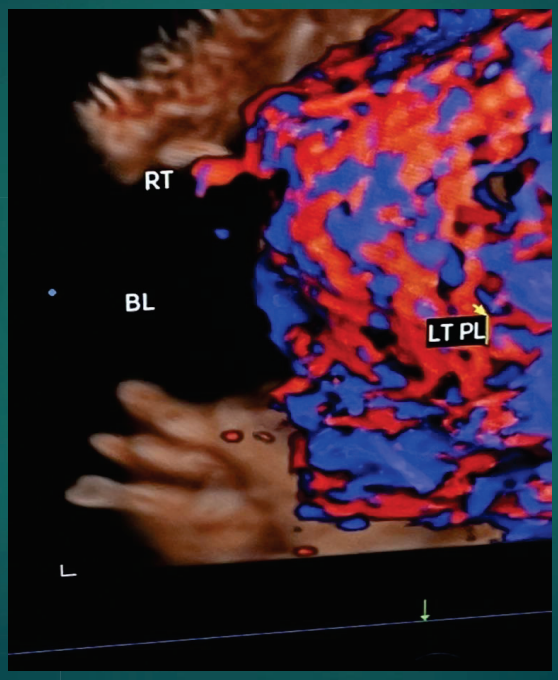
- What have we learned:

- What have we learned:
  - You never know what you are going to get
  - Nothing is ever where you think it is going to be
  - There are currently no imaging techniques that adequately define the extent of the disease

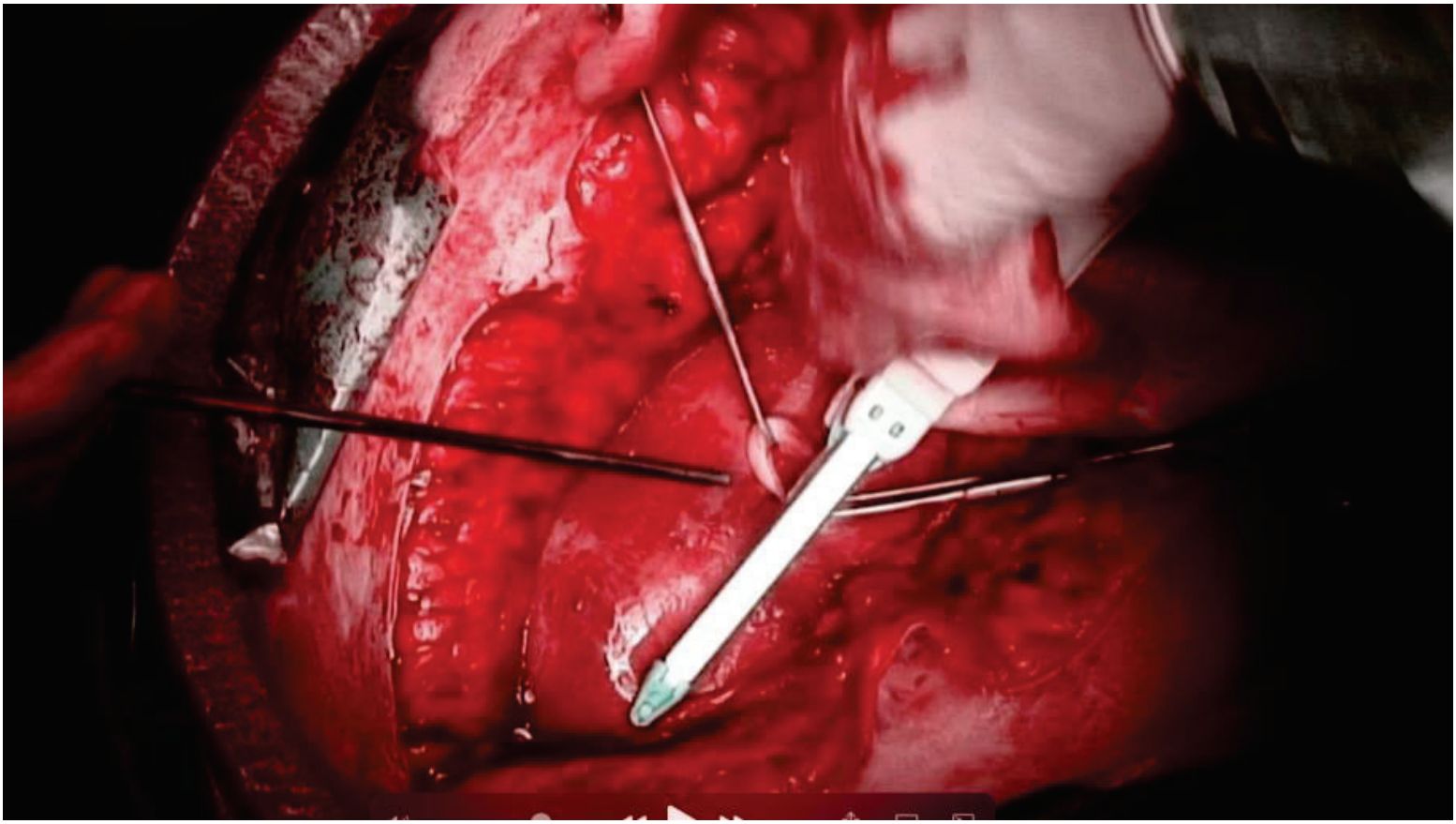
- Sonogram and MRI interpretation:
  - Placenta Accreta
  - No evidence of deep invasion
  - "This should be an easy one to catch your breath"

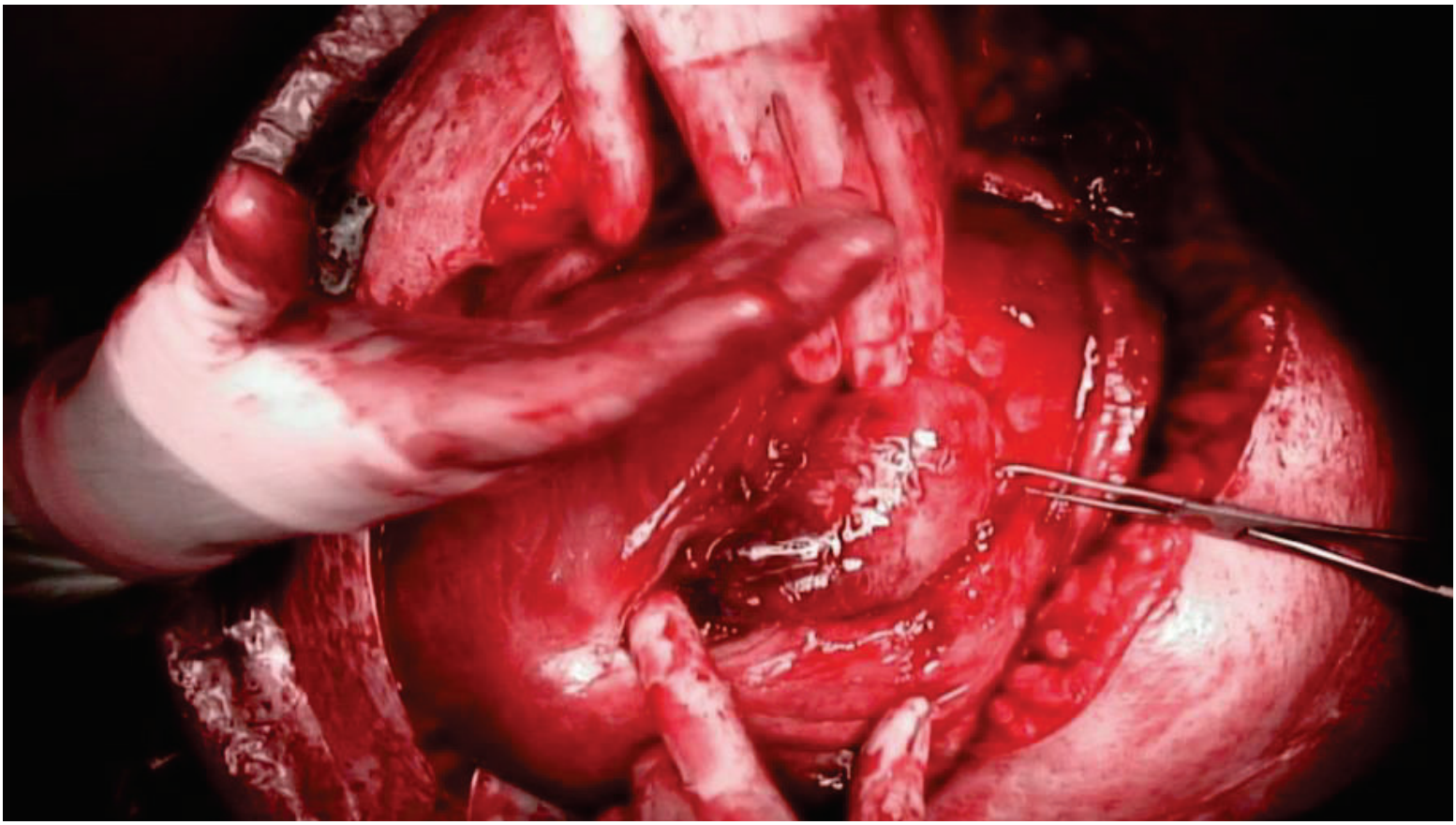
  - And we found:





- What have we learned:
- 1) The surgical approach:
  - Modified Radical Hysterectomy-
    - Divide round ligaments and dissect laterally opening the broad ligament
    - Stay away from the massive collateral circulation adjacent to the uterus. NO! clamps placed here. Vessels are immature and lack normal muscularis. Easily torn and bleed profusely.
    - Identify and expose the ureters/pelvic vessels
    - Delay bladder dissection. Create from lateral aspect to space of Retzius.





Delivery timing: literature suggests 34-36 weeks. We deliver at 34 to 35 weeks to decrease risk of emergent surgery

How do we provide for maximum patient safety?

Resilience Engineering

Resilience engineering starts from accepting the reality that failures happen, and, through engineering, builds a way for the system to continue despite those failures. Good resilience engineering produces a system that can adapt.

The capacity to fail without consequence

Our Approach

COE 2014 Silver et al

The key to success of an accreta center of excellence is to have coordinated, multidisciplinary teamwork between providers with the high level of skill that comes with experience in treating the condition and working together

When the balloon goes up, blood transfusion goes down

IOFFE ET AL, 2021

No one should bleed to death;
The sooner you stop bleeding, the better

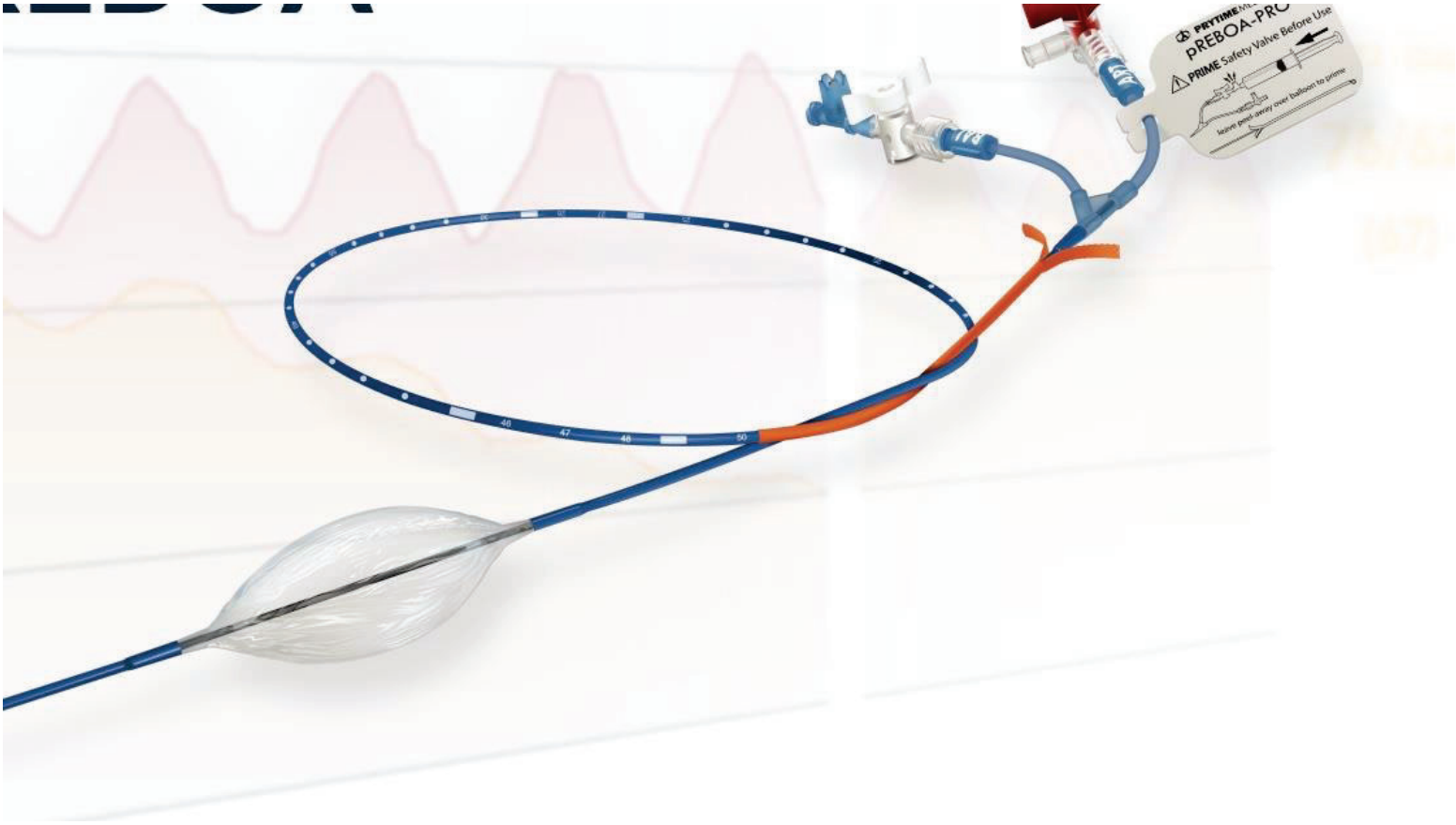
Prytime Medical

Resuscitative endovascular balloon occlusion of the aorta REBOA

Hospital Team First to Use Device in OB-GYN Case

Surgeons at Texas Health Dallas utilize aortic balloon catheter in saving woman and her baby

- First described during Korean war
- Involves passing a balloon catheter into the aorta via femoral artery and inflating
- Can be life saving in massive hemorrhage
- Placed by IR and verified by fluoroscopy
- Hypogastric artery balloons are less effective



Background

- Ioffe et al, 2021: 17.7% REBOA cases received >4u PRBC
  49.3% non-REBOA cases received >4u PRBC

- Ordonez et al, 2018: We provide clinical data supporting the use of REBOA in the management of pregnant women with MAP undergoing elective cesarean delivery. Our findings demonstrate the feasibility of REBOA as a prophylactic intervention to improve outcomes in women at risk of catastrophic postpartum hemorrhage.

Background

- **Shahin and Pang, 2018: comparison of interventional modalities for hemorrhage control**
  - **Balloon occlusion of IIA, aorta, UA, common iliac**
  - **Embolization of UA, pelvic collateral arteries, anterior division IIA**
  - **Endovascular intervention was associated with less blood loss than no intervention**
  - **Lowest blood loss with aortic balloon occlusion**

Our Approach

- The REBOA catheter is part of our resilience engineering
- Used electively to reduce complications associated with emergent placement

Our Approach

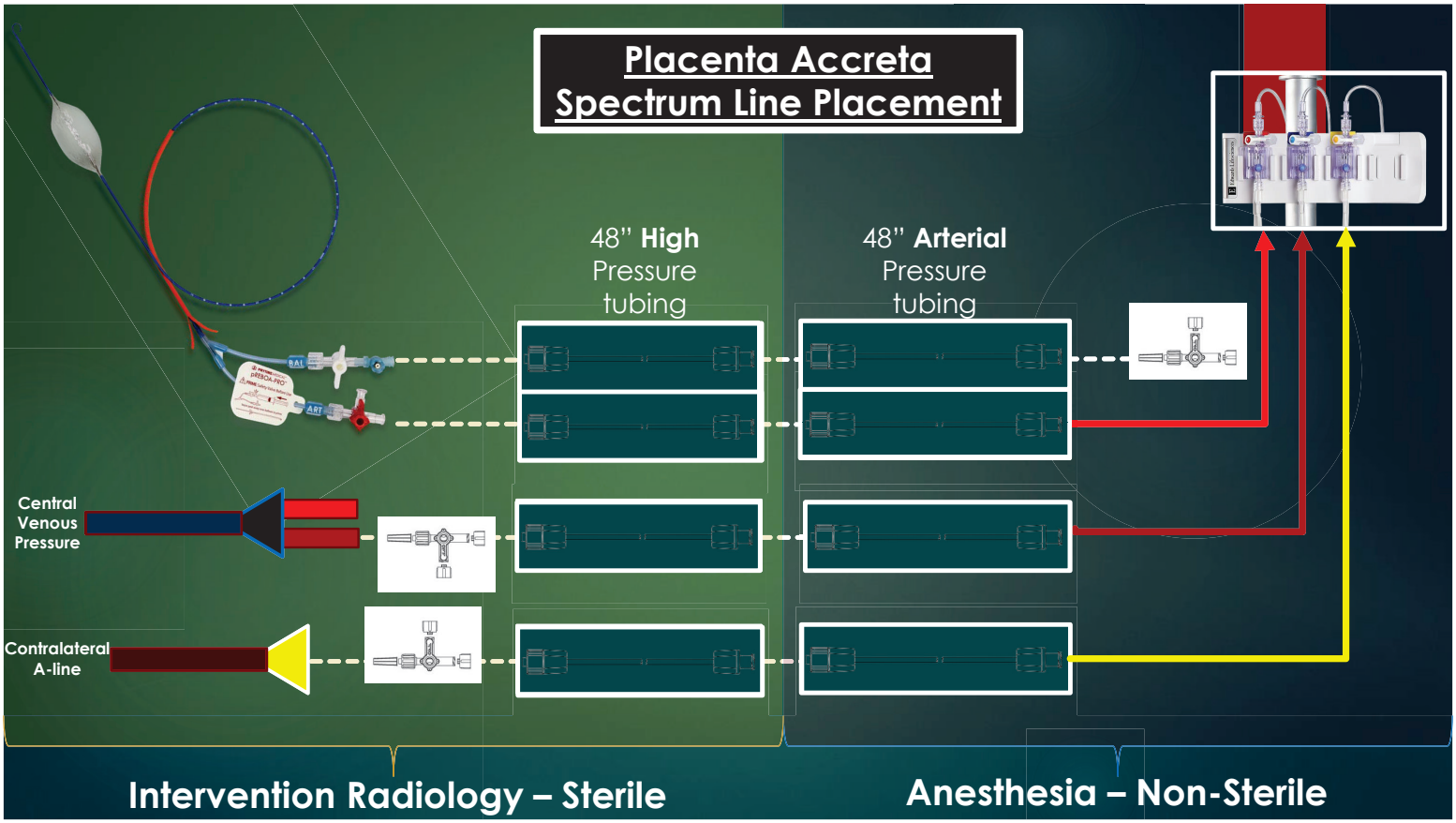
Placenta Percreta/Increta – central previa

- Femoral vein large bore central catheter
- REBOA
- Contralateral femoral arterial line
- Radial arterial line
- MTP
- Belmont rapid transfuser
- Cell Saver
- Ureteral Stents
- ICU/L&D post op for vascular checks

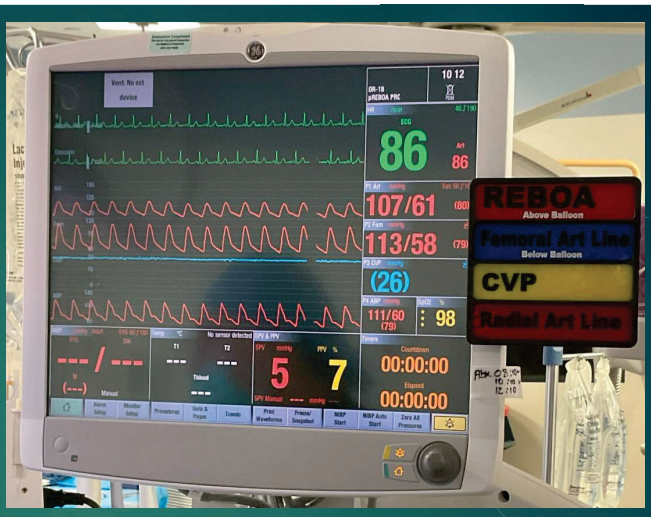
Our Approach

Placenta Accreta/Increta (without central previa)

- 4 fr femoral artery sheath
- Radial arterial line
- MTP
- Belmont rapid transfuser
- Cell Saver
- Ureteral Stents

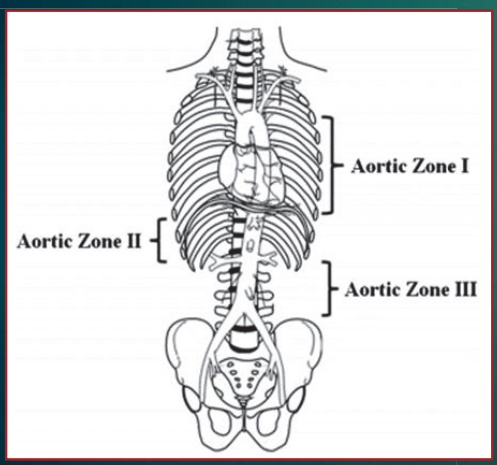


Invasive Pressure Monitoring



- Left Femoral 18G arterial access (P2 Fem)
- Left femoral venous dual infusion lumen catheter (P3 CVP)
- Right Femoral pREBOA Pro Catheter (P1 ART)

REBOA PLACEMENT



Zone 1

From left subclavian artery to celiac trunk

- To manage abdominal hemorrhage

Zone 2

From celiac artery to lowest renal artery

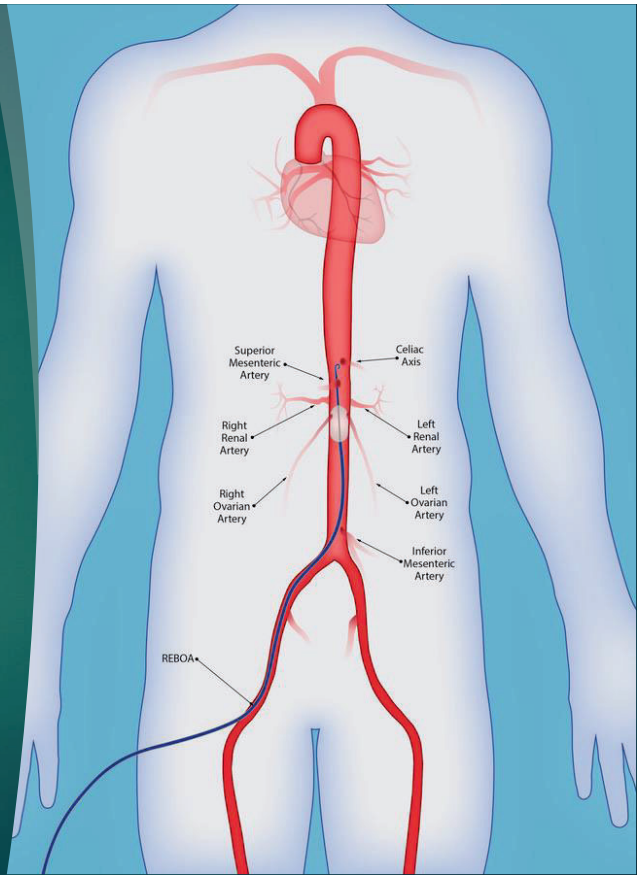
- Generally avoided

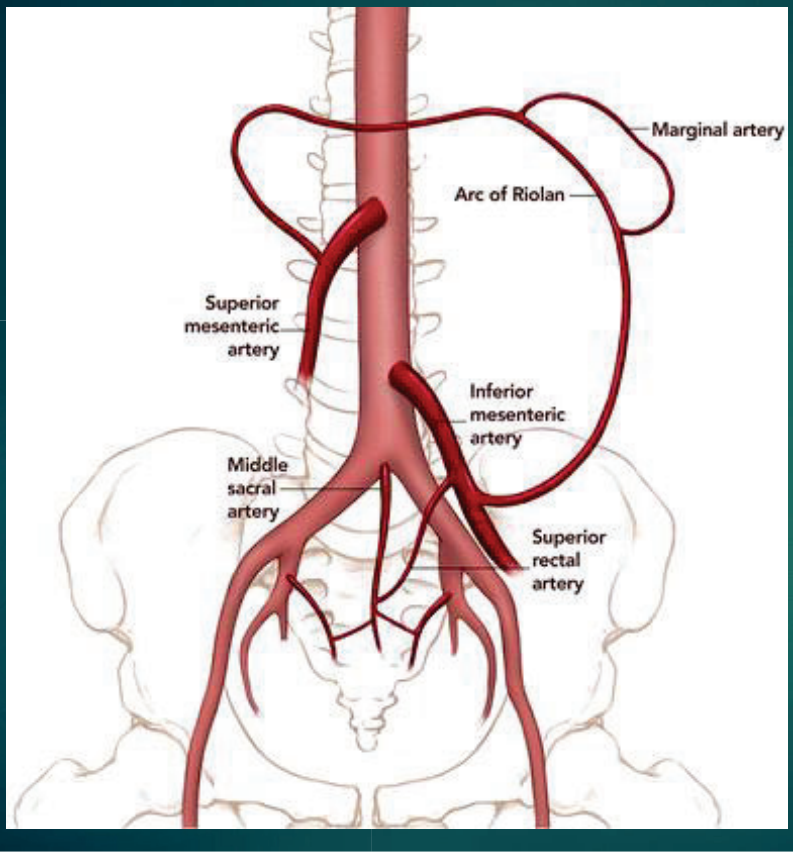
Zone 3

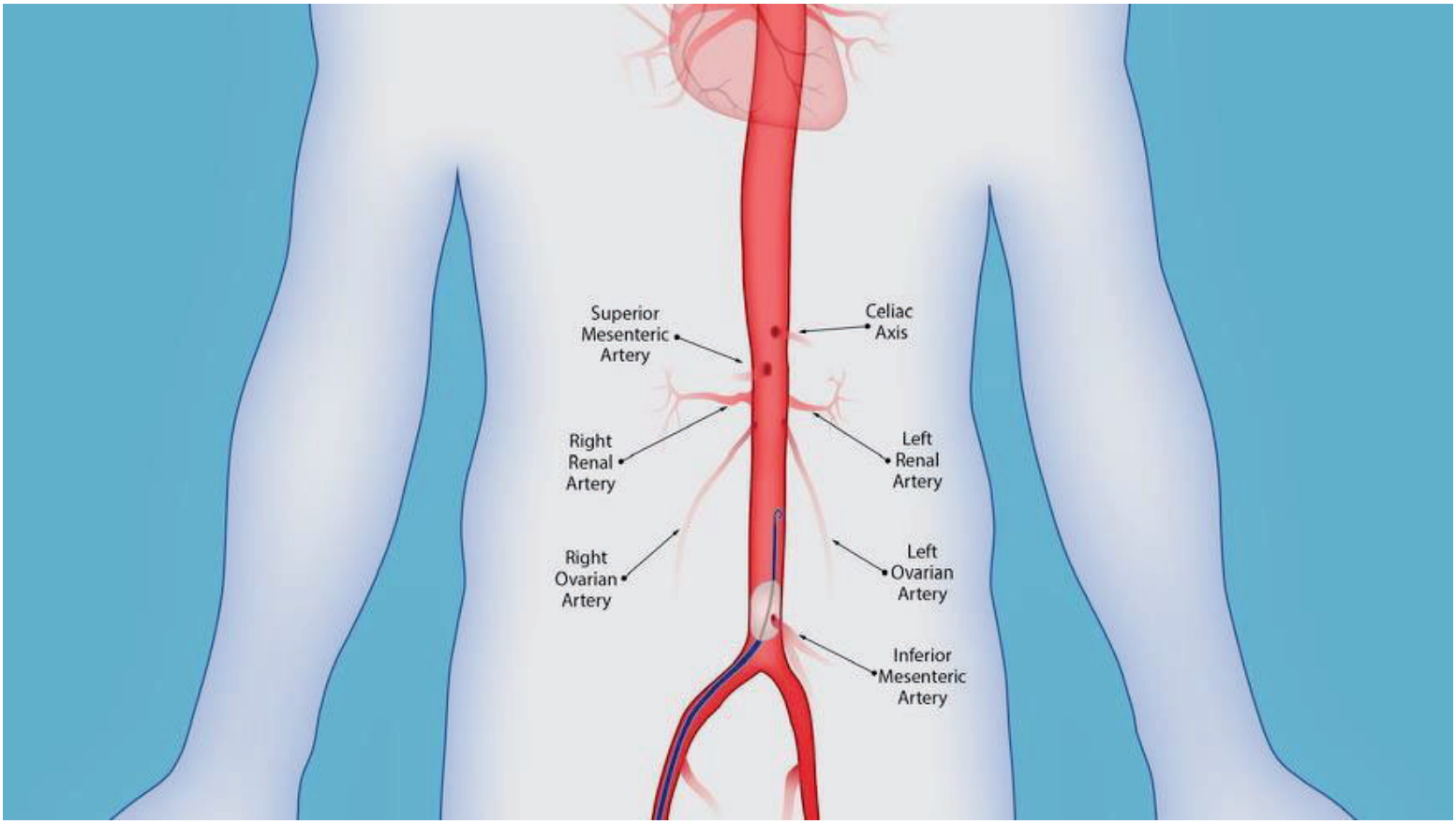
From lowest renal artery to aortic bifurcation

- To manage pelvic hemorrhage

- Balloon initially placed directly below the renal arteries
- This led to inadequate blood flow control despite loss of contralateral arterial pulse wave form
- Cause felt to be collateral circulation via superior mesenteric a. and back filling through Inferior Mesenteric a.







Statistics

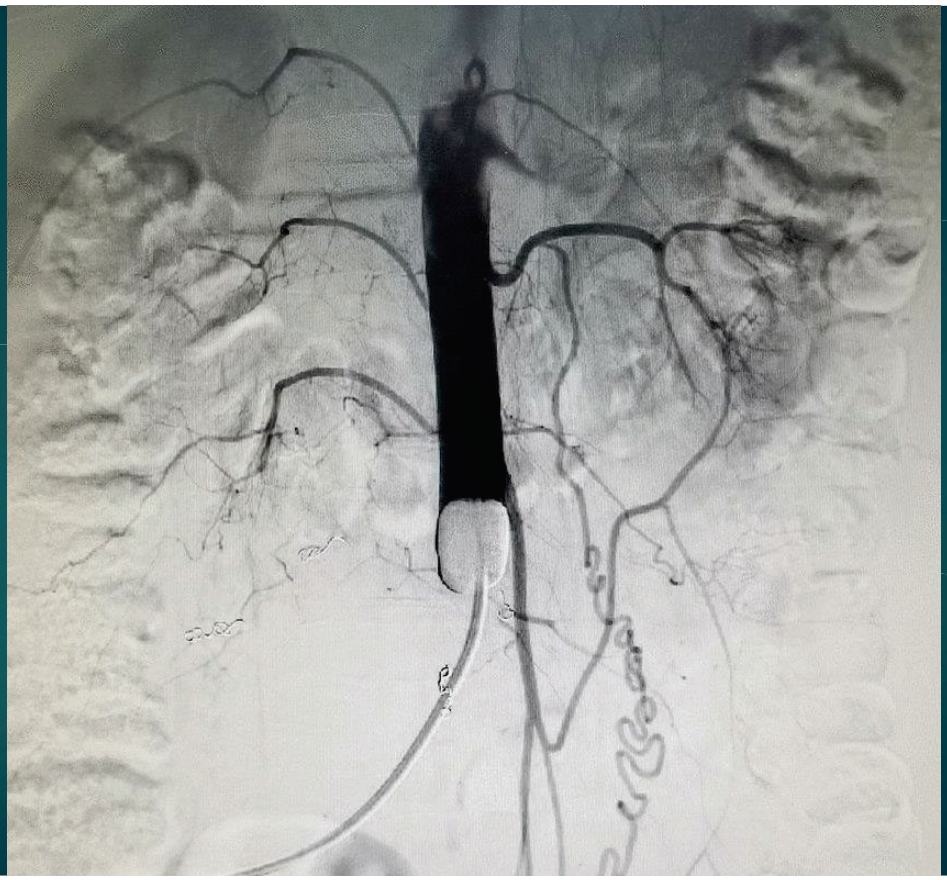
- EBL Percreta
  - Zone 3a 4971mL (7 cases)
  - Zone 3b 2911mL (19 cases) 41% decrease

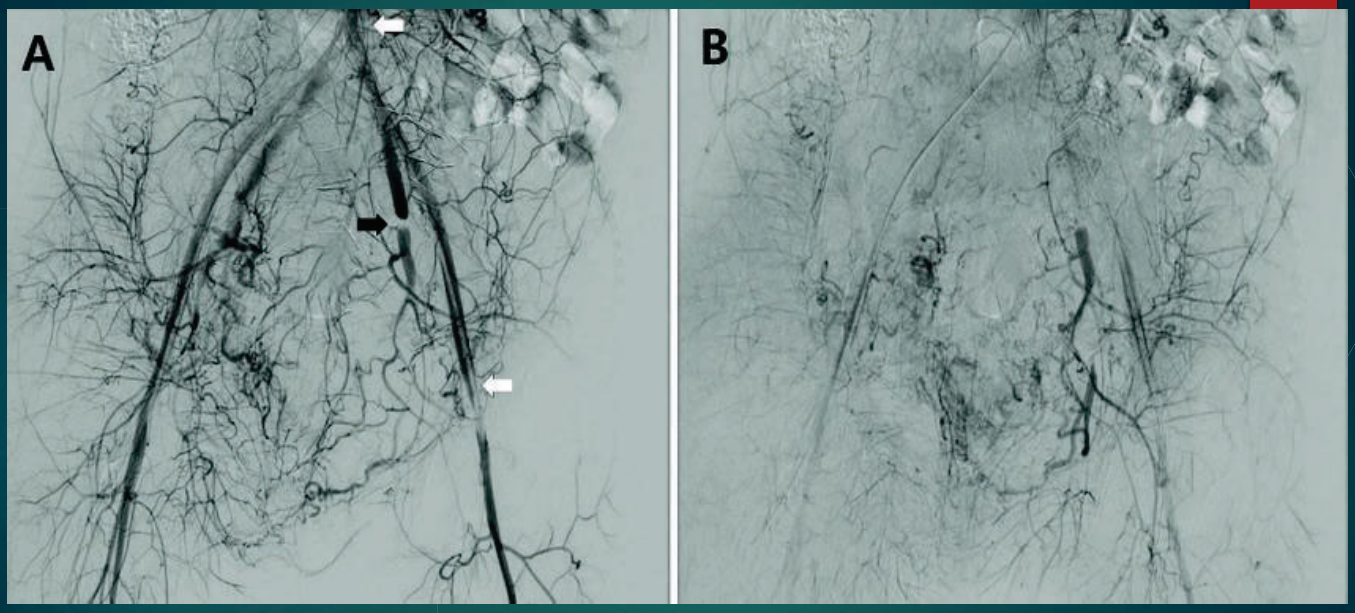
Accreta
Increta
Zone 3a 2653 (13 cases)
Zone 3b 2029 (7 cases)

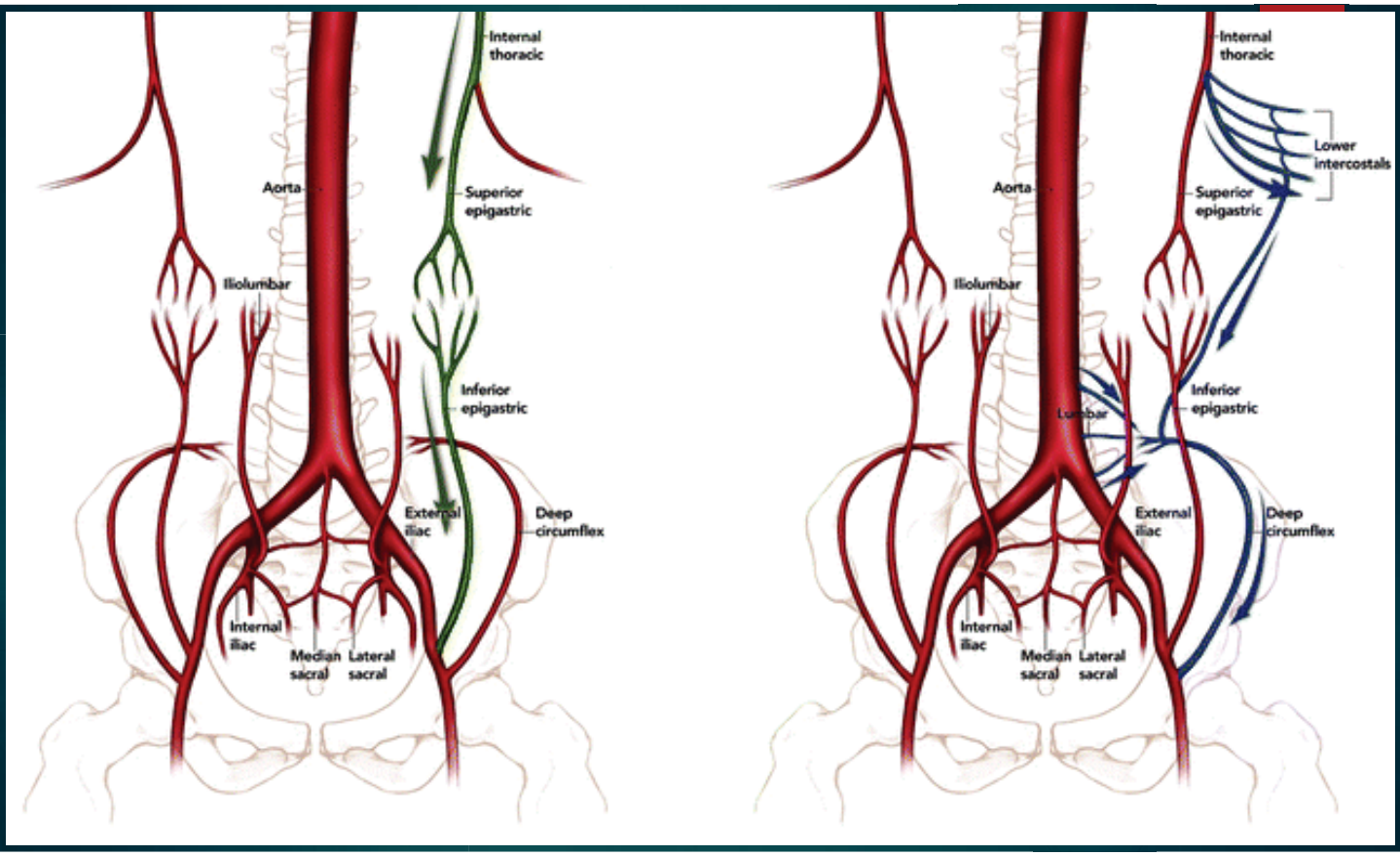
J Trauma Acute Care Surg. 2023 May 1;94(5):710-717. doi: 10.1097/TA.0000000000003917. Epub 2023 Feb 24.

Aortic balloon occlusion in distal zone 3 reduces blood loss from obstetric hemorrhage in placenta accreta spectrum

Sarah L Kluck [1], Rachel M Russo, Noah B Appel, Alan I Frankfurt, Craig Weltge, Tricia Shimer, Brian Feagins, Amin Frotan, Brian Rinehart, Robert A Cohen

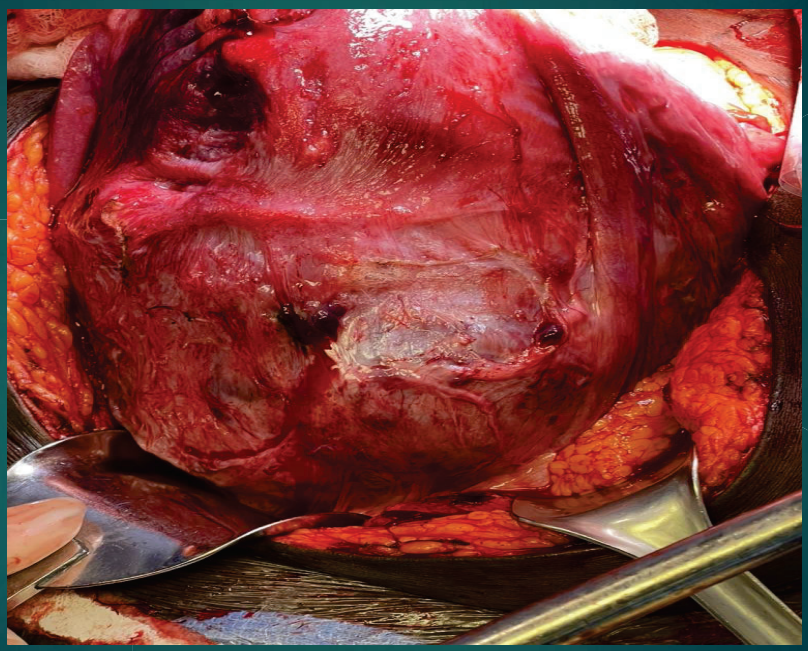


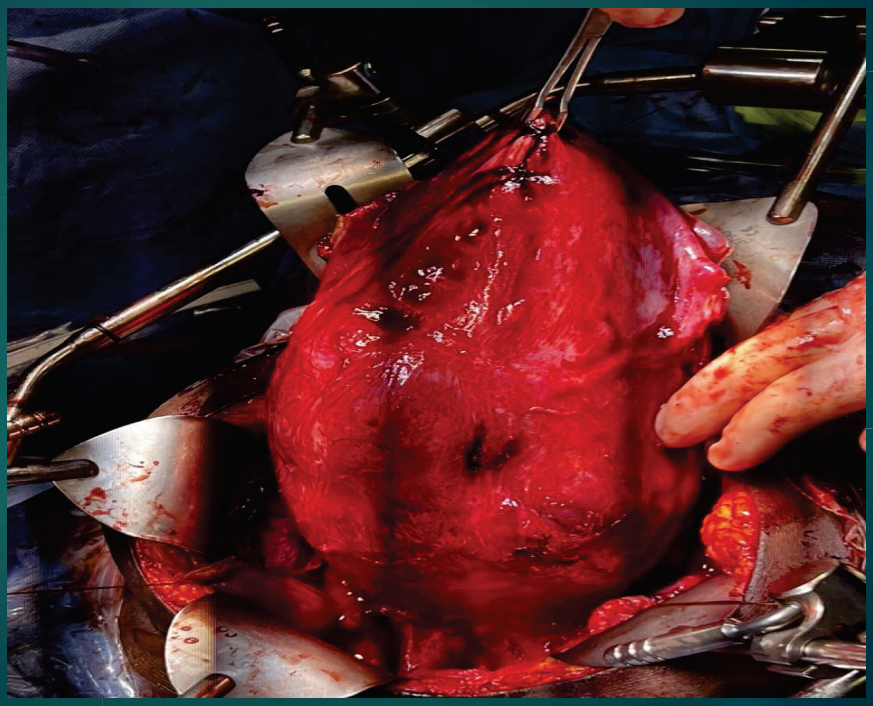

A
B


Internal thoracic
Aorta
Superior epigastric
Iliolumbar
Inferior epigastric
External iliac
Deep circumflex
Internal iliac
Median sacral
Lateral sacral
Internal thoracic
Lower intercostals
Aorta
Superior epigastric
Iliolumbar
Lumbar
Inferior epigastric
External iliac
Deep circumflex
Internal iliac
Median sacral
Lateral sacral

Additional benefits of REBOA beyond control of acute surgical blood loss

- Decrease in placental size and LUS lateral expansion = increased exposure
- Decrease in blood loss from placenta previa hemorrhage
- Luxury of time





- 34yo G9P5126 prior c/s x6. Admitted prior to scheduled C-Hyst at 34 weeks.
- At 33+6 complained of abdominal pain with contractions noted on monitor. Planned transfusion for anemia initiated early for Hct 24. Post 2 unit transfusion- no change in hct. EFM Cat 1. Increased abdominal pain.
- Patient taken to OR for surgery. Ureteral stents placed. IJ dialysis catheter placed. REBOA, contralateral femoral arterial line and radial arterial line inserted.

OPERATIVE FINDINGS

- Fusion of anterior abdominal wall to uterus; hemoperitoneum with blood visibly rising; Only visible uterus was small area at the fundus.
- Delivery viable male infant
- REBOA inflated to decrease active bleeding allowing for dissection to free uterus and allow hysterectomy
- Findings: 2500mL free blood in abdomen with torn, bleeding percreta; Total EBL 6700mL
- Post-op: mild coagulopathy-resolved; Discharged on post op day 8

Take Home Message

Resilience engineering allows a system to adapt to failure without consequence

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The REBOA catheter is a part of resilience engineering

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Resilience engineering allows a system to adapt to failure without consequence

The REBOA catheter is a part of resilience engineering

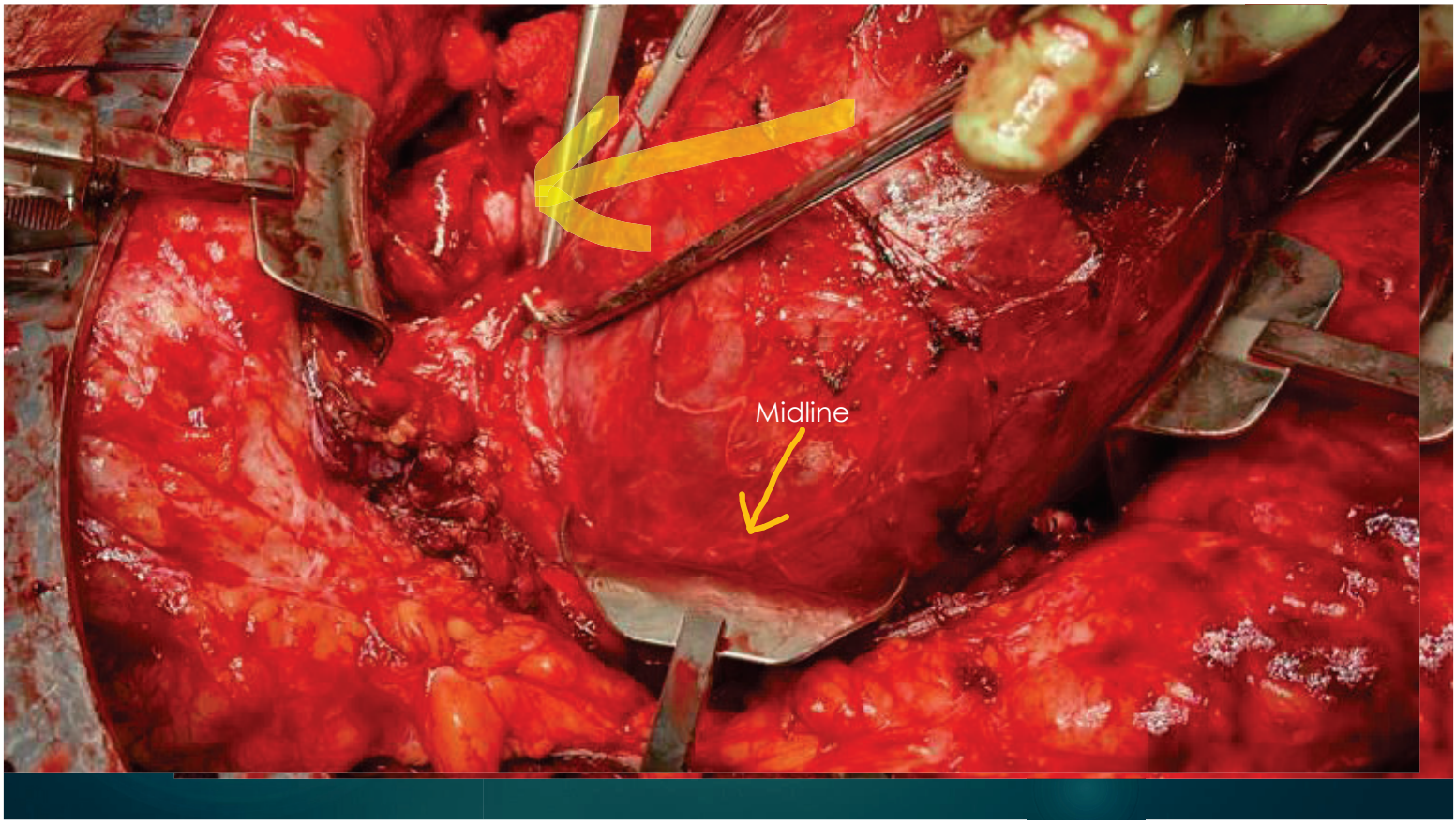
Elective REBOA insertion is safe and effective

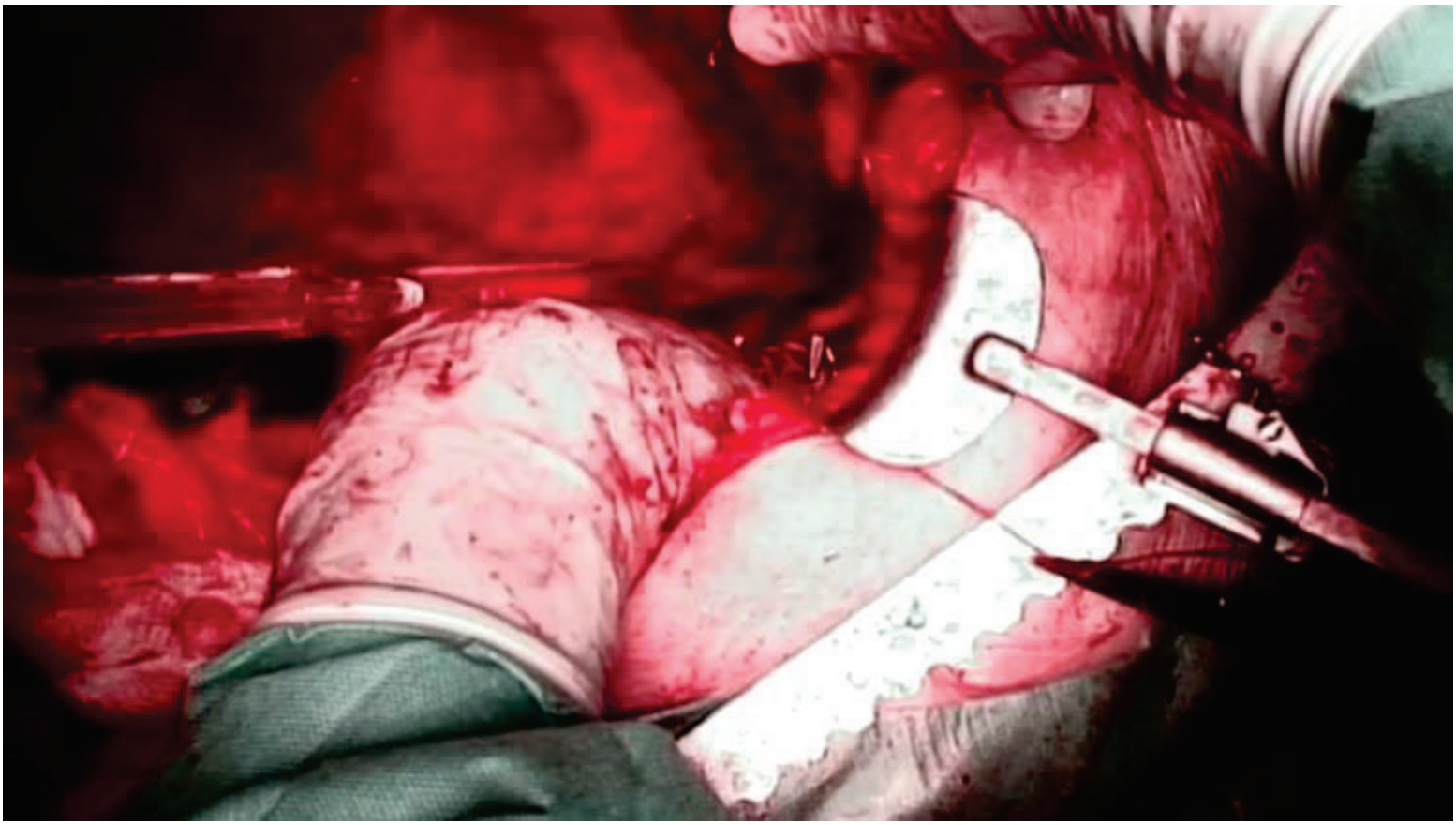
Ureteral stents: Originally controversial, becoming less so

- We feel they are critical
- Aids in identifying ureter when in abnormal location
- Aids in uterine artery ligation

- Obstet Gynecol 2022; 140:806-11

- Prophylactic ureteral stent placement was associated with a decreased risk of genitourinary injury during hysterectomy for placenta accreta spectrum


Midline



Mother needed 52 blood transfusions after 'catastrophic haemorrhage'

Team Approach is Critical

- OB Surgeons
- Anesthesia
- Urology
- IR
- General Surgery
- Vascular Surgery

- 1) Placenta Accreta Spectrum
- 2) Treatment
- 3) Management outside Accreta COE

Antepartum Diagnosis- Refer to PAS Center: MCD Protocol

Call Accreta coordinator with patient information as soon as diagnosis is made

Fax Prenatal record and sonograms

We will arrange a consultation with the patient

Continue prenatal care with primary OB

We will arrange admission when indicated and assume care on admission

Advise patient to present to ER for any bleeding or contractions

We will see patient for 2 week check and refer back to primary OB for 6 week check and ongoing care

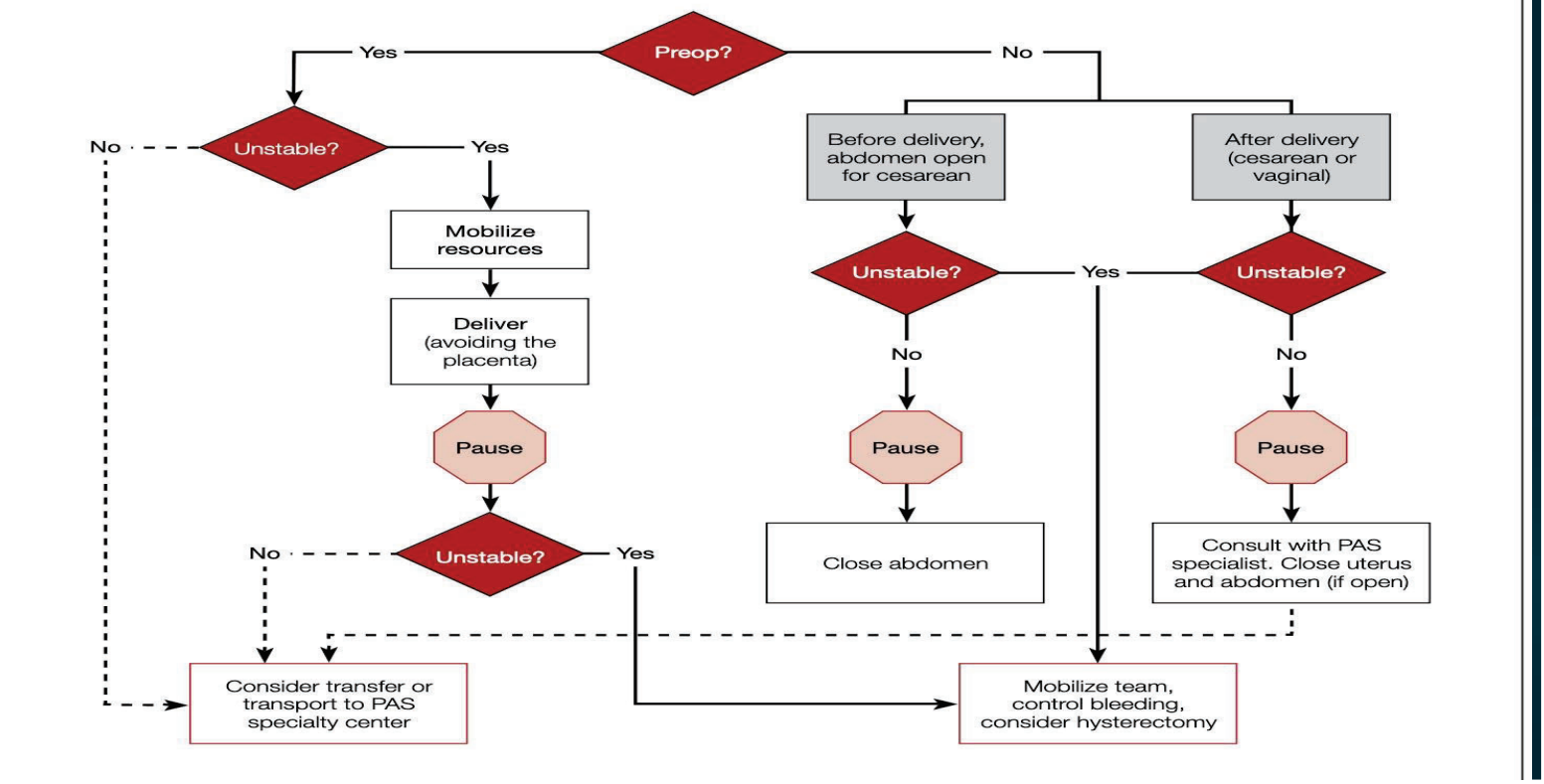
Management Strategies

Steps to minimize morbidity from unanticipated placenta accreta spectrum

Appropriate planning for placenta accreta spectrum can optimize management, facility transfer when needed, and patient outcomes

Daniela Carusi, MD, MSc, and Brett Einerson, MD, MPH

IGURE 2 Algorithm for managing placenta accreta spectrum



Medical City Dallas
Placenta Accreta Program

- Medical City Dallas Transfer Center
  - 877-422-9337

Accreta Coordinator:

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  - 972-207-7722