Placenta Accreta Spectrum (PAS)

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This guideline has been separated from the guidelines for placenta previa and vasa previa. Delivery timing has been updated to 32w0d-35w6d for known PAS patients.

Summary

- Patients with placenta previa or low-lying anterior placenta and history of Cesarean delivery or any uterine surgery should be referred to MFM for PAS evaluation at 20 weeks gestation.
- Repeat ultrasound evaluation with transabdominal and transvaginal approach should occur at 28-32 weeks for surgical planning in patients who are at risk for PAS (history of Cesarean/uterine surgery + persistent previa, low-lying placenta).
- Patients at high-risk for PAS should be delivered between 32w0d-35w6d with antenatal administration of corticosteroids. Earlier delivery may be indicated based on clinical presentation and shared decision making with the patient. Delivery past 36w0d is generally not recommended but may be individualized on a case-by-case basis. These patients are ideally scheduled through the BCM PAS team. Ensure the PAS Surgical Planning Checklist is in the Care Coordination Note for scheduled cases.
- Please refer to Figure 2 **for unscheduled/unplanned PAS delivery call-tree and management**. Of importance: (1) Notify PAS#1 on-call, (2) Book OR case for CS, possible TAH/BS, Cystoscopy/Stents, (3) Consult Transfusion Medicine and place 4U pRBC on hold to OR, (4) Consult Neonatology (5) Consult Urology for stent placement (if patient clinical status permits).
- **For unscheduled emergent deliveries**, OR to open both CS and PAS tray set. Place patient in dorsal lithotomy position. Follow the PAS Surgical planning checklist in the care coordination note, perform vertical midline skin incision, perform a classical or trans fundal hysterotomy (do not cut through placenta), deliver neonate and allow for delayed cord clamping as clinically stable. **Do not attempt to remove placenta manually.** If clinical status allows, pack abdomen and await on-call PAS physician. If status deteriorates, call for MTP, pack intestines into upper abdomen, and begin to perform supracervical hysterectomy (or if accessible, clamp uterine artery bilaterally).
- Order routine ERAS post-operative recovery

Background

Placenta accreta spectrum is an overarching term used to describe the clinical condition when part of the placenta, or the entire placenta, implants over a uterine scar and becomes inseparable from the uterine wall.[1] Previously, the terms “placenta accreta,” “abnormally invasive placenta,” and “morbidly adherent placenta” were used to describe the full spectrum of placental disease, however these terms have fallen out of favor, as each may refer to a specific subset of PAS, and the term “Placenta Accreta Spectrum” has now been accepted and endorsed by the International Society for Abnormally Invasive Placenta, FIGO (Federation Internationale Gynecologie et Obstetrique), the American College of Obstetricians and Gynecologists and the Society for Maternal-Fetal Medicine. The precise etiology is unknown, but there has been a recent shift away from considering placental trophoblast as a truly invasive placenta disease process (such as a cancer) toward the hypothesis that the placenta accreta spectrum is more of a uterine disease, in which there are defects in the endometrium, junctional zone and/or myometrium, that the placenta mechanically distorts the uterine architecture, and that the etiology of blood loss and morbidity is caused by fibrosis, loss of normal separation planes, and recruitment and proximity of pelvic vessels in close proximity to the placenta and lower uterine segment.

Definitions

Historically there have been three grades of placenta accreta spectrum disease as defined according to the depth of invasion:[1,2]

1. **Placenta Accreta**: chorionic villi attach directly and firmly to the myometrium, rather than being restricted within the decidua basalis, and with absence of the intervening fibrinoid or "Nitabuch's" layer
2. **Placenta Increta**: chorionic villi extend into the myometrium
3. **Placenta Percreta**: chorionic villi perforate through the myometrium

It is possible to have various depths of invasion ranging from accreta to percreta within a single placental implantation site.

Complications with PAS[1-3]

- Massive obstetric hemorrhage
- Need for hysterectomy
- DIC
- Acute transfusion reactions, TRALI
- Damage to local organs (bowel, bladder, ureters) or neurovascular structures
- ARDS
- Renal failure
- Amniotic fluid embolism
- Re-operation
- Post-op thromboembolism, infection, multisystem organ failure
- Maternal death

Risk Factors

People at greatest risk of placenta accreta are those who have myometrial damage caused by a previous CD (especially multiple prior CD) with a placenta previa or low-lying placenta overlying the uterine scar.[1] Anterior or central placental location has been found to be a significant risk factor in the presence of a previous scar (28.6% vs. 1.9%, P < .001), but not in the absence of a prior scar (2.4% vs. 6.0%, P = .239).[2,4] 90% of cases of PAS will involve an anterior placenta previa, and PAS may occur in the setting of a predominantly posterior placentation or higher implantation, especially in the setting of prior uterine surgery other than cesarean, IVF, or classical hysterotomy.

Table 1. Frequency (%) of placenta accreta according to number of cesarean deliveries and presence/absence of placenta previa[1-3,5]

Cesarean Delivery	Placenta Previa Present	Placenta Previa Absent
First (primary)	3.3	0.03
Second	11-24	0.2
Third	40	0.1
Fourth	61	0.8
Fifth	67	0.8
Sixth or more	67	4.7

Other risk factors for PAS:[1-3,5-10]

- Cesarean scar pregnancy

- In vitro fertilization, with highest risk with cryopreserved embryos
- Any condition resulting in myometrial tissue damage followed by a secondary collagen repair, such as previous myomectomy, classical CD, endometrial defects due to vigorous curettage resulting in Asherman syndrome, submucous leiomyomas, thermal ablation, uterine irradiation/radiation of lower abdomen (for example, radiation of pelvic lymph nodes), and uterine artery embolization
- Prior placenta accreta spectrum disease that was conservatively managed
- Advanced maternal age
- Multiparity
- Hypertensive disorders of pregnancy
- Smoking

Antenatal screening

First line screening is via ultrasound. MRIs may be considered as the second line imaging modality for posterior placentation and suspected lateral involvement.

A high index of suspicion and referral to a specialist for ultrasound imaging should occur for any person in which there is:

1. Suspicion for placenta accreta on ultrasound
2. Placenta previa with abnormal placental appearance
3. Placenta previa with ≥ 1 prior cesarean delivery
4. History of classical cesarean delivery and anterior placentation
5. History of endometrial ablation or pelvic irradiation
6. Inability to adequately evaluate or exclude findings suspicious for placenta accreta in people with risk factors for placenta accreta
7. Any other reason for suspicion for placenta accreta (such as abnormal appearance of the placenta on screening ultrasound)

PAS may be identified on ultrasound in any trimester; however, it is usually based on US findings in the 2nd or 3rd trimester and/or by MRI.[11,12]

Patients at high risk for PAS should have a third trimester ultrasound, at 28-32 weeks, and close to surgery with one of the PAS surgeons present for surgical planning.

Ultrasound Diagnosis for PAS

Image optimization

- In the setting of placenta previa or low-lying placenta, transvaginal ultrasound evaluation is recommended.
- Scan the placenta when the patient has a FULL BLADDER. This is a crucial feature to adequately visualize the uterine-bladder interface and identify any irregularity or bulging of placenta.
- With the abdominal probe in the sagittal/parasagittal plane, tilt the probe so that the handle moves closer to the patient's thighs (nearly parallel) and the transducer end rotates up slightly. This will bring the bladder line into better view and avoid dropouts that occur when the bladder line (interface) is parallel to the transducer.
- Use penetration and adjust the focal point to target the placenta
- Widen the angle of view, to ensure as much of the placenta is visible.
- Ensure the entire placenta is evaluated. Remember, PAS may affect only a portion of the placenta
- Obtain transverse sweeps from low to high (inferior to superior), to look for placental bulging along the parametria

- Transvaginal imaging with and without color Doppler and 3D color Doppler is recommended to evaluate the cervix and for deep invasion for any low-lying placenta, suspected PAS or if the lowermost edge cannot be clearly seen on transabdominal imaging.
- If there is suspicion for lacunae formation versus placental lakes, use of cine sweeps to evaluate turbulence as well as Doppler interrogation and velocimetry can be used to distinguish between the two findings. Placental lakes are more common benign findings in the third trimester and are associated with low velocity (<10cm/s) venous flow, whereas placenta lacunae are abnormal blood collections within the uterus that are highly associated with PAS formation and associated with higher velocity (>15cm/s) venous or arterial flow.[13]

Ultrasound findings

[1,3]In the Special Report of the Society for Maternal-Fetal Medicine Placenta Accreta Spectrum Ultrasound Marker Task Force: Consensus on definition of markers and approach to the ultrasound examination of pregnancies at risk for placenta accreta spectrum,[14] the definition of first trimester PAS markers and the proposed ultrasound approach are presented in Table 2 and Table 3, respectively. Similarly, the definition of second trimester PAS markers and proposed ultrasound approach are presented in Table 4 and Table 5, respectively.

Table 2. *Definitions of PAS markers in the first trimester of pregnancy*

Marker	Definition
Cesarean scar pregnancy	Gestational sac implantation in part or totally within the cesarean scar.
	Gestational sac may have a teardrop or triangular shape.
Low implantation pregnancy	Gestational sac located close to the internal cervical os (up to 8 6/7 weeks of gestation) and/or placental implantation located posterior to a partially filled maternal bladder (up to 13 6/7 weeks of gestation).

Shainker. Special Report of the SMFM: Definition of markers and ultrasound examination in pregnancies at risk of PAS. Am J Obstet Gynecol 2021.

Table 3. *Approach to ultrasound examination in the first trimester of pregnancy.*

Approach to ultrasound examination in the first trimester of pregnancy

- Transvaginal ultrasound is recommended in early pregnancy, and transabdominal ultrasound may be performed when appropriate.
- Detailed evaluation of the uterus in the midsagittal plane to document the gestational sac (up to 8 6/7 weeks of gestation) and/or the placental location (up to 13 6/7 weeks of gestation).
- Documentation should include reference to the position of the sac and/or placenta relative to the bladder, cesarean scar (if present), and internal cervical os.
- Color Doppler imaging using a low-velocity scale, low wall filter and high gain to maximize detection of flow (adjusting as needed for body habitus and other clinical factors).[a]
- Evaluate shape of gestational sac (up to 8 6/7 weeks of gestation).
- Imaging should be performed with a partially filled maternal bladder.
  - The area of interest should be magnified so that it occupies at least half of the ultrasound image with the focal zone at an appropriate depth.

[a] Color Doppler should be limited to the areas of interest and avoid the embryo or fetus whenever possible.

Shainker. Special Report of the SMFM: Definition of markers and ultrasound examination in pregnancies at risk of PAS. Am J Obstet Gynecol 2021.

Tables 4 and 5. *PAS ultrasound markers and ultrasound examination guidelines in the second and third trimesters of pregnancy.*

Definitions of PAS markers in the second and third trimesters of pregnancy

Marker	Definition
Placental lacunae	Irregular, hypoechoic spaces within the placenta containing vascular flow (which can be seen on grayscale and/or color Doppler imaging).
	The following lacunae findings are associated with high risk of PAS: Multiple (often defined as ≥3) • Large size • Irregular borders • High velocity[a] and/or turbulent flow within
Abnormal uteroplacental interface	Loss of the retroplacental hypoechoic zone between the placenta and myometrium.[b]
	This marker is often located along the posterior bladder wall resulting in partial or complete interruption or irregularities of the uterovesical interface.
	Thinning of the retroplacental myometrium (previously described as myometrial thickness of <1 mm).
Abnormal uterine contour (placental bulge)	Placental tissue distorting the uterine contour resulting in a bulge-like appearance.
Exophytic mass	Placental tissue extruding beyond the uterine serosa.
Bridging vessel	Vessel that extends from the placenta across the myometrium and beyond the uterine serosa.

PAS, placenta accreta spectrum.

[a] Some studies suggest a velocity of >15 cm/s as the threshold for high peak systolic velocity; [b] This space represents the uterine decidua and has been described as the "clear zone."

Shainker. Special Report of the SMFM: Definition of markers and ultrasound examination in pregnancies at risk of PAS. Am J Obstet Gynecol 2021.

Approach to ultrasound examination in the second and third trimesters of pregnancy

Marker	Approaches
Lacunae	Detailed evaluation of the entire placenta in orthogonal planes.
	Lacunae should be evaluated using grayscale and color Doppler imaging.
	Doppler assessment should generally be performed with a low-velocity scale, low wall filters, and high gain to maximize detection of flow[a] (adjusting as needed for body habitus and other clinical factors).
Abnormal uteroplacental interface	Evaluation of the uteroplacental interface is optimized by perpendicular orientation of the transducer to the area of interest with minimal transducer pressure.
	Transvaginal ultrasound is recommended in the setting of an anterior, low-lying placenta or placenta previa.
	Imaging should be performed with a partially filled maternal bladder.
	Optimization of gain settings to help differentiate between placental and myometrial tissues.
	The area of interest should be magnified so that it occupies at least half of the ultrasound image with the focal zone at appropriate depth.
	Myometrial measurement should be made perpendicular to the long axis of the uterus and measured at the thinnest site (commonly along the uterine scar).
Abnormal uterine contour (placental bulge)	Placental tissue distorting the uterine contour resulting in a bulge-like appearance (this is best appreciated in a midsagittal plane of the uterus).
Exophytic mass	Placental tissue visualized beyond the uterine serosa.
Bridging vessel	Doppler assessment of vessels extending from the placenta across the myometrium and beyond the uterine serosa.[b]

[a] Some studies suggest a velocity of >15 cm/s as the threshold for high peak systolic velocity; [b] Bridging vessels need to be differentiated from bladder varicosities, which are not placental in origin and do not increase risk of placenta accreta spectrum.

Shainker. Special Report of the SMFM: Definition of markers and ultrasound examination in pregnancies at risk of PAS. Am J Obstet Gynecol 2021.

Ultrasound Documentation, Patient Education and Coordination of Care

Technical performance guidelines for sonographers/physicians and a standard checklist for evaluating patients suspected to have PAS have been developed by an international working group of experts in PAS (Tables 4 and 5). When there is evidence of PAS on ultrasound, we recommend using this checklist or similar, very clear language when reporting (Figure 1). **It is important to note in the ultrasound report whether the bladder is adequately filled**. If the bladder is not sufficiently filled for any reason, the ultrasound may need to be repeated, if possible, to ensure an accurate diagnosis of PAS.

PAS Evaluation AS template

PAS Evaluation
A PAS evaluation was performed via transabdominal and transvaginal approach.
Placental location: anterior / posterior / left lateral / right lateral
Placental relation: far from cervix / low-lying / previa
Placental texture: homogeneous / heterogeneous
Placental lakes: absent / present
Lacunar formation: absent / Grade 1 / Grade 2 / Grade 3
Smallest myometrial thickness: thick normal intervening tissue / thinned > 3 but < 5mm / moderately thinned > 1 but < 3mm / significantly thinned <1mm
Bridging vessels: absent / present
Placental lacunar feeding vessels: absent / present
Uterovesical hypervascularity: absent / present
Subplacental hypervascularity: absent / present
Bladder wall interruption: absent / present
Placental bulge: absent / present
Focal exophytic mass: absent / present

Overall impression: LOW RISK / INCREASED RISK FOCAL / HIGH RISK
Comments:

PAI Score: ___ (3.0 for >2 CD; 3.5 for Grade 3, 1.0 for Grade 2; MT <1mm 1.0, 1-3 0.5, 3-5 0.25; anterior 1.0; bridging 0.5)
Probability of invasion: ____ (>0 5%; >1 10%; >2 19%; >3 33%; >4 51%; >5 69%; >6 83%; >7 91%; >8 96%)
Probability history based: ____ (0 prior CS 3%; 1 prior CS 11%; 2 prior CS 40%; 3 prior CS 61%; 4 prior CS 67%)

Value of each parameter is added together to generate Placenta Accreta Index score

Parameter[a]	Value
≥2 cesarean deliveries	3.0
Lacunae	
Grade 3	3.5
Grade 2	1.0
Sagittal smallest myometrial thickness[b]	
≤1 mm	1.0
<1 but ≥3 mm	0.5
>3 but ≤5 mm	0.25
Anterior placenta previa[c]	1.0
Bridging vessels	0.5

[a] If parameter is not present, then value is 0; [b] Measured in sagittal plane; [c] If any portion of placenta is anterior.

Rac. Placenta Accreta Index. Am J Obstet Gynecol 2014.

Figure 1. MFM Ultrasound Placenta Accreta Spectrum Checklist

MFM Ultrasound Placenta Accreta Spectrum Checklist

A. Patient History/PAS Risk Factors

	Yes	No
Advanced Maternal Age	☐	☐
Previous Cesarean Deliveries (s) and Number ____	☐	☐
Previous Uterine Surgery	☐	☐
Congenital Uterine Anomaly	☐	☐
Assisted Reproductive Technologies	☐	☐
Prior Pregnancy with Suspected Accreta	☐	☐

B. First Trimester Ultrasound Findings (< 13 weeks)

	Yes	No
Low Implantation of Gestational Sac	☐	☐
Placental Lacunae (increased size/number)	☐	☐
Abnormal uteroplacental interface	☐	☐
Lower uterine segment hypervascularity	☐	☐

C. Second and Third Trimester Ultrasound Findings (> 13 weeks)

	Yes	No
Placenta Previa	☐	☐
-- For Previa: Anterior or Posterior or Central		
Loss of retroplacental clear zone	☐	☐
Myometrial thinning	☐	☐
Maternal bladder wall interruption	☐	☐
Placental bulging	☐	☐
Uterovesical hypervascularity	☐	☐
Placental venous lacunae	☐	☐
Bridging vessels across uterine wall	☐	☐

Reminder: PAS Risk for Patients with Placenta Previa*

Number of Prior Cesarean Deliveries	% Risk
0	3%
1	11%
2	40%
3	61%
4	67%

**Citation: Silver RM et al. National Institute of Child Health and Human Development Maternal-Fetal Medicine Units Network. Maternal morbidity associated with multiple repeat cesarean deliveries. Obstet Gynecol. 2006 Jun;107(6):1226-32.*

Timing of Delivery and Delivery Planning

The timing of delivery in cases of suspected placenta accreta must be individualized, with a goal being to achieve a planned, controlled delivery. Generally, the recommended management of suspected placenta accreta is planned preterm cesarean hysterectomy with the placenta left in situ because removal of the placenta is associated with significant hemorrhagic morbidity.[3] **The results of a decision analysis suggested that combined maternal and neonatal outcomes are optimized in stable patients with ultrasonographic evidence of placenta previa and placenta accreta with delivery at 32w0d-35w6d of gestation without amniocentesis**.[15] Some patients may safely be delivered at 36 weeks; however this decision should be made on a case-by-case basis and only in people with low suspicion for percreta, and with no bleeding or contractions antenatally.

Delay to 36 weeks is not standard practice at Baylor College of Medicine for cases of suspected placenta accreta spectrum in the setting of placenta previa, or in any patient with regular contractions or bleeding, as up to 46% of our own patient cohort presents with clear indications for unscheduled delivery due to bleeding, contractions or both.[16] Further, we have shown that blood loss and need for transfusion is reduced for expected and planned deliveries compared to urgent or unscheduled deliveries.

Preoperative consultation with anesthesiology and notification of the blood bank are indicated before scheduled surgery. Additional surgical services such as gynecologic oncology, urology, interventional radiology, general surgery, and/or vascular surgery may provide additional surgical expertise if needed.[11] A Preoperative Summary Checklist is useful to confirm that needed preparations have been made and to identify the name and contact information for consultants in case they are needed for intraoperative or perioperative assistance.[1]

Management (1, 20-22)

Prenatal Management

- ❑ Any patient with suspected placenta accreta spectrum should be discussed and reviewed by MFM practice and the PAS team for uniformity in diagnosis and management plan.
- ❑ A discussion with the patient and family about the diagnosis of placenta previa or low-lying placenta with concern for placenta accreta spectrum (to what degree of suspicion and what depth is suspected), along with instructions to present to the hospital immediately for vaginal bleeding, loss of fluid or contractions, that a planned preterm delivery with cesarean-hysterectomy is indicated.
- ❑ Complete consents for cesarean hysterectomy at the initial transfer of care visit, and scan into the Media Tab in Epic, as up to 40% of patients may deliver early, most often for contractions or bleeding.
- ❑ Schedule follow up appointments as needed
- ❑ If MRI is requested, the optimal timing for imaging is between 20-32 weeks. After 32 weeks, the likelihood increases for a **false positive** result due to normal changes in the 3rd trimester placenta
- ❑ Evaluate and treat anemia (see Perinatal Guidelines for identification and management of anemia in pregnancy.)
- ❑ Provide the patient with a Placenta Accreta Spectrum medic alert bracelet and at all facilities, provide the patient with the hospital phone number and contact information for where to present and what number to call in case of emergency.
- ❑ The findings and recommendations must be conveyed to the patient and the primary OB provider, especially for patients who live remote from the Texas Medical Center.
- ❑ Identify patients who may require relocation to Houston or earlier than usual admission due to risk factors for emergent delivery (prior preterm birth, bleeding) or due to living remote from the Texas Medical Center.
- ❑ Coordination of care: the MFM will notify the PAS Team of the diagnosis and patient information so that admission and delivery arrangements can be made.

Inpatient Management

1. **Call PAS first on call (Qgenda, PAS team)** if there is a new inpatient diagnosis of PAS or concern about a currently admitted PAS patient.
2. **Utilize the following order sets:**
    a. OBG PW IP Accreta Admission
    b. OBG PW IP Accreta Day of Surgery
3. Ensure that the following information is listed in the patient's Care Coordination Note:

PAS Procedure Planning Checklist (smartphrase .pasplan)

Placental location (Describe): *
Anticipated extent (window, focal, extensive, accreta, increta/percreta): *
Cysto/stents Y/N: *
Femoral artery sheath access Y/N: *
COBRA-OS inserted at start? Y/N: *
Contraception if uterus preserved: *
Research? Y/N (List samples needed): *
Scheduled Delivery Date and GA: *
Scheduled Accreta Surgeon: *
Consents in chart: *

4. Based on logistical factors and the pregnancy history (e.g., previous admissions for episodes of bleeding, lives far from hospital), consider admission to the antepartum service at 32-33 weeks of gestation due to risk of emergency delivery from vaginal bleeding. For all other people, admission should occur no later than 2days prior to planned delivery date.
    a. Prior to 34 weeks of gestation, a single course of betamethasone should be administered for fetal lung maturity.
    b. If admission occurs after 34 weeks of gestation, administration of betamethasone may be considered, and its use should be individualized if no steroid course administered before 34 weeks
    c. Current type and crossmatch of 4 units RBC should be always maintained, in accordance with our hospitals' postpartum hemorrhage risk assessment and stratification tool. Reorder as needed to ensure type and crossmatch are current at all times, to minimize delay in blood release in the event of an emergency.
    d. Two large-bore IVs (18G or bigger) should be placed while on the inpatient service.
5. Contractions in the absence of vaginal bleeding may not necessitate delivery, however the PAS Team should be notified if they occur.
    a. If bleeding with contractions ensue after hours (i.e., nights and/or weekends) and delivery appears indicated but not urgent, consider a single dose of **Indomethacin** 50 mg if the patient is less than 32 weeks gestation. The use of **Nifedipine** for tocolysis should be individualized based on the patient's hemodynamic status.
    b. The back-up faculty should be notified immediately. All back-up faculty (PAS Team, MFM, Gyn Oncology) should be called in to ensure adequate staffing of both the PAS case and Labor and Delivery.
6. A specialist in MFM and/or Gynecologic Oncology is available as needed for all cases.

Intraoperative Management

1. When an intraoperative diagnosis of placenta accreta spectrum is made, all back-up faculty should be notified immediately if after hours. The hospitalist or other attending faculty should be notified immediately to assist with coordination of additional surgical help if needed. **DO NOT GO THROUGH OR CUT INTO the placenta**.

2. In the operating room:
    a. The patient should be placed in **the dorsal lithotomy position** in low, padded stirrups with an under-buttocks drape to allow for direct evaluation of intraoperative vaginal bleeding, provide access for placement of a vaginal pack or ureteral stents if needed, and allow additional space for an assistant to stand between the patient's legs.
    b. Regional anesthesia should be considered for ureteral stent placement (when indicated) and performance of the cesarean delivery. Once the infant has been delivered and the decision has been made to proceed with hysterectomy, general endotracheal anesthesia should be individualized. In patients who are unstable or with other contraindications, general anesthesia should be considered from the start of the case.
    c. A midline vertical skin incision should be used for optimal visualization and improved access for fundal or posterior uterine wall hysterotomy and for hysterectomy.
    d. The uterine incision should be located such that it **avoids the placenta**. A classical uterine incision, often trans-fundal, may be necessary to avoid the placenta and allow delivery of the infant, however a mid or high transverse hysterotomy above superior edge of placenta might considered on a case-by-case basis. In some cases, a posterior uterine wall incision after exteriorization of the uterus may be desired.
    e. Postoperative recovery may necessitate surgical ICU admission or prolonged observation in Labor and Delivery rooms with ICU capabilities (PFW CCU or Ben Taub LDRs 11 and 12).
    f. At Ben Taub, postoperatively, the patient should be placed back onto the antepartum service for continuity of resident and MFM faculty daily rounding. At PFW, the patient will be transitioned to the appropriate postpartum care unit and team.

PFW Workflows

Figure 2. PFW Notification Workflow for unscheduled or intraoperatively diagnosed PAS cases

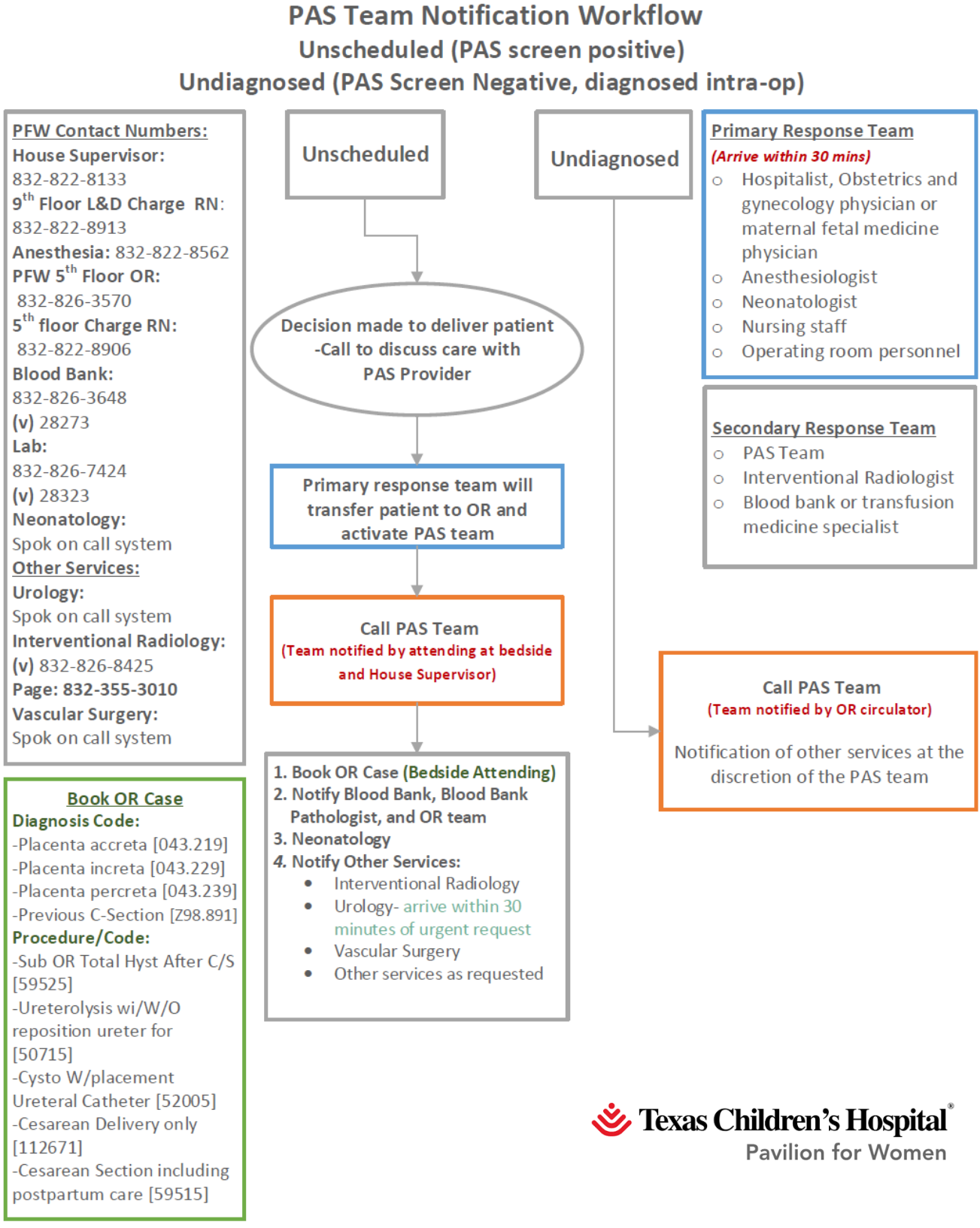
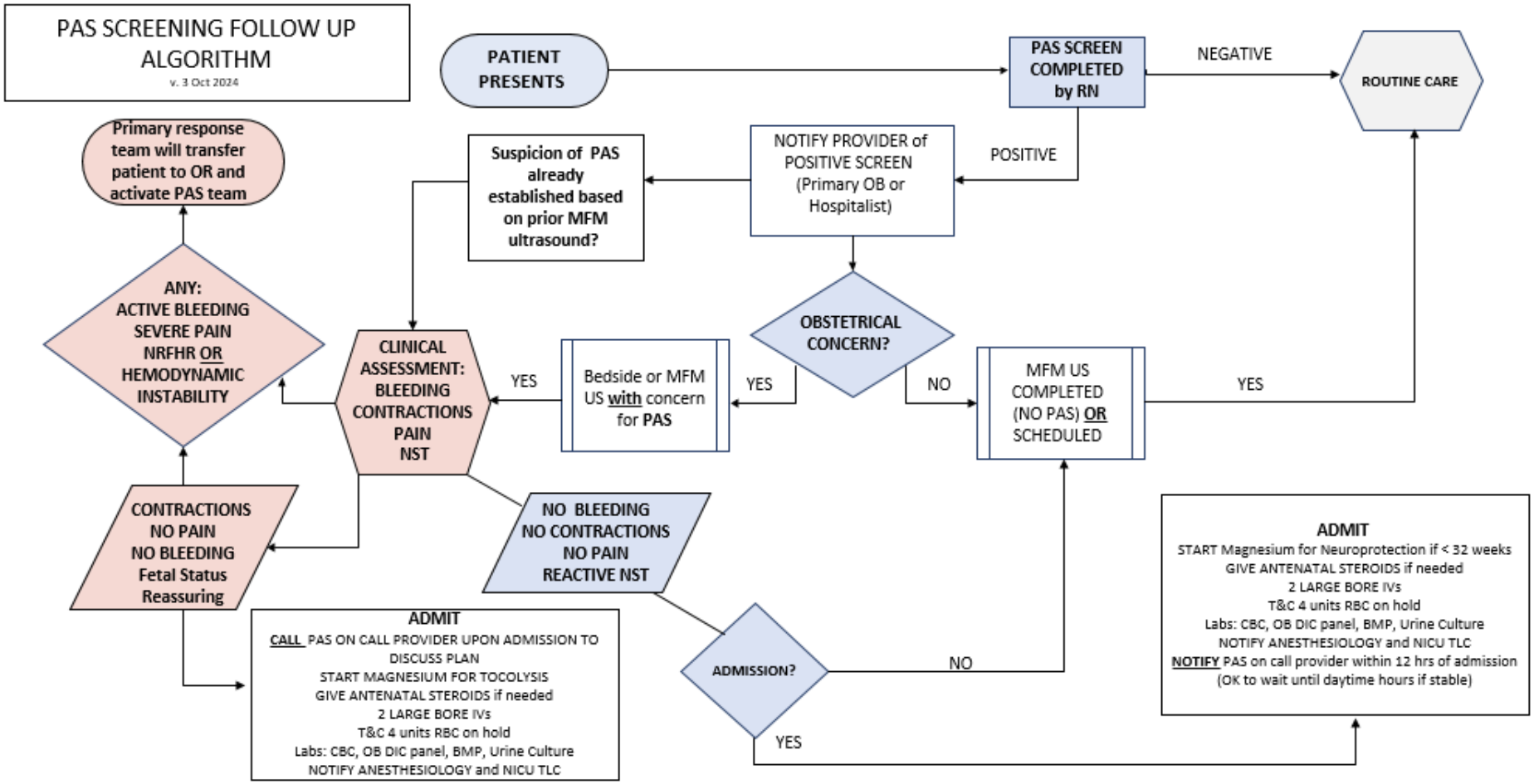


Figure 3. PFW PAS Follow Up Algorithm



Texas Children's Hospital®
Pavilion for Women

Ben Taub Workflows

Contact information

Ben Taub PAS Team		
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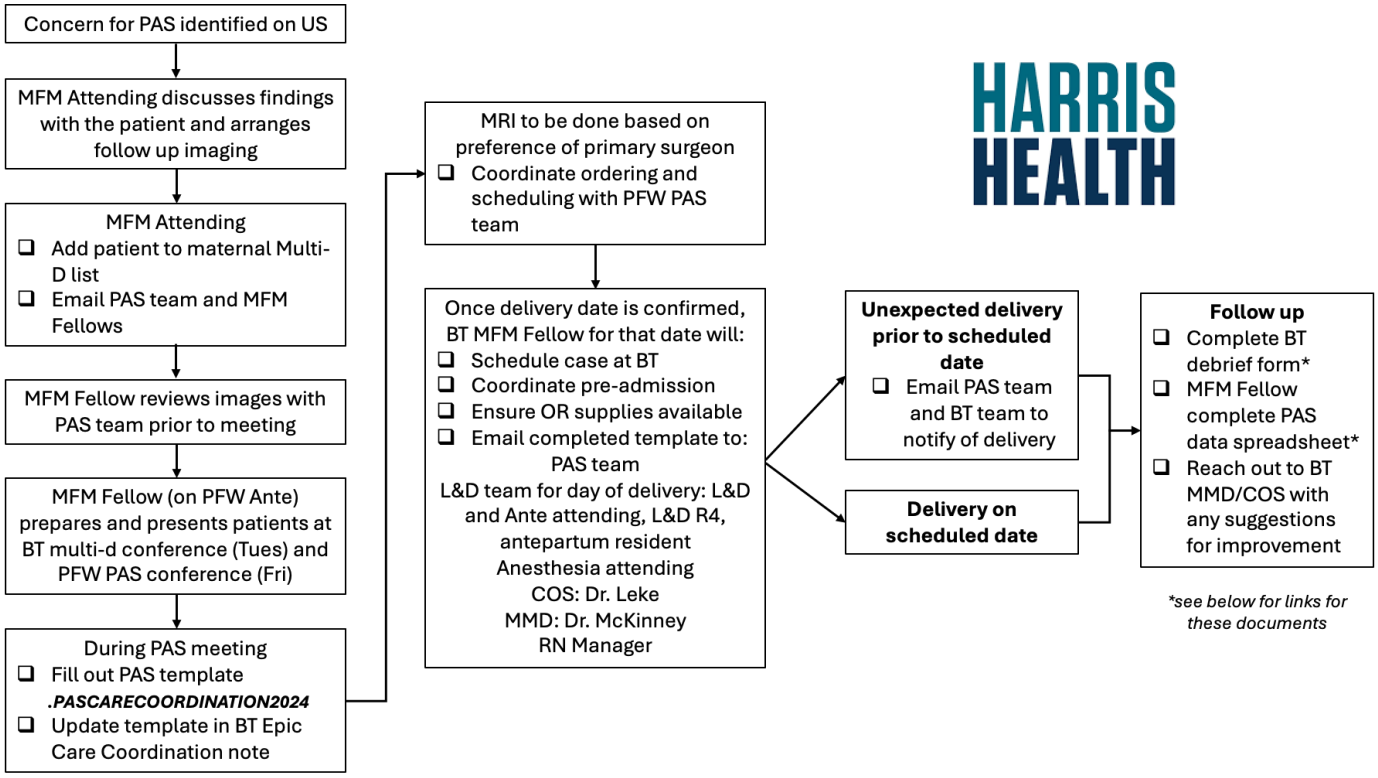
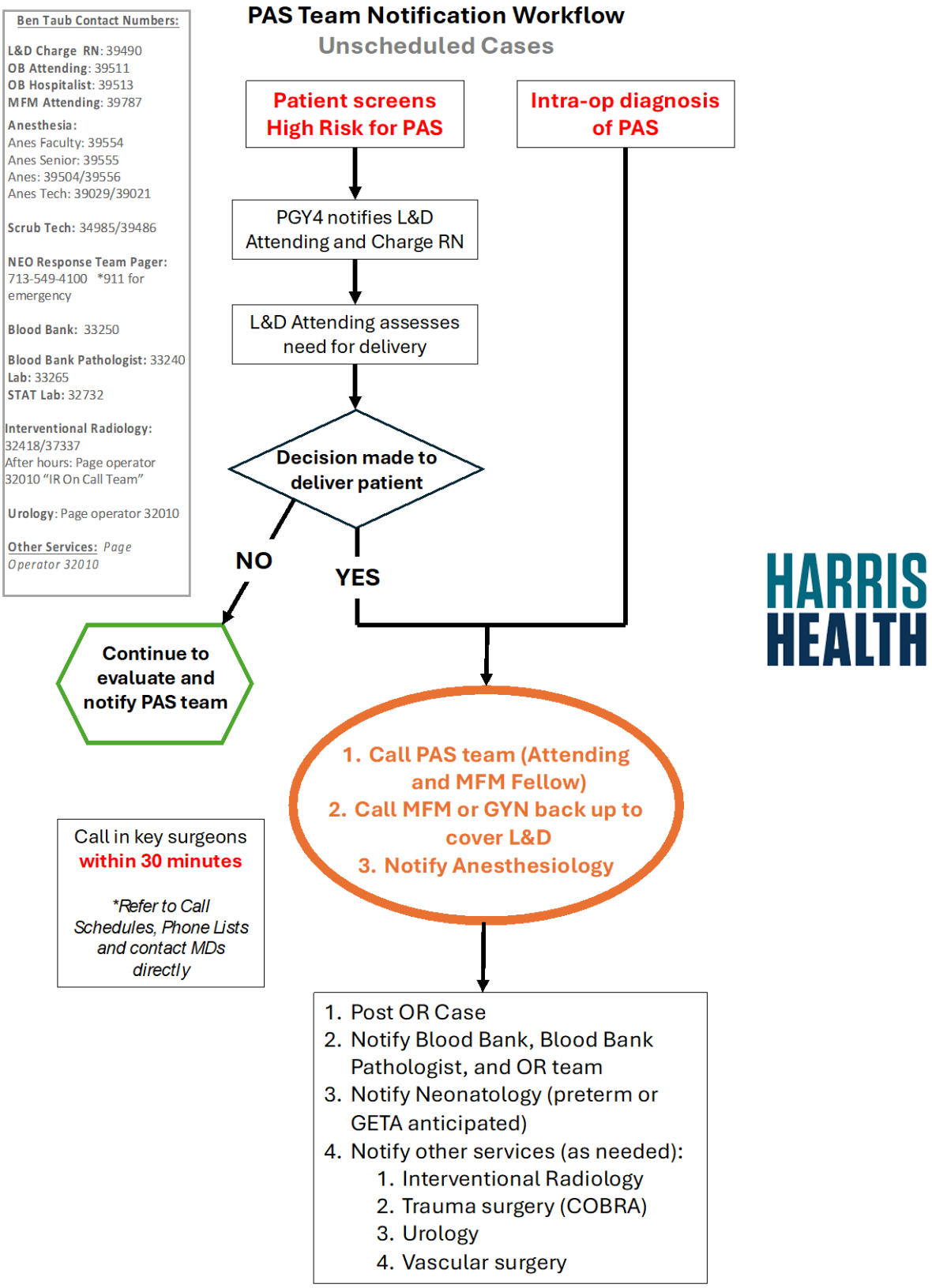
Figure 4. Ben Taub Workflow- Management of Suspected PAS:



BT Debrief Form: please ask Charge RN to coordinate quick huddle after the case to fill out
BT OB Debrief form 5.7.2018.docx

PAS data spreadsheet: fill in first sheet for 'Confirmed' PAS, second sheet if 'Suspected' but not confirmed
BT PAS Database

Figure 5. Workflow- Unscheduled PAS cases:



HARRIS HEALTH

Adams, Lundeen, Orozco 2023, updated 10.2024

Care Coordination Note

Template *.PASCARECOORDINATION2024*
Name:
DOB:
HHS MRN:
EDD:
Date when 34 weeks:
PMH:
PSH:
BMI:

<u>PAS Details</u>
Completed imaging:
Upcoming Imaging:
MRI:
Placental location:
Anticipated extent (window, focal, extensive, accreta, increta/percreta):
Impression: PAI:***; Risk ***%

<u>Delivery/Surgical Planning</u>
Planned surgery: ***Cesarean hysterectomy
Delivery Date and EGA at delivery:
Pre-operative admission date and EGA:
Pre-operative BMZ (date, location- inpatient or outpatient):
PAS primary surgeon:
MFM fellow assigned:
Skin incision type:
Uterine incision type:
Cysto/stents:
REBOA/COBRA:

[ ] L&D team notification via email:
- [ ] PAS team
- [ ] L&D team for day of delivery: L&D and Antepartum attending, R4, antepartum resident
- [ ] Anesthesia attending (or Dr. Munnur)
- [ ] Dr. Leke, Dr. McKinney, Sandra Salgar RN

Pre-Op Admission Checklist:

Consults
[ ] Neonatology
[ ] Anesthesia
[ ] Urology for stents, cysto, possible cystotomy repair, possible ureteral repair
[ ] General Surgery for COBRA/REBOA

Paperwork
[ ] Surgical consents (Cesarean delivery, possible hysterectomy, possible bilateral salpingectomy)
[ ] Medicaid hysterectomy consents

Orders
[ ] Type and Screen
[ ] T&C: 4U pRBCs
[ ] Ionized calcium
[ ] BMP
[ ] Fibrinogen
[ ] Coags
[ ] CBC (goal Hb >11 prior to delivery, discuss transfusion prn)

HARRIS HEALTH

Equipment

Pyxis: in ORs
SS: sterile supply on 2nd floor
Cart: Hysterectomy cart
[ ] Bookwalter retractor part 2 – 005 **SS**
[ ] C-section basin- 229
[ ] C section pack (007) **Main OR**
[ ] Minor lithotomy pack **Pyxis**
[ ] Miscellaneous:
Leggings, ¾ sheet, towels, needle box, foley, chloraprep **Pyxis**
Fluid warmer **OR**
Specimen container **Supply room**
[ ] Ligasure: large and small **Pyxis and Cart**
[ ] 9.75", 13" clip applier **SS**
[ ] GIA reloads **Main OR**
[ ] Fish **Cart**
[ ] 0 Vicryl CT-1 pop-offs 27" **Cart**
[ ] Pennington clamp tray – 001
[ ] Zepplin clamps **Main OR**
[ ] Quikclot **Cart**
[ ] Surgical powder **SS**
[ ] Surgicel **SS**
[ ] Vessel loops (blue and yellow) **Cart**
[ ] Long Bovie tip **Cart**
[ ] 22ga spinal needle **in OR**
[ ] Syringes (10cc, 20cc, 60cc) **in OR**
[ ] ObGyn lap closure set - 006
[ ] ObGyn lap set – 006
[ ] Gyn z-clamps set - 001
[ ] Gyn O'Sullivan retractors - 007
[ ] Stryker OS general new HD camera – 001 **Stryker**
[ ] Stryker OS GU cystoscope set – 001
[ ] Cysto Tubing **Pyxis**
[ ] Goldberg Ureteral Adapter **Pyxis**
[ ] Lighted stents and light cable **Stryker**
[ ] Stents and angle guide wire **Cart, Pyxis**
[ ] COBRA **Main OR or EC**
[ ] Sterile milk **LD Room (blue bowl in OR)**
[ ] Stirrup cart **in OR**
[ ] EEA sizers set – 001 **SS**
[ ] Gyn Z clamps set - 001
[ ] Intra-op US **LD Hallway**

Classification at Delivery:

In 2019, FIGO published the FIGO Classification of Placenta Accreta Spectrum Disorders. This classification system uses both clinical findings at the time of delivery and histopathologic findings to determine the final grading of PAS.[17] This system is recommended to standardize nomenclature across multiple centers and to allow more accurate comparison of clinical findings for patient counseling and research. Because clinical findings are used to grade placental invasion, this system works also for centers that offer conservative (uterine sparing) management.

DOCUMENT the FIGO Grade identified at the time of delivery, based on the following criteria:

Table 4. FIGO clinical classification for the diagnosis of PAS disorders at delivery (35)

GRADE 1	**Abnormally adherent placenta (PLACENTA ADHERENTA OR CRETA)**
Clinical criteria	At vaginal delivery - No separation with synthetic oxytocin and gentle controlled cord traction. - Attempts at manual removal of the placenta results in heavy bleeding from the placenta implantation site requiring mechanical or surgical procedures. If laparotomy is required - Same as above. - Macroscopically, the uterus shows no obvious distension over the placental bed (placental 'bulge'), no placental tissue is seen invading through the surface of the uterus, and there is no or minimal neovascularity.
Histologic criteria	- Microscopic examination of the placental bed samples from hysterectomy specimen shows extended areas of absent decidua between villous tissue and myometrium with placental villi attached directly to the superficial myometrium. - The diagnosis cannot be made on just delivered placental tissue nor on random biopsies of the placental bed.
GRADE 2	**Abnormally invasive placentation (PLACENTA INCRETA)**
Clinical criteria	At laparotomy - Abnormal macroscopic findings over the placental bed: bluish/purple colouring, distension (placental 'bulge'). - Significant amounts of neovascularity (dense tangled bed of vessels or multiple vessels running parallel cranio-caudially in the uterine serosa. - No placental tissue seen to be invading through the surface of the uterus. - Gentle cord traction results in the uterus being pulled inwards without separation of the placenta (the 'dimple' sign).
Histologic criteria	Hysterectomy specimen or partial myometrial resection of the increta area shows placental villi within the muscular fibres and sometimes in the lumen of the deep uterine vasculature.

GRADE 3	**Abnormally invasive placentation (PLACENTA PERCRETA)**
GRADE 3a	**Limited to the uterine serosa**
Clinical criteria	At laparotomy - Abnormal macroscopic findings on uterine surface (as above) and placental tissue seen to be invading through the surface of the uterus (serosa). - No invasion into any other organ, including the posterior wall of the bladder (a clear surgical plane can be identified between the bladder and uterus).
Histologic criteria	Hysterectomy specimen showing villous tissue within or breaching the uterine serosa
GRADE 3b	**With urinary bladder invasion**
Clinical criteria	At laparotomy - Same as 3a. - Placental villi are seen to be invading into the bladder but no other organs. - Clear surgical plane cannot be identified between the bladder and uterus.
Histologic criteria	hysterectomy specimen showing villous tissue breaching the uterine serosa and invading the bladder wall tissue or urothelium.
GRADE 3c	**With invasion of other pelvic tissue/organs**
Clinical criteria	At laparotomy - Same as 3a**.** - Placental villi are seen to be invading into the broad ligament, vaginal wall, pelvic sidewall or any other pelvic organ (+/- invasion of bladder).
Histologic criteria	Hysterectomy specimen showing villous tissue breaching the uterine serosa and invading pelvic tissues/organs.

Postoperative Management (Special Considerations):

1. Patients should be closely monitored in the immediate postoperative period for signs of ongoing hemorrhage or hemorrhagic shock.
2. Alert the attending physician for any signs of hypovolemia and/or if the patient triggers MEWS. Transfusion and reoperation may be required.
3. Those who have had a large transfusion or volume of fluid infused may have significant 3rd spacing and edema, including airway edema. In such cases, intubation may need to be maintained until the patient has had time to diurese and a breathing trial has been performed.
4. Intraperitoneal drain: An intraperitoneal drain (J-P, Blake) may be placed at the surgeon's discretion, most commonly when a complex cystotomy and repair are performed (to monitor for urinary leak), or if there is concern for ongoing intraperitoneal bleeding. If a drain is in place, output should be recorded and monitored, and the drain site inspected during rounds for signs of infection.
   a. In general, removal of the drain will be directed by the PAS or urology teams, depending upon the indication for placement.
   b. If a patient is to be discharged with the drain in place, the patient and their family should be instructed on drain care, output recording, and this teaching documented in the medical record.
5. Postoperative activity and intake: **An extended recovery after surgery (ERAS) approach is recommended following cesarean hysterectomy**. This includes early ambulation (when safe), physical

therapy consultation, and a supportive bowel regimen (docusate or peri-colace, scheduled simethicone, milk of magnesia or miralax prn). Patients should be allowed to eat or drink when they feel ready to do so. Avoid carbonation or gas-inducing foods until bowel function has returned. Sugar-free chewing gum and coffee have been shown to reduce the time of return of bowel function and their use is encouraged.

6. Cystotomy and repair (and urinary tract involvement): cystotomy may be performed intentionally when extensive fibrosis is present between the bladder and placenta or incidentally when extensive disease is present. To permit proper healing, the bladder must remain empty and tension-free.
   a. A Foley catheter is to remain in place, usually between 10-14 days, however a longer duration may be necessary. Timing of removal will be determined by the urology or PAS faculty.
   b. Bladder repair and maintenance of a catheter or stent can cause bladder spasm, therefore all patients with bladder repair or stent (without contraindications) should be given the following:
      i. B&O suppository BID prn
      ii. Oxybutynin 5 mg po q8h prn (may be a higher dose, as directed by the urology team)
      iii. Oxybutynin slow release
      iv. Keflex 250mg BID prophylaxis until Foley is removed outpatient

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