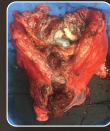


Obstetric Ultrasound:
Setting the Standard for 2019

Abnormal Placental Attachment

SEBASTIAN HOBSON



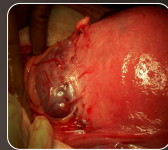
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Disclosures

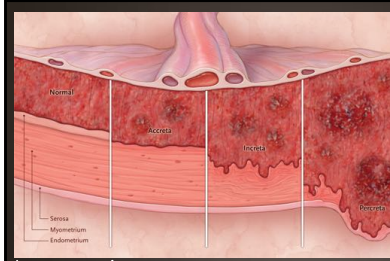
- ▶ None

Outline: Abnormal Placental Attachment

- ▶ Background
- ▶ Epidemiology
- ▶ Risk factors
- ▶ Outcomes
- ▶ US imaging
- ▶ Live scan



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- ▶ Normal
- ▶ Placenta accreta spectrum disorders (PASD)
 - ▶ Invasive placentation
 - ▶ Morbidly adherent placentation

▶ Pathophysiology

- ▶ Several theories

▶ Accreta

- ▶ Defective/absent decidua

▶ Increta & Percreta

- ▶ Uterine dehiscence

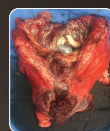
- ▶ Genetic, environmental & functional components

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Background

Irving, Frederick C. and Hertig, Arthur T.: A Study of Placenta Accreta, Surg. Gynec. Obst. 64: 178, 1937.

- ▶ Major **obstetric** & largely **iatrogenic** problem
- ▶ Becoming **more common**, a 20th/21st century disease
- ▶ Increased maternal & fetal **burden of disease**
- ▶ Significant **psycho-social** effects
- ▶ May or may not be diagnosed **before delivery**
- ▶ Need a high **index of suspicion** to screen/diagnose adequately
- ▶ Significant **resources & expertise**
- ▶ Cause of significant **stress** in all stakeholders

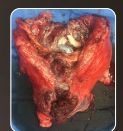


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Background

Irving, Frederick C. and Hertig, Arthur T.: A Study of Placenta Accreta, Surg. Gynec. Obst. 64: 178, 1937.

- ▶ Wide **variations** in diagnosis & management
 - ▶ Ultrasound vs MRI vs both
 - ▶ Pre-operative planning & Team structures
 - ▶ Timing of delivery
 - ▶ Skin incisions
 - ▶ Blood loss strategies
 - ▶ Cell salvage
 - ▶ Tranexamic acid
 - ▶ Vessel ligation/balloons
 - ▶ Management of placenta
 - ▶ Cystoscopy +/- ureteric stenting
 - ▶ Surgical or conservative management, etc.



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Original Research

Multidisciplinary team learning in the management of the morbidly adherent placenta: outcome improvements over time

OBSTETRICS
2017; 117(1): 1-7

Multidisciplinary Management of Invasive Placenta Previa

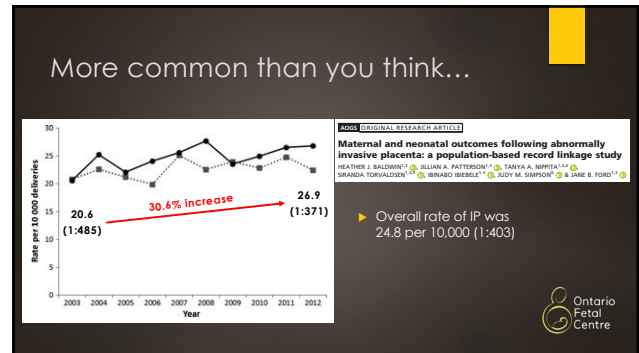
OBSTETRICS
2017; 117(1): 1-7

Maternal Morbidity in Cases of Placenta Accreta Managed by a Multidisciplinary Care Team Compared With Standard Obstetric Care

OBSTETRICS & GYNECOLOGY
2017; 117(1): 1-7

A Multidisciplinary Checklist for Management of Suspected Placenta Accreta

OBSTETRICS
2017; 117(1): 1-7



Risk Factors

- Increasing maternal age
- Increasing parity
- IVF
- Multiple pregnancy
- Placenta previa
- Prior Caesarean section
 - 1st 3%
 - 2nd 11%
 - 3rd 40%
 - 4th 61%
 - 5th or > 67%
- Uterine surgery
 - D&C
 - Myomectomy (cavity)
 - Hysteroscopic surgery/ablation
 - Cornual ectopic resection
 - Higher socioeconomic status
 - Pelvic irradiation
 - Etc...

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Maternal Outcomes

- Associated with poor maternal outcomes:
 - Overall maternal morbidity
 - Hemorrhage: median blood loss 2500-7800 mL
 - Blood transfusion: 40% massive transfusion >10u
 - Visceral/vascular injury
 - Hysterectomy
 - Maternal ICU admission
 - Length of stay
 - Readmission to hospital
- Mortality remains low in high-resource countries

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Perinatal outcomes

- Babies are usually well
- Except for... iatrogenic prematurity

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Screening /Diagnosis

"Mobile" Medicine: A Surprise Encounter with Placenta Percreta

Kate Attkin, BSc, Jennifer Chan, MD, FRCSC, Erin Raymond, MD, FRCSC, Nan Chen, MD, FRCSC, Lisa Allen, MD, FRCSC, Rory Winters, MD, FRCSC
Department of Obstetrics and Gynaecology, Mount Sinai Hospital, University of Toronto, Toronto, ON
Department of Obstetrics and Gynaecology, Mount Sinai Hospital, University of Toronto, Toronto, ON



▶ Intrapartum = HELPI!

▶ Antenatal

- ▶ Ultrasound: sensitivity 90.7% [95% CI 87.2-93.6], specificity 96.9% [95% CI 96.3-97.5]
- ▶ Foreknowledge of clinical setting is paramount, without this sensitivity only 53%
- ▶ MRI (non-contrast): sensitivity 94.4% [95% CI 86.0-97.9], specificity 84% [95% CI 76.0-89.8]
- ▶ Most of these pregnancies were in the third trimester; accuracy can be lower outside of 24-32 weeks of gestation
- ▶ Novel techniques currently being researched include imaging & maternal biomarkers



Non-Pregnant: Scar Defect



First Trimester

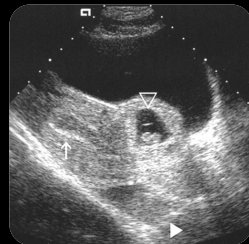
Ultrasound Obstet Gynecol 2018

Published online in Wiley Online Library (wileyonlinelibrary.com). DOI: 10.1002/ulog.20104

Screening for morbidly adherent placenta in early pregnancy

J. PANAIOTOVA, M. TOKUNAKA, K. KRAJEWSKA, N. ZOSMER and K. H. NICOLAIDES

- ▶ Pregnancy located in anterior uterine isthmus
- ▶ Empty cervical canal & uterine cavity
- ▶ Discontinuity in the anterior myometrium between GS + bladder
- ▶ No adnexal masses



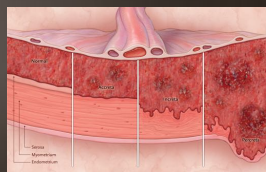
USS Features: 2D gray-scale

- ▶ [Placenta praevia]
- ▶ Myometrial thinning < 1mm
- ▶ Placenta bulging into bladder
- ▶ Placental lacunae (heterogeneity)
- ▶ Loss of hypo-echoic "clear space"
- ▶ Loss of hyper-echoic bladder line
- ▶ Overt invasion (usually bladder)



USS Features: Colour/Power Doppler

- ▶ Maternal pulsatile lacunae flow
- ▶ Turbulent/high velocity placental parenchymal flow
- ▶ Increased uterine-bladder vascularity
- ▶ Increased sub-placental venous complex



Ultrasound signs identified in diagnosis of 38 case reports and in 3 series^{63,84,102} including 34 cases ranked according to depth of villous myometrial invasion

Ultrasound signs	ACCRETA (n = 29)	INCRETA (n = 26)	PERCRETA (n = 17)
Gray-scale parameters			
Loss of clear zone	18 (62.1)	22 (84.6)	8 (47.1)
Myometrial thinning	6 (20.7)	12 (46.2)	4 (23.5)
Placental lacunae	16 (55.2)	16 (61.5)	14 (82.4)
Bladder wall interruption	2 (6.9)	2 (7.7)	5 (29.4)
Placental bulge	—	1 (3.9)	2 (11.8)
Focal exophytic mass	—	—	2 (11.8)
CDI parameters			
Uterovesical hypervascularity	3 (21.4)	2 (13.3)	2 (18.2)
Subplacental hypervascularity	5 (55.7)	9 (60.0)	6 (54.5)
Bridging vessels	10 (71.4)	7 (46.7)	2 (18.2)
Lacunae feeder vessels	4 (28.6)	8 (53.3)	5 (45.5)

CDI, color Doppler imaging; PC, placenta previa; PI, placenta increta; PP, placenta percreta.

Myometrial thinning/Loss of clear space



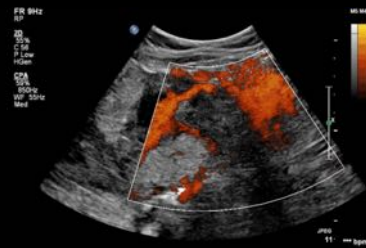
Heterogenous Placenta with Lacunae



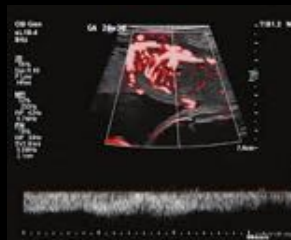
Placental Lacunae can create a thick placenta



Lacunae: direct maternal jets via arcuate/radial arteries (no spiral arteries to slow speed)

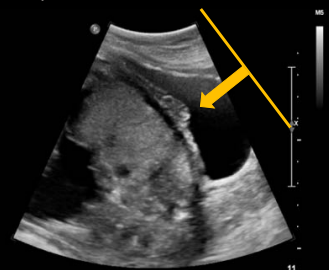


Arcuate/radial artery Doppler signals in or adjacent to lacunae

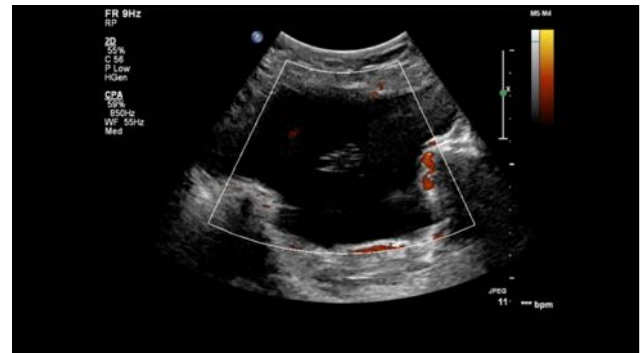
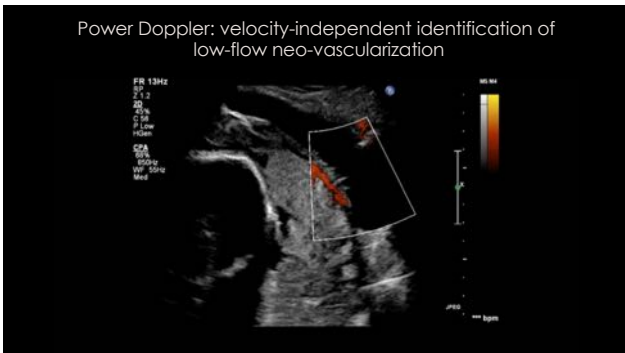


Bladder "Bulge" = Myometrial Dehiscence

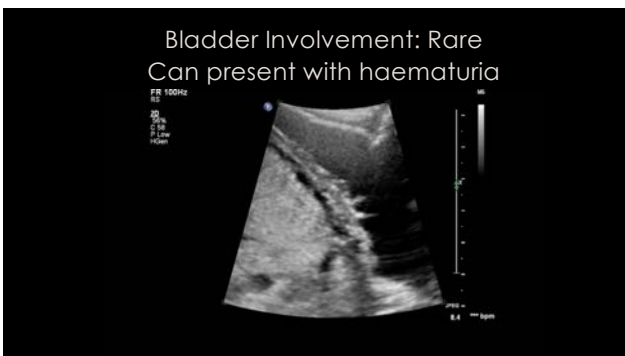
- ▶ Fill the bladder (essential)
- ▶ Get perpendicular
- ▶ Examine bladder line
- ▶ That is not clear space



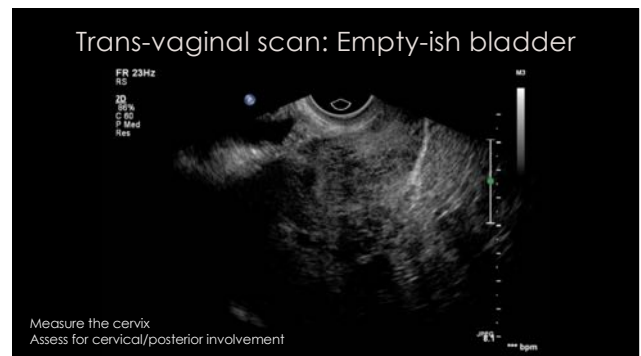
Power Doppler: velocity-independent identification of low-flow neo-vascularization



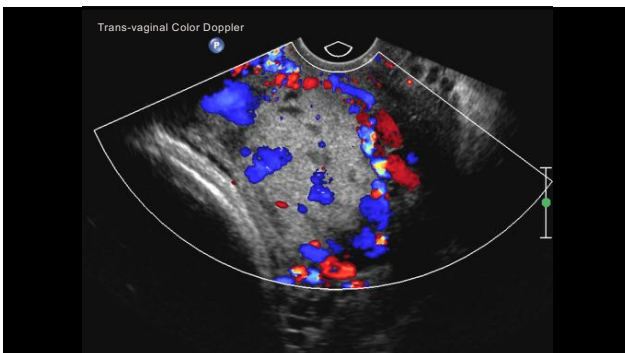
Bladder Involvement: Rare
Can present with haematuria



Trans-vaginal scan: Empty-ish bladder



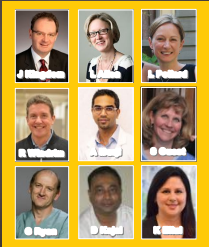
Trans-vaginal Color Doppler



Take Home Messages

- ▶ **Look for:**
 - ▶ Placenta praevia
 - ▶ Myometrial thinning < 1mm
 - ▶ Placenta bulging into bladder
 - ▶ Placental lacunae
 - ▶ Pulsatile lacunae flow
 - ▶ Increased bladder vascularity
 - ▶ Loss of hypo-echoic "clear space"
 - ▶ Loss of hyper-echoic bladder line
 - ▶ Overt invasion (usually bladder)
- ▶ **Tips/Tricks:**
 - ▶ Always be aware of **risk factors** without knowledge of them your diagnostic accuracy halves
 - ▶ **FILL THE BLADDER!**
 - ▶ Get **perpendicular** to the area of interest
 - ▶ Utilize both **grayscale** and **colour/power** Doppler
 - ▶ Beware of **artifact** and pushing too hard
 - ▶ **1st trimester** diagnosis should be our aim
 - ▶ Scar **dehiscence** can happen throughout pregnancy
 - ▶ Always get a **2nd opinion** if you're not sure

Thank you from the
Invasive Placenta Team!



LIVE SCAN:
Suspected Placenta Accreta
Spectrum Disorder

SEBASTIAN HOBSON & JOHN KINGDOM

MANY THANKS TO OUR GENEROUS PATIENT & HER BABY

