From Diagnosis to Resolution:
Current Evidence in Cesarean Scar Pregnancy Management

Considerations for Clinicians

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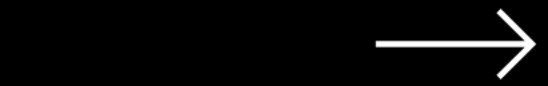
Disclosures

I have no relevant financial disclosures related to the content of this presentation.



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Objectives

1. Describe the epidemiology, clinical presentation, and diagnosis of cesarean scar ectopic pregnancies
2. Describe updated treatment options for CSEP
3. Discuss CSEP future research efforts

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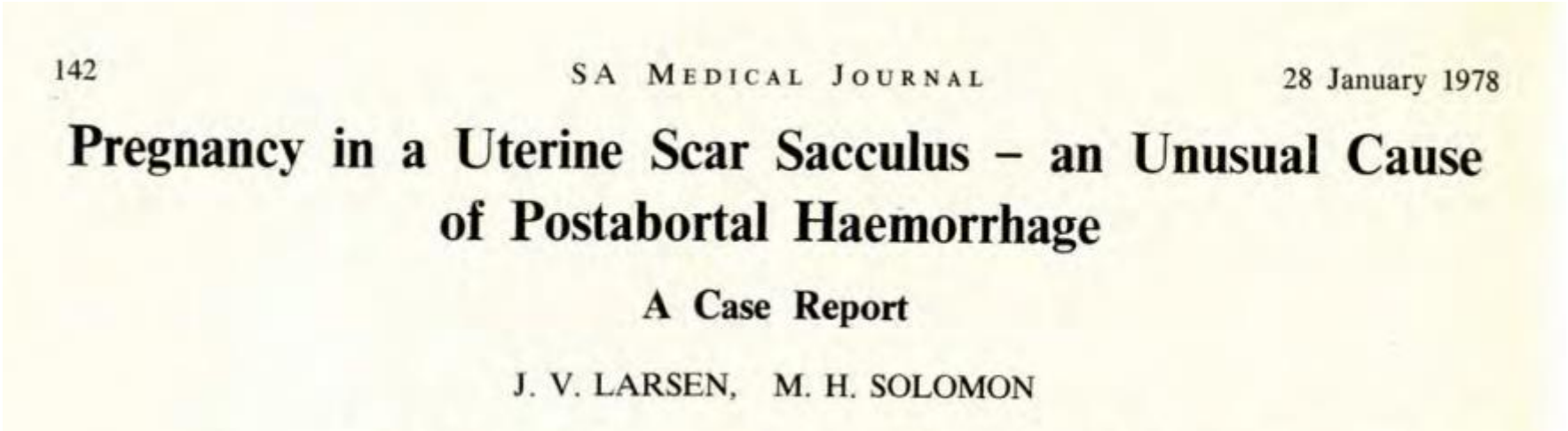
History

- First described in 1978
- Recognized as type of ectopic pregnancy in 1998
- Associated with severe maternal morbidity



142 SA MEDICAL JOURNAL 28 January 1978

Pregnancy in a Uterine Scar Sacculus – an Unusual Cause of Postabortal Haemorrhage

A Case Report

J. V. LARSEN, M. H. SOLOMON

Nijjar *et al, Best Pract Res Clin Obstet Gynaecol* 2024

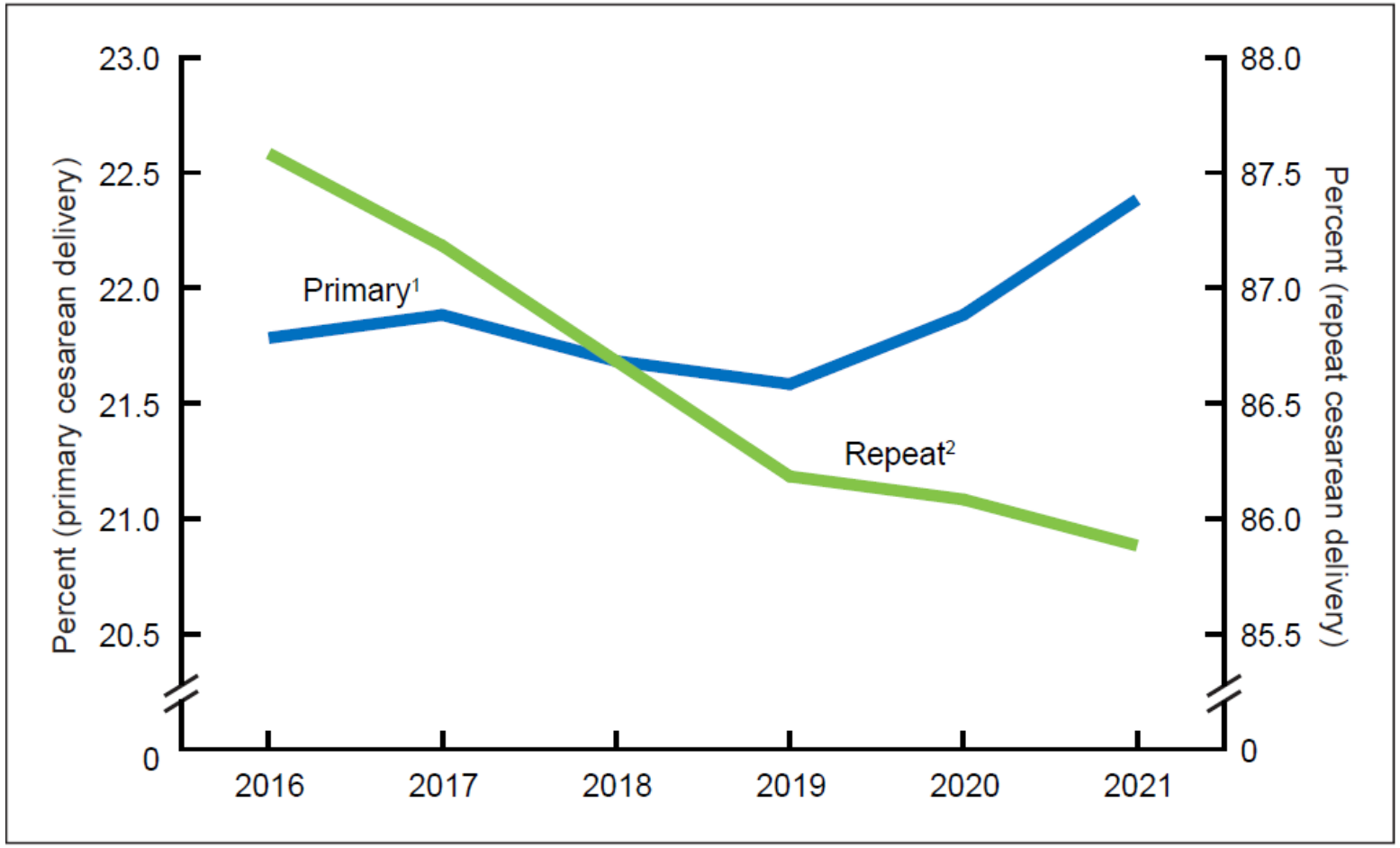
Complications

- Morbidly adherent placenta
- Uterine rupture
- Severe hemorrhage
- Preterm labor
- Maternal mortality

Miller *et al, AJOG* 2020

Rates of cesarean deliveries 2016-2021

Figure 1. Primary and repeat cesarean delivery: United States, 2016–2020 final and 2021 provisional



[1]Significant quadratic trend for 2016–2021; significant increasing trend for 2019–2021 at $p < 0.05$.
[2]Significant decreasing trend at $p < 0.05$.
NOTES: All rates are significantly different from the previous year at $p < 0.05$. Primary is cesarean delivery to women without a previous cesarean. Repeat is cesarean delivery to women with a previous cesarean delivery.
SOURCE: National Center for Health Statistics, National Vital Statistics System, Natality.

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cesarean scar ectopic pregnancy AND cesarean scar pregnancy

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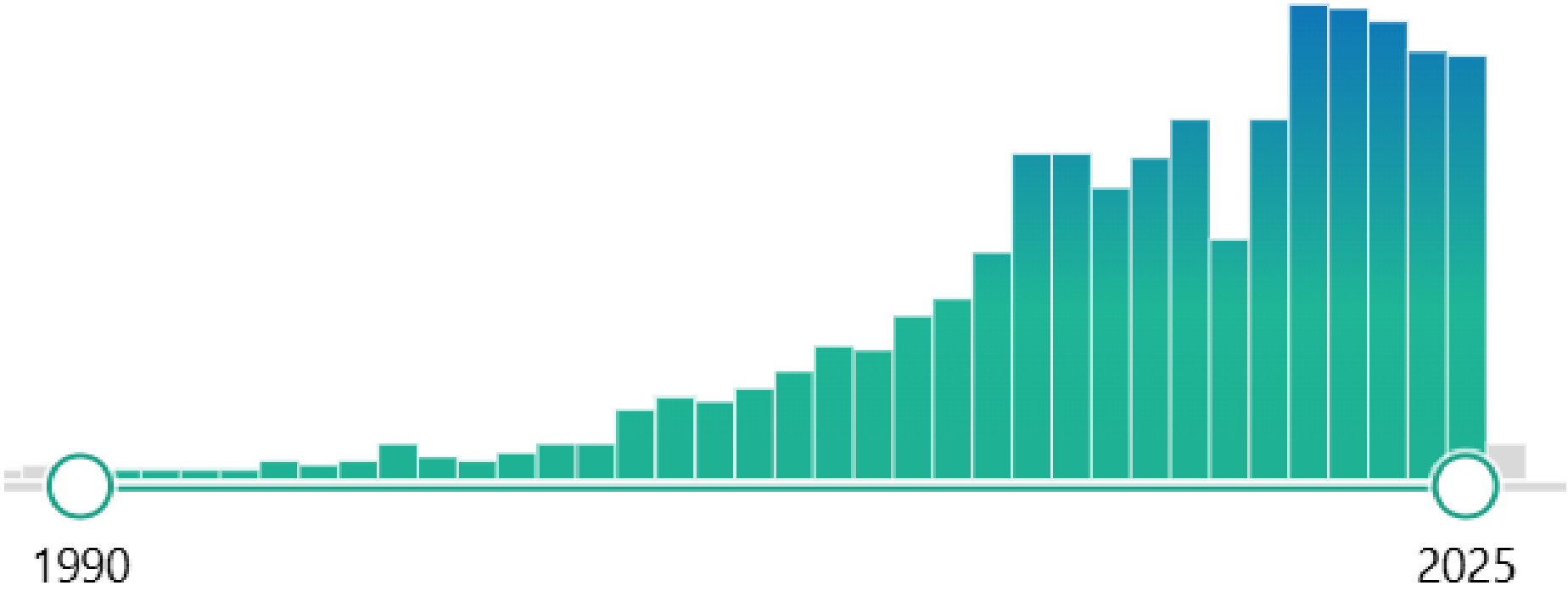

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Definition

- Embryo implants in the fibrous scar tissue of a prior cesarean hysterotomy
- The US does not have a consensus on definition
- ESHRE (2020) categorizes CSEP under uterine ectopic pregnancies
  - Partial or complete (rare)

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Pathophysiology

- Blastocyst implantation within microscopic dehiscence tract
- Absence of decidua at scar site drives trophoblast growth into myometrium
- CSEP and placenta accreta may have similar disease pathways

Miller *et al, AJOG* 2020

Incidence

Reports range from 1:1800-1:2200 pregnancies as high as 1:531 pregnancies with history of cesarean delivery

True incidence remains unknown

Nijjar *et al, Best Pract Res Clin Obstet Gynaecol* 2024

Terminology

- Wide variety of terms used in literature
  - First term “pregnancy in a uterine scar sacculus” in 1978
- Prior debate in wider community if CSEP is truly an ectopic pregnancy
- CSEP has potential for significant maternal morbidity and mortality, like other ectopic pregnancies
- SMFM affirmed CSEP terminology in 2020

Risk Factors

History of cesarean delivery is a prerequisite

No other risk factor has been well established

- Closure technique
- Number of prior cesarean deliveries
- Indication for CD (breech)
- Time interval between CD and conception

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Diagnosis: Ultrasound

Transvaginal ultrasound considered best imaging method

Misdiagnosis common (cervical ectopics or incomplete early pregnancy loss)

Best diagnosed at 6-7 weeks gestation

Diagnosis may not always be conclusive on initial scan

Diagnostic criteria
An empty uterine cavity and endocervix
Placenta, gestational sac or both embedded in the hysterotomy scar
<8 weeks' gestation: triangular gestational sac that fills the scar niche >8 weeks' gestation: rounded or oval gestational sac that fills the scar niche
A thin (1–3mm) or absent myometrial layer between the gestational sac and bladder
A prominent or rich vascular pattern at or in the area of a cesarean scar
An embryonic or foetal pole, yolk sac or both with or without cardiac activity

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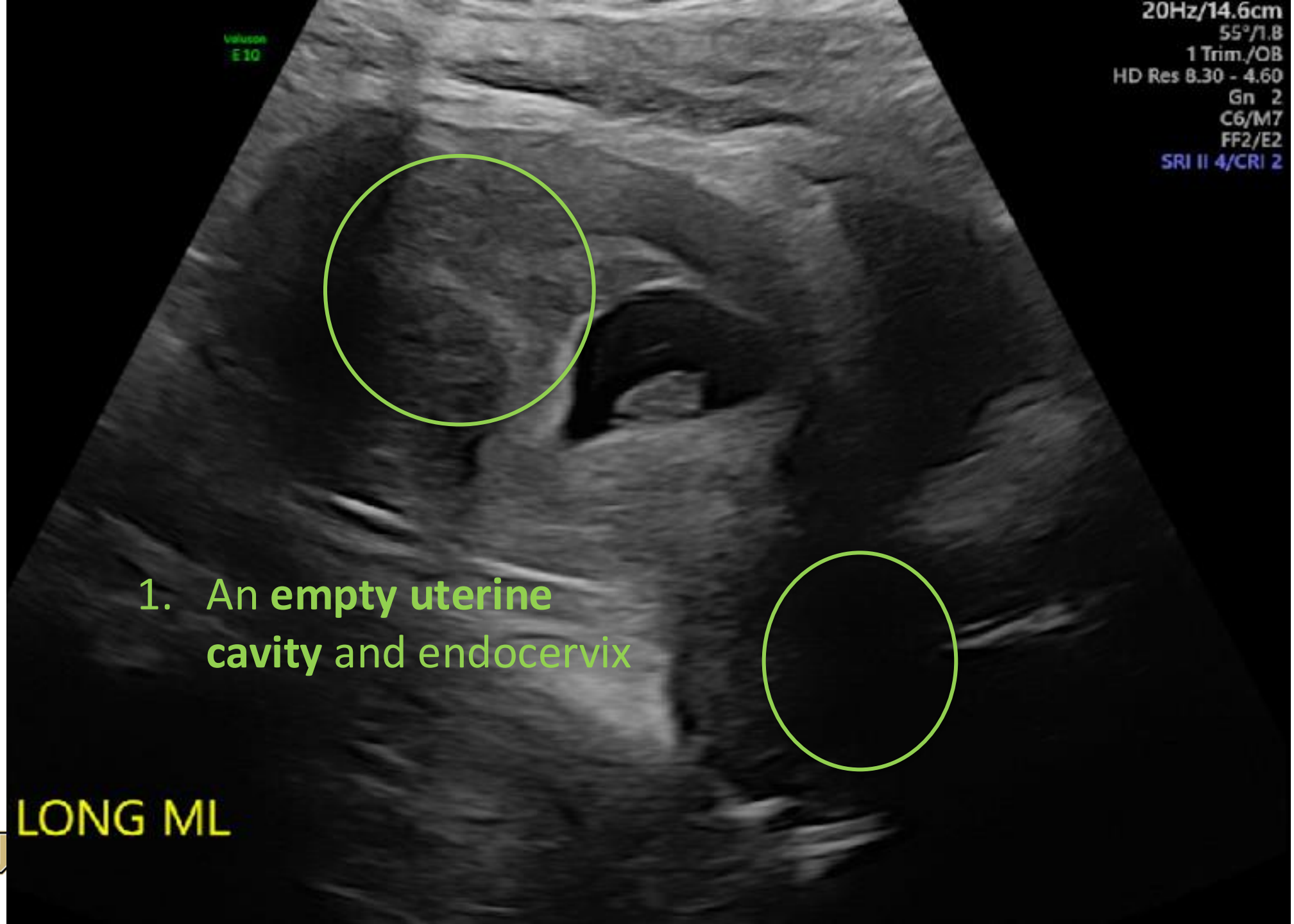
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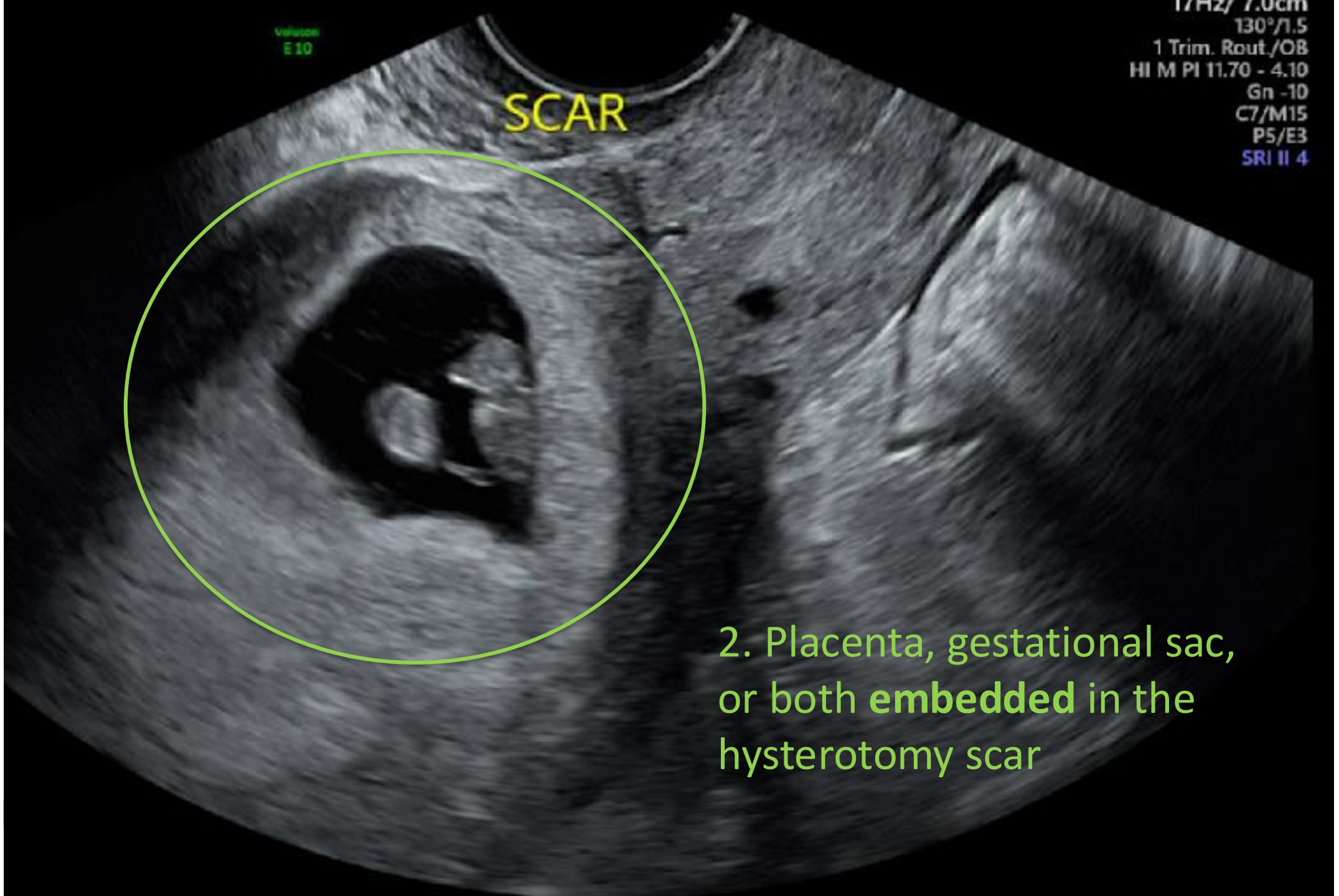
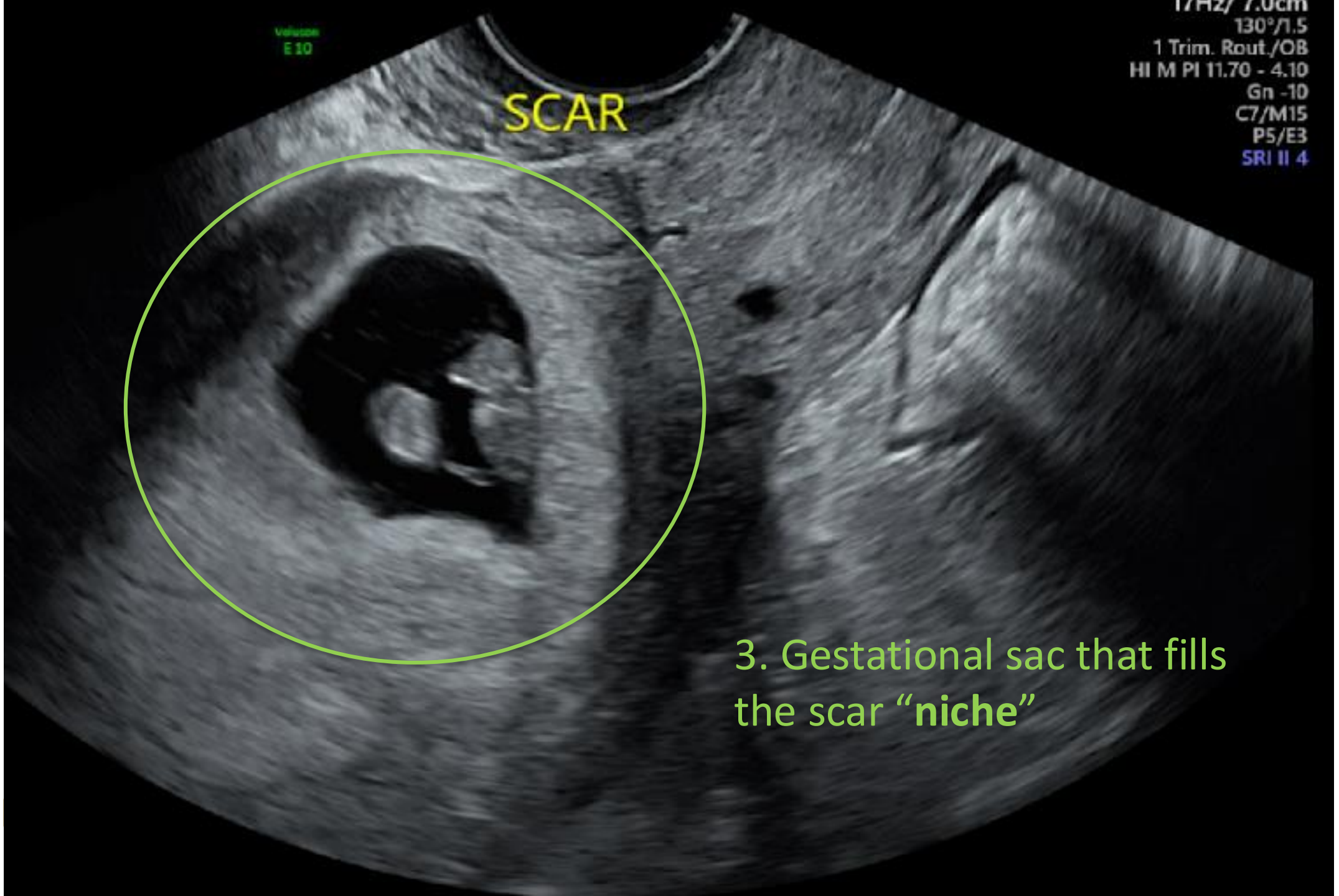
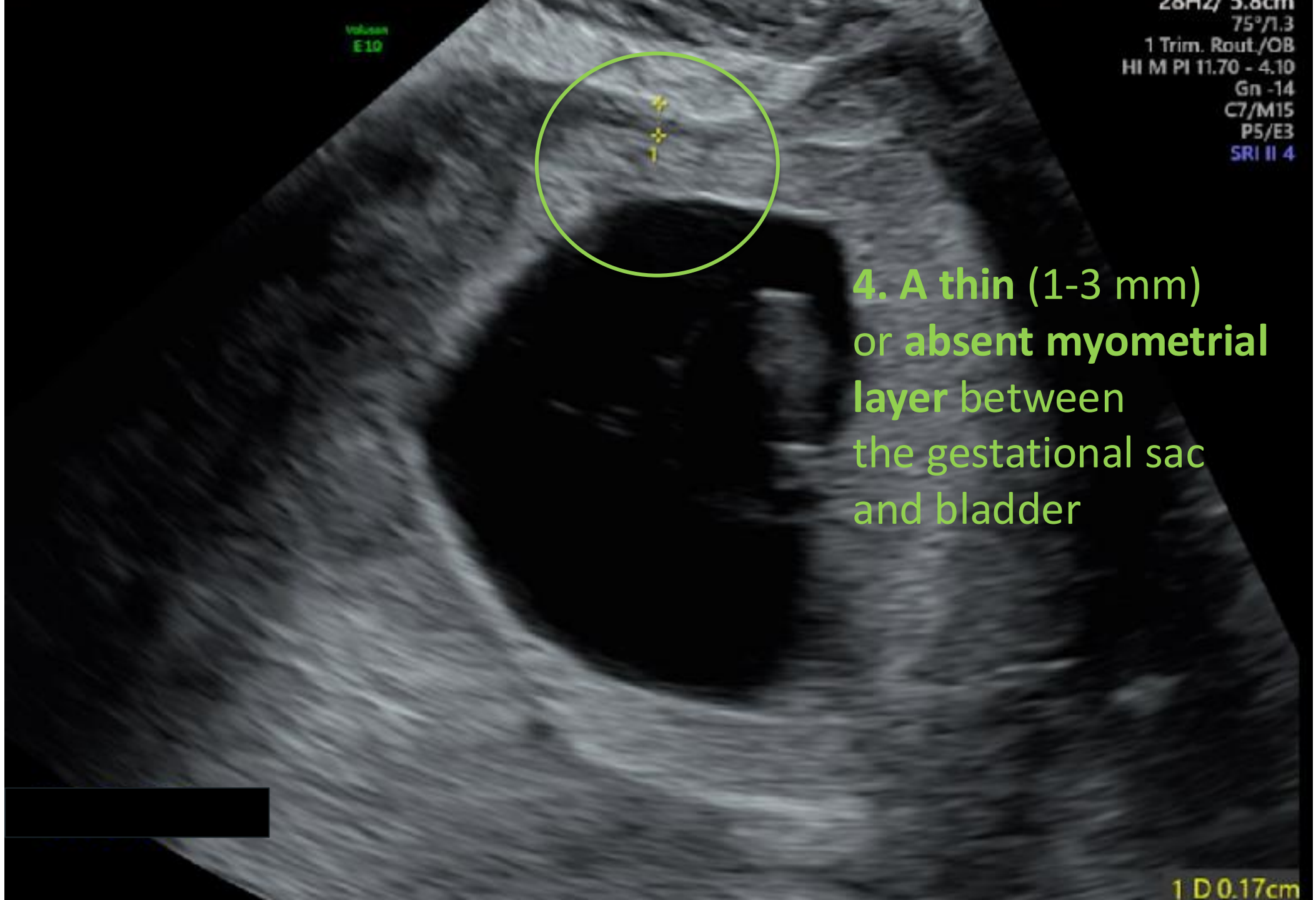
55°/1.8
1 Trim./OB
HD Res 8.30 - 4.60
Gn 2
C6/M7
FF2/E2
SRI II 4/CRI 2
1. An **empty uterine cavity** and endocervix
LONG ML



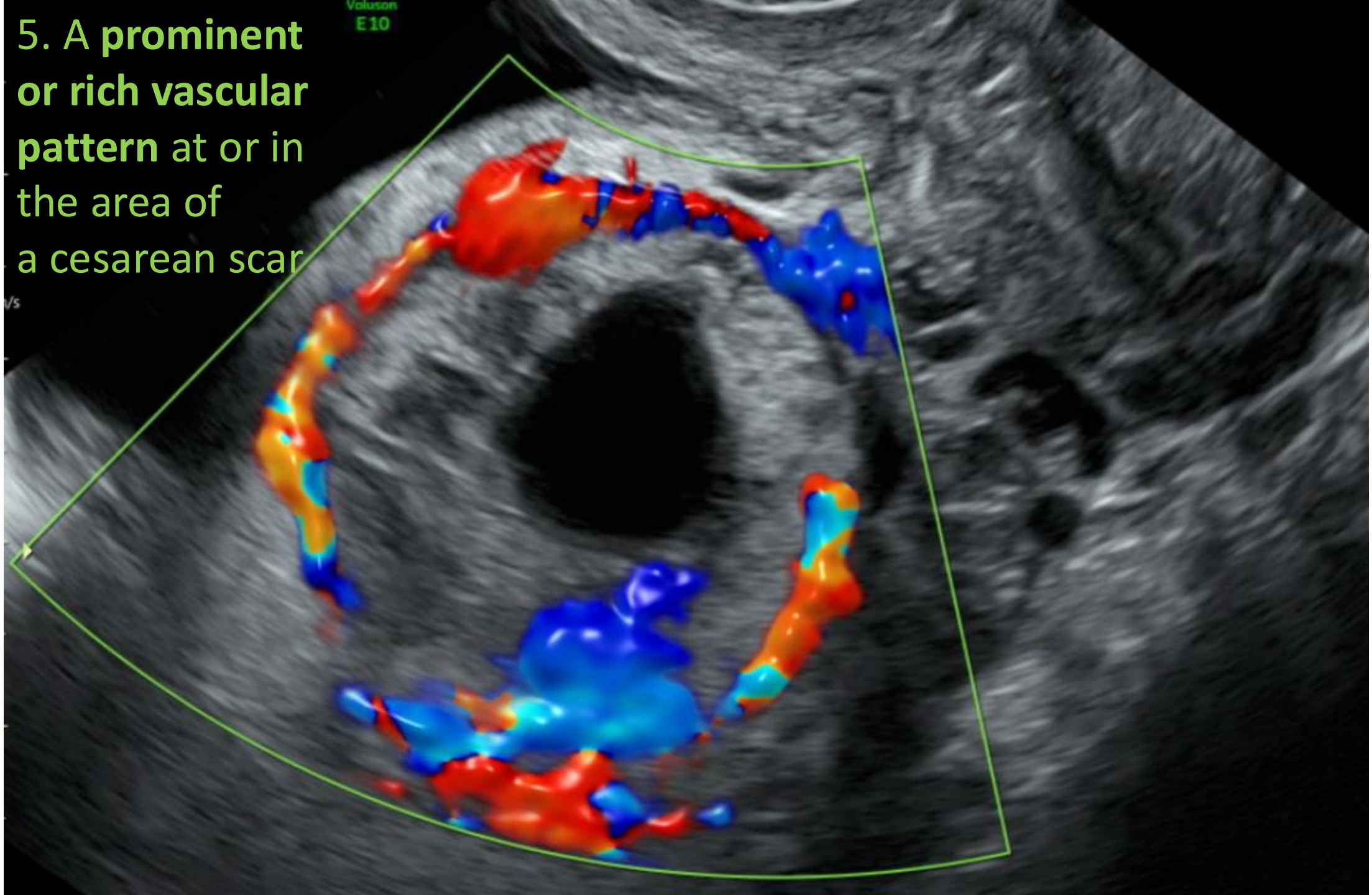
2. Placenta, gestational sac, or both **embedded** in the hysterotomy scar

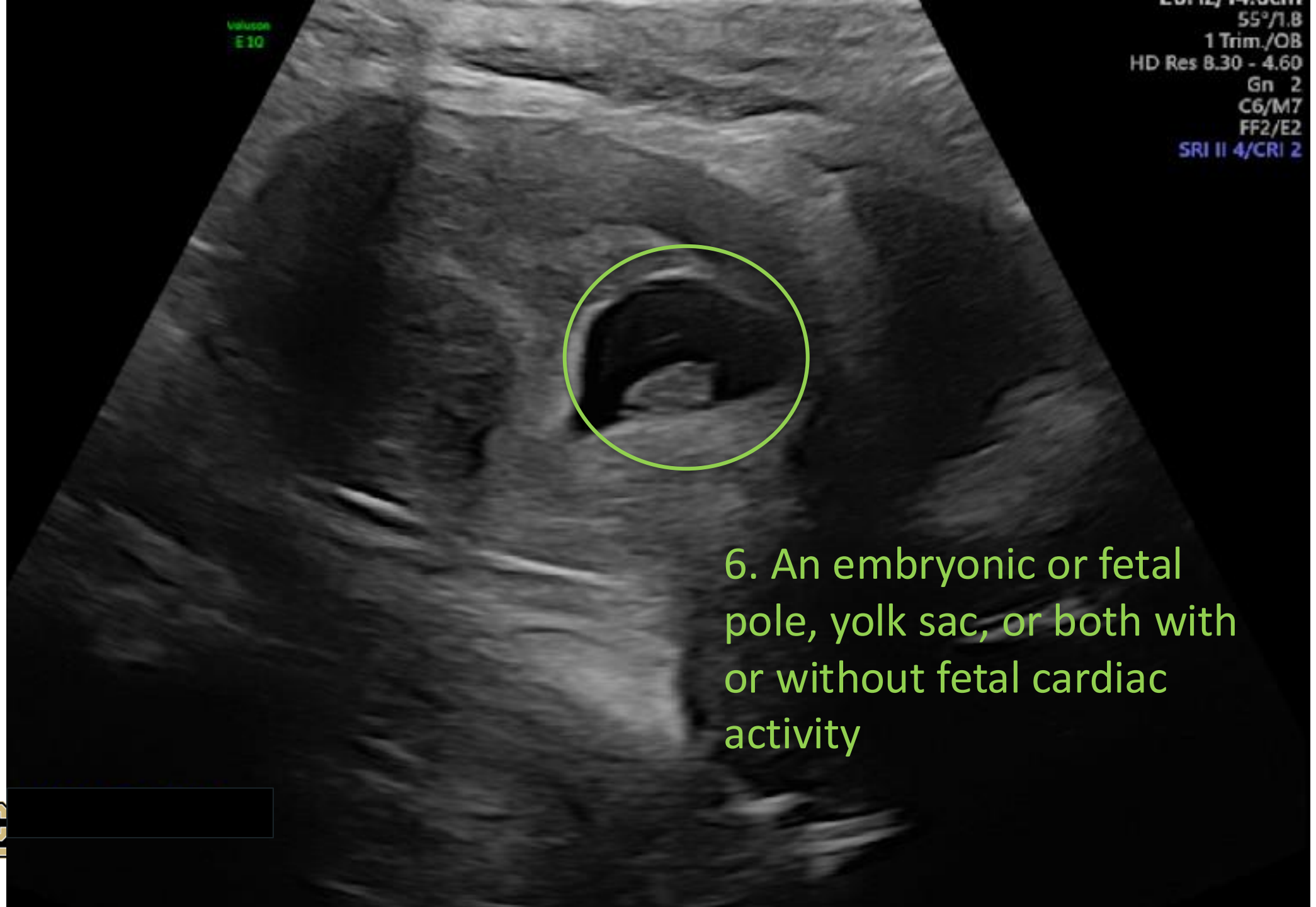

SCAR
130°/1.5
1 Trim. Rout./OB
HI M PI 11.70 - 4.10
Gn -10
C7/M15
P5/E3
SRI II 4
3. Gestational sac that fills the scar "**niche**"



4. A thin (1-3 mm) or **absent myometrial layer** between the gestational sac and bladder

5. A **prominent or rich vascular pattern** at or in the area of a cesarean scar





6. An embryonic or fetal pole, yolk sac, or both with or without fetal cardiac activity

Diagnosis: Ultrasouund

Consider

- measuring RMT and adjacent myometrial thickness in sagittal plane
- Color Doppler to assess vascular pattern in relation to niche
- Transabdominal scan for panoramic view of gestational sac and bladder

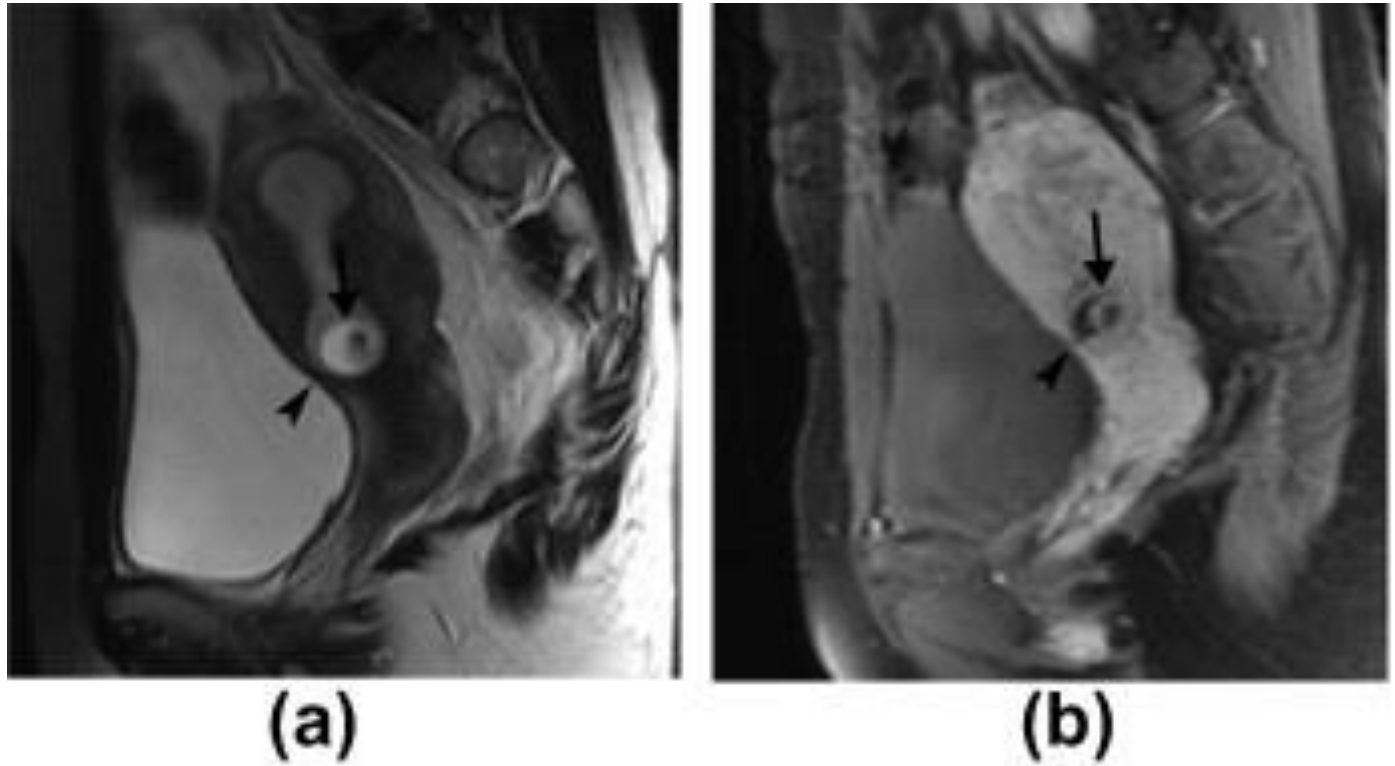
Only applies to CSEP diagnosed early in pregnancy

Diagnosis: Role of MRIs

Can be considered as adjunct to US to provide more information about exact implantation site

MRI more time consuming, not always readily available, requires expertise

May have a role where US expertise is lacking



Nijjar *et al, Best Pract Res Clin Obstet Gynaecol* 2024
Peng *et al, Clin Radiology* 2014

Classification of CSEP Types

Numerous classification systems have been suggested

None have been properly validated

Derived from case series or expert opinion

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Type 1/ Type 2

Vial et al (2000) proposed two distinct types

Type 1: implantation on the scar with progression of pregnancy into the uterine cavity and cervico-isthmic space

Type 2: Deep implantation and progression towards the abdominal cavity and bladder

Evolved to “on-the-scar” and “in-the-niche”

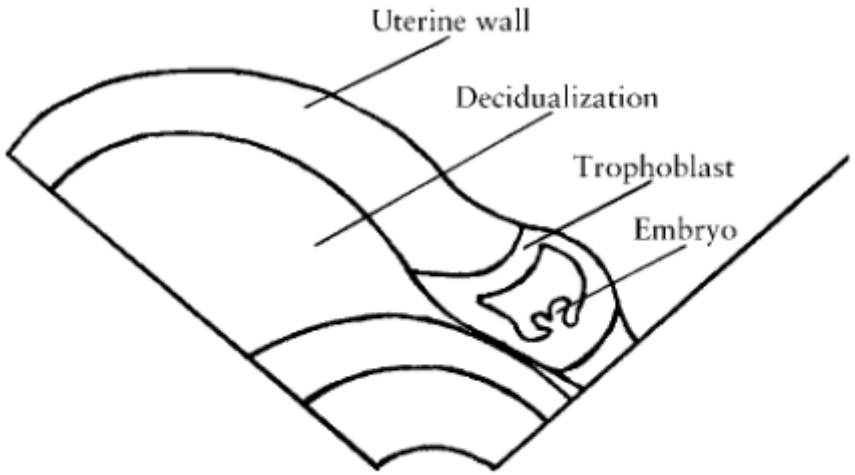
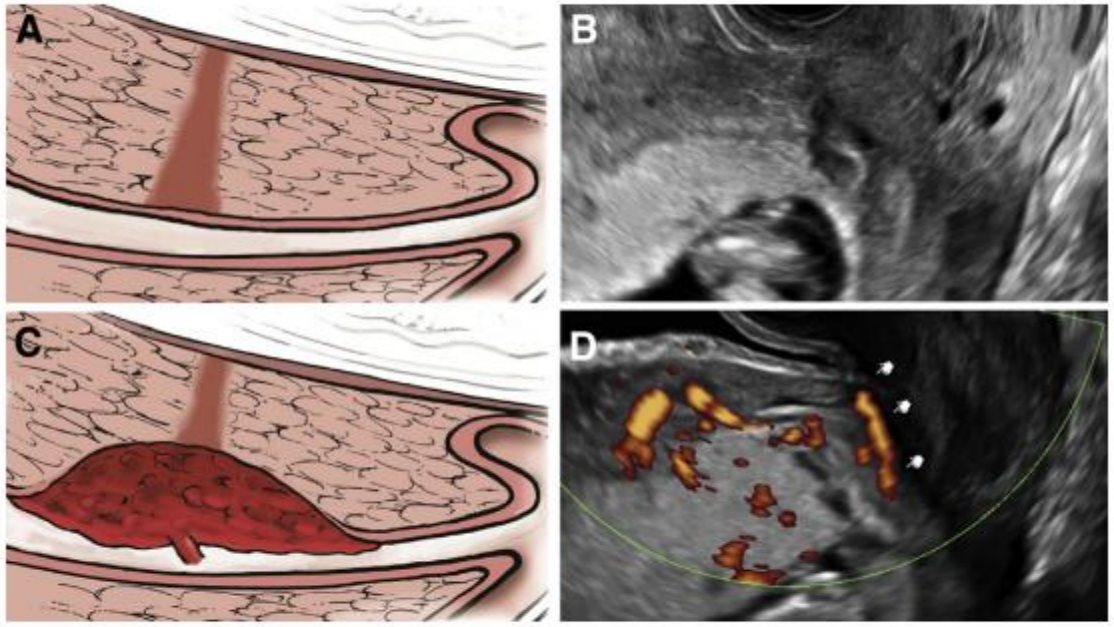


Figure 1 Sagittal view of the uterus, the trophoblast and the amniotic sac are bulging out under the Cesarean scar. The uterine cavity is full of blood clots.

Type 1/ Type 2

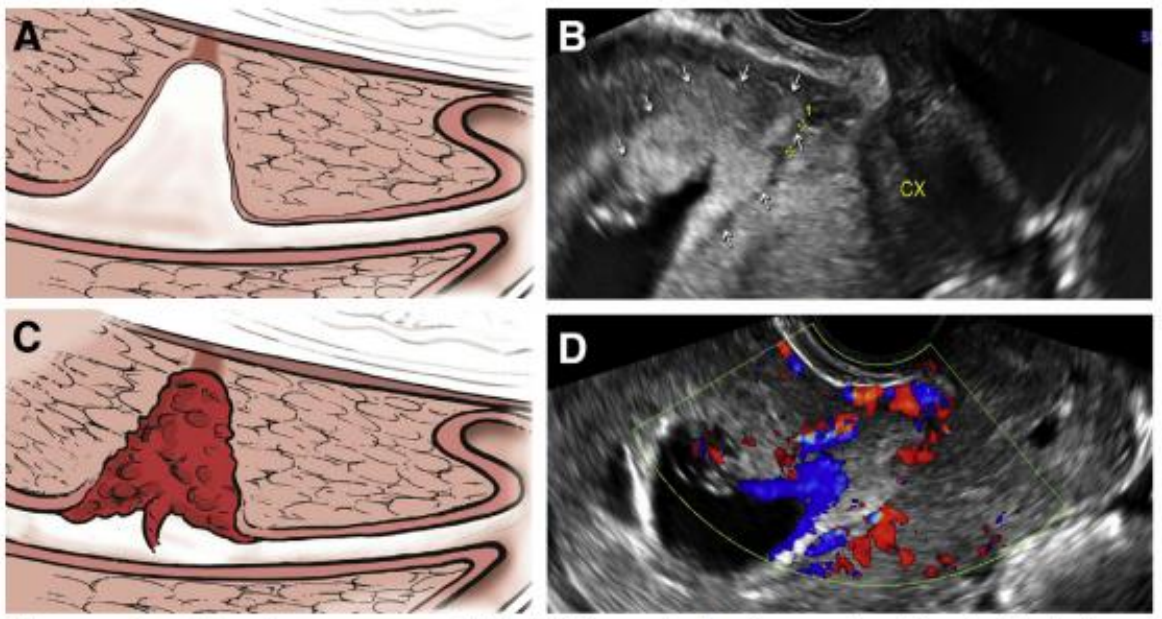
FIGURE 1
Cesarean scar pregnancies implanted "on the scar"



A, Image of a well-healed, nondeficient cesarean scar. Grey scale **B,** ultrasound and **C,** color illustration of the placenta implanted "on top of" the scar. **D,** Power Doppler ultrasound image shows the rich vascular pattern in the area of the scar.

Kaelin Agten et al. Clinical outcome of CSPs implanted "on the scar" vs "in the niche." Am J Obstet Gynecol 2017.

FIGURE 2
Cesarean scar pregnancies implanted "in the niche"



A, Image of a dehiscent cesarean scar ("niche"). Grey scale **B,** ultrasound and **C,** color illustration of the placenta implanted "in the niche." **D,** Power Doppler ultrasound image shows the rich vascular pattern in the area of the scar.

Kaelin Agten et al. Clinical outcome of CSPs implanted "on the scar" vs "in the niche." Am J Obstet Gynecol 2017.

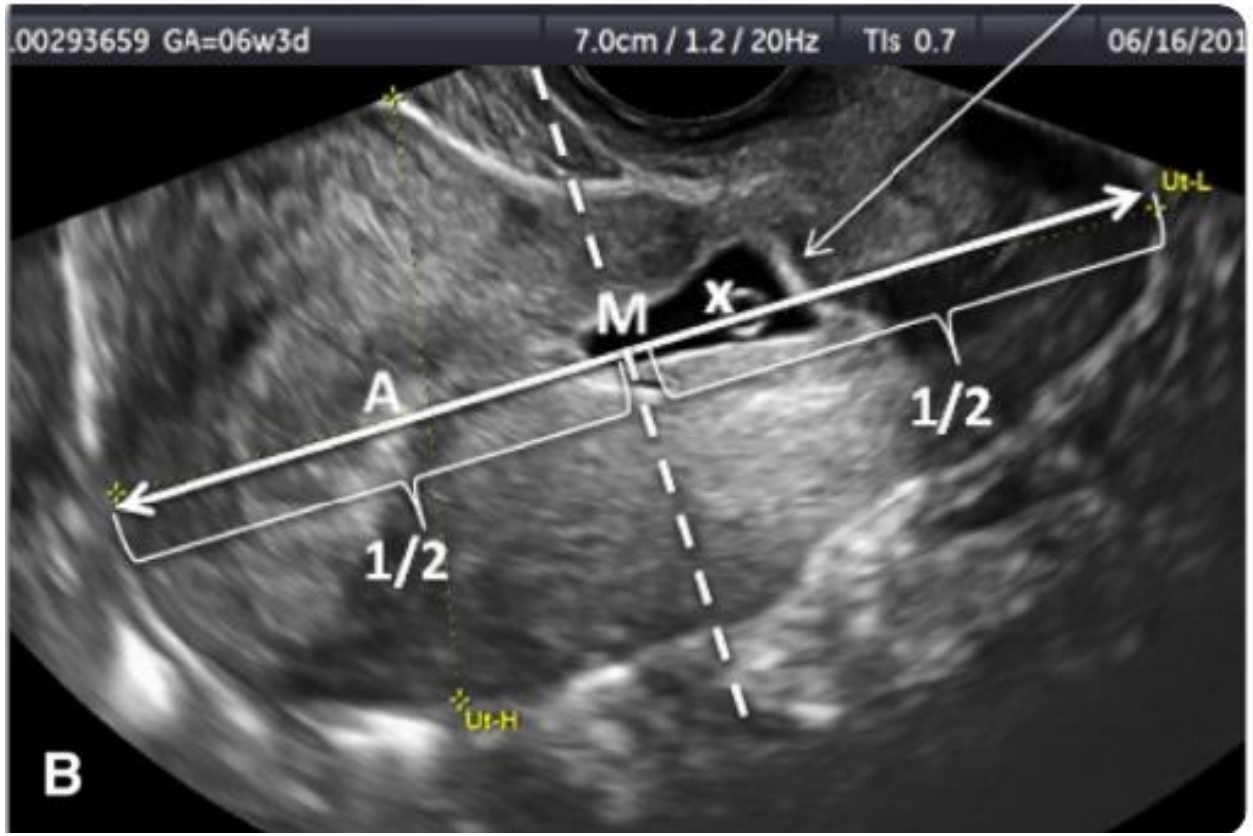
Type 1/ Type 2

Type 1: endogenic

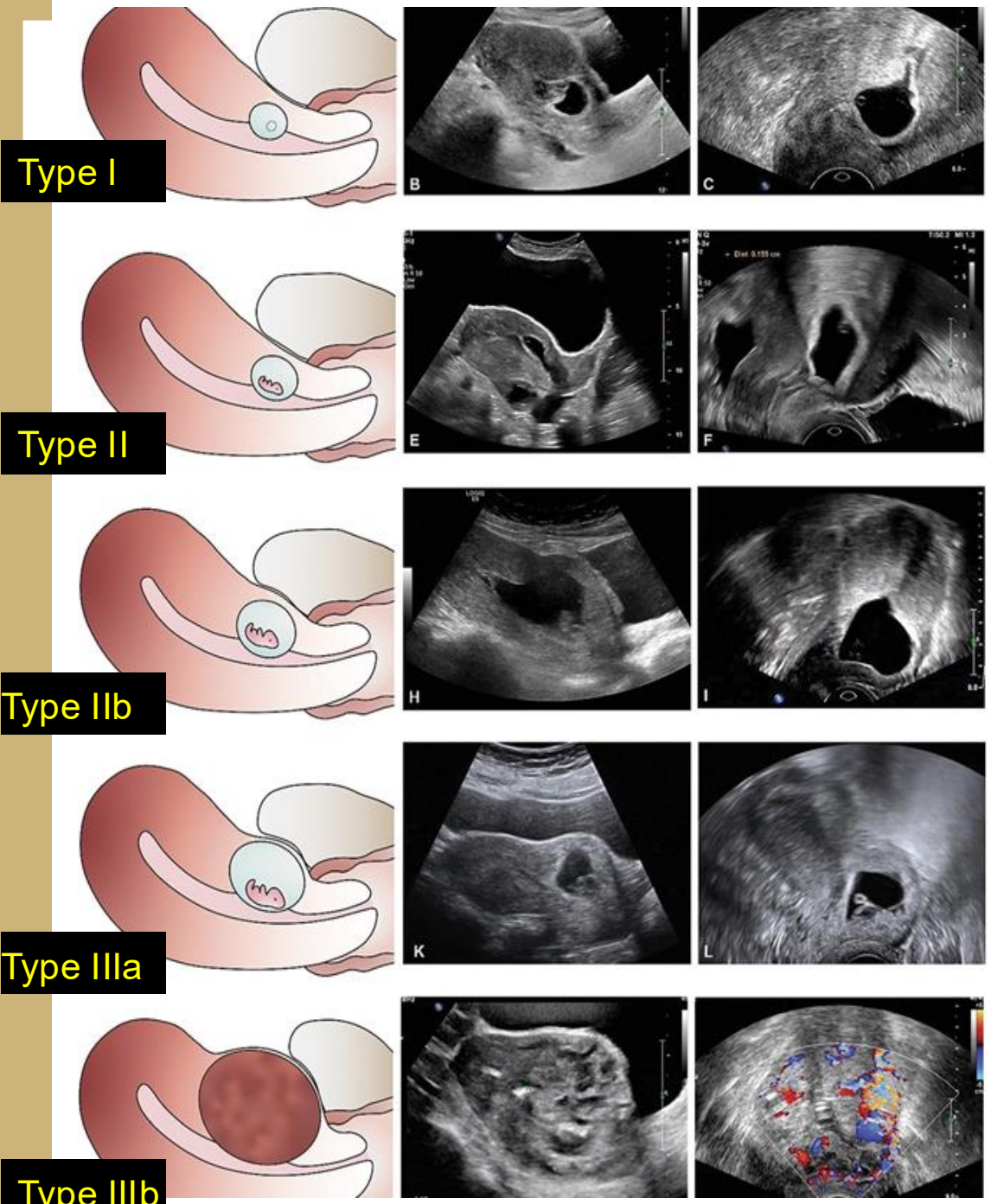
Type 2: exogenic

Volume of pregnancy will change as pregnancy progresses

No current correlation with patient outcomes



Nijjar *et al, Best Pract Res Clin Obstet Gynaecol* 2024
Timor-Tristch *et al*, *AJOG* 2016



CSEP Classification

Practical Clinical Classification	Anterior Myometrium Thickness (mm)	Average Diameter of the Gestational Sac or Mass (mm)
Type I	Greater than 3	
Type II	1–3	IIa: 30 mm or less
		IIb: greater than 30 mm
Type III	1 or less	IIIa: 50 mm or less IIIb: greater than 50 mm or with UAVF

Ban et al, *Obstet Gynecol* 2023

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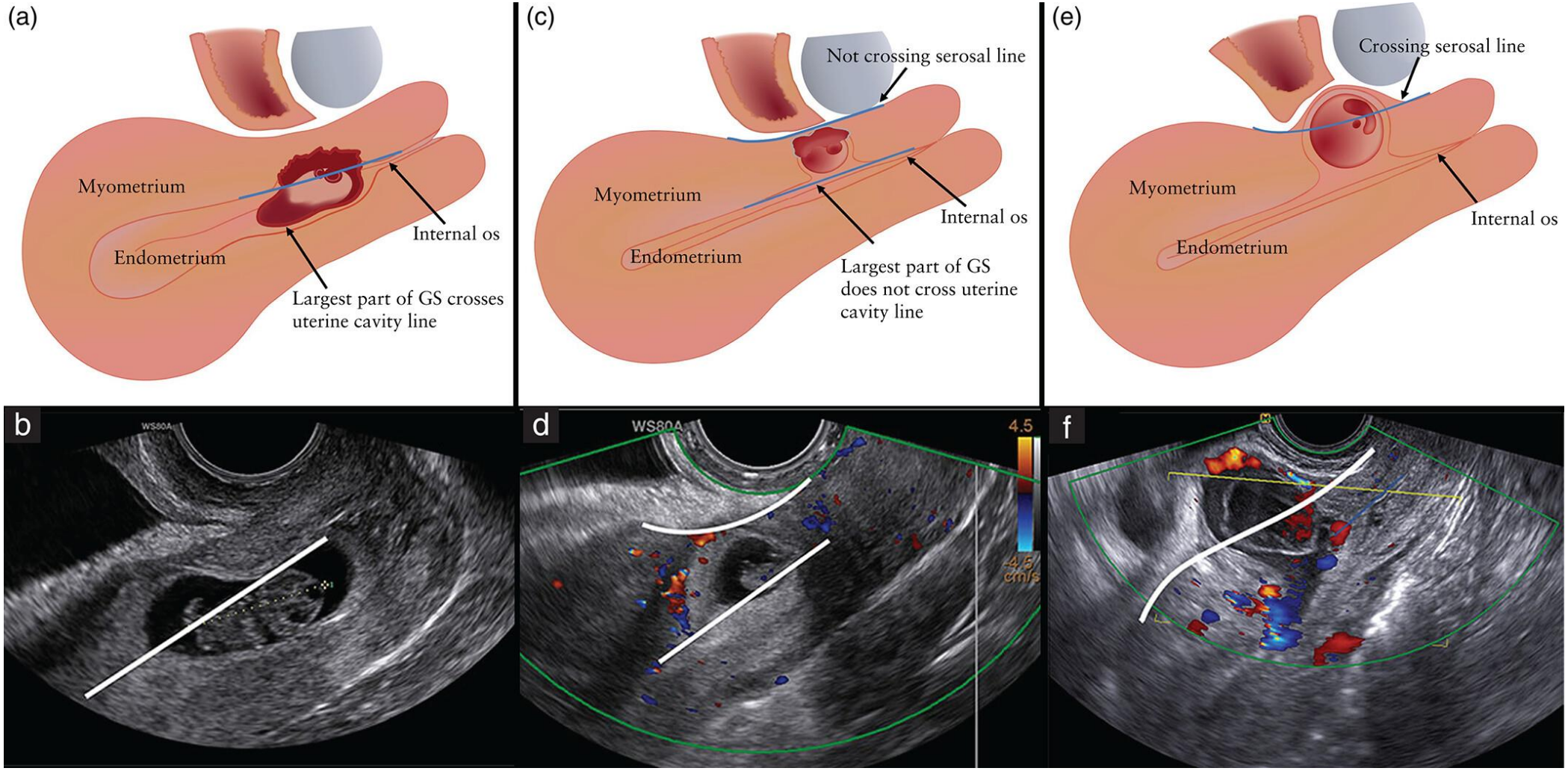
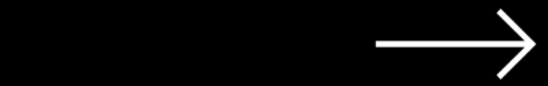
CSEP Classification



Management



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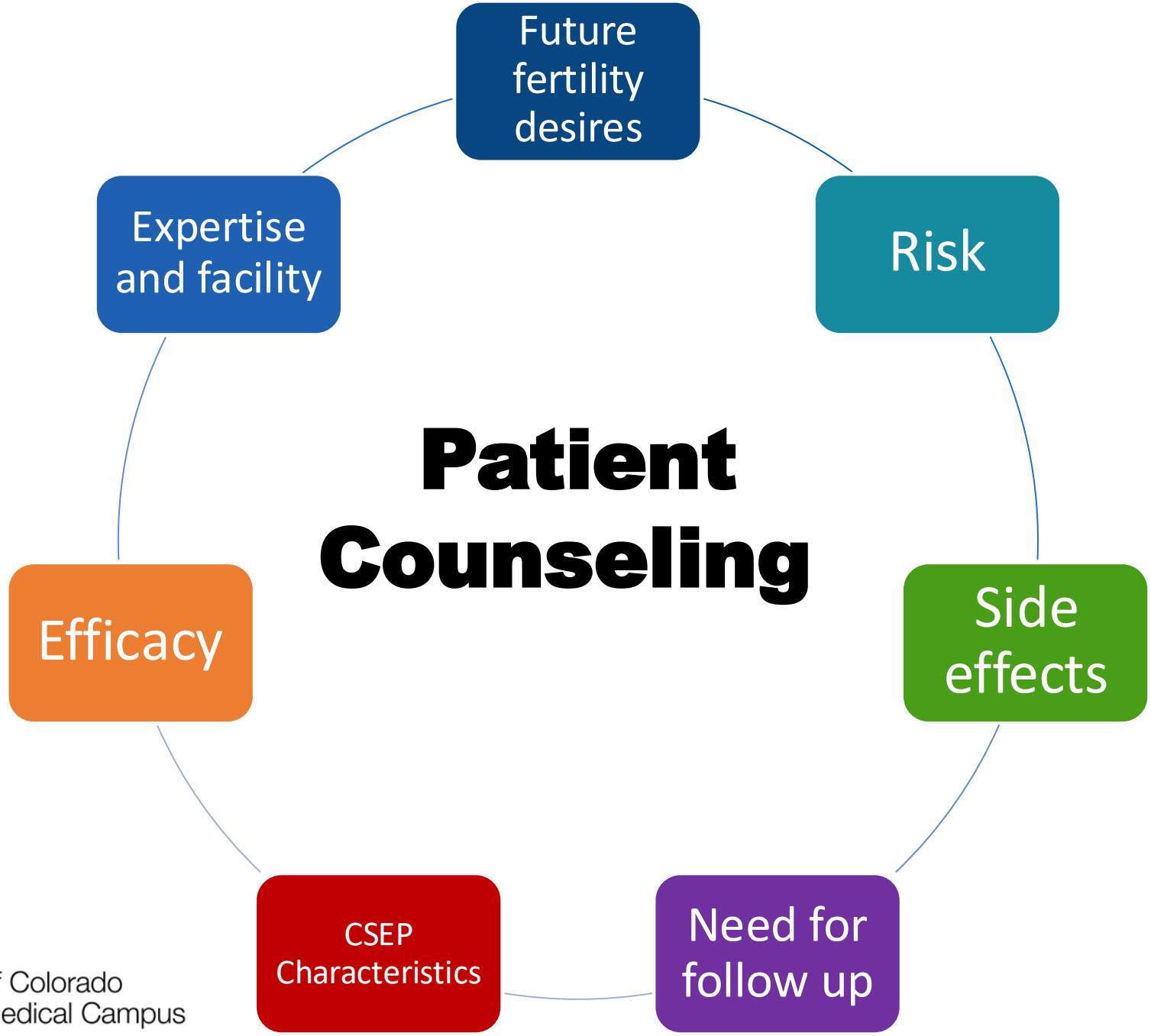
UNNUMBERED TABLE 1

Summary of recommendations

	Recommendation	Grade
1	We recommend against expectant management of cesarean scar ectopic pregnancy.	1B
2	We suggest that operative resection (with transvaginal or laparoscopic approaches when possible) or ultrasound-guided uterine aspiration be considered for the surgical management of cesarean scar ectopic pregnancy and that sharp curettage alone be avoided.	2C
3	We suggest intragestational methotrexate for the medical treatment of cesarean scar ectopic pregnancy, with or without other treatment modalities.	2C
4	We recommend that systemic methotrexate alone not be used to treat cesarean scar ectopic pregnancy.	1C
5	In patients who choose expectant management and continuation of a cesarean scar ectopic pregnancy, we recommend repeated cesarean delivery between 34 0/7 and 35 6/7 wk of gestation.	1C
6	We recommend that patients with a cesarean scar ectopic pregnancy be advised of the risks of another pregnancy and counseled regarding effective contraceptive methods, including long-acting reversible contraception and permanent contraception.	1C

Society for Maternal-Fetal Medicine (SMFM). Consult Series #63: Cesarean scar ectopic pregnancy. Am J Obstet Gynecol 2022..



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Treatment Options

Surgical

- Excision (hysterectomy or wedge resection)
  - XL, LSC, TV
- Suction aspiration with US guidance (sharp curettage associated with higher complications)
- Hysteroscopy

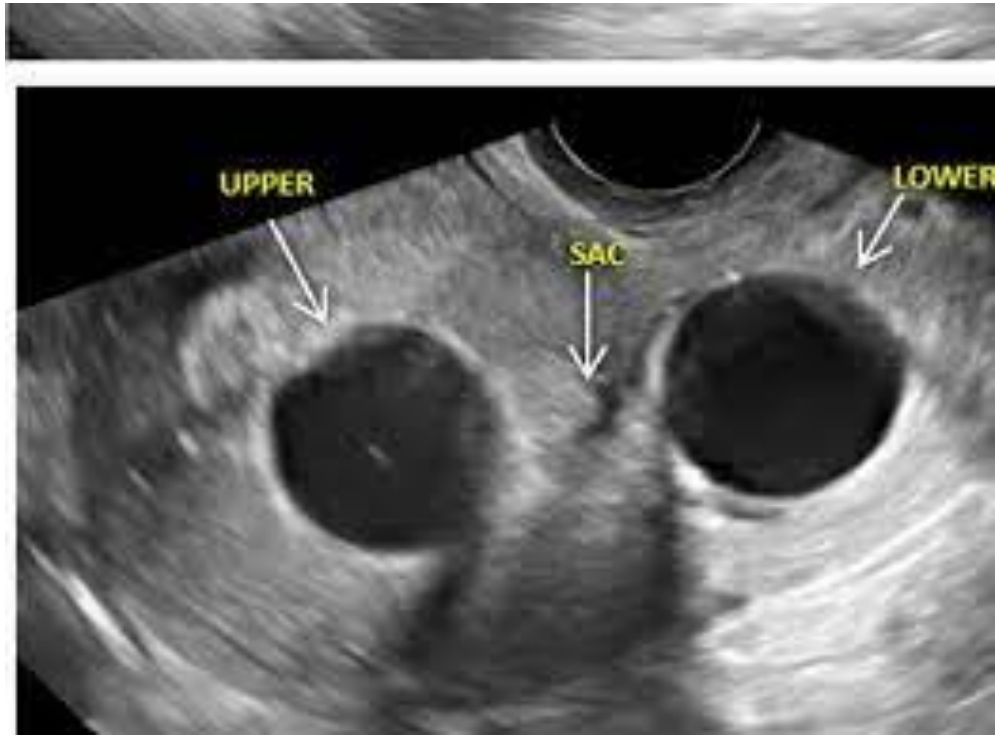
Treatment Options

Medical

- Local injection of MTX or KCl +/- systemic MTX
- UAE

Other

- Balloon placement
- Shirodkar Suture (during suction aspiration)



Timor-Tristch *et al*, *AJOG* 2016

U.S. Experience

- Prospective cohort database
- Collected cases through expert networks from 2020-2024
- 208 cases with complete treatment outcomes
  - Largest US only cohort

Unpublished

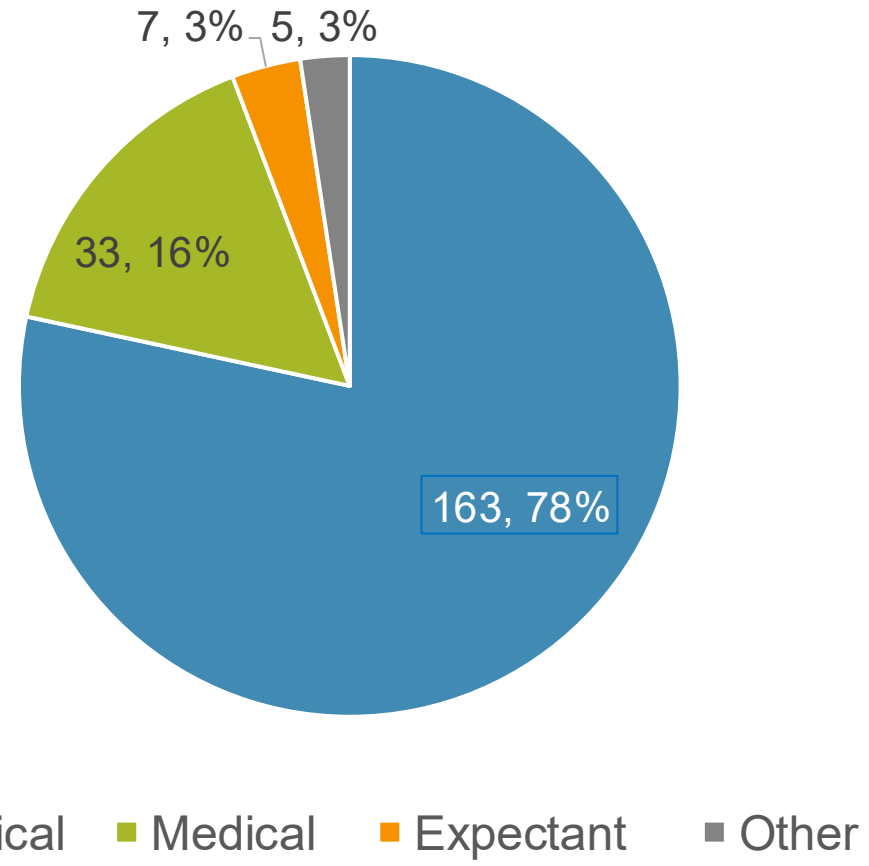
Demographics

Variable	Category	N	Percent
Age (years)	Median (Range): 33.0 (22.0 - 47.0)	207	
BMI (kg/m^2)	Mean (Range): 31.71 (18.70 - 65.00)	203	
Ethnicity			
	Hispanic	52	25.00%
	Not Hispanic	143	68.80%
	Unknown	13	6.20%
Race			
	Asian	18	8.70%
	Black	46	22.10%
	White	104	50.00%
	More than one race	8	3.80%
	Unknown/Not reported	28	13.50%

Demographics

Region		N	%
	Midwest	15	7.20%
	Northeast	54	26.00%
	Southeast	14	6.70%
	Southwest	3	1.40%
	West	121	58.20%
	Outside of the US	1	0.50%

Primary Interventions



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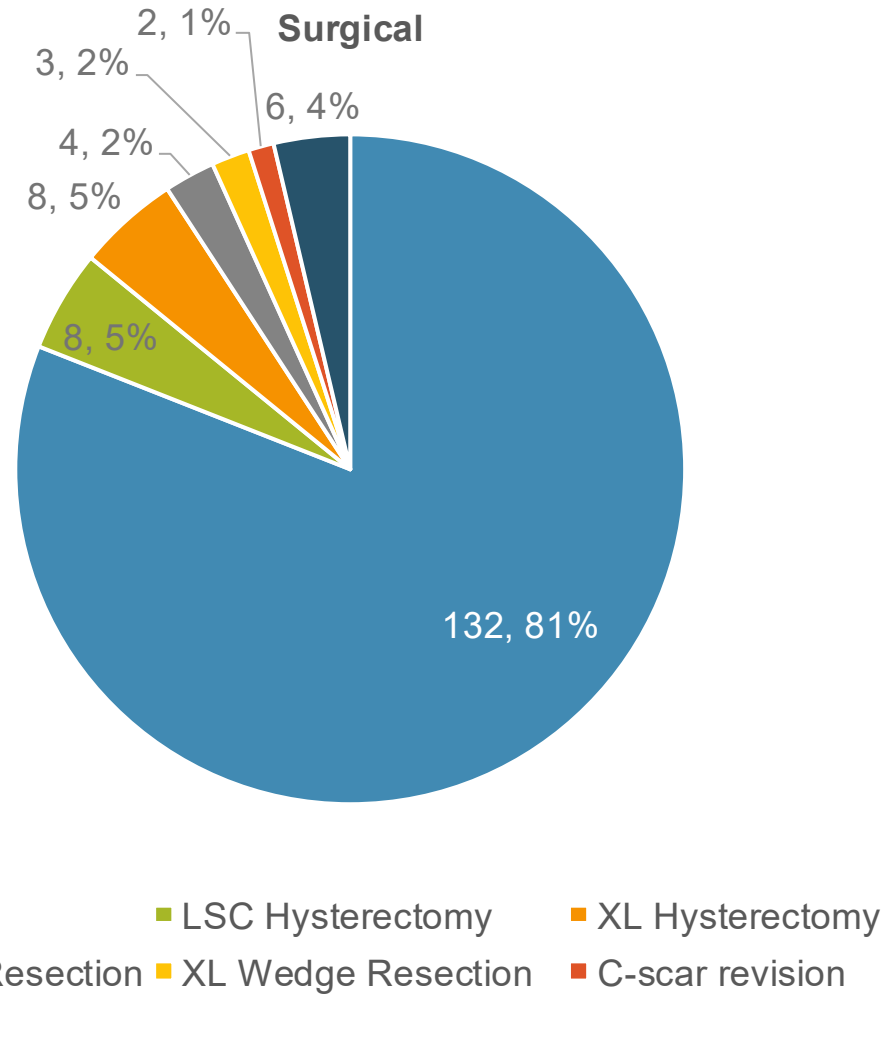
Primary Interventions- by type



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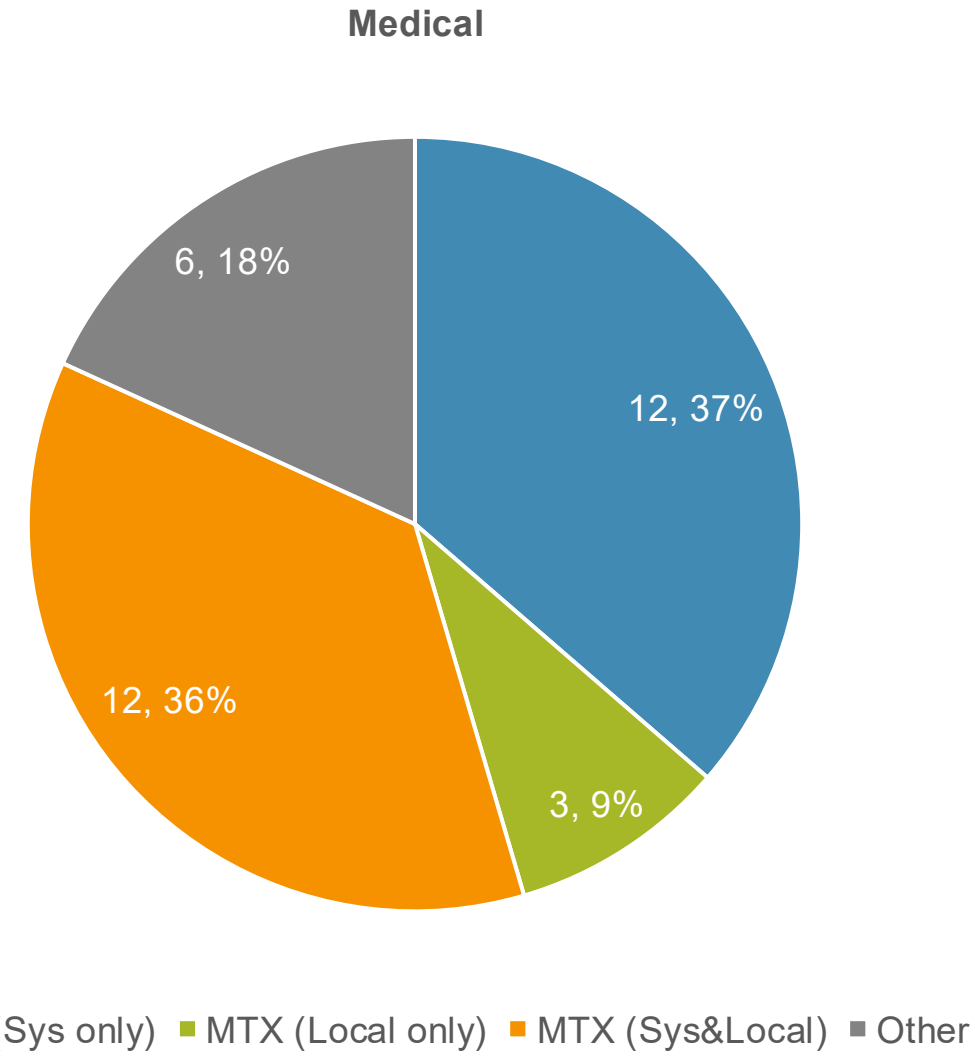
Primary Interventions- by type



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SURGICAL	Category	N	Percent
Pregnancy Type			
	Spontaneous pregnancy	157	96.30%
	ART	6	3.70%
CSEP Type			
	Type 1	61	37.90%
	Type 2	53	32.90%
	Unknown/Not determined	47	29.20%
GA (days)	Mean (Range): 53.4 (32 - 137)	150	
Vaginal Bleeding			
	Yes	85	52.10%
Pain			
	Yes	59	36.20%
Viability			
	Viable pregnancy	97	59.50%
	Non-viable pregnancy	26	16.00%
	Unable to determine	36	22.10%

MEDICAL	Category	N	Percent
Pregnancy Type			
	Spontaneous pregnancy	29	87.90%
	ART	3	9.10%
CSEP Type			
	Type 1	14	42.40%
	Type 2	12	36.40%
	Unknown/Not determined	7	21.20%
GA (days)	Mean (Range): 53.0 (33 - 89)	32	
Vaginal Bleeding			
	Yes	18	54.50%
Pain			
	Yes	17	51.50%
Viability			
	Viable pregnancy	17	51.50%
	Non-viable pregnancy	5	15.20%
	Unable to determine	9	27.30%

Complications- Comparison

Category	EXPECTANT	MEDICAL	SURGICAL	OTHER
	N (%)	N (%)	N (%)	N (%)
Hospitalization				
	0	10 (30.5%)	61 (37.4%)	3 (60.0%)
Avg Hospital Days	0	2.8 (1-5)	1.7 (1-4)	1.7 (1-3)
Complications				
Hemorrhage (>500 mL)	2 (28.0%)	2 (6.1%)	17 (10.4%)	0 (0%)
Blood transfusion	1 (14.3%)	2 (6.1%)	3 (3.7%)	0 (0%)
Uterine rupture	1 (14.3%)	1 (3%)	0 (0%)	0 (0%)
Unplanned hysterectomy	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Any complication	2 (28.6%)	2 (6.1%)	22 (13.5%)	0 (0%)

Complications- Suction D&C

Category	N (%)
Planned Status	
Unplanned	3 (2.3%)
Hospitalization	
	38 (28.8%)
Avg Hospital Days	1.4
Complications	
Bleeding more than expected	23 (17.4%)
Hemorrhage (>500 mL)	0 (0%)
Blood transfusion	3 (2.3%)
Cervical laceration	0 (0%)
Uterine perforation	2 (1.5%)
Uterine rupture	0 (0%)
Unplanned hysterectomy	0 (0%)
Other complication	4 (3%)

Unpublished

Need for further intervention

- Overall, the majority of cases were treated surgically
- Of the **163** cases treated surgically, **2 (1.2%)** needed additional intervention
  - 132 of the cases were suction D&C
- Of the **33** cases treated medically, **15 (45.5%)** needed additional interventions

Risk factors for bleeding with uterine aspiration in CSEP

Authors	Case N	
X.-Q. Wu et al. (2015)	232 cases	• **Increased risk: GA > 7 weeks and missed abortion** • Not significant: age, # CD, hCG, type of CSEP, myometrial thickness
Cetin (2023)	64 cases	• **Increased risk: #↑CD, ↑GA, ↑hCG** • Not significant: myometrial thickness
Jurkovic (2016)	232 cases	• **Increased risk: ↑ gestational sac diameter, pregnancy vascularity** • Not significant: viability, # CD
Peterson (2016)	40 cases	• Not significant: type of CSEP, myometrial thickness
Wang (2020)	93 cases	• **Increased risk: myometrial thickness <3mm**
Others (Polat 2016, Ou 2020, Wang 2018, Li 2018)		• **Increased risk: myometrial thickness <2mm**

Surgical management for advanced GA

- Retrospective single center cohort study
- 371 CSEP, 22 (6%) had advanced live CSEP >=10wga
  - 17 (77%) opted for surgical intervention
- All patients received a Shirodkar cerclage; selective UAE
- Successful in achieving hemostasis by tamponade in 76% (13/17) of patients.
- Median intraoperative blood loss **800 mL** (range: 250–2500) and **41% (7/17) women lost >1000 mL.**
- **35% (6/17**) needed blood transfusion. None required hysterectomy.

Nijjar et al, AOGS, 2024

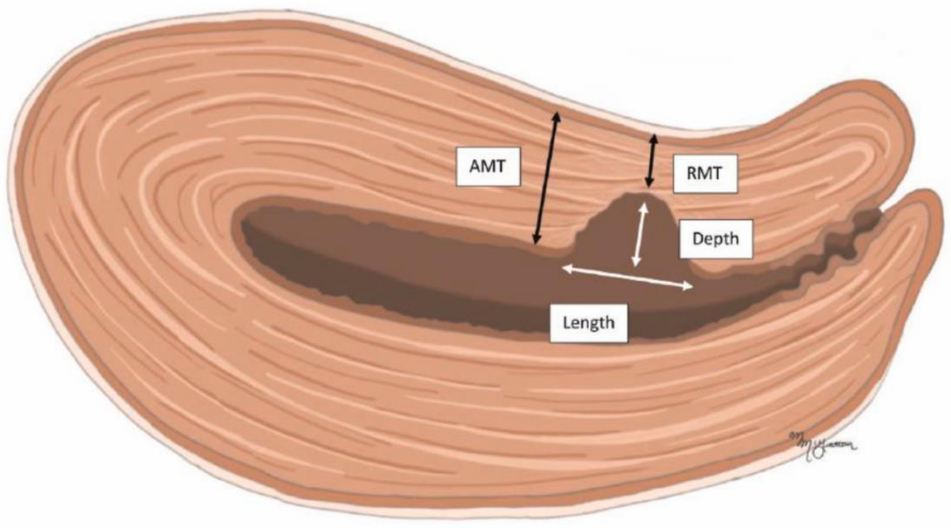
Future Fertility

- Single institution (Taizhou) consecutively enrolled patients (n=499)
- 62/113 of those who initially desired subsequent pregnancy abandoned fertility plans
- 51 pursued pregnancy, 48 pregnancies recorded in 43 patients
  - 15.7% (8/51) had secondary infertility
- 60.8% (31/51) achieved full term pregnancy, PAS identified in 2 patients, 1 had C-hyst
- 5 cases of recurrent CSEP

Jin et al, BMC Preg Childbirth 2023

Cesarean Scar Niche (CSN) Management

- CSN defined as myometrial indent at site of previous hysterotomy with at lease 2 mm >3 months after CD
- Currently no conclusive evidence that existence of a niche at the c-scar increases risk of CSEP
- Reasonable to offer for niches >2 mm and symptomatic

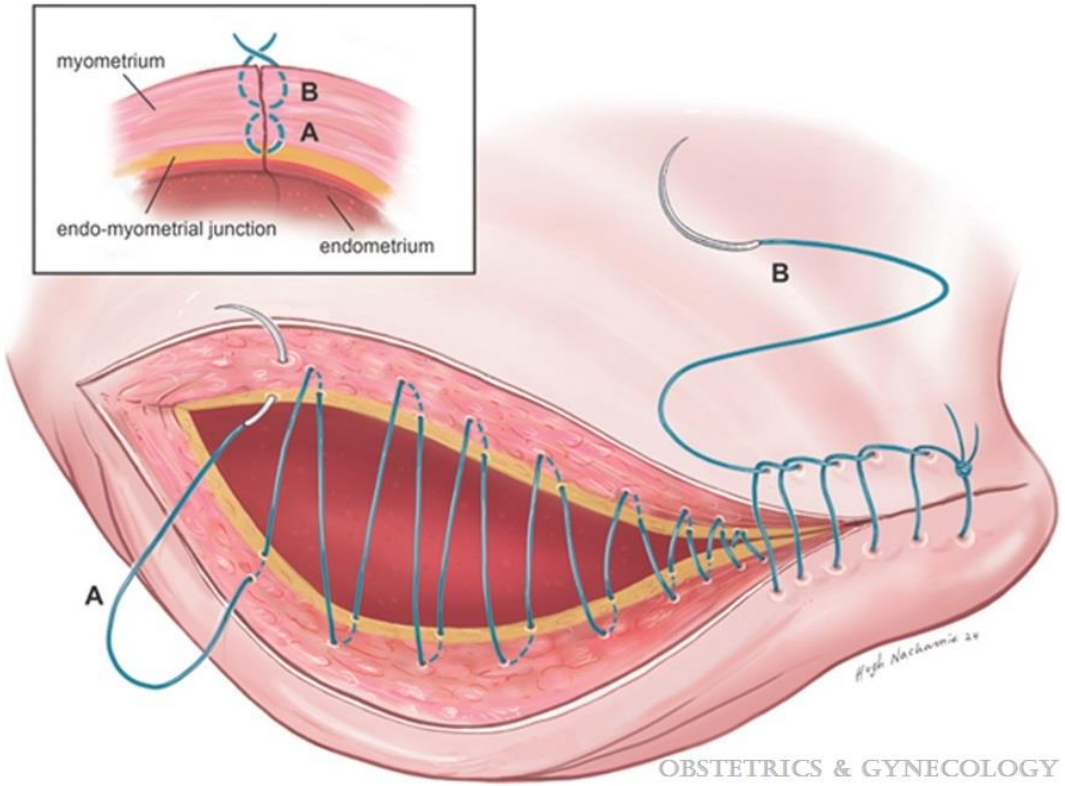


Brennan et al, JOGC, 2025

Harjee *et al, JMIG*, 2021

Prevention

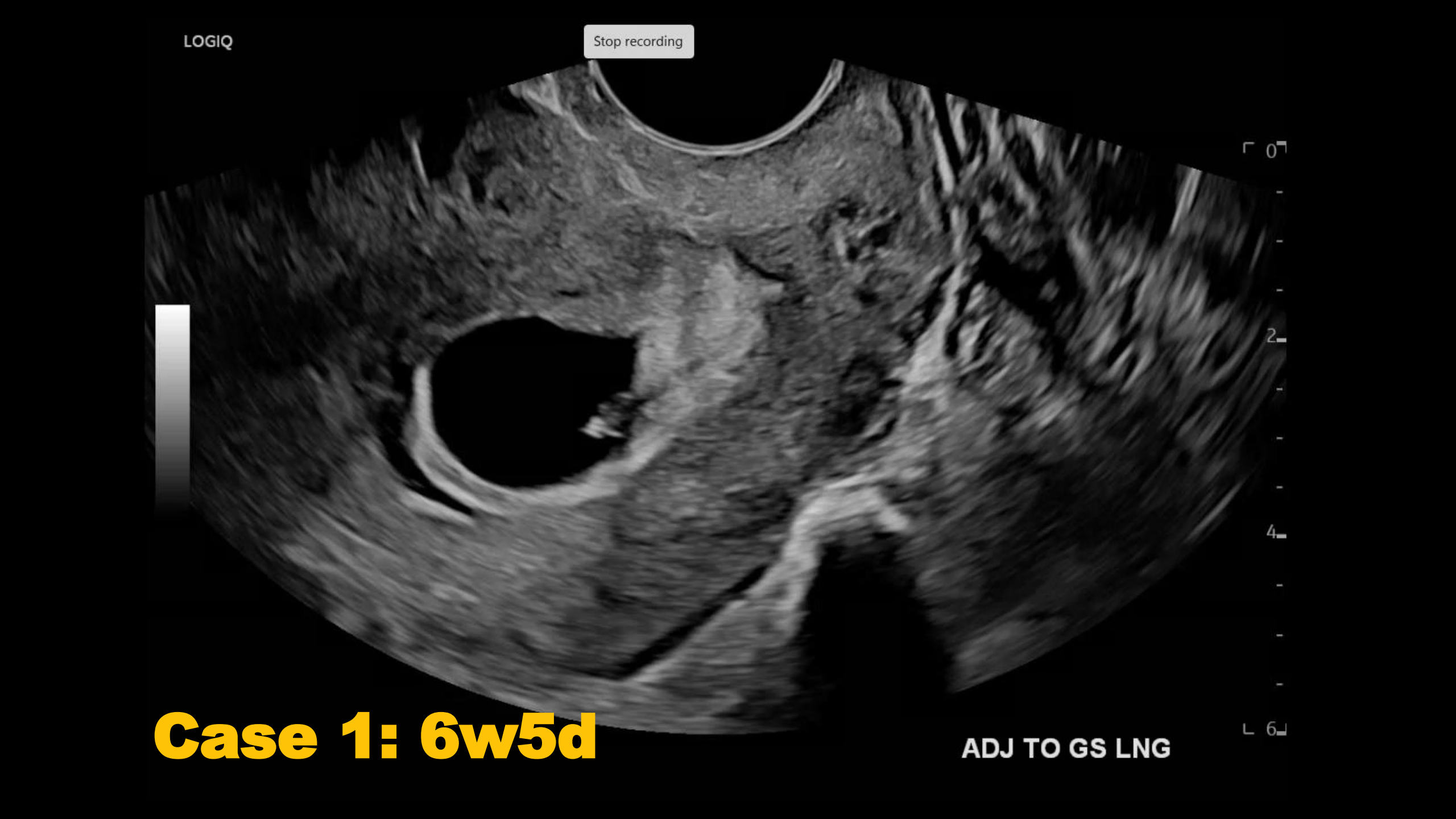
- Higher hysterotomy during advanced labor (at least 2 cm above vesicouterine junction)
- Double layer closure (compared with locked single layer that incorporates endometrium)
  - Excluding the endometrium in first layer
- Unlocked
- Suture type (unclear)



Brennan et al, *JOGC*, 2024
Antoine *et al, Obstet Gynecol,* 2025

Our Practice

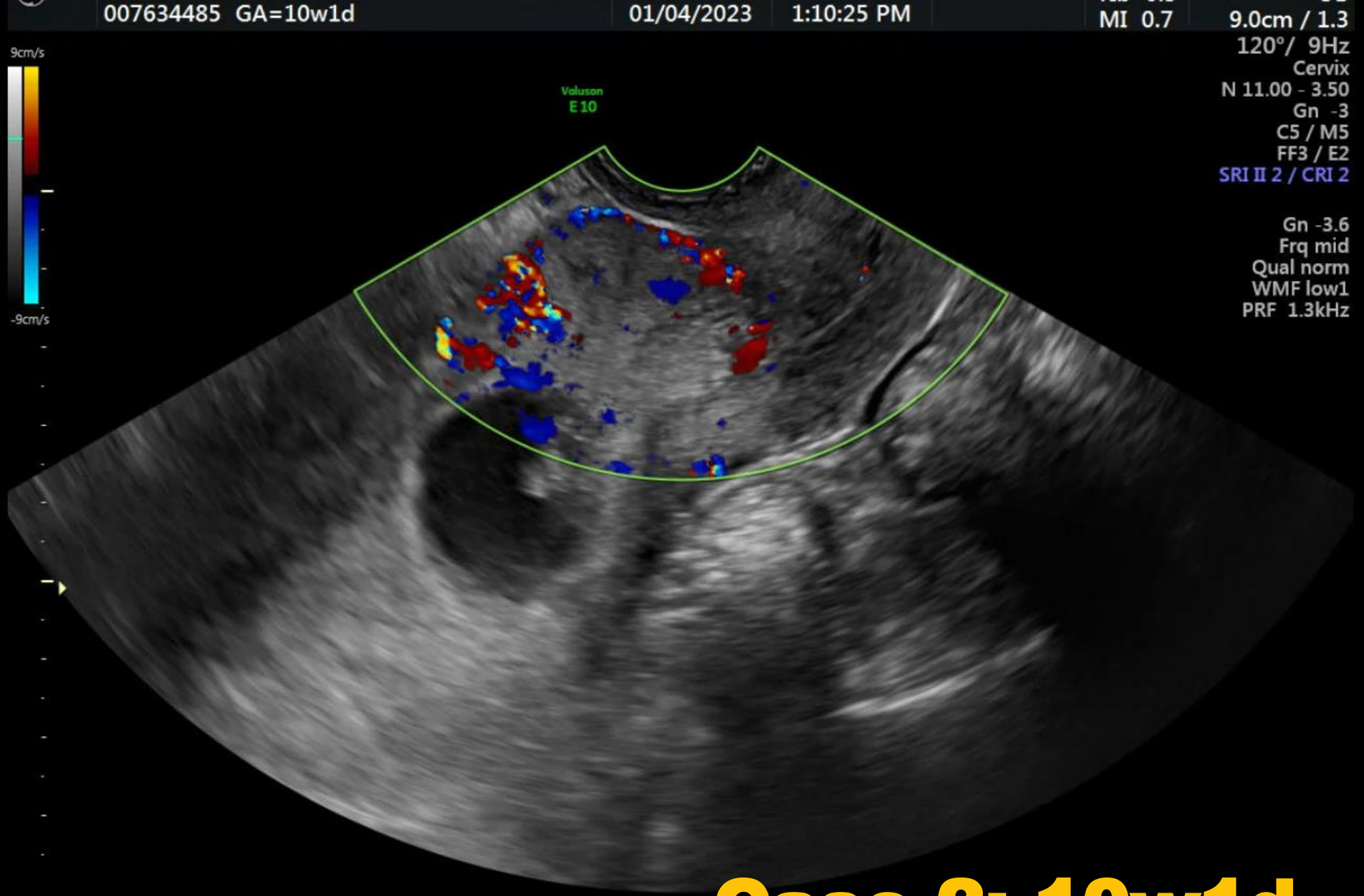
- Prioritize patient preference (uterine-sparing or not)
- Surgical suction aspiration is first-line for CSEP < 9 weeks regardless of type
- Prep for balloon tamponade post-procedure for 2-12 hours
- Consider UAE as adjunct 24 hours prior
- No hcg trend
- Counsel patient on TTC 3 months (type 1) or 6-12 months (type 2) minimum
- Consider referral to MIGS for niche repair



Case 1: 6w5d

Case 1

- CSEP not diagnosed at initial US
- Re-presented to our care ~ 20 weeks gestation with invasive PAS
- Patient desired expectant management but due to significant risk of morbidity based on imaging, MFM and Gyn Onc recommended delivery at 22 weeks gestation
- Underwent XL, CD, TAH, BS, bilateral stent placement and removal, cystoscopy
- EBL 4L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120°/ 9Hz
Cervix
N 11.00 - 3.50
Gn -3
C5 / M5
FF3 / E2
SRI II 2 / CRI 2
Gn -3.6
Frq mid
Qual norm
WMF low1
PRF 1.3kHz
9cm/s
-9cm/s
Voluson
E 10
FPS: 8/8

Case 2: 10w1d

Case 2

- EUA, dx LSC, vacuum aspiration, intrauterine foley balloon placement
- EBL 400 cc
- Removed foley balloon POD#1 in stable condition
- Conceived ~ 1 year later, progressed to term gestation with uncomplicated RCS at 39w0d

Billing and Coding (suction aspiration)

Diagnostic coding	There is no ICD-10 code for CSEP (yet) !!!
O00.80	Other ectopic pregnancy without intrauterine pregnancy
O34.22	maternal care for cesarean scar defect (isthomocele)
Billing	There is no CPT code of CSEP management; ACOG recommends:
CPT 59820 Modifier 22 as appropriate	No cardiac activity: treatment of missed abortion, completed surgically, first trimester
CPT 59899 Modifier 22 as appropriate	Cardiac activity: unlisted procedure, maternity care and delivery, request a valuation comparable to that of 59820. Recommend against using 59840 - does not adequately capture nature of work involved in CSEP
CPT 76998	Intraop ultrasound guidance

Future Considerations

- Biomarkers
  - Which CSEP are at highest risk of complications and which may lead to near-term or term delivery?
- Standardizagion to definitions
- Psychosocial impacts of CSEP diagnosis
- Optimal timing after treatment of CSEP

REQUIRES

- Standardization of reporting diagnosis and outcomes

Conclusion

- **Early intervention** yields better outcomes

  Later CSEP cases may require multimodal or multidisciplinary approach
- CSEP management is **highly individualized** and may differ by location, resources, and expertise
- Uterine aspiration under ultrasound guidance can be considered a **first line management** for early CSEP
- More research is needed!

THANK YOU!

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Chloe Briney, PhD, MD Candidate
Division of Complex Family Planning

Anschutz

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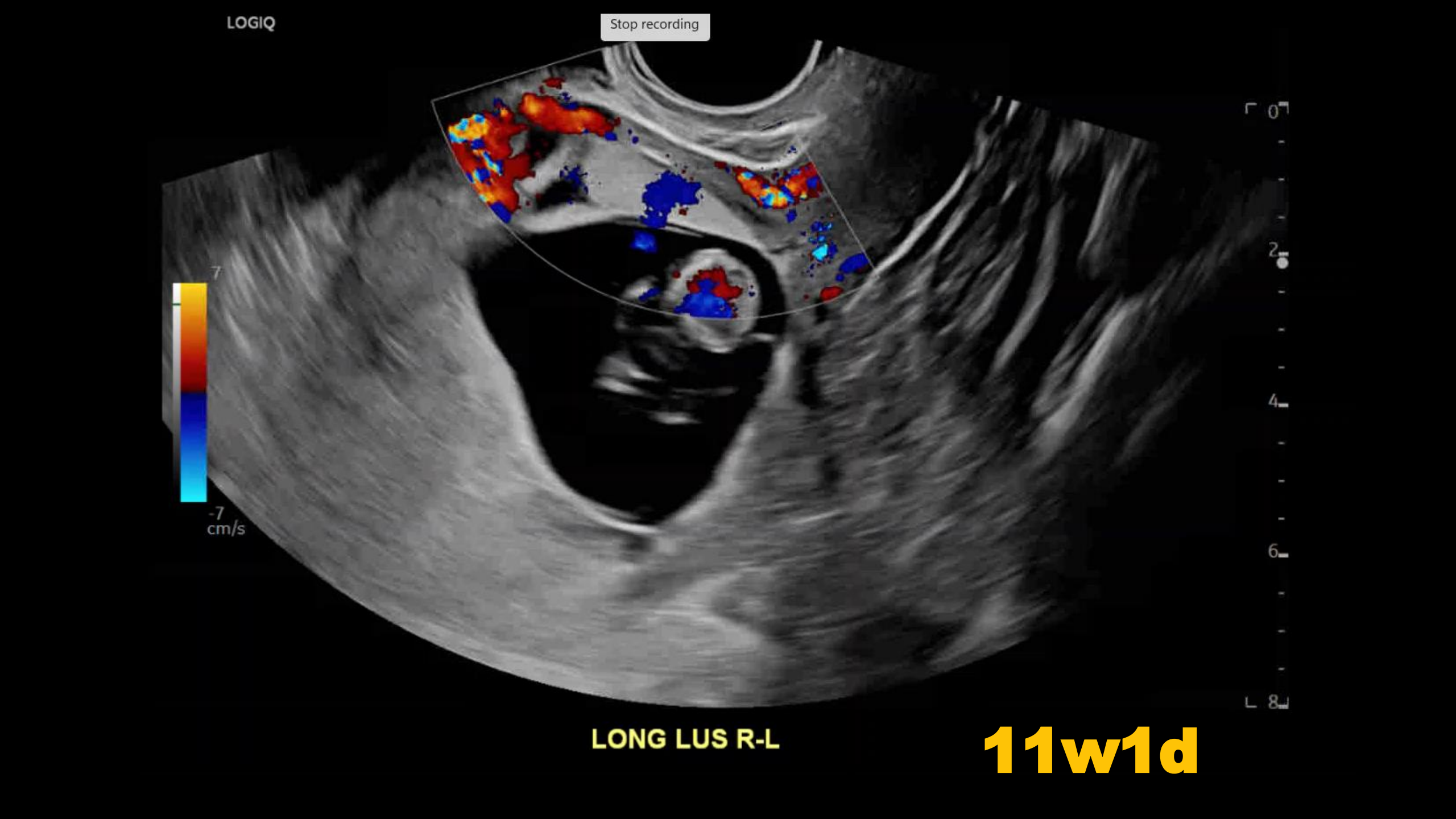
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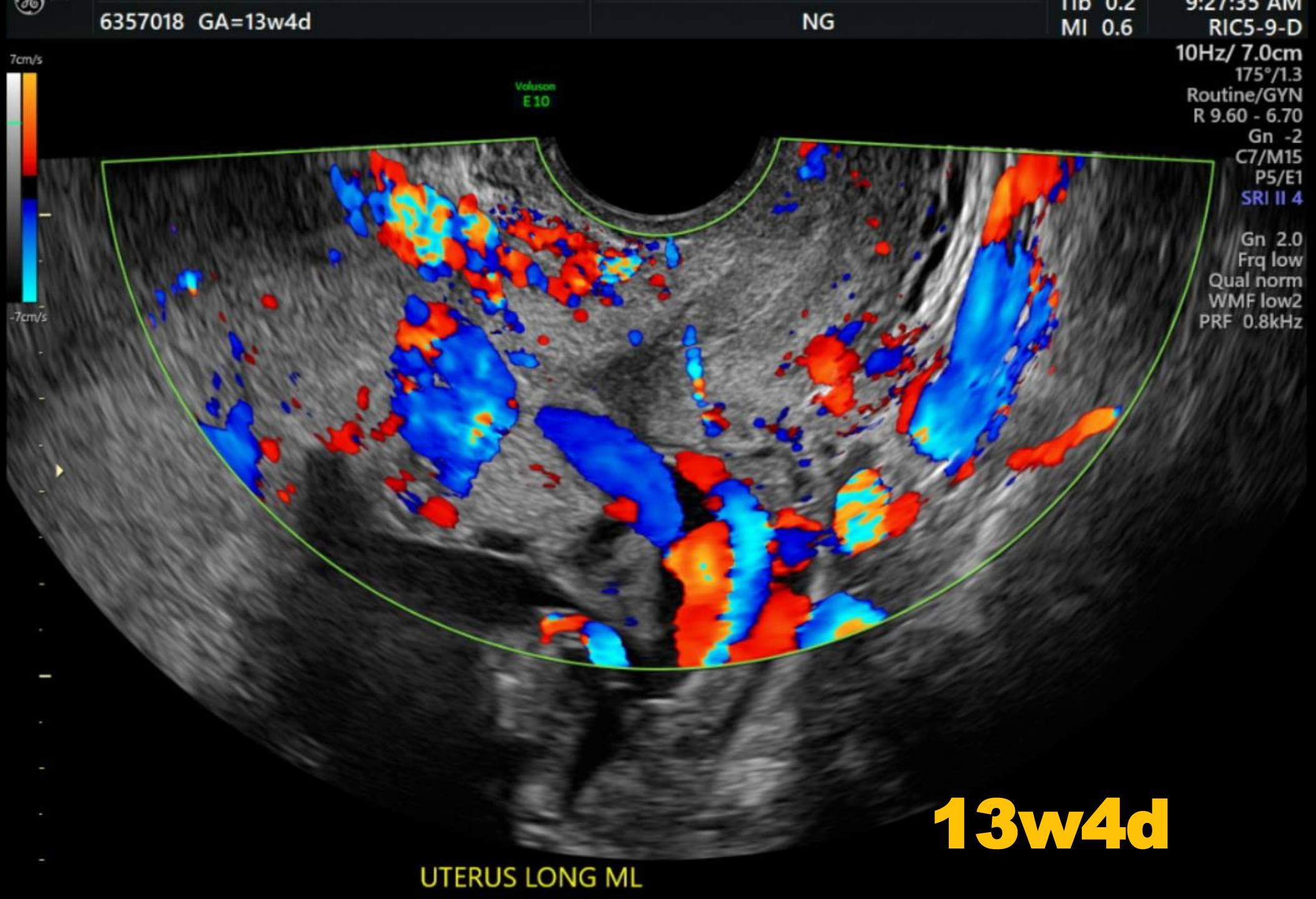
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C7/M15
P5/E1
SRI II 4
Gn 2.0
Frq low
Qual norm
WMF low2
PRF 0.8kHz
7cm/s
-7cm/s
Voluson
E10
13w4d
UTERUS LONG ML