

Isthmocele

CESAREAN SCAR DISORDER

indication and surgical management



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Head of postgraduate degree on reproductive medicine

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ISTHMOCELE ; NICHE CESAREAN SCAR DEFECT

- INDENTATION OF THE MYOMETRIUM AT THE SITE OF THE CAESAREAN SCAR
- ACCORDING TO EUROPEAN TASK FORCE / JORDAN AND ALL. (15 EXPERTS):
 - **INDENTATION DEPTH $\geq 2\text{MM}$** ON SAGITTAL PLAN
 - LENGTH AND WIDTH (TRANSVERSE PLAN)
 - MYOMETRIAL THICKNESS ADJACENT TO THE NICHE
- **RATIO NICHE DEPTH/MYOMETRIAL THICKNESS $> 50\%$** IN SEVERE AND MORE SYMPTOMATIC

PREVALANCE ACCORDING TO IMAGING

- ALL CESAREAN SECTION WITH INDENTATION ≥ 2 MM
- 2D TVUS : **24 – 49.6 %**
- SALINE INFUSION SONOGRAPHY - GIS : **64.5 % (SENSITIVITY 87% SPECIFICITY 100%)**
- 3D TVUS IS UNDER INVESTIGATION AND REQUIRE MORE SKILLS
- MRI IS MORE ACCURATE TO EVLUATE RMT BUT COST IS LIMITATION

TOWER AND ALL. JMIG 2013

VIKHAREVA . BJOG 2010

HYSTEROSCOPY IS THE GOLD STANDARD





isthmocoele retro flechi, *

VS8802763-24-02-14-1

Dr Jamal FIKRI

TIs 0.1
Tlb 0.1
MI 1.1

14.02.2024

16:47:44

RIC5-9A-RS

21Hz/ 7.0cm

180°/1.9

Routine HI/GYN

HI M PI 11.00 - 3.60

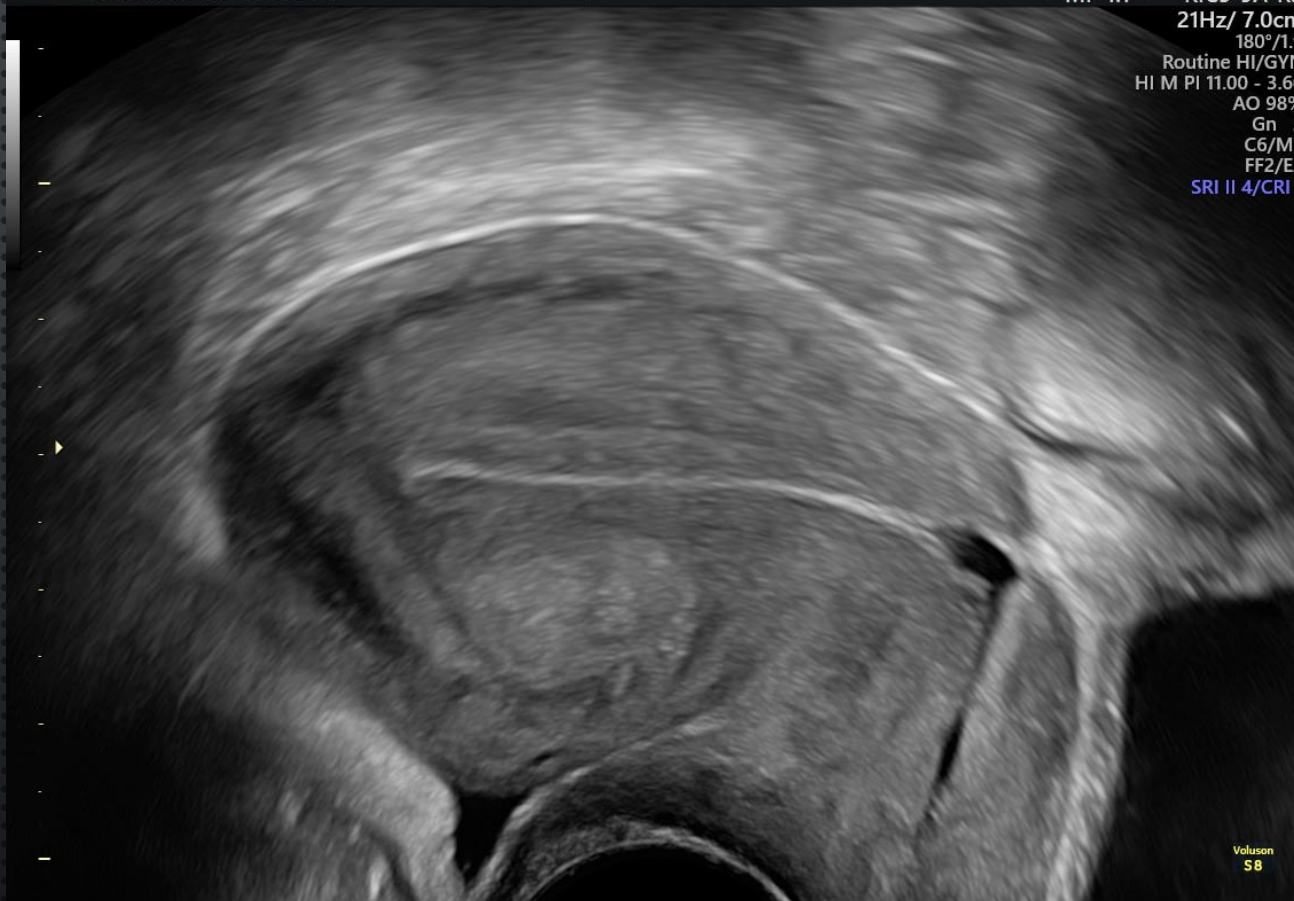
AO 98%

Gn 2

C6/M7

FF2/E2

SRI II 4/CRI 1





ENDOMETRIOSE BOWEL, *

VS8802763-23-10-10-1

Dr Jamal FIKRI

TIs 0.1
Tlb 0.1
MI 1.1

10.10.2023
15:15:17

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180°/1.2

Routine HI/GYN

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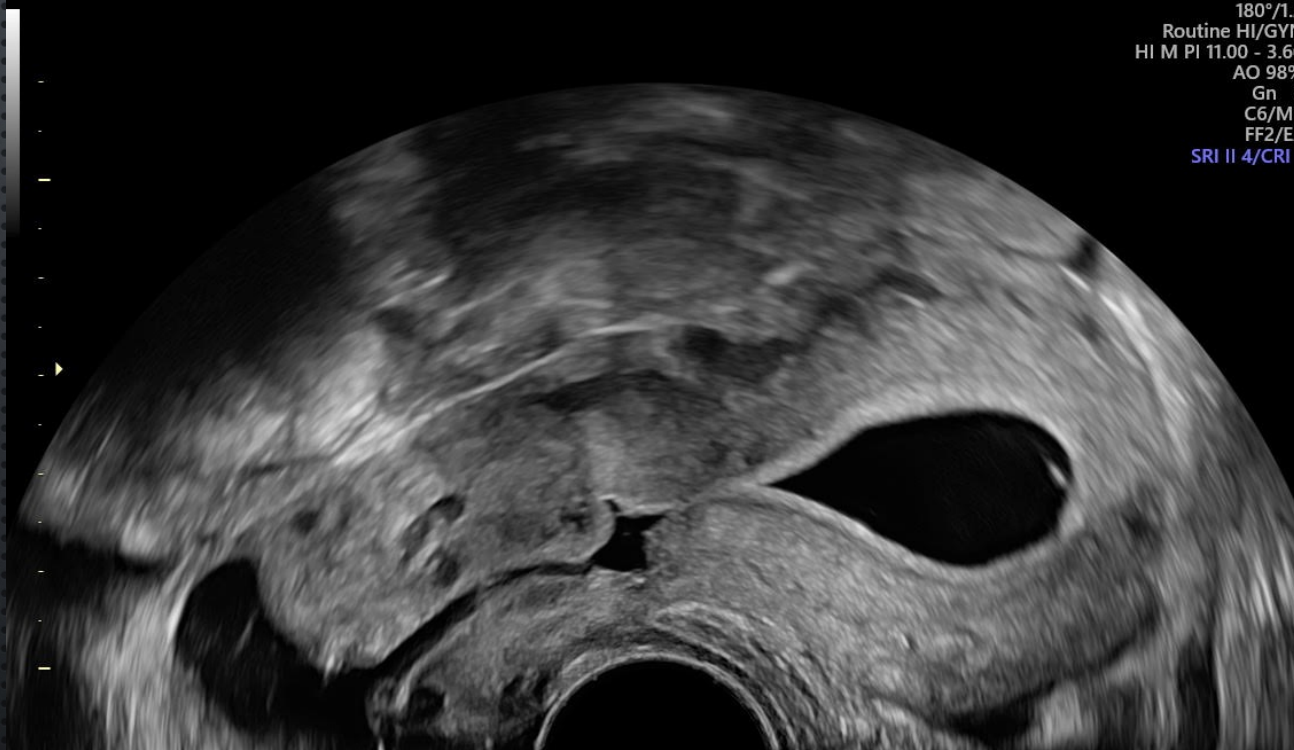
AO 98%

Gn 5

C6/M7

FF2/E2

SRI II 4/CRI 1



Voluson
S8



ISTHMOCELE WITH POLYP, *

Dr Jamal FIKRI

TIs 0.1
Tlb 0.1
MI 1.1

13.12.2023
15:50:00

VS8802763-23-12-13-4

RIC5-9A-RS

21Hz/ 6.0cm

180°/1.4

Routine HI/GYN

HI M PI 11.00 - 3.60

AO 98%

Gn 2

C6/M7

FF2/E2

SRI II 4/CRI 1



Voluson

1 D 0.34cm



ISTHMOCELE WITH POLYP, *

VS8802763-23-12-13-4

Dr Jamal FIKRI

TIs 0.1

13.12.2023

Tlb 0.1

15:50:38

MI 0.8

RIC5-9A-RS

15Hz/0.9

B156°/V90°/ 6.0cm

Render front./GYN

Qual high1

Mix 80/20

S5mm

SRI II 4

3D Static



POLYP
ITHMOCELE

Voluson™
S8

Dr Jamal FIKRI

Tls 0.1
Tlb 0.1
MI 1.1

23.03.2026
14:10:56
RIC5-9A-RS

21Hz/ 6.0cm

180°/1.8

Routine HI/GYN

HI M PI 11.00 - 3.60

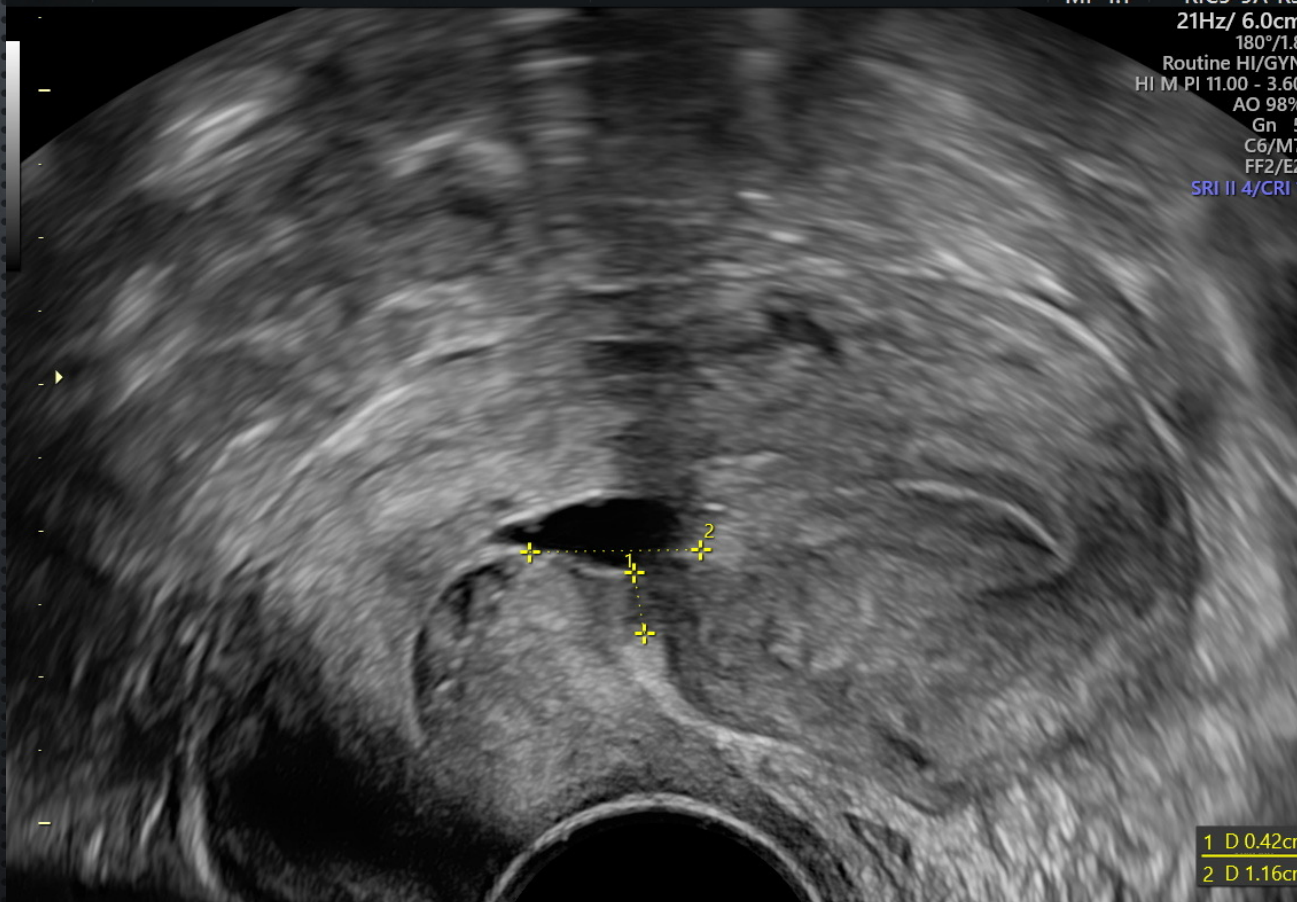
AO 98%

Gn 5

C6/M7

FF2/E2

SRI II 4/CRI 1



1 D 0.42cm

2 D 1.16cm



isthmocoele branches, *

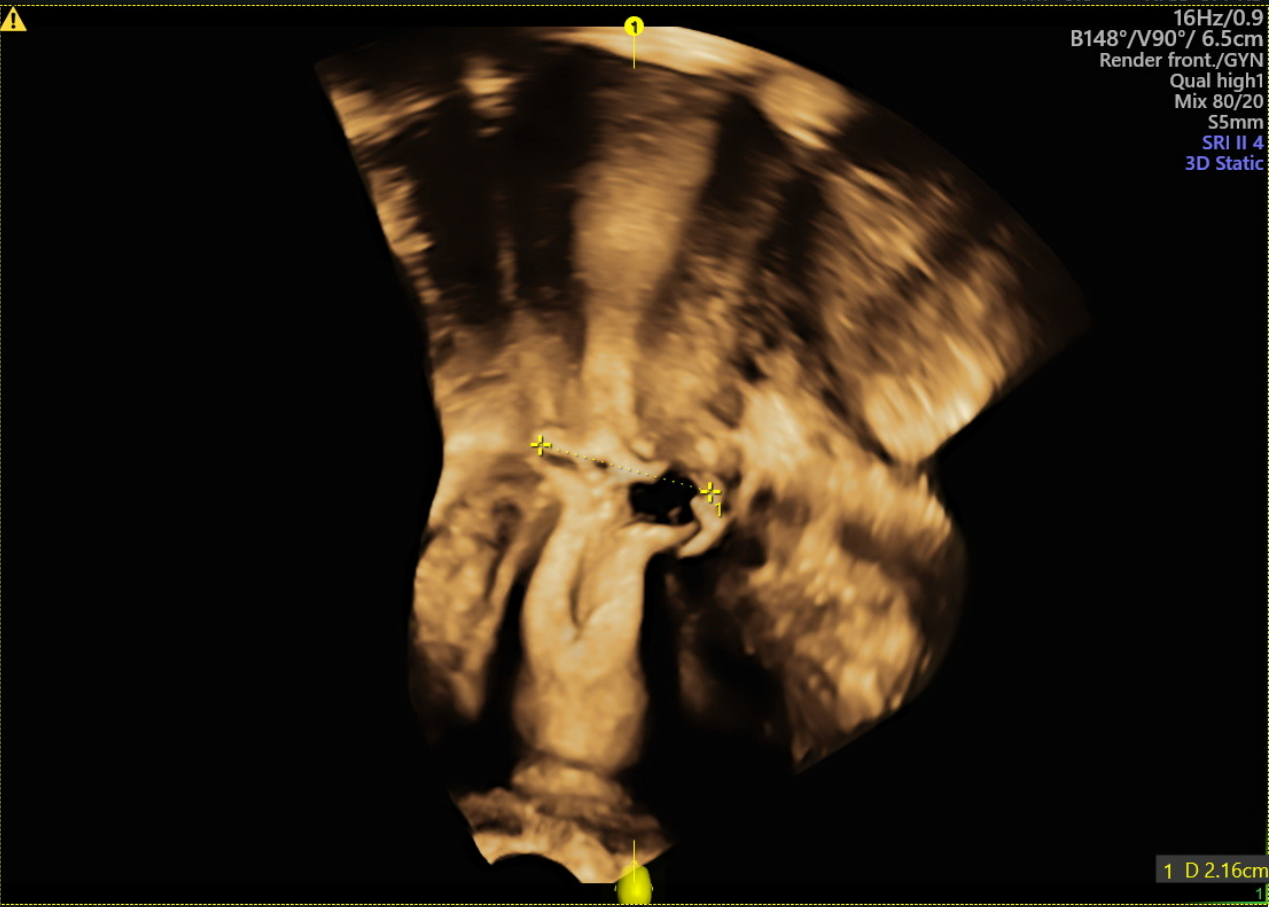
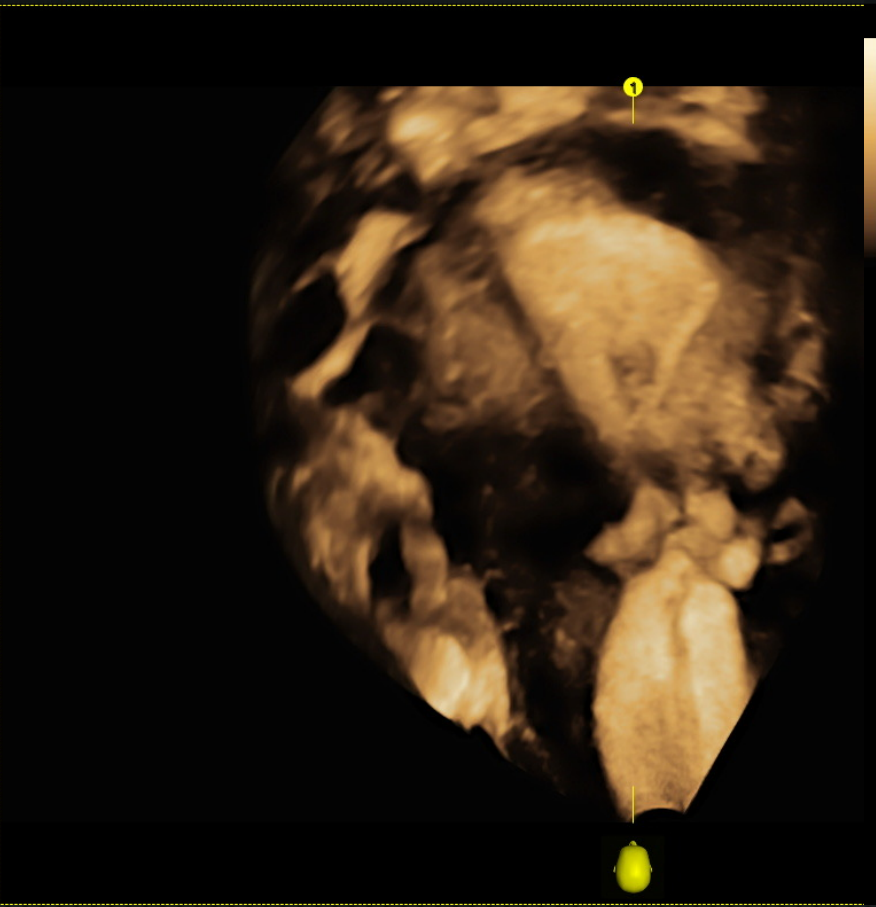
Dr Jamal FIKRI



Dr Jamal FIKRI

TIs 0.1
Tlb 0.1
MI 0.8

20.03.2024
13:26:01
RIC5-9A-RS



16Hz/0.9
B148°/V90°/ 6.5cm
Render front./GYN
Qual high1
Mix 80/20
S5mm
SRI II 4
3D Static

1 D 2.16cm

Voluson™
S8

Dr Jamal FIKRI

TIs 0.1
Tib 0.1
MI 1.1

10.02.2026
14:12:12

RIC5-9A-RS
21Hz/ 7.0cm
180°/1.6

Routine HI/GVN
HI M PI 11.00 - 3.60

AO 98%
Gn 2

C6/M7
FF2/E2

SRI II 4/CRI 1



Voluson
S8

Not all isthmoceles are symptomatic

Table 1

Reported prevalence of CSD in patients with previous cesarean section delivery

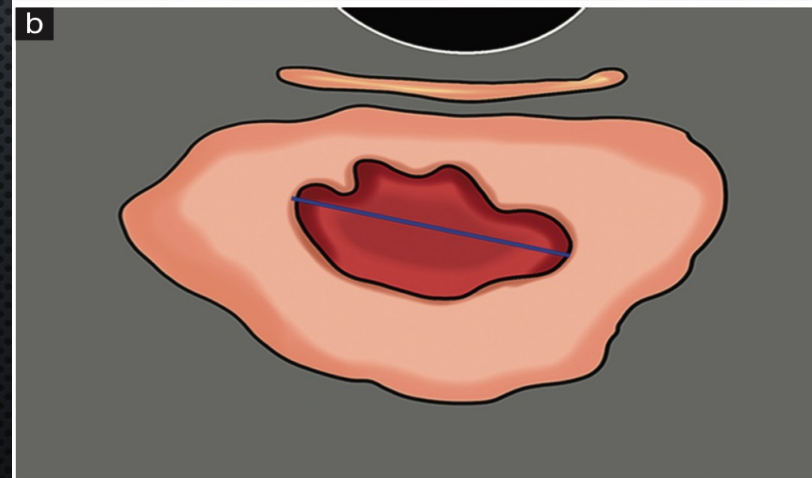
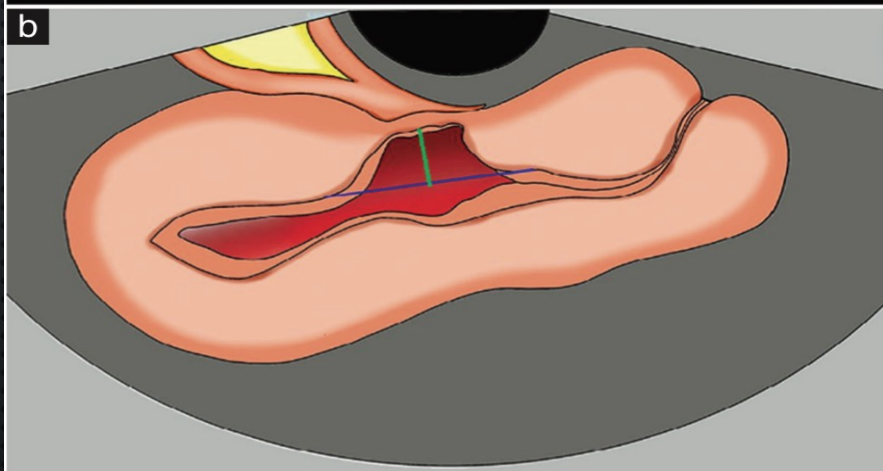
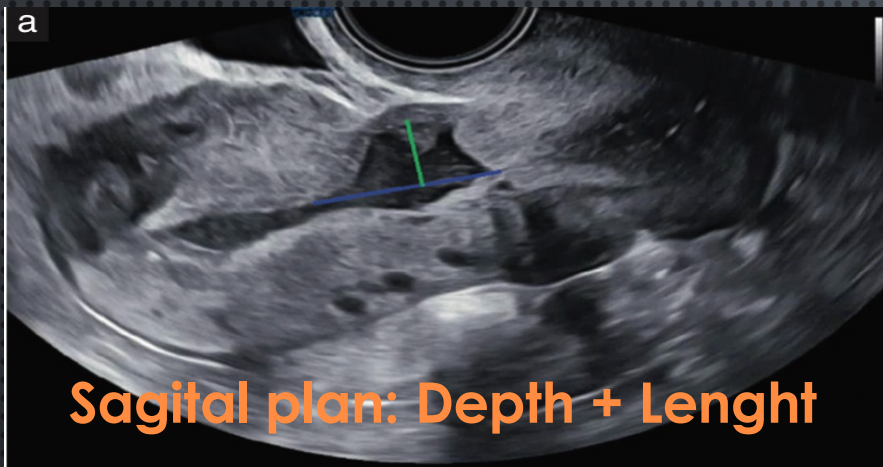
Population	Patients with CSD (%)
All patients with previous cesarean section	19.4–88 [4,7,13,36–40]
Abnormal uterine bleeding	82.6–88 [4,13]
Any gynecologic symptoms	19.4–88 [4,7,36,13]
No symptoms	42 [38]

CSD = cesarean scar defect.

How to perform standardized sonographic examination of uterine niche in non-pregnant women

USOG 2022

C. VERBERKT¹ , I. P. M. JORDANS¹ , T. VAN DEN BOSCH^{2,3} , D. TIMMERMAN^{2,3} ,
T. BOURNE^{3,4} , R. A. DE LEEUW⁵  and J. A. F. HUIRNE⁵ 



Residual Myometrial Thickness / Adjacent Myometrial Thickness

$RMT / AMT < 0.5$ severe isthmocele

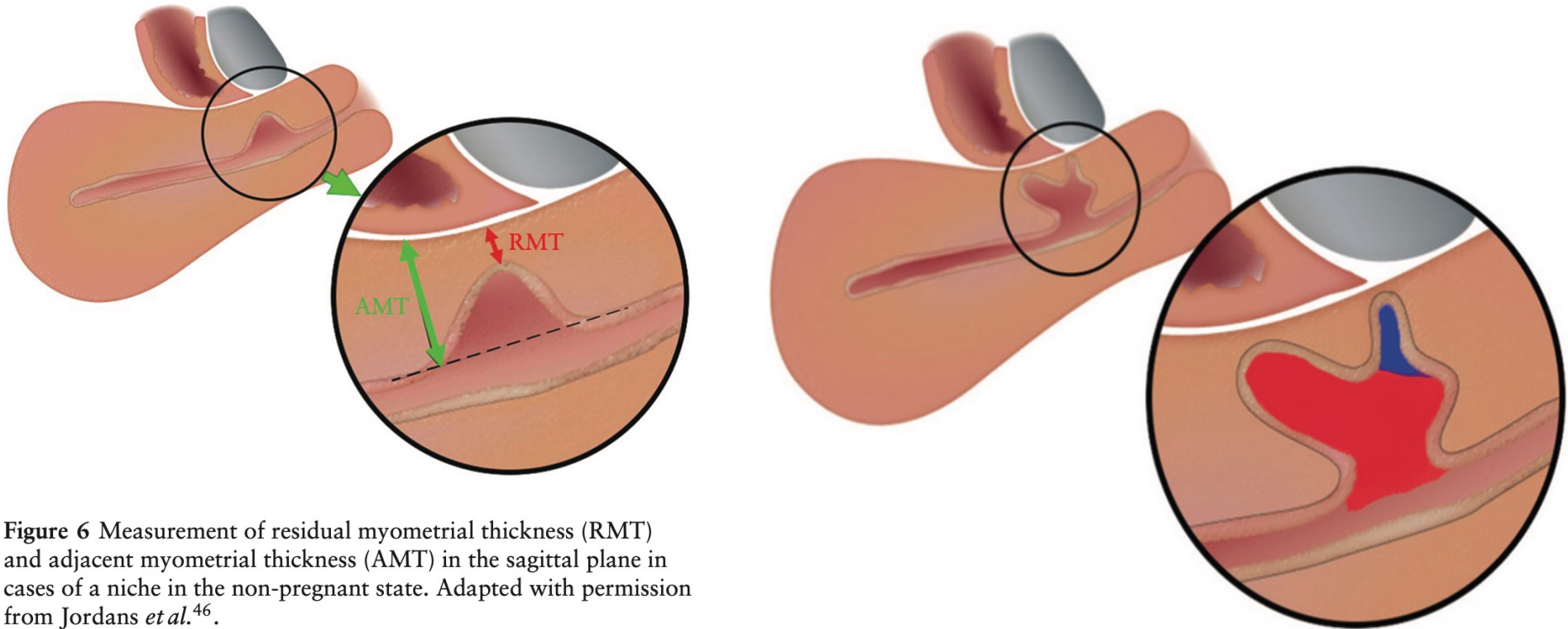
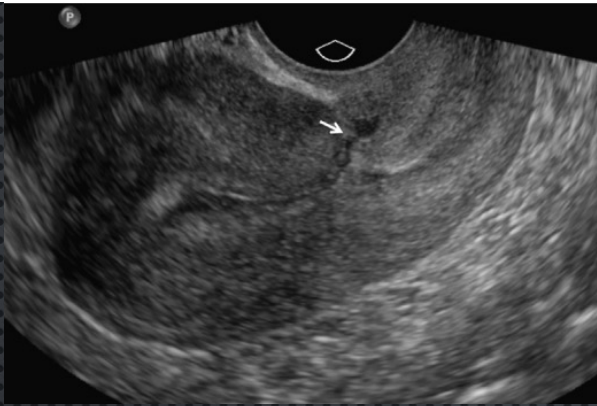


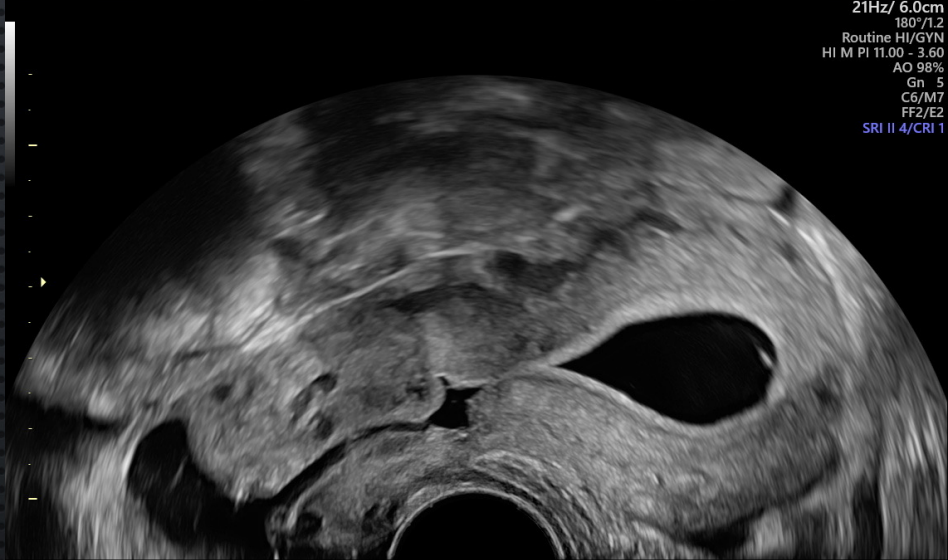
Figure 6 Measurement of residual myometrial thickness (RMT) and adjacent myometrial thickness (AMT) in the sagittal plane in cases of a niche in the non-pregnant state. Adapted with permission from Jordans *et al.*⁴⁶.



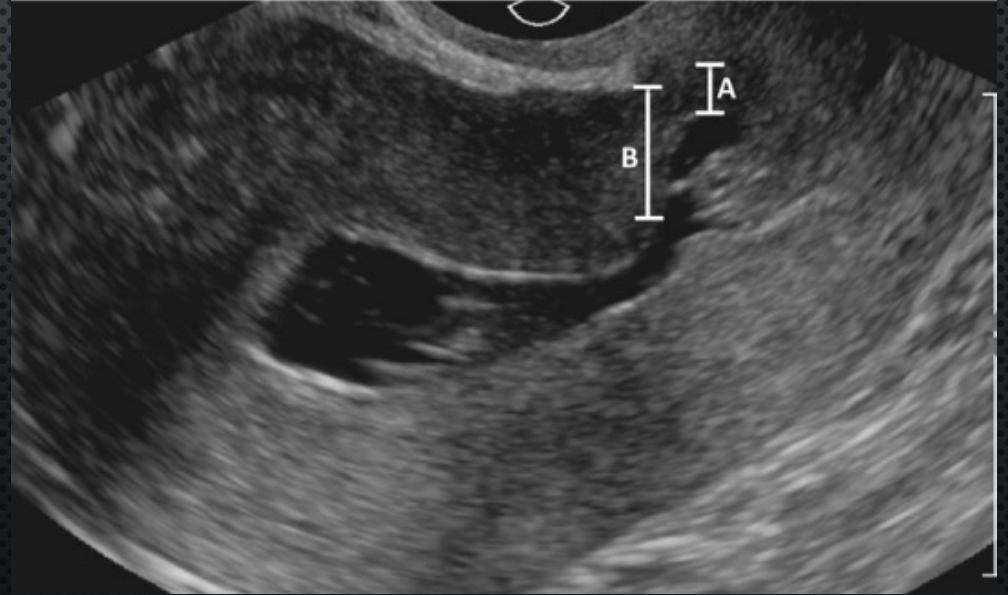
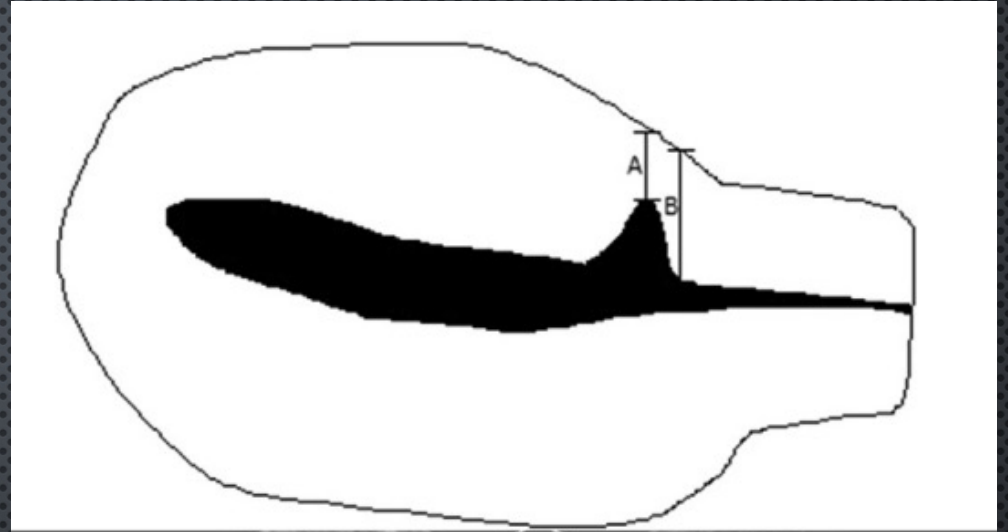
Voluson™ S8
 ENDOMETRIOSE BOWEL, *
 VS8802763-23-10-10-1

Dr Jamal FIKRI

TIs 0.1 10.10.2023
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 AO 98%
 Gn 5
 C6/M7
 FF2/E2
 SRI II 4/CRI 1



Voluson
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ISTHMOCELE WITH POLYP, *

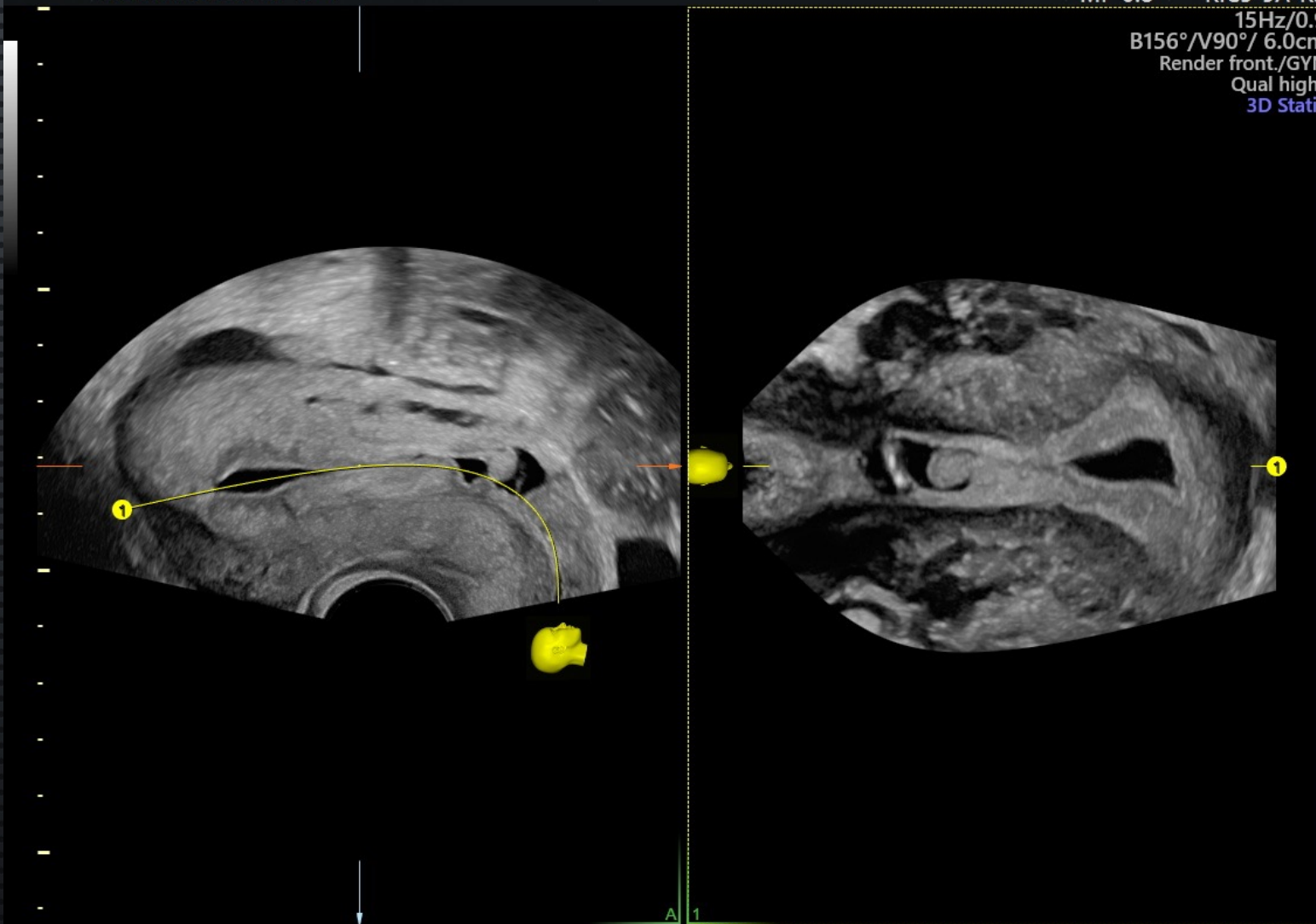
Dr Jamal FIKRI

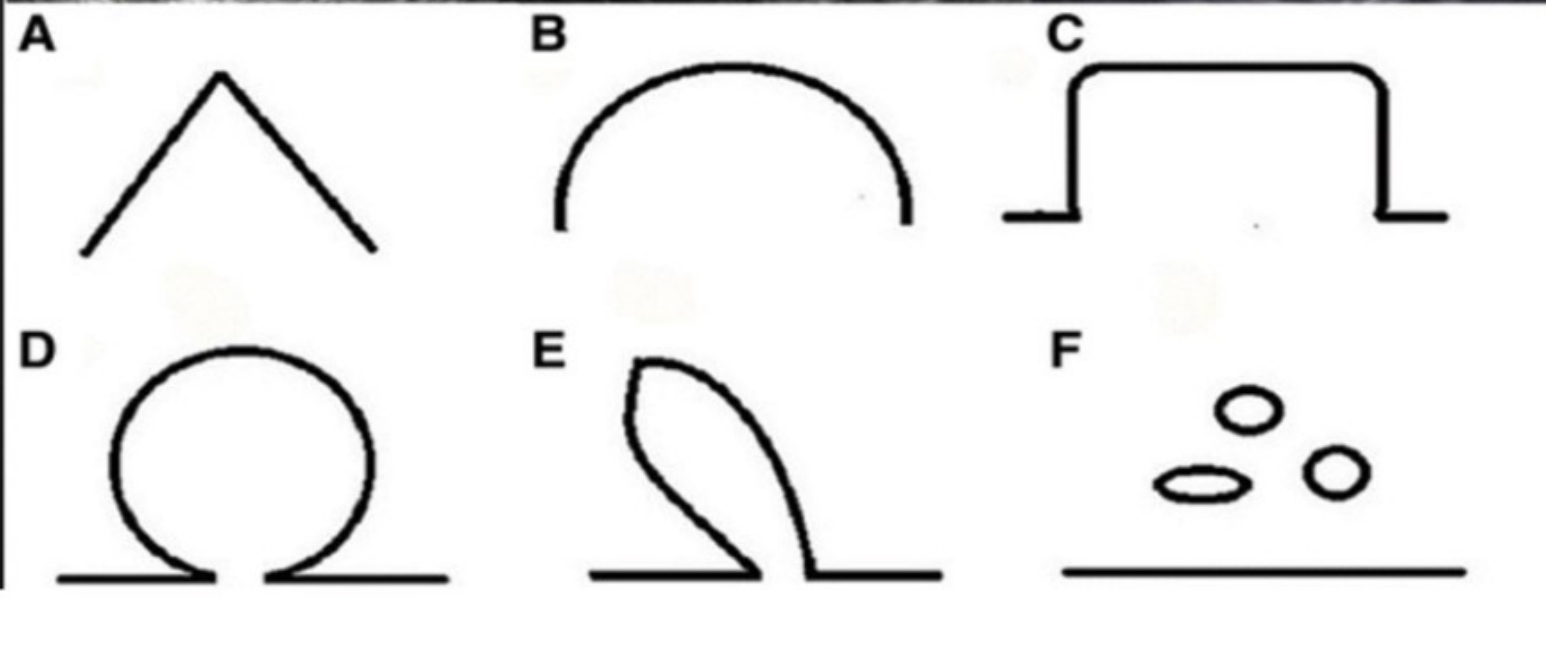
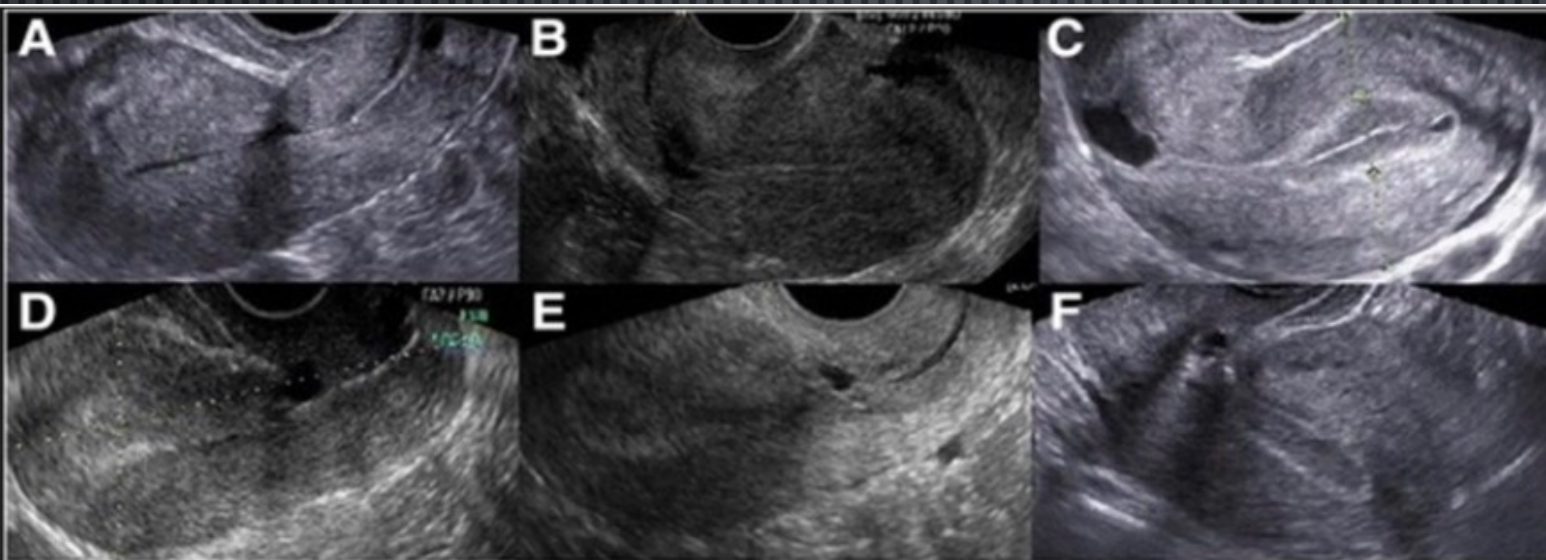
TIs 0.1
Tlb 0.1
MI 0.8

13.12.2023
15:50:38
RIC5-9A-RS

VS8802763-23-12-13-4

15Hz/0.9
B156°/V90°/ 6.0cm
Render front./GYN
Qual high1
3D Static





RMT



Simple niche one branche



Complex niche more than one branche

Clinical Implications

The ability to diagnose CSDi is of great clinical value. It is important to state that a diagnosis of CSDi does not necessarily mean that treatment is indicated. The decision to investigate and treat CSDi is influenced by the symptom burden, impact on quality of life, size of the niche, and the individualized expectations of the patient.

NOT ALL ISTHMOCELES ARE SYMPTOMATIC
NOT ALL ISTHMOCELE SHOULD BE OPERATED

CLINICAL SYMPTOMS

- ISTHMOCELE AT TVUS :

POSTMENSTRUAL SPOTTING/ PROLONGED MENSES **53 %**

DYSMÉNORRHEA / CHRONIC PELVIC PAIN **39.6 %**

DYSPAREUNIA **18.3 %**

POST INTERCOURSES BLEEDING

SECONDARY INFERTILITY

- THE LARGER THE SIZE THE MORE FREQUENT THE SYMPTOMS



Original Investigation | Obstetrics and Gynecology

Definition and Criteria for Diagnosing Cesarean Scar Disorder

SCDi

Saskia J. M. Klein Meuleman, MD; Ally Murji, MD, PhD; Thierry van den Bosch, MD, PhD; Oliver Donnez, MD, PhD; Grigoris Grimbizis, MD, PhD; Ertan Saridogan, MD, PhD; Frederick Chantraine, MD, PhD; Tom Bourne, MD, PhD; Dirk Timmerman, MD, PhD; Judith A. F. Huirne, MD, PhD; Robert A. de Leeuw, MD, PhD; for the CSDi Study Group

Table 2. Consensus-Based Definition of Primary and Secondary Symptoms of Cesarean Scar Disorder

Primary symptom/problems	RoA, %	Secondary symptoms	RoA, %
Postmenstrual spotting	80.6	Dyspareunia	72.7
Pain during uterine bleeding	84.2	Abnormal vaginal discharge	87.5
Technical issues with catheter insertion during embryo transfer	73.1	Chronic pelvic pain	87.1
Secondary unexplained infertility combined with intrauterine fluid	70.4	Avoiding sexual intercourse	90.3
NA	NA	Odor associated with abnormal blood loss	83.4
NA	NA	Secondary unexplained infertility	70.0
NA	NA	Secondary infertility despite ART	72.4
NA	NA	Negative self-image	88.0
NA	NA	Discomfort during participation in leisure activities	77.3



Original Investigation | Obstetrics and Gynecology

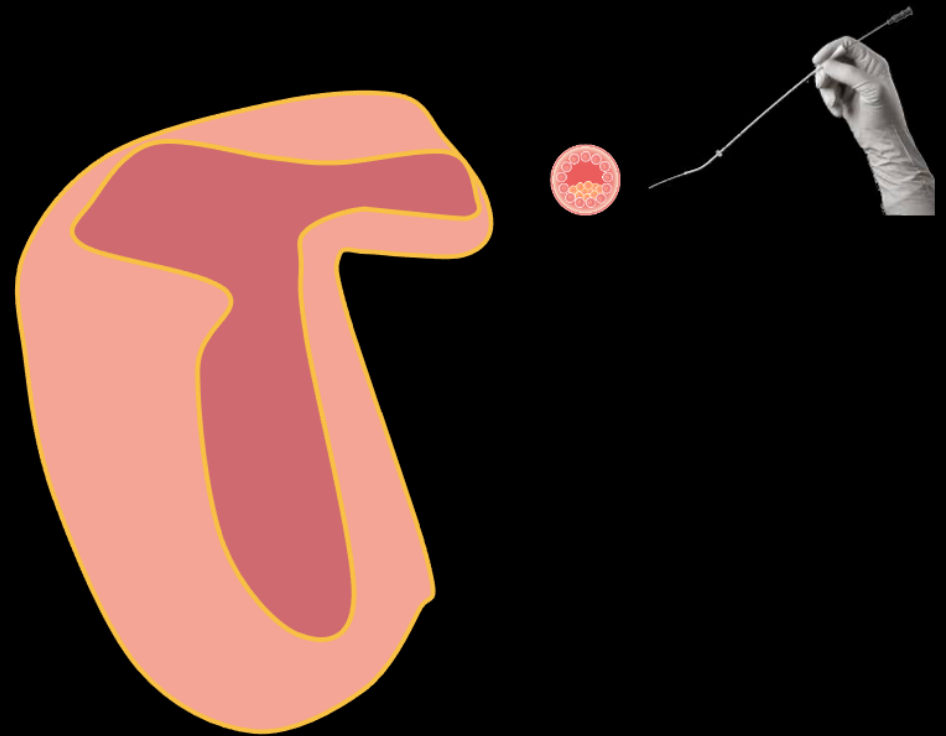
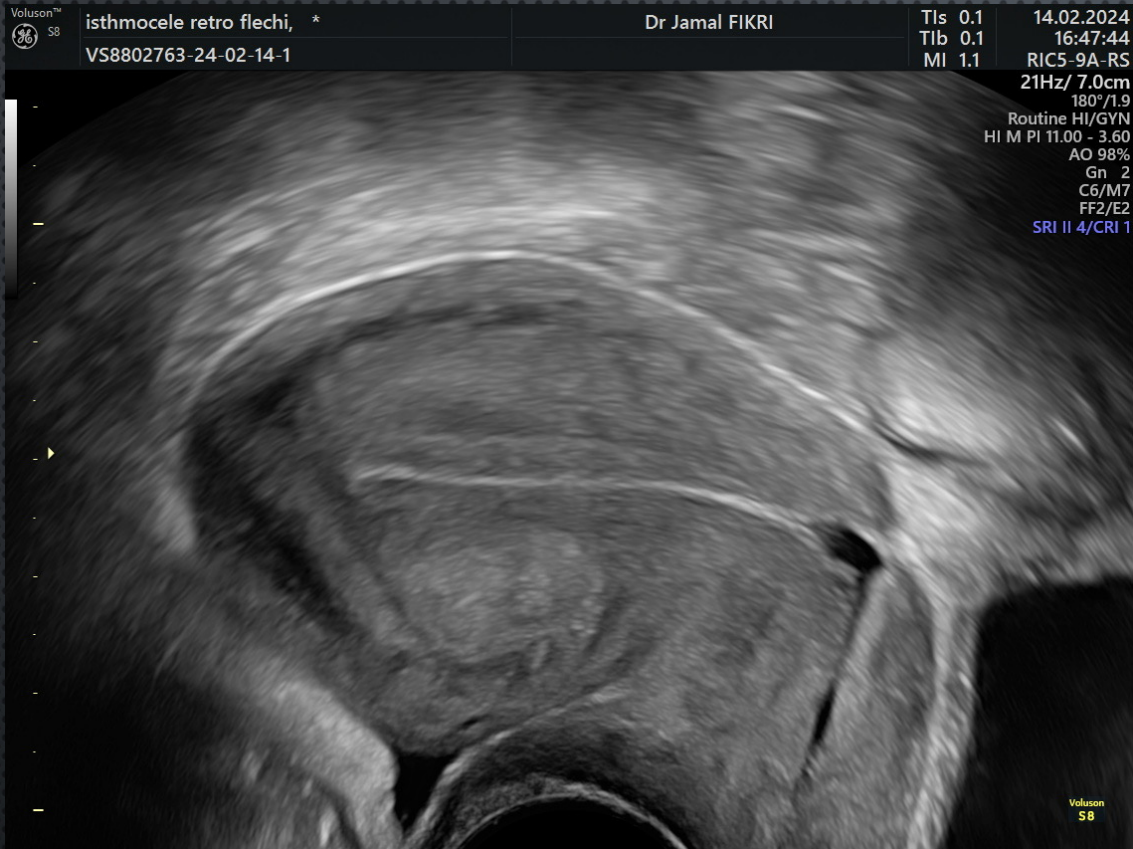
Definition and Criteria for Diagnosing Cesarean Scar Disorder

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Table 3. Criteria Required for Diagnosis of Cesarean Scar Disorder and Conditions That Should Be Ruled Out Before Confirming the Diagnosis

Diagnostic criteria	RoA, %	Conditions to exclude	RoA, %
Minimum of 3 regular menstrual cycles after CD before diagnosis can be made	93.5	Cervical dysplasia	74.2
A patient needs to be premenopausal	100	Vaginal/uterine infections	74.2
The complaints of a symptomatic niche should start after a CD or should worsen significantly after a CD	80.6	Other uterine intracavitary pathology	93.5
A patient can be cured from a symptomatic niche (this does not mean that all symptomatic niche should be treated)	87.1	Other causes of postmenstrual spotting (such as continuous oral contraceptive use or intrauterine device)	80.6
NA	NA	Anovulatory cycles	100

EMBRYO TRANSFER



2020 Post-Caesarean section niche-related impaired fertility: hypothetical mechanisms

Jolijn Vissers, Wouter Hehenkamp, Cornelis Bavo Lambalk, and Judith Anna Huirne*

Table I Overview of hypotheses on the intermediate role of the niche on fertility outcomes.

Hypothesis

Detrimental environment for sperm penetration and implantation

1. Niche-related accumulation of intrauterine fluid impairing implantation
2. Altered immunobiology and/or increased inflammation when a niche is present
3. Distorted contractility of the uterus caused by fibrosis or interruption of the myometrial layer at the site of the niche
4. Accumulation of mucus and old blood in the niche, which may impair sperm penetration

Physical barrier for embryo transfer and implantation

5. A large niche in combination with a strongly retroflexed uterus impairs accessibility for an eventual embryo transfer due to a distorted anatomy

Psychogenic causes that reduce the likelihood of pregnancy

6. Niche-related gynaecological symptoms may interfere with sexual intercourse, and focused therapies for niche complaints may interfere with opportunities to conceive during the convalescence period

ISTHMOCELE AND INFERTILITY

- META-ANALYSE GUROL-URGanci 2013:

10 % REDUCTION OF LIKELIHOOD TO BECOME PREGNANT AFTER CESAREAN

(RR) 0.91; 95% 0.87–0.95]

- SPONTANEOUS PREGNANCY OCCUR IN **37.5 – 90 %**

TORRE A. LITERATURE REVIEW 2021

- VISSER 2020: SERIE OF 159 ISTHMOCELE AND INFERTILITY

52 % SPONTANEOUS PREGNANCIES AFTER LAPAROSCOPIC REPAIR

IN PATIENTS WITH FAILED IVF

MEDICAL THERAPY

- ORAL CONTRACEPTIVE PILLS (30 MG EE + 150 MG DESOGETREL)
- REDUCTION OF MENSTRUAL DURATION FROM 10 TO 5 DAYS

ZHANG JMIG 2016

- NO IMPROUVEMENT FOR 3/4 PATIENTS

TURMOND 1999

- COMPARISON OF HYSTROSCOPIC TREATMENT / OCP
- SIGNIFICANTLY HIGHER REDUCTION IN PUAB, PELVIC PAIN, SATISFACTION IN HYSTEROSCOPY GROUP

FLORI P. GYNECOLOGICAL ENDOCRINOLOGY, 2011

LEVONORGESTREL-IUS VS HYSTEROSCOPIC SURGERY

RCT

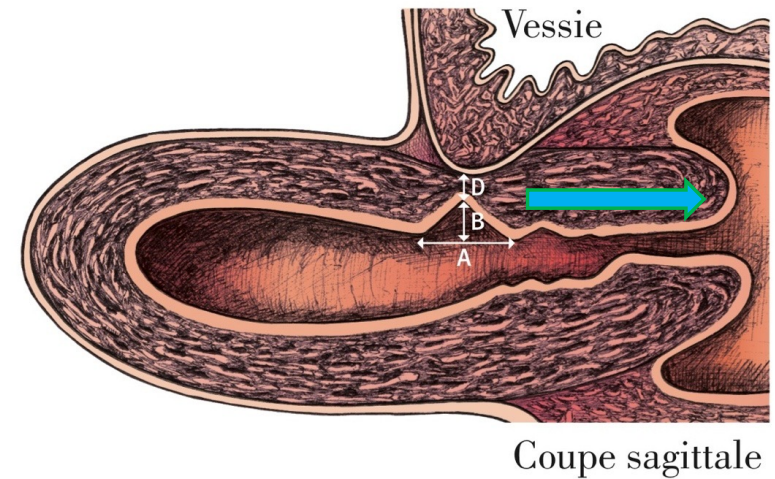
ZHANG J. AJOG MARCH 2023

Results concerning menstrual cycle outcome (intention to treat analyses)

	LNG-IUS group n=102	HNR group n=104	P value
9th month	n=102	n=104	
Spotting days/cycle	0.0 (0.0-1.0)	2.0 (0.0-4.3)	<0.001
Reduced spotting days/cycle	7.0 (5.0-9.8)	5.0 (3.0-8.0)	0.001
Total bleeding days/cycle	3.0 (0.0-7.0)	8.0 (7.0-10.0)	<0.001
Effective rate	89.2%(91/102)	72.1% (75/104)	0.002
Amenorrhea	44(43.1%)	0(0.0%)	/
Continuous spotting during menstrual cycle	1(1.0%)	0(0.0%)	/

SURGICAL TREATMENTS

- **GCH** EXPERTS GROUP RECOMMENDATION:
- HYSTEROSCOPIC RESECTION IF $RMT \geq 3 \text{ mm}$
- LAPAROSCOPIC RECONSTRUCTION $RMT < 3 \text{ mm}$
- VAGINAL RECONSTRUCTION: $\text{DISTANCE ISTHMOCELE} - \text{EXTERNAL OS} < 4 \text{ cm}$





isthmocele 3D, *
VS8802763-20-09-24-1

Dr Jamal FIKRI

TIs 0.1
Tlb 0.1
MI 1.1

24.09.2020

2:33:42 PM

RIC5-9A-RS

21Hz/ 6.0cm

180°/1.2

Routine HI/GYN

HI M PI 11.00 - 3.60

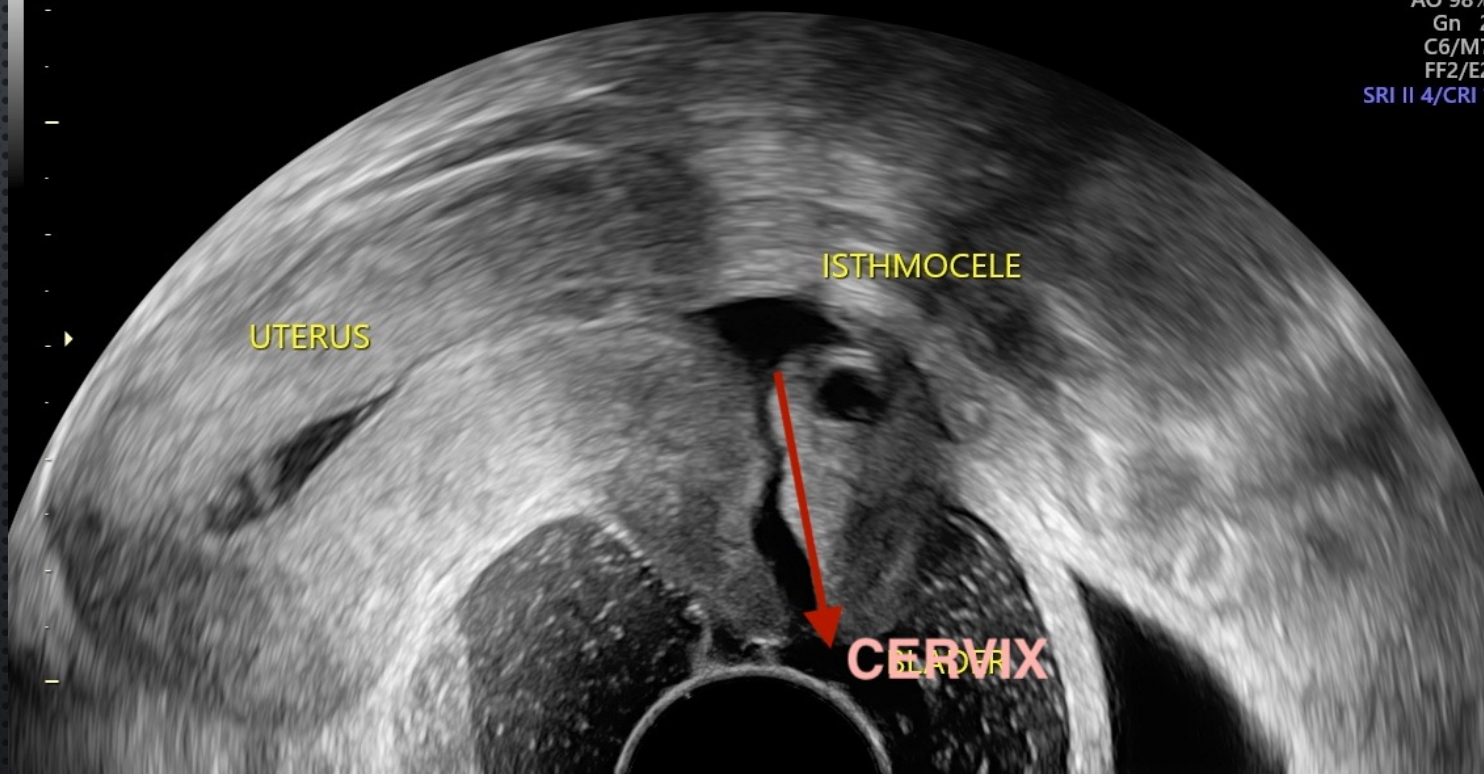
AO 98%

Gn 2

C6/M7

FF2/E2

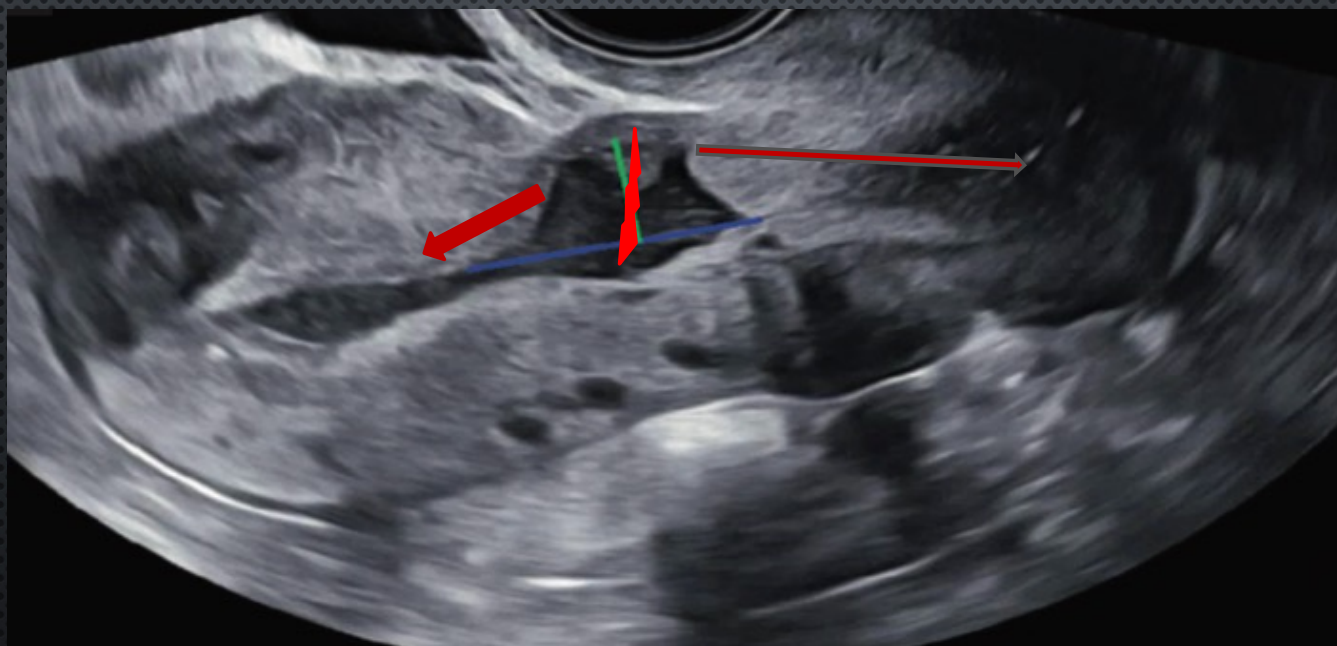
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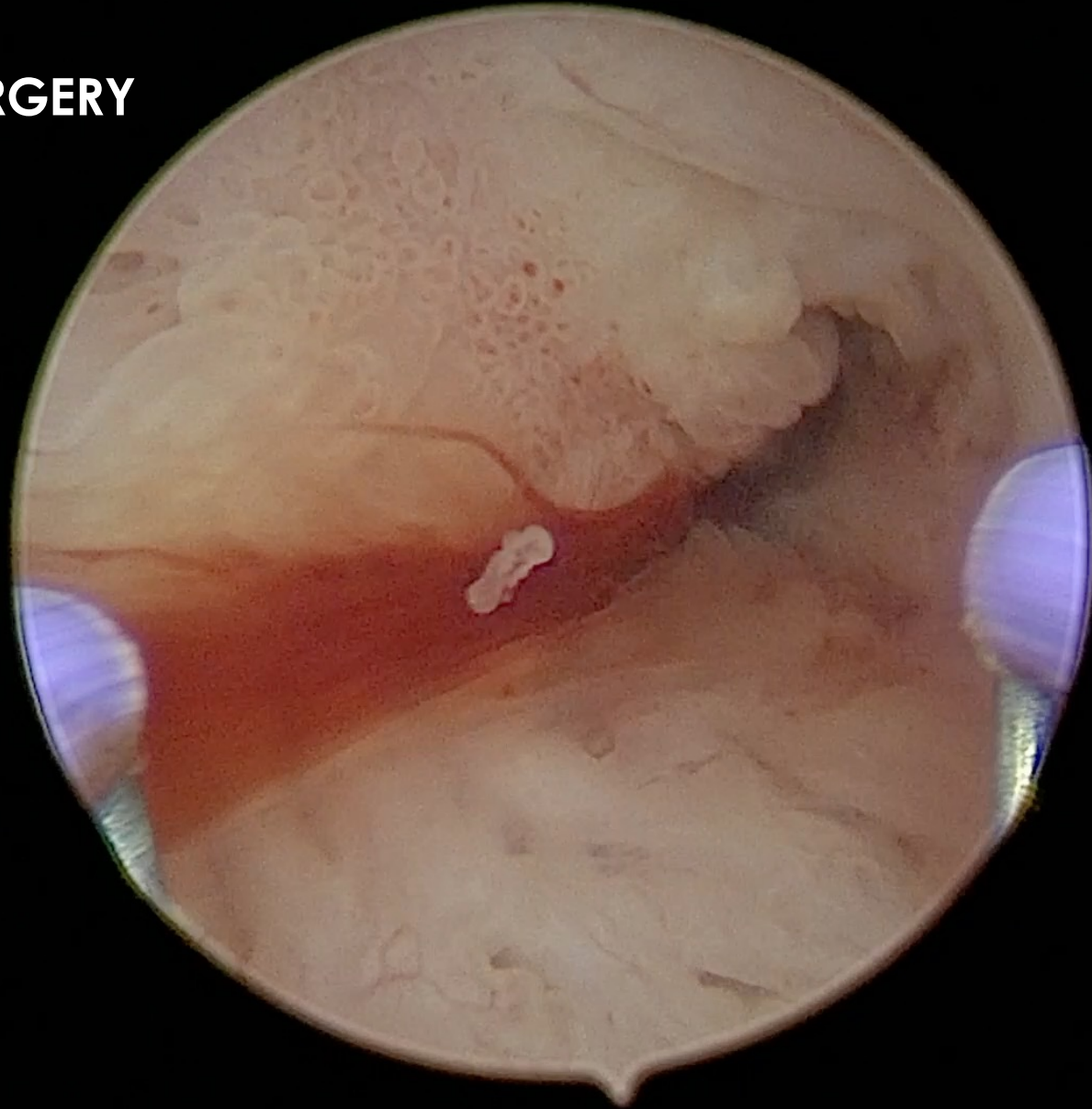
Voluson
S8

HYSTEROSCOPIC RESECTION PRINCIPLE

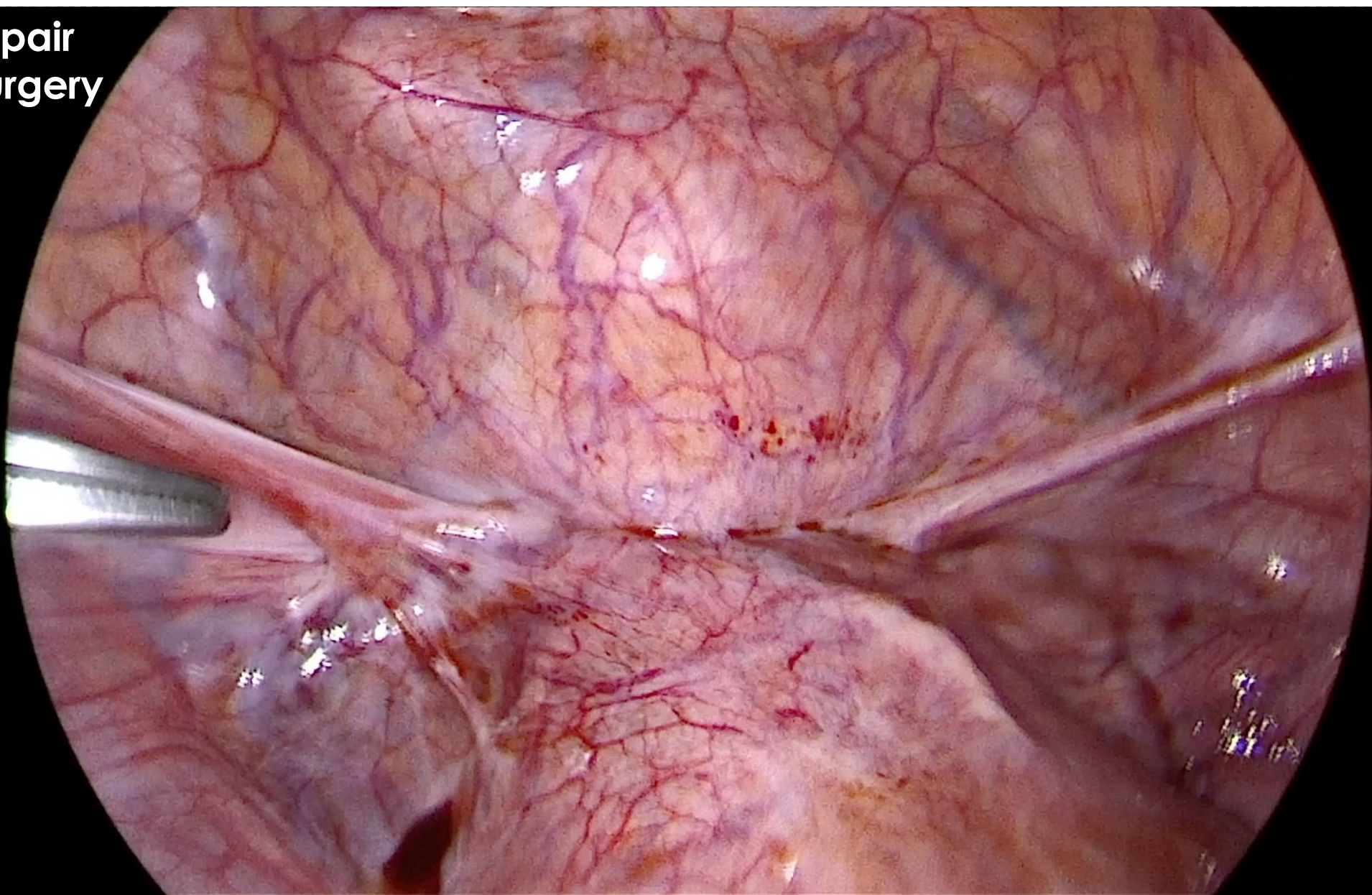
FLATTENING AND REMODELING THE NICHE ALLOWING NORMAL MENSTRUAL FLOW



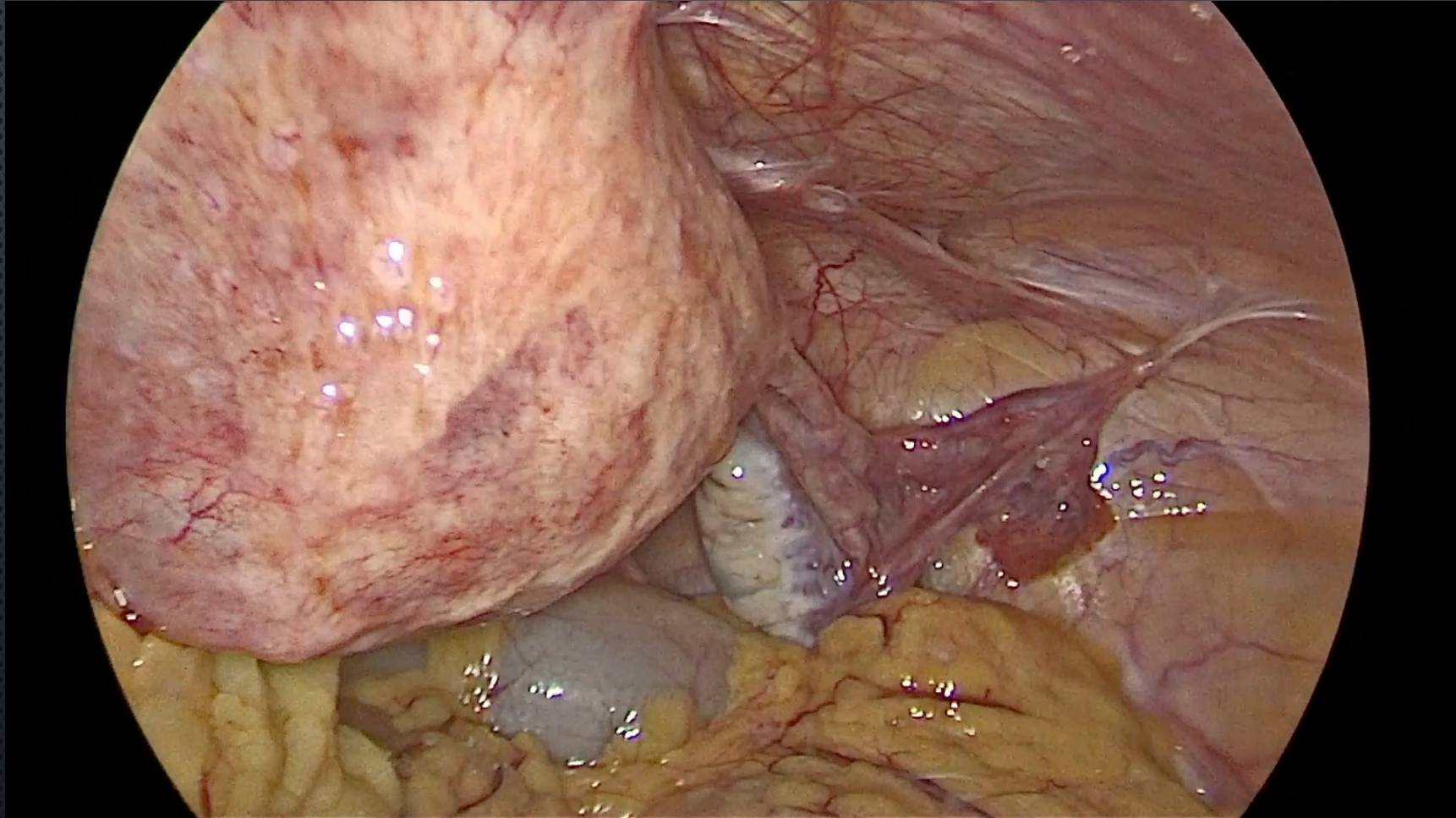
REMODELING SURGERY



Repair
surgery



RECONSTRUCTIVE SURGERY



Hysteroscopic resection of a uterine caesarean scar defect (niche) in women with postmenstrual spotting: a randomised controlled trial *BJOG 2017*

AJMW Vervoort,^a LF van der Voet,^b WJK Hehenkamp,^a AL Thirkow,^c PJM van Kesteren,^d

- RCT : 52 HYSTEROSCOPIC RESECTION VS 51 EXPECTANT MANAGEMENT
- RMT ≥ 3 MM
- DAYS OF POST-MENSTRUAL SPOTTING
4 DAYS INTERVENTION GROUP / 7 DAYS EXPECTANTS **P= 0.04**
- DISCOMFORT SIGNIFICANTLY REDUCED **P= 0.02**

From hysteroscopy to laparoendoscopic surgery: what is the best surgical approach for symptomatic isthmocele? A systematic review and meta-analysis

Salvatore Giovanni Vitale¹ · Artur Ludwin^{2,3} · George Angelos Vilos⁴ · Péter Török⁵ · Jan Tesarik⁶ · Amerigo Vitagliano⁷ · Ricardo Bassil Lasmar⁸ · Benito Chiofalo⁹

Archives of Gynecology and Obstetrics 2020

No Complication

Archives of Gynecology and Obstetrics

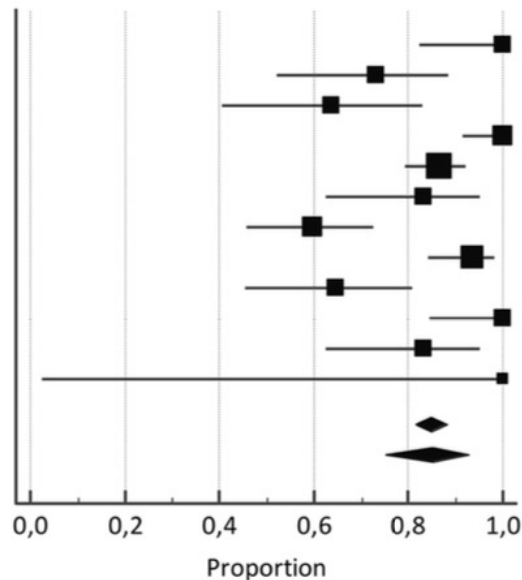
a

Hysteroscopy

Improvement of menstrual symptoms

Zhang et al 2016
Gubbini et al 2008
Chang et al 2009
Gubbini et al 2011
Raimondo et al 2015
Li et al 2014
Wang et al 2011
Feng et al 2012
Xie et al 2014
Pérez-Medina et al 2014
Fabres et al 2005
Lin et al 2010

Total (fixed effects)
Total (random effects)



Standard deviation	Proportion (%)	95% CI
19	100,000	82,353 to 100,000
26	73,077	52,213 to 88,427
22	63,636	40,658 to 82,802
41	100,000	91,396 to 100,000
120	86,667	79,252 to 92,183
24	83,333	62,616 to 95,265
57	59,649	45,821 to 72,439
62	93,548	84,297 to 98,214
31	64,516	45,370 to 80,773
22	100,000	84,563 to 100,000
24	83,333	62,616 to 95,265
1	100,000	2,500 to 100,000
449	84,903	81,303 to 88,047
449	85,000	75,051 to 92,762

I ² (inconsistency)	84,80%
95% CI for I ²	75,05 to 90,74

From hysteroscopy to laparoendoscopic surgery: what is the best surgical approach for symptomatic isthmocele? A systematic review and meta-analysis

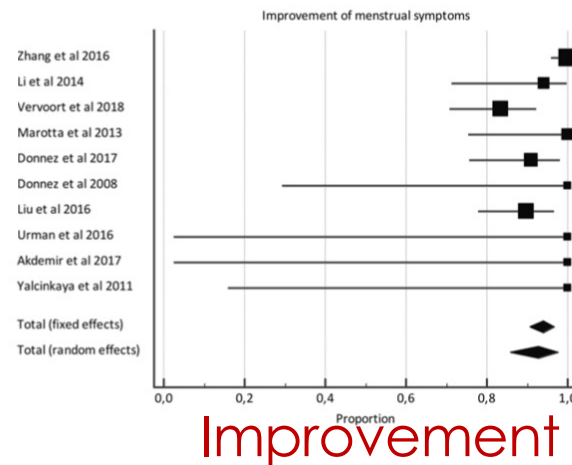
Salvatore Giovanni Vitale¹ · Artur Ludwin^{2,3} · George Angelos Vilos⁴ · Péter Török⁵ · Jan Tesarik⁶ · Amerigo Vitagliano⁷ · Ricardo Bassil Lasmar⁸ · Benito Chiofalo⁹

Archives of Gynecology and Obstetrics

Laparoscopy

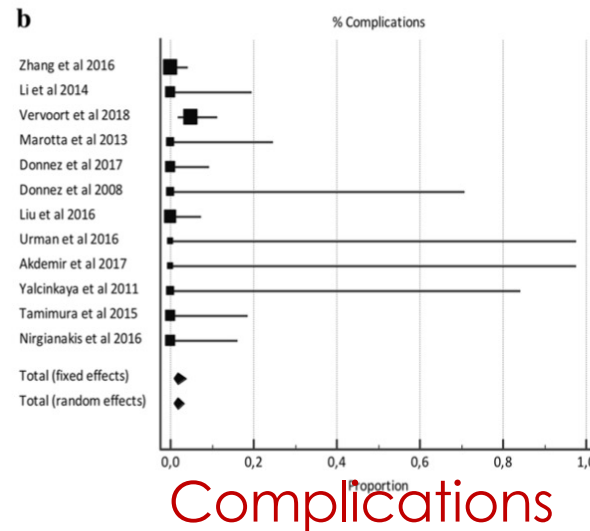
Blader injurie : 2 %

Not conclusive regarding fertility improvement



Standard deviation	Proportion (%)	95% CI
86	100,000	95,801 to 100,000
17	94,118	71,311 to 99,851
54	83,333	70,706 to 92,085
13	100,000	75,295 to 100,000
33	90,909	75,668 to 98,085
3	100,000	29,240 to 100,000
49	89,796	77,772 to 96,603
1	100,000	2,500 to 100,000
1	100,000	2,500 to 100,000
2	100,000	15,811 to 100,000
259	93,952	90,400 to 96,485
259	92,771	85,532 to 97,639

I ² (inconsistency)	62,42%
95% CI for I ²	25,41 to 81,07



Standard deviation	Proportion (%)	95% CI
86	0,000	0,000 to 4,199
17	0,000	0,000 to 19,506
101	4,950	1,627 to 11,176
13	0,000	0,000 to 24,705
38	0,000	0,000 to 9,251
3	0,000	0,000 to 70,760
49	0,000	0,000 to 7,252
1	0,000	0,000 to 97,500
1	0,000	0,000 to 97,500
2	0,000	0,000 to 84,189
18	0,000	0,000 to 18,530
21	0,000	0,000 to 16,110
350	1,703	0,638 to 3,634
350	1,703	0,629 to 3,289

I ² (inconsistency)	0,00%
95% CI for I ²	0,00 to 51,16

Fig. 5 Laparoscopic/robotic treatment of isthmocele. Forest plots of pooled estimates (%): **a** improvement of symptoms after surgery; **b** perioperative complications

Hysteroscopy in the Treatment of Myometrial Scar Defect (Diverticulum) Following Cesarean Section Delivery: A Systematic Review and Meta-Analysis

CUREUS 2020

Bdour H. Al Mutairi¹, Ibtehal Alrumaih¹

Reproductive outcomes

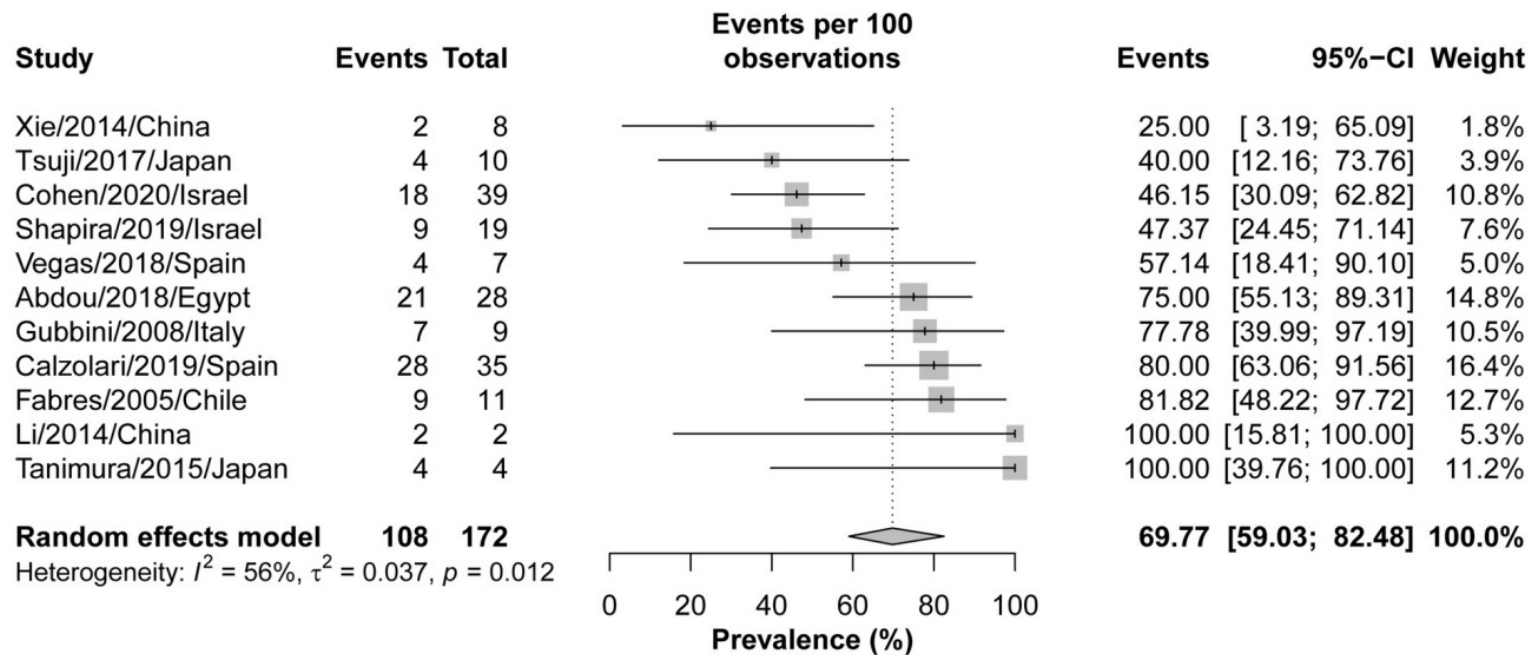


FIGURE 7: Forest plot for pregnancy rates following hysteroscopic treatment of myometrial scar defect (diverticulum)

Postoperative morphologic changes of the isthmocoele and clinical impact in patients treated by channel-like (360°) hysteroscopic technique

Int J Gynecol Obstet. 2022

- PROSPECTIVE STUDY 32 CSDI

RMT BEFORE 2.3 mm (± 0.3) VS 4.3 mm (± 0.7) AFTER HYSTEROSCOPIC S $P < 0.001$

VOLUME AND TRANSVERSE DIAMETER SIGNIFICANTLY DECREASED

AUB 90.6 % BEFORE / 3 % AFTER $P < 0.001$

SIGNIFICANT IMPROVEMENT OF PELVIC PAIN AND DYSMENORRHEA

- TSUJI S. PLOS ONE 2020 RETROSPECTIVE STUDY

POST OPERATIVE INCREASE OF RMT ≥ 4.9 mm GOOD PROGNOSIS FACTOR FOR PREGNANCY

LAPAROSCOPIC REPAIR AND SECONDARY INFERTILITY

- DONNEZ O. PROSPECTIVE OBSERVATIONAL STUDY (FERT.STERIL. 2016)
 - 38 LAPAROSCOPIC REPAIR FOR CSDI
 - 44 % PREGNANCY RATE IN THE GROUP SEEKING FERTILITY (18)
 - RMT INCREASED FROM 1.4 MM TO 9.6 MM
 - NO UTERINE RUPTURE

KARAMPELAS 83.3%

TANIMURA . (J.OBSTET. GYNAECOL. RES . 2015)

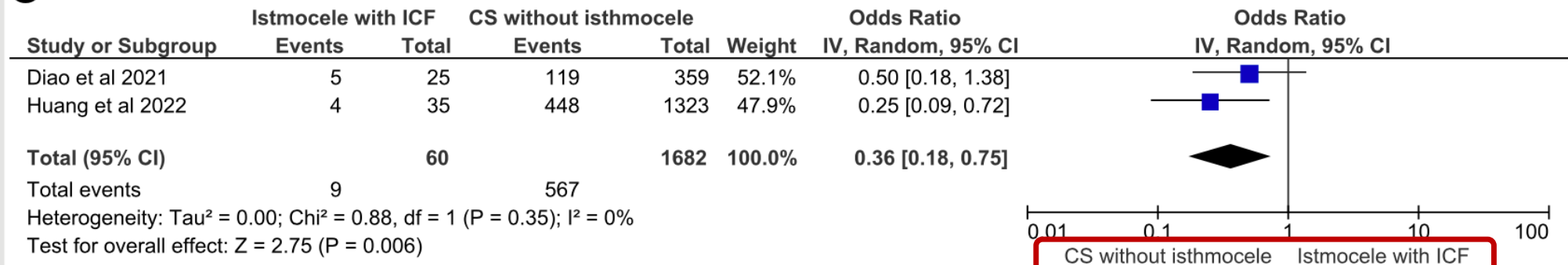
55.5 % PREGNANCY RATE IN 18 PATIENTS TREATED LAPAROSCOPICALLY

Isthmocele, not cesarean section per se, reduces in vitro fertilization success: a systematic review and meta-analysis of over 10,000 embryo transfer cycles

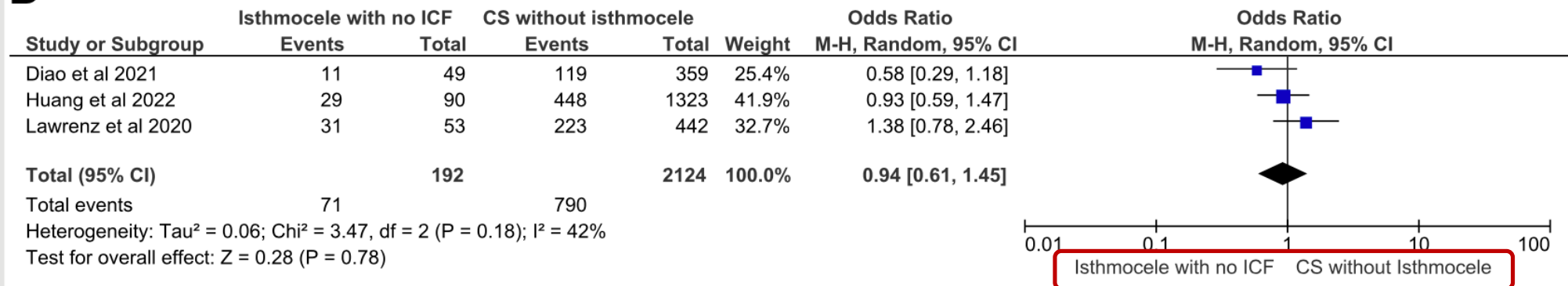
fertil.Steril2024

Amerigo Vitagliano, M.D., Ph.D.,^a Ettore Cicinelli, M.D., Ph.D., Paola Viganò, M.D., Ph.D.,^b

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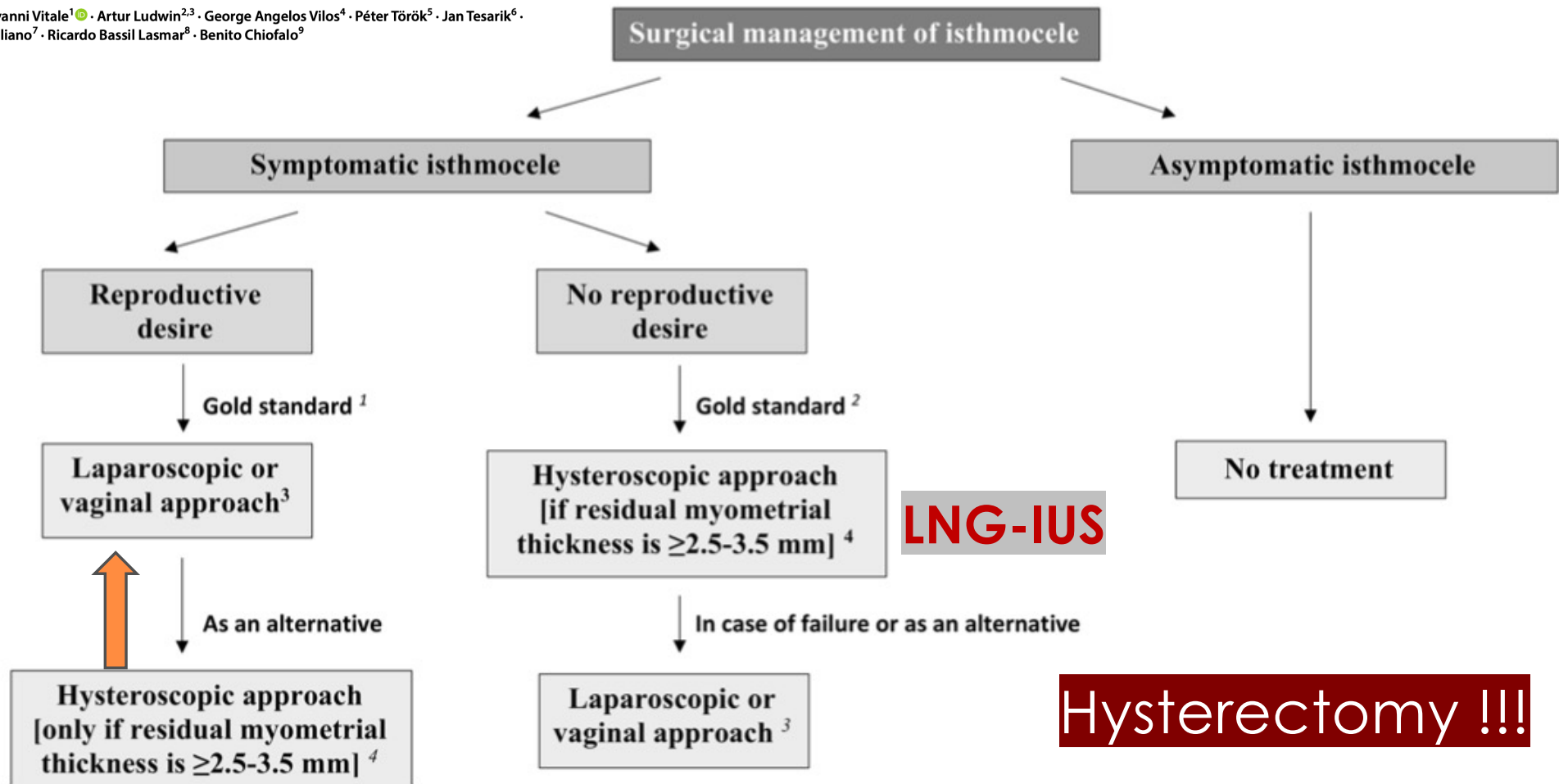


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From hysteroscopy to laparoendoscopic surgery: what is the best surgical approach for symptomatic isthmocele? A systematic review and meta-analysis

Salvatore Giovanni Vitale¹ · Artur Ludwin^{2,3} · George Angelos Vilos⁴ · Péter Török⁵ · Jan Tesarik⁶ · Amerigo Vitagliano⁷ · Ricardo Bassil Lasmar⁸ · Benito Chiofalo⁹



STRENGTHS

- Isthmocele can be diagnosed by transvaginal ultrasound
- Isthmocele repair restores the natural fertility potential and prevents secondary infertility.
- Isthmocele repair could reduce the risk of abortion and other obstetrical complications
- Isthmocele repair may be the right treatment for secondary infertility
- Isthmocele repair can improve other symptoms

WEAKNESSES

- There is a heterogeneity of diagnostic criteria
- Absence of high-quality evidence of the benefits on fertility outcomes after surgical correction of isthmocele
- Need for surgeons with skill and experience in different techniques.
- Isthmocele repair does not prevent the need of a cesarean section delivery in subsequent pregnancies

SWOT Analysis

OPPORTUNITIES

- Awareness of isthmocele ultrasound diagnosis
- Prevention of obstetric and perinatal complications in subsequent pregnancies
- Prevention of cesarean scar pregnancy

THREATS

- Risk of overdiagnosis and overtreatment
- Three different conservative surgical techniques without properly defined indications
- Absence of cost-effectiveness analyses
- Naboth inclusion cysts as potential cause of misdiagnosis