Transperineal Ultrasound for Anal Sphincter Trauma

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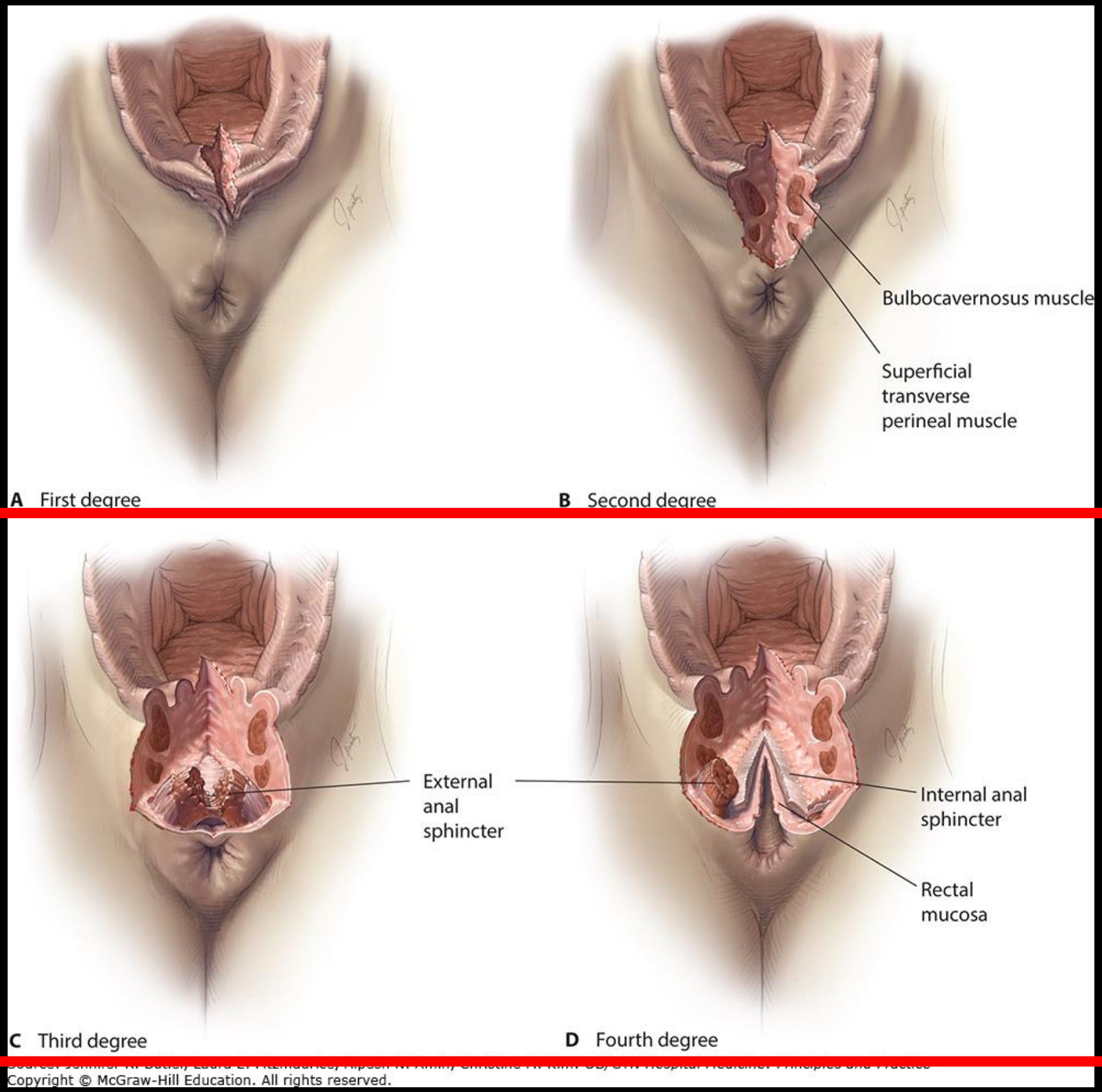
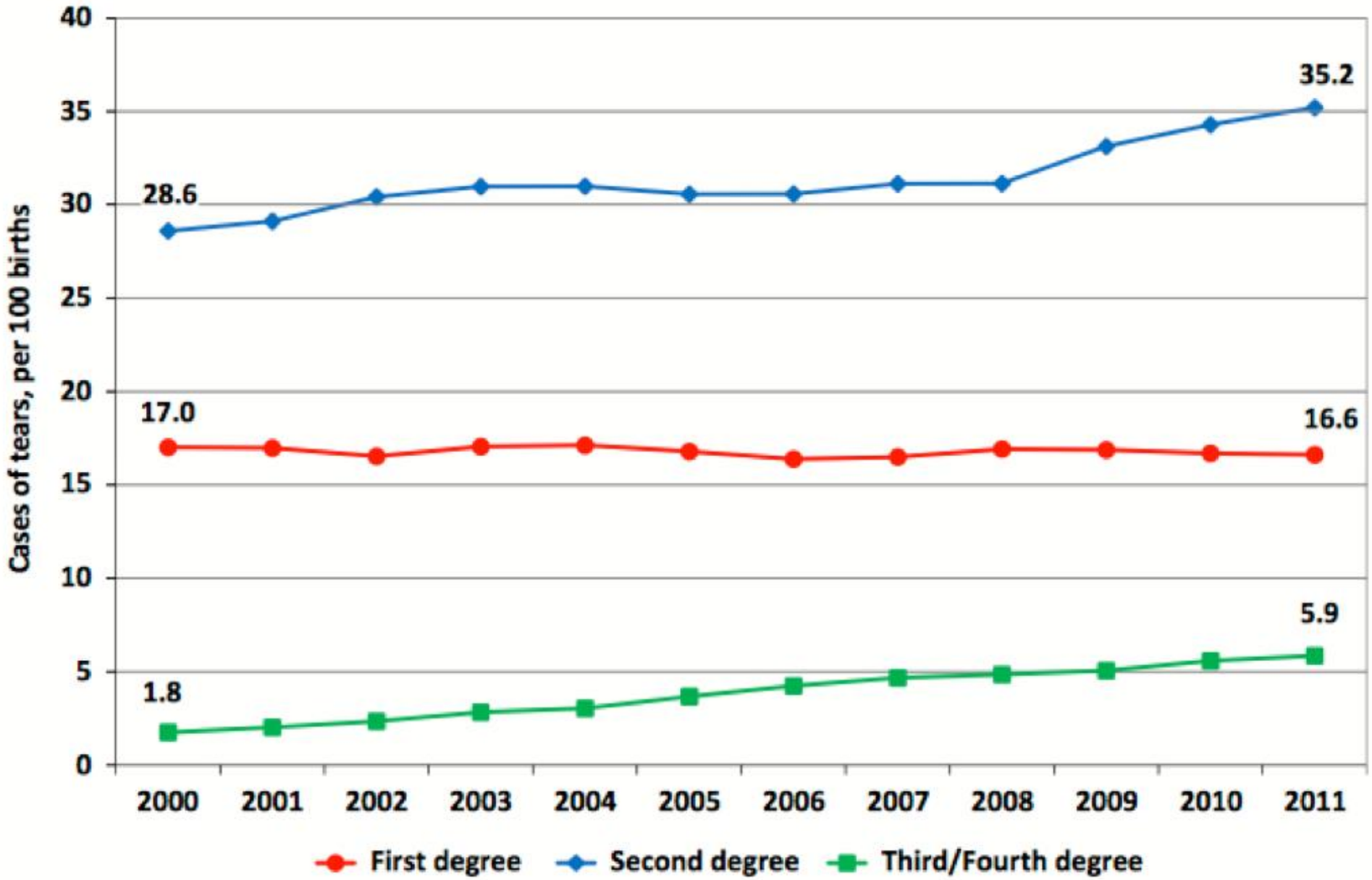
March 2022

Pelvic Floor Trauma includes…

OASI



Clinical Dx.* of perineal tears in UK primiparous women between 2000-2011



Israel- 0.46%
2% VE+FD

***Sonographic Dx., in contrast, is ~30% according to EAUS & TPUS**

Gurol-Urgancy L et al. *BJOG*, 2006

Why do we need perineal clinics?

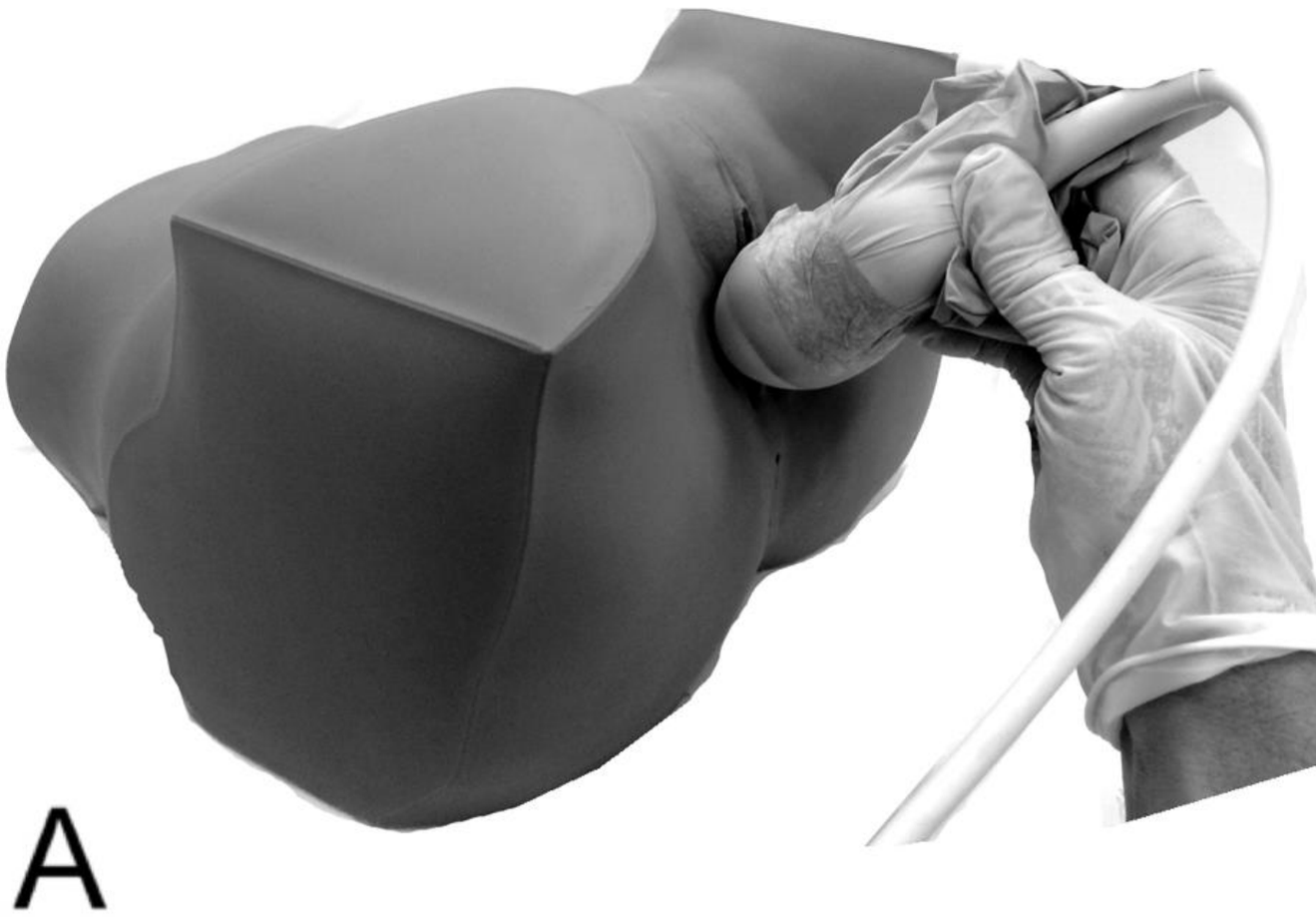
- Treat current & prevent future Sx.
- Consult future delivery mode
- Identify missed OASI* (15-fold more AI)
- Identify false (+) OASI** (~10%)
- Audit our repairs

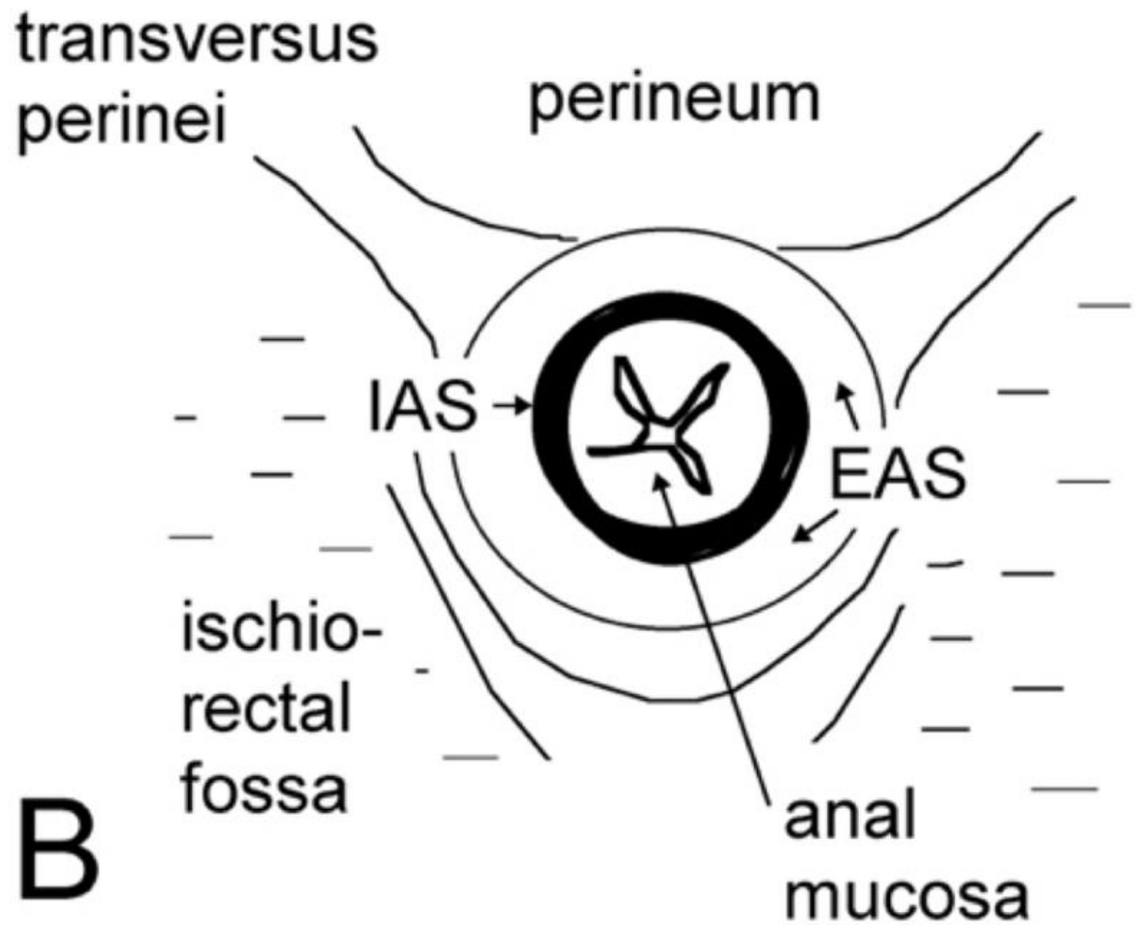
***Andrews V et al. *BJOG*, 2006; Sideris M et al. *EJOGRB*, 2020**
**** Sioutis D et al. *UOG* 2017; Gillor M et al. *UOG* 2019**

How to evaluate anal sphincter integrity?

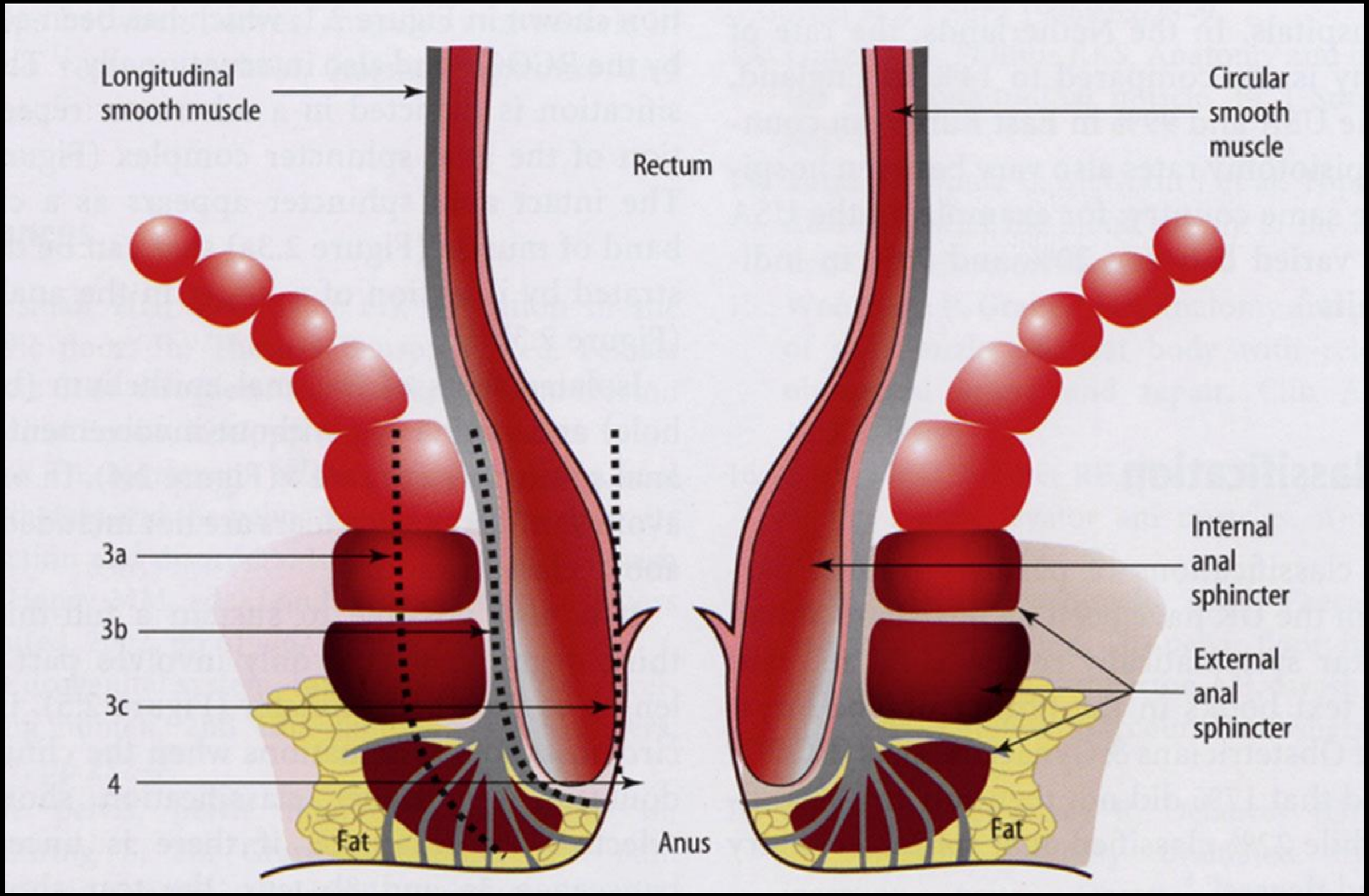
- PR- poor correlation with defects diagnosed on US (Shek et al. 2016)
- MRI- ↓availability, expensive
- EAUS- considered as gold standard but,
  ↓comfort, ↓availability, ↑operator dependent, non-physiologic?
- TVUS/IUS- ↑comfort , accessible, ↑inter- & intra- rater variability (though poorer than TPUS- Cattani et al. 2019), ↓near field resolution
- TPUS- ↑comfort (Taithongchai et al. 2019), accessible, ↓cost, repeatable (Turel et al. 2018), concurrent assessment of puborectalis & POP + visualization of perineum

Transperineal ultrasound (TPUS)

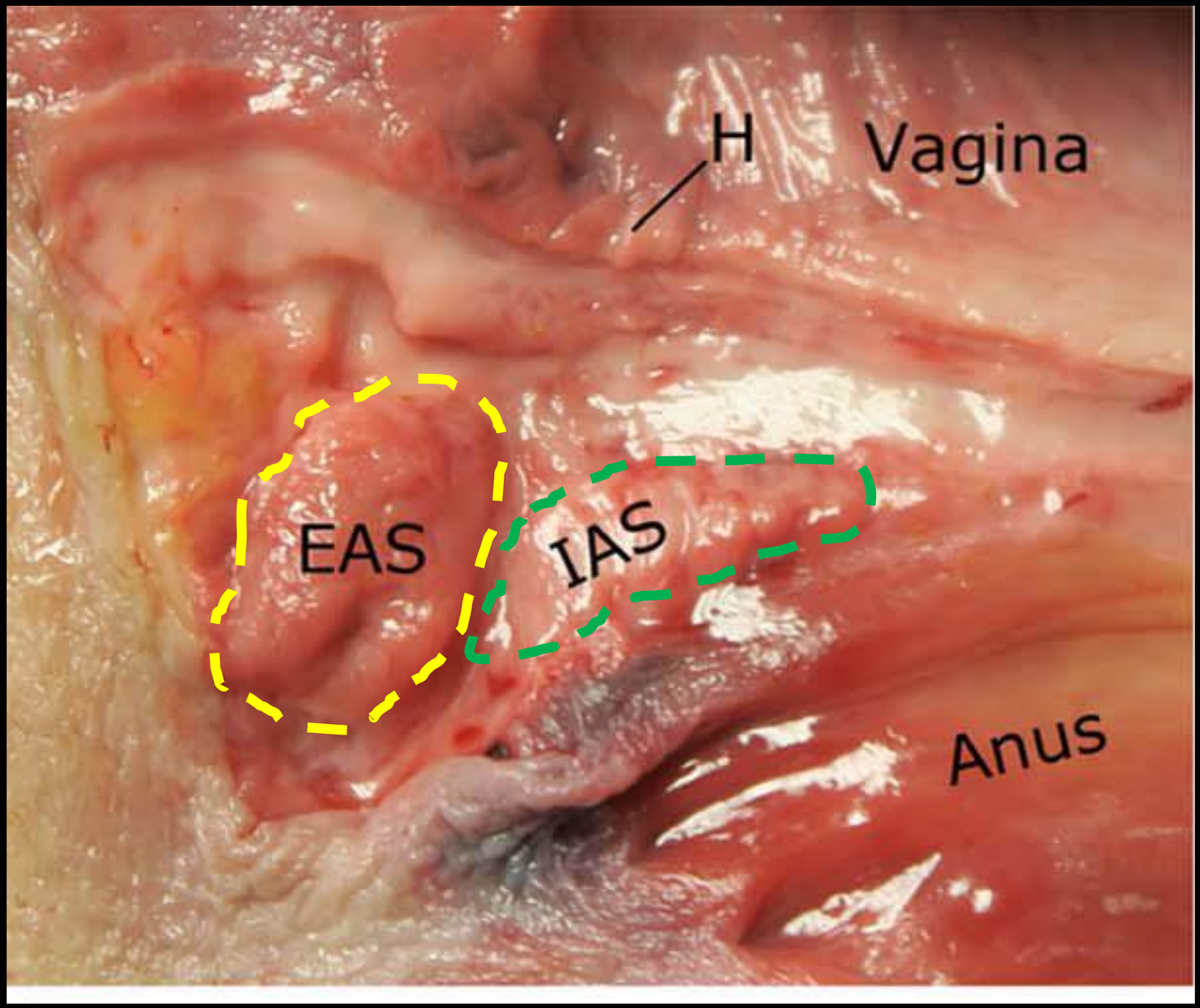




Dietz et al,2017



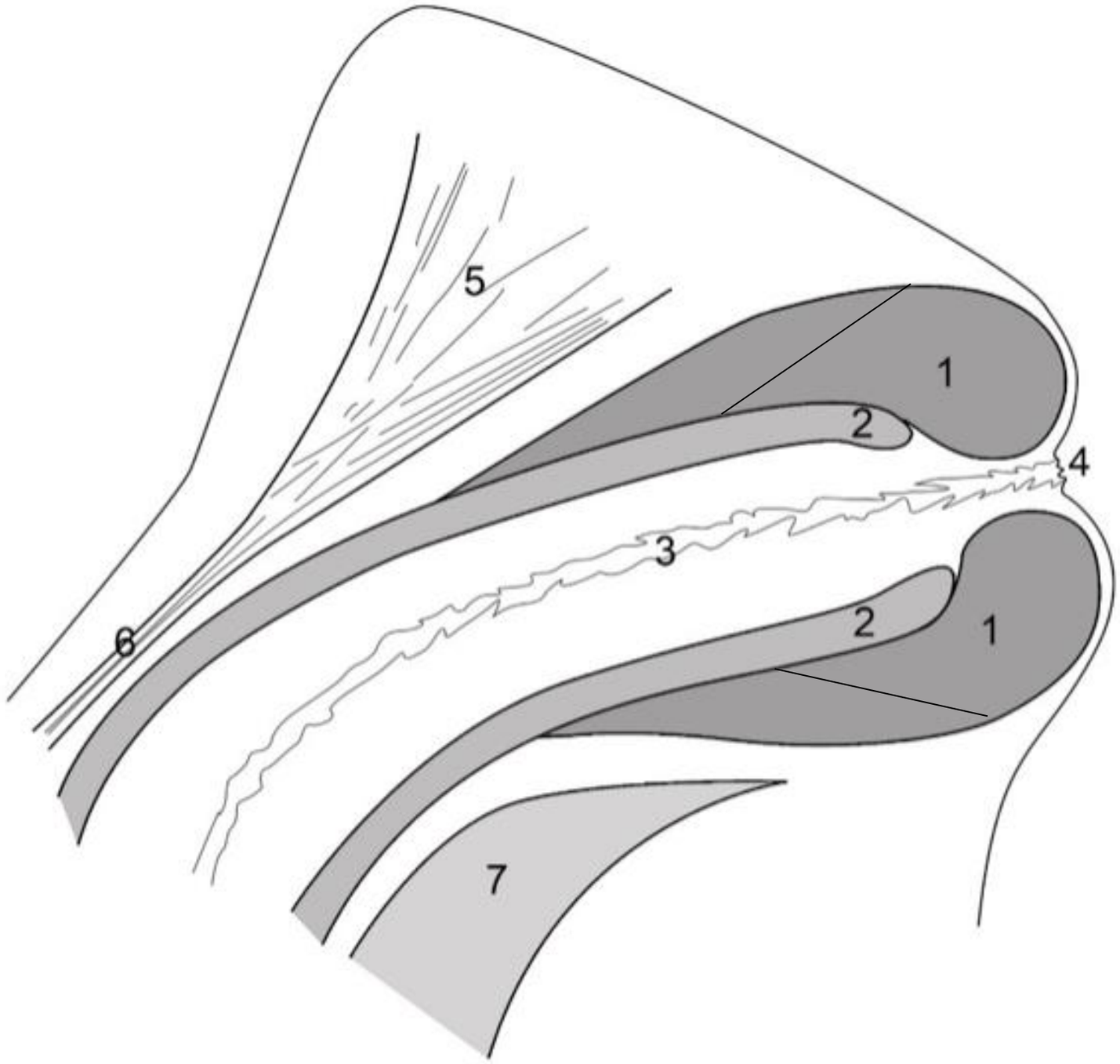
Sultan AH et al., An IUGA/ICS Joint Report on the Terminology for Female Anorectal Dysfunction, *Neurourology and Urodynamics* 36:10–34 (2017)



Maldonado PA et al. Posterior Vaginal Compartment Anatomy: Implications for Surgical Repair. *Female Pelvic Med Reconstr Surg.* 2020 Dec 1;26(12):751-7.

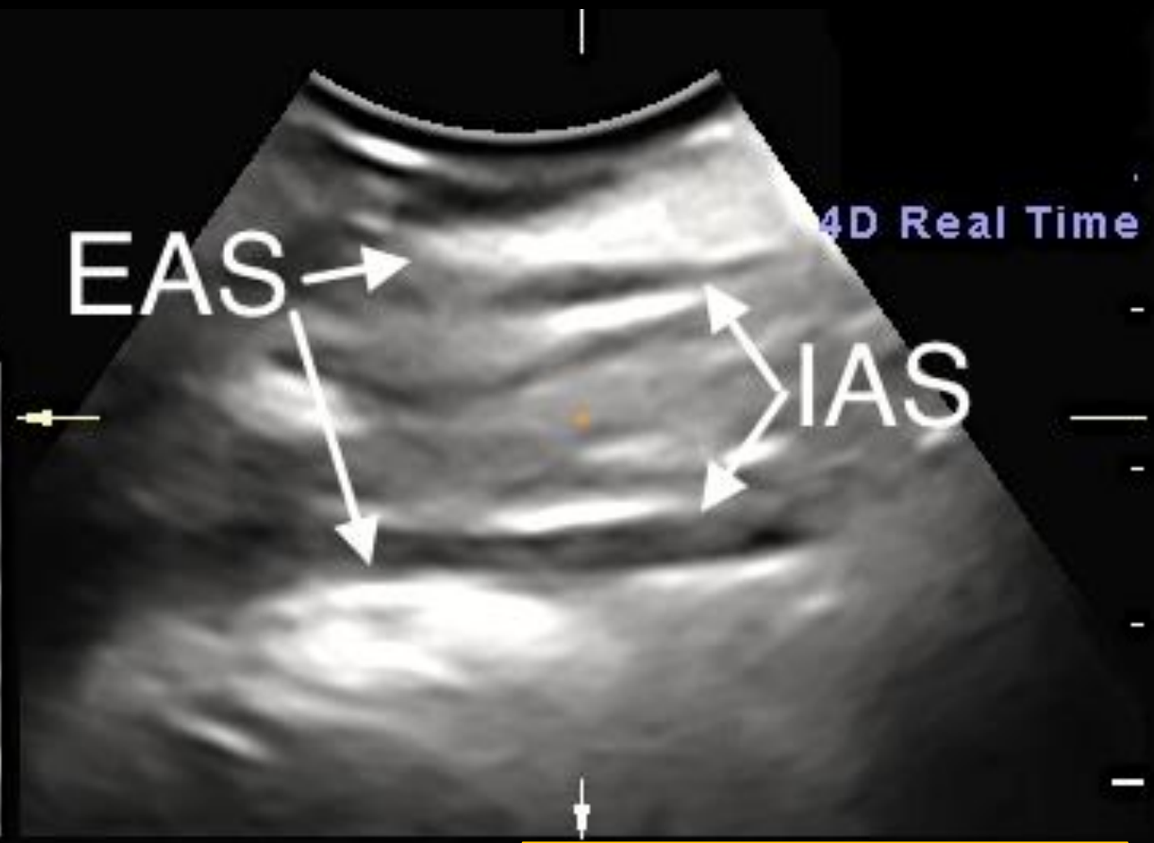
Ventral

Cranial

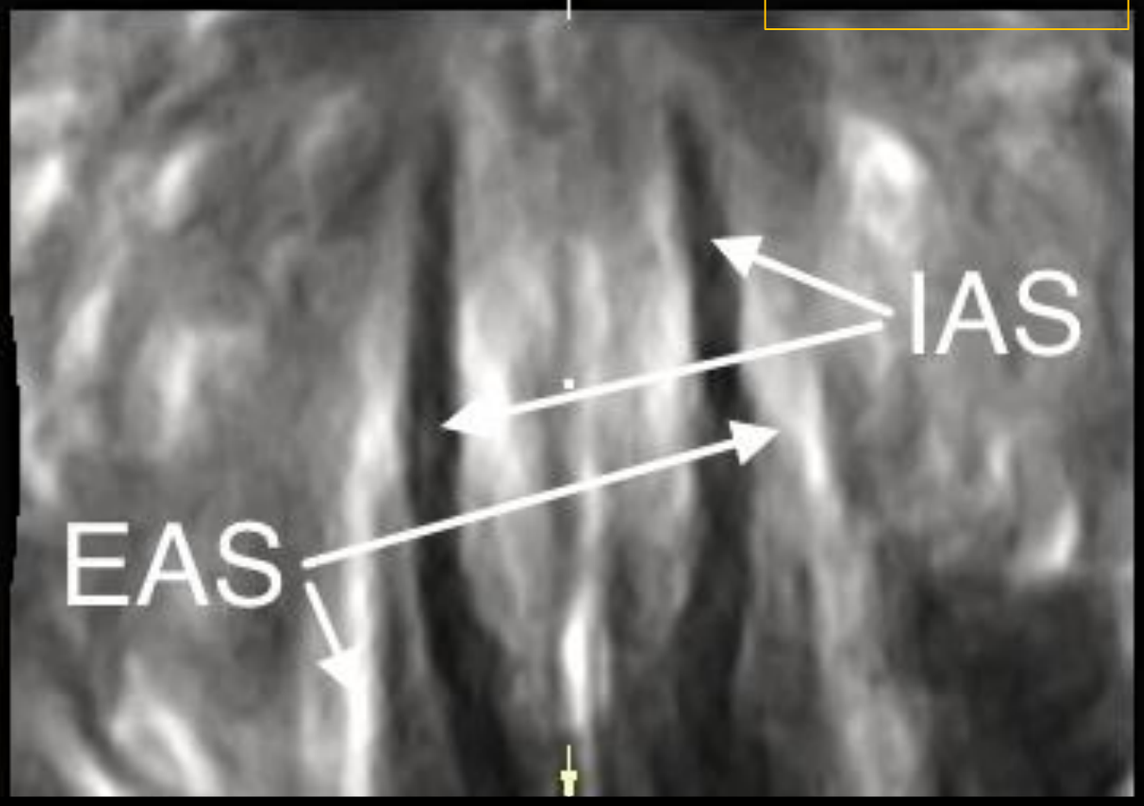


Schematic image of mid-sagittal view of the female anal canal, positioned as on translabial ultrasound. 1. External anal sphincter (EAS), 2. Internal anal sphincter (IAS), 3. Anal mucosa, 4. Anal verge, 5. Perineal body, 6. Rectovaginal septum, 7.Puborectalis muscle or levator plate.

Axial



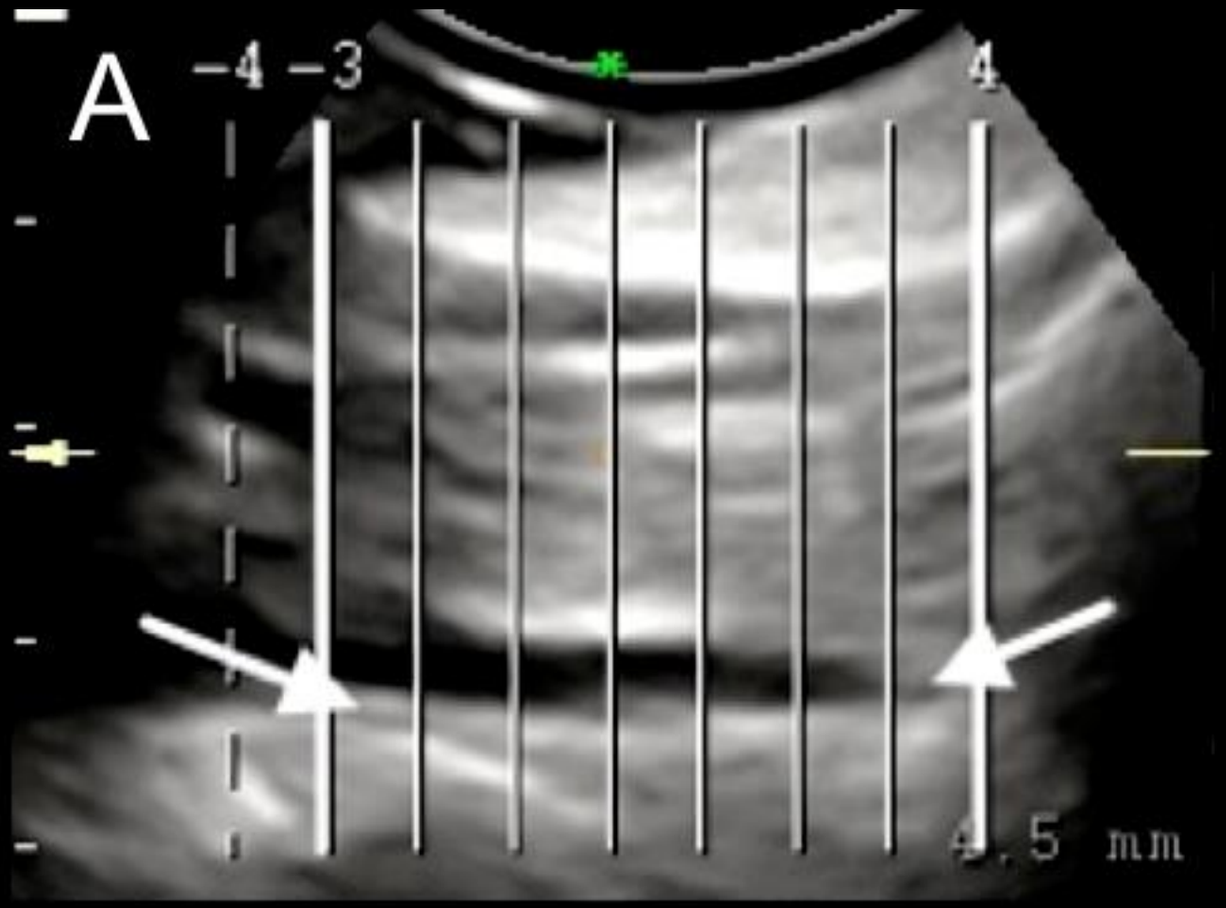
Mid-sagittal

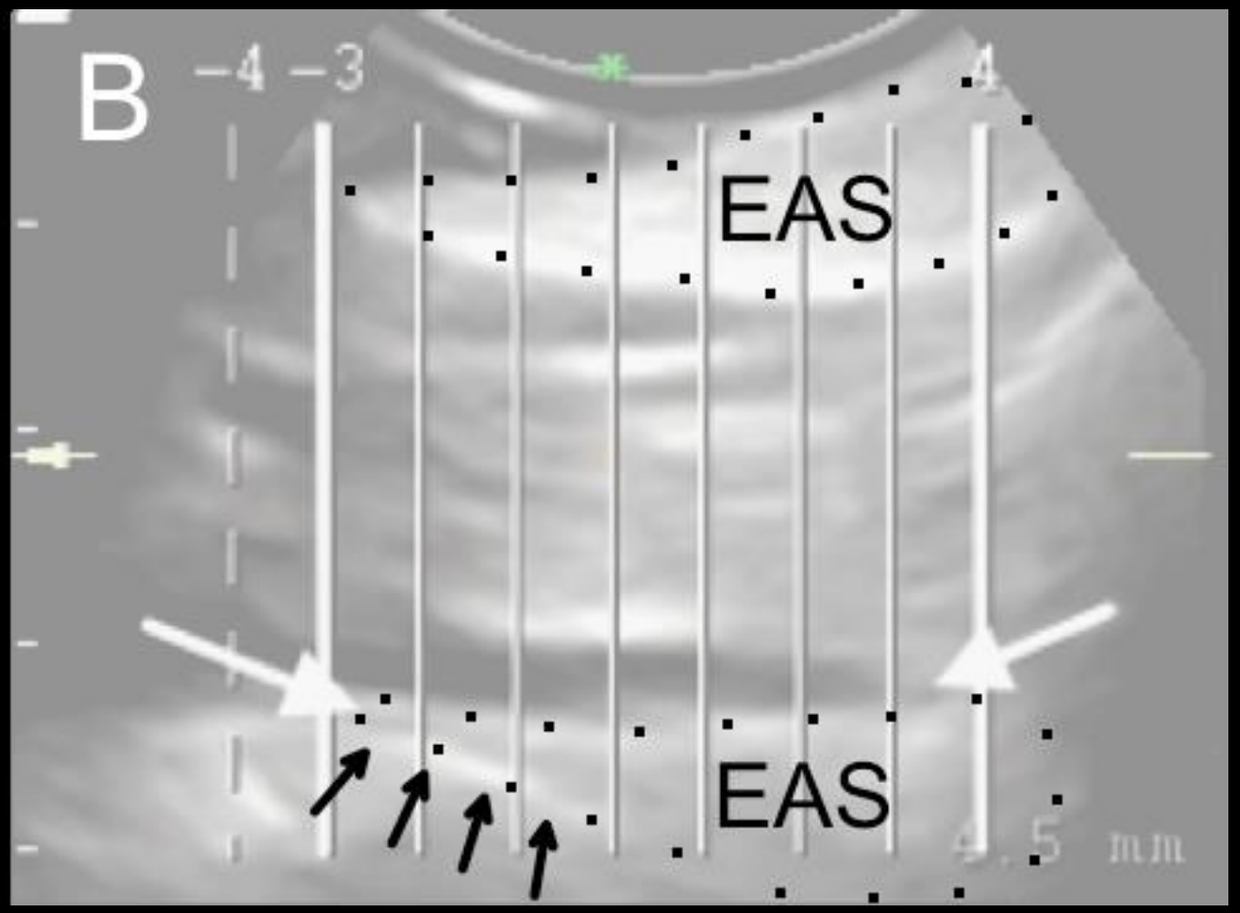


Coronal

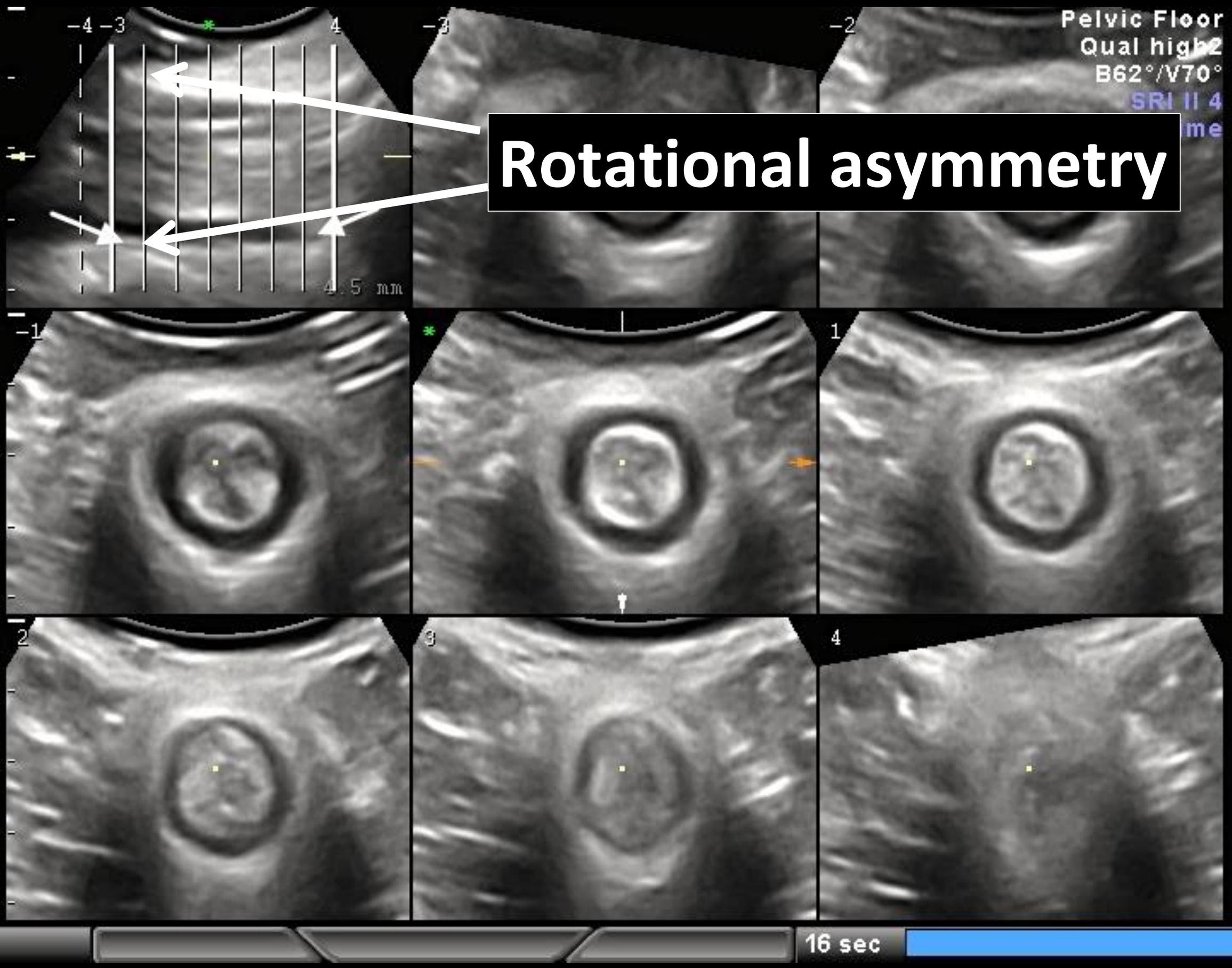
3 orthogonal planes

The Fascial Plane

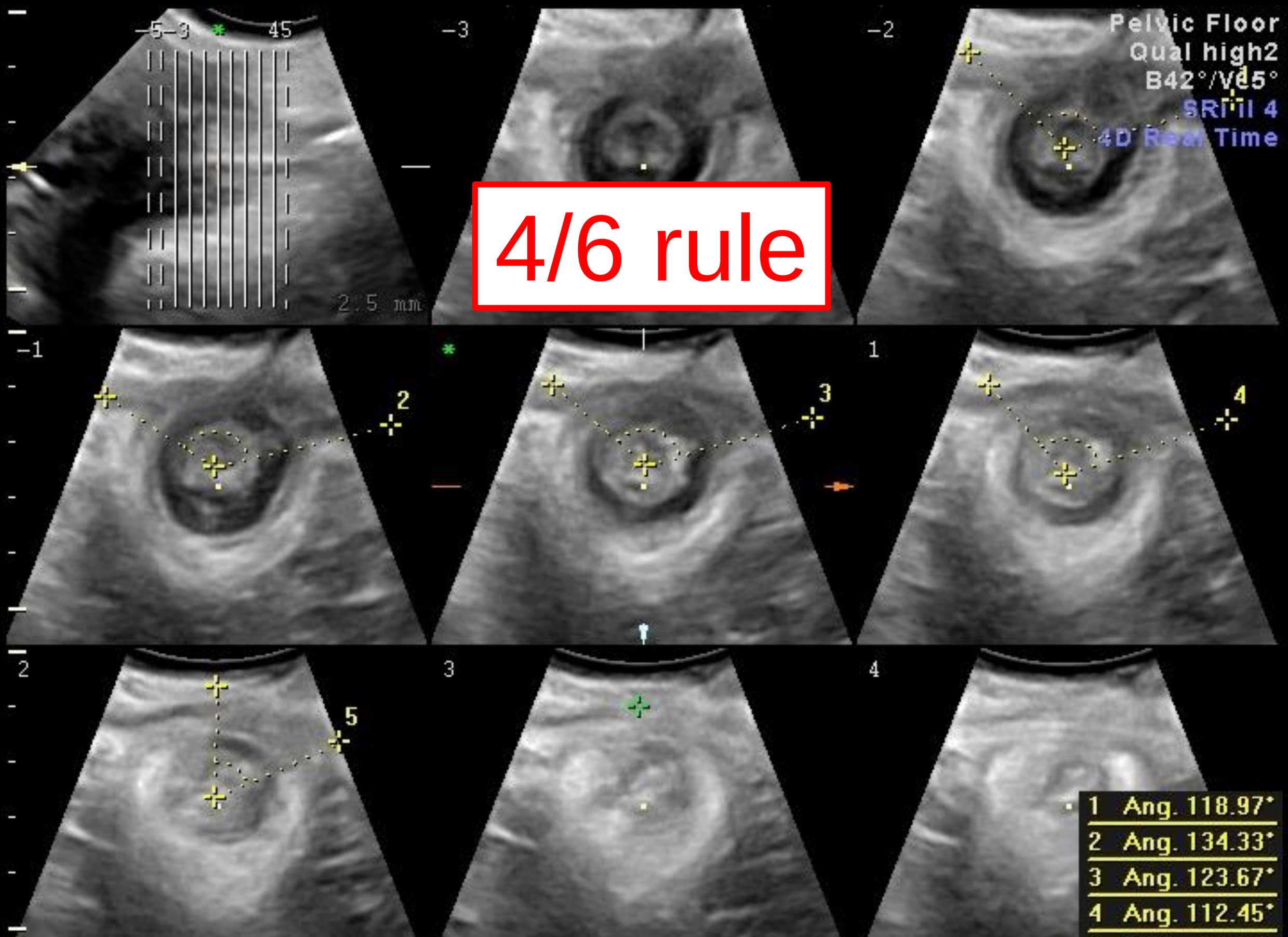




The <u>dorsal</u> part of the EAS is used as reference as theoretically no obstetric trauma should effect it


Pelvic Floor
Qual high2
B62°/V70°
SRI II 4
me
Rotational asymmetry
16 sec

−4 −3 * 4
3.5 mm
−3
−2
Anal Sphinct
Qual high2
B58°/V70°
SRI II 4
4D Real Time
−1
*
1
2
3
4


Pelvic Floor
Qual high2
SRI fil 4
4D Real Time
4/6 rule
1 Ang. 118.97°
2 Ang. 134.33°
3 Ang. 123.67°
4 Ang. 112.45°

-4 3 4

2.0 mm

-3

-2

3 Hz/1.8
B57% V70% 6.3cm
Anal Sphincter PD/GYN
Qual high2
4D Real Time

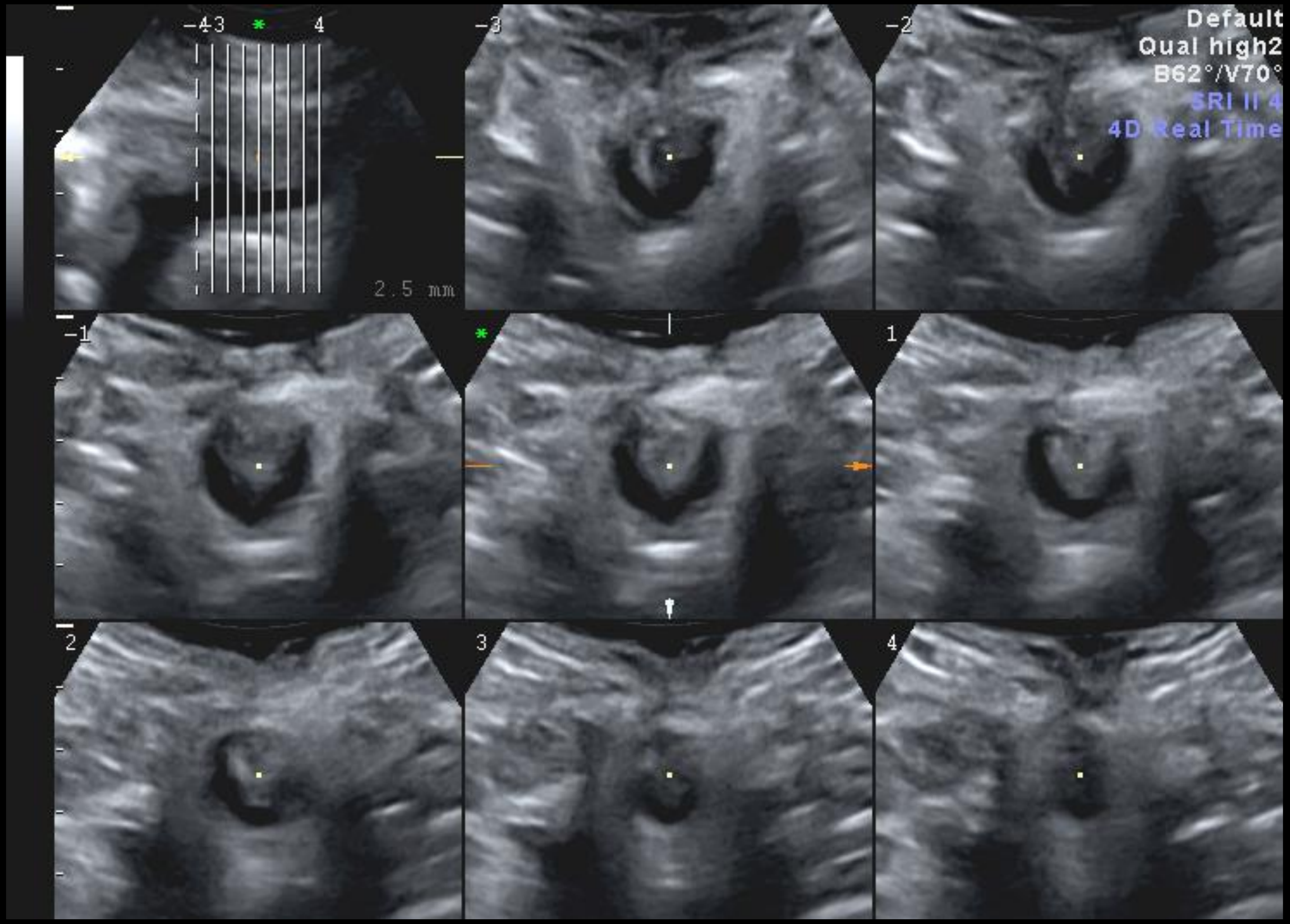
-1

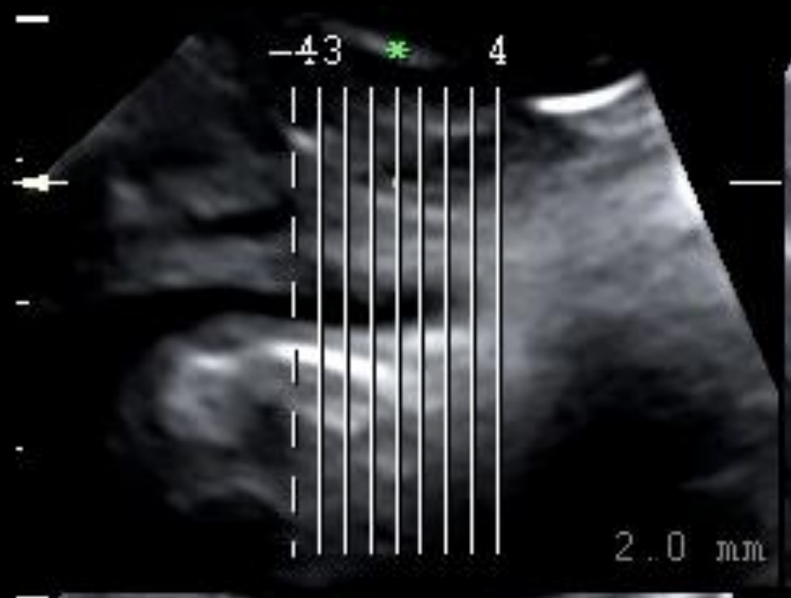
1

2

3

4


-4 3 4
2.5 mm
-3
-2
Default
Qual high2
B62°/V70°
SRI II 4
4D Real Time
-1
1
2
3
4


-4 3 4
2.0 mm


-3

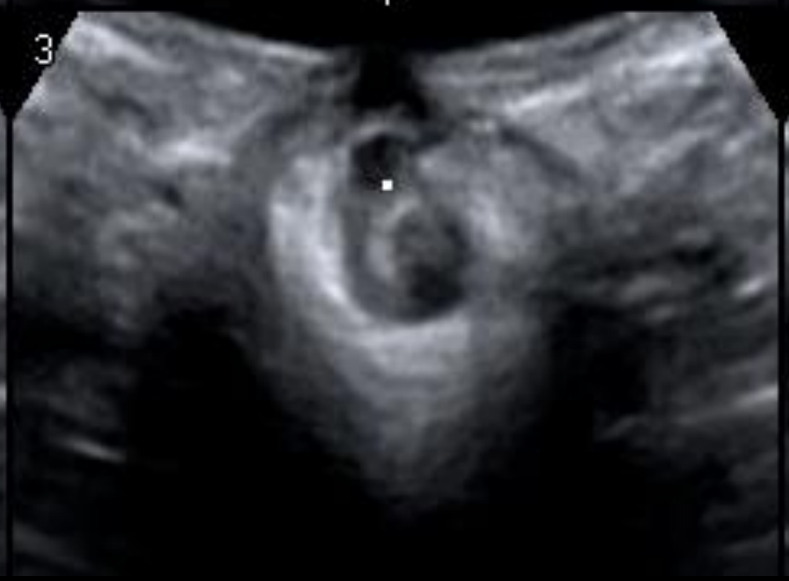

-2
Default
Qual high2
B62°/V70°
SRI II 4
4D Real Time

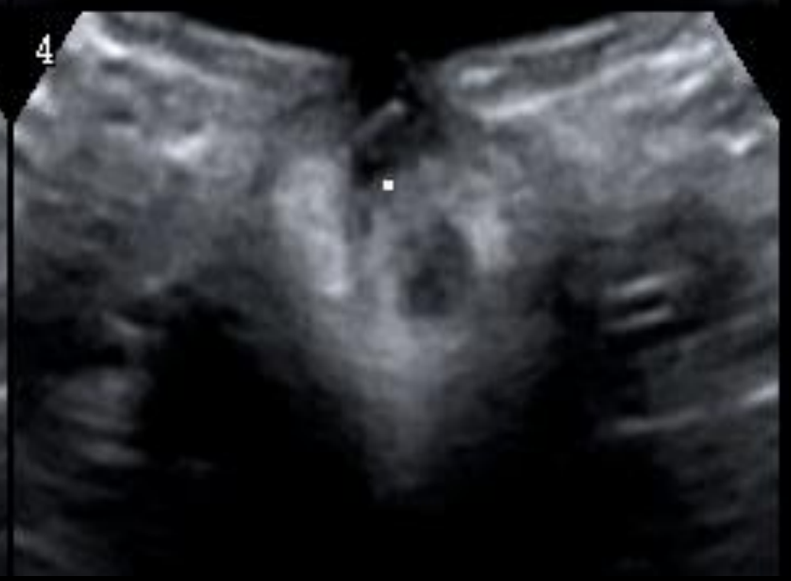

-1

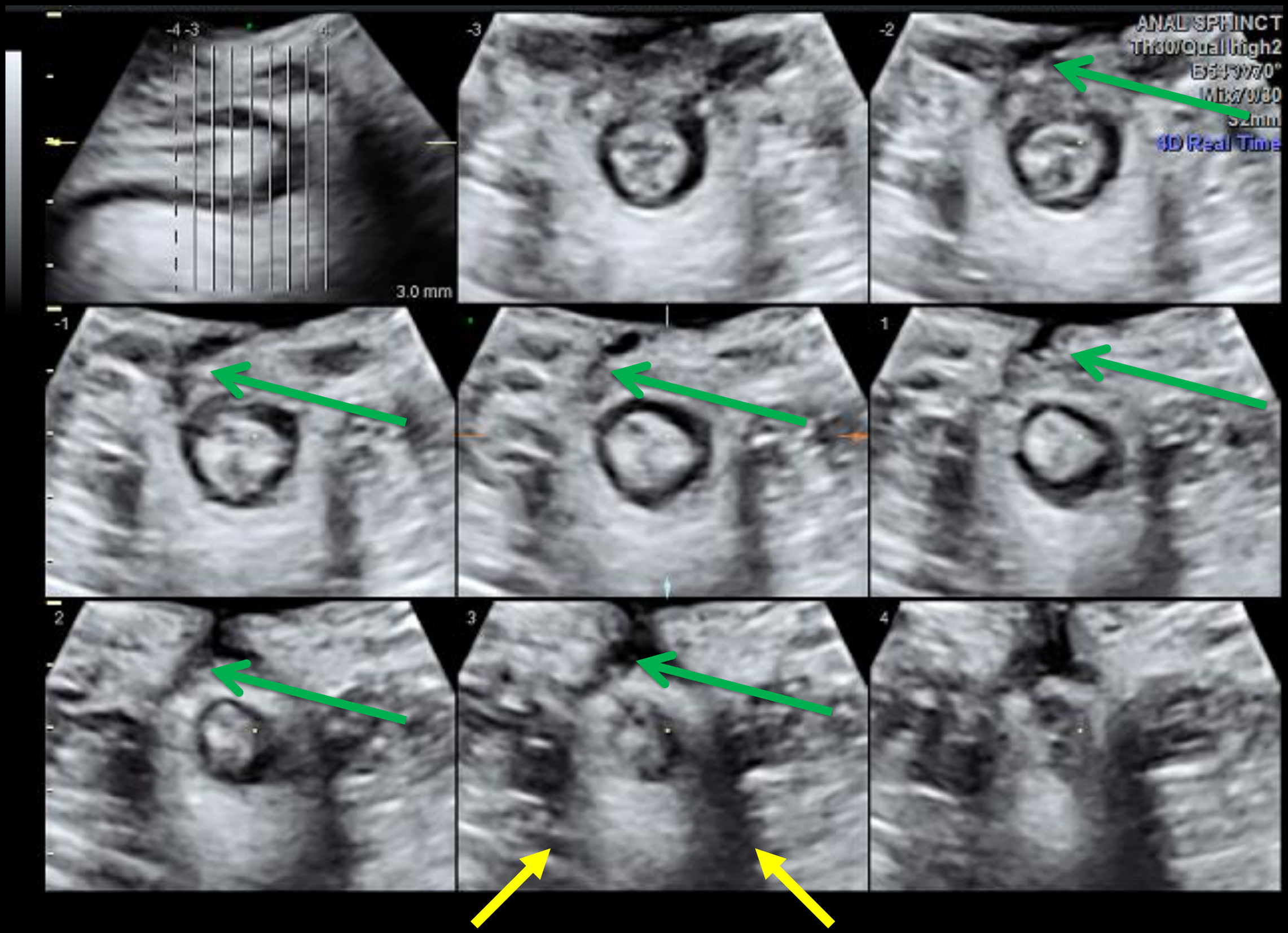

1


1

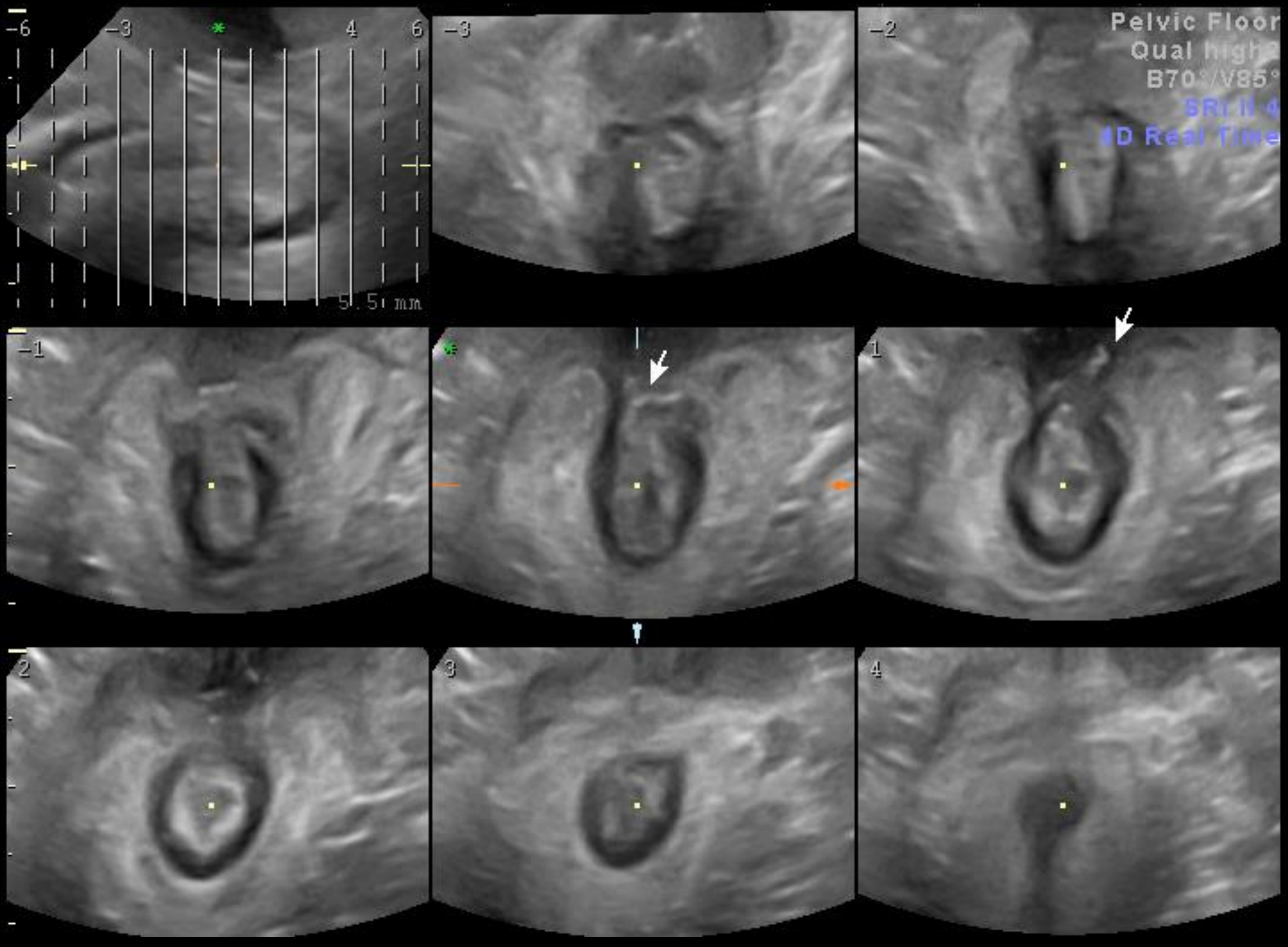

2


3

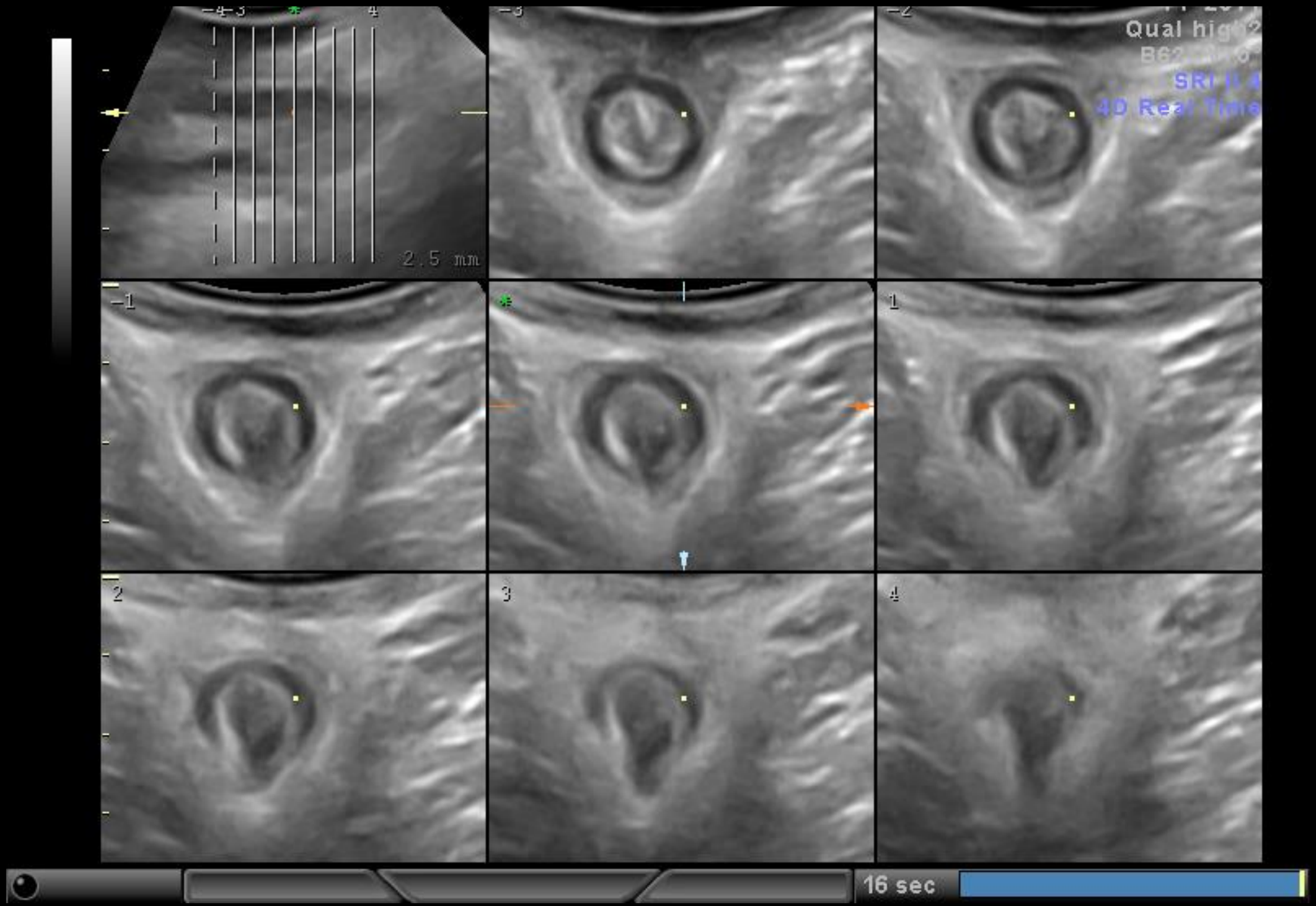

4


-4 -3
-3
-2
ANAL SPHINCT
3.0 mm
-1
1
2
3
4

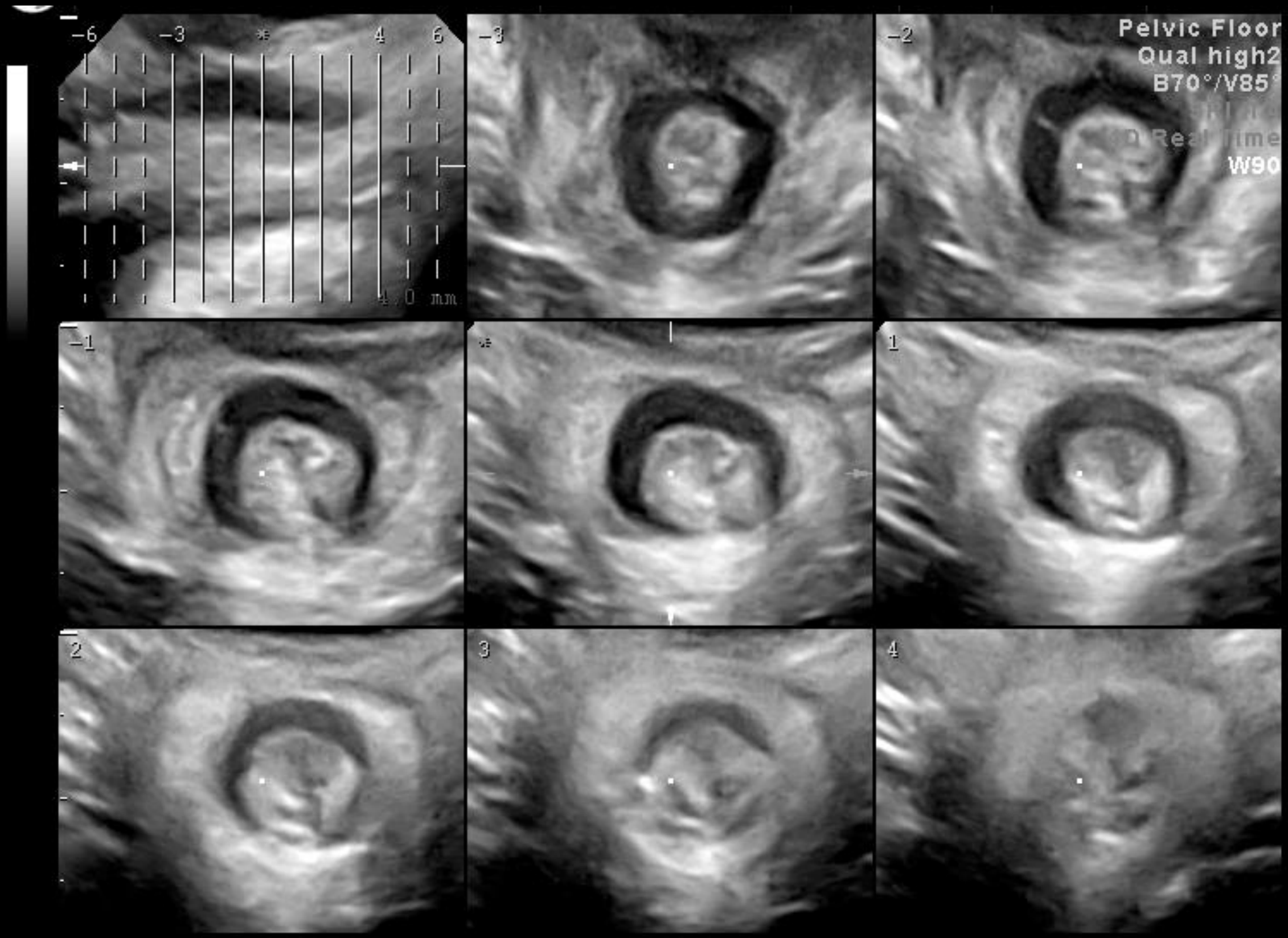
Ano-vaginal fistula



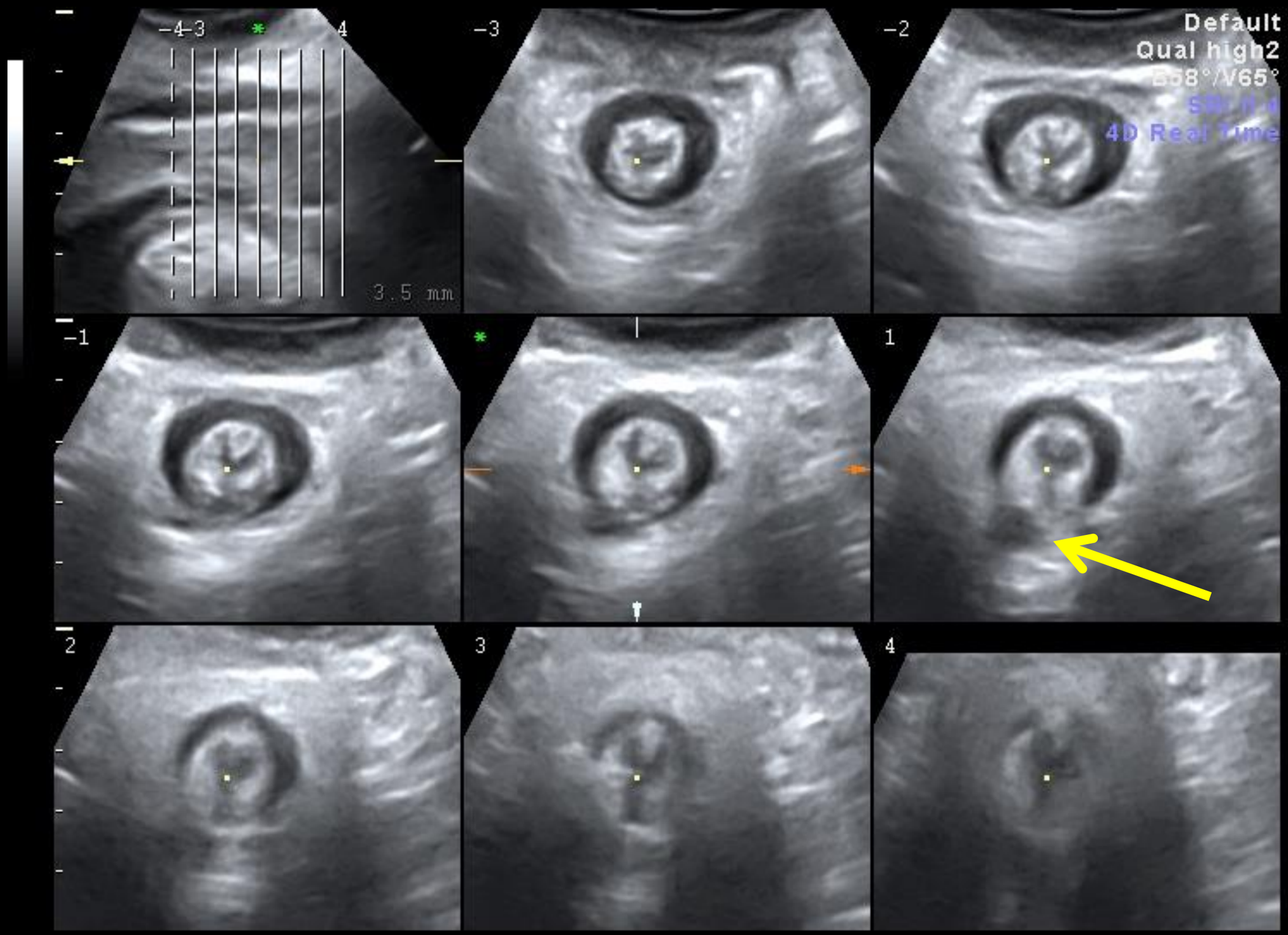
A Pain in the Butt



Hemorrhoidectomy



Peri-anal abscess



•. 2009 Dec;114(6):1287-1294.

Recent findings in TPUS for OASI

- No major sonographic improvement over first 2 years (Shek et al., 2016)
- Rest & PFMC are both OK (Subramaniam et al., 2020)
- Adding EAS subcutaneous slice does not improve AI prediction (Subramaniam et al. 2017)
- Defects on TUI are better predictor of AI than reported OASIS (Guzman Rojas et al., 2018)
- Low likelihood of false (+) TUI results using the 4/6 rule (Turel et al. 2018)

•. 2009 Dec;114(6):1287-1294.
•. 2009 Dec;114(6):1287-1294.

Recent findings in TPUS for OASI (cont.)

- Defect angle doesn’t seem to matter much

  (Subramaniam et al., 2019)

- 3c/4 are more symptomatic than 3a/b (Turel et al., 2019)

- Clinical over-Dx. in ⅓ and under-Dx. in ⅙ (Gillor et al., 2019)

- Episiotomy scars can be identified and characterized

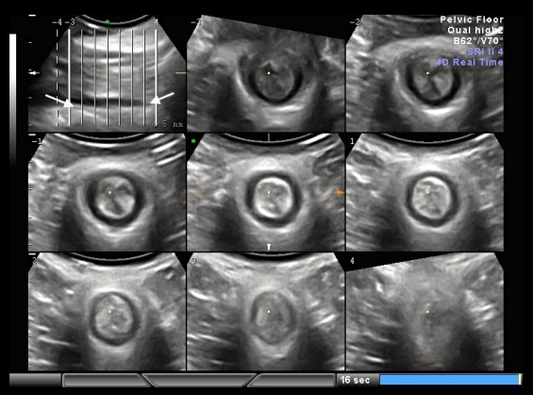
  (Subramaniam et al., 2021)

- EAS scars after OASI usually involves its entire length, but partial tears are more common proximally (Dietz et al., 2021)

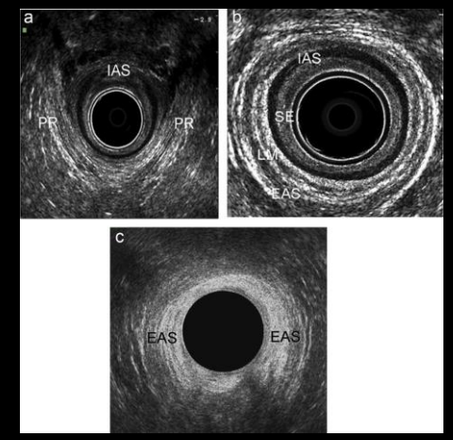
How should we decide ?

- Correlation with clinical Dx.?
  - Significant correlation between TPUS Starck's score with OASI grade[1]
  - Fair agreement between TPUS clinical grading[2]

[1] **Ignell C et al. *J ultrasound*, 2019**
[2] **Gillor M et al. *Ultrasound Obstet Gynecol*, 2020**



How should we decide ?



- Correlation between different imaging modalities?
  - n=55, AI, good agreement with EAUS for EAS and IAS defects (κ=0.63 & 0.78, respectively)[1]
  - n=55, OASI, Good agreement with EAUS for EAS & IAS defects (κ=0.73 & 0.66, respectively)[2]
  - n=59, OASI, strong correlation with EAUS (r_s= 0.77, p<0.01)
  - n=250, OASI, fair agreement with EAUS for EAS & IAS defects (AUC=0.72 & 0.7, respectively)[4]

[1] **Oom DMJ et al. *Dis Colon Rectum*, 2012** [2] **Ros C et al. *Ultrasound Obstet Gynecol*, 2017**
[3] **Stuart A et al. *Acta Obstet Gynecol Scand*, 2019** [4] **Taithongchai A et al. *Am J Obstet Gynecol*, 2019**

How should we decide ?

- Prediction of symptoms?
  - Association between residual EAS defect and SMIS as well as Wexner score[1-3]
  - Moderate correlation of liquid stool with residual EAS defects[4]
  - Moderate correlation of flatal incontinence with residual EAS defects[5]
  - EAS defects are associated with fecal urgency[6]
  - Association between fecal & flatal incontinence and residual IAS defects[6,7]
  - Association (fecal incontinence) persists 20 years after delivery (residual EAS+IAS defects)[6]

[1] Speksnijder L et al. *Ultrasound Obstet Gynecol*, 2021 [2] Shek KL et al. *Ultrasound Obstet Gynecol*, 2014 [3] Stuart A et al. *Acta Obstet Gynecol Scand*, 2019 [4] Ignell C et al. *J ultrasound*, 2019 [5] Hubka P et al. *Ceska Gynekol*, 2021 [6] Guzman Rojas RA et al. *Ultrasound Obstet Gynecol*, 2018 [7] Volløyhaug I et al. *Int Urogynecol J*, 2020

International Urogynecology Journal
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ORIGINAL ARTICLE

Is endoanal, introital or transperineal ultrasound diagnosis of sphincter defects more strongly associated with anal incontinence?

Ingrid Volløyhaug[1,2] · Annika Taithongchai[3] · Linda Arendsen[3] · Isabelle van Gruting[3] · Abdul H. Sultan[3] · Ranee Thakar[3]

Commentary on: Is endoanal, introital or transperineal ultrasound diagnosis of sphincter defects more strongly associated with anal incontinence?

Moshe Gillor[1] · Ka Lai Shek[2,3] · Hans Peter Dietz[3]

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This was a cross-sectional study evaluating assessment of anal sphincter defects after obstetric anal sphincter injury (OASI) with endoanal, introital and transperineal ultrasound, assessing the predictive value for diagnosing anal incontinence (AI) [1]. This is the largest study to date performing this type of comparison. The authors concluded that defects diagnosed by endoanal ultrasound (EAUS) had a stronger association with AI than either introital ultrasound (IUS) or transperineal ultrasound (TPUS). Additionally, they have demonstrated an association between anal sphincter defects, as demonstrated in all sonographic modalities, and lower anal pressures on anorectal manometry.

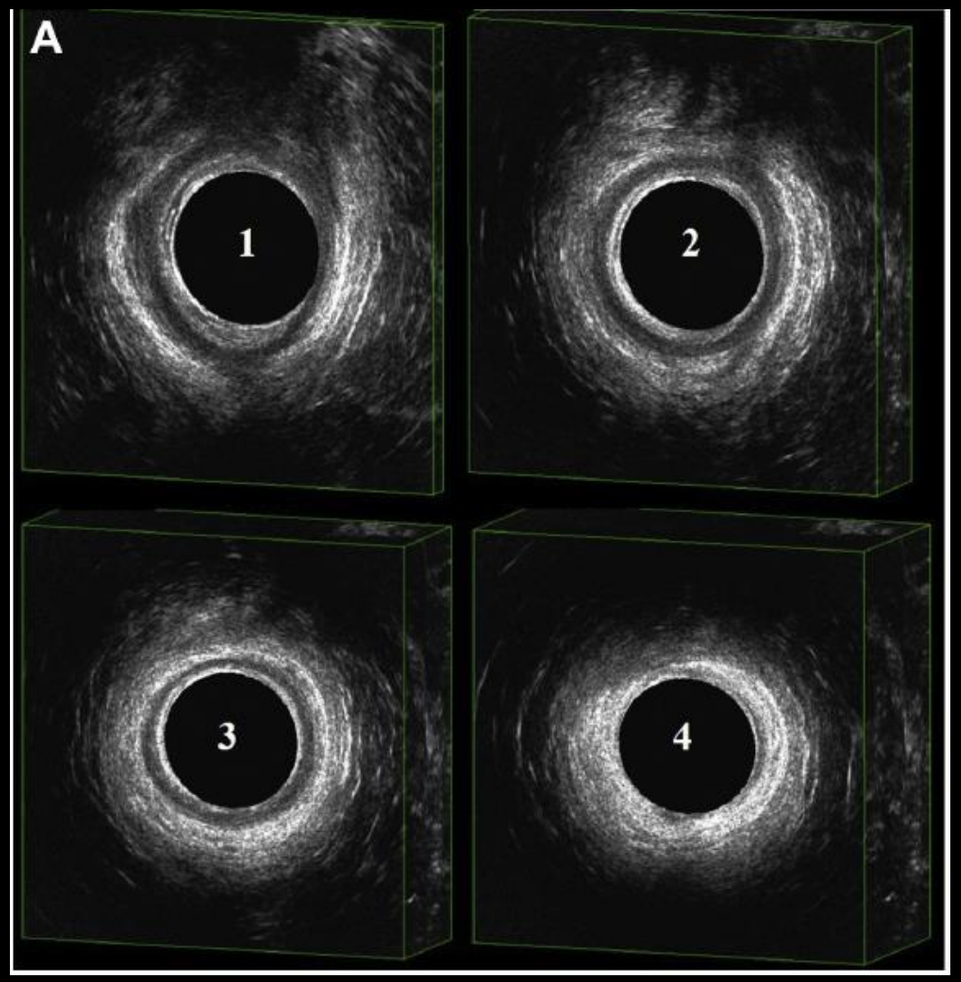
Although the rationale for the study is highly appropriate, we beg to differ with the authors' conclusions, in particular regarding the alleged inferiority of TPUS compared to EAUS. First, as mentioned by the authors themselves in the Discussion, TPUS was performed with a GE Voluson i ultrasound system, which is obsolete and significantly inferior to modern machines commonly used in recent studies of OASI imaging [2–4]. The poor image quality would be expected to lower sensitivity and specificity. The first author (I.V.) has in fact published a recent paper using a more modern ultrasound system [3], and the difference in the image quality of the figures between those studies is striking. Second, the criteria for diagnosing significant external and internal anal sphincter defects (EAS and IAS, respectively) on TPUS are flawed. The authors use cutoffs that are derived from previous comparisons to EAUS in which the latter was considered the gold standard. This assumption is quite inappropriate since suggested cutoffs should be validated against symptoms and tested in a normal control group rather than in women after OASI repair, as previously done for TPUS [2, 5]. Third, the authors tested for an association of AI with EAS and IAS defects combined. This may well be misleading since IAS defects on TPUS are sometimes seen in nulliparous women and are less predictive of AI [2]. Finally, IAS assessment was not conducted according to current validated methodology for IAS imaging, which differs from EAS with assessment criteria, using a more cranial slice placement and a wider inter-slice interval on tomographic imaging.

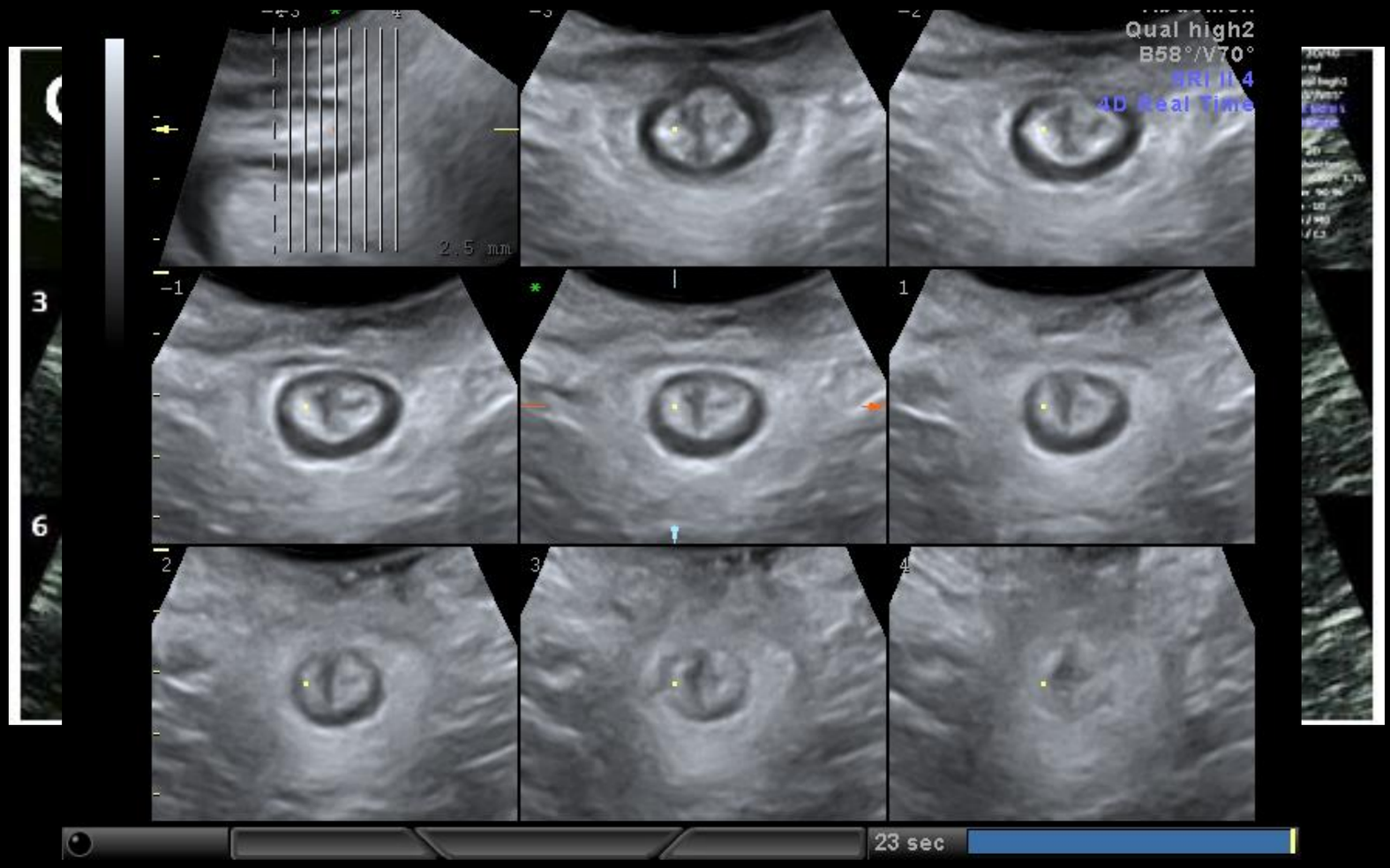
In conclusion, it appears to us that the authors have performed an inappropriate comparison with suboptimal conditions, which prevents drawing any firm conclusions regarding superiority of any ultrasound modality for predicting anal incontinence after obstetric anal sphincter injury.

Compliance with ethical standards

Conflict of interest HP Dietz and KL Shek have both received lecture fees and unrestricted educational grants from GE Medical and Mindray. M Gillor has no conflicts of interest to declare.

In conclusion





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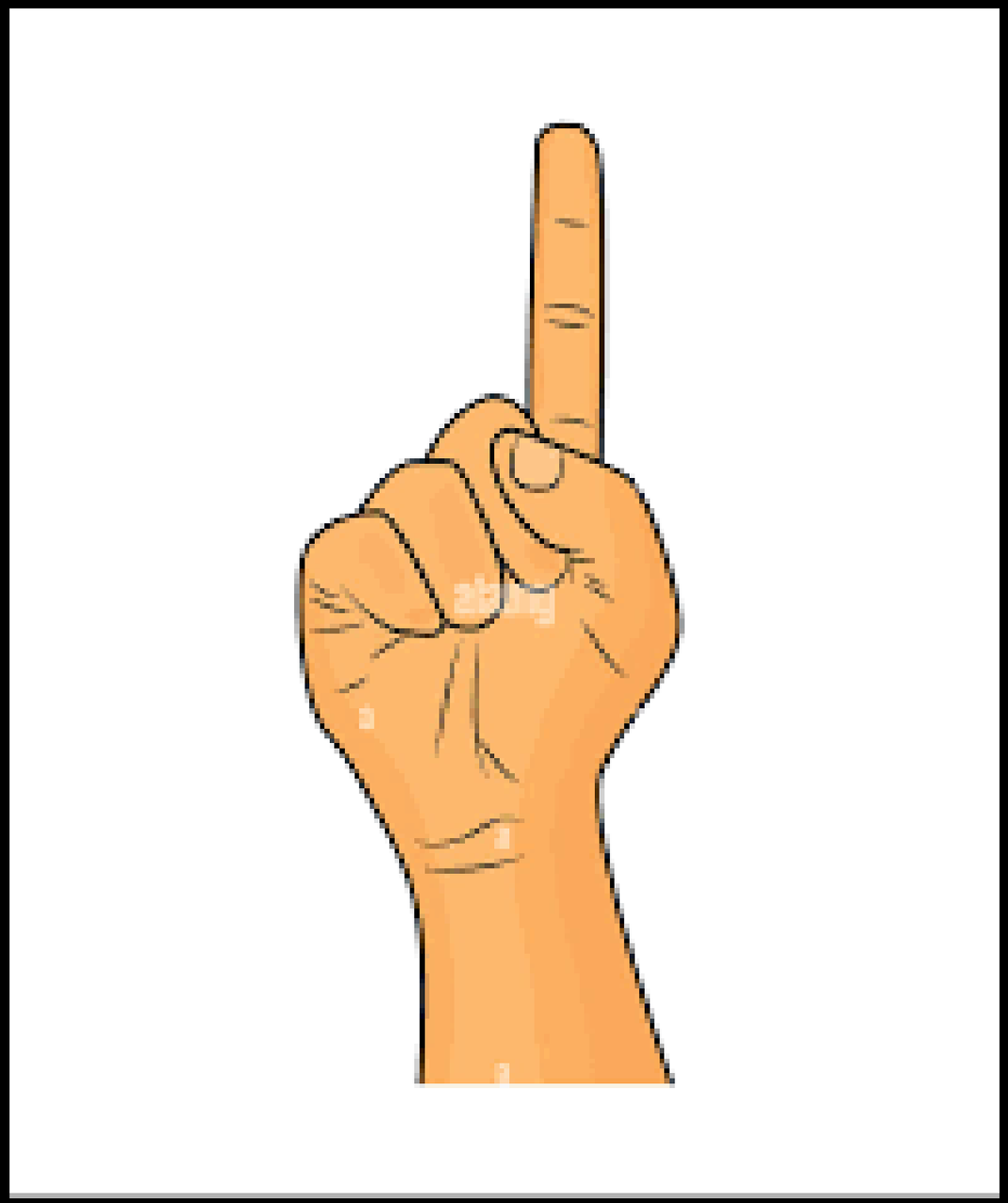

Guidelines

ISOG (2017):

"...אופן הלידה העתידית לאחר לידה עם OASIS מותנה בהתבטאות תסמינים של אי שליטה במתן צואה, דיספראוניה, דרגת הקרע בלידה הקודמת, נוכחות גורמי סיכון לקרע חוזר, הנתונים המיילדותיים בהריון החדש, התוכנית המיילדותית של האישה, תוצאות בדיקות העזר ורצון האישה.

יש לדון עם האישה על כל ההיבטים לעיל, ולקבוע את אופן היילוד על בסיס פרטני."

St. Mark's Incontinence Score (SMIS)

	Never	Rarely	Sometimes	Weekly	Daily
Incontinence for solid stool	0	1	2	3	4
Incontinence for liquid stool	0	1	2	3	4
Incontinence for gas	0	1	2	3	4
Alteration in lifestyle	0	1	2	3	4

	No	Yes
Need to wear a pad or plug	0	2
Taking constipating medications	0	2
Lack of ability to defer defecation for 15 min (fecal urgency)	0	4

Other scoring systems used in the medical literature include: Wexner, Pescatori and Rockwood