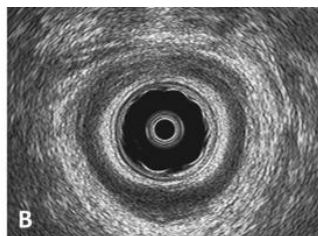


המרכז  
הרפואי  
שמיר



# TRANSRECTAL IMAGING OF OASIS

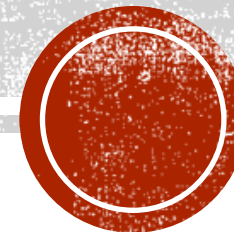
The Israeli Society  
of Urogynecology  
and Pelvic Floor

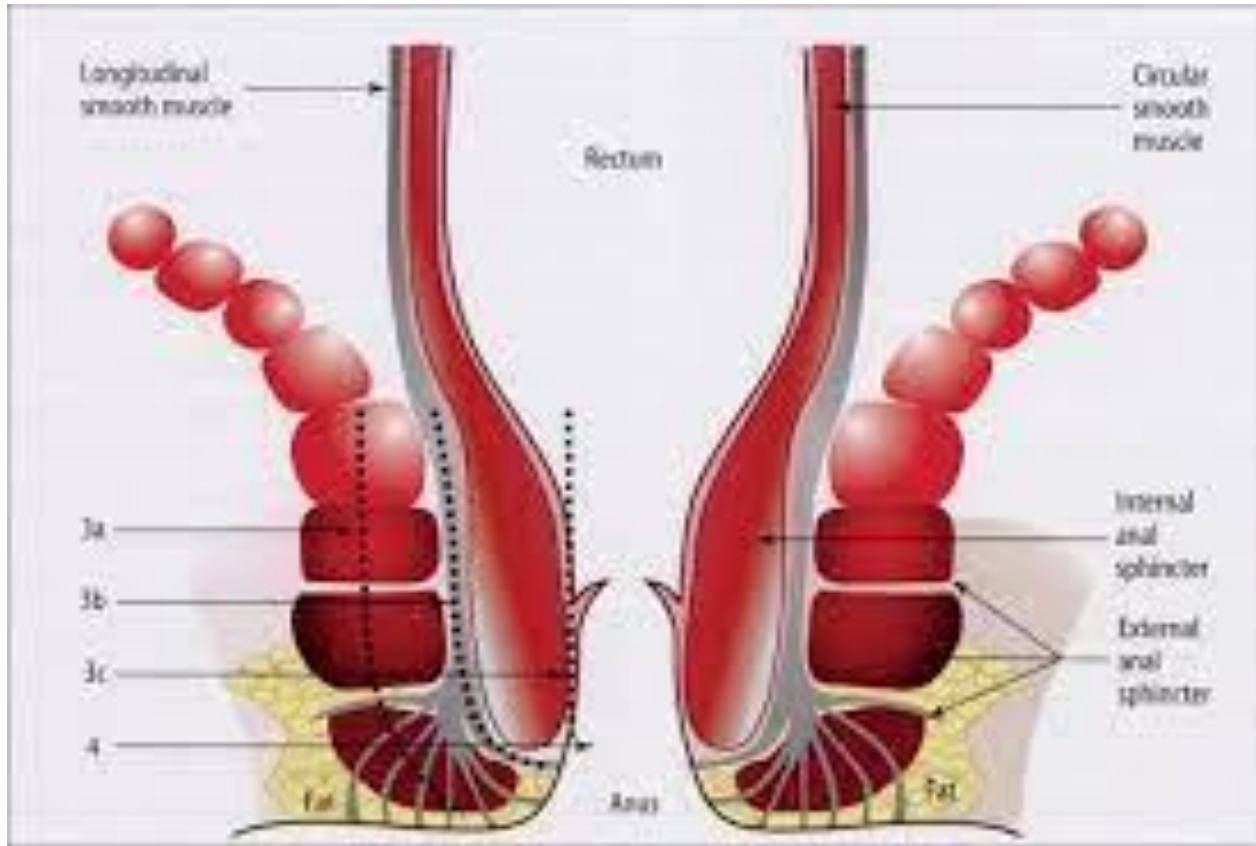


החברה הישראלית  
לאורוגינקולוגיה  
ורצפת האגן

Dr Tomashev Roni

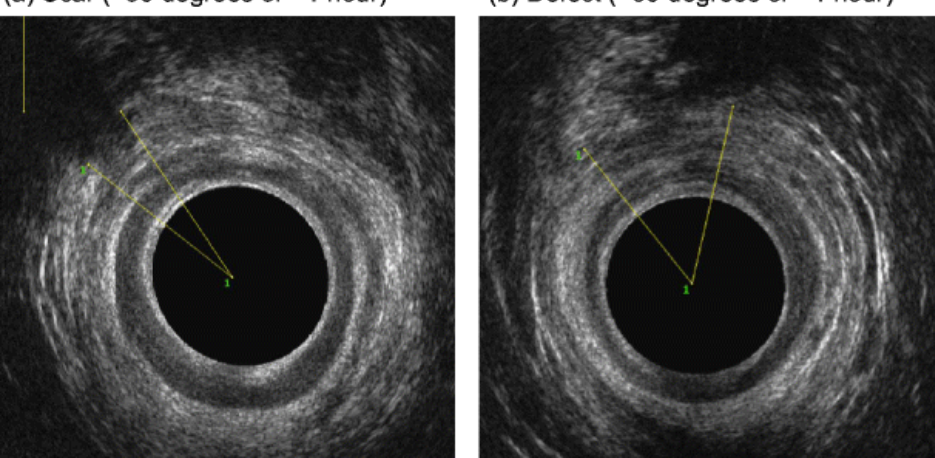
Shamir Medical Center





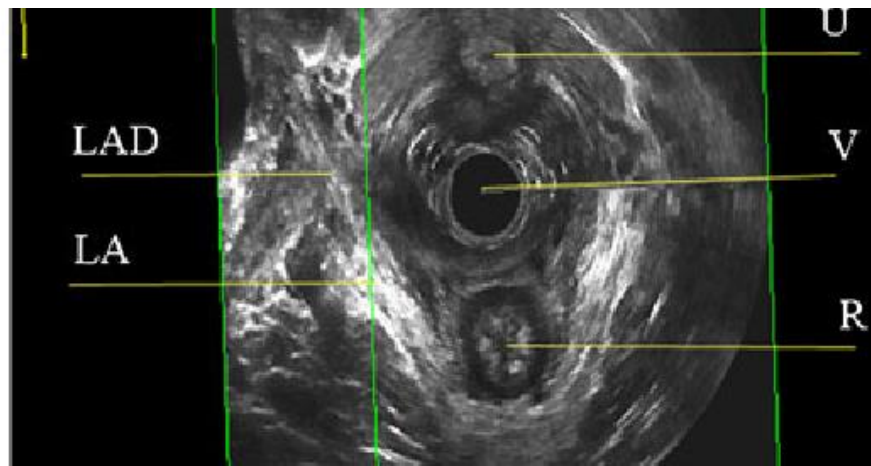
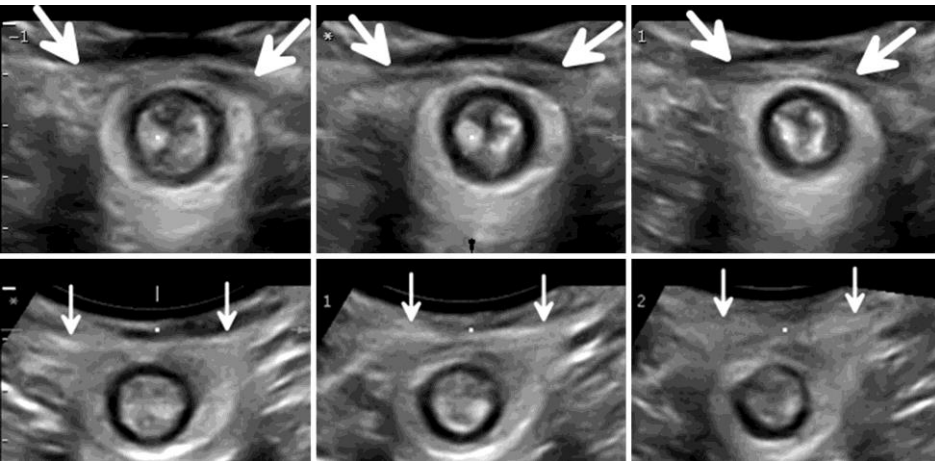
# OASIS

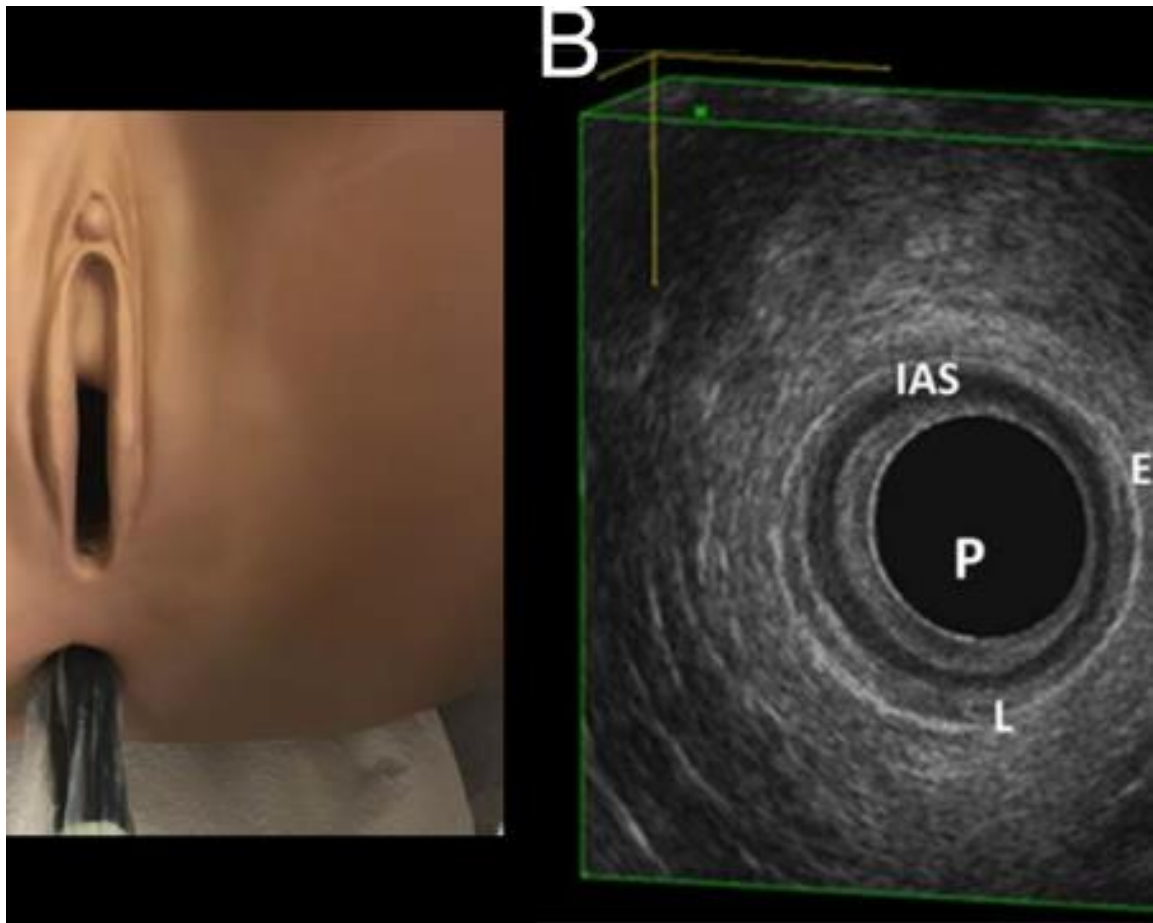




# ANAL SPHINCTER ULTRASOUND IMAGING

- Endo – anal/ Trans – rectal Ultrasound
- Trans – perineal/ Trans – labial Ultrasound
- Endo – vaginal Ultrasound





# ENDO — ANAL/ TRANS — RECTAL ULTRASOUND

© Shobeiri A



# TRUS/EAUS INDICATIONS

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1. Fecal incontinence

2. Anal sphincter imaging after birth trauma

3. Perianal fistulae

4. Rectal tumors

5. Anal carcinoma for staging

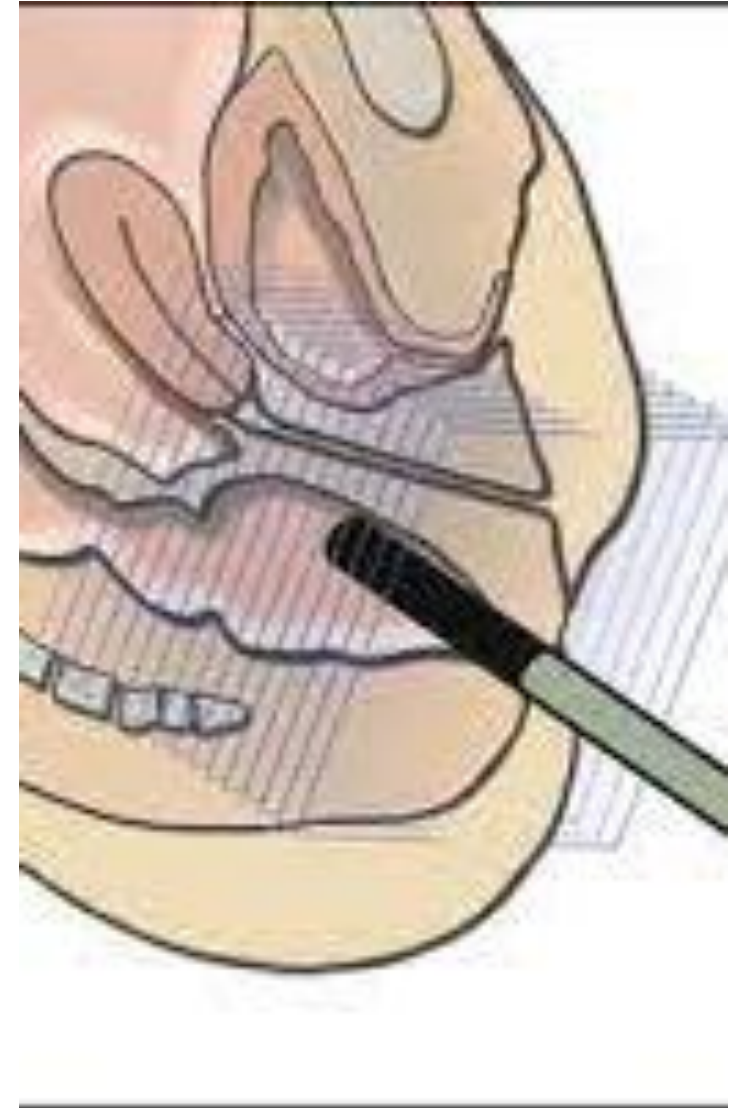
6. Prostate and seminal vesicle evaluation

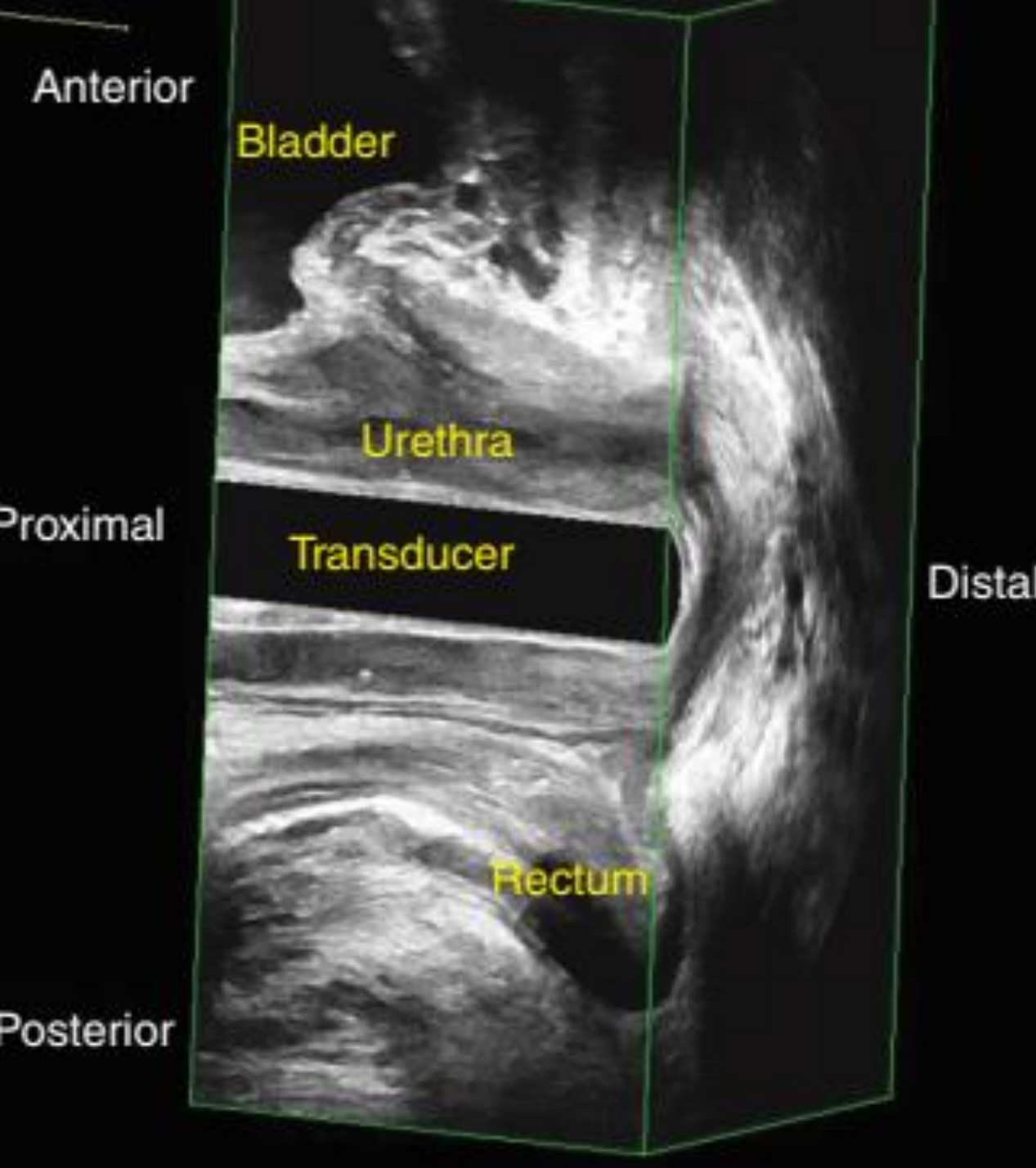
7. Mesh Imaging



**WALTERS & KARRAM**  
**“UROGYNECOLOGY AND RECONSTRUCTIVE PELVIC SURGERY”**  
**FIFTH EDITION 2022**

- Endoanal ultrasound is useful for the evaluation of anal sphincter defect or pathology and is performed with a high-resolution, multifrequency, mechanical 360-degree rotational transducer
- The patient is placed in the lithotomy, lateral, or prone position (Some clinicians prefer the left lateral position)
- If in lithotomy position, the transducer is inserted gently at a 45-degree angle until the levator plate is visualized posteriorly



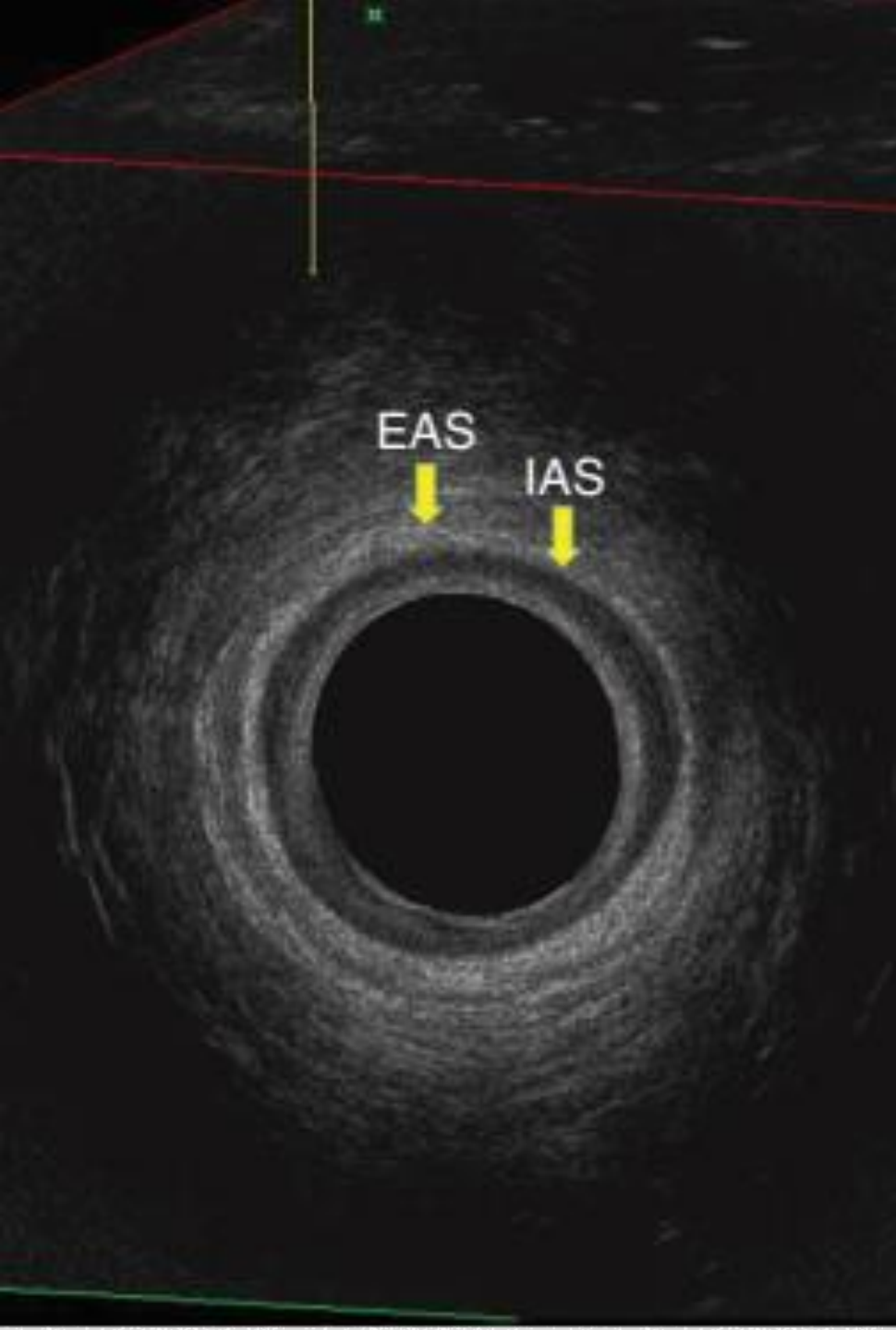


## WALTERS & KARRAM "UROGYNECOLOGY AND RECONSTRUCTIVE PELVIC SURGERY" FIFTH EDITION 2022

- Irrespective of patient positioning, the transducer should be positioned so that the anterior aspect of the anal canal is superior on the screen, at the 12 o'clock position
- The distal end of the transducer should be at the level of the puborectalis muscle or 6 cm into the anal canal
- The mechanical rotational transducer, once activated, automatically obtains 3D images



**WALTERS & KARRAM**  
**“UROGYNECOLOGY AND RECONSTRUCTIVE PELVIC SURGERY”**  
**FIFTH EDITION 2022**

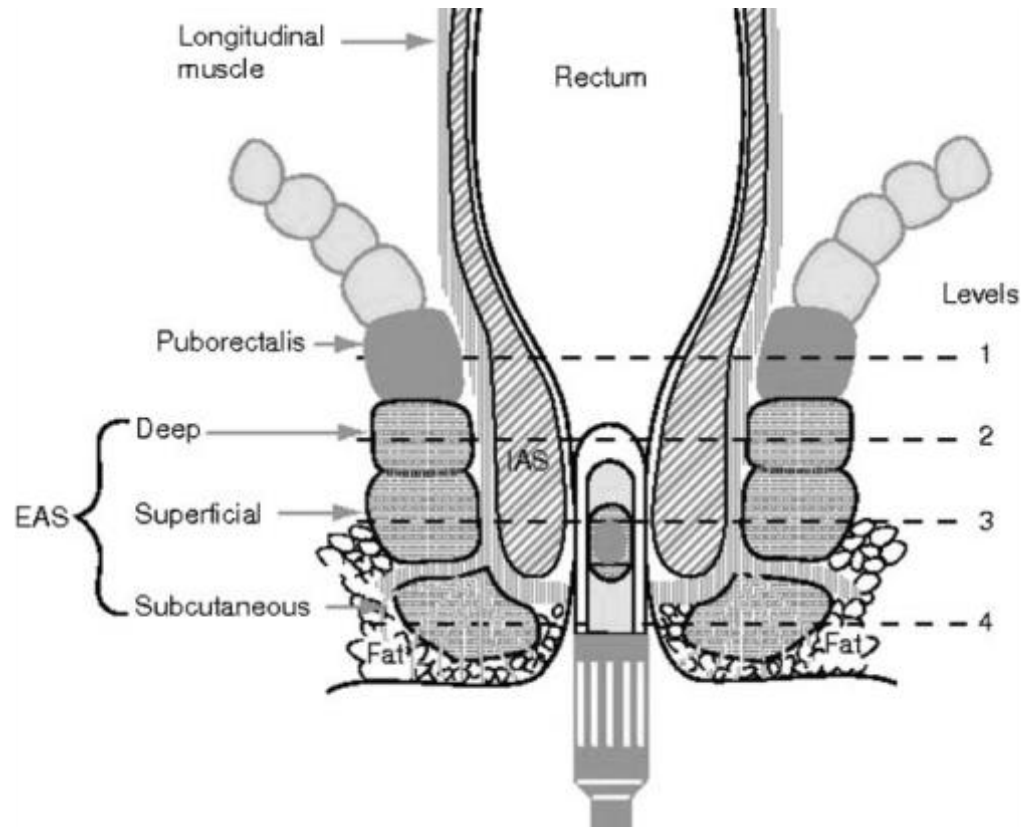


- The IAS is a continuous smooth muscle hypoechoic ring, the EAS is a striated muscle hyperechoic ring, and the conjoint longitudinal muscle consists of a mixed echogenicity layer between the two sphincters





# ANAL CANAL IMAGING LEVELS



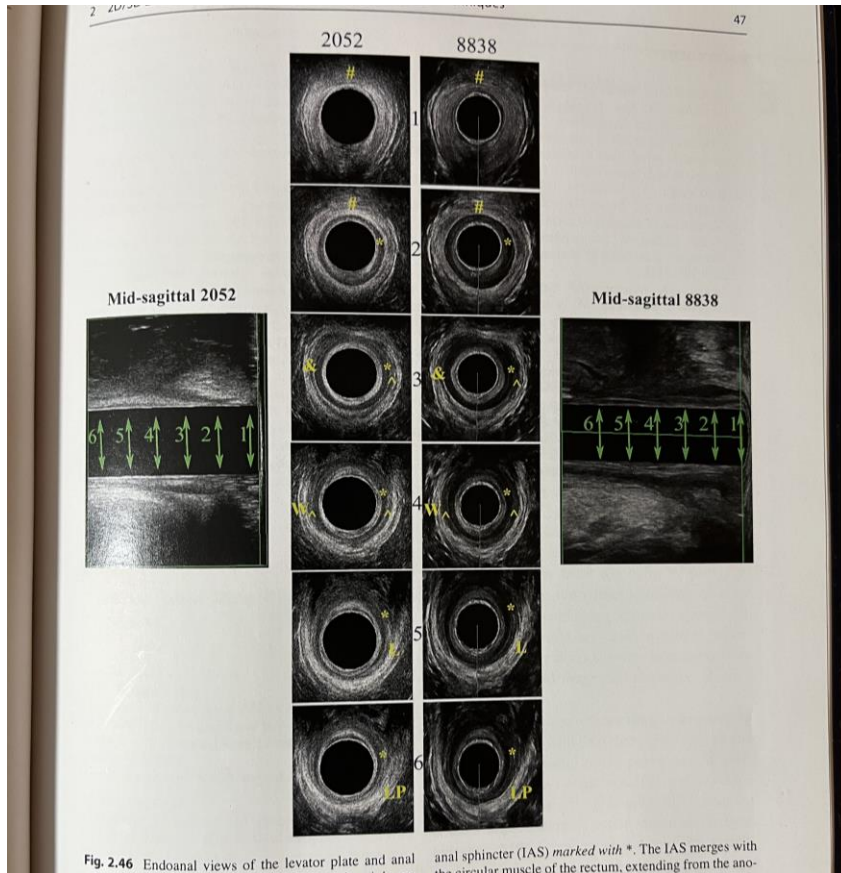
- Proximal anal canal: at the most cranial level of the puborectalis
- Middle anal canal: level where the EAS forms a complete ring
- Distal anal canal: level below which the IAS terminates

- Gold DM, Halligan S, Kmiot WA, Bartram CI. Intraobserver and interobserver agreement in anal endosonography. *Br J Surg* 1999;86:371-5

- Abdool, Z., Sultan, A. H., & Thakar, R. (2012). *Ultrasound imaging of the anal sphincter complex: a review. The British Journal of Radiology, 85(1015), 865-875.* doi:10.1259/bjr/27314678

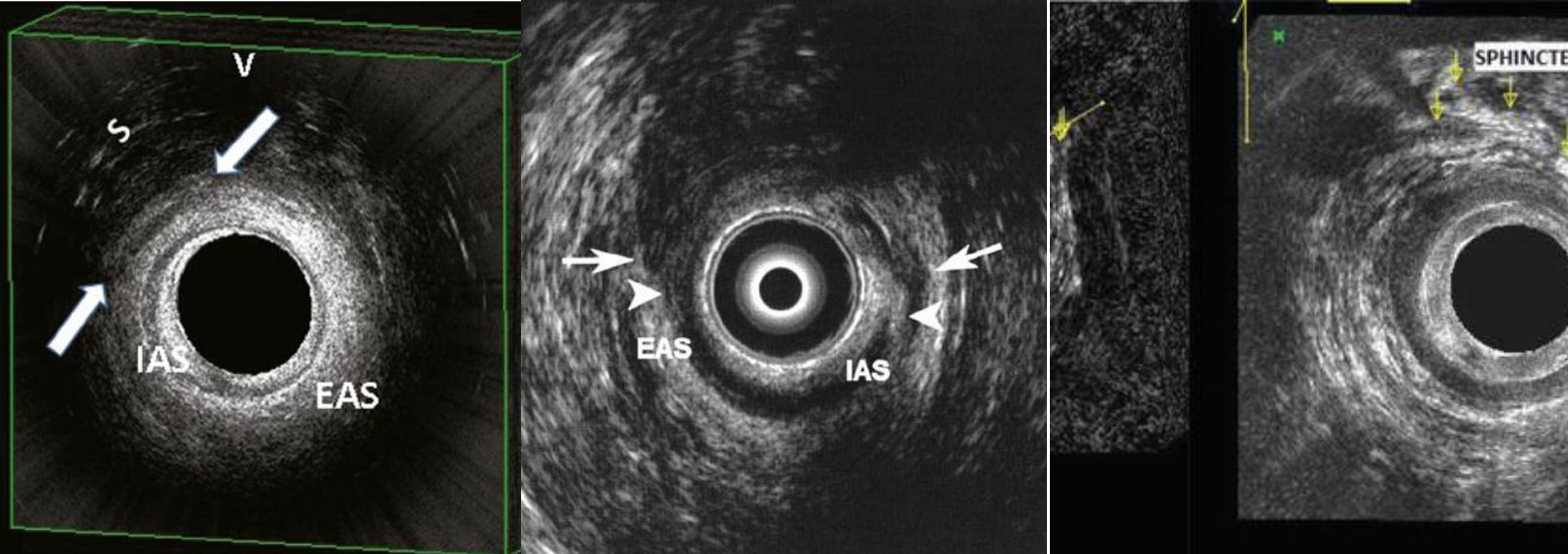


WALTERS & KARRAM  
"UROGYNECOLOGY AND RECONSTRUCTIVE PELVIC  
SURGERY" FIFTH EDITION 2022



- When performing endoanal ultrasound, the anal canal is divided into three levels in the axial plane: upper, middle, and lower
- The uppermost level is marked proximally by the puborectalis muscle and distally by the ring of the IAS
- The middle level is marked by the complete ring of the IAS and EAS and by visualization of the transverse perinei muscles
- The lower level is marked by the subcutaneous part of the EAS





Significant” obstetric anal sphincter injuries (OASIS) have been defined as visible defects of at least 30° in at least 4/6 slices using tomographic ultrasound imaging

*European Journal of Obstetrics & Gynecology and Reproductive Biology 257 (2021) 70–75*

**TABLE 2**  
**Diagnosis of residual defect after OASI according to sonographic technique**

Technique	3D-EAUS	4D-TPUS
OASI	Defect of $\geq 30^\circ$ of the EAS in $\geq 2$ of 3 slices <sup>41</sup>	Defect of $\geq 30^\circ$ of the EAS in $\geq 4$ of 6 TUI slices <sup>5,9</sup>

3D, 3-dimensional; 4D-TPUS, 4-dimensional transperineal ultrasound; EAS, external anal sphincter; OASI, obstetrical anal sphincter injury.

Bellussi. Sonographic diagnosis of obstetrical anal sphincter injury. Am J Obstet Gynecol MFM 2021.

Federica Bellussi, MD, PhD; Hans Peter Dietz, MD, PhD, November 2021 AJOG MFM

# OASIS DIAGNOSIS



AN INTERNATIONAL  
UROGYNECOLOGICAL  
ASSOCIATION  
(IUGA)/INTERNATIONAL  
CONTINENCE SOCIETY  
(ICS) JOINT REPORT  
ON THE TERMINOLOGY  
FOR FEMALE PELVIC  
FLOOR DYSFUNCTION -  
2010

- **Anal ultrasound (endosonography): is the gold standard investigation in the assessment of anal sphincter integrity**




- According to Sultan AH Endoanal Ultrasound is superior to other diagnostic tools for the evaluation of sphincter defects
- when confirmed histologically, Endoanal Ultrasound had an accuracy of 100%, compared with 75% for electromyogram (EMG) mapping, 75% for manometry and 50% for clinical assessment.
- Its now considered to be the gold standard in the management of anal incontinence
- Sultan AH. The role of anal endosonography in obstetrics. Ultrasound Obstet Gynecol, 2003;22:559–60.

# TRUS / EAUS VALIDITY AND ACCURACY

# TRUS / EAUS VALIDITY AND ACCURACY

- Transrectal ultrasound (TRUS) is a validated, highly accurate, technique for the detection of anal sphincter morphology abnormalities
- There is a perfect correlation with surgical findings
- TRUS findings of anal sphincter tears are correlated with electromyography and manometric findings

*(TRUS, MANOMETRY, AND PNTML/GURLAND, HULL 2008)*

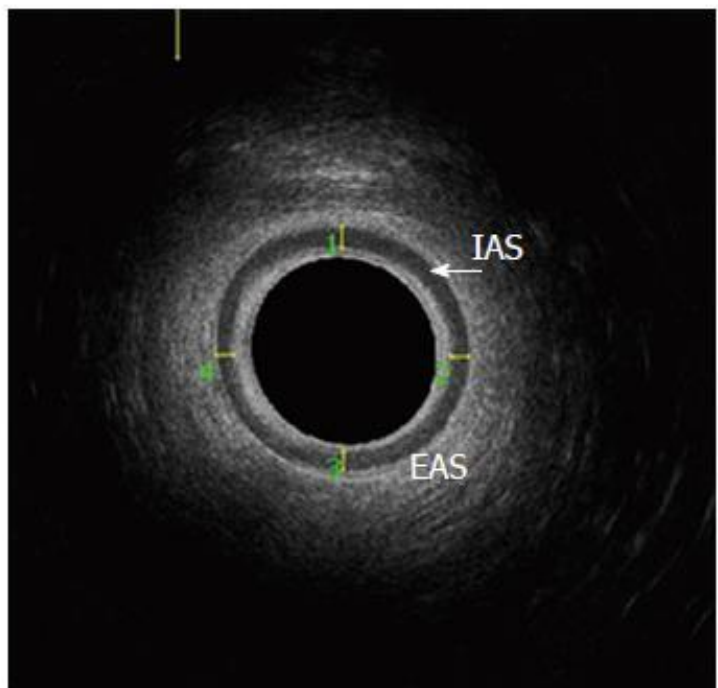


TRUS/ EAUS  
VALIDITY AND  
ACCURACY

- Studies comparing AE with endoanal magnetic resonance imaging (MRI) have shown that **both methods are equally good** for demonstrating defects in the external anal sphincter, **while the internal anal sphincter is better visualized with AE**

Malouf, A. J et al (2000). *Prospective Assessment of Accuracy of Endoanal MR Imaging and Endosonography in Patients with Fecal Incontinence. American Journal of Roentgenology*

# SO WHO DOES IT BETTER?







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

Ingrid Volløyhaug<sup>1,2</sup> · Annika Taithongchai<sup>3</sup> · Linda Arendsen<sup>3</sup> · Isabelle van Gruting<sup>3</sup> · Abdul H. Sultan<sup>3</sup> · Raneer Thakar<sup>3</sup>

- 250 women with OASI recruited during the period 2013–2015
- They were examined 6–12 weeks postpartum or in a subsequent pregnancy with 3D EAUS, IUS and TPUS and measurement of anal pressure
- Prevalence of urgency/solid/liquid AI or flatal AI and anal pressure were compared in women with a defect and those with an intact sphincter
- **”Endoanal ultrasound had the strongest association with AI symptoms 2 years after OASI”**

**Table 2** Proportion with anal incontinence (AI) for women with intact (including non-significant defects<sup>a</sup>) and defect external anal sphincter (EAS) and internal anal sphincter (IAS) diagnosed with endoanal, introital<sup>b</sup> and transperineal<sup>c</sup> ultrasound

	Intact sphincter <i>n/N%</i>	Defect sphincter <i>n/N%</i>	Chi-squared test, <i>p</i>
Any faecal urgency, solid or liquid AI versus EAS defect			
Endoanal ultrasound	23/175 (13.1)	26/73 (35.6)	<0.01
Introital ultrasound	24/143 (16.8)	19/80 (23.8)	0.21
Transperineal ultrasound	20/131 (16.0)	25/96 (26.0)	0.06
Any flatal AI versus IAS defect			
Endoanal ultrasound	27/214 (12.6)	9/34 (26.5)	0.03
Introital ultrasound	27/189 (14.3)	7/52 (13.5)	0.90
Transperineal ultrasound	28/219 (12.8)	6/19 (31.6)	0.03

<sup>a</sup> <2 out of 5 slices with an IAS defect and <3 out of 7 with an EAS defect

<sup>b</sup> On introital ultrasound, it was possible to evaluate 223 volumes of the EAS and 241 of the IAS in all 7 (EAS) and 5 (IAS) slices

<sup>c</sup> On transperineal ultrasound, it was possible to evaluate 227 volumes of the EAS and 238 of the IAS in all slices



## GYNECOLOGY

## Comparing the diagnostic modalities for diagnosis of anal sphincter injuries

Annika Taithongchai, MBChB;  
Abdul H. Sultan, FRCOG; Rane

- Three-dimensional transperineal ultrasound provide suitable intact anal sphincter sensitive endoanal accurately
- Onward referral ultrasound imaging if a defect is seen remains the most correlates best with symptoms

TABLE 3

**Diagnostic test characteristics of introital and transperineal ultrasound imaging for diagnosis of external and internal anal sphincter defects with the use of endoanal ultrasound imaging as reference standard in 250 women who sustained obstetric anal sphincter injury**

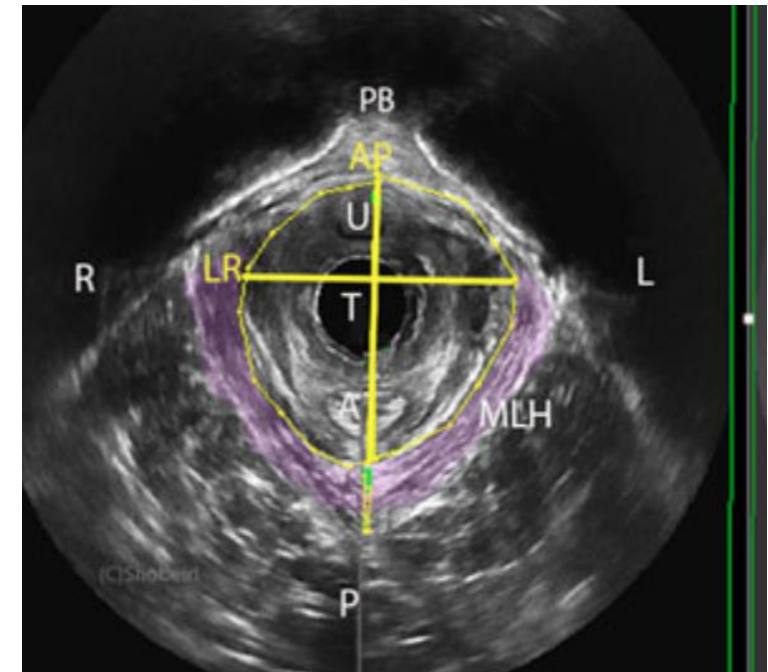
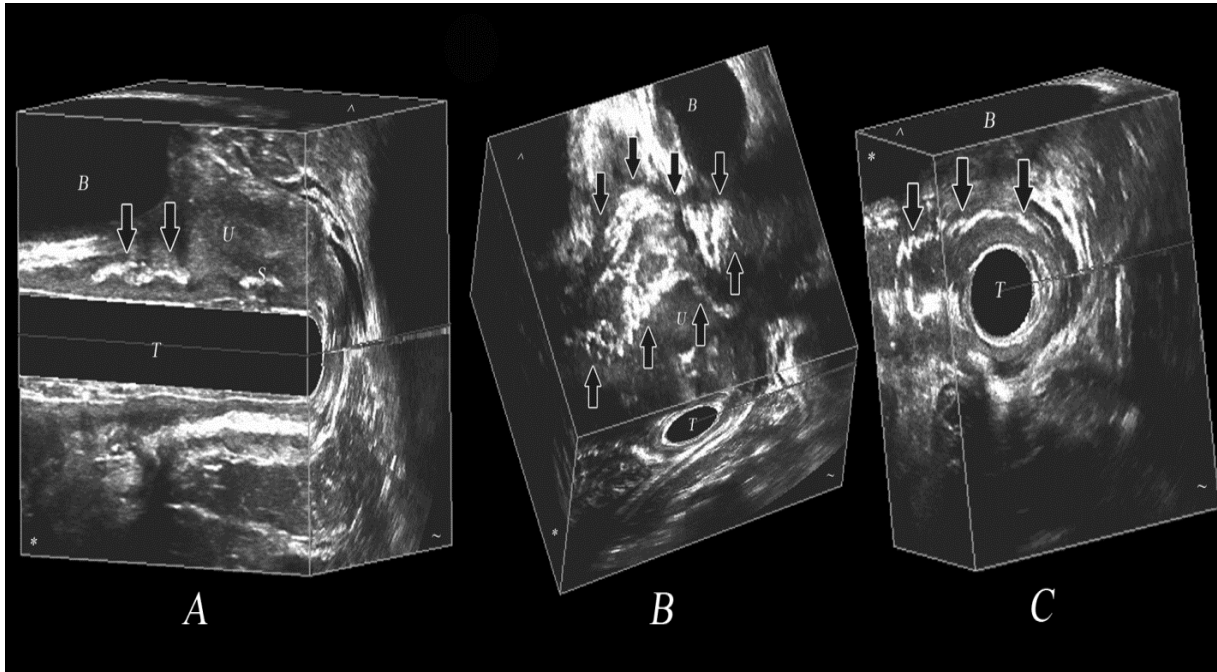
Anal sphincter	Imaging modality	Defect, <sup>a</sup> n/N (%)	Sensitivity	Specificity	Positive predictive value	Negative predictive value	Positive likelihood ratio	Negative likelihood ratio
External	Endoanal ultrasound imaging (N=248) <sup>b</sup>	73/248 (29.4)	N/A	N/A	N/A	N/A	N/A	N/A
	Introital ultrasound imaging (N=248) <sup>b</sup>	80/223 <sup>c</sup> (35.9)	0.65	0.75	0.50	0.86	2.60	0.47
	Transperineal ultrasound imaging (N=246) <sup>b</sup>	96/227 <sup>d</sup> (42.3)	0.70	0.69	0.51	0.85	2.26	0.43
Internal	Endoanal ultrasound imaging (N=248) <sup>b</sup>	34/248 (13.7)	N/A	N/A	N/A	N/A	N/A	N/A
	Introital ultrasound imaging (N=248) <sup>b</sup>	52/241 <sup>c</sup> (21.6)	0.59	0.84	0.63	0.93	3.69	0.49
	Transperineal ultrasound imaging (N=246) <sup>b</sup>	19/238 <sup>d</sup> (8.0)	0.43	0.97	0.37	0.93	14.33	0.59

N/A, not applicable.

<sup>a</sup> With the use of the cut off values of  $\geq 1$  level for external and internal anal sphincter on endoanal ultrasound,  $\geq 3/7$  slices for external anal sphincter or  $\geq 2/5$  slices for internal anal sphincter on introital ultrasound imaging/transperineal ultrasound imaging; <sup>b</sup> 2 volumes for different women were missing; <sup>c</sup> 22 volumes had incomplete data to assess external anal sphincter and or internal anal sphincter fully; <sup>d</sup> 23 volumes had incomplete data to assess external anal sphincter and or internal anal sphincter fully.

Taithongchai et al. *Ultrasound diagnosis of anal sphincter defects. Am J Obstet Gynecol* 2019.

D OF 250  
SPHINCTER  
ENSIONAL  
ULTRASOUND  
IC



© Shobeiri A

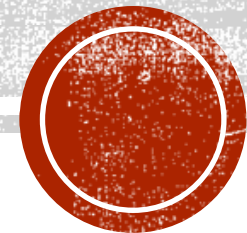
# PELVIC FLOOR AND MESH IMAGING

- Endovaginal US that performed with the 3D endo-anal probe allows an accurate visualization of the pelvic floor musculature and vaginal meshes
- Sacrocolpopexy mesh can be visualized with transrectal and transvaginal probes only



PROS	CONS
<b>GOLD STANDARD</b>	Inserted transanally
Accuracy of 100%	Can cause a distortion of anal canal
Perfect correlation with surgical findings	
Best for visualization of IAS	
Best correlation with symptoms	
Best for mesh visualization	
Preferred by anorectal surgeons	

# PROS AND CONS



**Thank you :) )**

**Questions**

