

Start	End	Topic	Speakers
10:30	10:35	Introduction and Objectives of Workshop	Shannon Wallace
10:35	10:50	Defecography: When to order, How it is performed, how to interpret and how it will guide management	Anna Spivak Ola Stankiewicz
10:50	11:05	Anorectal manometry and Motility Studies: When to order, How it is performed, how to interpret and how it will guide management	Leila Neshatian
11:05	11:20	Dynamic pelvic floor ultrasound including endoanal ultrasound and echodefecography: When to order, How it is performed, how to interpret and how it will guide management	Ola Stankiewicz Sthela Murad-Regadas
11:20	11:35	Urodynamic studies and Cystoscopy: When to order, How they are performed, how to interpret and how it will guide management	Shannon Wallace
11:35	11:50	Panel discussion on how we practice using pelvic floor testing	Shannon Wallace Anna Spivak Leila Neshatian Ola Stankiewicz Sthela Murad-Regadas
11:50	12:00	Questions	All

### **Description**

Background information:

With growing awareness of the pathophysiology of pelvic floor disorders, there has been a slow and steady trend toward team-based care of complex health issues, including pelvic floor dysfunction. Patient with pelvic floor disorders including pelvic organ prolapse, rectal prolapse, urinary incontinence, fecal incontinence and defecatory dysfunction are treated by a variety of specialists in urogynecology/female urology, colorectal surgery, gastroenterology, and physical therapy. It is therefore crucial to understand what work-up and testing may need to be done to home in on the diagnosis and develop a holistic treatment plan.

A thorough pelvic floor history should include questions about bladder and bowel symptoms, urinary and fecal incontinence, feelings of bulge from the vagina or rectum, difficulty emptying the bladder or bowels, sexual function and pain. Standardized tools such as the Pelvic Floor Distress Inventory (PFDI-20) and Pelvic Floor Impact Questionnaire (PFIQ-7) can be used to assess symptom severity and impact on quality of life.

#### Anterior and Middle Compartment Focused History and Examination

A focused history includes questions about previous prolapse and anti-incontinence surgeries, obstetric history such as operative deliveries (forceps/vacuum) and perineal lacerations involving the anal sphincter, and any genitourinary disorders. Daytime and nighttime urinary frequency and urinary incontinence, history of urinary tract infections, a sensation of incomplete bladder emptying, hematuria, vaginal pain, and vaginal bulge/pressure should also be assessed. Abnormal vaginal bleeding or discharge should be addressed as these could be a result of poor vaginal tissue quality (atrophy) or uterine pathologies, such as endometrial hyperplasia or cancer. The vaginal exam is performed in the supine or standing position. A Pelvic Organ Prolapse Quantification (POP-Q) exam is performed to determine the extent of anterior, apical, or posterior vaginal prolapse with Valsalva(14). Vaginal prolapse is staged from 1 to 4, with stage 1 being minimal prolapse and stage 4 being complete eversion of the uterovaginal tissue. Urinary leakage with cough or Valsalva is also determined. The uterus and adnexa are palpated for any masses, and a Kegel squeeze is elicited to determine pelvic floor muscle strength.

#### Posterior Compartment Focused History and Examination

A focused bowel history should include: bowel consistency and frequency, use of laxative or antidiarrheal agents, incomplete defecation, and digital or positional maneuvers required to defecate as well as lifestyle modifications adopted to cope with symptoms (e.g. pads, social isolation). The presence of mucus discharge, fecal soiling or leakage, and urgency or passive incontinence may suggest internal or occult external rectal prolapse, sphincter dysfunction or dyssynergic defecation. Rectal examination is often performed in the left lateral position, or while kneeling or squatting. Patients are encouraged to bring in a picture of the prolapse in situations where it can be painful or difficult to elicit during examination. Visual inspection of the anus and perianal area to identify patulous anus, anal fissure, perianal fistulas, or evidence of prior interventions such as fistulotomy is essential. Attention should be paid to visible contractions of the anal sphincter versus accessory muscles with squeeze and pelvic floor motion with Valsalva. Digital rectal exam will allow assessment of anal tone, contractility and dyssynergia during squeeze and simulated defecation maneuvers Anoscopy visualizes the hemorrhoid complex and can help to identify rectal

intussusception or full-thickness rectal prolapse. Colonoscopic evaluation is recommended for age appropriate screening for colorectal cancer, and in women with red flag symptoms.

### Pelvic Floor Testing

Anorectal manometry and EMG testing help to determine anal sphincter pressures, rectal sensation, mobility of the pelvic floor and anorectal coordination. It is often done in conjunction with balloon expulsion test to assess the rectal evacuation.

Integrated total pelvic floor ultrasound included multiple exams including endoanal, intravaginal, intrarectal and perineal ultrasound with dynamic echodefecography. It provides detailed information on anal sphincter and pelvic floor muscle and organ structural pathologies along with functional pathologies on dynamic testing.

MRI defecography (MRD) or fluoroscopic defecography helps to identify multicompartiment or occult prolapse, enterocele, sigmoidocele and perineoceles and their impact upon evacuation by the assessment of defecatory dynamics as well as the function of the pelvic floor in defecation such as the ability to initiate and complete the bowel movement. It also helps assess the degree of perineal descent.

Urodynamic testing is a combination of procedures to determine bladder and urethral function and can be used to assess for stress urinary incontinence, overactive bladder, bladder outlet obstruction, underactive bladder, abdominal voiding and urethral sphincter disorders.

Motility studies including transit tests and colonic manometry allow diagnosis of slow transit and colonic inertia in patients with resistant constipation.

### Key learning points

1. A comprehensive evaluation of the pelvic floor is crucial for assessing various pelvic floor disorders including pelvic organ prolapse, rectal prolapse, urinary incontinence, fecal incontinence and defecatory dysfunction
2. Pelvic floor disorders often require multidisciplinary evaluation and treatment with specialists in colorectal surgery, gastroenterology, urogynecology/female urology and pelvic floor physical therapy
3. An understanding of when to order pelvic floor testing and how to interpret the results in the context of clinical assessment is crucial to homing in on an accurate diagnosis and creating a holistic treatment plan

### Take home messages

This workshop focuses on the comprehensive evaluation of the pelvic floor which is crucial for assessing various pelvic floor disorders including pelvic organ prolapse, rectal prolapse, urinary incontinence, fecal incontinence and defecatory dysfunction. A thorough evaluation involves a combination of medical history, physical examination, and diagnostic tests. A medical history and physical examination will often guide which diagnostic tests are ordered and which specialists should also be involved in evaluation. Pelvic floor evaluation requires a multidisciplinary approach with experts in urogynecology/female urology, colorectal surgery, gastroenterology, and physical therapy. This collaborative effort is often underutilized, and patients continue to be symptomatic because a holistic approach is not used to develop a treatment plan. This workshop aims to educate providers who evaluate these patients and give them a comprehensive understanding of all the diagnostic tests used to evaluate the pelvic floor.

### **Aims of Workshop**

This workshop focuses on the comprehensive evaluation of the pelvic floor which is crucial for assessing pelvic floor disorders including pelvic organ prolapse, urinary incontinence, fecal incontinence, and defecatory dysfunction. A thorough evaluation involves a combination of medical history, physical examination, and diagnostic tests. We will highlight what symptoms and physical examination findings should trigger which pelvic floor testing. We will discuss how to perform and how to interpret: anorectal manometry, integrated total pelvic floor ultrasound (including endoanal), defecography, motility studies and urodynamics. We will then discuss how different diagnostic tests can guide treatment and management of pelvic floor disorders.

### **Educational Objectives**

A comprehensive evaluation of the pelvic floor involves diagnostic tests which are ordered, performed, and interpreted by providers in the fields of urogynecology/female urology, colorectal surgery, and gastroenterology. This workshop is designed to educate providers who evaluate these patients and may not be as familiar with some of the diagnostic tests ordered by their colleagues. The workshop will review the medical history and physical examination findings which prompt ordering of the various pelvic floor tests and will focus on how to perform the individual pelvic floor tests and how to interpret them. At the end of the individual lectures, the workshop will focus on how these pelvic floor tests can guide treatment and management in a panel discussion format. This workshop has broad appeal to nurses, nurse practitioners, physiotherapists, urogynecologist, female urologists, and colorectal surgeons by providing a comprehensive overview of all the pelvic floor testing which can aid in diagnosis and treatment of pelvic floor disorders.

### **Learning Objectives**

1. To better understand what medical history and physical examination findings will guide diagnostic tests of the pelvic floor
2. To better understand how to interpret diagnostic tests of the pelvic floor (anorectal manometry, motility studies, defecography, urodynamics, integrated total pelvic floor ultrasound including dynamic pelvic floor ultrasound, endoanal ultrasound and endovaginal ultrasound)
3. To better understand how diagnostic tests of the pelvic floor will guide treatment and management of pelvic floor disorders.

## **Target Audience**

Urology, Urogynaecology and Female & Functional Urology, Bowel Dysfunction

## **Advanced/Basic**

Intermediate

## **Suggested Learning before Workshop Attendance**

1. Hickman LC, Walters MD. Evaluation of pelvic floor disorders: History, physical examination, and diagnostic testing. In: Barber MD, Bradley CS, Karram MM & Walters MD editors. Walters & Karram Urogynecology and Pelvic Surgery 5th Edition and Novak's Gynecology 16th Edition. Philadelphia: Elsevier; 2022
2. Karram MM, Mahdy A. Urodynamics: Indications, Techniques, interpretation, and clinical utility. In: Barber MD, Bradley CS, Karram MM & Walters MD editors. Walters & Karram Urogynecology and Pelvic Surgery 5th Edition and Novak's Gynecology 16th Edition. Philadelphia: Elsevier; 2022
3. Cundiff GW. Endoscopic assessment of the lower urinary tract. In: Barber MD, Bradley CS, Karram MM & Walters MD editors. Walters & Karram Urogynecology and Pelvic Surgery 5th Edition and Novak's Gynecology 16th Edition. Philadelphia: Elsevier; 2022
4. Carrington EV, Scott SM, Bharucha A, Mion F, Remes-Troche JM, Malcolm A, Heinrich H, Fox M, Rao SS; International Anorectal Physiology Working Group and the International Working Group for Disorders of Gastrointestinal Motility and Function. Expert consensus document: Advances in the evaluation of anorectal function. *Nat Rev Gastroenterol Hepatol*. 2018 May;15(5):309-323. doi:10.1038/nrgastro.2018.27. Epub 2018 Apr 11. PMID: 29636555; PMCID: PMC6028941.
5. Bharucha AE, Basilisco G, Malcolm A, Lee TH, Hoy MB, Scott SM, Rao SSC. Review of the indications, methods, and clinical utility of anorectal manometry and the rectal balloon expulsion test. *Neurogastroenterol Motil*. 2022 Sep;34(9):e14335. doi: 10.1111/nmo.14335. Epub 2022 Feb 27. PMID: 35220645; PMCID: PMC9418387.
6. Alshiek J, Murad-Regadas SM, Mellgren A, Glanc P, Khatri G, Quiroz LH, Weinstein MM, Rostaminia G, Oliveira L, Arif-Tiwari H, Ferrari L, Bordeianou LG, Shobeiri SA; Members of the Expert Panel on Dynamic Ultrasound Imaging of Defecatory Disorders of the Pelvic Floor. Consensus Definitions and Interpretation Templates for Dynamic Ultrasound Imaging of Defecatory Pelvic Floor Disorders: Proceedings of the Consensus Meeting of the Pelvic Floor Disorders Consortium of the American Society of Colon and Rectal Surgeons, the Society of Abdominal Radiology, the International Continence Society, the American Urogynecologic Society, the International Urogynecological Association, and the Society of Gynecologic Surgeons. *Dis Colon Rectum*. 2023 Feb 1;66(2):200-216. doi: 10.1097/DCR.0000000000002651. Epub 2023 Jan 6. PMID: 36627252.
7. Paquette I, Rosman D, El Sayed R, Hull T, Kocjancic E, Quiroz L, Palmer S, Shobeiri A, Weinstein M, Khatri G, Bordeianou L; Members of the Expert Workgroup on Fluoroscopic Imaging of Pelvic Floor Disorders. Consensus Definitions and Interpretation Templates for Fluoroscopic Imaging of Defecatory Pelvic Floor Disorders: Proceedings of the Consensus Meeting of the Pelvic Floor Consortium of the American Society of Colon and Rectal Surgeons, the Society of Abdominal Radiology, the International Continence Society, the American Urogynecologic Society, the International Urogynecological Association, and the Society of Gynecologic Surgeons. *Dis Colon Rectum*. 2021 Jan;64(1):31-44. doi: 10.1097/DCR.0000000000001829. Erratum in: *Dis Colon Rectum*. 2021 Apr 1;64(4):e83. PMID: 33306530.
8. Gurland BH, Khatri G, Ram R, Hull TL, Kocjancic E, Quiroz LH, El Sayed RF, Jambhekar KR, Chernyak V, Mohan Paspulati R, Sheth VR, Steiner AM, Kamath A, Shobeiri SA, Weinstein MM, Bordeianou L; Members of the Expert Workgroup on Magnetic Resonance Imaging of Pelvic Floor Disorders. Consensus Definitions and Interpretation Templates for Magnetic Resonance Imaging of Defecatory Pelvic Floor Disorders: Proceedings of the Consensus Meeting of the Pelvic Floor Disorders Consortium of the American Society of Colon and Rectal Surgeons, the Society of Abdominal Radiology, the International Continence Society, the American Urogynecologic Society, the International Urogynecological Association, and the Society of Gynecologic Surgeons. *Dis Colon Rectum*. 2021 Oct 1;64(10):1184-1197. doi: 10.1097/DCR.0000000000002155. PMID: 34516442.



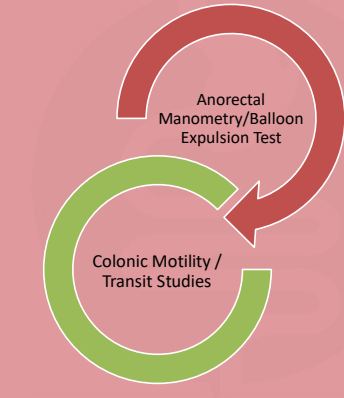


# Anorectal Manometry & Motility Testing

**Leila Neshatian, MD, MSc, FAGA**  
 Clinical Associate Professor of Medicine  
 Stanford University  
 October 23, 2024

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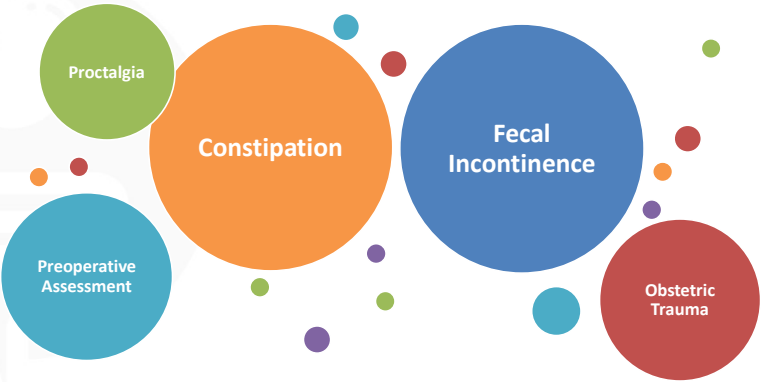
## Outline

- ✓ Indications
- ✓ Equipment
- ✓ Protocol
- ✓ Interpretation of anorectal manometry
  - ✓ Age and sex-matched normal values
  - ✓ Reproducibility
  - ✓ Utility
- ✓ Transit studies
  - ✓ Techniques

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## Indications of Anorectal Manometry



**Proctalgia**


**Constipation**

**Fecal Incontinence**

**Preoperative Assessment**

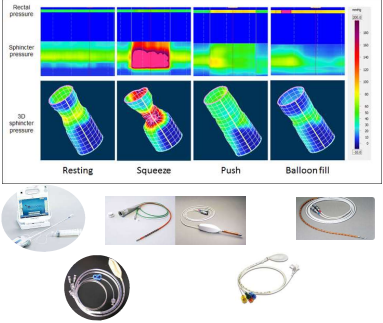
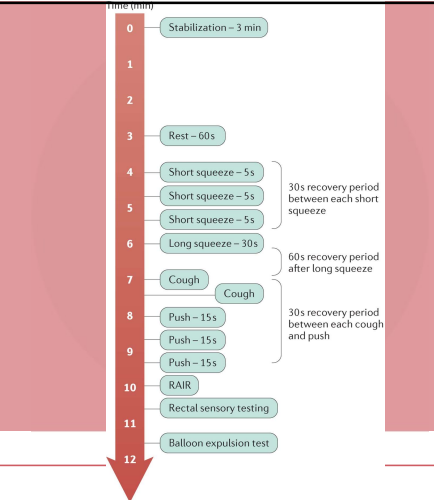
**Obstetric Trauma**

Carrington et al. Neurogastroenterology & Motility, 2019




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## Anorectal Manometry Equipment & Protocol

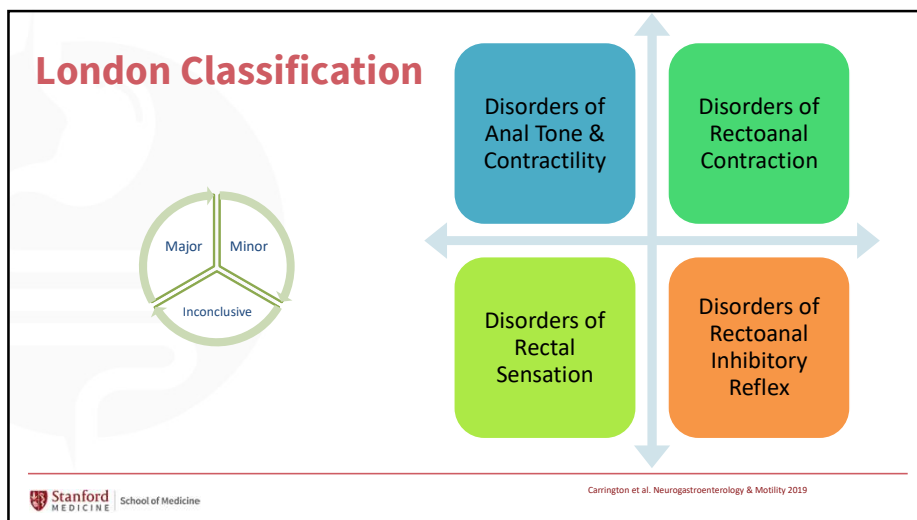
Time (min)	Activity	Recovery Period
0	Stabilization	3 min
1		
2		
3	Rest	60s
4	Short squeeze	30s recovery period between each short squeeze
5	Short squeeze	
6	Short squeeze	
6	Long squeeze	60s recovery period after long squeeze
7	Cough	
8	Push	30s recovery period between each cough and push
9	Push	
10	Push	
10	RAIR	
11	Rectal sensory testing	
12	Balloon expulsion test	



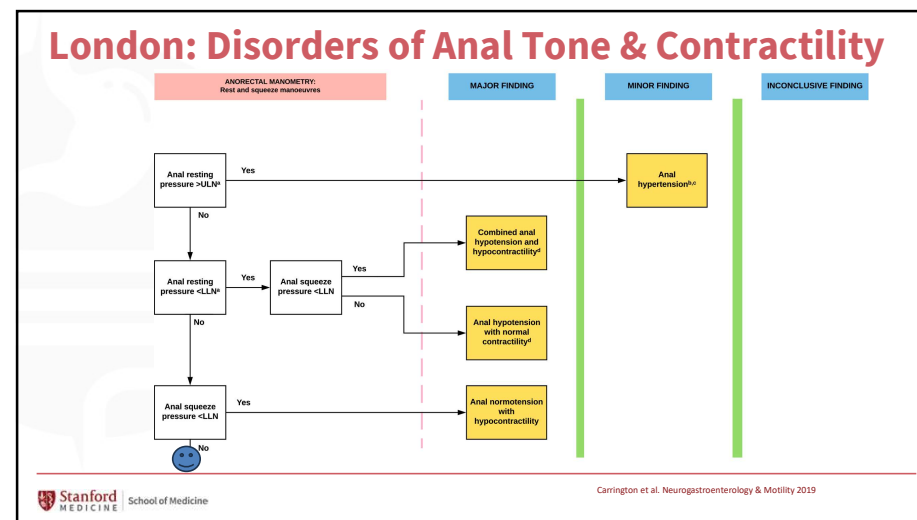
Nature Reviews | Gastroenterology & Hepatology

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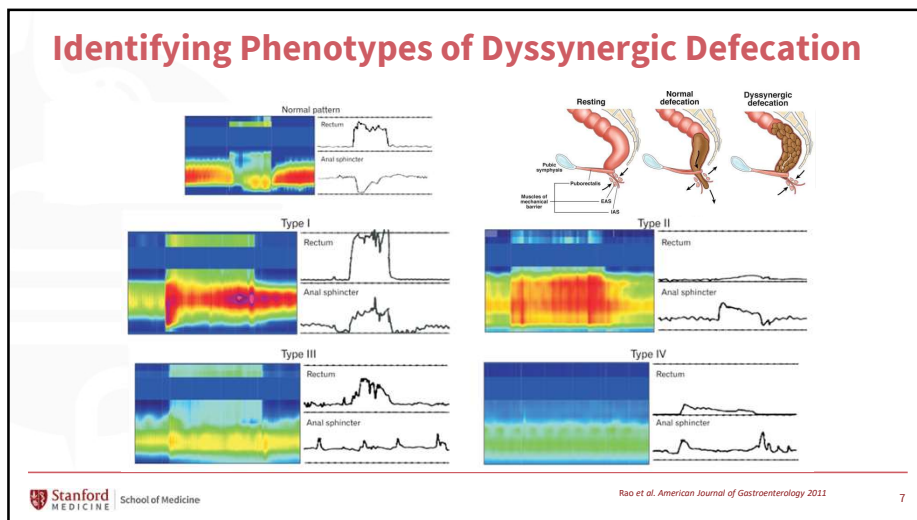




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## Balloon Expulsion Test

- ✓ A useful, low-cost, radiation-free, outpatient assessment tool for impaired evacuation
- ✓ An abnormal rectal balloon expulsion test predicts the response to biofeedback therapy

Balloon filled with 50 mL water

Normal  $< 60$  seconds

Patient sits on toilet

Patient tries to expel balloon

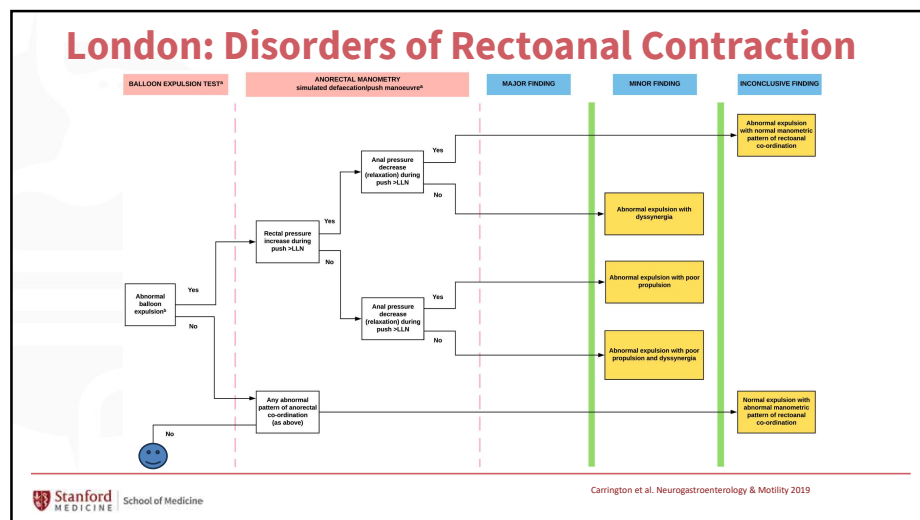
Polyethylene catheter

3-way stopcock  $\rightarrow$  to pressure transducers

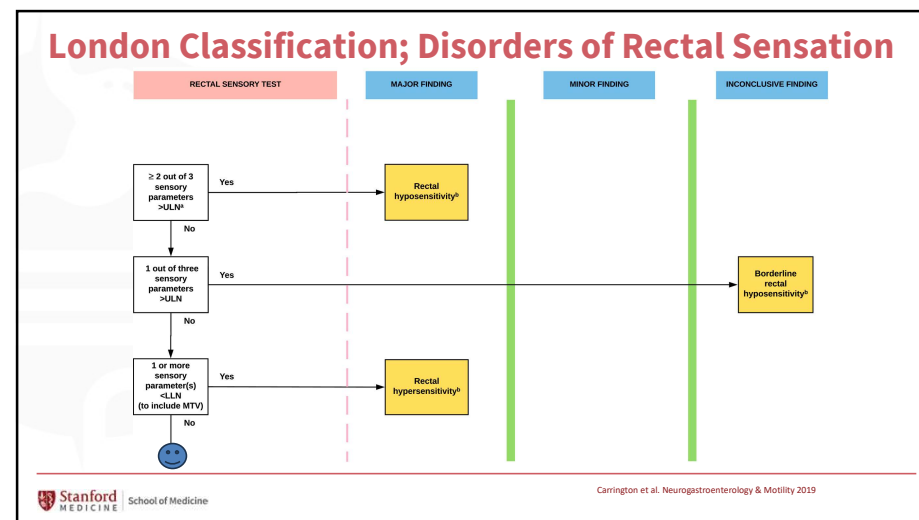
Stanford MEDICINE School of Medicine

Chey et al. The American Journal of Gastroenterology, 2018  
Chiarioni et al. Gastroenterology, 2005

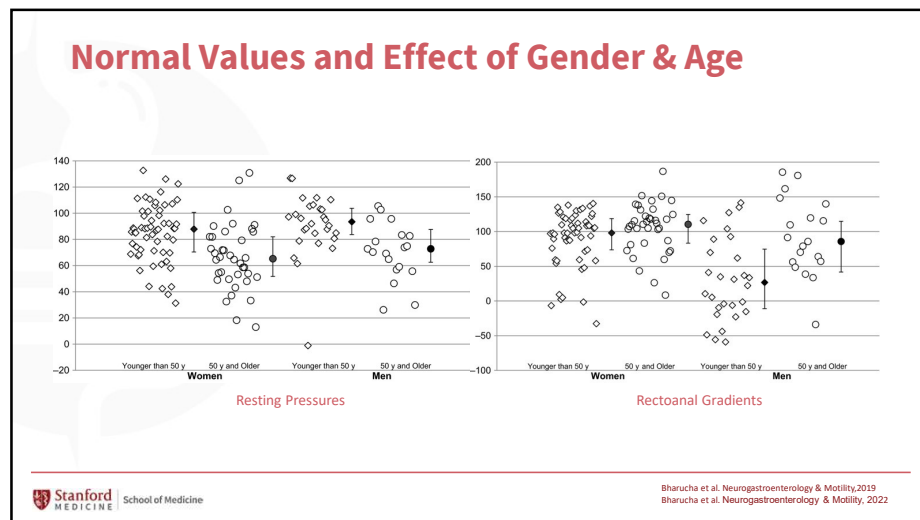
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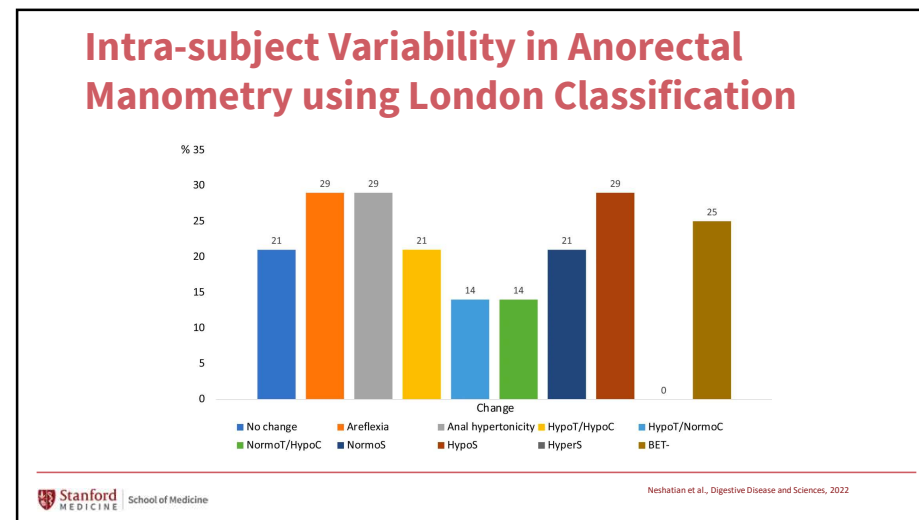
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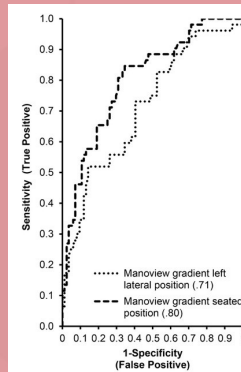
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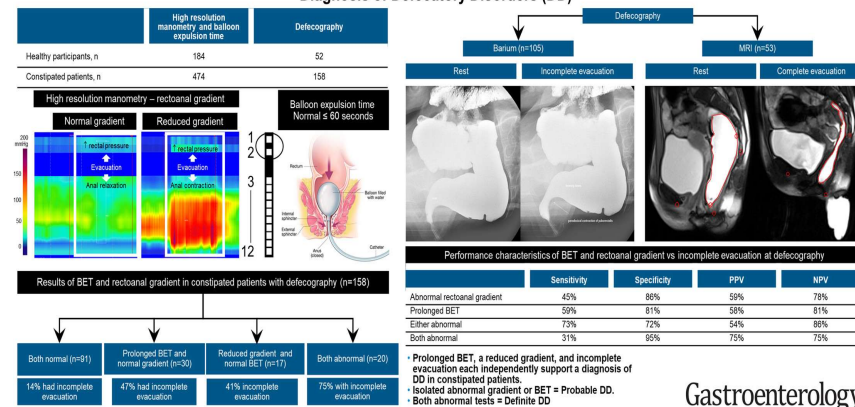
## Improving the Utility of Manometry for the Diagnosis of Defecatory Disorders

Should It Be Performed In a Seated Position?



Bharucha et al. Neurogastroenterology & Motility, 2020

## Diagnosis of Defecatory Disorders (DD)



Stanford School of Medicine

Bharucha et al. Gastroenterology 2022

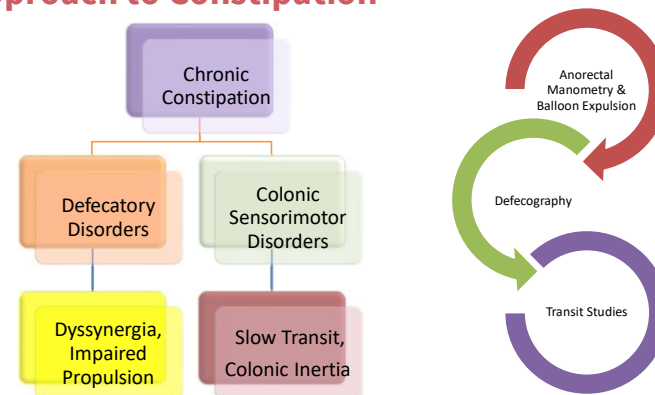
## Utility of Anorectal Manometry

	Anal Pressures	Ano-Rectal Coordination	Rectal Sensation
<b>Defecatory Disorders</b>	Anal Hypertonia	Dyssynergia Poor Propulsive Forces Akinesia	Hyposensitivity Hypersensitivity
<b>Fecal Incontinence</b>	Anal hypotension Hypocontractility		Hyposensitivity Hypersensitivity
<b>Proctalgia</b>	Anal Hypertonia	Dyssynergia	Hypersensitivity

Modified from Bharucha AE et al. Nat Rev Dis Primers. 2022

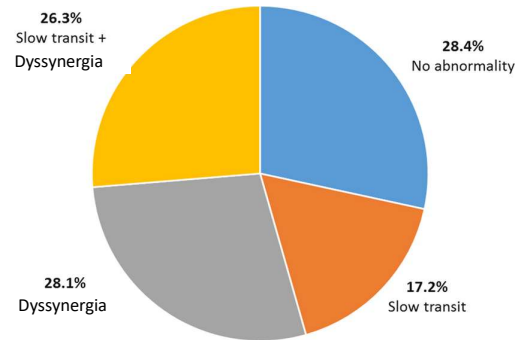
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## Approach to Constipation



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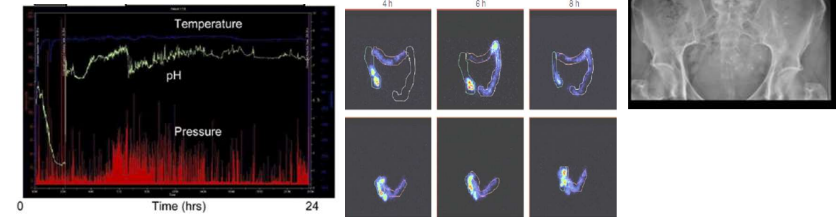
## Abnormal Motility and Dyssynergic Defecation



Kuo et al. Neurogastroenterology & Motility 2015  
Rao et al. Neurogastroenterology & Motility 2004

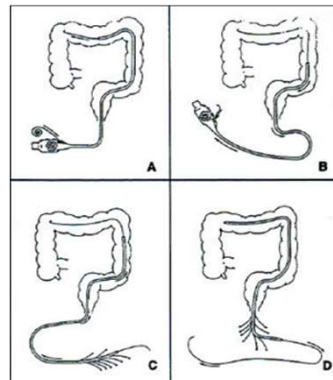
## Evaluation of Slow Colonic Transit

- Radiopaque markers (24 radiopaque 4.5-mm rings)
- Colonic transit scintigraphy (indium-labeled and gamma scan)
- Wireless Motility Capsule

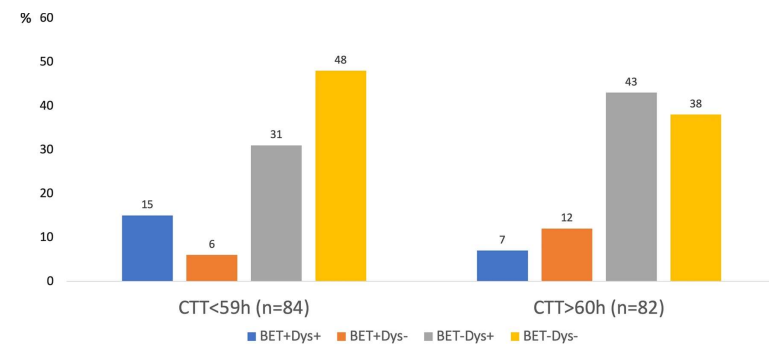


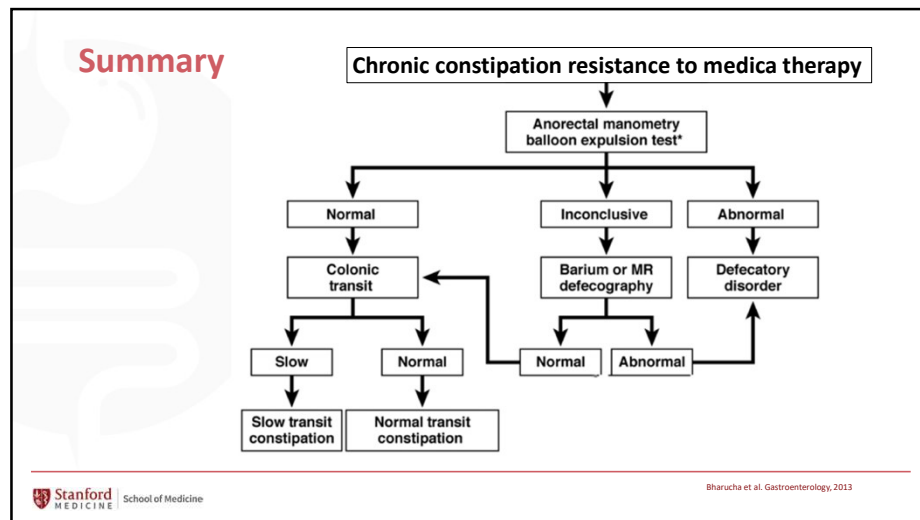
## Colonic Manometry

- Diagnosis of Colonic Inertia
- To identify neuromuscular pathologies underlying chronic constipation through the meal stimulation and pharmacology



## High Prevalence of Defecatory Disorders in Chronic Constipation, Regardless of Transit Time





### Conclusions

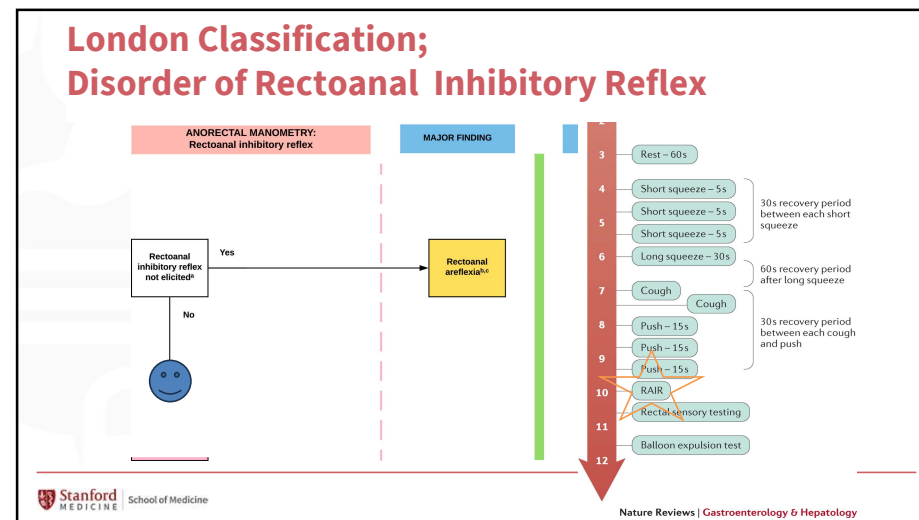
- ✓ Anorectal Manometry provides an understanding of anorectal pathophysiology in the context of clinical findings
- ✓ The anorectal physiologic tests and dynamic imaging are complimentary tests
- ✓ Despite the challenges involved in analysis and interpretation of anorectal test, they provide a mechanistic understanding of anorectal pathophysiology
- ✓ Future studies are needed to determine the clinical utility of anorectal manometry and motility testings in directing patients' management and factors associated with response to the treatment


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## Thank You!

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 Comprehensive Evaluation of the Pelvic Floor  
Workshop 5

Dynamic pelvic floor ultrasound including endoanal ultrasound and echodefecography: when to order, how it is performed, how to interpret and how it will guide management

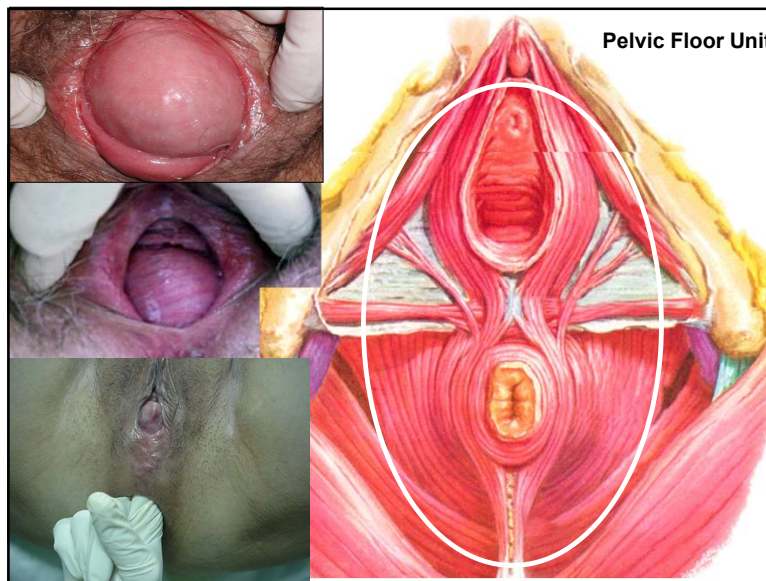
**Sthela Murad-Regadas, MD, PhD**  
Associate Professor of Surgery,  
Chairman of Colorectal Surgery at University Hospital,  
School of Medicine, Federal University of Ceara, Brazil  
Past-President of Brazilian Society of Coloproctology  
Honorary member – ASCRS



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*No Disclosure*

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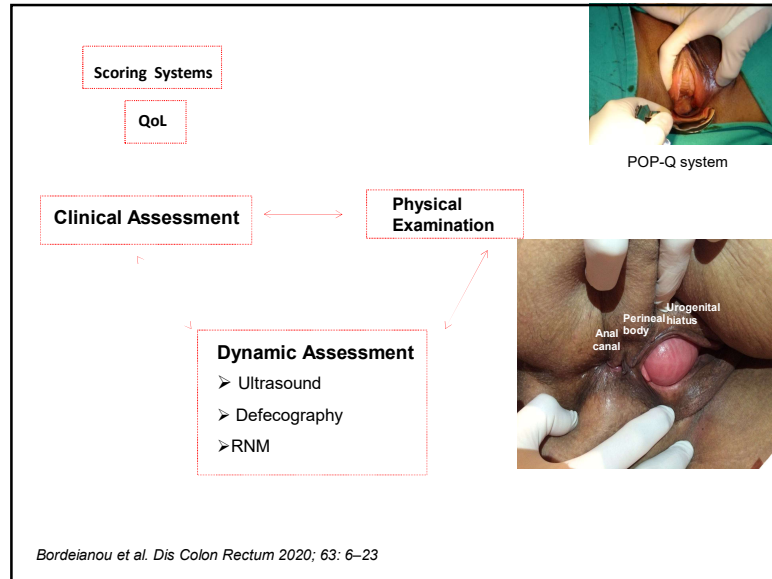


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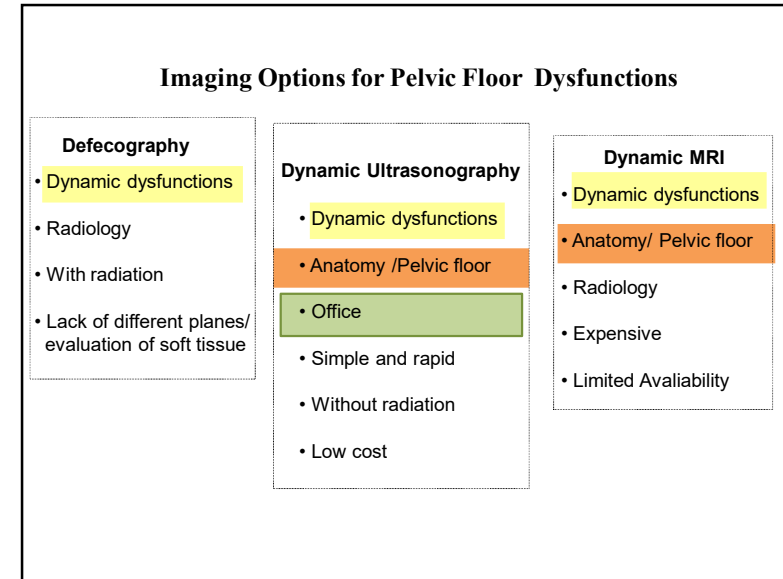
when to order ?

- Patients with pelvic floor dysfunctions
- One or multiples symptoms
- To identify the multiples dysfunctions

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### Dynamic Anal Endosonography (US) and MRI Defecography in Diagnosis of Pelvic Floor Disorders: Comparison With Conventional Defecography

Defecography (standard):	US	MRI
* <b>Rectocele</b> - Sensitivity	74%	82%
- Specificity	86%	86%
* <b>Perineal Descent</b> - Sensitivity	61%	61%
- Specificity	73%	73%
* <b>Enterocele</b> - Sensitivity	58%	67%
- Specificity	100%	100%

•Tolerance high/very high: \* **US – 76%**  
 \* MRI - 45%  
 \* Defecography - 37%

*Veronique, Bartet et al. Dis Colon Rectum 2011*

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### How it is performed ?

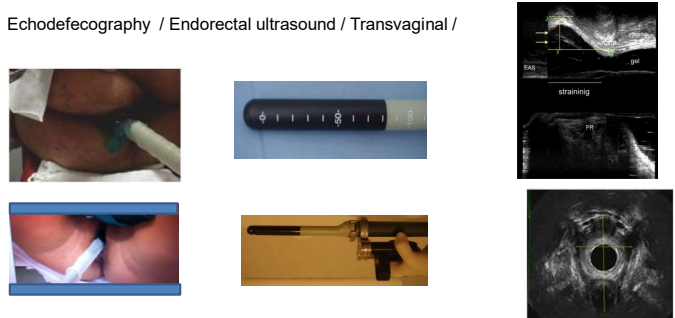
- ✓ 3-D Dynamic Anorectal Ultrasonography – Echodefecography;
- ✓ Translabial / Transperineal ultrasound
- ✓ Endorectal ultrasound / Transvaginal

*Bartet et al. Endoscopy 2000; Beer-Gabel et al. Int J Colorectal Dis 2004.  
 Dietz HP; Steensma AB. Ultrasound Obstet Gynecol 2005. Murad-Regadas et al. Surg endosc, 2008.  
 Dietz HP, Am J Obstet Gynecol 2010.*


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Echodefecography / Endorectal ultrasound / Transvaginal /




Translabial / Transperineal ultrasound



*Bartet et al. Endoscopy 2000; Beer-Gabel et al. Int J Colorectal Dis 2004.  
Dietz HP, Steensma AB. Ultrasound Obstet Gynecol 2005. Murad-Regadas et al. Surg endosc, 2008.  
Dietz HP, Am J Obstet Gynecol 2010.*

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**3-D Dynamic Anorectal Ultrasonography - Echodefecography**



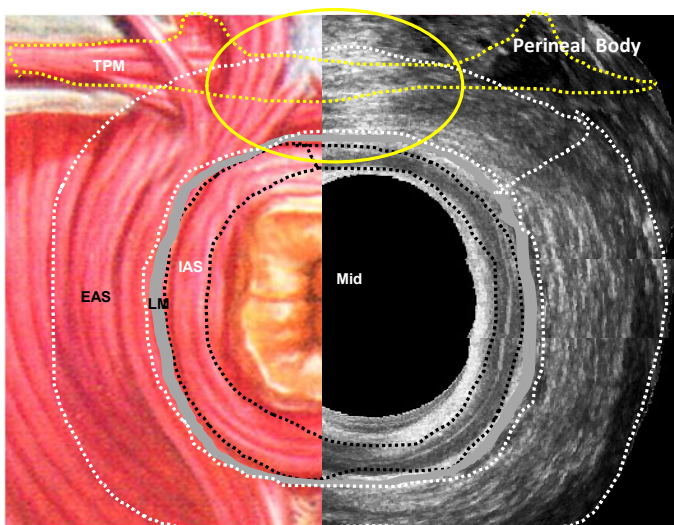
*Murad-Regadas et al. Colorectal Dis 2007; Murad-Regadas et al. Surg Endosc, 2008  
Regadas et al Dis colon Rectum 2011; Murad-Regadas et al. Colorectal Dis 2012*

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- Series of closely spaced 2D images – 3D volume
- ❖ Scan lasts 55 seconds with a slice width of 0.25 mm.



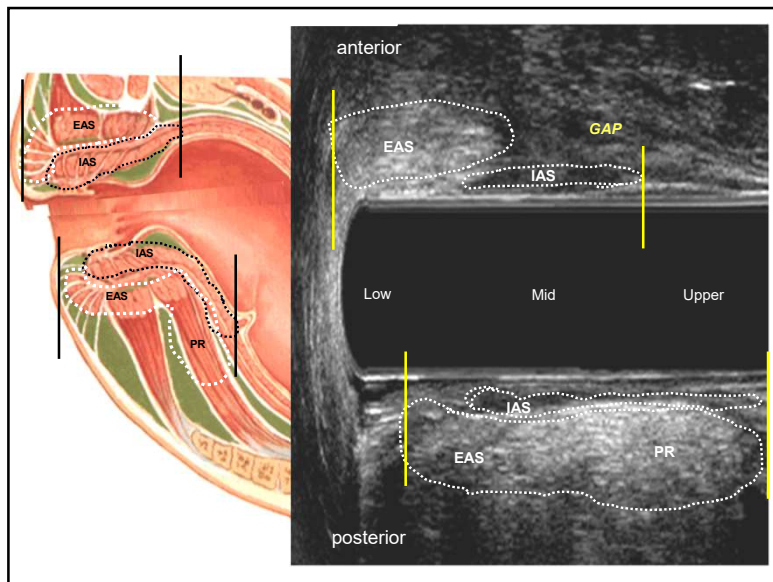
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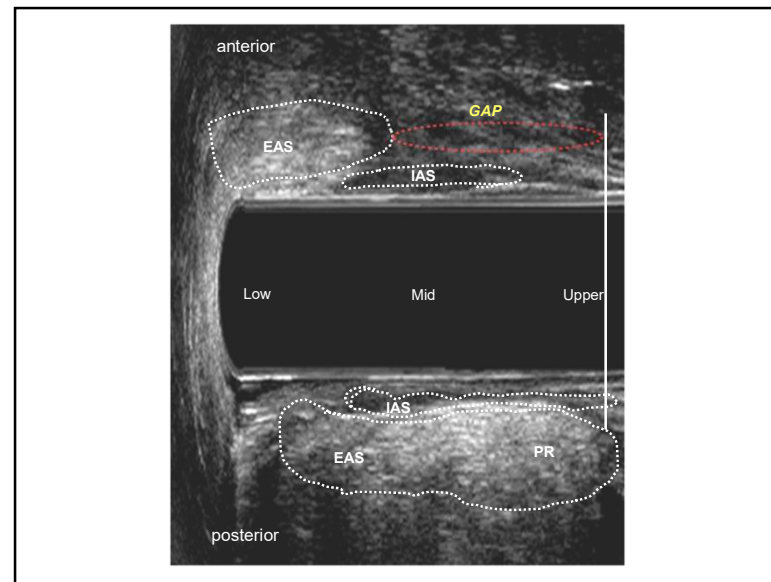
TPM, Perineal Body, EAS, IAS, LM, Mid

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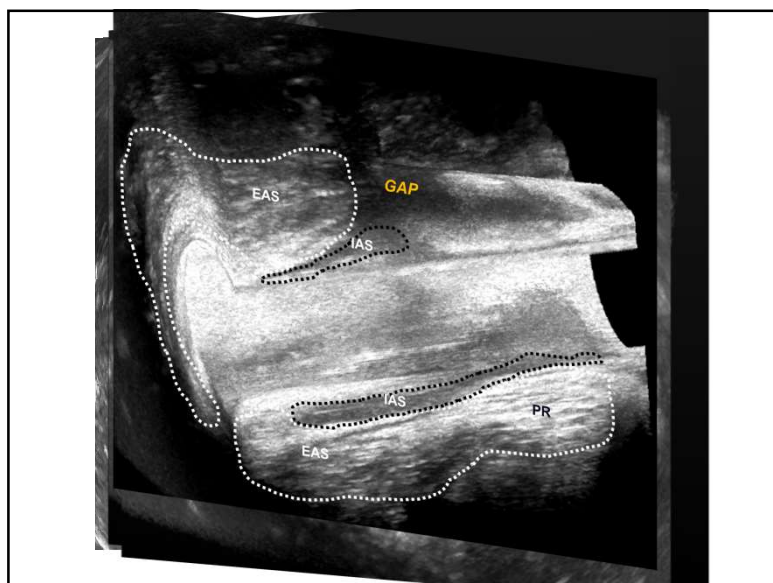




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How to interpret ?  
How it will guide management ?

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**3-D Dynamic Anorectal Ultrasonography - Echodefecography**

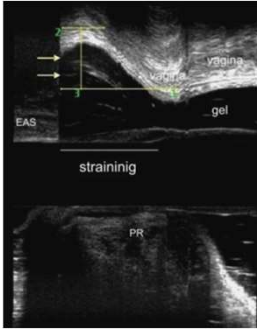
**Pelvic floor dysfunctions**

- Rectocele
- Intussusception
- Paradoxal contraction of puborectalis muscles –anismus
- Perineal descent

• Entero/sigmoidocele

• Cistocele

**Sphincter muscles and Pelvic floor muscles Defect**



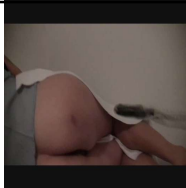
*Murad-Regadas et al. Colorectal Dis 2007; Murad-Regadas et al. Surg Endosc, 2008  
Regadas et al Dis colon Rectum 2011; Murad-Regadas et al. Colorectal Dis 2012*

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**Echodefecography Technique**

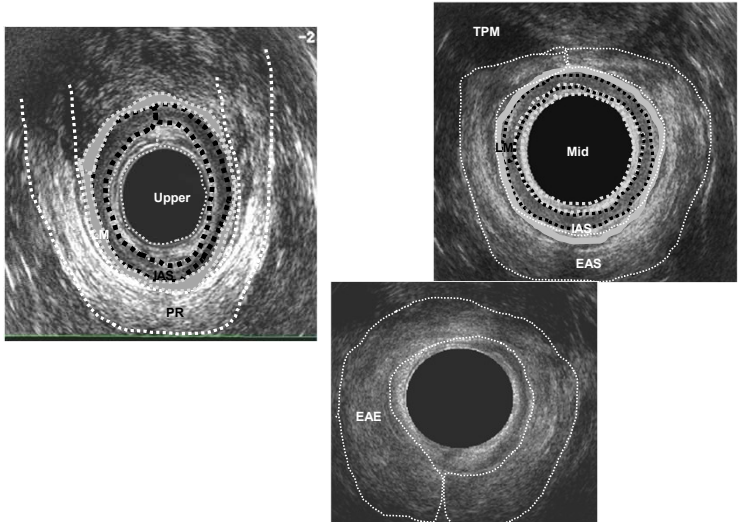
Four automatic scans: (scan =55 sec. )

- \* **Scan 1 ( at rest )**: Evaluate the anal muscles integrity
- \* **Scan 2 ( Dynamic )**: 6 cm from anal verge  
15 sec. - at rest / 20 sec. Straining / 15 sec. At rest  
Evaluate Voluntary muscles ( EAS/PR ) movements to detect:  
- Normal relaxation , Nono-relaxation or Paradoxal Contraction
- \* **Scan 3 ( Dynamic )**: 3 sec. At rest / straining  
- Perineal Descent measurement
- \* **Scan 4 ( Dynamic)**: 15 sec. - at rest / 20 sec. Straining / 15 sec. At rest  
- Assess Rectocele, Intussusception and Enterocele

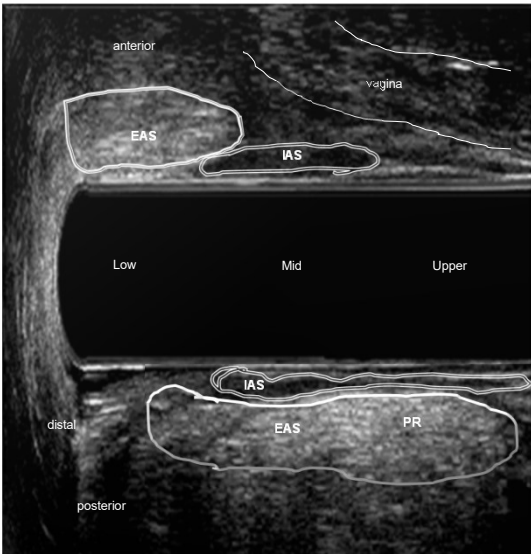


18

**•Scan 1 ( at rest )**: Evaluate the **anal muscles integrity**



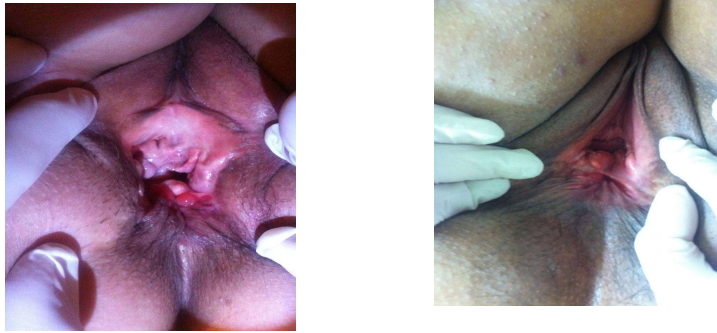
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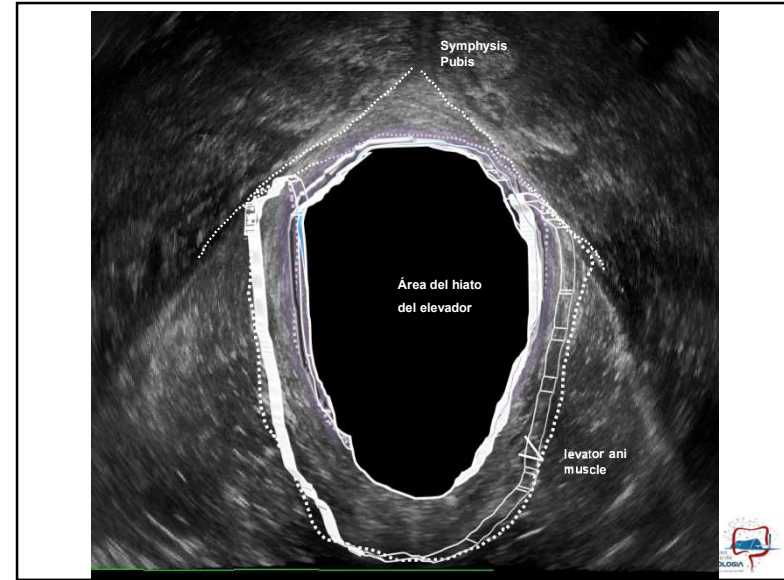
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•Scan 1 (at rest): Evaluate the anal muscles integrity

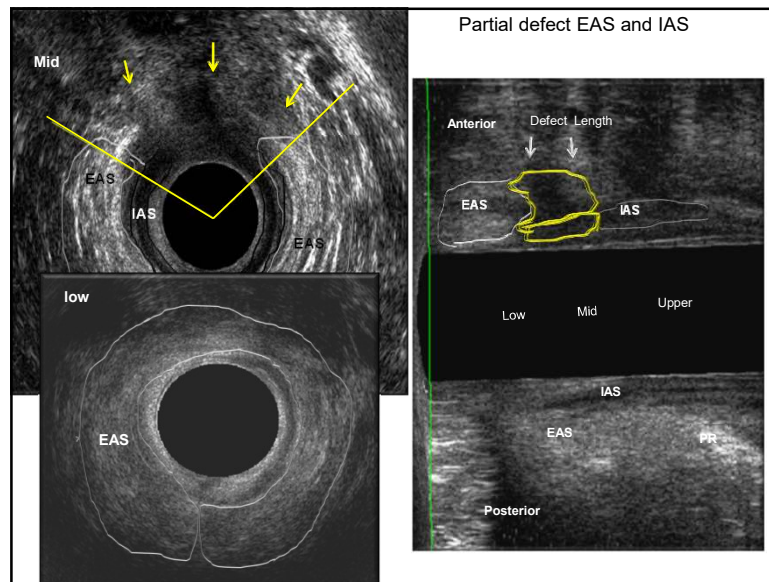
Evaluate the levator ani muscle - vaginal delivery



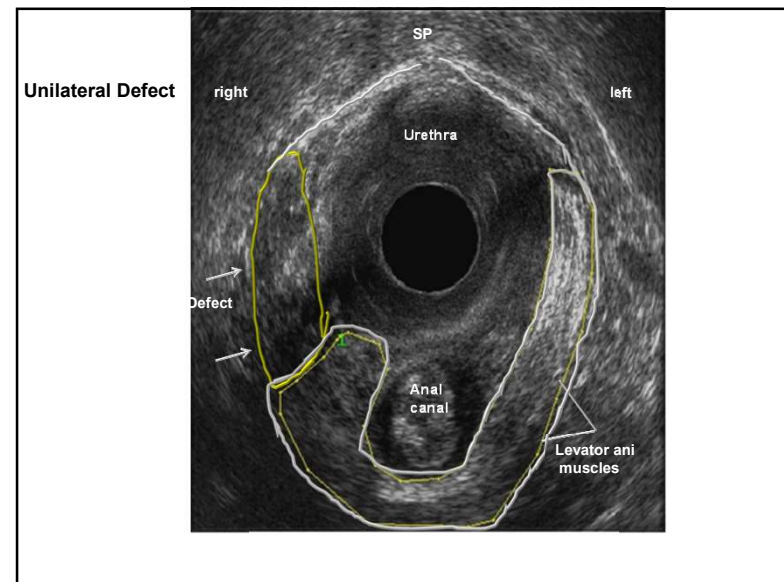
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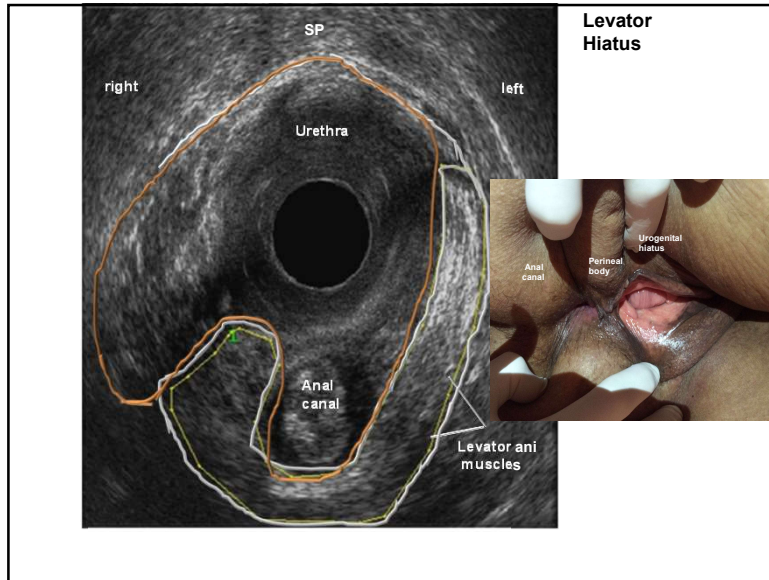


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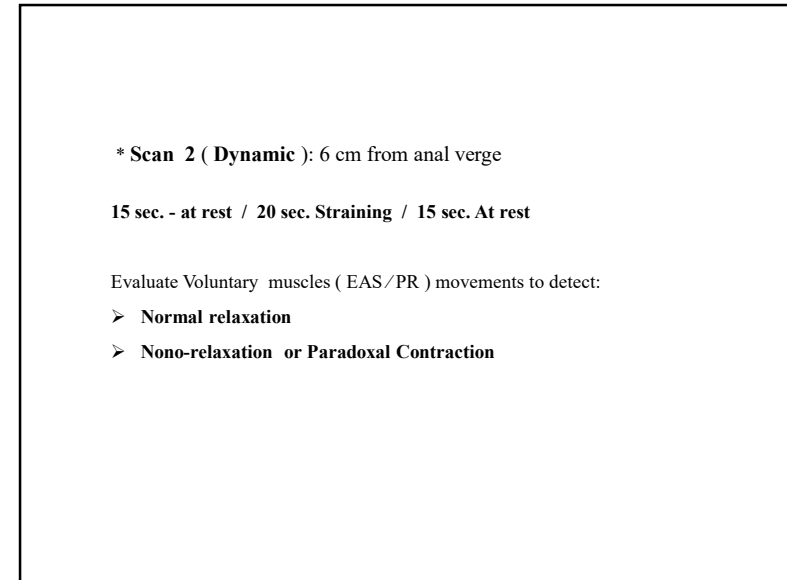


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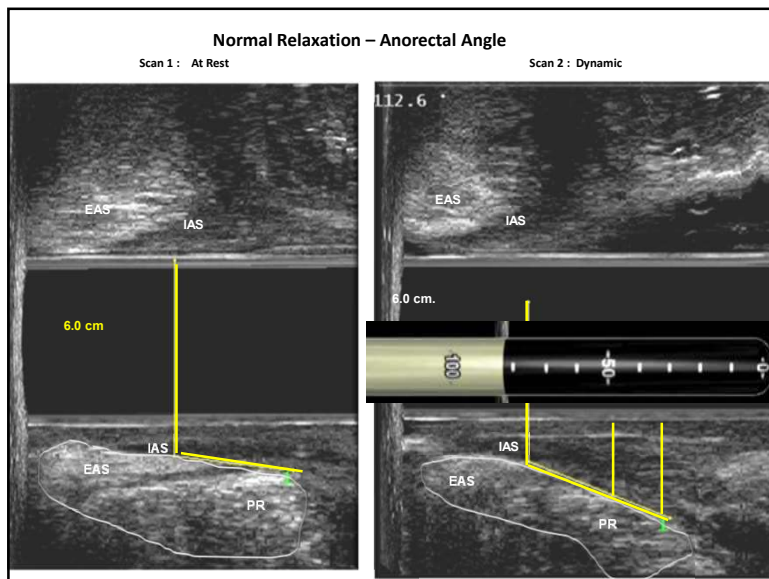




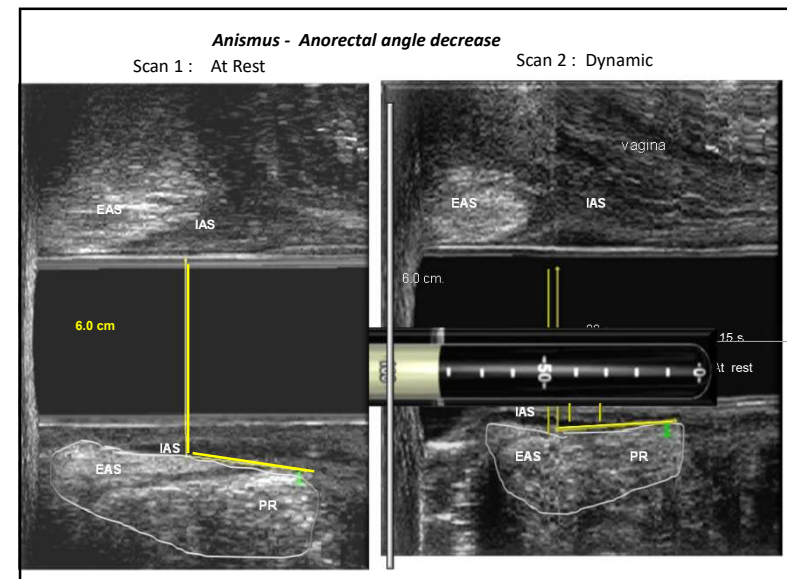
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\* **Scan 4 (Dynamic):** 15 sec. - at rest / 20 sec. Straining / 15 sec. At rest

- Assess Rectocele, Intussusception and Entero-sigmoidocele

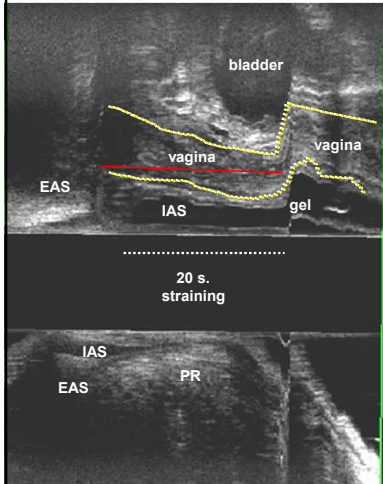
Intrarectal Gel – 60 – 120 ml



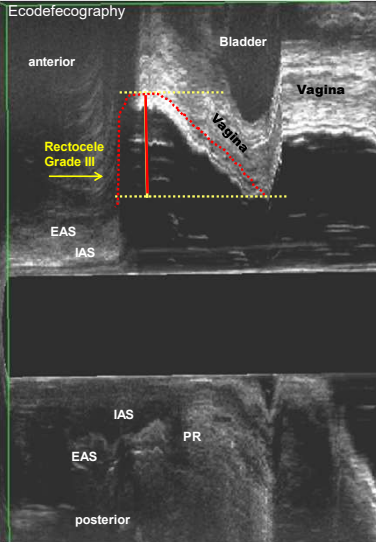
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Scan 4 – Dynamic ( Intrarectal Gel – 60 to 120 ml )

Without Rectocele

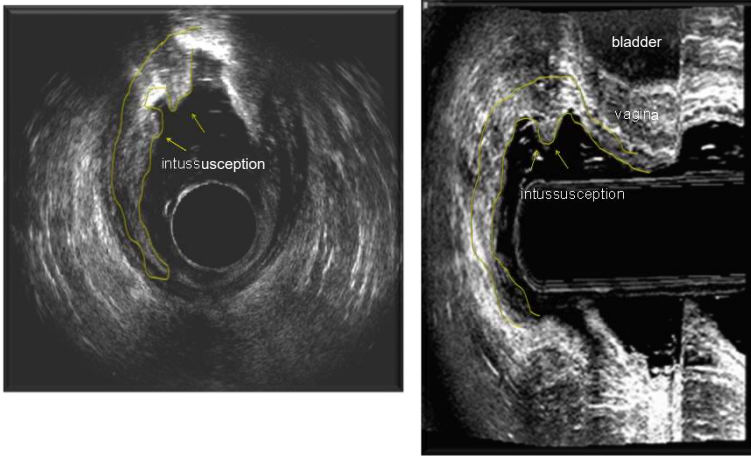


Ecodefecography




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Intussusception

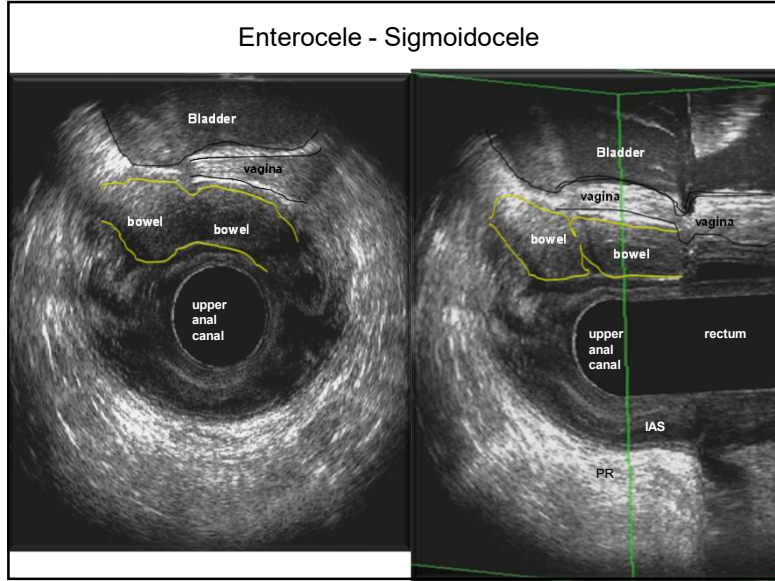


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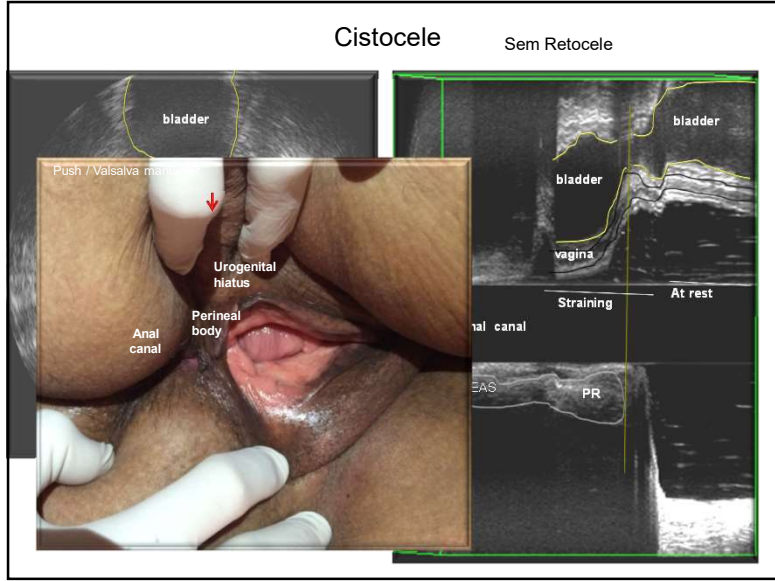
Rectocele plus intussusception



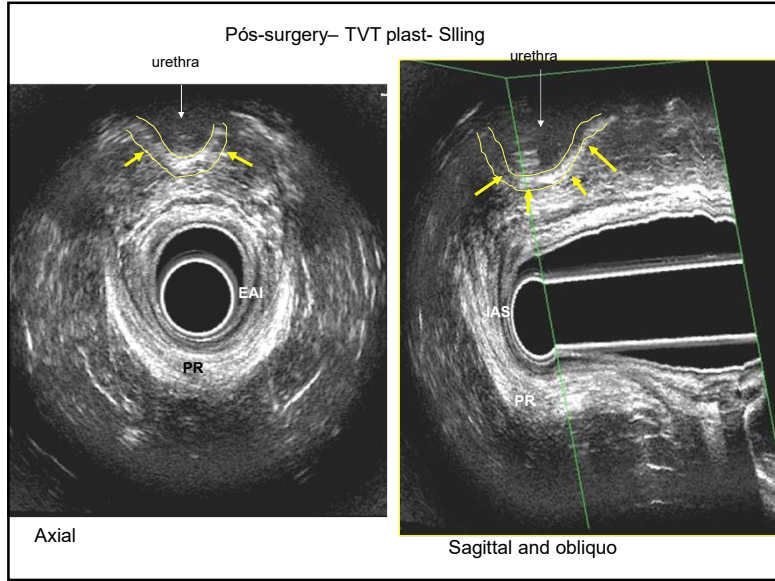
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**ORIGINAL CONTRIBUTION**

**Prospective Multicenter Trial Comparing Echodefecography With Defecography in the Assessment of Anorectal Dysfunction in Patients With Obstructed Defecation**

F. Sergio P. Regadas, Ph.D.<sup>1</sup> • Eric M. Haas, M.D.<sup>2</sup> • Maher A. Abbas, M.D.<sup>3</sup>  
 J. Marcio Jorge, Ph.D.<sup>4</sup> • Angelita Habr-Gama, Ph.D.<sup>4</sup> • Dana Sands, M.D.<sup>5</sup>  
 Steven D. Wexner, M.D.<sup>5</sup> • Ingrid Melo-Amaral, M.D.<sup>6</sup> • Carlos Sardinias, M.D.<sup>6</sup>  
 Doryane M. Lima, M.D.<sup>7</sup> • Evaldo U. Sague, Ph.D.<sup>7</sup> • Sthela M. Murad-Regadas, Ph.D.<sup>1</sup>

1 School of Medicine of the Federal University of Ceara, Fortaleza, Brazil  
 2 University of Texas Medical School at Houston, Houston, Texas  
 3 Kaiser Permanente, Los Angeles, California  
 4 School of Medicine, University of Sao Paulo, Sao Paulo, Brazil  
 5 Cleveland Clinic Florida, Weston, Florida  
 6 University Hospital of Caracas, Caracas, Venezuela  
 7 Gastroclinica, Curitiba, Parana, Brazil

*DISEASES OF THE COLON & RECTUM VOLUME 54: 6 (2011)*

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## Prospective Multicenter Trial Comparing Echodefecography with Defecography in the Assessment of Anorectal Dysfunction in Patients with Obstructed Defecation

Regadas et al. *Dis Colon Rectum*, 2011

7 centers – (4 Brazil / 2 USA / 1 Venezuela)

Rate of concordance: *Kappa*

* <b>Without Rectocele</b>	- 06 / 06 (0.73) - <u>Substantial agreement</u>
* <b>Rectocele</b>	- 76 / 80 (0.61) - <u>Substantial</u>
- Grade I	- 09 / 16 (0.62) - <u>Substantial</u>
- Grade II	- 29 / 44 (0.56) - <u>Moderate</u>
- Grade III	- 19 / 20 - (0.62) <u>Substantial</u>
* <b>Intussusception</b>	- 37 / 42 (0.61) - <u>Moderate</u>
* <b>Anismus</b>	- 16 / 19 (0.87) – <u>Substantial</u>
* <b>Entero/Sigmoidocele</b>	- 08 / 09 (0.87) – <u>Substantial</u>

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## In Summary

- Dynamic technique make it possible identify sphincter muscles and pelvic floor muscles defect as well as all dysfunctions and it can improve the management of dynamic pelvic floor dysfunctions;
- The exam should be perform by expert: knowledge about the technique ; Anatomy and dysfunctions;
- The patient cooperation with correct performance of straining and the Valsalva maneuver is of great importance for achieving good results.

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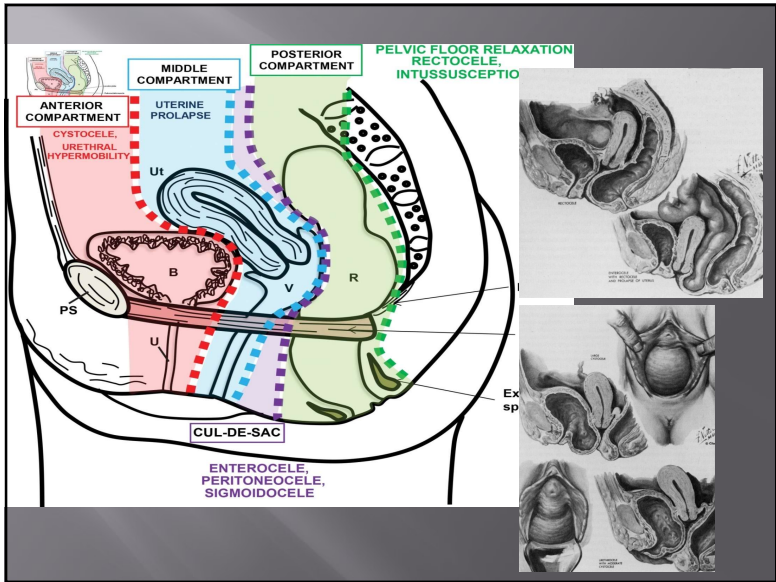
University Hospitals of North Midlands NHS ICS Madrid 2024

# PELVIC FLOOR ULTRASOUND

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Cochrane Library  
Cochrane Database of Systematic Reviews

Imaging modalities for the detection of posterior pelvic floor disorders in women with obstructed defecation syndrome (Review)

van Gruting IMA, Stankiewicz A, Thakar R, Santoro GA, Biffout J, Sultan AH

In a population of women with symptoms of ODS, *none of the imaging techniques met the criteria to replace EP. MRI and TPUS met the criteria of a triage test*, as a positive test confirms diagnosis of rectocele, enterocele and intussusception, and a negative test rules out diagnosis of anismus.

www.cochranelibrary.com

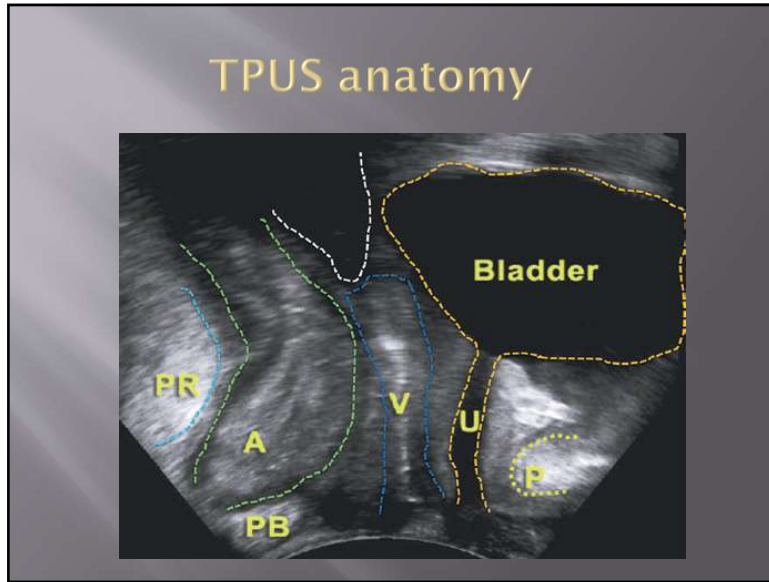
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## Pelvic floor US

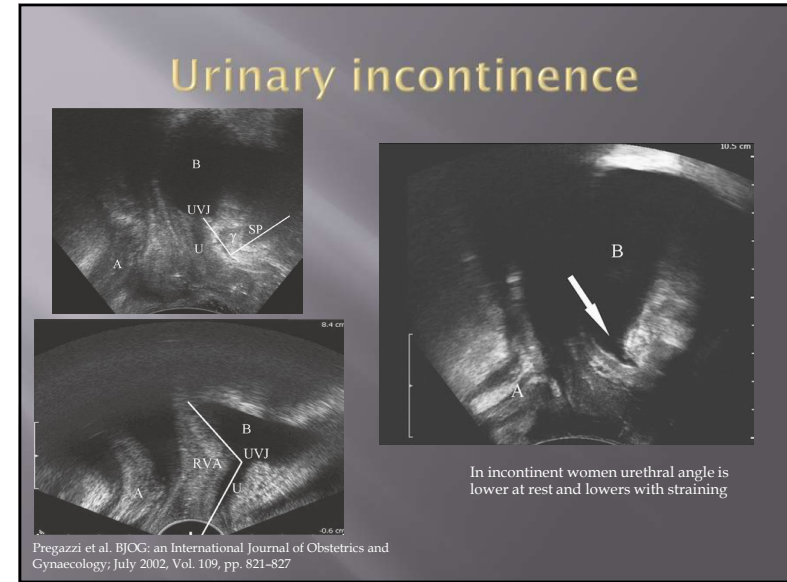
- ❑ Transperineal (translabial, transintroital)- 2D , dynamic and 3D/4D
- ❑ EVUS (endovaginal US- 3D and 2D dynamic)
- ❑ EAUS (endoanal US)

4

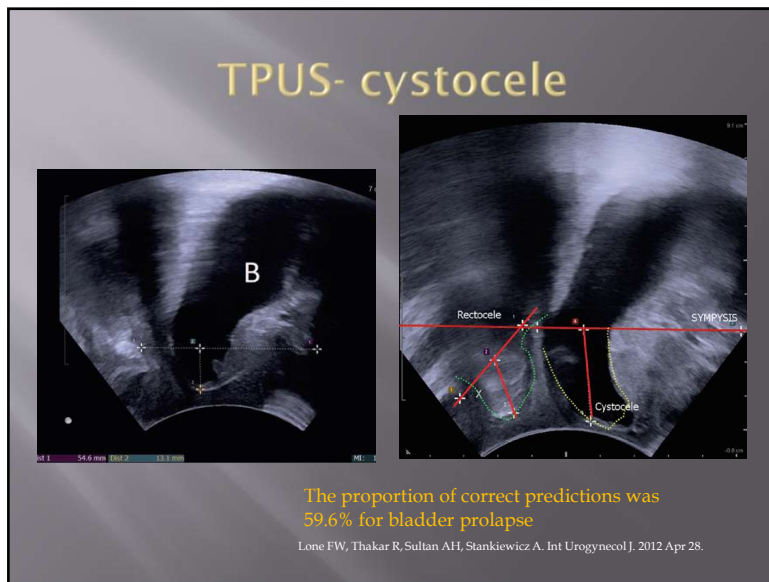




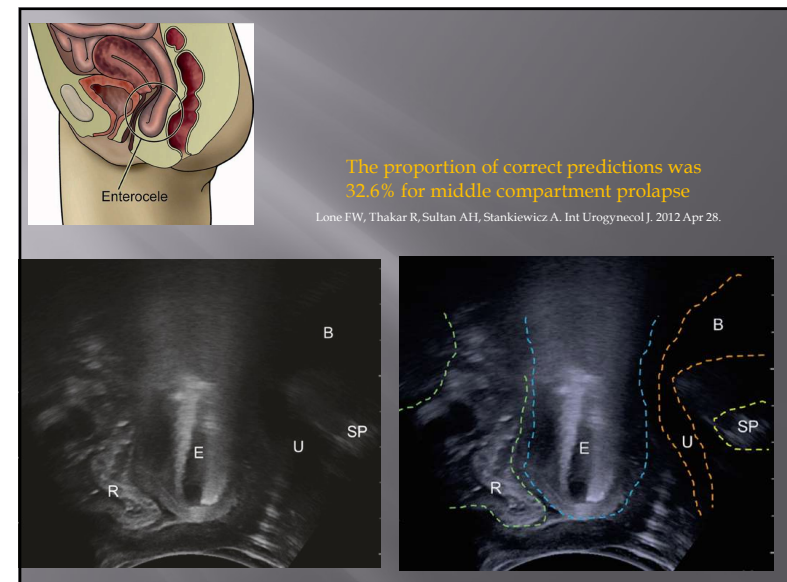
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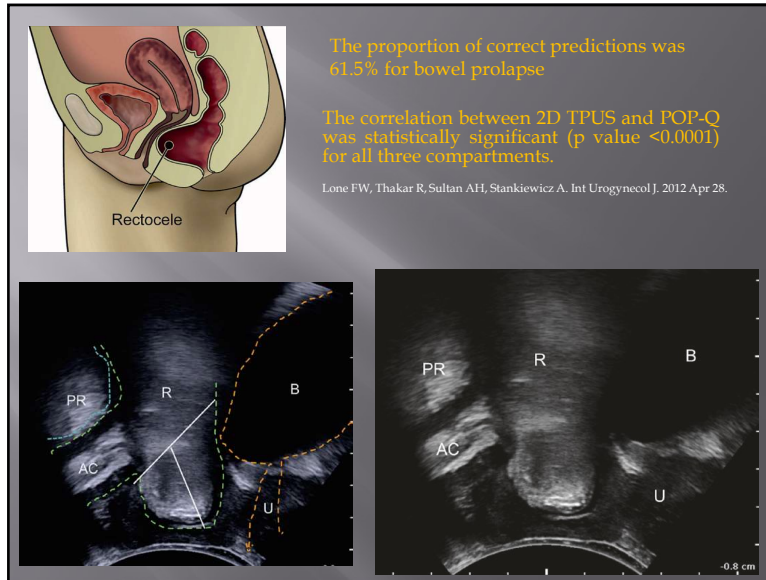
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The proportion of correct predictions was 61.5% for bowel prolapse

The correlation between 2D TPUS and POP-Q was statistically significant ( $p$  value  $<0.0001$ ) for all three compartments.

Lone FW, Thakar R, Sultan AH, Stankiewicz A. Int Urogynecol J. 2012 Apr 28.

Rectocele

PR R B AC U

0.8 cm

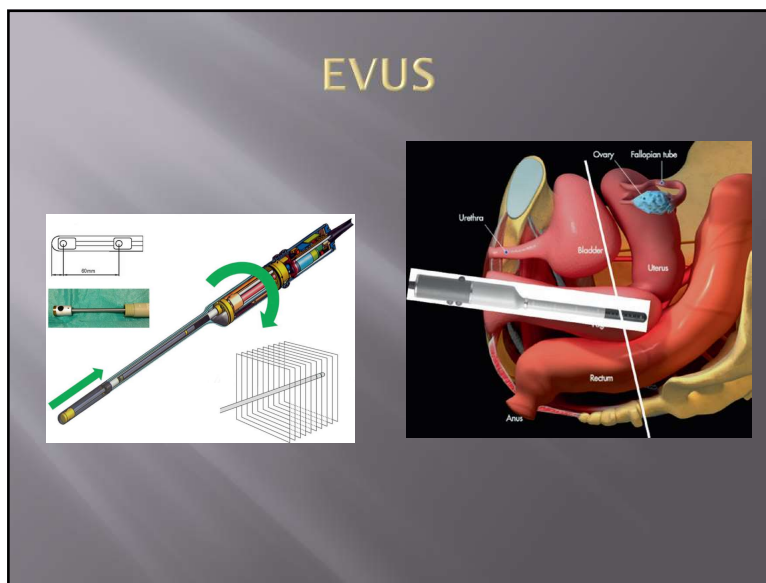
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## TPUS                      EVUS



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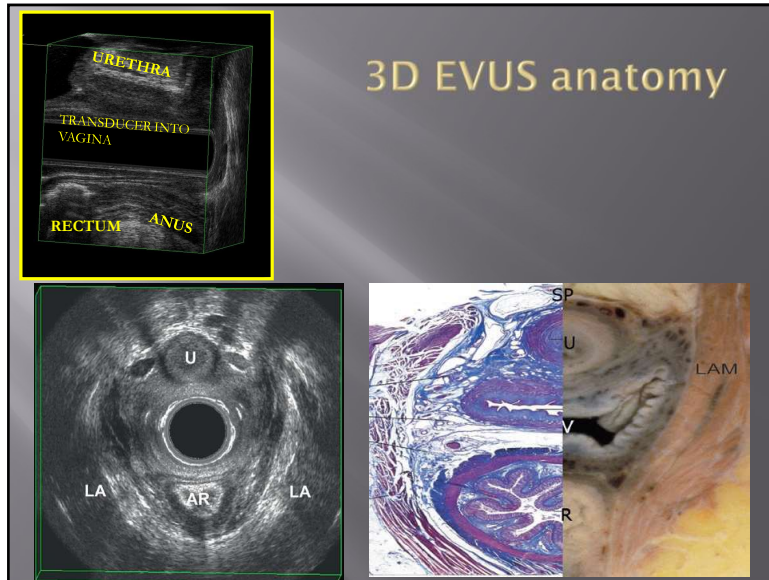
## EVUS



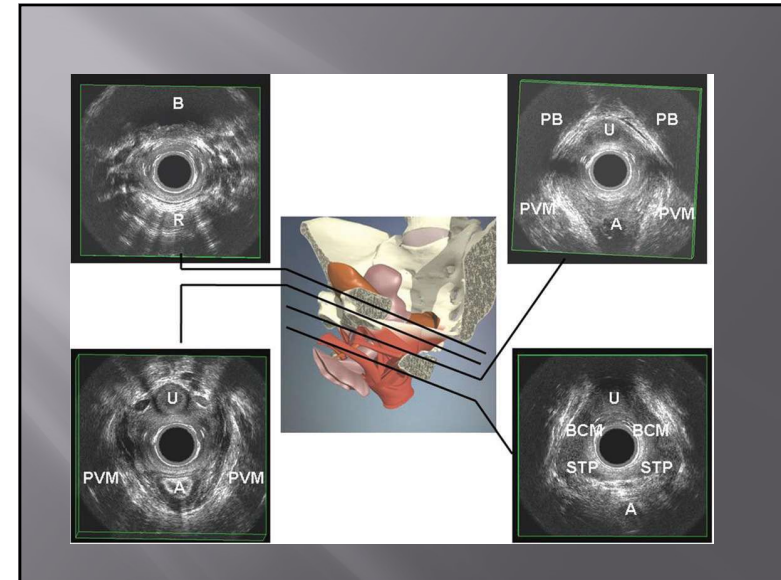
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- Video acquisition
- Video post-processing
- Video- MPR

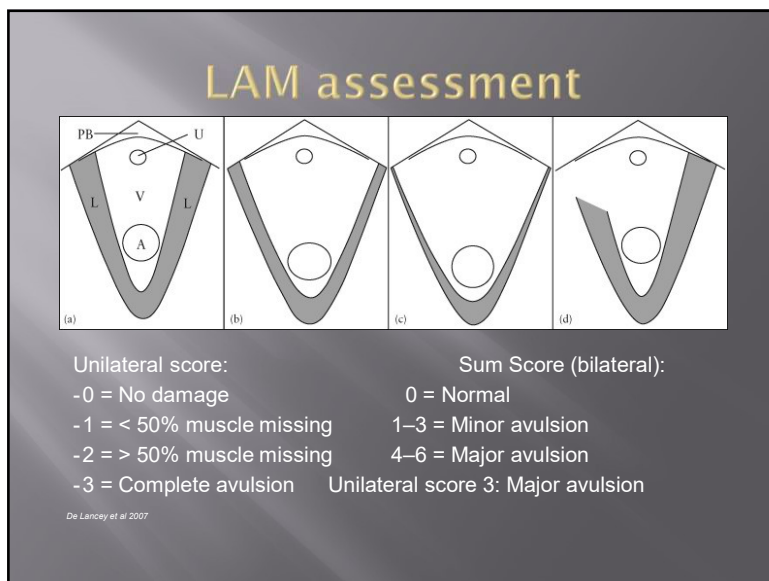
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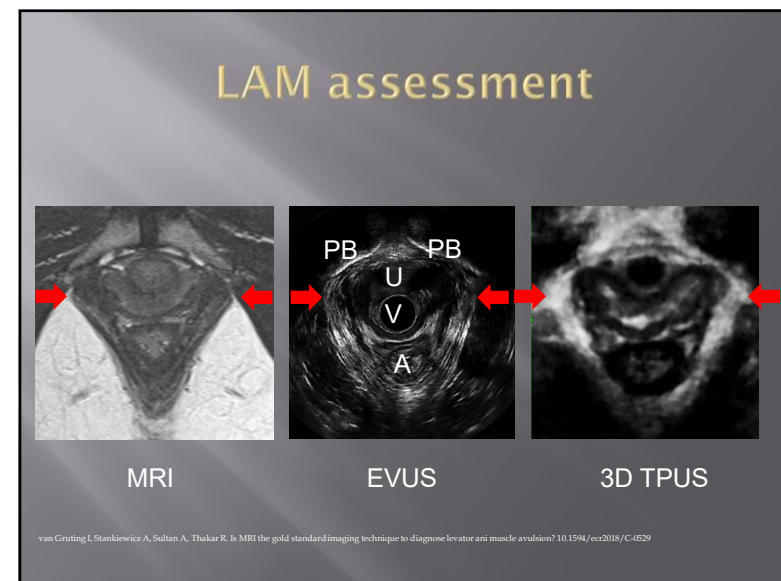
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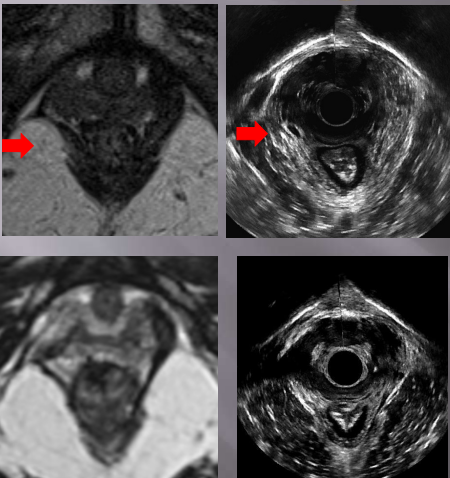
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### Minor/ major avulsion



**-Sensitivity of EVUS (91%; for LAM avulsion is lower than MRI (100%))**

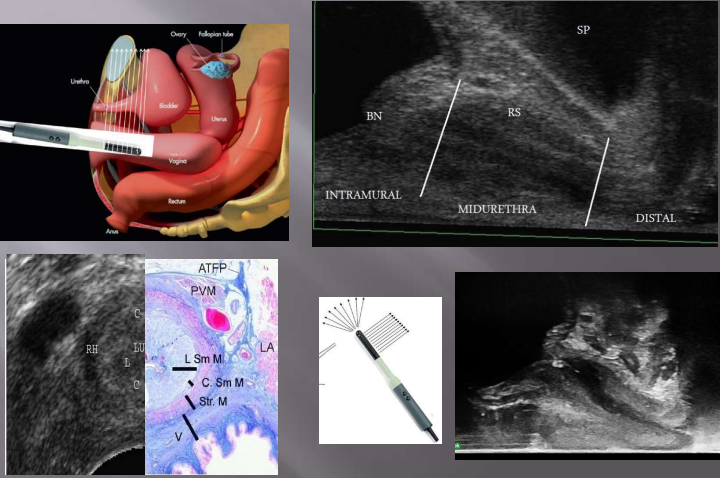
**-Specificity of EVUS (95%; is higher than MRI (91%))**

**-For diagnosis of major LAM avulsion, MRI (PPV 95% and NPV 100%) and EVUS (PPV 100% and NPV 98%) have high predictive values and correlate to anterior vaginal wall prolapse.**

van Gruting I, Stankiewicz A, Sultan A, Thakar R. Is MRI the gold standard imaging technique to diagnose levator ani muscle avulsion? 10.1594/ecr2018/C-0529

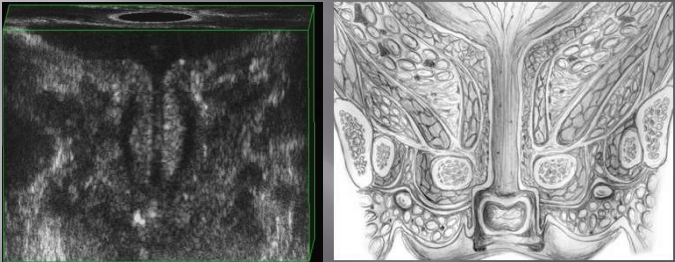
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### Anterior compartment



18

### Urethra 3D EVUS



Women who **failed continence surgery** had significantly **smaller preoperative urethral sphincter volumes** than those who had an objective cure ( $P < 0.001$ ). urethral pressure profilometry parameters were not found to be predictive of surgical outcome ( $P = 0.5$ ).

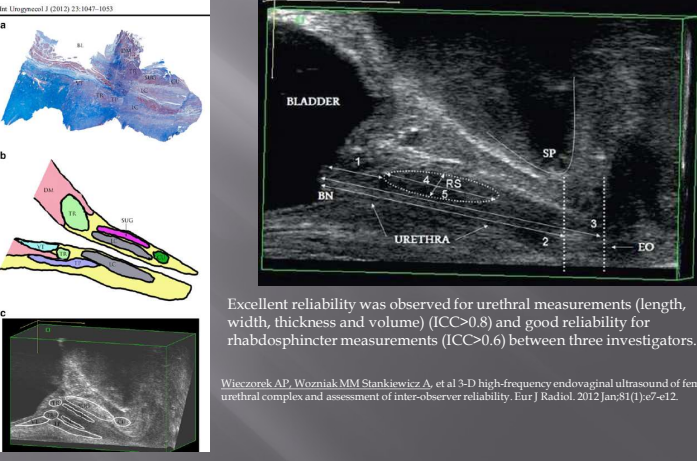
- The 3D US assessment of the urethral sphincter predicts the outcome of continence surgery.  
Dineis GA et al. Three-dimensional ultrasound of the urethral sphincter predicts continence surgery outcome. NeuroUrol Urolyn. 2009;28(1):90-4.

Smaller rhabdomyosphincter length and area on US are associated with x-ray funneling. **US urethral volume of 3.5 cm** as a cut off provides the same reliability as x-ray funneling for the diagnosis of intrinsic sphincter deficiency

Santiago AC. Decreased Urethral Volume Is Comparable to Funneling as a Predictor of Intrinsic Sphincter Deficiency. Female Pelvic Med Reconstr Surg. 2017 Sep/Oct;23(5):336-342.

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### Urethra 3D EVUS



Excellent reliability was observed for urethral measurements (length, width, thickness and volume) ( $ICC > 0.8$ ) and good reliability for rhabdosphincter measurements ( $ICC > 0.6$ ) between three investigators.

Wieczorek AP, Wozniak MM, Stankiewicz A, et al 3-D high-frequency endovaginal ultrasound of female urethral complex and assessment of inter-observer reliability. Eur J Radiol. 2012 Jan;81(1):e7-e12.

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## Urethra vascularity

30% of urethral closure pressure is attributed to the function of vascular systems.  
Caine M. 1986 J Urol

Compared to continent nulliparous women, continent multiparous women demonstrated a **significant reduction** in the vascularity parameters in all measured variables when parity was accounted for.

Lone F et al. Vascularity of the urethra in continent women using colour doppler high-frequency endovaginal ultrasonography. Springerplus. 2014 Oct 20;3:619. doi: 10.1186/2193-1801-3-619. eCollection 2014.

At 12 months there is no change in vascularity parameters in women who opt for conservative or surgical treatment of SUI

Lone F, et al. Assessment of urethral vascularity using 2D colour Doppler high-frequency endovaginal ultrasonography in women treated for asymptomatic stress urinary incontinence: 1-year prospective follow-up study. <http://dx.doi.org/10.1007/s00193-016-0185-9> 2016 Jan;27(1):85-92.

Wieczorek AP, Woźniak MM, Stankiewicz A, et al Quantitative assessment of urethral vascularity in nulliparous females using high-frequency endovaginal ultrasonography. World J Urol 2011, Jul 28

21

## Role of US

- ❑ As triage test for POP
- ❑ TPUS gives sufficient dynamic information about pelvic organs
- ❑ EVUS gives more detailed information about pelvic floor
- ❑ LAM assessment
- ❑ The only imaging modality enabling visualisation of urethra in such detail

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## Thank you

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University Hospitals of North Midlands  NHS  
ICS Madrid 2024

## Fluoroscopic and MRI defecography- role in patients' management

Dr Ola Stankiewicz  
Consultant Radiologist  
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Stoke-on-Trent, UK

1

- I have no interests to disclose

2

## Evacuation proctography

- - *Defecation Proctography, Fluoroproctography, Defecation barium proctography*
- a study of voluntary evacuation in physiological position ;first described by Mathieu in 80ies
- X-ray radiation

3

## Patient preparation

- Patient to arrive early
- 2 glycerin suppositories
- 400-600 ml of oral barium suspension to opacify the *small bowel*
- Opacification of *vagina* with 10 mls of barium
- 150 mls of E Z HD that is mixed immediately before use, with warm water to a 'toothpaste' consistency, is injected into the *rectum*-gently using an enema catheter.
- The enema catheter is removed and the patient walks to the commode chair.

4

### EP anatomy

**Anorectal angle (ARA)**  
*between the longitudinal axis of the anal canal and the posterior rectal line, parallel to the longitudinal axis of the rectum.*

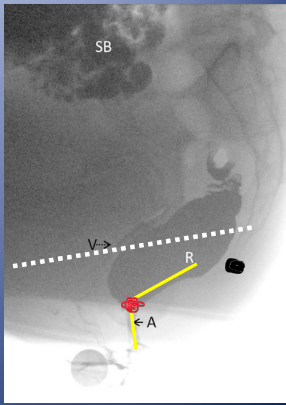
- difficult to measure as the posterior rectal wall is often not clearly delineated
- At rest, is 95-96° (physiologic range, 65-100°)**
- an indirect indicator of the PRM activity.

During muscle contraction, ARA becomes more acute, during relaxing phase -obtuse.

**Anorectal junction (ARJ)**  
*-the uppermost point of anal canal*  
*-the craniocaudal migration of ARJ indirectly represents the elevation and descent of pelvic floor.*

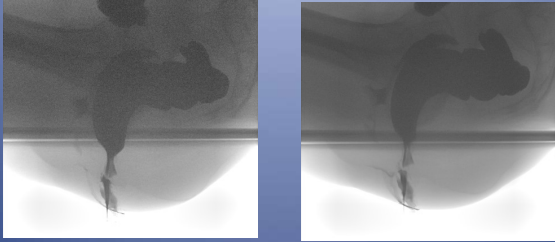
**Bony landmarks**

- Bis-ischiatic line- the line drawn between the ischial
- **The tip of the coccyx**
- Pubo-coccygeal line



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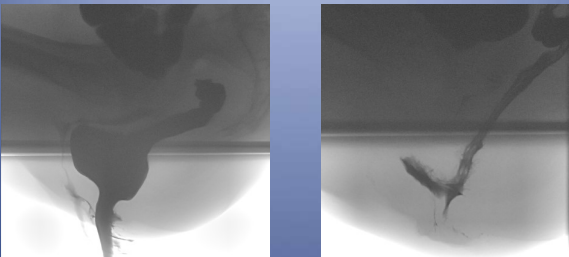
### EP rest and squeeze



'Relax' then 'squeeze and lift' then 'relax'  
 indication of pelvic floor level and puborectalis contraction.

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### EP- straining and evacuation

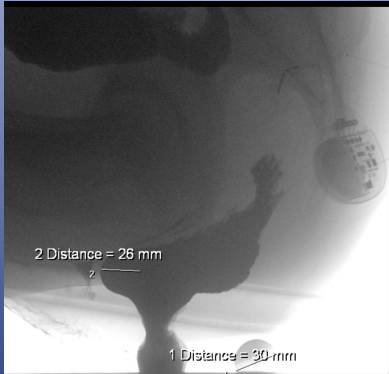


To '**push**' out the rectal paste- repeated until all the paste is evacuated or if a diagnosis of rectal prolapse is made.

If patients are unable to empty, they are asked to try to evacuate on a normal toilet in privacy

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### EP



2 Distance = 26 mm  
 1 Distance = 30 mm

8



## Pathologies

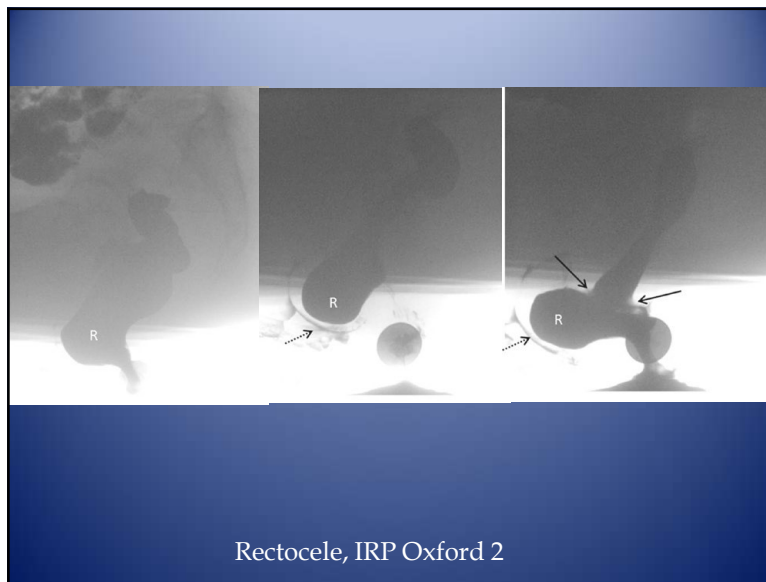
- **Rectocele**- an anterior bulge of the rectal wall wider than 2 cm in the AP diameter
- The depth of a rectocele is measured from the anterior border of the anal canal to the anterior border of the rectocele.
- *A distance of <2 cm is classified as small, 2-4 cm as moderate, and >4 cm as large*
- **Enterocele/sigmoidocele**- herniation of the peritoneal sac into the rectovaginal space containing small bowel loops or sigmoid
- **Rectal prolapse**- concentric invagination or infolding of the entire rectal wall into the rectal lumen during straining or defecation
- **Anismus** also known as Dyskinetic puborectalis muscle syndrome- *inappropriate contraction of the pelvic floor during defecation seen as lack of pelvic floor descent and paradoxical contraction of the puborectalis muscle and evacuation time longer than 30 seconds.*

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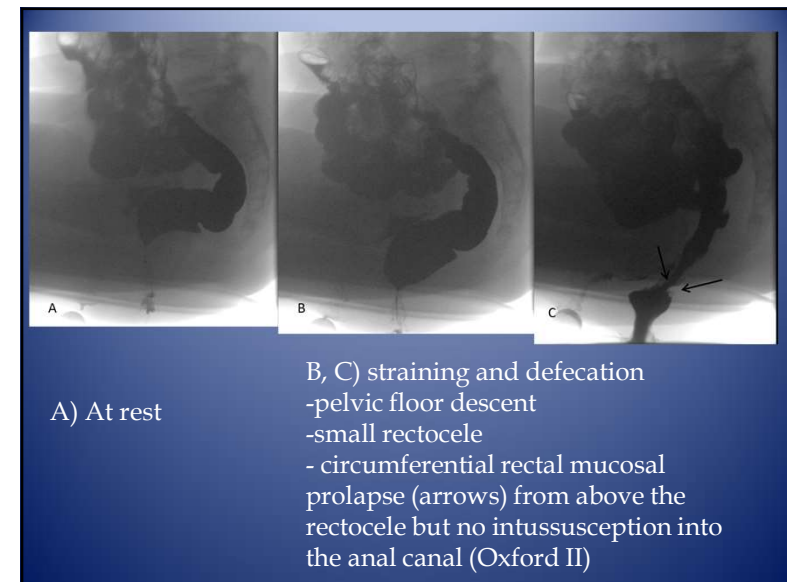
## Rectal Intussusception/prolapse Oxford Classification System

Recto-rectal (non- pathological) grade I and II	Recto- anal (pathological) grade III and IV	Rectal prolapse Grade V

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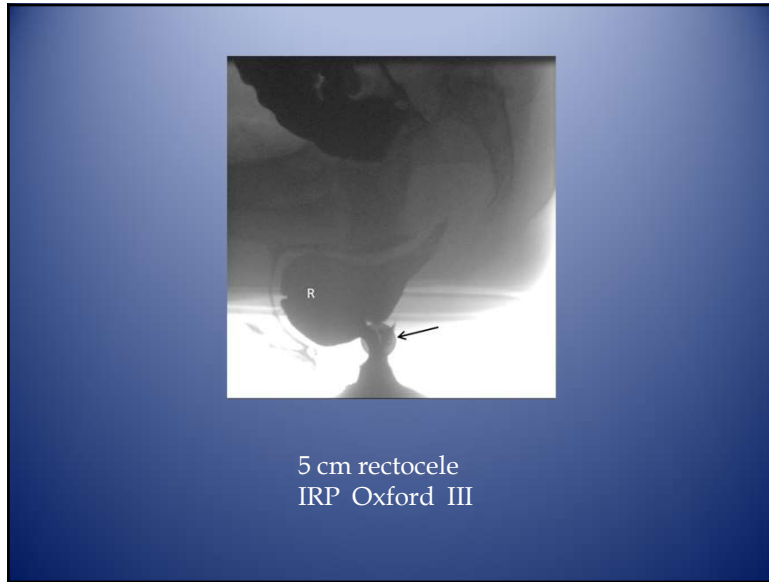


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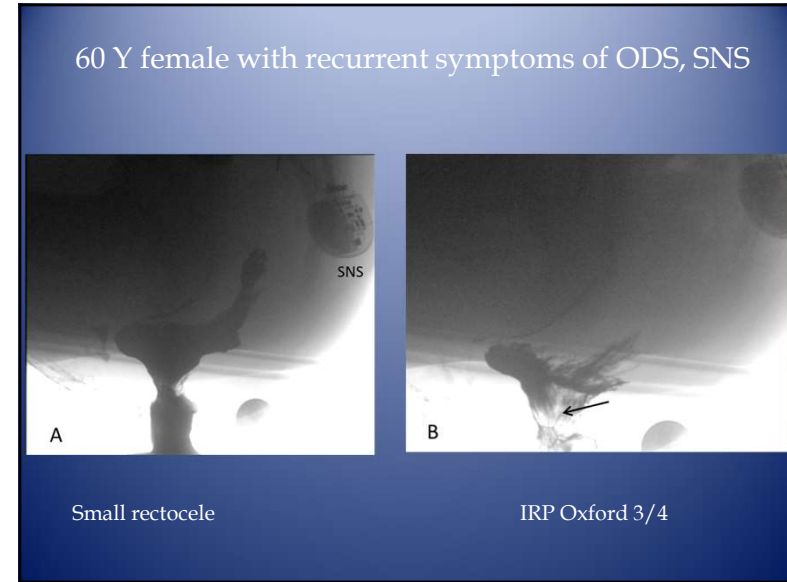


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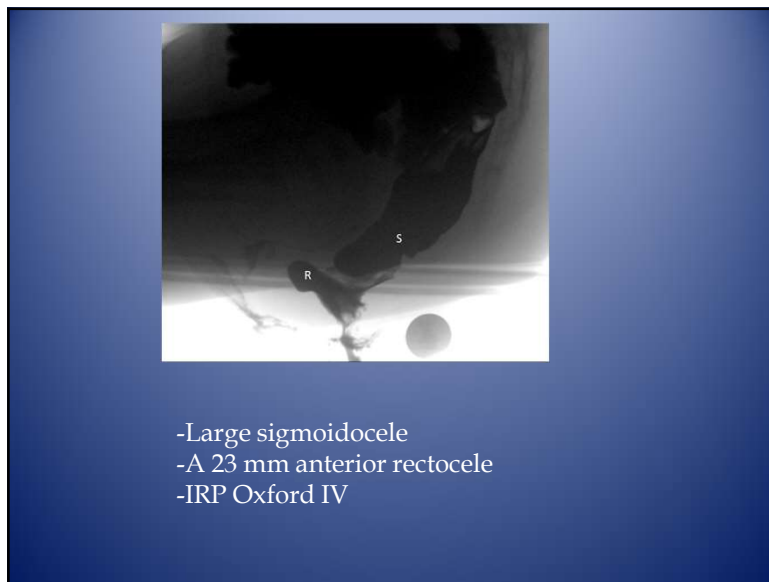




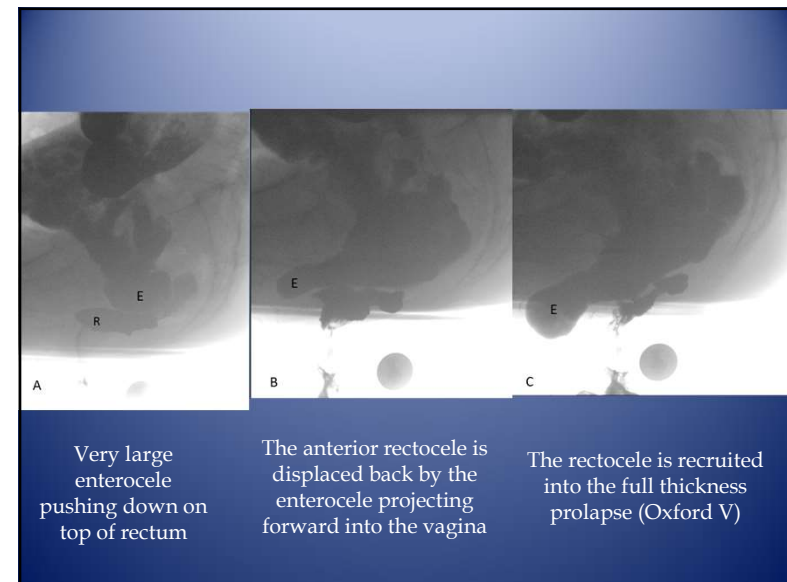
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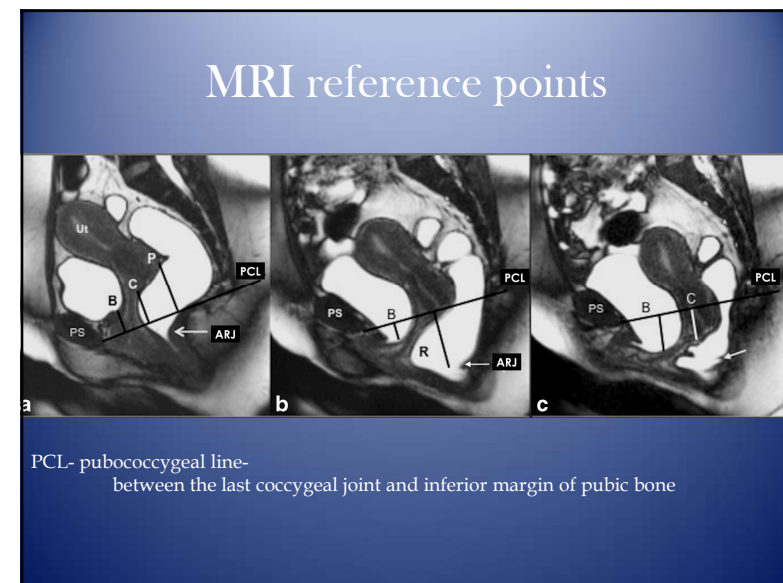


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## MRI- patient preparation and scanning protocol

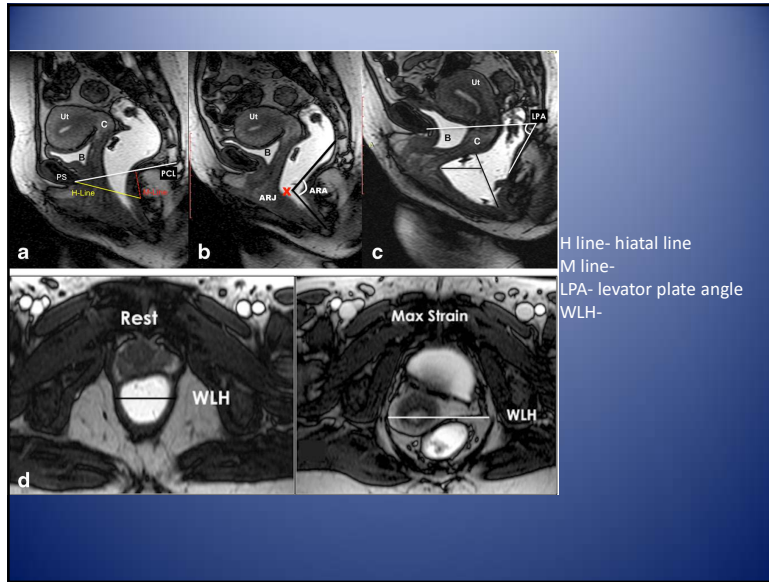
- comfortably full bladder
- suppositories
- no small bowel preparation, no vaginal contrast
- rectal contrast- US gel (Gd+barium, balloon)
  
- Patient scanned in supine with knees flexed
- Patient instructed about how to perform dynamic manoeuvres prior the scan: *relax-squeeze-relax-straining-evacuation*
  
- Scanning time is at least 20 minutes:
- Dynamic sequences and also anatomical sequences to assess anatomy

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# W5 4b. Fluoroscopic and MRI defecography



H line- hiatal line  
M line-  
LPA- levator plate angle  
WLH-

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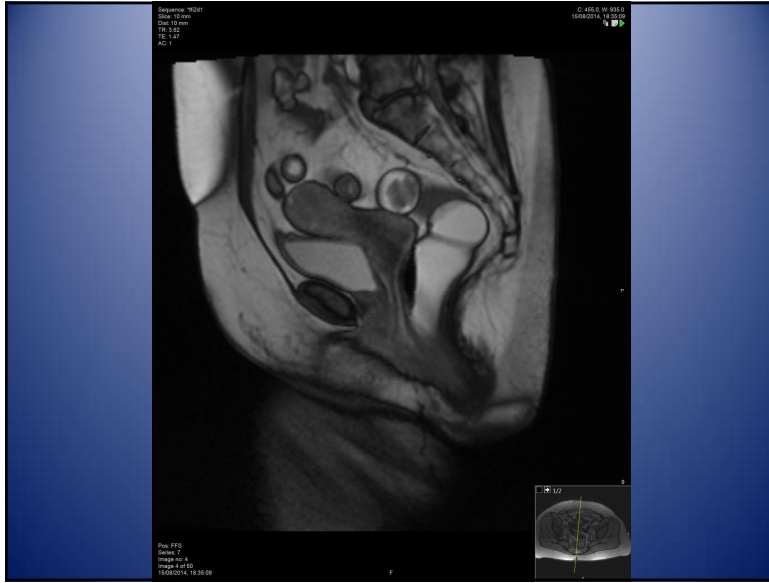


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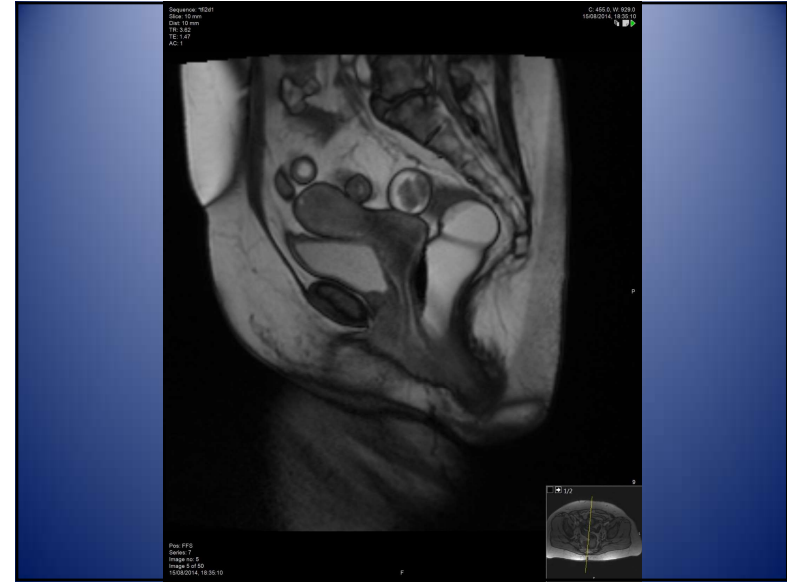


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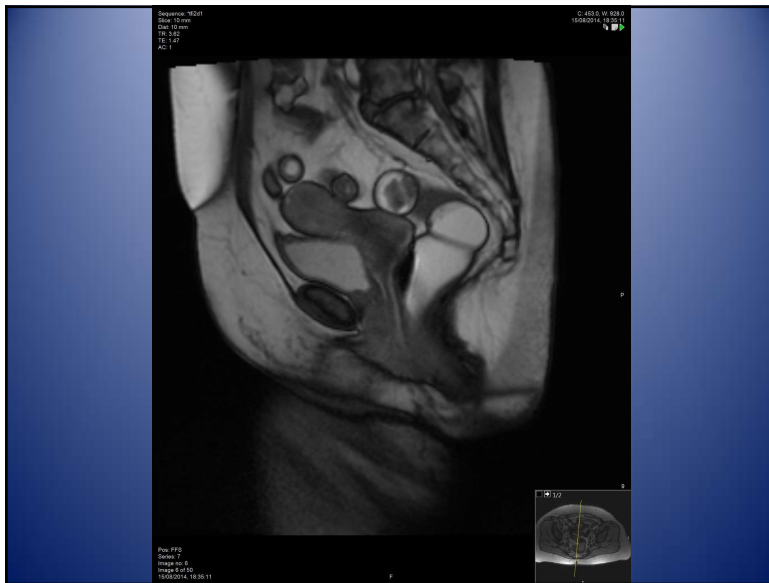
# W5 4b. Fluoroscopic and MRI defecography



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# W5 4b. Fluoroscopic and MRI defecography



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# W5 4b. Fluoroscopic and MRI defecography



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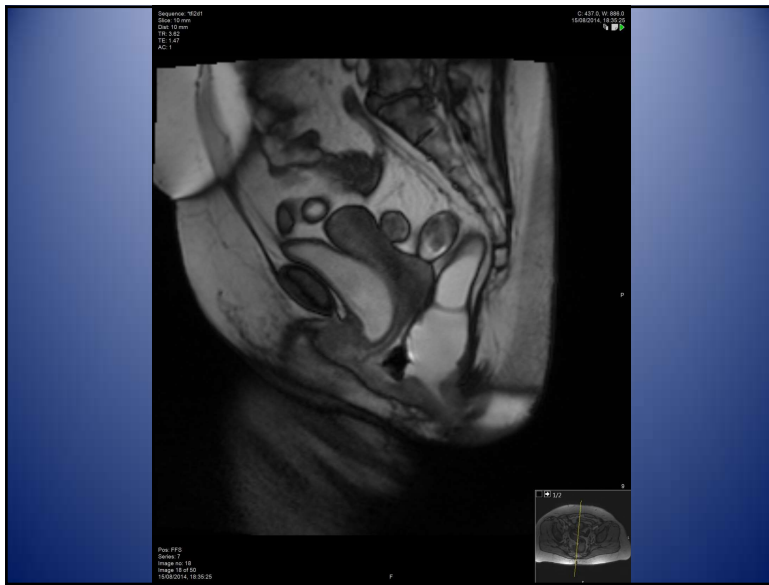
# W5 4b. Fluoroscopic and MRI defecography



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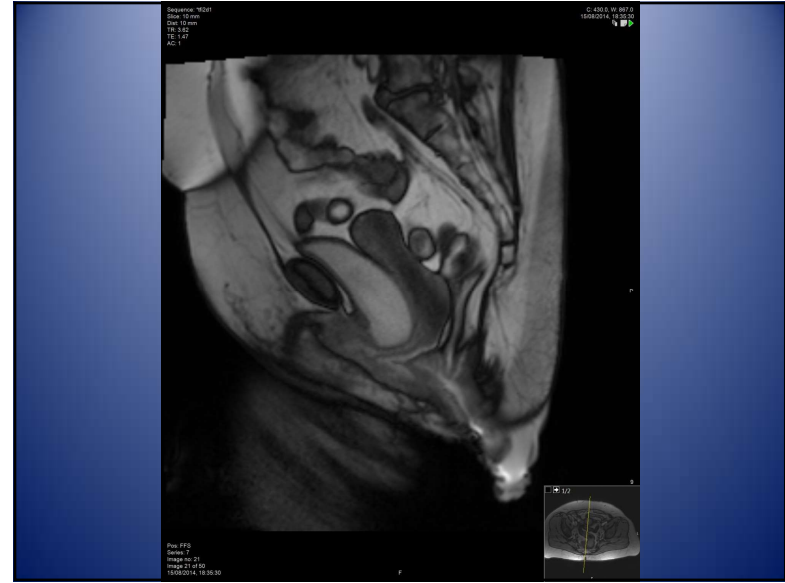


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# W5 4b. Fluoroscopic and MRI defecography



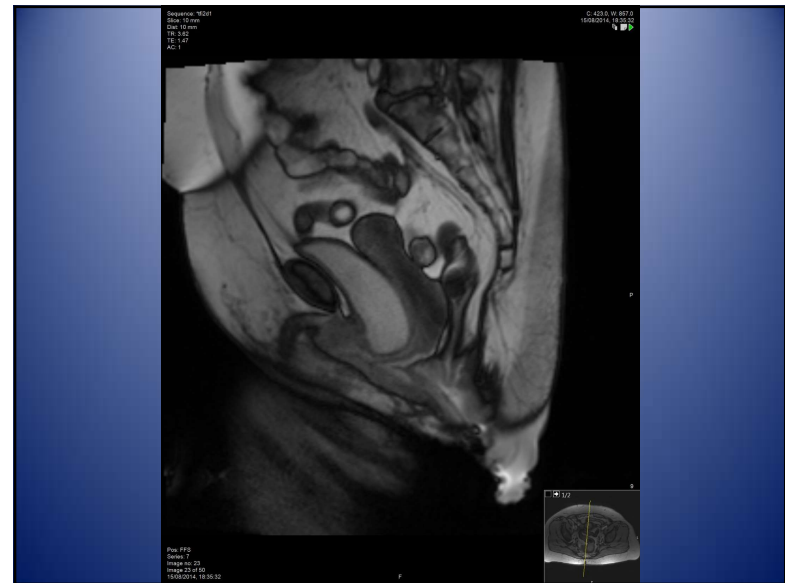
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### Pathologies

Small- 0-2 cm  
Moderate 2-4 cm  
Large >4 cm

47

### Pathologies

Ant Post  
enterocoele  
Ant Post  
intussusception

48

### Normal posterior compartment Cystourethrocele

- Cystocele 1- 3 cm- small,
- 3-6 cm moderate
- >6 cm- large

49

### Puborectalis muscle

50

### EP? / MRI?

Evacuation Proctography	MRI defecography
<b>PROS:</b>	<b>PROS:</b>
Physiological position	Very good tissue delineation
Good information about physiology and indirectly about PRM	No bowel or vaginal contrast
Very good in assessing intussusception	Anatomical and functional information
<b>CONS:</b>	<b>CONS:</b>
Radiation	Supine position, open scanner not widely available
Lengthy preparation	

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### What technique is best?

*Original Research*

#### Accuracy of Four Imaging Techniques for Diagnosis of Posterior Pelvic Floor Disorders

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Imaging Technique	Discomfort (VAS 0-10)	P	Embarrassment (VAS 0-10)	P
EP	3.4 (0-10)		6.8 (0-10)	
MRI	4.2 (0-10)	.005*	6.9 (0-10)	.022*
TPUS	0.7 (0-8)	<.001*	1.8 (0-10)	<.001*
EVUS	1.8 (0-10)	<.001*	2.1 (0-10)	<.001*
		<.001*		<.001*

VAS, visual analog scale; EP, evacuation proctography; MRI, magnetic resonance imaging; TPUS, transperineal ultrasonography; EVUS, endovaginal ultrasonography.  
Data are mean (range) unless otherwise specified.  
\* Statistical difference of test as compared with evacuation proctography.  
† Statistical difference of test as compared with MRI.  
‡ Statistical difference of test as compared with transperineal ultrasonography.

Evacuation proctography, MRI, and TPUS and EVUS were shown to have **similar diagnostic test accuracy**.

EP is **not the best** available imaging technique.

There is **no one optimal test** for the diagnosis of all posterior pelvic floor disorders.

As TPUS and EVUS have good test accuracy and patient acceptability, we suggest these could be used for initial assessment of ODS

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Thank you for your attention

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