Faecal incontinence

New insights into pathophysiology and diagnosis

Emma V Carrington

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Scottish Pelvic Floor Network ASM 2023

Imperial College London

Emma V Carrington declares the following disclosures

Collaborations for education

Laborie
Johnson & Johnson
Cambridge Medical Robotics

Guideline groups / working parties

The Rome Foundation
The International Anorectal Physiology Working Group

Imperial College London

Its well appreciated that continence and defecation is multifaceted

COLON

luminal contents are propelled distally

RECTUM

the rectum distends
activates mechanoreceptors
and generates urge

ANUS

the RAIR allows sampling
if inconvenient the
sphincter contracts

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So why do most surgeries focuses on augmentation of the barrier function of the anus?

COLON

RECTUM

Diversion (stoma)

Sacral neuromodulation
Rectopexy

ANUS

Sphincteroplasty
~~Gracilloplasty~~
~~Artificial anal sphincter~~
(Sphinctkeeper)
(Radiofrequency ablation)
(Cell therapies)

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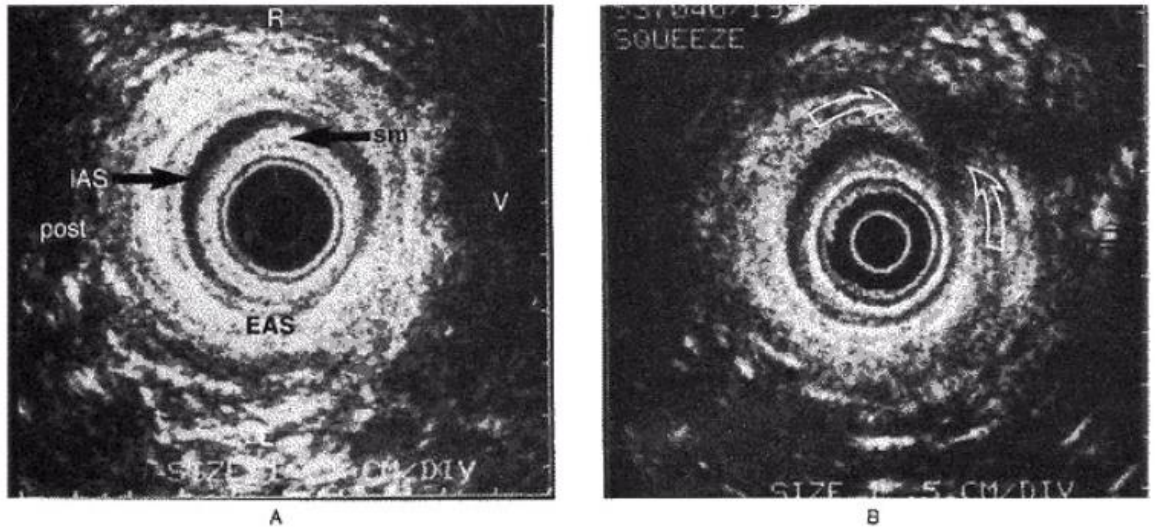
It’s because the sphincter was thought to have primacy for continence

The New England
Journal of Medicine

Volume 329 DECEMBER 23, 1993 Number 26

ANAL-SPHINCTER DISRUPTION DURING VAGINAL DELIVERY

ABDUL H. SULTAN, M.B., CH.B., MICHAEL A. KAMM, M.D., CHRISTOPHER N. HUDSON, M.CHIR., JANICE M. THOMAS, M.SC., AND CLIVE I. BARTRAM, F.R.C.P.



SYMPTOM	DEFECT (N = 49)	NO DEFECT (N = 78)	P VALUE*
	no. of women		
Fecal urgency			
Yes (n = 18)	18	0	<0.001
No (n = 109)	31	78	
Anal incontinence			
Yes (n = 11)	10	1	<0.001
No (n = 116)	39	77	

*By Fisher’s exact test. Both symptoms were strongly associated with the presence of a defect.

(only) 20% with defects reported FI

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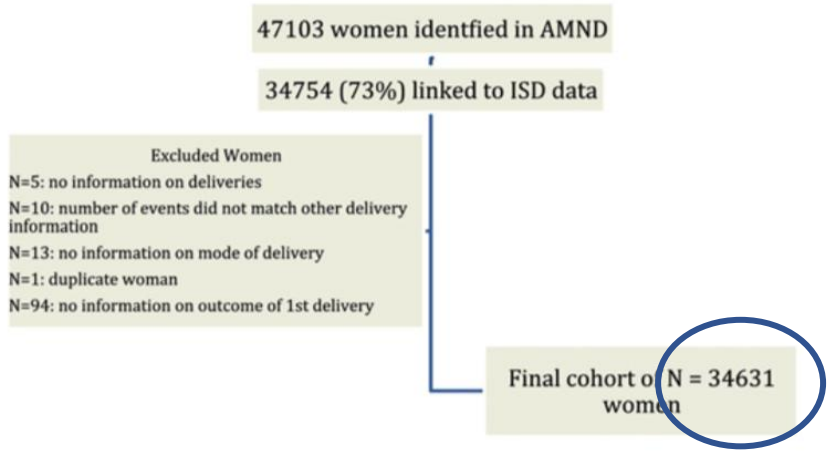
But this theory this isn't supported by population data



BMJ open accessible medical research

Primary and repeat surgical treatment for female pelvic organ prolapse and incontinence in parous women in the UK: a register linkage study

Mohamed Abdel-fattah,[1] Akinbowale Familusi,[1] Shona Fielding,[2] John Ford,[2] Sohinee Bhattacharya[3]

To cite: Abdel-fattah M, Familusi A, Fielding S, *et al*. Primary and repeat surgical treatment for female pelvic organ prolapse and incontinence in parous women in the UK: a register linkage study. *BMJ Open* 2011;**1**:e000206. doi:10.1136/bmjopen-2011-000206

Table 4 Cox regression results for risk factors for undergoing surgical treatment for RP-FI

Risk factor	No operation (N=32 501) N (%)	RP or FI operation (N=1508) N (%)	Unadjusted HR (95% CI)	Unadjusted p Value	Adjusted HR (95% CI)	Adjusted p Value
Type of perineal wound						
No wound	13 601 (41.8%)	43 (43.9%)	1.00		1.00	
All episiotomy	8852 (27.2%)	26 (26.5%)	0.98 (0.60 to 1.60)	0.94	0.80 (0.48 to 1.33)	0.40
At least one third-degree tear	150 (0.5%)	7 (7.1%)	21.8 (9.72 to 48.7)	<0.001	16.9 (7.44 to 38.3)	<0.001
No perineal tears (lacerations only)	9898 (30.5%)	22 (22.4%)	0.83 (0.49 to 1.38)	0.47	0.76 (0.45 to 1.29)	0.31

CS, caesarean section; RP-FI, rectal prolapse or faecal incontinence; SVD, spontaneous vaginal delivery.

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And we know that many patients with FI in fact have normal sphincter function

Neurogastroenterology & Motility NGM
Neurogastroenterol Motil (2016) **28**, 1580–1588 doi: 10.1111/nmo.12858

Pathophysiology of fecal incontinence differs between men and women: a case-matched study in 200 patients

D. C. TOWNSEND, E. V. CARRINGTON, U. GROSSI, R. E. BURGELL, J. Y. J. WONG, C. H. KNOWLES & S. M. SCOTT

National Bowel Research Centre (NBRC) and GI Physiology Unit, Barts and the London School of Medicine and Dentistry, Queen Mary University of London, London, UK

77%

47%

NORMAL tone & contractility

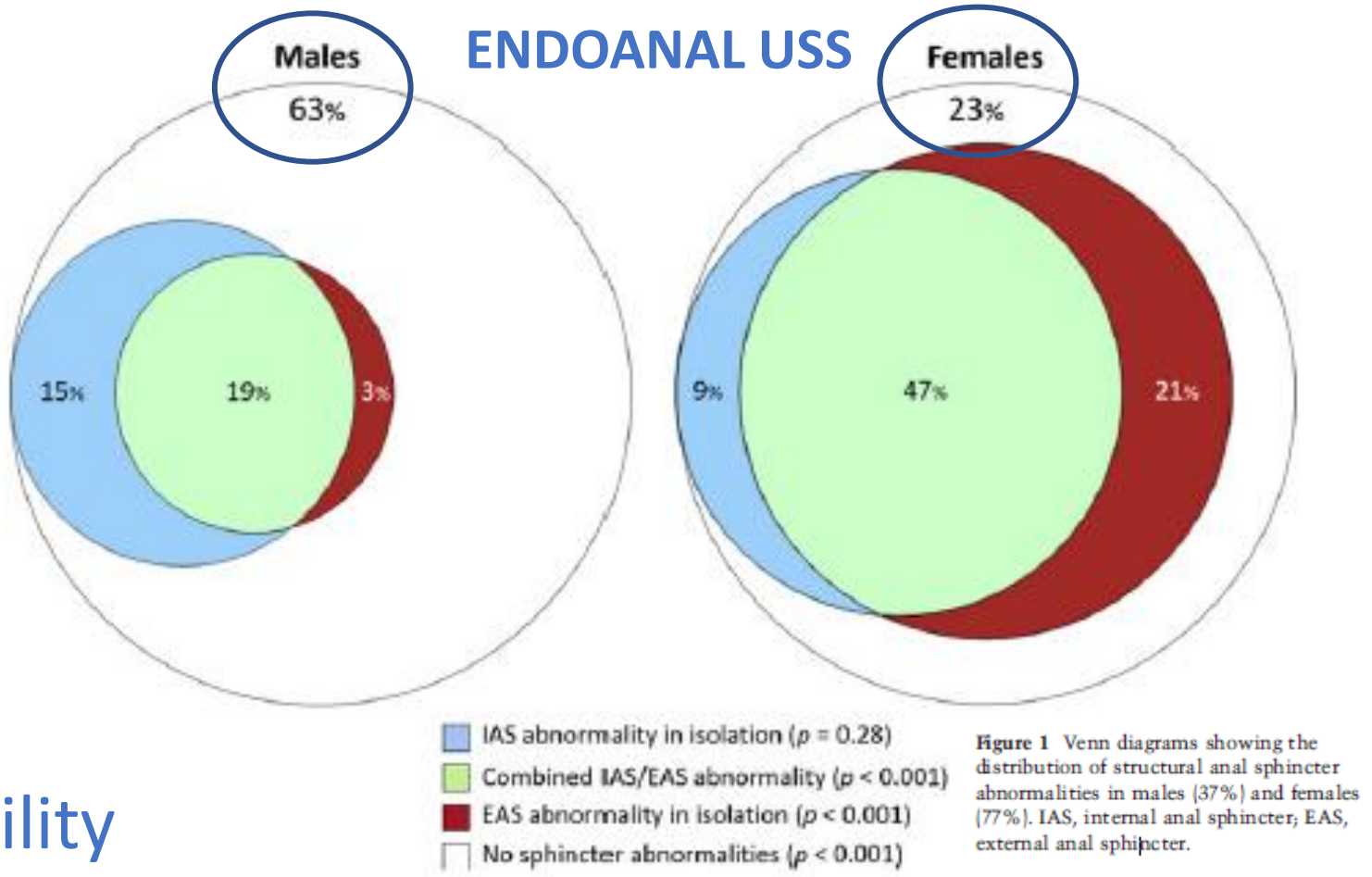

Figure 1 Venn diagrams showing the distribution of structural anal sphincter abnormalities in males (37%) and females (77%). IAS, internal anal sphincter; EAS, external anal sphincter.

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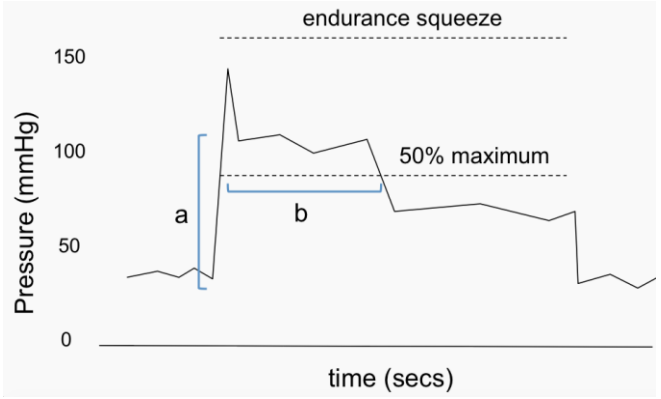
Besides, we all know that anal contraction alone doesn't really describe normal continence!



Neurogastroenterol Motil (2014) **26**, 625–635 doi: 10.1111/nmo.12307

Traditional measures of normal anal sphincter function using high-resolution anorectal manometry (HRAM) in 115 healthy volunteers

E. V. CARRINGTON,*,†,# A. BROKJÆR,*,‡,# H. CRAVEN,* N. ZARATE,* E. J. HORROCKS,*,† S. PALIT,† W. JACKSON,§ G. S. DUTHIE,§ C. H. KNOWLES,*,† P. J. LUNNISS* & S. M. SCOTT*,†

Table 5 Table of suggested normal values for use in clinical practice

	All females		Parous females		Nulliparous females		Males	
Suggested normal values	Lower	Upper	Lower	Upper	Lower	Upper	Lower	Upper†
Functional anal canal length (cm)	2.3	5	2.3	4.9	2.3	5.3	2.4	5.1
Average anal resting pressure (mmHg)	33	101	31	100	47	110	38	114
Maximum absolute anal squeeze pressure (mmHg)	90	397	86	387	89	447	94	590
Maximum incremental anal squeeze pressure (mmHg)	45	324	43	313	52	352	61	525
Average absolute anal squeeze pressure (mmHg)	73	314	71	310	74	348	86	430
Average incremental anal squeeze pressure (mmHg)	29	235	24	232	32	247	40	366
Endurance squeeze duration (secs)	2	30	3	30	2	30	3	30
Residual push pressure (mmHg)	16	88	15	99	16	79	20	93
Push relaxation percentage (mmHg)	0*	66	0*	64	0*	81	0*	51
Peak rectal push pressure (mmHg)	21	122	22	129	19	144	20	132
Maximum absolute anal cough pressure (mmHg)	82	298	70	276	82	315	109	498
Maximum incremental anal cough pressure (mmHg)	34	224	35	221	34	230	29	413

Lower limit values are estimated from the 5th percentile and upper limit values estimated from the 95th percentile.
*Substitute value of 0 as 5th percentile for relaxation percentage was negative i.e. representing a paradoxical anal contraction during push.
†90th percentile quoted due to low sample size in males.

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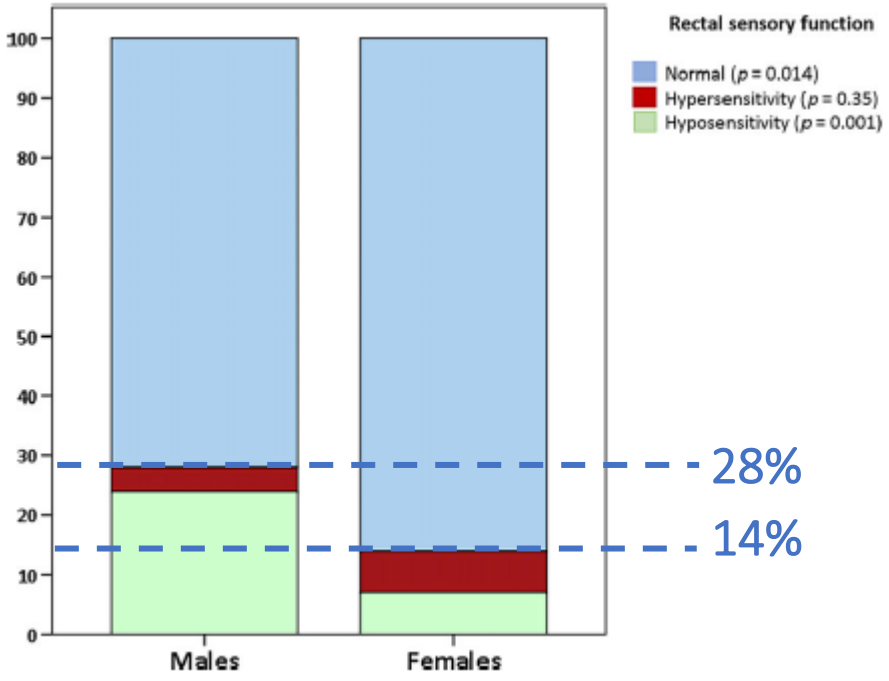
There is a large body of evidence to suggest that rectal function is key

Neurogastroenterology & Motility
NGM
Neurogastroenterol Motil (2016) **28**, 1580–1588
doi: 10.1111/nmo.12858

Pathophysiology of fecal incontinence differs between men and women: a case-matched study in 200 patients

D. C. TOWNSEND, E. V. CARRINGTON, U. GROSSI, R. E. BURGELL, J. Y. J. WONG, C. H. KNOWLES & S. M. SCOTT



Abnormal rectal sensation is common

ANORECTAL DISEASE

Rectal sensorimotor dysfunction in patients with urge faecal incontinence: evidence from prolonged manometric studies

C L H Chan, P J Lunniss, D Wang, N S Williams, S M Scott

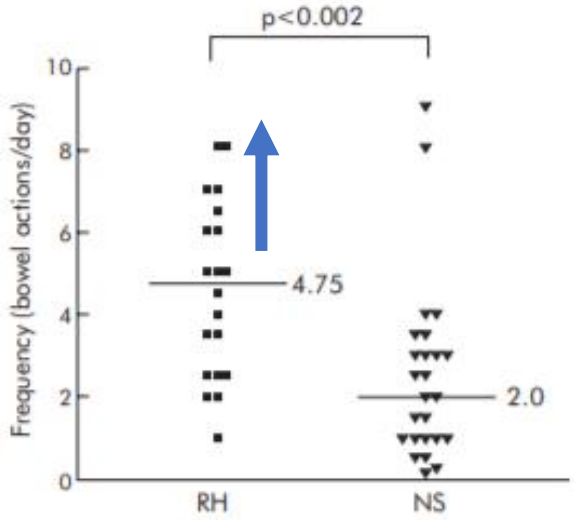
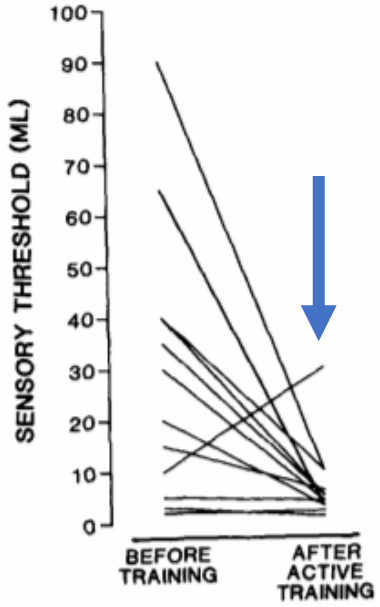


Figure 1 Reported bowel frequency in the rectal hypersensitivity (RH) and normal rectal sensation (NS) groups. A significantly higher median stool frequency was reported in the RH compared with the NS group (4.75 v 2.0).

It's associated with urgency

Investigation of Mode of Action of Biofeedback in Treatment of Fecal Incontinence

P.B. MINER, T.C. DONNELLY, and N.W. READ



Rx can be associated with symptom resolution

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In particular rectal motor function

COLORECTAL DISEASE

Relationship between symptoms and disordered continence mechanisms in women with idiopathic faecal incontinence

A E Bharucha, J G Fletcher, C M Harper, D Hough, J R Daube, C Stevens, B Seide, S J Riederer, A R Zinsmeister

Gut 2005;54:546–555. doi: 10.1136/gut.2004.047696

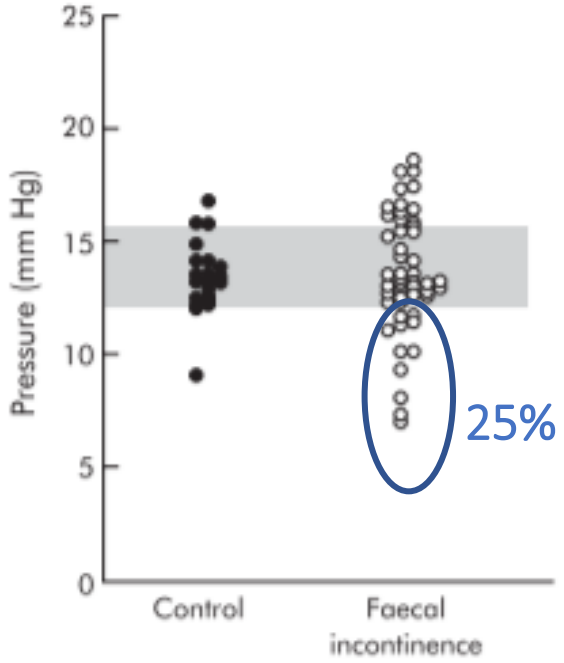

Figure 4 Rectal compliance (pressure at half maximal volume

Abnormal compliance is common

ANORECTAL DISEASE

Rectal sensorimotor dysfunction in patients with urge faecal incontinence: evidence from prolonged manometric studies

C L H Chan, P J Lunniss, D Wang, N S Williams, S M Scott

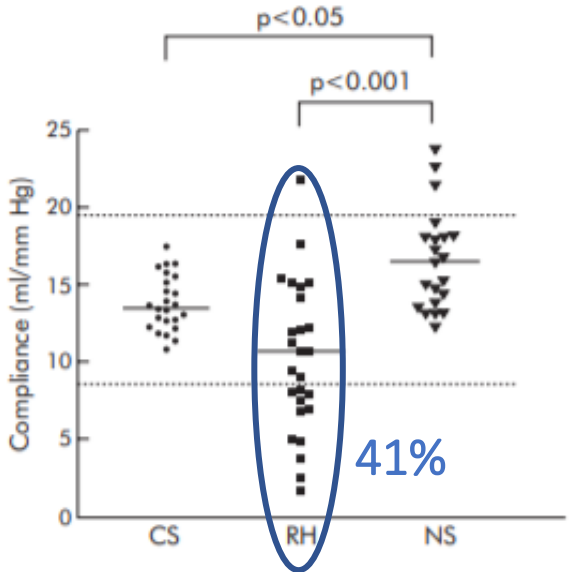

Figure 2 Rectal compliance in control subjects (CS) and in those with rectal hypersensitivity (RH) and normal rectal sensation (NS).

Associated with rectal hypersensitivity

Rectal Volume Tolerability and Anal Pressures in Patients With Fecal Incontinence Treated With Sacral Nerve Stimulation

Hanne B. Michelsen, M.D.,[1] Steen Buntzen, M.D., D.M.Sc.,[1] Klaus Krogh, M.D., D.M.Sc.,[2] Søren Laurberg, M.D., D.M.Sc.[1]

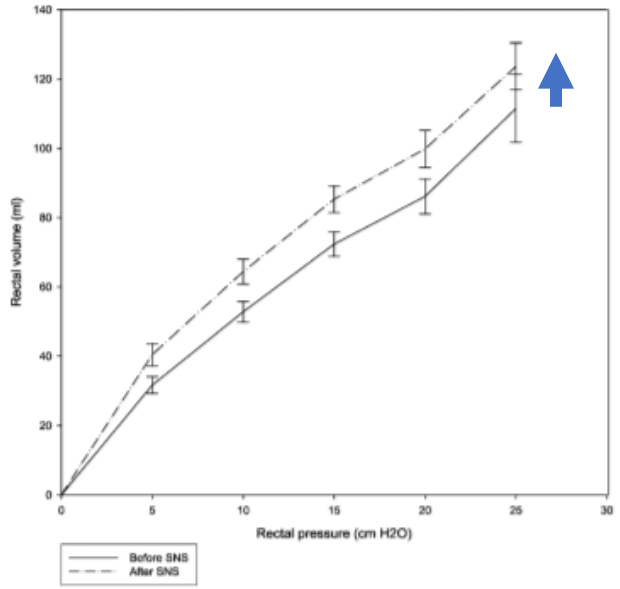

Figure 1. Rectal pressure-volume curves before and after sacral nerve stimulation.

May be modulated with SNS

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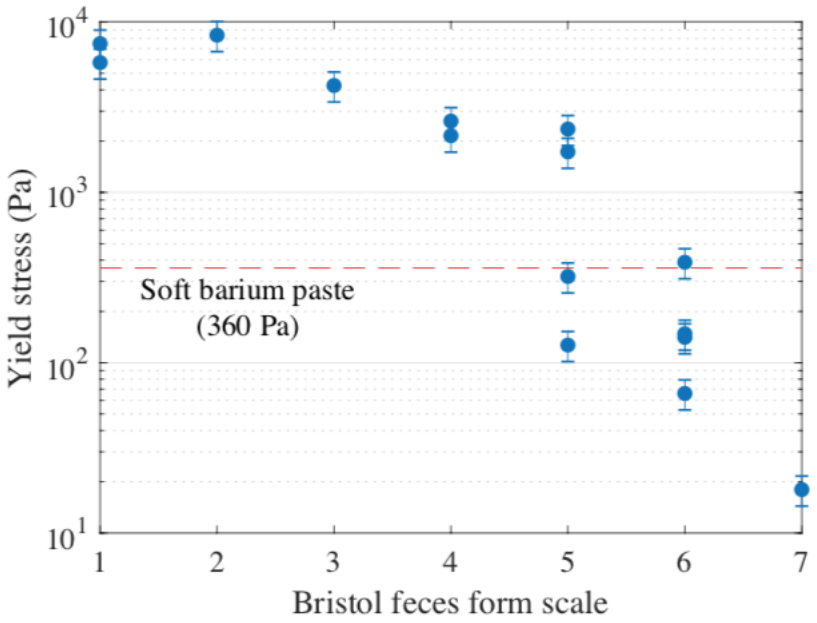
More recently, the theory of rectal overactivity is gaining popularity

Rheology of human faeces and pathophysiology of defaecation

Clément de Loubens, Alain Dubreuil, Roger G Lentle, Albert Magnin, Nadia El Kissi, Jean-Luc Faucheron

Clément de Loubens, Alain Dubreuil, Roger G Lentle, Albert Magnin, Nadia El Kissi, et al.. Rheology of human faeces and pathophysiology of defaecation. Techniques in Coloproctology, Springer Verlag (Germany), 2020, 24 (4), pp.323-329. 10.1007/s10151-020-02174-0 . hal-02502923



New concepts in the pathophysiology of fecal incontinence

Charles H. Knowles[1], Phil Dinning[2], S. Mark Scott[1], Michael Swash[3], Stefan de Wachter[4]

[1]Centre for Neuroscience, Surgery & Trauma, Blizard Institute, Barts & the London School of Medicine & Dentistry, Queen Mary University of London, London, UK; [2]Department of Surgery and Gastroenterology, Flinders Medical Centre & College of Medicine & Public Health, Flinders University, Adelaide, Australia; [3]Institute of Neuroscience (Translational Neurophysiology), University of Lisbon, Lisbon, Portugal; [4]Department of Urology, Antwerp University Hospital, University of Antwerp, Antwerp, Belgium

Ann Laparosc Endosc Surg 2022;7:15 | https://dx.doi.org/10.21037/ales-2022-02

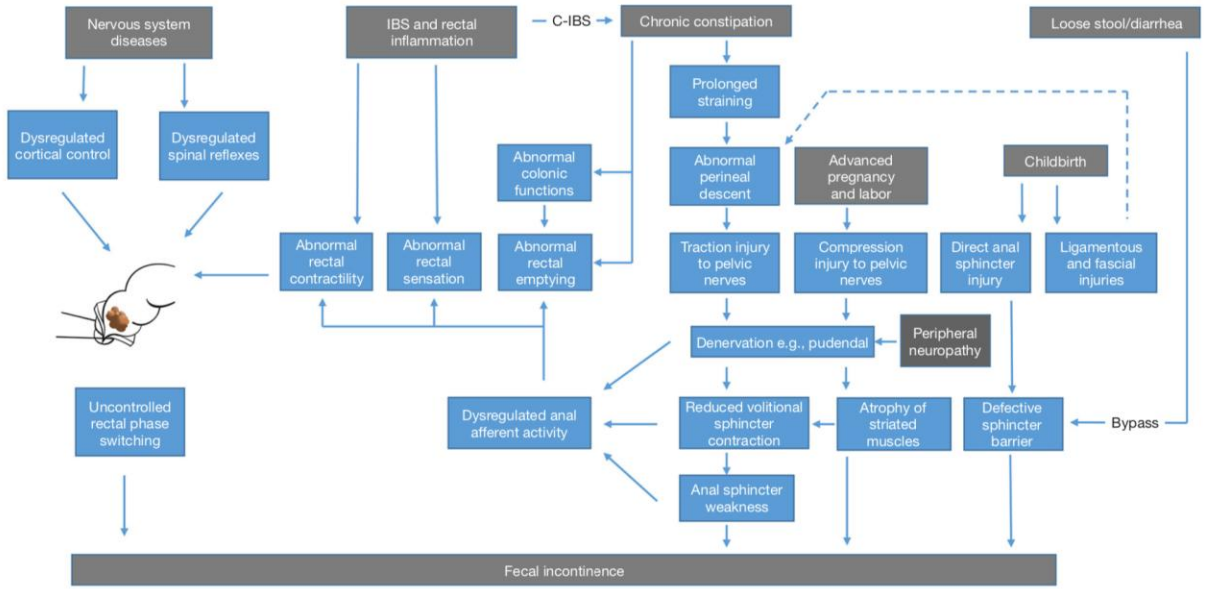


Figure 5 New rectum-centric schema for the pathophysiology of FI (see summary text). IBS, irritable bowel syndrome; C-IBS, constipation-predominant-IBS; FI, fecal incontinence.

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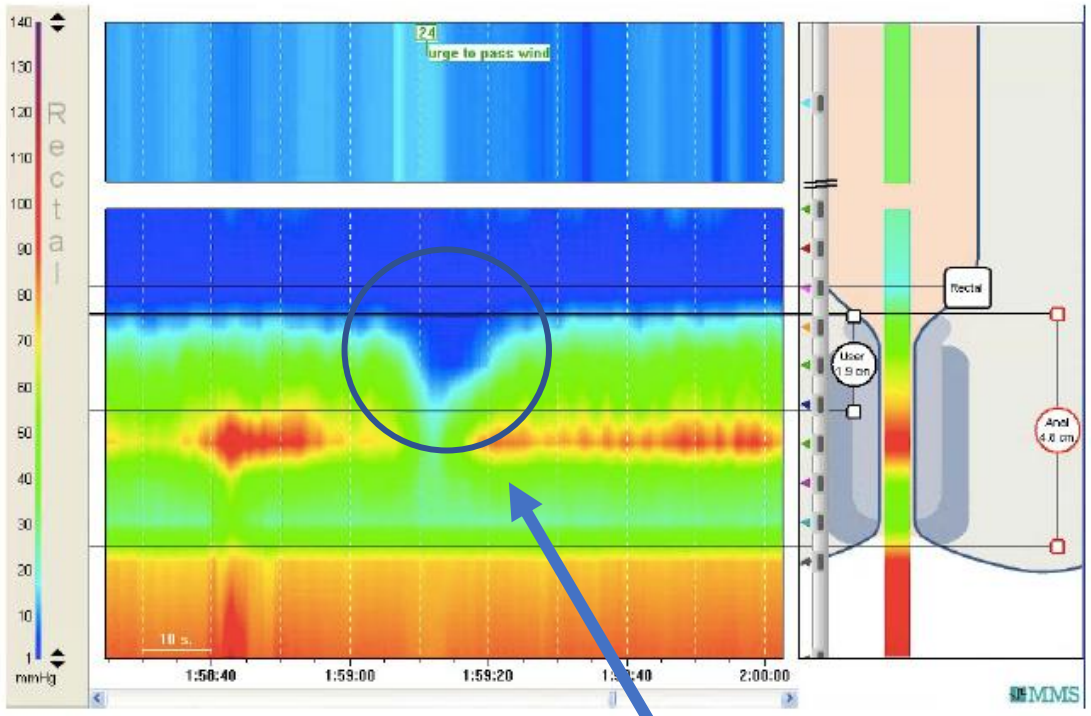
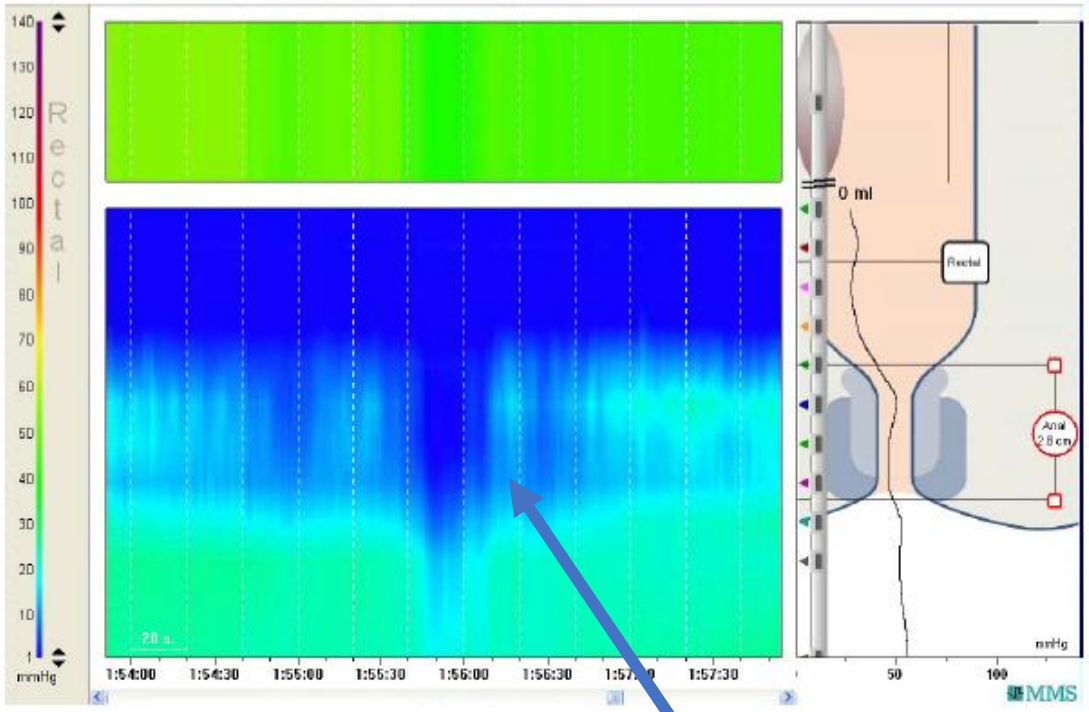
And alteration of sensation of urge may influence continence more than we realized

HEALTHY VOLUNTEER



Perceived
anal sampling

FECAL INCONTINECE



not perceived
disorganised activity

Carrington 2016

Imperial College London

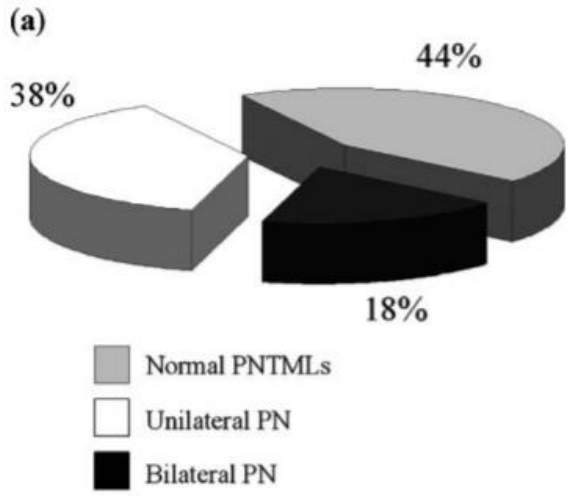
Pudendal neuropathy is likely to particularly influential

Diseases of the Colon & Rectum

Unilateral Pudendal Neuropathy is Common in Patients with Fecal Incontinence

Mayoni L. Gooneratne, M.R.C.S., S. Mark Scott, Ph.D., Peter J. Lunniss, F.R.C.S.

Center for Academic Surgery (GI Physiology Unit), Barts & The London, Queen Mary's School of Medicine and Dentistry, London, United Kingdom



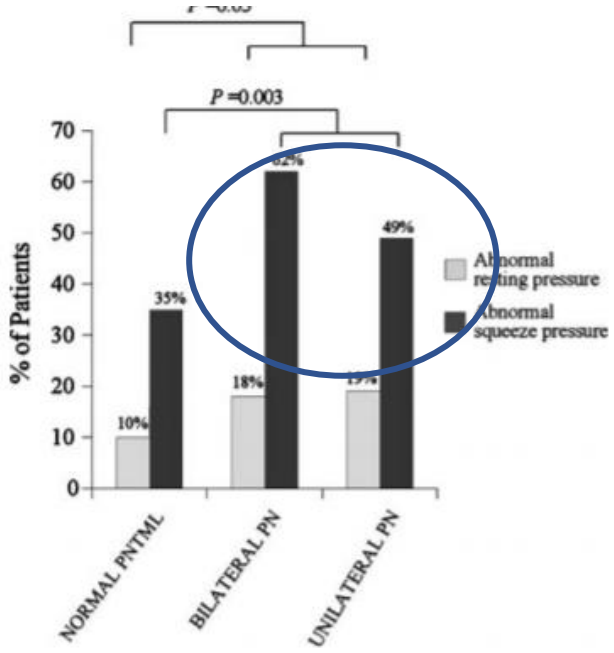


Figure 3. Association between abnormal resting pressures and squeeze increments and pudendal nerve terminal motor latency (PNTML).

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New concepts in the pathophysiology of fecal incontinence

Charles H. Knowles[1], Phil Dinning[2], S. Mark Scott[1], Michael Swash[3], Stefan de Wachter[4]

[1]Centre for Neuroscience, Surgery & Trauma, Blizard Institute, Barts & the London School of Medicine & Dentistry, Queen Mary University of London, London, UK; [2]Department of Surgery and Gastroenterology, Flinders Medical Centre & College of Medicine & Public Health, Flinders University, Adelaide, Australia; [3]Institute of Neuroscience (Translational Neurophysiology), University of Lisbon, Lisbon, Portugal; [4]Department of Urology, Antwerp University Hospital, University of Antwerp, Antwerp, Belgium

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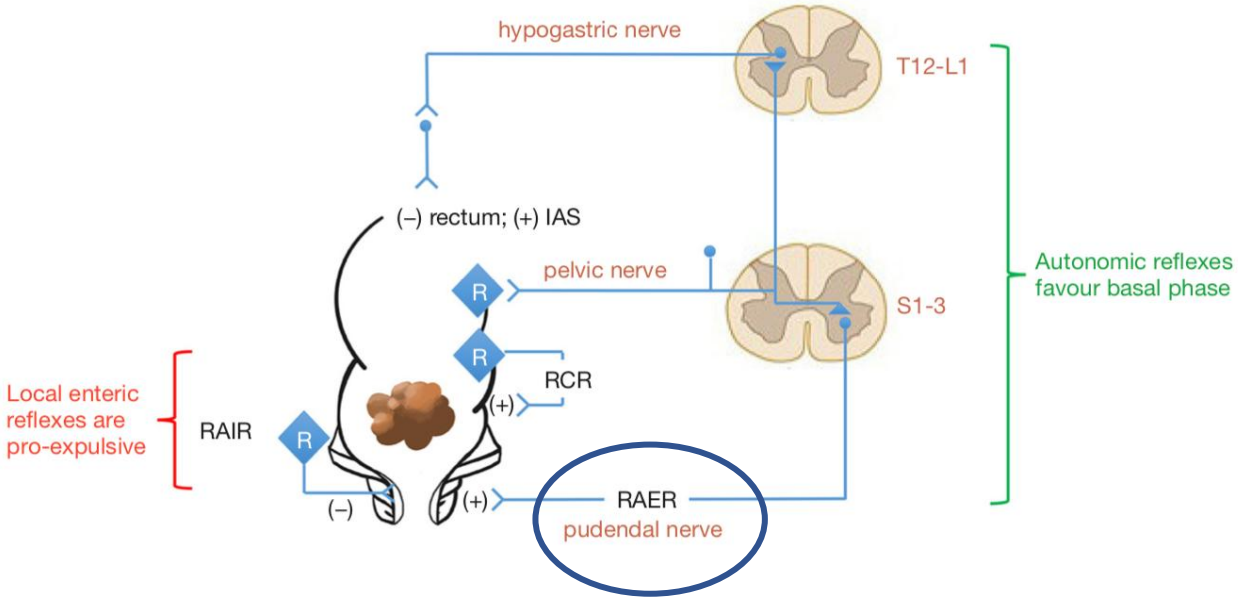


And co-existent constipation therefore becomes more relevant

Contents lists available at ScienceDirect

EClinicalMedicine

journal homepage: https://www.journals.elsevier.com/eclinicalmedicine

Research Paper

Coexistent faecal incontinence and constipation: A cross-sectional study of 4027 adults undergoing specialist assessment

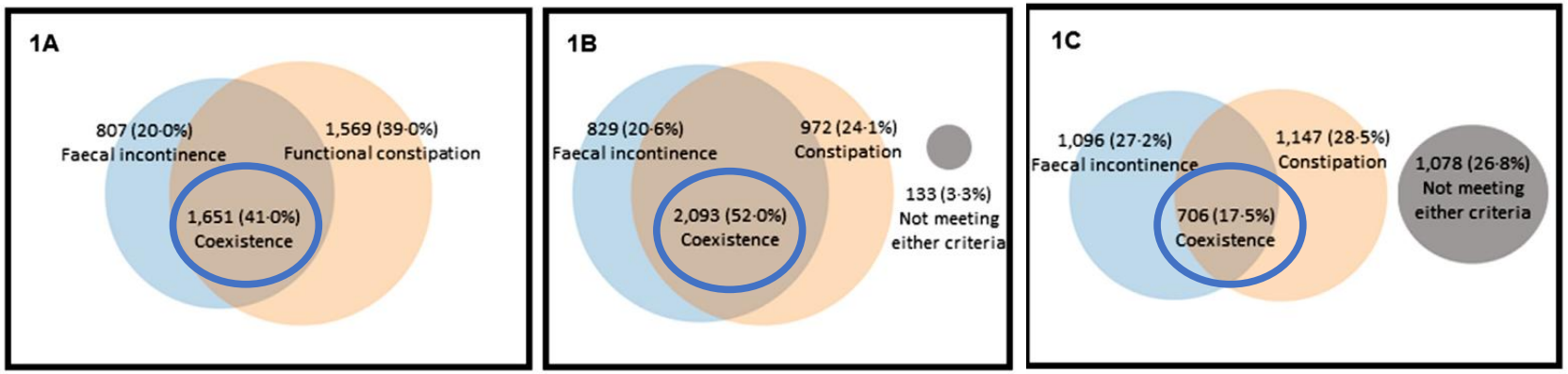
Paul F. Vollebregt[a], Lukasz Wiklendt[b], Phil G Dinning[b,c], Charles H. Knowles[a], S.Mark Scott[a,*]

[a] National Bowel Research Centre and GI Physiology Unit, Blizard Institute, Centre for Neuroscience, Surgery & Trauma, Barts and the London School of Medicine & Dentistry, Queen Mary University of London, London, United Kingdom
[b] College of Medicine and Public Health, Flinders University, Australia
[c] Department of Gastroenterology, Flinders Medical Centre, Australia

EClinicalMedicine 27 (2020) 100572

86% **Referrers didn't appreciate overlap**

Patient reported

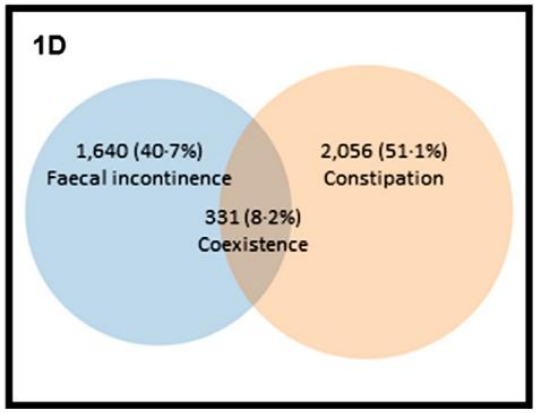


Rome IV

SIMS ≥ 6
CCCS ≥ 9

SIMS ≥ 12
CCCS ≥ 15

Clinician referral



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Especially as improving barriers to emptying are particularly successful

PAPER OF THE 22ND ANNUAL ESA MEETING

Long-term Outcome After Laparoscopic Ventral Mesh Rectopexy

An Observational Study of 919 Consecutive Patients

Esther C. J. Consten, MD, PhD, Jan J. van Iersel, MD,* Paul M. Verheijen, MD, PhD,**
Ivo A. M. J. Broeders, MD, PhD,† Albert M. Wolthuis, MD,‡ and Andre D'Hoore, MD, PhD‡*

TABLE 3. Functional Outcome and Recurrence

Functional Outcome	Total n (%)	ERP (n = 242)	IRP and/or Symptomatic Rectocele (n = 460)	IRP and/or Symptomatic Rectocele with Enterocele (n = 217)
Fecal incontinence				
Pre-op	344 (37.5)	98 (40.5)	174 (37.8)	72 (33.2)
Grade 3	18	3	8	7
Grade 4	326	95	166	65
Last FU	102 (11.1)	36 (14.8)	39 (8.5)	27 (12.5)
Grade 3	27	10	9	8
Grade 4	75	26	30	19
P	<0.0001	<0.0001	<0.0001	<0.0001
Obstructed defecation				
Pre-op	496 (54.0)	82 (33.9)	291 (63.3)	123 (56.7)
Last FU	143 (15.6)	32 (13.2)	75 (16.3)	36 (16.6)
ST	12 (1.3) ST	4 (1.7) ST	7 (1.5) ST	1 (0.5) ST
P	<0.0001	<0.0001	<0.0001	<0.0001

82%

Patients reported improvement in FI symptoms

Imperial College London

The key is for assessment is to be as comprehensive as possible

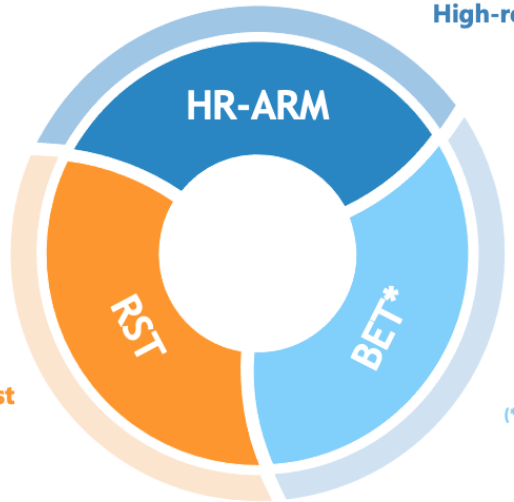
Received: 20 February 2019 | Revised: 25 June 2019 | Accepted: 2 July 2019
DOI: 10.1111/nmo.13679

POSITION PAPER

WILEY

The international anorectal physiology working group (IAPWG) recommendations: Standardized testing protocol and the London classification for disorders of anorectal function

Full assessment involves the use of 3 complimentary investigations

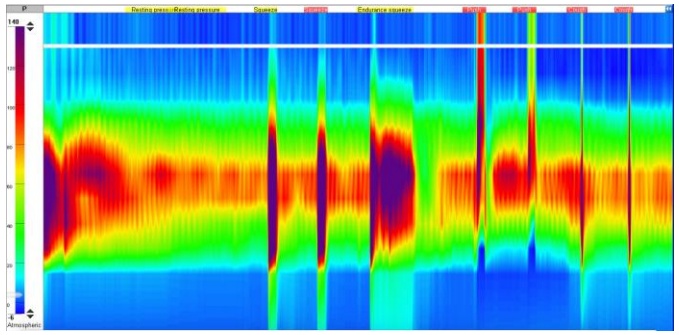


High-resolution anorectal manometry

Rectal sensory test

Balloon expulsion test
(*or alternative test of evacuation e.g. defecography)

HIGH RESOLUTION MANOMTERY



ANORECTAL REFLEXES

rectoanal inhibitory reflex (RAIR)

ANAL TONE AND CONTRACTILITY

normo / hypo / hyper TONIA
normo / hypo / CONTRACTILITY

ANORECTAL CO-ORDINATION

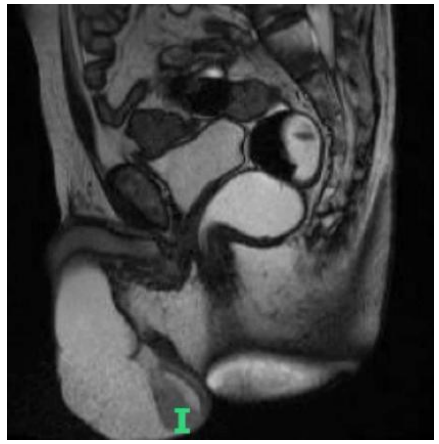
normal / impaired / PROPULSION DYSSYNERGIA

RECTAL SENSORY TESTING

3 THRESHOLDS MEASURED

First constant sensation (FCS)
Defaecatory desire volume (DDV)
Maximum tolerated volume (MTV)

EVACUATION STUDIES



TRANSIT STUDIES

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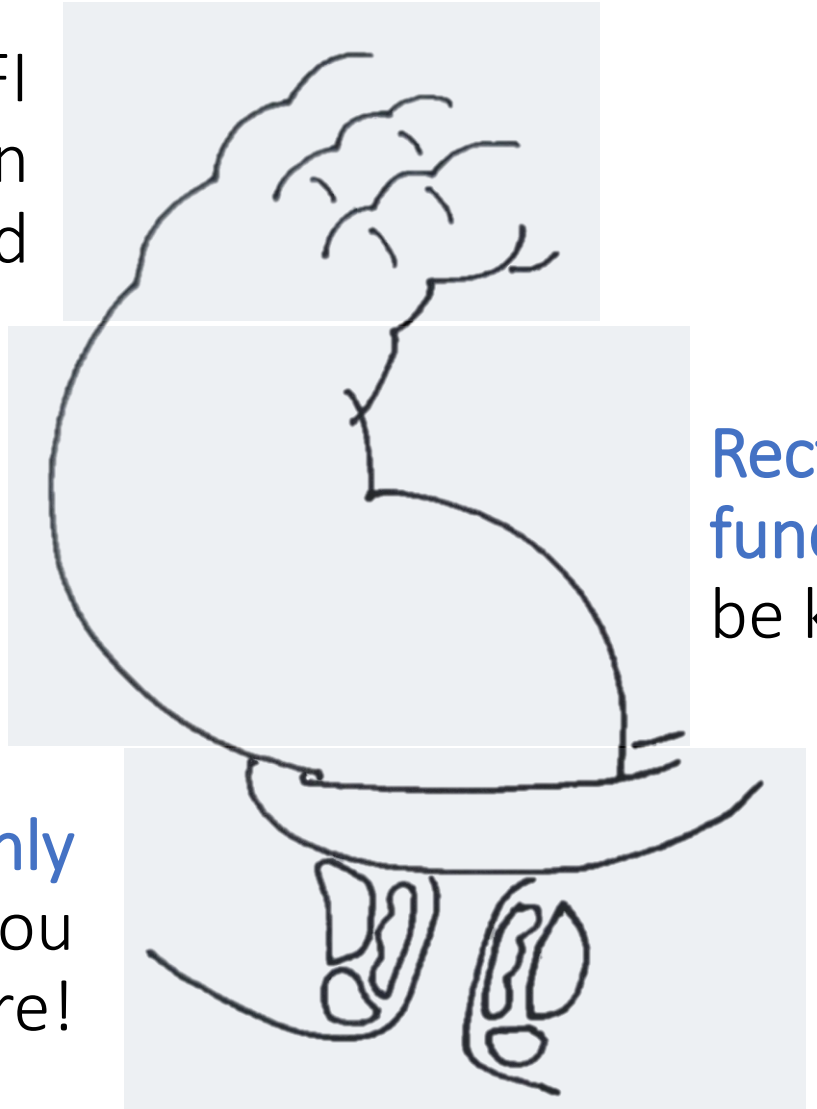
The pathophysiology of FI is more complex than previously appreciated



Rectal sensorimotor function is likely to be key

Don’t forget you’ll only understand what you measure!

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So (please) never request ‘just an ultrasound’!

Imperial College London

Thank you

emma.carrington@imperial.ac.uk

@emmaVcarrington

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Join us!

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