Editorial

Anorectal manometry in dyssynergic defecation: Are we there yet?

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Dyssynergic defecation (DD) refers to the paradoxical contraction or inadequate relaxation of the pelvic floor on attempted defecation.[1] As symptoms do not reliably discriminate between subtypes of chronic constipation, diagnostic tests are frequently required.[1]

The Rome III criteria require a combination of functional constipation and two abnormal dynamic tests of the pelvic floor on attempted defecation (i.e., impaired evacuation on balloon expulsion or defecography; inappropriate contraction of the pelvic floor muscles or incomplete relaxation of the anal sphincter on manometry, electromyography, or imaging; inadequate propulsive forces assessed by manometry or imaging) to diagnose functional defecation disorder.[1] Dyssynergic defecation is seen in a subset of patients with functional defecation disorder, and is defined as inappropriate contraction of the pelvic floor or less than 20% relaxation of basal resting sphincter pressure with adequate propulsive forces during attempted defecation.[1] Among the various available tests, anorectal manometry (ARM) and balloon expulsion test (BET) are the most commonly performed tests for diagnosis of DD. In fact, a combination of ARM and BET has been recommended as the initial test of choice to assess patients with defecatory disorders;[2] some authors advocate defecography (either barium or MR) if resources allow.[2]

Anorectal manometry (ARM) is routinely performed for objective assessment of anal sphincter function and anorectal coordination. Prior to the introduction of high-resolution manometry catheters, anorectal manometry was performed with non-high resolution, water-perfused or solid state catheters. High resolution manometry with solid state catheters has set new benchmarks in research of assessment of gastrointestinal motility. This is partly due to the fidelity and reproducibility of the results obtained on solid state systems as compared to systems. The water-perfused systems are still popular in clinical practice due to their low cost as well as adequacy in providing accurate diagnosis for patient management. Despite increasing use of solid state systems for anorectal function research, they are yet to gain as much acceptance as that for esophageal function. In fact, ARM HRM with water-perfused catheter and solid state catheter show comparable results for most parameters, except that anal sphincter pressures recorded by solid state catheters tend to be higher.[4] The latest improvisation in solid state technology has been three- dimensional high-definition probe (3-D HDAM).[5] which has 256 sensors. 3-D HDAM is useful for assessing the anal canal morphology as well as detailed pressure measurements.

Balloon expulsion test[6] is a good test to assess simulated evacuation; a balloon-tipped catheter is inserted into the rectum, and filled with water or air (typically 50 mL). The time required for the patient to evacuate the balloon in privacy is measured. However, the methods of conducting the test vary across studies. In some centers, balloon BET is conducted in the left lateral decubitus position, wherein a rectal balloon is connected over a pulley; weights are added to provide external traction when necessary to facilitate expulsion of rectal balloon.[7]The left lateral position is unphysiological for defecation. Almost 36% of normal healthy subjects

exhibit a dyssynergic pattern in the lying position.[8] Recent studies suggest that the sitting position appears to be more appropriate for testing. Since sitting is an actual defecation posture and provides more driving force to defecate, it is desirable for patients to perform the balloon evacuation in position. A balloon expulsion time of > 2 min is considered abnormal in most studies.[9]

In cases where the diagnosis of DD is made by ARM, the sensitivity and specificity of BET range from 68-94% and 75-100%, respectively.[10] The correlation of HRM and BET findings is not perfect, and a single test is not adequate to diagnose DD. Using a principal components analysis of HR-ARM studies in 62 healthy women and 295 women with chronic constipation, Ratuapli et al[11] identified 4 phenotypes that discriminated healthy people from patients with abnormal balloon expulsion times; this approach was 75% sensitive and 75% specific in discriminating healthy individuals from constipated patients with a prolonged . A new parameter viz, integrated pressurized volume,[12] estimated by multiplying amplitude, distance, and time, was found to be a good predictor of anorectal muscular contractility, and also predicted delayed BE tests as compared to conventionally used parameters.

Besides DD, another interesting group of disorders where ARM finds use is anal sphincter damage. ARM provides basal and squeeze pressures, which can assess the basic internal and external sphincter functioning. The 3-dimensional high resolution ARM can provide the topographic sphincter details.[13]

Solitary rectal ulcer syndrome (SRUS) is a chronic disease with variable clinical manifestations. It is a disease entity with modest cure rates probably due to poorly understood pathophysiology. The proposed etio-pathogenetic mechanisms contributing to SRUS are abnormal rectal evacuation due to paradoxical contraction of the puborectalis muscle, abnormal defecation due to a reversed pressure gradient produced by the external anal sphincter, trauma and ischemic damage to prolapsed mucosa due to excessive straining and chronic damage due to digital evacuation. Dyssynergic defecation appears to play an important role in the development of SRUS.[14]

In this volume, Beheraet al[15] have published an interesting study addressing the role of FED in 92 patients with SRUS. The authors used the BET and abnormal anal relaxation on straining to diagnose FED as is common worldwide practice. They found a high prevalence abnormal in 53% of 34 patients in whom ARM was done, as compared to 4 of 20 age-matched controls. Abnormal anal relaxation was found in 15 patients as compared to 3 controls. However, it is not clear whether the patients had both or only one abnormality. In the best case scenario, if all patients with anal relaxation had abnormal BET, then FED was present in 15/34 i.e 44%. In a similar study, Sharma et al[7] reported abnormal BET in 53%, impaired anal relaxation in 35%, and abnormal defecography in 55% of 40 patients with SRUS. Overall, 42.5% patients fulfilled the Rome III criteria for, ie; constipation and abnormalities in two physiological test parameters. The authors also reported abnormal BET in 26%, and impaired anal relaxation in 10.5% of 19 control subjects.[7]

In recent years, many studies have questioned the methodology and interpretation of ARM and BET. For instance, Heinrich et al,[16] showed that maximum squeeze pressure, intra-rectal pressure and the recto-anal pressure gradient during the push maneuver were all increased when 'enhanced' verbal feedback was given to patients. Such verbal intervention was able to change manometric findings from 'pathological' to 'normal' values in 12 of 39 patients with fact, the use of ARM as gold standard for diagnosis of DD has been challenged recently after a study showed that dyssynergic defecation was identified at ARM in 87% of healthy controls, if the person analyzing the data was blinded.[17] A proposed explanation for this is that the force exerted during the straining maneuver drives the recording catheter against the wall of the anal canal, increasing the recorded pressure due to the impact of contact and producing a negative pressure gradient. This study suggests that DD diagnosed on ARM may represent study recording artefact, rather than an actual disorder. In Behera's study,[15] it would have been interesting to see whether similar results were reported if the analysis was blinded and ARM data available for all 92 patients.

While the reliability of ARM for diagnosis of DD is being challenged, its role in sub-classifying DD, based on abnormality of abdominal muscle contraction, sphincter relaxation or both, into 4 types has remained standard of care.[18] This classification helps in identifying the abnormality, which can be targeted during biofeedback therapy.

Besides ARM and BET, MR defecography (MRD) or barium defecography are useful for diagnosis of DD as well as to identify structural defects that may be either the cause or complication of these disorders.[19] Internal sphincter intussusception is one of the consistent findings in DD seen on MRD. The findings in Behera's study[15] could have been

emphasised further with use of MRD, as was done in the study by Sharma et al.[7] The above studies stimulate the readers to conduct research to elucidate the etiopathogenesis of SRUS in a country where FED is probably a bigger problem than chronic constipation.[20]

In this rapidly emerging competitive era of bio-technology, even minor deficiencies in investigations get highlighted. Therefore, the investigative options should be considered supplementary or complementary to each other rather than considering one superior to the other. This holds true for ARM, BET, and MRD for assessment of ano-rectal function as well at least till the exact role of these modalities is established beyond doubt.

References

1. Bharucha AE, Wald A, Enck P, Rao S. Functional anorectal disorders. *Gastroenterology*. 2006;**130**:1510–8.
2. Dinning PG, Carrington EV, Scott SM. The use of colonic and anorectal high-resolution manometry and its place in clinical work and in research. *Neurogastroenterol Motil*. 2015;**27**:1693–708.
3. Lee TH, Bharucha AE. How to perform and interpret a high-resolution anorectal manometry test. *J Neurogastroenterol Motil*. 2016;**22**:46–59.
4. Kang HR, Lee JE, Lee JS, Lee TH, Hong SJ, Kim JO, Jeon SR, Kim HG. Comparison of high-resolution ano-rectal manometry with water-perfused anorectal manometry. *J Neurogastroenterol Motil*. 2015;**21**:126–32.
5. Raizada V, Bhargava V, Karsten A, Mittal RK. Functional morphology of anal sphincter complex unveiled by high definition anal manometery and three dimensional ultrasound imaging. *Neurogastroenterol Motil*. 2011;**23**:1013–9
6. Lee BE, Kim GH. How to perform and interpret balloon expulsion test. *J Neurogastroenterol Motil*. 2014;**20**:407–9.
7. Sharma A, Misra A, Ghoshal UC. Fecal evacuation disorder among patients with solitary rectal ulcer syndrome: A case-control study. *J Neurogastroenterol Motil*. 2014;**20**:531–8.
8. Rao SS, Kavlock R, Rao S. Influence of body position and stool characteristics on defecation in humans. *Am J Gastroenterol*. 2006;**101**:2790–6.
9. Chiarioni G, Kim SM, Vantini I, et al. Validation of the balloon evacuation test: reproducibility and agreement with findings from anorectal manometry and electromyography. *Clin Gastroenterol Hepatol*. 2014;**12**:2049–54.
10. Wald A, Bharucha AE, Cosman BC, Whitehead WE. ACG clinical guideline: management of benign anorectal disorders. *Am J Gastroenterol*. 2014;**109**:1141–57.
11. Ratuapli SK, Bharucha AE, Noelting J, Harvey DM, Zinsmeister AR. Phenotypic identification and classification of functional defecatory disorders using high-resolution anorectal manometry. *Gastroenterology*. 2013;**144**:314–22.
12. Jung KW, Joo S, Yang DH, et al. A novel high-resolution anorectal manometry parameter based on a three-dimensional integrated pressurized volume of a spatiotemporal plot, for predicting balloon expulsion in asymptomatic normal individuals. *Neurogastroenterol Motil*. 2014;**26**:937–49.
13. Prichard D, Harvey DM, Fletcher JG, Zinsmeister AR, Bharucha AE. Relationship among anal sphincter injury, patulous anal canal, and anal pressures in patients with anorectal disorders. *Clin Gastroenterol Hepatol*. 2015;**13**:1793–800.
14. Rao SS, Ozturk R, De Ocampo S, Stessman M. Pathophysiology and role of biofeedback therapy in solitary rectal ulcer syndrome. *Am J Gastroenterol*. 2006;**101**:613–8.
15. Behera MK, Dixit VK, Shukla SK, Ghosh JK, Abhilash VB, AsatiPK , Jain AK. Solitary rectal ulcer syndrome: the clinical, endoscopic, histological and anorectal manometry findings in north Indian patients. *Trop Gastroenterol*. 2015
16. Heinrich H, Fruehauf H, Sauter M, Steingotter A, Fried M, Schwizer W, Fox M. The effect of standard com- pared to enhanced instruction and verbal feedback on anorectal manometry measurements. *Neurogastroenterol Motil*. 2013;**25**:230–7
17. Grossi U, Carrington EV, Bharucha AE, Horrocks EJ, Scott SM, Knowles CH. Diagnostic accuracy study of anorectal manometry for diagnosis of dyssynergic defecation. *Gut*. 2016;**65**:447–55.
18. Rao SS. Dyssynergic defecation and bio feedback therapy. *Gastroenterol Clin North Am.* 2008;**37**:569–86.
19. Heinrich H, Sauter M, Fox M, Weishaupt D, Halama M, Misselwitz B, et al. Assessment of obstructive defecation by high-resolution anorectal manometry compared with magnetic resonance defecography. *Clin Gastroenterol Hepatol*. 2015;**13**:1310–7.
20. Ghoshal UC, Abraham P, Bhatt C, Choudhuri G, Bhatia SJ, Shenoy KT, et al. Epidemiological and clinical profile of irritable bowel syndrome in India: report of the Indian Society of Gastroenterology Task Force. *Indian J Gastroenterol*. 2008;**27**:22–8.