

SEATED ANORECTAL MANOMETRY DURING SIMULATED EVACUATION. A PHYSIOLOGICAL EXERCISE OR A NEW CLINICALLY USEFUL DIAGNOSTIC TEST?

Guido Basilisco¹, Maura Corsetti^{2,3}

¹Gastroenterology and Endoscopy Unit. Fondazione IRCCS Cà Granda Ospedale Maggiore Policlinico, Milano, Italy.

²NIHR Nottingham Biomedical Research Centre (BRC), Nottingham University Hospitals NHS Trust and the University of Nottingham, Nottingham, UK. ³Nottingham Digestive Diseases Centre, School of Medicine, University of Nottingham, Nottingham, UK

Correspondence

Guido Basilisco, Padiglione Bergamasco, Fondazione IRCCS Cà Granda, Ospedale Maggiore Policlinico, Via della Commenda 19, 20122 Milano, Italy. Email: guido.basilisco@policlinico.mi.it

Abstract

Symptoms such as a feeling of incomplete evacuation, straining, absence of the call to stool, anal blockage or digitation suggest the presence of a functional defecation disorder. As symptoms do not distinguish between patients with and without functional defecation disorder, Rome IV criteria recommend that this disorder is diagnosed when two of three tests are positive: balloon expulsion test (BET), anorectal manometry (ARM) and defecography. However previous studies have demonstrated that the agreement among these tests is limited. In this issue of Neurogastroenterology and Motility, Sharma et al tested the hypothesis that conducting the ARM in a seated position would increase the diagnostic accuracy of the test in discriminating between patients with normal and prolonged BET. This minireview discusses the current knowledge on the role of the techniques to diagnose defecation disorder and the potential role of the ARM in a seated position.

Key words: defecatory disorder, manometry, balloon expulsion test, defecography

Background

Chronic constipation is a heterogeneous condition characterized by unsatisfactory defecation related to either infrequent or difficult passing of stools, or both. Chronic constipation is one of the most common functional bowel disorders with an estimated global prevalence of 14%¹, resulting in a significant cost for healthcare systems worldwide² and a substantial negative impact on work productivity, which increases with constipation severity³.

Chronic constipation can present as functional constipation or irritable bowel syndrome with constipation (IBS-C), where the presence of abdominal pain related to change in the frequency and/or consistency of bowel movements differentiates IBS-C from functional constipation, but with a recognized large overlap between the two groups⁴. In both conditions, symptoms such as a feeling of

incomplete evacuation, straining, absence of the call to stool, anal blockage or digitation suggest a defecation disorder. The term functional defecation disorder is used by Rome IV criteria to identify those patients where “paradoxical contraction or inadequate relaxation of the pelvic floor muscles during attempted defecation and/or inadequate propulsive forces during attempted defecation” could explain the symptoms⁵.

Normal defecation requires a very complex interaction between visceral, sensory and behavioural components: the rectosigmoid should be loaded with normal stools, the resulting rectal distension perceived, and the voluntary act of defecation performed at the right time and in the right way. Last, but not least, the subject should be satisfied with the result.

A number of alterations in the preparatory phase of defecation, the call to stool and the dynamic of faecal expulsion have been reported in patients with defecatory disorders⁶. These dysfunctions may co-exist and, when they do, it is unclear whether they are primary or secondary to constipation. Alterations in the behavioural component are often unspecific (i.e. they can also be found in normally defecating healthy subjects) and their appraisal may vary depending on the subject’s degree of participation in their assessment⁷. Structural alterations such as a rectocele, rectal prolapse, or rectal intussusception may also be present but their causal role in the symptoms experienced is debated⁸. A patient’s dissatisfaction with their bowel habits may well be a result of a combination of objective and subjective components, both an evident dysfunction in the defecation process along with a patient’s perception of what normal defecation should be^{9,10}.

Current criteria to diagnose functional defecation disorders

Given the multiplicity of factors underlying a normal defecation, it is not unexpected that “there is no single gold standard diagnostic test to diagnose functional defecation disorder and that the agreement among various tests is limited”¹¹. According to this statement, Rome classification indicates that a functional defecation disorder can be diagnosed (after organic alterations are ruled out) by two of three tests: balloon expulsion test (BET), anorectal manometry (ARM) and defecography⁵.

BET measures the time needed to expel a balloon placed in the rectum. Volumes of water or air in the balloon ranging from as little as 25 ml up to the volume required to produce the desire to defecate have been used, with little standardization in the size, shape, or type of balloon used¹². The upper limit of the normal time to expel the balloon varies across studies and has been reported as anywhere between 1 and 5 minutes¹². A BET that applies 50 ml of water has been found to be predictive of a positive response to biofeedback¹³.

ARM evaluates abnormal anorectal evacuation patterns such as paradoxical contraction or inadequate relaxation of the pelvic floor muscles and/or inadequate propulsive forces during attempted defecation. ARM also provides a measure of other parameters, such as anal sphincter pressure when resting or squeezing, the presence of anal sphincter relaxation in response to rectal distension, and rectal sensitivity¹⁴. ARM is normally performed in a left lateral position, which is not the position in which the subject would normally defecate. Previous studies have shown that body position affects the measurement of rectal and anal pressures.¹⁵⁻¹⁷ Also in this case the technique has been used without standardization in protocol and catheters across different centers. However more recently a first attempt to obtain a standardization of this technique has been done by the London Classification¹⁸.

Defecography assesses both the anatomical and functional abnormalities of the anorectum^{11,19}. This radiologic technique dynamically evaluates the anorectum during the simulated defecation of a

viscous contrast material, with a consistency similar to stool, while the patient is sitting on a commode. As well as the rectum, opacification can be extended to the vagina, bladder, and/or small bowel. The technique is applied with considerable variation in terms of patient position, bowel preparation, consistency of contrast materials, types of radiolucent commode, and definitions of normality and abnormality¹⁹. More recently, defecography has also been conducted by means of MRI, which has the advantage over barium of simultaneously assessing the three pelvic compartments without ionising radiation, and enabling the quantitative analysis of the acquired images^{20,-21}. MRI defecography is usually performed with the patient supine.

The idea that two abnormal tests are better than one in the diagnosis of a functional defecation disorder, has several limitations. As reported above, the criteria used to define when the tests are abnormal are quite heterogeneous and poorly standardized for each technique. In the absence of a gold standard for diagnosis, and in the presence of a multifactorial disorder, it can be hypothesized that the precise definition of a combination of different abnormal tests, exploring different pathophysiological mechanisms, might contribute to the definition of more meaningful clinical subgroups. On the other hand, most of the studies in the field have tried to validate the tests by measuring the agreement between the results of two tests that explored the same pathophysiological mechanism, instead of assessing the diagnostic performance of one test, or a sequence of two or more tests, in the disordered patients as compared to the performance of the same test(s) with healthy subjects.

Seated anorectal manometry during simulated evacuation

In this issue of *Neurogastroenterology and Motility*, Sharma et al²² tested the hypothesis that conducting the ARM in a seated position, and applying a new way of analyzing the results, would increase the diagnostic accuracy of the test in discriminating between patients with normal and prolonged BET. The participants were given up to 3 minutes to expel a 4-cm-long balloon, filled with 50 ml of water, from the rectum, in privacy, while seated on a commode. A BET greater than 60 seconds was considered to be prolonged (i.e. abnormal). The results of the study show that body position significantly affects rectal and anal pressures, both at rest and during simulated evacuation, and increases the likelihood ratio of discriminating between constipated patients with normal or abnormal BET. Based on these results, the Authors suggest that ARM performed in a seated position is more useful for the diagnosis of functional defecation disorders. They propose a diagnostic algorithm in which these disorders are diagnosed when both tests are abnormal, can be excluded when both tests are normal, and should be followed by defecography when the two tests are discordant.

The better agreement between BET and ARM when both tests are performed in a seated position will hopefully reduce the need for a third test (defecography), but does this represent a clinical indication to perform ARM in patients with chronic constipation?

Clinical utility of a diagnostic test according to evidence-based medicine: the lesson of esophageal manometry

A diagnostic test should be used in clinical practice when, in the presence of suggestive symptoms, it permits the identification of a disease, to which a specific treatment should be applied²³. The test is useful for the patient if tested patients have a better quality of life than untested ones, at the end of the diagnostic-therapeutic process. A practical example of a useful test is the application of esophageal manometry in the diagnosis of achalasia²⁴. The test is recommended for patients with retrosternal dysphagia. When a diagnosis is made, patients are effectively treated by esophageal dilation, peroral endoscopic myotomy, or surgery. With these treatments, dysphagia improves and the resulting quality of life in treated patients is better than in those that are left untreated. Why is

esophageal manometry so important? Because dysphagia is not specific to achalasia, and the adverse effects of the treatments would be unacceptable if the diagnosis was not correct. Luckily for both patients and doctors, the diagnostic performance of esophageal manometry is ideal because the abnormal motor patterns that define achalasia are not encountered in healthy subjects²⁴.

Is this the case for ARM, BET and defecography? In the landmark study by Grossi et al²⁵, high-resolution ARM was performed in the left lateral position in 85 constipated women and in 85 healthy asymptomatic female volunteers. The assessment of the anorectal pressure patterns was completed by experts who were blinded to the health status of the subjects. The abnormal motor patterns used to define defecatory disorders were reported in 87 % (!) of healthy subjects and in 91% of the constipated patients, undermining the concept that these motor patterns might identify a pathological instead of a physiological condition, and demonstrating once again that well-designed studies are crucial to understanding the real role of tests in clinical practice. This lack of specificity might perhaps improve by performing manometry in a seated position, as the results of the study by Sharma et al show that motor patterns, such as paradoxical contraction during attempted evacuation, were recorded in 9% vs 18 % of healthy controls in seated vs left lateral position respectively²². In line with this possibility, the increase in the likelihood ratio of the recto anal gradient in seated position for discriminating between constipated patients with normal or abnormal BET might hopefully reflect better diagnostic performances of this parameter in distinguishing between healthy subjects and constipated patients. Further studies with an experimental design such as the one used in the Grossi et al study should be performed to measure this improvement.

Even more important, further studies should directly investigate whether the dissection by ARM of the behavioral mechanisms involved in a normal defecation is more useful than the simpler and cheaper BET, in predicting treatment outcome. So far this has been demonstrated only for BET¹³. Whether the detection of abnormal anorectal evacuation patterns during ARM performs better than BET in predicting the response to biofeedback or whether these patterns are associated with the response to other treatments remains to be established. This evidence would be necessary to justify the use of ARM instead of or in combination with BET in the assessment of the altered behavioral mechanisms of patients with defecation disorder.

The suggestion by Sharma et al that the disagreement between BET and ARM represents an indication to defecography needs also to be supported by more data. The functional and anatomical abnormalities assessed by defecography in patients with defecatory disorders are far from specific. Both functional and anatomical alterations found during defecography are poorly standardized and reproducible and are also often found in healthy subjects with normal defecation²⁶⁻²⁷. Concerning the anatomical alterations that can be corrected by surgery, prospective studies showing that tested patients will have a better prognosis than untested ones are urgently needed, as the risk of adverse events associated with rectal surgery for functional disorders is not negligible, ranging from 6.1% to 21.5%^{7,28} and certainly not acceptable in the absence of a clear clinical indication.

Symptoms characteristic of defecation disorder such as a feeling of incomplete evacuation, straining, anal blockage or digitation were equally distributed in the Sharma et al study in patients with normal or prolonged BET and normal or abnormal ARM, questioning the clinical relevance of such physiological abnormalities in the explanation of these symptoms. In line with these results, a recent study has demonstrated that the presence of major alterations of colonic and/or anorectal function were not predictive of patient response to medical therapy for chronic constipation¹⁰. This discordance between the results of older and less standardized tests and the defecatory symptoms has been used to assume that a test-based definition of defecatory disorders might be better than a symptom-based definition of the condition^{11,29}. By reconsidering the central role of symptoms, it is conceivable that multiple interconnected neuromuscular, anatomical and psychological factors

concur in the pathophysiology of such symptoms and that the results of this complex interaction is only marginally captured by the current tests. In addition, the discrepancy between the narrative of patients' symptoms and the results of pathophysiological investigations support the hypothesis that psychological factors, not currently assessed during the clinical evaluation, might be involved in patients' symptomatology³⁰.

What do we need for the future?

The assumption that pathophysiological biomarkers might be useful to better characterize patients with defecatory disorders and ultimately allow the targeted treatment of their symptoms is certainly shareable and desirable, but this advantage should be demonstrated in well-designed clinical trials before tests are introduced in clinical practice.

The definition of new phenotypes, including symptoms, abnormal aspects of colonic function, psychological characteristics and carefully defined alterations of anorectal function, might hopefully help to better investigate the effects of treatments in more homogeneous subgroups of patients with defecation disorder. In this context, the study of Sharma et al²² represents a clear example of how the investigated variables should be precisely defined. With a very sophisticated technique, Sharma et al showed that the change of body position influences anorectal pressures at rest and during attempted defecation, as well as the diagnostic performances of ARM. Whether ARM in seated position represents a more physiological exercise or an important advance in the diagnosis of defecatory disorders remains however to be established.

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