Anal Manometry in the Investigation of Fecal Incontinence: *totum pro parte, not pars pro toto*

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The prevalence of fecal incontinence, especially in the older population, is comparable to hypertension but associated with great physical and social disability. Nevertheless, the condition is often not declared by the patient and not recognized even by family members and health-care professionals since, even today, defecation remains a taboo subject that is difficult to discuss, possibly even more than issues of sexual function. To improve detection it is often necessary to ask direct questions about incontinence of patients who complain of any change of bowel habits (including those with irritable bowel syndrome), anorectal symptoms or urinary difficulties.

If fecal incontinence is present then initial management demands exclusion of fecal impaction and regulation of bowel habit, especially the control of loose stool which is, by far, the single biggest risk factor for involuntary loss of stool [1]. In patients who fail to respond to empiric management, diagnostic testing includes endoscopy, ideally with (endoscopic) ultrasound and magnetic resonance imaging to exclude rectal inflammation, neoplasia, anal sphincter defects or trauma to the pelvic floor. However, in the absence of overt 'organic disease' these investigations provide little insight into the cause of symptoms and no guide to therapy. In this situation, as-

essment of anorectal function is indicated [2, 3]. Conventional anorectal manometry (ARM) acquires measurements of resting tone using a 'pull-through' technique and measurements of voluntary squeeze pressure and rectoanal coordination during simulated defecation. This is often followed by measurements of the rectal sensitivity using a latex balloon. Although widely applied, this technique has important limitations. First, conventional ARM with 4–8 water-perfused measuring ports has relatively low resolution and is susceptible to measurement artifacts caused by sphincter asymmetry and catheter movement relative to the anal sphincter due to patient behavior or pelvic floor descent [2, 3]. Second, measurement of rectal capacity, compliance and sensitivity by elastic balloon are affected by the properties of the balloon as well as the rectum [4, 5]. Third, there are no generally accepted standardized operating procedures (SOPs). Fourth there is a lack of established normal values stratified by sex and age, and a lack of clarity as to what constitutes clinically relevant anorectal dysfunction.

Recent publications by Christian Pehl, first author of ARM guidelines from the German Society of Neurogastroenterology and Motility [6], have improved the evidence base and aid interpretation of ARM results in clin-

ical practice. In a recent issue of *Digestion* [7], his group presented age- and gender-specific normal values for ARM in a large cohort of healthy volunteers (n = 144) and, in the current issue [8], this is now followed by one of the largest reported reviews of ARM findings in patients with fecal incontinence (n = 559). Applying published SOPs and normal values, the results confirmed a high prevalence of abnormal anal sphincter function and/or abnormal rectal sensation in this patient group and linked the severity of dysfunction to the severity of symptoms. Further, ROC analysis indicated high sensitivity of individual (or multiple) ARM measurements for diagnosis of fecal incontinence. As the authors state, if therapeutic decisions in patients with continence problems are to be based on ARM results, then this assessment of anorectal function must distinguish between health and disease. This large study provides demonstrates that ARM can provide this information and, by relating ARM findings with symptoms (Wexner score), also provides insight into the link between abnormal physiology and symptoms (e.g. urge vs. passive incontinence). However, just as hepatologists would refuse to base the diagnosis of 'hepatitis' on elevated measurements of one liver enzyme, proctologists would be wrong to base diagnosis on any one measurement of sphincter function or rectal perception. This is highlighted by the modest specificity of individual measurements for 'diagnosis' (i.e. identification) of patients with fecal incontinence. Whereas few (~10%) patients with fecal incontinence had entirely normal anorectal function, a large proportion (~40%) of healthy individuals with weak sphincter function had no such problem. In some individuals with normal stool consistency and a regular bowel habit it may be that the continence mechanism is never 'put to the test'. However, in others, it is likely because changes in rectal sensitivity and adaptation of patient behaviors compensate for potential weaknesses in the system. This is illustrated by our work

that reveals a dynamic interaction between continence function, anal sphincter pressure and rectal sensation during rectal filling [9]. In healthy subjects there are highly significant associations between (i) low resting tone and a low threshold volume for first sensation and (ii) low squeeze pressure and a low threshold volume for urge to defecate [9]. These findings indicate the presence of an adaptive mechanism in health that enables timely, appropriate responses to events that threaten fecal continence. Thus increased rectal sensitivity in patients at risk of fecal incontinence can be regarded as an appropriate adaptation, and it is the loss of this adaptive mechanism rather than gross sphincter disruption or primary rectal hypo- or hypersensitivity that appears to be present in many patients fecal incontinence [10, 12].

The study by Pehl et al. [8] indicates that ARM following an SOP in a 'totum pro parte', *not* 'pars pro toto' approach (i.e. consider the whole and not the parts) is useful in identifying the causes of fecal incontinence in many affected patients. Technical advances such as high-resolution manometry with '3D analysis' of sphincter pressures may further improve the precision of ARM measurements [13]. Furthermore, assessment of rectal capacity and sensitivity with a non-compliant (barostat) bag rather than an elastic balloon would certainly improve assessment of rectal function [4, 5]. However, since no gold standard test of continence function exists, outcome studies are required to demonstrate the value of ARM in clinical practice. Current therapy of fecal incontinence is far from perfect and patient selection is likely to be key to the success of management. If ARM measurements can help select the optimal medical, behavioral (biofeedback) or surgical (e.g. sacral nerve modulation, sphincter reconstruction) therapy, then this would represent important progress in this common and difficult to treat condition.

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