

# PHYSIOLOGICAL ASPECTS OF THE ANAL SPHINCTERS AND PELVIC FLOOR

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- Anal continence and defecation are highly complex processes that necessitate the structural and functional integrity of the cerebral, autonomic and enteric nervous systems, the gastro-intestinal tract (especially the rectum) and the pelvic floor and anal sphincter complex, any of which may be compromised and lead to disturbances of function of varying severity. The sphincter mechanism provides the ultimate barrier to leakage and its integrity can be assessed fairly simply and objectively in the physiology laboratory. Perineal position and degree of descent on straining (markers of pelvic floor and pudendal nerve function) can be quantified, and functional anal canal length, resting tone (reflective predominantly of internal sphincter activity) and squeeze increment (reflective of external sphincter function) can be measured by a variety of simple manometric techniques (Figure 80.5). Distension of the rectum produces reflex relaxation of the internal sphincter, which allows rectal contents to come into contact with the anal transition zone mucosa. This allows discrimination of solid, liquid and gas contents. The rate of recovery of sphincter tone after relaxation differs between the proximal and distal anal canal (Figure 80.6). This is an important continence mechanism. The structural integrity of the sphincters can be visualised with endoluminal ultrasonography (Figure 80.7a which usually consists of high-resolution three-dimensional images constructed from standard two-dimensional images. Magnetic resonance imaging (MRI) provides excellent tissue differentiation, although spatial resolution of the anal sphincters using a body coil is reduced (Figure 80.7b). The dynamics of defecation can be assessed radiologically by evacuation proctography, in which radio-opaque pseudo-stool is inserted into the rectum and the patient asked to rest, rectal contents squeeze and then bear down to evacuate the rectum, under real-time imaging (Figure 80.8 and 80.1). The procedure may also be performed with oral contrast to outline the small bowel and in females following insertion of a

70 60 0) 2 50 40 30 20 Pressure  
 (cmH 10 0 7 6543 210 Distance  
 from anal verge (cm) Figure 80.5 A  
 typical normal 'pull-through'  
 manometric study of the anal  
 canal (3.5 cm long; maximal  
 resting anal canal pressure approx  
 imately 60 cmH O). 2 Rectal  
 balloon Rectal balloon in /f\_ l ated  
 de /f\_ l ated 140 120 O) 2 100 80  
 60 40 Anal pressure (cmH 20 0 1  
 min Time Figure 80.6 Anal  
 manometry tracing demonstrating  
 a normal rectoanal inhibitory re /f\_ l  
 ex when the rectal balloon is in /f\_ l  
 ated with 50 mL of air.

(b) Figure 80.7 (a) Axial view of endoanal ultrasonography through the mid-anal canal of a female patient. Normal intact fibres of the internal (thin arrow) and external (thick arrow) anal sphincter complex. (b) Cor

onal T2-weighted magnetic resonance imaging through the anal canal of a male patient showing the three distinct zones of the low-signal external anal sphincter complex (arrows) (courtesy of Dr Alison Corr, Consultant Radiologist, St Mark's Hospital, London, UK).

radio-opaque vaginal tampon that will allow anatomical changes during defecation (e.g. rectocele, enterocele) to be identified. Dynamic magnetic resonance (MR) proctography provides more details of other pelvic organs; however, evacuation in the supine position may be less physiological than the sitting position that can be achieved within an open magnet ( Figure 80.8 ). Interobserver agreement for MR proctography is better than for barium defecography; however, imaging must be interpreted in the context of the patient's symptoms and used to guide rational rather than empirical treatment strategies.

Figure 80.8 Visualisation of the rectum is achieved with barium-impregnated 'synthetic stool' using conventional defecating proctography (a) or magnetic resonance proctography (b) . A large rectocele is apparent.

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