Parameters of the Rectoanal Inhibitory Reflex in Patients with Idiopathic Fecal Incontinence and Chronic Constipation


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PURPOSE: The rectoanal inhibitory reflex is a response of the internal anal sphincter to rectal distention, reflecting the functional nature of the anal sampling mechanism of rectal discrimination. The aim of this study was to assess the parameters of the rectoanal inhibitory reflex in healthy volunteers and incontinent and symptomatically constipated patients. METHODS: The rectoanal inhibitory reflex was recorded in 42 patients using reproducible threshold volumes. Excitatory and inhibitory latencies, maximum excitatory and inhibitory pressures, amplitude, and slope of inhibition, slope and time of pressure recovery, and area under the inhibitory curve were estimated. Pudendal nerve terminal motor latency and endoanal magnetic resonance imaging were performed in all incontinent patients. RESULTS: Significant linear trends were found for most parameters at each sphincter level when analyzed. Recovery time and area under the inhibitory curve differed between the sphincter levels and patient groups, with the most rapid recovery occurring in the distal sphincter of incontinent patients (P < 0.001). These pressure findings were not accounted for by differences in excitation between patient groups. CONCLUSION: A coordinated response by the internal anal sphincter to rectal distention with recovery of anal pressure from the distal to the proximal sphincter is suggested. Continence may rely on the character of internal anal sphincter inhibition, and recovery and preoperative assessment of rectoanal inhibitory reflex parameters may be important for predicting functional result following low anastomosis. [Key words: Anal physiology; Rectoanal inhibitory reflex; Fecal incontinence; Rectoanal excitatory reflex]


Transient relaxation of the internal anal sphincter (IAS) following rectal distention was first described by Gowers in 18771 and confirmed by Denny-Brown and Robertson in 1935. The concept of a coordinated "sampling mechanism" discriminating between flatus and feces, which may be the functional purpose of the rectoanal inhibitory reflex (RAIR), was proposed by Duthie and Bennett. This reflex is thought to be mediated via an intramural neuronal plexus and is used as a diagnostic test for Hirschsprung's disease, particularly after the neonatal period.6-6

The reflex is lost after low anterior resection and ileoanal pouch procedures, although there is a tendency for late recovery.7 It has been shown that the greatest relaxation during rectal distention occurs in the proximal IAS, with a tendency for distal external anal sphincter (EAS) excitation, preventing undesired leakage.8 Most anorectal physiology laboratories merely define the presence or absence of the reflex in the exclusion of adolescent Hirschsprung's disease or correlate its presence with anal resting pressure.

Few studies have assessed the significance of the different components of the RAIR; namely, the latency intervals to both excitation and inhibition and the amplitudes of pressure change between the proximal and distal sphincter in health and disease. The importance of ascertaining the character of activity of the IAS following balloon distention of the rectum may lie in the ability of measured parameters to predict function following surgery.

This study assesses the parameters of the RAIR in the proximal, intermediate, and distal sphincteric zones in patients with neurogenic fecal incontinence and chronic constipation (as defined by a history of 3 months or longer of less than one bowel movement every 4 days). We outline the significance of these
parameters in an overall view of the continence mechanism.

**MATERIALS AND METHODS**

Sixteen patients with neuropathic fecal incontinence (15 females), 16 patients with symptomatic constipation (13 females), and 10 control patients (4 females) without anorectal disorders were prospectively studied. All patients with incontinence complained of inadvertent leakage of liquid stool. They were assessed by endoanal magnetic resonance imaging (MRI) for the presence of a sphincter defect, and only those patients without either an internal or external sphincter defect were included in the study. Endoanal MRI imaging has been recently shown to be a valuable technique for the demonstration of obstetric-related injury of the EAS, with good correlation between radiologic and histopathologic findings, although there are as yet no comparative studies between endoanal MRI and endoanal ultrasound.9

Patients were defined as being constipated if their history exceeded three months in duration, if they had one bowel movement every four days, and/or if more than 25 percent of their movements were accompanied by excessive straining.10 The symptomatically constipated patients were a heterogeneous group, and no attempt was made to distinguish those cases of pure outlet obstruction from those with delayed colonic transit. Careful clinical examination including maximum straining during sigmoidoscopy was performed on all patients, and those patients with rectal prolapse, solitary rectal ulcer, rectocele, or rectoanal intussusception were excluded from analysis.

We used an 8-channel, water-perfused, flexible manometric probe, 5.5 mm in external diameter (Arndorfer Inc., Greenvale, WI) with spirally located perfusion ports for simultaneous balloon inflation and pressure recording. A computerized system (Polygram Lower GI, edition 6.31C3 version, Synectics, London, United Kingdom) was used for data acquisition. A pressure recorder system is interfaced with a microcomputer providing graphic representation of pressure profiles and calculation of parameters.

Balloon inflation was routinely conducted in three separate runs at the reproducible threshold volume of rectal sensation for each patient. Signaling was provided for the computer at the time of commencement of inflation, and inflation was performed as rapidly as manually possible to make reproducible inhibitory tracings. The proximal sphincter waveform was recorded closest to the rectal pressure trace, and the distal sphincter waveform was recorded as the most inferior pressure tracing from which measurements could be ascertained.

A schematic representation of the parameters of the R AIR that were measured is shown in Figure 1. Exci

![Figure 1. Schematic representation of parameters of the rectoanal inhibitory reflex as measured in the study.](image-url)