Anorectal sphincter assessment through physiologic testing has been in use for more than 120 years. The first studies of anorectal manometry were done in 1877 by Gowers,1 who measured anal canal resting tone and was reportedly the first to explore the rectoanal inhibitory reflex. A comprehensive physiologic evaluation of the anorectal sphincter function includes assessment of the shape and function of the rectum, the sphincter muscles, the pelvic floor, and the anal canal. Anorectal manometry is one way of evaluating the pressures in the rectum and anal canal as well as the compliance of the rectum and the basic reflex and sensory mechanisms.

Methods of Performing Anorectal Manometry

Anorectal manometry is an investigation used to assess the pressures in the rectum and anal canal; in other words, it is a measurement of the resistance of the anal sphincter complex involuntary evacuation. This evaluation is performed by placing a specially designed catheter or balloon into the lower rectum and anal canal. This pressure-sensitive device is connected to a transducer, which converts mechanical into electronic signals that are then recorded and displayed on a computer monitor. The aim is to record reproducible measurements and a quantitative assessment of the anal sphincter complex. However, the procedure as well as the equipment used during anal manometry are not yet standardized; therefore, comparing results among various centers is difficult. Thus, follow-up investigations comparing results should be performed with the identical technique in the same anorectal manometry unit. General parameters evaluated by anal manometry include (1) internal and external anal sphincter pressures, (2) anal and rectal pressure response during straining, (3) anal sphincter length, (4) anal and rectal motility, (5) rectal sensation, (6) rectal capacity and compliance, and (7) anal sphincter muscle reflexes.

Fluid-Filled and Air-Filled Balloon Systems

One of the most common methods of measuring anorectal pressure utilizes a closed balloon system. The pressure result obtained with balloon recording is an average of all pressures acting into the balloon; radial asymmetry cannot be detected. However, larger balloons are unphysiologic as the probe itself may cause reflex contractions but the results obtained are more representative of a greater area of the sphincter. It is of tremendous importance to understand that a compliance hysteresis phenomenon exists in the anal canal, wherein both pressure-radial curves (distention/deflation) are not superimposable, and the level of pressure is lower on return, for similar levels of distention due to compliance adaptation processes. Thus, probes with a larger diameter generate greater pressures in the same patient than do smaller balloons.2 Furthermore, more rapid distention records higher pressures. Air is compressible; therefore the use of water for the balloon filling may be more reproducible.3

Anorectal Manometry and the Rectoanal Inhibitory Reflex

Johann Pfeifer and Lucia Oliveira
Air-Filled Balloon Technique (Schuster)

In the 1960s, Schuster\(^4\) invented a simple method for measuring anorectal pressure changes. The device consisted of a metal cylinder around which double-molded latex balloons are tied forming two compartments (Fig. 8.1). These balloons were connected with separate catheters through a hole in the cylinder to either inflate air or to record pressure changes, when appropriate. The inner balloon has a doughnut shape when inflated with 7 to 10 ml of air; the outer balloon has a pear-shaped structure. Through the metal cylinder, further balloons (rectal and/or colonic) can be inserted. Thus, rectal pressures can be measured or the rectoanal inhibitory reflex can be elicited.

This device is inserted into the anus and positioned where the inner balloon lies attached to the internal anal sphincter and the pear-shaped balloon to the outer bundle of the external anal sphincter. Thus, theoretically, the pressures of the internal and external sphincter can be independently measured; however, the overlap of these two portions is too wide to allow adequate differentiation. Normally, recording is performed with an aneroid manometer. The advantage is that recording is done from a larger surface reflecting overall pressures of a large area of the sphincters. Furthermore, the technique is simple and cost-effective, and the balloon stays fixed in place, thereby requiring only one operator. The disadvantage is that larger balloons create more artifacts during recording; therefore, this method is better for evaluating pressure changes than for evaluating actual pressures. Balloons and cylinders are available in three sizes: infant, pediatric, and adult. Although the device is not widely used for diagnostic evaluation, it may have a therapeutic role as a biofeedback catheter.\(^4,5\)

Small Balloon Tube Technique

Another form of measuring anorectal pressures is with small tubes. The advantage of this technique is that only minor changes and irritation of the sphincters by the device itself are obtained.\(^6\) Standardization is very important in order to obtain reliable and reproducible results; a three-balloon system is generally used. While the water-filled microballoons (diameter 5–7 mm) are placed in the upper and lower anal canal, the third balloon on top of the catheter is distended by air to elicit the rectoanal inhibitory reflex in the distal rectum (Fig. 8.2).

![Figure 8.1. Air-filled balloon of Schuster. 1, aneroid manometer; 2, syringe for air insufflations; 3, pear-shaped balloon (for the external anal sphincter); 4, doughnut-shaped balloon (for the internal anal sphincter); 5, rectal balloon for eliciting the rectoanal inhibitory reflex.](image-url)