

Supplemental Materials

Measurements & Data Analysis:

Anal Sphincter Pressures:

First, the acquired data were corrected for thermal sensitivity by using the thermal compensation function. Next, the lollipops were adjusted to define the length of anal high pressure zone (figure 2) which also defined the anal electronic sleeve (e-sleeve). The electronic sleeve provides a mean of the maximum pressures recorded by all transducers within a defined pressure zone, and at one time point. The pressure display at any time point and at any one level (there are 16 levels) is the average of all pressures recorded from each of the 16 axial sensors located at that level. The software also provided specialized tools during each maneuver such as the 30 seconds frame window that displayed the topographic plots for both the rectal and anal pressure changes. Each maneuver was recorded in a separate frame, and the data within each frame were analyzed to measure the anal resting pressure, anal squeeze pressure and the rectal and anal pressure changes during the bearing down maneuver.

The maximal rectal pressure refers to the highest pressure generated in the rectum during each maneuver and the mean pressure refers to the average pressure during the entire maneuver. For the assessment of sustained squeeze maneuver, patient was asked to sustain squeeze for as long possible and the mean pressure observed during this maneuver in a 30 second window at sensors located in the distal anal canal were used as shown in figure 2. Software does not provide a specific tool for analysis of pressure changes during party balloon maneuver (Valsalva) or sustained squeeze pressure. For these purposes, data were analyzed by drawing the squeeze maneuver frame over these maneuvers and by using the automated analysis software to measure the maximal rectal and anal pressures.

The sphincter length was assessed visually by using specific landmarks located over an anatomical panel that showed both the rectal and anal configurations. The upper limit of the anal sphincter high pressure zone was marked as the level where there was a clear pressure drop to atmospheric pressure or ± 10 mmHg. The lower limit was located in the transition zone between the anal sphincter high pressure zone and the atmospheric pressure.

In order to provide an overall index of the changes in the rectal and anal pressures during attempted defecation, we calculated a defecation index: defecation index = maximum rectal pressure when bearing down ÷ minimal anal residual pressure when bearing down (9). These calculations were performed during the bearing-down maneuvers, both with and without 60 cc balloon distension. To assess the anal response during the intermittent phasic rectal balloon distension, the lowest balloon volume required to elicit a relaxation of the internal anal sphincter (rectoanal inhibitory reflex) was recorded.

Comparative analysis of measurements obtained by the software and an expert

In order to assess the accuracy of measurements provided by the commercial software, we evaluated the anal and rectal topographic pressure changes during squeeze, when blowing into a party balloon and during bearing down maneuvers. This allowed the expert to use the smart mouse tool and measure pressure changes or draw boxes over an area of interest or over a topographic plot to perform the analysis. An independent investigator (EC), who was blinded to the measurements obtained by the expert, performed the computerized analyses using the software (Manoview Analysis®, Given Imaging, Yoqneam, Israel).