PRACE POGLĄDOWE

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ANORECTAL MANOMETRY AND ITS ACTUAL PLACE
WITHIN PHYSIOLOGY EXAMINATION IN DISORDERS OF ANUS
AND RECTUM SPHINCTER APPARATUS

MANOMETRIA ANOREKTALNA – AKTUALNE MIEJSCE
W DIAGNOSTYCE ZABURZEŃ APARATU ZWIERACZOWEGO ODBYTU I ODBYTNICY

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Abstract
Disorders of anus and rectum sphincter apparatus constitute a complex medical problem. Anorectal manometry is considered to be one of the basic diagnostic methods for anus and rectum function disorders, which measures the following parameters: anal canal resting pressure, anal canal squeeze pressure, anal canal length, cough reflex, recto-anal inhibitory reflex, rectal sensitivity, rectal compliance, balloon expulsion test, recto-anal pressure changes during expulsion test.

KEY WORDS: anorectal manometry, defecation, anus and rectum sphincter apparatus, fecal incontinence.

Streszczenie
Choroby aparatu zwieraczowego odbytu i odbytnicy stanowią złożony problem kliniczny. Jedną z podstawowych metod diagnostyki zaburzeń funkcji aparatu zwieraczowego odbytu i odbytnicy stanowi manometria anorektalna. Mierzy ona takie parametry, jak ciśnienie spoczynkowe i skurczowe kanału odbytu, długość kanału odbytu, odruch kaszlowy, odruch odbytniczo-odbrytniczy, progi odczucialność odbytnicy, podatność odbytnicy oraz test wydalania balonu.

SŁOWA KLUCZOWE: manometria anorektalna, defekacja, aparat zwieraczowy odbytu i odbytnicy, nietrzymanie stołu.

The function of the anus and rectum rests on maintaining the stool and controlling its defecation. The very process consists of the following functions: diagnosis, differentiation, retention, and finally controlled defecation of the waste products. The process constitutes a complex mechanism as a whole and comprises visceral and somatic components, local reflexes, and conscious will [1].

The lower gastrointestinal tract has a tubular shape and consists of the rectum and the upper anal canal. Its wall has two layers of smooth muscles: the outer- longitudinal and the inner- circular one. The lower part of circular muscle encircles the anal canal in a ringlike way, creating at the same time, the internal sphincter muscle of anus. The somatic part includes mainly pelvic floor muscles and the external sphincter muscle, which are subordinate to human’s will. The rectum and the anal canal create the anorectal angle within the pelvis. The opening of anorectal angle constitutes one of the elements of defecation. The rectum is empty most of the time and does not contain any stool. The colonic transit of fecal matter causes the rectum to stretch and the internal sphincter muscle to relax. Next, the anus external sphincter muscle contracts which stops the fecal matter. The above-mentioned mechanism is known as recto-anal inhibitory reflex- RAIR. Recto-anal inhibitory reflex enables differentiation of presence and type, if any, of fecal matter while maintaining pelvic floor contraction together with contraction of the external anal sphincter. Also, the suppression of defecation may be done consciously. However, the final act of stool defecation is possible due to the relaxation of pelvic floor muscles, opening of the anorectal angle, and involuntary rectal contractions. Additionally, this mechanism is supported by intraabdominal pressure increase as a result of abdominal muscles contraction. Defecation ends with anus sphincter muscle and pelvis floor contraction while closing the anal canal at the same time and causing the anorectal tightening.
Anorectal manometry

Anorectal manometry is an exam performed to evaluate pressures both in the rectum and in the anal canal at rest or while voluntary squeezing the anus and the defecation urge. This exam measures functioning of the anus and rectum muscles together with rectal capacity and compliance. Anorectal manometry aims at accurate assessment and diagnosis of defecation disorders such as: fecal incontinence and disturbed defecation.

The manometry exam should be performed after normal defecation, without any further bowel preparation and at least at 10 minute interval from the previous finger rectal examination or proctoscopy. Pressures within anus may either be measured by stationary method or dynamic method during gradual- manual or automatic evacuation of the probe from the anus [2]. The patient should be examined in the left-lateral position with knees flexed.

Anorectal manometry equipment comprises: a probe, a special device for recording and processing data, and a computer with appropriate software that enables to record and to analyze the results. The probe consists of: a balloon which is filled with water or air during an examination, and a catheter equipped with balloon sensors that measure the external pressure. There are usually 4 up to 8 sensors, within 5–10 mm of the probe. The following catheters may be filled with air, water, or equipped with special sensors that transfer data electronically (ie, solid state). While comparing various catheters used in anorectal manometry, Simpson et al. showed that there were no significant differences in the registration of individual manometry parameters [3].

The indications for the anorectal manometry:
- fecal incontinence
- constipation
- differential diagnosis of the anal pain
- patients assessment before and during biofeedback training
- risk assessment of the rectoanal function disorders after low rectal surgeries

Anorectal manometry measures: anal canal resting pressure, anal canal contraction pressure, anal canal length, cough reflex, recto-anal inhibitory reflex - RAIR, rectal sensitivity, rectal compliance, balloon expulsion test and recto-anal pressure changes during expulsion test [4, 5]. There are no standardized values of each parameter studied in manometry currently. It is mainly due to the fact that the equipment, techniques, and protocols for data processing, used during the test, vary in each laboratory [6]. Therefore, the above-named variations should be thoroughly specified.

The difference between intra-rectal pressure and maximum anal sphincter pressure makes up the anal canal resting pressure (Figure 1). The results of anal canal resting pressure are taken in left lateral position during the relaxation of anal muscles. This parameter assesses the function of the internal anal sphincter. Normal range: 30–50 cm H2O.

The anal canal squeeze pressure is calculated as a difference between the intra-rectal pressure and a maximum pressure of anal sphincter (Figure 2). It is measured during repeated anal muscles contractions, which can be maintained up to 20 seconds. The anal squeeze pressure, which ranges from 60–100 cm H2O assesses the function of the external sphincter muscle of anus.

Cough reflex evaluates involuntary increase of the pressure within the anal canal during intra-abdominal pressure changes.

Rectal sensation thresholds are determined through measuring the so-called sensory thresholds. These thresholds are measured through filling the balloon with water that is placed in the rectum (on average every 10 ml). It is possible to determine the so-called sensory threshold – the first sensation, rectal urgency threshold- a volume which triggers an urge, and the maximum volume – the maximum tolerable volume of the filled balloon.

Rectal compliance may also be determined by measuring the so-called sensory thresholds which constitutes a ratio increase of volume to an increased pressure within rectum.

Recto-anal inhibitory reflex is determined during the filling of rectal balloon simulating filling of the rectum with fecal matter. Then the rectal wall contracts, which evokes the relaxation of internal sphincter, and leads to involuntary contraction of external sphincter.

This is so-called inhibition of defecation. Lack of recto-anal inhibitory reflex indicates the internal sphincter muscle dysfunction. It is also possible to determine threshold value of the stimuli that triggers RAIR (Figure 3).

Balloon expulsion test is mainly used for assessing the recto-anal coordination during the process of stool evacuation. This test evaluates patient’s ability to expel a filled balloon from the rectum. The majority of examined patients expel the balloon within one minute. Lack of the ability to expel the balloon within 3 minutes indicates dyssynergic defecation [7].
Figure 1. Anal resting pressure. Channels 1–7: rectum. Channel: 8 anus.
Figure 2. Anal squeeze pressure, Channels 1–8.
Figure 3. Recto-anal inhibitory reflex (RAIR). Channels 4–8.
Discussion

Diagnosis of disorders of anus and rectum sphincter apparatus is a complex medical problem. Dysfunction of the rectum and anus can be due to anatomic abnormalities, neuropathy, or myopathy and interaction within the remaining structures of pelvic floor organs. To perform final diagnosis the physical medical examination and additional tests should be performed. According to American Gastroenterological Association Medical Position Statement on Anorectal Testing Techniques [8] different techniques have a different value in assessing anorectal abnormalities. Complete physical examination will identify certain structural disorders (e.g., prolapse, perineal disease), local and systematic disease processes, and evidence for more specific neural lesions (e.g., spinal cord tumor) that may have an impact on anorectal function and dysfunction. Endoscopy is necessary for exclusion of organic disease in patients with fecal incontinence, constipation, or proctalgia. Evacuation proctography (defecography) allows to observe structural and functional alterations and include rectocele, internal rectal intussusception, external rectal prolapse, enterocele and pelvic floor dysfunction, or dyssynergia. Barium enema helps to exclude intraluminal mucosal disease or to assess bowel dilation. Anal ultrasonography is the most reliable test defining the anatomic defects in the external and internal anal sphincters. Electromyography of the external anal sphincter and pelvic floor muscles is performed to: identify areas of sphincter injury by mapping the sphincter, to determine whether the muscle contracts or relaxes, and to identify denervation-reinnervation potentials, which are indicative of nerve injury.

The first step in diagnosing the functional disorders of anus and rectum sphincter apparatus is to exclude the anatomical causes or other diseases which can disturb function of pelvic floor using the above-mentioned techniques. The final diagnosis is set up according to diagnostic criteria. The results of manometry of the rectum and anus is on the one hand the part of those criteria and on the other allows to assess the function of the anus and rectum.

Conclusions

There is a discussion in the literature concerning anorectal manometry. There are two main issues related to discriminative opinions presented by some authors [9, 10]. One of them is lack of standardized normal values of manometric parameters and its differences between sex, age, which hampers the comparison between healthy and ill patients and its interpretation. The predication with the second one is that there are not enough randomized trials focused on assessing this test and its role in diagnosis. There are also some attitudes which do not support using anorectal manometry as a routine test in defecation disorders [10].

On the other hand, there are studies in which there were no differences depending on used techniques [3] and anorectal manometry is endorsed by experts and professional organizations. It is seen as a valuable procedure the results of which are part of the diagnostic criteria of many anorectal disorders. [2, 8, 11].

The anorectal manometry is a common practice among medical experts who deal with the rectum and anus disorders, which is easy to implement. It is found to be inexpensive and allows to: assess the value of the disturbance of the function of anus and rectum, to plan treatment strategy, and, in many cases, to monitor the effect of this strategy.

References


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