



Original Article

The real impact of colonic transit time and anorectal manometry in the diagnosis of adult patients with chronic constipation



Abel Botelho Quaresma ^{a,b,*}, Antuani Raphael Baptistella ^a, Carina Rossoni ^a

^a Universidade do Oeste de Santa Catarina (UNOESC), Joaçaba, SC, Brazil

^b Universidade Católica do Paraná (PUCPR), Programa de Pós-Graduação em Ciências da Saúde, Curitiba, PR, Brazil

ARTICLE INFO

Article history:

Received 14 April 2020

Accepted 13 May 2020

Available online 12 June 2020

Keywords:

Constipation

Gastrointestinal motility

Gastrointestinal transit

Manometry

Digestive system phenomena

ABSTRACT

Introduction: Anorectal physiology tests are indicated for patients who have refractory symptoms of constipation, but the best sequence of investigation remains controversial.

Objective: To evaluate the influence of colonic transit time and anorectal manometry in the diagnosis of chronic constipation in adults.

Method: This was a study of adult patients with constipation at a private clinic in a city in southern Brazil, from January 1, 2009 to December 31, 2018. Those who showed warning signs were referred for colonoscopy and those with any anatomical alterations were excluded. The patients received 10 g of psyllium and those who remained symptomatic after three weeks were referred for functional assessment with colonic transit time (CTT). Those who presented outlet obstruction in the colonic transit time were referred to anorectal manometry.

Results: Of the 889 adult patients surveyed, 227 were included. Of the 216 who completed the study, 167 responded to primary treatment. Forty-nine underwent CTT. In these, 16 had normal colonic transit time and 33 were altered. In those with altered colonic transit time, eight had a pattern of colonic inertia and 25 had an obstruction pattern. The 25 patients with an outlet obstruction pattern underwent anorectal manometry. Eighteen had signs of paradoxical contracture of the puborectal muscle (PPRC) and seven did not.

Conclusion: This study concluded that anorectal physiology exams contribute to the diagnosis of constipation, often changing the behavior. These exams should be performed whenever the patient does not respond to hygienic changes and fiber replacement.

© 2020 Sociedade Brasileira de Coloproctologia. Published by Elsevier Editora Ltda. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

* Corresponding author.

E-mail: abel@proctoclinic.com.br (A.B. Quaresma).

<https://doi.org/10.1016/j.jcol.2020.05.014>

2237-9363/© 2020 Sociedade Brasileira de Coloproctologia. Published by Elsevier Editora Ltda. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

O real impacto do tempo de trânsito cólico e da manometria anorretal no diagnóstico de pacientes adultos com constipação crônica

R E S U M O

Palavras-chave:

Constipação
Mobilidade gastrointestinal
Trânsito gastrointestinal
Manometria
Sistema digestivo

Introdução: Os exames de fisiologia anorretal estão indicados nos pacientes que mantêm sintomas refratários de constipação, porém uma sequência desejada de investigação permanece contraditória.

Objetivo: Avaliar a influência do tempo de trânsito colônico e da manometria anorretal no diagnóstico da constipação crônica de adultos.

Método: Estudamos os pacientes adultos de uma clínica privada em uma cidade do sul do Brasil, no período de 01 de Janeiro de 2009 a 31 de Dezembro de 2018 apresentando constipação. Aqueles que apresentassem sinais de alerta, eram encaminhados a colonoscopia e com qualquer alteração anatômica eram excluídos. Foram prescritos 10 g de Psyllium e aqueles que permaneceram sintomáticos após três semanas foram encaminhados à avaliação funcional com tempo de trânsito colônico (TTC). Os que apresentavam obstrução de saída ao tempo de trânsito colônico foram encaminhados a manometria anorretal.

Resultados: Dos 889 pacientes adultos levantados, 227 foram incluídos. Dos 216 que concluíram o estudo, 167 responderam ao tratamento primário. Quarenta e nove realizaram TTC. Nestes, 16 tiveram tempo de trânsito colônico normal e 33 alterado. Naqueles com tempo de trânsito colônico alterado: oito tinham padrão de inércia colônica e 25, padrão de obstrução de saída. Os 25 pacientes com padrão de obstrução de saída foram submetidos à manometria anorretal. Dezoito tinham sinais de Contratura Paradoxal do músculo Puborretal (CPPR) e sete não.

Conclusão: Concluímos que os exames de fisiologia anorretal contribuem para o diagnóstico da constipação, muitas vezes alterando a conduta. Estes exames devem ser realizados sempre que o paciente não responder as alterações higienodietéticas e a reposição de fibras.

© 2020 Sociedade Brasileira de Coloproctologia. Publicado por Elsevier Editora Ltda. Este é um artigo Open Access sob uma licença CC BY-NC-ND (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

Introduction

Intestinal constipation (IC) is a symptom rather than a disease, requiring adequate investigation for a diagnosis to be determined. Most patients do not present an specific abnormality, and constipation is considered to be functional.¹

Constipation is one of the most frequent gastrointestinal disorders, with a mean prevalence of 14% in children.² In adults, the prevalence of IC ranges from 2.6% to 30.7%^{3,4}; the female sex and advanced age are highlighted as associated factors. The Brazilian data for self-reported constipation are 25.2% in total, 37.2% among women, and 10.2% among men.⁵ Initially, organic causes should be discarded, to subsequently later define whether constipation is effectively functional (FC); this diagnosis is currently based on the Rome IV Criteria.^{6,7}

Different techniques were developed and used for the assessment of anorectal physiology and constipation, such as anorectal manometry, electromyography, colonic transit time with radiopaque markers, defecography, ultrasound, nuclear magnetic resonance imaging (NMR), and study with radioisotopes. However, the desired sequence of these procedures remains contradictory; the methods followed in published works are varied.⁸⁻¹⁰ Physiological tests are necessary only in constipated patients, after discarding secondary causes whose refractory symptoms persisted even with an adequate

increase in the amount of fiber in the diet¹¹; however, in most cases, these steps are not followed.

Objective

To assess the influence of colonic transit time and anorectal manometry in the diagnosis and treatment of chronic constipation in adults.

Material and methods

This was a retrospective study of all patients aged 18 years or older with complaints of constipation by the Rome IV criteria who attended their first appointment at a specialized coloproctology reference clinic in a city in the southern region of Brazil, from January 1, 2009 to December 31, 2018.^{6,7} The following data were collected from medical records: clinical history, clinical evolution, and laboratory tests at the initial assessment (measurement of thyroid hormones [TSH and free T4], serum calcium, blood count, blood glucose, and fecal occult blood in three samples).^{12,13} Patients who presented alterations in their laboratory tests were considered to have secondary constipation; they were excluded from the study and referred to specific treatment.

Table 1 – Characteristics of constipated patients.

Constipated = 227 patients					
Responsive = 167 (73.56%)		Non-responsive = 49 (21.59%)		Did not complete = 11 (4.85%)	
♂ = 46	♀ = 121	♂ = 12	♀ = 37	♂ = 5	♀ = 6

Table 2 – Patients who underwent colonic transit time.

Colonic transit time = 49 patients					
Male gender = 16 patients			Female gender = 33 patients		
Outlet = 8	Inertia = 2	Normal = 6	Outlet = 17	Inertia = 6	Normal = 10

Those with warning signs were referred for colonoscopy; patients for whom obstructive causes were discarded were included in the study.¹⁴ Patients with masses (tumors or polyps) were excluded and referred for surgical treatment (conventional or endoscopic). Patients with anatomical changes (diverticulum, anastomosis, narrowing, or dilation) at colonoscopy were excluded from the study.

All patients underwent a proctological examination, with anal inspection, digital rectal examination, and anoscopy, and were prescribed 10 g of psyllium, corresponding to 7 g of fiber divided into two daily doses, to be consumed in the morning and evening, and received instruction and encouragement for the adoption of adequate hygiene/dietary measures.¹⁵ Those who were not asymptomatic or whose response were considered incomplete by the patient or attending physician after three weeks were referred to functional evaluation at the anorectal physiology service of the coloproctology reference service in the same region, performed by the same physician.

Total and segmental colonic transit time tests were performed on patients who did not respond to the initial treatment. Patients ingested radiopaque markers for colonic transit time (Sitzmarks[®]) on consecutive days at the same time. Simple radiographs of the abdomen, including the pelvis, were performed on the fourth and seventh days at the radiology service of a reference hospital in the region, near the time the patients ingested the capsules. The patient was provided with a questionnaire to indicate the time, consistency, stool size, and whether effort was required in each evacuation.

The markers were identified and counted directly on the radiographs. The delineations of the regions corresponding to the right, left, and rectosigmoid segments of the radiographs were based on the recommendations by Martelli et al.¹⁶ Subsequently, calculations were performed according to the Metcalf formula.¹⁷ The mean values observed in the study by Sobrado et al. carried out in 2005 (40.9 h in females and 32.5 h in males) were used as reference.¹⁸ This standard was chosen because those authors used the same markers as the present study. All patients who presented terminal obstruction on the colonic transit time test were referred to anorectal manometry at the service described above; they were oriented to perform rectal lavage with enema two hours before the procedure, and to avoid eating in this interval. The device used was the Manograph MT 2000[®] (Sigma Instruments — Belo Horizonte, MG, Brazil), and the Manograph 2.0 software was used for analy-

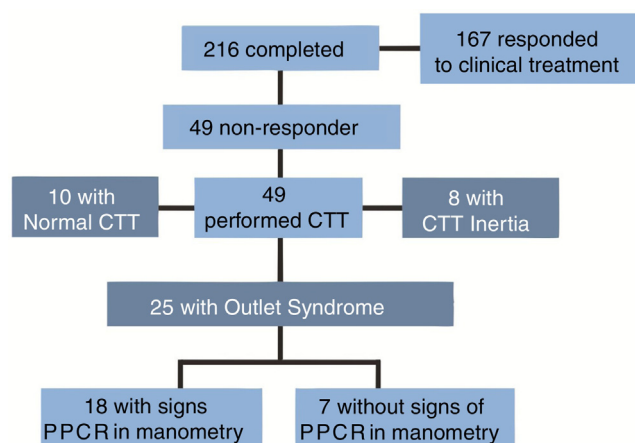


Fig. 1 – Study design (CTT, colonic transit time; PPCR, paradoxical puborectalis contraction).

sis. A four-channel solid-state probe with a lumen to inflate a balloon located at the tip of the catheter was used.

The study was submitted and approved by the UNOESC Research Ethics Committee under number 1,255,378/2019.

Results

Of the 889 adult patients retrieved, 227 (25.53%) were included in the study. Of the 227 patients evaluated and included in the study, 11 (4.85%) did not complete the protocol, as they either did not perform all the proposed tests or did not return for the evaluations, therefore being excluded (Table 1).

Of the 216 who completed the study, 167 (77.31%) responded to primary treatment with fiber and changes in hygiene/dietary habits. Forty-nine (22.69%) patients underwent colonic transit time test, as they did not achieve a satisfactory improvement in the initial symptoms (Fig. 1).

The mean age of the patients was 50.41 years (~18–88 years). In females, the mean was 49.96 years (~18–88 years). In males, the mean was 51.65 years (~18–86 years; Tables 2 and 3; Fig. 2).

The two male patients with negative rectoanal inhibitory reflex (RAIR) were paraplegics with severe neurological impairment, and the only ones who did not present RAIR, even after 60 mL of liquid was injected into the balloon.

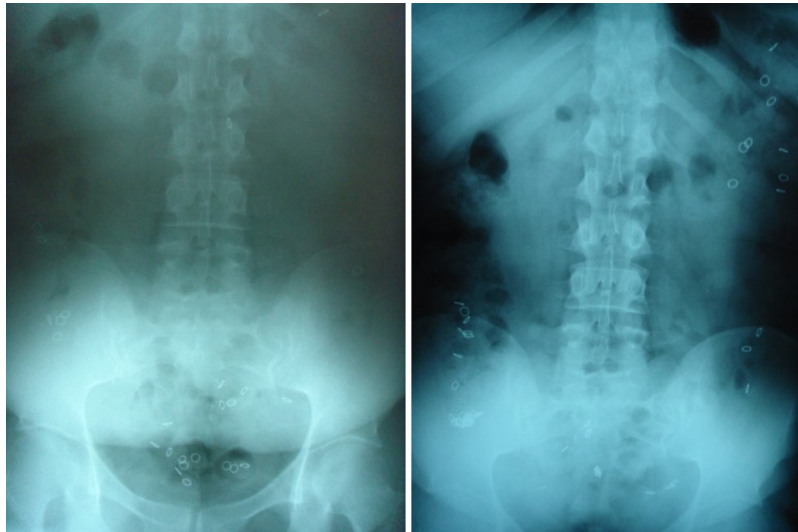


Fig. 2 – Terminal obstruction pattern (left) and colonic inertia pattern (right).

Table 3 – Patients with anorectal manometry.

Anorectal manometry = 25 patients

Male gender = 8 patients

Female gender = 17 patients

PPRC = 6	Normal = 2	PPRC = 12	Normal = 5
RAIR – = 2	RAIR + = 6	RAIR – = 0	RAIR + = 17

RAIR, rectoanal inhibitory reflex; PPRC, paradoxical puborectalis contraction.

Discussion

Constipated patients remain a very heterogeneous group, posing a great challenge for randomized and/or multicentric studies, and hindering systematization of propaedeutic assessment and treatment.¹⁹

In 1981, Arhan et al.²⁰ carried out colonic transit studies in adults and children and established the quantitative method as it is currently used, demonstrating that the transit speed of each segment of the colon is different. In the case of constipated patients, the examination allows the differential diagnosis between colonic inertia and terminal obstruction. In the latter case, it is necessary to complement the diagnosis with other methods, such as anorectal manometry, defecography (or magnetic resonance defecography), electromanometry, or balloon proctography.²¹

Manometry has become a great tool for diagnosis and therapeutic guidance, by transforming the findings into data, proving to be a different way of approaching constipated patients, with surprising strategic changes. In a prospective study to assess the clinical importance of manometry in constipated patients, it was demonstrated that an unsuspected clinical information was evidenced by the examination in up to 88% of patients and that, in 76% of them, it led to a strategic change in their treatment.²²

In a study by Lacerda-Filho et al.,²³ 179 patients with chronic constipation according to the Rome II criteria were initially treated with dietary measures and functional re-education; those who did not respond were subjected to colonic transit time test, defecography, anorectal manometry, and electromyography, according to the clinical presentation of chronic constipation. In constipated patients, no relationship was observed between fiber intake, segmental colonic transit time test, and the intensity of constipation. These data demonstrate that the intensity of constipation does not depend only on fiber intake. In the present sample, the number of respondents was greater than the usual in the literature, probably due to the strict exclusion criteria that removed any patient with comorbidities, laboratory findings, and colonoscopies that are very frequent at this age.

In 1974, Ihre pointed out that a false negative RAIR can be found in patients with rectal prolapse and fecal incontinence, which is explained by the sphincter fragility in different degrees, causing very low resting pressure levels of the sphincter muscles.²⁴ Other authors have shown that, after surgical correction of patients with rectal prolapse, the reflex is restored.^{25,26}

In Brazil, due to the high prevalence of chagasic megacolon, manometry is paramount in the assessment and suspicion of anorectal colonic involvement; the presence of a negative reflex is highly suggestive of the disease in patients with strong clinical suspicion.²⁷ In the present study, no cases of Hirschsprung's disease or Chagas disease were observed, probably due to the low prevalence of the former and due to the fact that the latter is not endemic in the region where the study was conducted. The only cases of negative RAIR in the present study were two patients with spinal cord trauma of traumatic origin.

Over 50% of constipated patients report difficulty in defecation and many present alterations in the pelvic floor.²⁸ Many patients with obstructed defecation were shown to have paradoxical anal contraction (anismus) and/or inability to relax

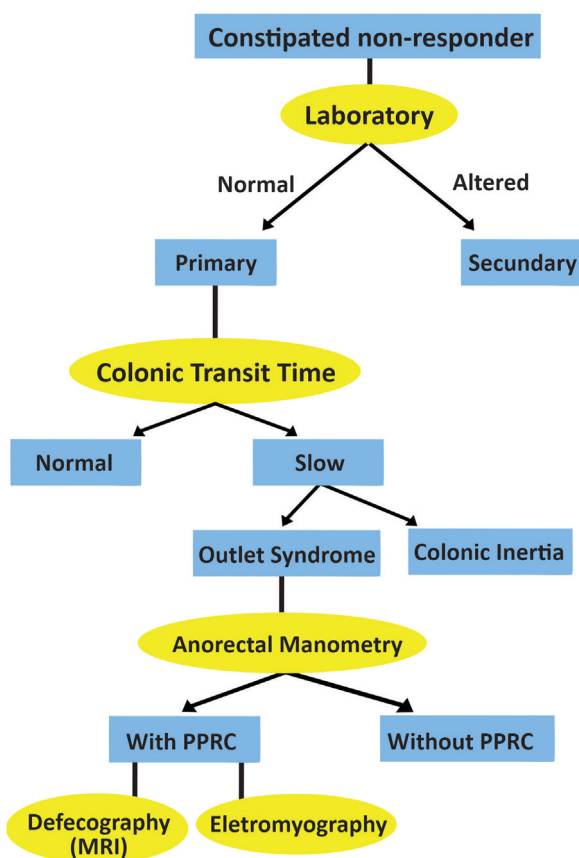


Fig. 3 – Investigation flowchart (PPRC, paradoxical puborectalis contraction).

the anal sphincter and/or paradoxical puborectal contraction (PPRC).²⁹

In a prospective study, Rao et al. observed that 30% of patients with chronic constipation and symptoms suggestive of obstructed defecation presented normal anorectal manometry, and were able to expel the intra-rectal balloon during this test. In this group, only 11% of patients presented constipation with slow transit without anorectal dysfunction. The others had normal transit. Therefore, 19% of these patients had constipation, apparently without dysfunction, and were then classified as constipated with normal colonic transit and pelvic function. Manometric changes were observed in 70% of the patients, which led the authors to stratify patients with pelvic dysfunction into three distinct groups. Considering that 20%–30% of normal individuals present manometric alterations suggestive of obstructed evacuation, the study demonstrated that the association of manometry with balloon expulsion test is able to diagnose the majority of these patients.³⁰ The present study found data very similar to these.

Although physiological anorectal colonic tests are valid and complement each other, defecography (or magnetic resonance defecography) alone would add very little to patients with obstructed evacuation.^{25,27} The difference is in the treatment to be instituted. Many authors emphasize that defecography would have a very small value in constipated patients,²⁹ being important in those with altered colonic transit time in

a pattern of terminal obstruction and manometry with outlet obstruction (anismus).³⁰

According to the results obtained, the following investigation flowchart is proposed (Fig. 3).

The present study had some limitations: (1) the fact that some data were self-reported by the research participants (diet, daily fluid intake, evacuation frequency, evacuation effort, and stool consistency). These data may contain several potential sources of bias, as they cannot be verified. (2) The small sample size; even with the large initial number of patients, the final number of patients undergoing examinations was less than expected. This was due to the strict exclusion criteria that removed any patient with laboratory or endoscopic alterations; moreover, due to the high percentage of response to the clinical treatment, only 49 patients who did not respond underwent anorectal physiology studies. (3) Failure to perform defecography (magnetic resonance defecography) and electromyography in patients who were unable to relax the sphincter by manometry, which could better elucidate these cases and often direct them to surgical treatment. The authors decided not to mention these tests, because in addition to the treatment not being the objective of this study, the tests were performed in other services, with different devices and methodologies, which would not allow sample homogenization.

Conclusions

The authors conclude that anorectal physiology exams contribute to the diagnosis of constipation, often changing its behavior. These exams should be performed whenever the patient does not respond to hygienic/dietary changes and fiber replacement.

The authors recommend that the first exam to be performed on refractory patients is colonic transit time with radiopaque markers; in those with terminal obstruction, manometry should be performed soon after. The other imaging exams (defecography, ultrasound, and magnetic resonance defecography) would be indicated in those with terminal obstruction at manometry, candidates for surgical treatment, those with clear signs of prolapse or with altered image exams for the same reason, in addition to those not responsive to clinical treatment for colonic inertia.

Conflicts of interest

The authors declare no conflicts of interest.

REFERENCES

1. Stewart WF, Liberman JN, Sandler RS, Woods MS, Stemhagen A, Chee E, et al. Epidemiology of constipation (EPOC) study in the United States: relation of clinical subtypes to socioeconomic features. *Am J Gastroenterol.* 1999;94:3530–40.
2. Vandenplas Y, Devreker T. Functional constipation in children. *J Pediatr.* 2019;1:1–3.
3. Pare P, Ferrazzi S, Thompson WG, Irvine J, Rance L. An epidemiological survey of constipation in Canada: definitions,

- rates, demographics and predictors of health care seeking. *Am J Gastroenterol.* 2001;96:3130-7.
4. Suares NC, Ford AC. Prevalence of, and risk factors for, chronic idiopathic constipation in the community: systematic review and metaanalysis. *Am J Gastroenterol.* 2011;106:1582-91.
 5. Schmidt FMQ, Santos VLGG, Domansky RC, Barros E, Bandeira MA, Tenório MAM, et al. Prevalence of self-reported constipación in adults from the general population. *Rev Esc Enferm USP.* 2015;49:443-52.
 6. Dossman DA, Hasler WL. Rome IV-functional GI disorders: disorders of gut-brain interaction. *Gastroenterology.* 2016;150:1257-61.
 7. Mearin F, Lacy BE, Chang L, Chey WD, Lembo AJ, Simren M, et al. Bowel disorders. *Gastroenterology.* 2016, <http://dx.doi.org/10.1053/j.gastro.2016.02.031> [published online ahead of print, 2016 Feb 18]; S0016-5085(16)00222-5.
 8. Mertz H, Naliboff B, Mayer E. Symptoms and physiology in severe chronic constipation. *Am J Gastroenterol.* 1999;94:131-8.
 9. Lembo A, Carnillieri M. Chronic constipation. *N Engl J Med.* 2003;349:1360-8.
 10. Karlbom U, Lundin E, Graf W, Pahlman L. Anorectal physiology in relation to clinical subgroups of patients with severe constipation. *Colorectal Dis.* 2004;6:343-9.
 11. Thompson W, Longstreth G, Drossman D, Heaton K, Irvine E, Muller-Lissner S. Functional bowel disorders and functional abdominal pain. *Gut.* 1999;45:1143-7.
 12. Sweeney MA. Diagnosis and treatment. *Home Care Provider.* 1997;Oct;2(5):250-5, [http://dx.doi.org/10.1016/s1084-628x\(97\)90120-9](http://dx.doi.org/10.1016/s1084-628x(97)90120-9).
 13. Soffer EE. Constipation: an approach to diagnosis, treatment, referral. *Cleve Clin J Med.* 1999;66:41-6.
 14. Longstreth GF, Thompson WG, Chey WD, Houghton LA, Mearin F, Spiller RC. Functional bowel disorders. *Gastroenterology.* 2006;1430:1480-91.
 15. Fucks FD, Wannamacker L. *Farmacologia Clínica – Fundamentos da Terapêutica Racional.* 2ª ed. Rio de Janeiro, Guanabara: Koogan; 1998. p. 543-8.
 16. Martelli H, Devroede G, Arhan P, Duguay C, Dornic C, Faverdin C. Some parameters of large bowel motility in normal man. *Gastroenterology.* 1978;75:612-8.
 17. Metcalf A. Transit time. In: *Practical guide to anorectal testing.* New York: Igaku-Shoin Medical Publishers Inc.; 1990.
 18. Sobrado CW, Pires CEF, Habr-Gama A, Kiss DR. Avaliação do tempo de trânsito colônico com marcadores radiopacos: estudo em voluntários assintomáticos. *Rev Col Bras Cir.* 2005;32:111-4.
 19. Sobrado CW, Corrêa Neto IJF, Pinto RA, Sobrado LF, Nahas SC, Cecconello I. Diagnosis and treatment of constipation: a clinical update based on the Rome IV criteria. *J Coloproctol.* 2018;38:137-44.
 20. Arhan P, Devroede G, Johanin B, Lanza M, Faverdin C, Dornic C, et al. Segmental colonic transit time. *Dis Colon Rectum.* 1981;24:625-92.
 21. Neves J, Habr-Gama A. Tempo de trânsito colônico total e segmentar: análise crítica dos métodos e estudo em indivíduos normais com marcadores radiopacos. *Rev Bras Colo Proct.* 1991;11:55-60.
 22. Patel RS, Rao SSC. How useful are tests of anorectal function in the management of defecation disorders? *Gastroenterology.* 1994;106:A554.
 23. Lacerda-Filho A, Lima MJR, Magalhães MF, Paiva RA, Cunha-Melo JR. O papel da avaliação clínica e dos testes de fisiologia colo-reto anal no diagnóstico etiológico da constipação intestinal crônica. *Arq Gastroenterol.* 2008;45:50-7.
 24. Ihre T. Studies on anal function in continent and incontinent patients. *Scand Gastroenterol.* 1994;9:25.
 25. Agachan F, Pfeifer J, Wexner SD. Defecography and proctography results of 744 patients. *Dis Colon Rectum.* 1996;39:899-905.
 26. Wexner SD, Cheape JD, Jorge JM, Heymen S, Jagelman DG. Prospective assessment of biofeedback for the treatment of paradoxical puborectalis contraction. *Dis Colon Rectum.* 1992;35:145-50.
 27. Rezende JMDE, Moreira H. Megacolon chagásico. In: Porto JAF, editor. *Clínica das doenças intestinais.* Rio de Janeiro: Livraria Atheneu; 1978. p. 451-74.
 28. Bassotti G, Chiaroni G, Vantini I, Betti C, Fusaro C, Pelli MA, et al. Anorectal manometric abnormalities and colonic propulsive impairment in patients with severe chronic idiopathic constipation. *Dig Dis Sci.* 1994;39:1558-64.
 29. Rao SSC, Patel RS. How useful are manometric tests of anorectal function in the management of defecation disorders. *Am J Gastroenterol.* 1997;92:469-75.
 30. Rao SSC, Mudipalli RS, Stessman M, Zimmerman B. Investigation of the utility of colorectal function tests and Rome II criteria in dyssynergic defecation (Anismus). *Neurogastroenterol Motil.* 2004;16:589-96.