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Original Article

Manometric analysis of the influence of rectal content on anal pressures in chronically constipated patients

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ABSTRACT

Objective: The aim of our study was to analyze whether the presence of content in the rectum influences the anorectal manometry examination results in chronically constipated patients.
Methods: We evaluated 38 chronically constipated patients, 36 women and 2 men, with an average age of 53.55 years of age, all with a score above 10 on the Agachan Constipation Scoring System. All the patients underwent rectal preparation and then had the anorectal manometry examination without rectal content and after 5 min had it with a rectal balloon inflated with 200 ml of air in the rectum.
Statistical analysis: The statistical parametric paired-*t* test was applied in order to verify the difference in response between the groups after an intervention, adopting a significant level of 5% ($p < 0.05$).
Results: The anal pressure was analyzed from the standard anal manometry examination and we found a statistically significant influence on the manometric results for the patients' average resting pressures, absolute average contractions, average contractions, evacuations, and sustained contractions in the functional anal canals.
Conclusion: The presence of rectal content influences the manometric values of average resting pressure, average absolute contraction, average contraction, evacuation, and average sustained contractions in the functional anal canal in the group of chronically constipated patients.

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Análise Manométrica da Influência do Conteúdo Retal nas Pressões Anais em Pacientes Cronicamente Constipados

Palavras chave:
Constipação
Manometria
Doenças Retais

R E S U M O

Objetivo: O objetivo deste estudo foi analisar se a presença de conteúdo no reto influencia os resultados do exame de manometria anorretal em pacientes cronicamente constipados.
Métodos: Foram avaliados 38 pacientes cronicamente constipados, 36 mulheres e dois homens, com média de 53,55 anos de idade, todos com pontuação acima de 10 no Agachan Constipation Scoring System. Todos os pacientes foram submetidos a preparo retal e, em seguida, passaram por um exame de manometria anorretal sem conteúdo retal e, depois de transcorridos cinco minutos, um novo exame foi realizado, agora com um balão retal inflado com 200 ml de ar no reto.
Análise estatística: Na análise estatística, foi aplicado o teste t paramétrico, com a finalidade de verificar a diferença, em termos de resposta, entre os grupos após uma intervenção. Para tanto, foi adotado um nível de significância de 5% (P <0,05).
Resultados: A pressão anal foi analisada com base no exame de manometria anal de rotina; em nossos pacientes, foi observada influência estatisticamente significativa nos resultados manométricos para as pressões médias em repouso, contrações médias absolutas, contrações médias, evacuações e contrações sustentadas nos canais anais funcionais.
Conclusão: A presença de conteúdo retal influencia os valores manométricos da pressão média em repouso, contração absoluta média, contração média, evacuação, e contrações sustentadas médias no canal anal funcional no grupo de pacientes cronicamente constipados.

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Introduction

Changes in bowel movements, such as constipation and fecal incontinence, are some of the most common gastrointestinal disorders in the general population, ranging in American adults from 15%[1] to 20%.[2,3] Among them, constipation is most prevalent, and can affect up to 27% of Americans.[3–5] The high frequency of this disorder, and its high cost, justify the importance given to the problem.

From a clinical standpoint, constipation is defined as a bowel alteration based on unsatisfactory evacuation, and it may be associated with an infrequent bowel movement, difficulty in passing stool, or both.[6,7]

The Rome III criteria defined functional constipation as occurrence of 2 or more symptoms for at least 12 weeks in the absence of structural explanation. The symptoms are unspecific self-reported symptoms, stool frequency of less than three bowel movements per week, gut transit time of more than 68 h, anal blockage, manual maneuvers to defecate, loose stools area rarely present without the use of laxatives and there are insufficient criteria for irritable bowel disease.[8–11]

In order to classify the prevalence and severity of the constipation, the Agachan Constipation Scoring System was used.[12]

Complete evaluation of chronically constipated patients should be based on a medical history and directed physical examination,[13] and in the most severe cases supplemented with specific anorectal physiology examinations.[11,14] Anorectal manometry is considered to be the most important of these examinations and provides detailed information on the motor and sensory activities in the region being studied.[4,5,15–18]

International gastroenterology and coloproctology societies have standardized the methodology and interpretation of this anorectal manometry examination.[15]

Thus, considering the importance of this examination and reviewing the medical literature on anorectal manometry in chronically constipated patients, there remains the question of whether the presence of content in the rectum influences, or not, the examination results.

Cleaning of the rectum before manometry is especially important in chronically constipated patients, as the presence of large amounts of feces in the rectum may influence the positioning of the catheter.[18] Irrespective of these hypotheses, anorectal physiology services ignore this and perform rectal examinations without rectal preparation,[11,19–22] while others empty the rectal ampulla before the examination.[2,5,18]

Given this, and not having found in the literature any clear references to the importance or otherwise of pre-existing content in the rectum or prior preparation for anorectal manometry, we came up with this comparative study, in which we evaluated the examination in question with and without rectal content in chronically constipated patients. To simulate the presence of content in the rectum during the examination, we inserted an inflated rectal catheter balloon and compared it with the data obtained with the balloon deflated.

The objective of this paper, then, is to analyze whether the presence of known content introduced to the rectal ampulla influences the anorectal manometry examination results in chronically constipated patients.

Material

We evaluated the data obtained from the anorectal manometry examinations carried out on 38 chronically constipated patients at the Coloproctology Clinic at the University Hospital at Taubaté University (UNITAU) from July 2010 to April 2011.

Method

This is a prospective study with chronically constipated adult patients at the Coloproctology Clinic, at UNITAU University Hospital. All of the patients met the Rome III[23] criteria and scored above 10 on the Agachan Constipation Scoring System.[12] The patients signed an informed consent form and the study was approved by the Ethics Committee University Hospital at Taubaté University (UNITAU).

We excluded patients with anorectal diseases known to lead to impairment in anorectal manometry values, such as grade IV hemorrhoids, anal fissures, and fistulas.[24] Associated with these, we also excluded patients who had had anorectal surgery, abdominal pain concomitant with a manometry examination, organic disease discovered through colonoscopy, patients with irritable bowel syndrome, megacolon,[24] those who used oral antihypertensive drugs based on calcium channel blockers,[11] and patients who had not been successfully rectally prepared.

All 38 patients underwent the anorectal manometry examination having previously been rectally prepared. The preparation was carried out with a sorbitol-based stimulant and sodium lauryl sulphate, applying a 5 ml vial rectally the day before and two vials 2 h before the examination.

Each examination was conducted in two phases: the first phase with the rectal balloon deflated, and soon after, without removing the catheter from the anorectal region. The first phase was called group 1. The examination was repeated, but this time with the rectal balloon inflated in the rectal ampulla, simulating fecal content in the rectum. The second phase was called group 2.

No digital rectal examination was carried out in advance, so as not to compromise the tone of the anal sphincters.

The study was based on the standard anorectal manometry examination, measuring pressure at rest, contraction, absolute contraction, evacuation, maintained contraction, sustention capacity, and fatigue rate for the anal sphincter muscles, centimeter by centimeter, from 5 cm from the rectum (Fig. 1). Following this step, rectal sensitivity was analyzed by measuring the anal inhibitory reflex, the lowest sensitive volume in the rectum, and the volume for the desire for constant evacuation. The maximum rectal capacity was not analyzed, in order not to compromise the next phase of the examination.

At the end of this phase, the catheter balloon was slowly inflated in the rectal ampulla, approximately 5 cm from the anal verge, with 200 ml of air, to fill the entire rectal ampulla and thus simulate a rectum with content (Fig. 1).[5,25] We waited for approximately 5 min[5] for the rectal and sphincter muscles to settle. The catheter was then withdrawn, and all the measurements were compared with those taken with a deflated balloon.

Statistical analysis

The statistical analysis evaluated possible differences between the data obtained in anorectal manometry performed in chronically constipated patients with and without rectal content.

For this purpose, the statistical parametric paired-*t* test was applied in order to verify the difference in response between the groups after an intervention adopting a significant level of 5% ($p < 0.05$). The analysis was performed with the software SPSS Statistics version 22.

Results

In this study, out of 38 patients, 36 (94.7%) were female and only two (5.3%) were male. The average age of the patients was 53.55 years old, the main age group being that between the fifth and sixth decades of life, accounting for 65.78% of the sample.

The sample scored an average of 17.66 out of a maximum of 30 on the Agachan Constipation Scoring System, illustrating a high level of constipation for the group average. In this same sample, 21 patients (55.26%) had severe constipation, with a score of more than 18 points.

With regard to the time of onset of the symptoms to date, 11 patients (28.9%) had an average time of 5–10 years; 13 patients (34.2%) from 10 to 20 years; 9 patients (23.7%) had more than 20 years, and only five of the 38 patients (13.2%) had been constipated for a period of 1–5 years.

The average length of the patients' functional anal canal was 2.42 cm, which is in line with the anatomical standard, with 94.7% of these patients being female.

In the rectal sensitivity test, the smallest sensitive volume in the rectum was an average of 33.29 ml, and initial volume for the desire for constant evacuation was an average of 53.29 ml of Hg.

The anorectal pressures analyzed in the manometry examinations in both group one and group two are compared below, showing an important and statistically significant difference between the pressures at rest, contraction, absolute contraction, evacuation, and sustained contraction. Neither the rate of fatigue nor the contraction sustention capacity showed a statistically significant difference.

The following Table 1 compares the average resting pressures, the absolute contraction pressure, contraction pressures average and average evacuation pressure for 3 cm from the anal canal.

Table 2 compares the average sustained contraction pressure in the functional anal canals of chronically constipated patients in groups 1 (rectal balloon deflated) and 2 (rectal balloon inflated), obtaining statistically significant results.

Discussion

Anorectal manometry is part of the study protocol for chronic constipation, in view of the variability of causes and factors.[1,2,26] However, with respect to specific techniques for this examination, there is no clear definition of the details, in

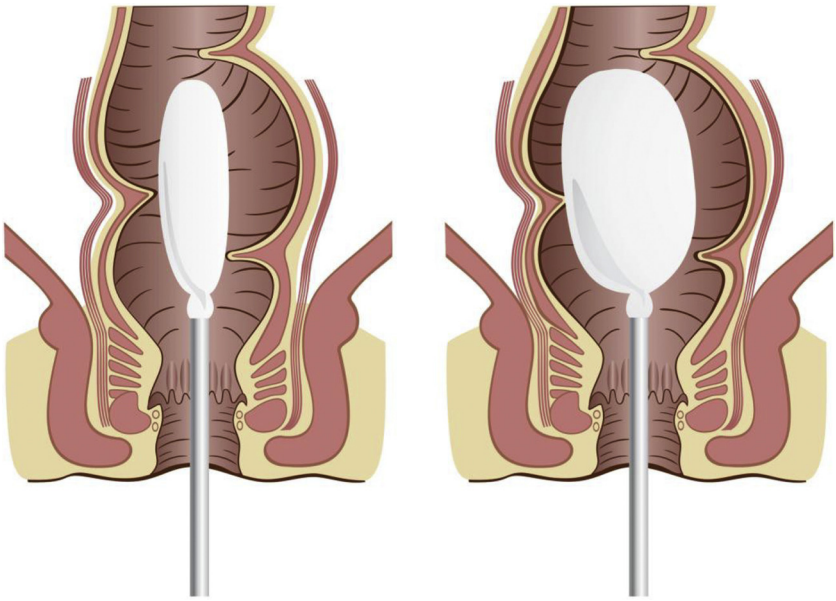

Fig. 1 – Simulation of anorectal manometry examination with and without the rectal balloon deflated.

Table 1 – Comparison with the pressures found during anorectal manometry from 3 cm of the anal canal in chronically constipated patients in groups 1 and 2 from July 2010 to April 2011.

Groups	Average resting	Standard deviation	Absolute contraction	Standard deviation	Average contraction	Standard deviation	Evacuation	Standard deviation
1	52.98	26.7	12.528	60.01	73.82	49.33	64.52	30.60
2	40.17	25.21	96.71	54.61	57.98	39.55	44.33	26.04
		$p = 0.001$		$p < 0.001$		$p < 0.001$		$p < 0.001$

Source: Coloproctology Clinic – UNITAU University Hospital.

addition to there being a great deal of non-comparable equipment and criteria in terms of methodology.

There is also disagreement over whether or not there should be prior preparation and whether or not the rectal content can influence results. Several Brazilian and international services have performed anorectal manometry examinations and posted their results in extensive studies, but without there being any standardization regarding rectal preparation and the importance of the existence or otherwise of solid or other fecal waste in the rectum.

Klug et al.,[27,28] in his studies at the Faculty of Medical Sciences at Santa Casa in São Paulo, and Caesar et al.,[11,20,21] at the Department of Medicine, University of Taubaté, do not routinely carry out rectal preparation before the examination. However, the work published by authors such as Rao et al.,[5,25] Raza and Bielefeldt,[2] Pfeifer et al.[24] and Oliveira[24] recommends rectal preparation in patients prior to completion of a manometry test as routine.

Rao et al. in their work perform a 500 ml rectal enema 30 min before the examination.[5,25] Raza and Bielefeldt, however, recommended cleaning with an enema on the morning of the examination, also in order to empty the rectal ampulla.[2]

These authors believe that in chronically constipated patients, not cleaning the rectal ampulla may influence the positioning of the catheter, influencing the acquisition of data, as well as obstructing the channels, compromising the examination results,[24] this being one of the reasons to clean the rectum.

However, based on these different studies, the need arose to define the importance of content in the rectum, which could

Table 2 – Comparison between the averages sustained contraction pressure in the functional anal canals of chronically constipated patients in groups 1 and 2 from July 2010 to April 2011.

Groups	Number of patients	Minimum	Maximum	Average	Standard deviation
1	38	24.7	163	93.02	33.14
2	38	4.3	138.4	72.51	35.32
					$p < 0.001$

Source: Coloproctology Clinic – UNITAU University Hospital.

possibly alter the results of manometry tests and other examinations. If the content present in the rectum of chronically constipated patients does interfere with anorectal manometry results, besides the need to establish a preparation standard, then there is a need to more carefully interpret some of the results obtained and, furthermore, understand how these functional disorders work.

Authors such as Raza and Bielefeldt and Rao and Singh perform digital rectal examinations prior to introducing the manometry catheter.[2] Klug et al.[27,28] and Cesar et al.,[11,19–22] on the other hand, do not believe that this dilation of the sphincter muscles could compromise the examination.

The sample of 38 patients studied herein had a moderate to severe degree of constipation, according to the scoring system recommended by Agachan.[12] The minimum score was 12 points, and the maximum was 24 points, with an average of 17.66, in a range from 0 to 30.

In our study, the symptoms of constipation had been present in 75% of the patients for more than 5 years, and in 34.2% (13 patients) they had been present for 10–20 years, with 23.7% having them for over 20 years. These figures corroborate the epidemiological concerns held by some Brazilian and international authors,[29,30] who stress on large size of the group affected by this disorder and the psychological, social, and economic problems it causes in our society as a whole.

The data on rectal sensitivity analyzed were the first sensation and the desire for constant evacuation. The results obtained for the lower sensitive volume in the rectum, on inflating the balloon, produced values compatible with those described in the literature for chronically constipated patients, i.e. greater than 30 mmHg.[5,24,31,32]

In everyday clinical practice, the most reliable way to measure rectal sensation is by manual distension with an air-filled balloon.[31] Thus, based on the results for maximum tolerable pressure in the rectal ampulla in anorectal manometry sensitivity tests found in the literature, the balloon was inflated with 200 ml of air to perform the manometry test with rectal content.[2,5,24,28] This is sufficient volume to shape the rectal ampulla, stimulating sensitivity and simulating the presence of content in the rectum, as occurs in chronic constipation, when carrying out the examination unprepared.[31]

Scott et al.[31] in 2011, when analyzing motor dysfunction and rectal sensitivity in chronically constipated patients, also demonstrated the highest capacity of the rectum in these patients, calling them megarectums (or compliant rectums).

These two factors – greater capacity of the rectal ampulla in the chronically constipated[31] and the maximum volume of 200 ml to feel the desire to evacuate – led us to this value for the performance of the anorectal manometry test with an inflated balloon.[5]

In our results, we found a statistically significant difference in the patients' functional anal canals in most of the pressures analyzed when we conducted the examination with and without content in the rectum.

To achieve a better analysis of the pressures, we then compared, centimeter by centimeter in the anorectal canal, the average for the 3 cm from the anal canal, and the averages for the functional anal canal for each patient.

Analyzing the average pressures for the 3 cm from the anal canal and the averages of the pressures for the functional anal canal at rest, absolute contraction, contraction, and sustained contraction from group 1 (with the rectal balloon deflated), we concluded that they are greater than the pressures and average pressures in group 2 (rectal balloon inflated), thus showing, when compared with each other, statistically significant differences.

Comparing centimeter by centimeter, there are some slight differences in these measurements but they do not interfere with the final result. The rates of fatigue in anal contraction and sustention capacity, however, showed no significant difference in any measurements.

Group one of our sample, with 38 examinations with the rectal balloon deflated, was at an average of 3 cm from the anal canal and the average resting pressures for the functional anal canal were 52.98 mmHg and 59.9 mmHg, respectively, compared with 40.17 mmHg and 48.9 mmHg in group 2, with the rectal balloon inflated. The same happened with the absolute pressure of contraction for the average of 3 cm from the anal canal and the average for the functional anal canal, which had values of 125.28 mmHg and 136.92 mmHg, respectively in the group with the balloon deflated, and 114.47 mmHg and 96.71 mmHg in group 2.

The fall in pressure in contraction, evacuation, and sustained contraction both in the average for the 3 cm range and the average for the functional anal canal was clear, showing the influence that the rectal content has on rest pressures.

The fatigue rates and sustention capacity values for the group with the rectal balloon deflated compared with the inflated balloon group showed no statistically significant interference for this content on pressures.

We have, therefore, demonstrated that some of the sphincter pressures measured in anorectal manometry tests in the chronically constipated vary depending on the presence or otherwise of rectal content. This is certainly important, given the widespread and large number of patients with this complaint in society and its social, economic, and psychological impacts.

The results found lead us to conclude that there is a decrease in the average resting pressures in the functional anal canal, in the average pressures for absolute contraction in the functional anal canal, in the average pressures for contraction of the functional anal canal, and in the average pressures for sustained contraction in the group with examinations carried out with a full rectal ampulla.

For the other values measured, such as the rate of fatigue in anal contraction and the sustention capacity, despite there being a tendency for the pressures to fall, the results were not statistically significant.

In conclusion, it is possible to identify an alteration in some measurements of anal pressure in constipated patients with intrarectal content. And the preparation is justified prior to the examination to avoid such interference.

Conflicts of interest

The authors declare no conflicts of interest.

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