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Investigating the findings of anorectal manometry among the patients suffering from functional constipation

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ABSTRACT

Background and goal: functional constipation is a quite common phenomenon in Iran with its frequency ranging from 28 to 32.9 percent. Anorectal manometry findings in functional constipation are different in various countries and races, thus the present research seeks to study the anorectal manometry among patients suffering from functional constipation.

Methodology: some 101 patients with functional constipation and difficult disposal introduced by Gastroenterologists from all around Iran to the manometry unit of Taleghani Hospital of Tehran underwent anorectal manometry using Medtronic 8ynetic medical version 2.0 device. While resting on the left heap, the squeezing rest pressure of the anal sphincter was measured in accordance to the principles of the stationary method. Anal rectum and sphincter pressures during the Straining operation were also measured. Furthermore, rectal sensation, compliance & Recto anal inhibitory reflex and Balloon Expulsion Test were also measured among all rectal patients. The Defecting index was also calculated in order to quantitatively study the disposal performance of the patients. The resulting data was finally analyzed using SPSS v.13 and analytical and descriptive statistics.

Results: as the results indicate, the squeezing pressure of anal sphincter among men is much more than what is observed among women ($p < 0.01$). During the Straining phase, the average rectum pressure among men was more than women, and the average lowest anal sphincter pressure was also greater among men. However, no significant difference was observed with regards to Deification index. Straining and Squeezing during the Balloon Expansion Test was long among 90% of the patients. A significant difference was observed between the different anorectal pressures of patients with Deification Index below 1 and those patients with Defection Index more than or equal to 1 (p<).

Conclusion: gender can influence the results of anorectal manometry. Furthermore, Deification index can also play a major role as a quantitative finding in describing the disaccord of pelvic floor during the disposal.

KEY WORDS: functional constipation, manometry, anorectal.

1. INTRODUCTION

The old definition of constipation is reduction of bowel movements frequency to less than the typical frequency of three times a week which is the normal level for 95% of the healthy people in North America and Britania (Sandler and Drossman, 1987). On the other hand, the majority of those suffering from constipation exhibit some symptoms such as long straining, hard stool, unsuccessful defecation, abdominal discomfort, a feeling of insufficient defecation, and spending a long time in toilets for defecations (Koch, 1997, Zandi, 2014, Zandi, 2013). Constipation is one of the commonest digestive complaints among the general public and constitutes a heavy economic load on the society. Its prevalence in the western societies ranges from 2 to 27% (Singh, 2007). In US, more than 2.5 million visits (85% of which end in laxative prescription), 92 thousand hospitalization and million dollars' worth of laxatives have been recorded as the result of constipation (Lembo and Camilleri, 2003). The highest rate of constipation is observed among the elderly and women. Nearly 60% of the elderly take laxatives regularly (Talley, 1996). In National Canadian Survey, 34% of people with constipation had resorted to doctor (Sandler and Drossman, 1987). Functional constipation is common in Iran, but its diagnosis can't just rely on the patient's complaints (Sandler and Drossman, 1987, Rasolabadi, 2015). Various studies have reported a frequency of 28 to 32.9% for it in Iran.

Anorectal manometry can play a major role in diagnosing a major portion of functional constipation cases. The study conducted by Liu, T.T. et al showed that patients suffering from constipation notably exhibit signs of rectum allergy and reduced anal sphincter contraction pressure. Anorectal manometry is really useful in diagnosing the anorectal performace disorder among patients suffering from chronic constipation (Agarwal and Sivalingam, 2016).

In another research conducted by Satishas, C. et al (1998), the results indicated a longer sphincter among men and higher anal sphincter pressure during squeezing. However, their anal sphincter rest pressure was equal to that which was observed among women. Generally, age has no influence on anorectal function (Rao, 1999).

Even among those patients suffering from low-passing constipation, checking the anorectal manometry and diagnosing combined disorders (pelvic floor disorders and bowel movement material passage disorder) before any surgery (such as colectomy and ileorectostomy) can cure some of these patients through retraining of pelvic floor muscles can help treat their problem without any need for surgery (Wiener, 2008). Considering the importance of these studies and findings and keeping in mind the fact that there is, unfortunately, no study conducted in Iran about this issue, the present research seeks to study the anorectal manometry results among the patients with functional constipation suffering from hard defecation resorting to the manometry center of digestion researches in Shahid Beheshti University of Medical Sciences located in Taleghani Hospital of Tehran in 2007 and the first half of 2008.

2. METHODS & MATERIALS

Methodology: In this research, some 101 patients suffering from functional constipation who had been checked by the internists or gastroenterologists around Iran and (after rejecting the organic causes of constipation and after Colonoscopy and Barium enema checking) had been introduced to the digestion research center of Shahid Beheshti Medical Sciences University located in Taleghani Hospital of Tehran in 2007 or early 2008 and possessed the diagnostic criteria of ROME III functional constipation were studied.

First, the patients were given the necessary trainings such as Squeezing and Straining by the relative technician who had put his finger in their anus (TR). Then, manometry checking was accomplished while the patients were lying on their left heap with their knees flexed. The present research utilized the manometry device Medtronic synetics Medical version 2.0 made in US. Zinetics Anorectal water per fused catheters with 4 Spiral channels and balloons made in the US was used as the counter to measure pressure in the various areas of the anorectal canal.

The lubricated catheter was placed inside the rectum. This catheter was equipped with pressure sensors with 4cm balloon made of latex on it. Probe was attached to the amplifier and the recorder. Five minutes after the catheter got inside the canal, the anal sphincter rest pressure was measured and recorded without any maneuver, while the sensors were placed in two lower and upper parts of the anal canal. Then the patients was asked to perform the Straining act while the 2 sensors were placed in the rectum and 2 more were inside the anal canal. The patient was requested to conduct this act in 2 separate maneuvers.

The highest pressure inside the rectum within these 2 maneuvers was recorded as the Maximum rectal straining pressure, while the lowest anal sphincter pressure was recorded as the Minimal anal sphincter straining pressure. Defecation index was also used in the manometry study in order to quantitatively study the defecation functioning of the patients. The following formula was used to calculate it:

$$\text{Deification index} = \frac{\text{Maximum Straining rectal pressure (mmHg)}}{\text{Minimum Straining sphincter pressure (mmHg)}}$$

After conducting these tests, all the patients would undergo BET and after this test was over, the balloon located on the tip of the probe was filled with 30, 40, 50, 60, 80, 110, 140, 170, 200, 250, 300, 350, 400 cc of air using a manual syringe and the volume required for First rectal sensation and Tolerable volume was maximized. In this RAIR test following an anal sphincter pressure reduction (inner sphincter) after the dilation of the rectum canal and the constancy of this pressure drop which will be recorded as present and in the absence of Absent sphincter pressure and in the case of sphincter pressure drop, this pressure drop was not constant. It was, in fact variable and instantaneous and we can consider it an unmeasured able.

In this test, the patients was said to lie on his heap the 4 cm latex balloon Synetics media made in USA was filled with 50 cc of air inside the rectum of the patient. The patient was then requested to assume the defecation position on a tub and push the balloon out. While conducting this test, the personnel and the doctor got out of the room in order to give the patient more privacy and reduce the intervening factor. If the patient was capable of completing the test in less than 3 minutes (push the balloon out in the tub), the test would be considered normal and if he failed to do that, the results would be considered prolong.

3. RESULTS

Of 101 patients afflicted with functional constipation with hard defecation and with Rome III criteria who had no organic problems or other exclusion criteria who underwent anorectal manometry study and took Balboon expulsion test, 75 were female (74.3%) and 26 were male (25.7%). The average age of the participants was 40.3 ± 14.6 years, while the average age of the male and female participants was 40.7 ± 17 and 40.17 ± 13.8 respectively. The minimum age was 15, while the maximum age was 77 years old.

No significant difference was observed in the anal sphincter squeezing pressure among men and women ($P<0.01$) and men had higher pressures. The average rectum pressure during the straining among men was more than women ($P<0.01$) and the average least anal sphincter pressure among men was higher ($P<0.05$) but no difference was observed in terms of Deification index (table 1). 45.56% of the patients had a defecation index below 1. A

significant difference was observed between patients with a deification index below 1 and those patients with a defecation index more than or equal to 1 in terms of various anorectal pressures in the resting position which was statistically significant (table 2). Squeezing, Straining (P<0.05). Meanwhile, Balloon Expulsion test was prolong among 90% of the patients (table 3).

Table.1.Manometric change in rest, squeeze, strain

	All	Male	Female
MRAP(mmgh)	44.70±22.50	43.46±23.82	41.82±21.32
MSAP(mmgh)	77.06±37.80	91.9±43.3	73.2±34.7
MSRP(mmgh)	55.84±24.42	70.1±26.2	50.8±21.8
MISAP(mmgh)	52.73±25.41	64.4±25.6	48.6±24.2
DI	1.2±0.69	1.20±0.58	1.20±0.73

Table.2. Age effect in anorectal manometer finding

	All		Male		Female	
	≤ 50	>50	≤ 50	>50	≤ 50	>50
MRAP(mmgh)	246.9 ±23.9	36.9 ± 14.1	55.9 ±25.7	43 ±15.9	43.9 ± 22.6	34.1 ± 13.1
MSAP(mmgh)	79.9 ± 38.5	71.2 ±35.1	93.7± 47.3	86 ±28.7	75.3 ± 34.2	65.6 ± 36.6
MSRP(mmgh)	57.3 ± 23.4	50.6 ± 27.8	70.9 ± 23.5	67.6 ± 36.4	52.6 ±21.6	44.2 ± 22.1
MISRP(mmgh)	53.1 ± 36.2	51.5± 20.7	63.7 ± 27.9	66.5 ±17.5	49.5 ± 24.8	45.8 ± 22.2
DI	1.24 ± 0.66	1.12± 0.77	1.22 ± 0.55	1.25 ± 0.73	1.25 ± 0.71	1.1 ± 0.80

p=0.01

Table.3. BET in patient

Bet	All	Male
Normal	11(10.9%)	-
Prolong	90(89.1%)	26(100%)

DISCUSSION

The present study measured the maximum resting and squeezing anal sphincter pressure in accordance with the Stationary method. The average MRAP pressure among all patients was 44.70 ± 22.50 mmHg which was a little bit less than the value reported in the study of Lembo (October 2003, conducted on patients with difficult defecation) and the study of pelvic floor in patients with obstructive defecation in Athens (March 2000) (Lembo and Camilleri, 2003). This difference might be due to the technique and the type of manometry used in those researches as Statinarypull through and rapid pull through were utilized which wrongly show higher levels of anal sphincter resting and squeezing pressures. These variations might also be due to personal and ethnic differences.

The average pressure in studying MSAP was 78.06 ± 37.8 mmHg which was also less than the results of the previous studies in other countries. The same reasons cited for MRAP can also be true about MSAP as well. It can also indicate less pressure in people with constipation than the normal people studied in Aiwa, America (Rao, 1999).

As for studying the anorectal pressures while straining maneuver, the average MSRP pressure was 55.84 ± 24.42 mmHg and the average MISAP pressure was 52.73 ± 25.41 mmHg (table 1). The study conducted by Sathis reported less MSRP, but the average MISAP pressure in our research was much greater which could be due to anismus or, in other words, the paradoxical movement of anal sphincter muscles during defecation which is one of the most important causes of constipation due to lack of harmony between pelvic floor muscles (Rao, 2005). It seems to be an acquired behavioral disorder in defecation and biofeedback therapy can be a good treatment for this group of patients (Mertz, 2003, Ghobadi, 2013).

The other parameter studied in this research was Defication index (the ration between the highest rectum pressure while Straining to the least anal sphincter pressure while Straining which is a quantitative measure to study the coordination between pelvic floor muscles during the defecation following rectum pressure rise) (Singh, 2007). The average DI in this research is 1.2 ± 0.69 which was less than the results reported in the study of normal people in American Journal of Gastroenl (1999) (Rao, 1999). This can be an important parameter indicating the existence of anismus among those suffering from functional constipation with hard defecation.

As lower DI increases the chance of pelvic floor disorders and anismus, we divided the patients into 2 groups in our research. The first group included patients with a DI below 1. In other words, the 46 patients (45.54%) in this group are not capable to reduce the rectum pressure while straining to the level less than rectum pressure. In the second group, there were patients with a DI more than or equal to 1 who are able to reduce anal sphincter pressure to a level less than or equal to rectum pressure. The results of our research indicate that nearly half of our patients had low DI's and the possibility of anismus and dis-synergy of pelvic floor muscles among them is high. However, the intervening factors such as test environment, unreal defecation and the presence of technician and doctor during the process (which is quite necessary in order to record the results and conduct the test) can bias the results of this

parameter and yield a false low DI (we tried to reduce the influence of such factors through correctly training the patients and providing them with explanations about the value of each test).

In studying the sensing threshold of rectum conducted by filling the balloon with various volumes of water, the following two parameters were studied: First sensation volume and maximum tolerable volume (the maximum volume of balloon in the rectum canal where the other individual is not capable of retracting the external anal sphincter).

The average volume of First sensation volume among those patients studied was 37.72 ± 15.8 cc which exhibited no difference compared to the studies conducted on normal people. This indicates that this factor in patients with functional constipation does not show much change compared to the normal state. In studying the maximum tolerable volume, the average volume was 267.42 ± 90 cc which did not indicate much difference compared to the normal people in previous studies.

In studying the Rectoanal inhibitory reflex where the internal anal sphincter has a relaxing response to rectal distension and its disorder might be caused by rectal distension due to long staying of stool inside the patients, we divided the patients into 3 groups. The first group consists of those patients whose internal sphincters completely and constantly relaxed and they were called Present. As of the second group, the reflex would take place but it was momentary and never stable and they are called Unmeasureable. The last group included those with no responses at all.

In our research, 67.3% of the patients were present, 26.6% were Unmeasureable and 5.9% were absent. As a large minority of the patients had no suitable reflex and even 5.9% had no reflex at all, it might be indicative of the fact that long term constipation in these patients will turn into a vicious circle and result in more retention of stool and deterioration of constipation among these people.

Investigating the anorectal manometry results in both groups of men and women in order to determine the effect of gender on the force of pelvic floor muscles and its changes while Squeezing and Straining showed no significant difference in the average MRAP pressure among men and women. No difference was observed between the results of this research and other researchers conducted on normal people.

The average MSAP pressure among men and women was 91.9 ± 43.3 mmHg and 73.2 ± 34.7 mmHg which indicated no statistically significant difference ($P<0.05$). This indicates higher anal sphincter squeeze pressure among men than women. The studies conducted by Satis and other researches (McHugh and Diamant, 1987, Leoning-Baucke and Anuras, 1985, Whitehead and Schuster, 1987) have also pointed to this difference. The cause of lower anal sphincter pressure during Squeeze can be due to occult Sphincter defect during a vaginal child delivery as most of the female patients in our study were multiparous (Sultan, 1993).

Significant differences were observed between men and women in terms of anorectal pressures during straining maneuver. The average MSRP pressure for men and women was 70.1 ± 26.2 and 50.8 ± 21.8 mmHg respectively and this difference is not statistically significant ($P<0.05$). In other studies conducted on normal people, this difference was not significant (McHugh and Diamant, 1987, Leoning-Baucke and Anuras, 1985, Whitehead and Schuster, 1987).

Average MISAP pressure also indicated a significant difference between men and women indicating higher anal sphincter pressure among men during Straining compared to women ($P<0.05$). No significant difference was observed in studying this pressure among the normal people.

DI was also relatively equal between the two groups. But this parameter was different among normal people in previous studies and this index was higher among normal men, although this difference was not significant.

To study the effect of age on manometry results, the patients were divided into 2 groups. The first group had average MRAP pressure which was statistically significant (PV = 0.01). This pressure was lower among men aging 50 years or older. This can be due to their old age and its influence on the internal sphincter which plays a more prominent role in the resting pressure.

BET (Balloon Expulsion Test) was long among 90 of the whole 101 patients which can be considered as the positive value of this test. Of course, causes such as lack of equipments to place the patient in the appropriate defecation position, test environment and inappropriate simulation of stool by the latex balloon to dilate the rectum canal to arouse a sense of defecation in the patient can be described as factors which resulted in high false positive.
As the above-said results indicate, we may conclude that anorectal manometry can be an effective method to measure the functional constipation with hard defecation (in case of correct selection of the patients). Although absence of a control group reduces the value of data, this research illustrated that Defication index can be used as a suitable criterion in studying such patients. The present research showed that there are differences between men and women in terms of gender in many anorectal manometry parameters which need to be taken into consideration in interpreting the results.

4. CONCLUSION

We hope the results of this research to aid the beginning of vast researches in the field of anorectal and pelvic floor area problems in our country as correct diagnosis of these disorders and using biofeedback training can prevent recurring and, sometimes, unnecessary operations.

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