

## Comparing the Effects of Biofeedback and Posterior Tibial Nerve Stimulation (PTNS) on Dyssynergic Defecation Signs and Symptoms

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### Abstract

**Background:** According to past studies it was proved that the treatment of dyssynergic defecation was by doing treatment exercises to defecate properly with biofeedback, but recent studies have proved that using tibial nerve stimulation plays an important role in treatment and recovery of pelvic floor dysfunctions therefore this study took a look at the comparison of exercise therapy with biofeedback and posterior tibial nerve stimulation in patient's treatment.

**Materials and Methods:** This study was a randomized clinical trial of 42 patients who complained of hard stool, 30 patient were chosen based on RomeIII criteria and they were put into separate groups of biofeedback and PTNS. And then some factors including, volume and time of balloon expulsion, patients complaints and RomeIII criteria before and after intervention were Investigated and compared.

**Finding:** In both groups symptoms of dyssynergic defecation have decreased compared to before treatment but in quantitative criteria a difference was observed in fever of biofeedback. In quantitative criteria time and volume of balloon expulsion were in favor of biofeedback group ( $p < 0/05$ ). In qualitative criteria including, hard stool, painful defecation, excessive strain and feeling of incomplete defecation significant changes were observed in both groups ( $p < 0/05$  in following criteria such as, bleeding, number of defecation per week and manual maneuver there were so significant differences in groups ( $p > 0/05$ ). In relation to quantitative criteria, obstructive defecation changes were significant in favor of PTNS group

**Conclusion:** Using PTNS in dyssynergic defecation is effective.

**Keywords:** Biofeedback; Posterior Tibial Nerve Stimulation; Constipation; Dyssynergic Defecation; Anorectal Dyssynergia; Anorectal

### Introduction

Dyssynergic defecation is one of the functional disorders of the digestive system, its symptoms appears when anorectal region shows physiological dysfunctions which causes anorectal dyssynergia or dyssynergia between pelvic floor muscles which leads to constipation [1] in obstructive constipation the patients report that although he/she doesn't have adequate intake of water and fiber and his/her stool isn't dry, when he/she attempted to defecate, stool doesn't come out no matter how much the patient tried as if

the stool channel is blocked [1-4]. This constipation existed individually in 7 percent of patients in each society while 28 percent of patients with constipation individually or with other etiologies, suffer from anorectal dyssynergia [5,6]. Anorectal dyssynergia is diagnosed by having difficulties in relaxing anus muscles during attempt to defecate or abstraction in stool channel while the pressure inside the abdomen increases and sensation of defecation is stimulated [7-10]. Prestone, Lennard Jones were the first people who defined this disorder. They expressed that anorectal dyssynergia is a kind of functional disorder in defecation in which anal mus-

cle become contracted instead of becoming relaxed as a result they block stool channel [10]. Also at the end they concluded by taking this issue into consideration that anorectal dyssynergia is a disorder in the individual movement behavior during defecation [11]. According to the research, researchers today have realized that the treatment of this disorder is to practice proper defecation way along with biofeedback [11-17] albeit it was highly recommended to the patients to do these exercises at home so their defecation way could improve get treated [11-17].

In anorectal dyssynergia treatment by biofeedback the patient got an auditory or visual response or both from anal muscles while doing exercise which according to that response the patient tried to relax that region's muscles so that he/she can exercise better [5,11,13-20] recent studies has shown that using sensory stimulation of TENS plays a fundamental role in pelvic floor dysfunctions treatments [31,32]. So, in this research the effect of correct defecation way by biofeedback and PTNS were compared with each other.

## Materials and Methods

This research was a clinical trial which among 42 patients who referred to physiotherapy department at Firozgar hospital in Tehran during 2017 and 2018, 30 patients were chosen according to the criteria of the research. In order to choose patients correctly, at the very beginning each patient was visited by two gastroenterological and physical medicine experts according to ethical guideline. ROMEIII criteria includes: 1) excessive straining in 25 percent of cases. 2) the feeling of incomplete defecation in 25 percent of cases. 3) The Feeling of blocked stool in 25 percent of cases. 4) Using manual maneuver. 5) Hard stool, patient had to experience at least two of the mentioned items during the last 3 months [1-4,29-33] in order to scrutinize and diagnose patients who suffered from colon syndrome, some radiography and manometry tests were done [1-4,23-29] at the end patients with slow transit colon syndrome, neurological disorders, trauma and those who had a surgery in pelvic floor region were eliminated from the study and 30 chosen patients entered the study consciously after signing informed consent. At first some presentations and pictures about the correct defecation way were shown to the patients and then they were randomly put in two biofeedback and PTNS groups. For each group intervention were done for 8 weeks. Intervention were 3 sessions in a week and each session took about 30 minutes [5-10,17-20,30].

Biofeedback group in this group an anal probe was used to record and transfer the measurement of anal muscles activities also in order to do this procedure EMG biofeedback device MyoTrac infinity a product of thought technology made in Canada was used.

The anal electrode was first disinfected by deconex and then lubricant was rubbed on it and then it was placed in anal chan-

nel while the patient was lying on his/her side. The electrode was placed on anatomic region of internal and external sphincter. Then while the patient was looking at the biofeedback device and isoelectric line he/she could see how it changed by voluntary contractions of anal muscles in a way that he/she was relaxing his/her pelvic floor muscles and contracts abdominal muscles He/she did abdominal breathing and kept his breath for 30 seconds. Changes in monitor's isometric line were taken place and an auditory and visual feedback was provided to the patient. This was how the patients were instructed, first the patient was asked to make the isometric line on the monitor close to a straight line while he/she relaxed his/her pelvic floor muscles. By relaxing pelvic floor muscles the music sound of the device was kept and in case the patient did it wrongly the music stopped. In the next step the patient was asked to defecate in a way that isometric line on the monitor would go up in potential. Looking at the monitor and determining the best time to relax happened during defecation and helped the patient to control anorectal angle to ease stool evacuation. Actually the effect of muscle activity and model of electrical activity were available on the monitor for patient to look at while they rested during the exercise to defecate properly. The patients kept looking at the isometric line on the monitor if during the patient's attempt the isometric didn't have an increase the patients could understand that she/he was doing the exercise correctly so the patient was encouraged to relax anal muscles and defecate without increase in sphincter activity. As the patients improved, device sensitivity increased and that was how controlling and exercising would become difficult for the patient also the patients were recommended to do exercises of proper evacuation at home in both lying and sitting position.

PTNS group the treatment process was as following, in order to stimulate tibial nerve, a stimulator channel with two rubber electrodes was used. One of the electrodes was attached to posterior of medial malleolus and the other 5cm upper on the skin by linen straps. And then the channel was connected to the stimulator device (model 620P) made by Novin Company in Iran, after that, high tense was chosen and intensity was adjusted according to the patient's sense by the therapist. The intensity kept increasing until the patient completely felt the current but at the same time the patient didn't have an intense or bad feeling. Treatment Took about 20 minutes. Pulse wide was about 60  $\mu$ s and the current frequency was 100 Hz.

## Measurement

In both groups mentioned criteria in ROMEIII before and after intervention were measured. In both groups after training the correct anal muscles functioning during evacuation, time and the volume of balloon expulsion were measured and when the treatment was over the time and expulsion of evacuation were recorded

again also a questioner including personal information and patient history, estimating different parameters mentioned in evacuation, rectum function and details of patients history before and after treatment was filled out.

Statistics analysis patients information after being confirmed were analyzed in SPSS version 21 and T-student, paired-T test was used in order to analyze quantitative values and Wilcoxon test was used to analyze qualitative values.

**Finding**

Generally the study included 30 patients who were divided in biofeedback group including 15 people (8 women, 7 men) and PTNS group including 15 (10 women, 5 men) the age average of participants was 45/5 ± 13 which in biofeedback group it was 41/5 ± 11 years and in PTNS group it was 49/46 ± 13 years and the average of balloon expulsion volume before treatment was 35/66 ± 6/78 milliliter and after treatment 36/3 ± 8 and the average of balloon expulsion time before treatment 48 ± 0/64 and after treat-

ment 4/5 ± 0/09 minutes. Patients chief complaint included :hard stool, bleeding, pain, irritation while defecation in which 100 percent of patients suffered from hard stool, 30% suffer from bleeding and 83/33 percent of patients suffered from pain before treatment. In both groups in hard stool, pain and irritation changes were in favor of improvement (p < 0/05). But in bleeding changes didn't tend to be improved (p < 0/05) the percentage of ROMEIII frequency of criteria in both groups and in all patients are shown in table 1. In both criteria using hands and numbers of defecation per week in both groups didn't have meaningful changes (p > 0/05) but in straining and sensation criteria on incomplete evacuation both groups had meaningful improvement. (p < 0/05). It is worth mentioning that in criteria of blocked bowel movement while evacuating in biofeedback group changes weren't meaningful (p < 0/05). Changes were also observed for quantitative parameters, in which the average difference of balloon expulsion volume after treatment between two groups were statically meaningful. Also, the average difference of evacuation time after treatment were meaningful between 2 groups. (p < 0/05) the mentioned items are provided in table 2.

	Biofeedback		PTNS Group		Total	
Symptom	Before	After	Before	After	Before	After
Need to strain	93/33	53/33	73/33	26/66	83/33	40
Less than 3 defecation per week	13/4	-	26/66	6/66	20	3/33
Incomplete evacuation	60	33/33	80	33/33	70	20
Blocked bowel	53/33	26/66	80	40	66/66	23/33
Manual maneuver	46/66	26/66	66/66	13/33	56/66	13/33

**Table 1:** ROMEIII in patient before and after intervention.

Groups	Numbers	The volume of balloon expulsion after treatment (Milliliter )	Balloon expulsion tome after treatment (Minutes)
Biofeedback group	15	32/3 ± 8	4 ± 0/7
PTNS group	15	40/3 ± 6	4/7 ± 0/4
p-value	-	P = 0.007	P = 0.002

**Table 2:** Average and standard deviation of time and balloon volume of each group.

**Discussions**

The result extracted from this research shows a decrease in symptoms and an increase in patient's satisfaction in both groups but about time and volume of balloon expulsion, significant difference was observed for biofeedback group.

While in some qualitative criteria no significant changes were observed between two groups. It seems that the reason of signifi-

cant changes in PTNS group were effects of TENS current because tense current can relax and improve the function of pelvic floor muscles by H reflex in addition to analgesic effects. Also, in PTNS group because the patient had a feeling of being under a treatment the effect of placebo was also considerable [25,27,28]. Because when patient were asked about how they feel about the treatment, their response showed that they had a feeling of being cured while in biofeedback group this feeling was rare.

Leonard Jones and colleagues (1995, 2002), Heyman (1995, 2002) and colleagues (1999) Jao Koo Shin and colleagues (2001), Jun Wang and colleagues (2003), Chiarioni and colleagues (2005, 2006), Rao and colleagues (2007, 2010), Nabil Glahak (2010), Stacey L. Hart and colleagues (2011) and Miguel A. Simon and colleagues (2011) they all reached the same results that curing dyssynergic defecation by biofeedback is more effective than traditional treatments (high fiber diet) and actually exercise of the correct defecation by biofeedback is the main treatment of dyssynergic defecation [16-20]. Pourmomeny and colleagues (2009) made a comparison between biofeedback and balloon expulsion in which the biofeedback group showed a better result [5] in our study also the quantitative variable was more significant in biofeedback but in qualitative criteria the PTNS group had significant changes that showed improvement. In all done studies the patients in biofeedback group defecated properly by biofeedback but they weren't exposed to any stimulation and their attention was just on exercise therapy and trying to set a better record. This issue itself motivated biofeedback patient to continue their treatment

## Conclusion

Treating dyssynergic defecation by PTNS has effective therapeutic effects but it arises the question that does it have placebo effects or not.

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