

Effect of Biofeedback Combined with Psychological Intervention in the Treatment of Functional Constipation

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Functional constipation is a common intestinal functional disease in clinic, although there is no related organic disease, if long term accompanied by functional constipation patients, it can cause anal intestinal diseases (hemorrhoids, anal fissure, anal distension, rectal cancer, etc.). The purpose of this study is to explore the treatment of middle aged functional constipation patients with biofeedback therapy combined with psychological intervention through the combination of theory and clinic, to find an effective, simple and low recurrence rate treatment. According to the inclusion criteria and exclusion criteria, 150 adult patients with functional constipation diagnosed in the anorectal surgery clinic of our hospital from March 2017 to October 2018 were randomly divided into two groups: treatment group (n=75) and control group (n=75). There is no difference in general data, defecation symptoms, clinical symptoms and psychological problems between the two groups. The patients in the two groups were treated for 3 w respectively. After 3 w of treatment, the observation indexes of the two groups before and after treatment were statistically analyzed and the recurrence of functional constipation was statistically analyzed after drug withdrawal. Comparison of clinical efficacy: among the 75 patients, 30 cases were cured, 24 cases were markedly effective, 14 cases were cured, 7 cases were ineffective and the total effective rate was 90.67 %. Among the 75 patients in the control group, 23 cases were cured, 24 cases were markedly effective, 8 cases were effective, 20 cases were ineffective and the total effective rate was 73.3 %. The chi square test showed that the difference between the two data was statistically significant ($p < 0.05$). Biofeedback combined with psychological intervention is effective in the treatment of functional constipation in terms of defecation symptoms, clinical symptoms and psychological problems.

Key words: Functional constipation, biofeedback therapy, psychological intervention, anal intestinal diseases

Functional constipation (FC) is a medical term used to describe different gastrointestinal symptoms, such as low stool frequency, dry stool and abdominal discomfort^[1]. No intestinal lesions were found by related examination. In long term patients with FC, can cause anal intestinal diseases (hemorrhoids, anal fissure, anal distension, rectal cancer, etc.), but also complicated with cardiovascular and cerebrovascular diseases^[2]. Related studies have found that with changes in human lifestyle, life stress, bad eating habits, social aging and other changes, the incidence of FC patients has a gradual upward trend^[3]. Related studies have shown that the incidence of constipation in the elderly and children in China is 18.1 % and 18.8 % respectively, while the incidence of FC in urban patients is about 6.7 %, which is significantly lower than that in rural areas^[4]. The incidence of the elderly is significantly higher than that of the young and the incidence of FC is 26 %, 34 % in the elderly over 65^[5]. FC patients have a great influence on normal work and life and are important risk factors for

cardiovascular and cerebrovascular diseases, colorectal cancer and *so on*. The increase in the prevalence of FC not only affects the quality of life, but also increases the medical burden in China^[6,7]. Many studies have found that patients with chronic constipation are more likely to have mental and psychological problems such as anxiety and depression^[8]. Drossman put forward the definition of functional gastrointestinal disorders (FGIDs). The occurrence of related intestinal diseases is affected by family genetic factors and psychological factors. Psychological factors cause related intestinal diseases through intestinal nervous system (enteric nervous system (ENS)) and central nervous system (CNS)^[9]. Related studies have shown that psychological intervention can solve the psychological problems of FC patients, improve their mood and then change the abnormal movement of colorectal and anal canal, so that constipation can be improved or cured. FC is a common disease of all ages. There are some similarities between children and adults, but there are important differences

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in epidemiology, symptomatology, pathophysiology, diagnostic examination and treatment management. In this article, we provide the related treatment of FC in adults, study the efficacy of biofeedback combined with psychological intervention in the treatment of middle aged and elderly patients with FC and lactulose oral liquid and observe the clinical index, defecation index, essence, mind and recurrence of the patients and explore the efficacy of biofeedback combined with psychological intervention in the treatment of FC and provide theoretical basis for its clinical application.

MATERIALS AND METHODS

Clinical data

Source of cases:

From March 2017 to October 2018, adult patients with

FC were diagnosed in the outpatient clinic of anorectal surgery in our hospital.

General information:

One hundred and fifty patients with FC were randomly divided into two groups: treatment group (biofeedback combined with psychological intervention) and control group (lactulose oral liquid). In the treatment group, there were 39 males and 36 females, aged 42-75 ((58.60±9.89) y), the course of disease was 1-15 y ((6.53±3.65) y) and the control group was 34 males and 41 females, aged 43-76 ((57.71±9.41)). The course of disease was 1-15 y ((5.26±2.48) y). There was no significant difference in sex (Table 1), age (Table 2) and course of disease (Table 3) between the two groups ($p>0.05$).

TABLE 1: GENDER COMPARISON BETWEEN THE TWO GROUPS

| Groups | Number of cases | Gender | |
|-----------------|-----------------|--------|--------|
| | | Male | Female |
| Treatment group | 75 | 39 | 36 |
| Control group | 75 | 32 | 41 |

Note: By χ^2 test, $\chi^2=0.292$ ($p>0.05$). There was no significant difference in sex between the two groups

TABLE 2: COMPARISON OF AGE BETWEEN THE TWO GROUPS

| Groups | Number of cases | Age |
|-----------------|-----------------|------------|
| Treatment group | 75 | 58.60±9.89 |
| Control group | 75 | 57.71±9.41 |
| p | - | 0.875 |

Note: $p=0.875$, there is no difference in age between the two groups

TABLE 3: COMPARISON OF THE COURSE OF DISEASE BETWEEN THE TWO GROUPS

| Groups | Number of cases | Course of disease |
|-----------------|-----------------|-------------------|
| Treatment group | 75 | 6.53±3.65 |
| Control group | 75 | 5.26±2.48 |
| p | - | 0.736 |

Note: $p=0.736$, there is no difference in course of disease between the two groups

Exclusion criteria for cases

Those who do not meet the above inclusion criteria; patients with constipation caused by taking anesthetic drugs; intestinal diseases caused by benign or malignant intestinal diseases; those who cannot receive psychotherapy for personal reasons; patients with severe underlying organ diseases (hypertension, diabetes, coronary heart disease, lung disease); those who are taking anxiety, depression, anti-choline and other drugs that affect the indexes observed in this study; those with severe scar at the lower end of the rectum around the anus; patients with poor dependence, patients who do not follow the doctor's orders can not cooperate with the follow up; patients with serious adverse reactions.

Treatment methods

Treatment group: biofeedback combined with psychological intervention

Electronic biofeedback therapy: electronic biofeedback instrument Medtronic Synectics instrument of the United States is used. Anal finger examination was performed before treatment to understand the contraction and relaxation of the external anal sphincter during defecation and to explain the anorectal anatomy, the normal defecation physiology of popular science and the method, process and purpose of this treatment. Guide patients to defecate and master the essentials of increasing intra-abdominal pressure, contracting and

relaxing the anus. Each training lasted 20 min, once a day for 3 w. During and after biofeedback therapy, patients were asked to consolidate the learned movements at home and strengthen the practice, 3 times a d, and each time for 20 min.

Psychological intervention: Understand the patient's condition and psychological feelings, collect basic data in detail, analyze the causes and psychological feelings of constipation, explain the relevant knowledge of FC to patients and their families and help patients find their mental and psychological bad ideas. Help patients correct, at the same time, give the correct way of defecation to the patient. Communicate with patients on time, family members cooperate and support each other, help and guide the difficulties faced by patients, increase the dependence of patients and achieve the purpose of treatment. Psychological intervention 3 times a w for 30 min each time for 3 w.

Control group:

The patients were treated with lactulose oral liquid, one bag at a time, twice a day, before meals for 3 w.

Research methods

According to the case of inclusion criteria, 150 middle aged patients with FC were randomly divided into two groups: control group (n=75) and treatment group (n=75).

There was no significant difference in sex, age, course of disease, defecation index, clinical symptoms and mental psychology between the two groups ($p>0.05$). The treatment group was treated with biofeedback combined with psychological intervention for 3 w and the control group was treated with lactulose oral liquid for 3 w. After treatment, the clinical cured number, effective number, ineffective number, defecation index score, clinical symptom score and psychotherapy score of the two groups were counted. After 2 w of drug withdrawal, the recurrence of 2 was recorded in the follow up. Use relevant software to process and analyze the data.

Statistical methods

The SPSS 25.0 software was used to score the data obtained in this experiment. All the metrological data were shown by ($\bar{x}\pm s$), the numerical data were analyzed by χ^2 test and the metrological data were analyzed by t test, the difference was statistically significant ($p<0.05$) and there was dominant difference ($p<0.01$).

RESULTS AND DISCUSSION

After 3 w of treatment, the defecation indexes of the two groups were analyzed by χ^2 test and the results showed that the difference between the two groups was statistically significant, indicating that the total effective rate of the treatment group was better than that of the control group (Table 4).

TABLE 4: COMPARISON OF CLINICAL EFFICACY BETWEEN THE TWO GROUPS AFTER TREATMENT (EXAMPLE, %)

| Groups | Number of cases | Cure | Significant effect | Effective | Invalid | Total efficiency |
|-----------------|-----------------|------|--------------------|-----------|---------|------------------|
| Treatment group | 75 | 30 | 24 | 14 | 7 | 90.67 % |
| Control group | 75 | 23 | 24 | 8 | 20 | 73.3 % |
| p | - | - | - | - | - | 0.025 |

Comparison within the group: after 3 w of treatment, the improvement of defecation frequency in the two groups was compared with that before treatment in the treatment group. After t test, the results showed that the treatment group was $0.003<0.01$ and the control group was $0.002<0.01$. After treatment, there was a significant difference between the two groups before treatment, indicating that both groups could significantly improve the defecation frequency of patients with FC. The improvement of fecal properties in the two groups was observed. Compared with that before treatment, t test showed that the treatment group was 9.324 and the control group was 7.367, $0.000<0.01$ and $0.000<0.01$, respectively. The results showed that the stool quality of

the treatment group was lower than that of the control group ($p<0.01$). There was a significant difference between the two groups after treatment, indicating that both groups could significantly improve the condition of dry stool in patients with FC. The improvement of defecation smoothness in the two groups was observed. Compared with that before treatment, the t test showed that the treatment group was 10.865 and $0.000<0.01$ respectively, while the control group was 3.238 and $0.069>0.05$. There was no difference, indicating that the treatment group could significantly improve the defecation effort of FC patients, while the treatment group had little significance in improving the defecation effort of FC patients. The improvement of inexhaustible

sensation after defecation was observed in the two groups. Compared with that before treatment in the treatment group, t test showed that the treatment group had a t test of 9.234 and a control group of $0.000 < 0.01$ and a control group of 7.153 and $0.000 < 0.01$ respectively. There were significant differences between the two groups after treatment compared with those before treatment, indicating that both groups could significantly improve the situation of FC patients with unexhausted defecation after conscious defecation (Table 5).

Comparison between groups: after 3 w of treatment, the treatment group improved the defecation frequency of patients with FC, compared with the control group. The t test of independent samples showed that the difference was not statistically significant ($t=1.455$, $p>0.05$). The results showed that there was no significant difference in improving defecation frequency between the two groups. In terms of improving the fecal properties of patients with FC, compared with the control group, the independent sample t test showed that the treatment

TABLE 5: COMPARISON OF DEFECTION INDEX SCORES BETWEEN THE TWO GROUPS BEFORE AND AFTER TREATMENT (POINTS, $x \pm s$)

| Groups | Number of cases | Defecation frequency | | Defecation nature | | Defecate smoothly | | Enough after defecating | |
|-----------------|-----------------|----------------------|-----------------|-------------------|-----------------|-------------------|-----------------|-------------------------|-----------------|
| | | Before treatment | After treatment | Before treatment | After treatment | Before treatment | After treatment | Before treatment | After treatment |
| Treatment group | 75 | 2.35±0.44 | 0.94±0.30 | 2.77±0.30 | 0.71±0.52 | 2.81±0.24 | 0.96±0.52 | 2.32±4.43 | 0.94±0.30 |
| Control group | 75 | 1.83±0.49 | 0.86±0.44 | 2.49±0.53 | 1.83±0.31 | 2.40±0.68 | 1.83±0.31 | 2.33±4.77 | 1.36±0.24 |

group had no statistical significance in improving the fecal properties of the patients with FC (t test, $t=1.634$, $p>0.05$, $p>0.05$).

Righteousness; The results showed that there was no significant difference in improving the properties of feces between the two groups. In terms of improving the defecation smoothness of the patients with FC, compared with the control group, the independent sample t test showed that the treatment was 1.657 and $0.004 < 0.05$. The difference was statistically significant. The results showed that there was a significant difference in the improvement of defecation smoothness between the two groups. There was no statistical significance in improving dry stool knot in FC patients, defecation frequency in FC patients and defecation effort in FC patients ($p>0.05$).

Intra group comparison: After treatment, the improvement of abdominal distension and abdominal

pain in the two groups was compared with that in this group before and after treatment. After independent t test, the treatment group was 4.324 and $0.000 < 0.01$ respectively, while that in the control group was 3.356 and $0.000 < 0.01$ respectively. After treatment, there was a significant difference between the two groups before treatment, indicating that both groups could significantly improve the abdominal distension and abdominal pain in patients with FC. It was observed that the frequency of nocturnal urination in the two groups was better than that in the control group. Compared with that before treatment, there was a significant difference between the two groups by t test, which showed that the treatment group could significantly improve the frequency of nocturnal urination in patients with FC, while that in the control group was 1.456 and $0.067 > 0.05$, respectively and there was no significant difference between the control group and the control group (Table 6).

TABLE 6: COMPARISON OF TRADITIONAL CHINESE MEDICINE (TCM) CLINICAL SYMPTOM SCORES BETWEEN THE TWO GROUPS BEFORE AND AFTER TREATMENT (POINTS, $x \pm s$)

| Groups | Number of cases | Abdominal distension and abdominal pain | | Frequency of nocturnal urination | |
|-----------------|-----------------|---|-----------------|----------------------------------|-----------------|
| | | Before treatment | After treatment | Before treatment | After treatment |
| Treatment group | 75 | 1.45±0.54 | 0.67±0.37 | 1.31±0.45 | 0.34±0.32 |
| Control group | 75 | 1.34±0.43 | 0.96±0.72 | 1.01±0.68 | 0.42±0.27 |

Comparison between groups: After 3 w of treatment, the treatment group shows improvement of abdominal distension and abdominal pain in patients with FC, compared with the control group, t test treatment and the difference was statistically significant. It shows that the treatment group can significantly improve the abdominal distension and abdominal pain of FC patients than the control group. In terms of improving the frequency of nocturnal urination in patients with FC in the treatment group, compared with the control group, the independent sample t test showed that the difference was statistically significant ($t=2.342$, $p<0.05$). The results showed that compared with the control group, the treatment could significantly improve the frequency of nocturnal urination in patients with FC.

Intra group comparison: After 3 w of treatment, the treatment group was compared with the group before and after treatment in improving somatization, obsessive compulsive symptoms, interpersonal sensitivity, depression, anxiety, hostility, sleep, diet, psychosis

and *so on*. After t test, the p values were $0.032<0.05$, $0.0001<0.05$, $0.021<0.05$, $0.009<0.05$, $0.065>0.05$, $0.031<0.05$, $0.012<0.05$. It was concluded that there was no obvious improvement in anxiety, there were significant improvements in somatization, obsessive compulsive symptoms, interpersonal sensitivity, depression, hostility, sleep, diet, psychosis and *so on*.

The control group was compared with the group before and after treatment in the improvement of somatization, obsessive compulsive symptoms, interpersonal sensitivity, depression, anxiety, hostility, sleep, diet, psychosis and *so on*. After t test, the p values were $0.072>0.05$, $0.112>0.05$, $0.069>0.05$, $0.087>0.05$, $0.093>0.05$, $0.041<0.05$, $0.073>0.05$, respectively. Besides improving sleep and diet, there was no significant improvement in somatization, obsessive compulsive symptoms, interpersonal sensitivity, depression, hostility, anxiety, psychosis and *so on* (Table 7).

TABLE 7: COMPARISON OF THE FACTORS OF SYMPTOM CHECKLIST 90 (SCL-90) BETWEEN THE TWO GROUPS BEFORE AND AFTER TREATMENT (SCORE, $\bar{x}\pm s$)

| Groups | Time | Somatization | Obsessive compulsive symptoms | Interpersonal sensitivity | Depression | Anxiety | Hostile | Sleep and diet | Psychosis |
|-----------------|------------------|--------------|-------------------------------|---------------------------|------------|-----------|-----------|----------------|-----------|
| Treatment group | Before treatment | 1.36±0.39 | 1.44±0.36 | 1.38±0.35 | 1.26±0.29 | 1.31±0.36 | 1.23±0.56 | 1.04±0.29 | 1.22±0.35 |
| | After treatment | 1.25±0.32 | 1.06±0.53 | 0.81±0.39 | 0.85±0.35 | 1.06±0.41 | 0.81±0.25 | 0.46±0.21 | 0.75±0.32 |
| Control group | Before treatment | 1.32±0.43 | 1.28±0.42 | 1.21±0.58 | 1.10±0.23 | 1.27±0.37 | 1.01±0.24 | 1.26±0.46 | 1.28±0.64 |
| | After treatment | 1.06±0.42 | 0.97±0.31 | 0.96±0.33 | 0.93±0.36 | 0.93±0.32 | 0.98±0.41 | 0.88±0.55 | 1.07±0.35 |

Comparison between the two groups: After treatment, the two groups were treated by t test in improving somatization, obsessive compulsive symptoms, interpersonal sensitivity, depression, anxiety, hostility, sleep, diet, psychosis and *so on*. p values were $0.042<0.05$, $0.024<0.05$, $0.031<0.05$, $0.029<0.05$, $0.015<0.05$, $0.011<0.05$, $0.037<0.05$ respectively. It was concluded that the treatment group was better than

the control group in mental psychology.

2 w after drug withdrawal, the recurrence of the two groups was observed. The data of the two groups were tested by χ^2 test, $\chi^2=6.468$, $p<0.006<0.05$ and the difference was statistically significant. In terms of long term therapeutic effect, the treatment group was better than the control group (Table 8).

TABLE 8: ANALYSIS OF RECURRENCE

| Treatment group | Cure | Relapse | Recurrence rate |
|-----------------|------|---------|-----------------|
| Control group | 30 | 7 | 23.3 % |
| Treatment group | 23 | 19 | 82.6 % |

With the progress of the times, the increase of human survival pressure, the change of diet structure and social aging, the incidence trend of FC patients is increasing year by year, which seriously affects the psychology, life and work of patients^[3]. FC is constipation caused by abnormal anal and rectal function and its pathogenesis is still unclear. Related studies have shown that constipation may be closely related to abnormal colorectal transmission and pelvic floor muscle dysfunction^[10,11].

Biofeedback therapy is one of the more advanced rehabilitation techniques at present, which uses related instruments to convert unconscious electrical signals such as electromyography, electroencephalogram (EEG) and heart rhythm into visual signals. Patients recognize, learn and control this feedback information at will. The use of biological behavior therapy is to reduce or correct abnormal physiological activities^[12,13], biofeedback treatment of diseases. The neural central system of the biofeedback instrument is used to identify^[14] and there by regulating the various systems of the human body to maintain stable regulation of psychological and physiological activities, each regulatory system forms a closed loop. After the adjustment of the unbalanced psychological and physical problems of the body, the patients gradually return to normal and the patients are aware of their abnormal defecation behavior through the computer program and the professional doctors inform the patients through the program on the computer. Guide patients to learn to be self-aware of morbid, but through their own body regulation, so that the movement of the pelvic floor and abdominal muscles back to normal and finally constipation is effectively treated^[15,16].

With regard to the quality of FC, biofeedback therapy has been widely used^[17,18]. For example, Kegel training program, one of the most commonly used pelvic floor muscle exercise methods, can improve pelvic floor muscle contractile function and promote the recovery of pelvic floor muscle tension by improving pelvic floor muscle blood circulation^[19]. Biofeedback has the advantages of non-invasive, no drug side effects, drug resistance and long lasting curative effect, so it has become a new direction in the treatment of FC.

With the continuous development of modern bio psycho social medical model, great attention has been paid to the relationship between psychological factors and FC. There are certain mental and psychological changes in patients with long term habitual constipation, mainly as follows: poor anorexia, mental tension, anxiety, physical fatigue, lack of sleep and even severe insomnia^[20,21].

Due to constipation, feces are stored in the intestinal tract for a long time and toxins enter the brain through circulation in the body, affecting the normal operation of the brain and reducing the quality of life and work of patients. In the long run, it will lead to depression, irritability, anxiety and other mental and psychological problems; at the same time, these bad mental and psychological problems will aggravate the constipation of patients^[22,23]. Patients can improve clinical symptoms through simple drug treatment, but cannot improve their negative emotions and the disease is easy to repeat under long term mental pressure. Psychological intervention advocates patient centered mental and psychological intervention under the guidance of professional doctors, so that patients can become the constructors of learning and understand the basic knowledge such as defecation mechanism and pathological changes of constipation. Encourage them to find reasonable, diet and good living habits, improve patient's psychological state, so as to reduce patient's negative emotions such as anxiety and depression and finally it gradually become normal defecation habits.

The results of this study show that the clinical symptoms and negative emotions of patients are improved by biofeedback therapy combined with psychological intervention and biofeedback combined with psychological intervention has certain clinical significance in the treatment of FC.

Conflict of Interests:

The authors declared no conflict of interest.

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