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Effects of Probiotics on Gut Microbiota in Type 2 Diabetes Patients

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ABSTRACT

Objective: To study the effect of probiotics on gut microbiota in Type 2 diabetes patients and its clinical application value.

Methods: Select Type 2 diabetes patients to take orally probiotics for 24 weeks, collect stool samples of subjects at the baseline and end of the trial, identify and analyze gut microbiota of each sample by 16srRNA high-throughput sequencing, and compare the changes of blood glucose, blood lipid and insulin resistance before and after the intervention. **Results:** A total of 75 patients completed clinical observations. 16srRNA high-throughput sequencing showed that the proportion of the subjects with increased Actinobacteria and Tenericutes at the end of the trial has increased (37.8% and 75.7% respectively). The genus level analysis showed that the number of subjects with increased intestinal probiotics and with decreased conditioned pathogens all increased. Cluster analysis before and after intervention showed that the gut microbiota of samples in the same group had a higher similarity. Compared with the subjects at the baseline status, at the end of the trial after the intervention, fasting blood glucose (FBG) of the subjects significantly decreased ($P<0.05$), the proportion of the subjects with triglyceride (TG) and cholesterol up to standard increased, and HOMA-IR was significantly improved ($P<0.05$). **Conclusions:** Probiotics can regulate the gut microbiota of Type 2 diabetes patients, promote fasting blood glucose (FBG) to reach the standard and improve insulin resistance, and help improve lipid metabolism.

1. Introduction

In recent years, the relationship between gut microbiota and Type 2 diabetes has attracted more and more attention from scholars both at home and abroad ^[1]. The changes

of gut microbiota are closely related to insulin resistance, obesity, systemic inflammation and oxidative stress of the host ^[2]. Gut microbiota imbalance increases insulin resistance and thus affects the progress of glucose metabolism and its complications. This study is aimed to

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study the changes of gut microbiota in Type 2 diabetes patients by probiotics intervention and explore the clinical application value of this intervention method.

2. Materials and Methods

2.1 Research Objects

101 Type 2 diabetes patients who received treatment from the Department of Endocrinology and Metabolism, China-Japan Union Hospital of Jilin University from January 2017 to July 2017 were selected as subjects, meeting the requirements of $7.0\% \leq \text{HbA1c} \leq 10.0\%$, with the history of diabetes for one week to 26 years. All subjects were informed of the research plan and then participated in the trial, voluntarily followed the guidance of the researchers and signed informed consent. Exclusion criteria: patients with severe impairment of liver and kidney functions, heart failure, fever, infection, or acute diabetic complications, pregnant and lactating women, or patients with FBG no less than 13.3 mmol/L, or patients with severe hypertension (systolic blood pressure no less than 180 mmHg and/or diastolic blood pressure no less than 110 mmHg) or patients researchers considered inappropriate for the trial. The diagnosis of Type 2 diabetes conforms to the diagnostic criteria of WHO diabetes formulated in 1999.

2.2 Research Plan

A special person is responsible to collect the information of the medical history of all subjects, and record their gender, age, course of diseases, height, weight and blood pressure. Require the subjects to have a regular diet and guide them to take the similar daily exercise, and on the basis of keeping the same hypoglycemic treatment plan unchanged, probiotics products were taken daily, including three Changle capsules taken orally three times a day and one bag of Jiangtangqi granule taken two times a day after mixing with water 1.5 hours before meals (all produced by Jilin Tiansanqi Pharmaceutical Co., Ltd.) for 24 weeks. Changle capsule is a health food mainly made from corn flour, rice flour, defatted milk powder, wheat flour, defatted soybean flour, Isomaltooligosaccharide, sugar, glucose and yeast extracts. It contains 1.2×10^8 CFU *Bifidobacterium bifidum*, 4.2×10^8 CFU *Lactobacillus acidophilus*, and 4.3×10^8 CFU *Streptococcus thermophilus* per 100g. The effective ingredients of Jiangtangqi granule are soybean flour, milk powder, cocoa powder, calcium powder, yam flour, konjac flour, spirulina powder, almond powder, Fructus Mume powder, licorice powder, etc. Take it before meals to increase the sense of satiety and the carbohydrates in it play a role similar to prebiotics.

During the trial period, all subjects continued the original hypoglycemic, hypotensive, hypocholesterolemic treatment plan. A total of 101 subjects participated in the trial, the clinical observation of 75 subjects was completed and these subjects were safely discharged.

2.3 Testing Indicators

FBG, and blood glucose, blood lipid, liver function, kidney function, urine routine, fasting C-peptide (FCP), glycosylated hemoglobin (HbA1c) and other indicators 2 hours after meals of each subject were detected at the baseline and end of the trial. The feces of the subjects at the baseline and end of the trial were collected for 16srRNA high-throughput sequencing of gut microbiota (implemented by Shanghai Omicspace Biotech CO., LTD) to identify and analyze the intestinal microbial diversity of the samples. $\text{HOMA-IR} = (\text{FCP} \times \text{FBG}) / 22.5$.

2.4 Statistical Methods

The data in normal distribution were expressed by means \pm standard deviation (SD) and analyzed by paired t-test. The data in non-normal distribution were expressed by median (quartile) and analyzed by paired rank sum test. All data were analyzed by SPSS software.

3. Results

The clinical observation of 75 patients on the effect of the joint intervention on the general condition, blood glucose, blood lipid and insulin resistance of subjects was completed (with an average age of 56.5 ± 7.5 years), including 25 male and 50 female patients. The body weight, systolic and diastolic blood pressure of the subjects decreased at the end of the trial compared with those at baseline, but there was no statistical significance. The fasting blood glucose (FBG) significantly decreased, and the difference was statistically significant ($P < 0.05$). The blood glucose and glycosylated hemoglobin decreased 2 hours after meals, but there was no statistical significance (Table 1). $\text{HbA1c} < 7.0\%$ was defined as reaching the standard, and the HbA1c standard-reaching rate of subjects was 27.7% when the subject entered the group and 35.6% when the subject left the group. The effect of the joint intervention on blood lipid was not statistically significant (Table 1). Triglyceride (TG) $< 1.7 \text{ mmol/L}$ was defined as reaching the standard, the triglyceride standard-reaching rate was 38.6% when the subject entered the group and 52.5% when the subject left the group. The total cholesterol (TC) $< 5.2 \text{ mmol/L}$ was defined as reaching the standard. The TC standard-reaching rate was 44.6% when the subject entered

the group and 61.4% when the subject left the group. There was no statistical difference in fasting C-peptide (FCP) level between the subjects before and after the intervention. HOMA-IR was used to represent the insulin resistance level. HOMA-IR of the subjects decreased at the end of the trial after the intervention, the difference was statistically significant ($P<0.05$), and insulin resistance was improved.

Safety

During the visit, no severe hypoglycemia and cardiovascular and cerebrovascular diseases occurred in all subjects, and there was no significant change in liver function and renal function of all subjects before and after the joint intervention.

Results of gut microbiota sequencing

After the feces of all subjects were collected, the DNA sample and OUT generation were all completed by the sequencing company. A total of 70 effective samples were obtained, with "pre-" representing pre-intervention samples and "post-" representing post-intervention samples. a: The analysis of Alpha diversity is obtained by statistical software. The Chao index represents the abundance of flora, and the Shannon index represents the diversity of flora. The OUTs dilution curves of each sample are shown in Figure 1 and the Shannon dilution curves are shown in Figure 2. The curves with different colors represent different samples. With the increase of sequencing quantity, the dilution curves of each sample gradually become flat, indicating that the samples have sufficient test depth, rich species, and enough sequencing quantity to reflect the microbial information in the samples. The Runk-Abundance curve of each sample is shown in Figure 3. With the increase of the number of flora in each sample, the species abundance of each sample decreases. When the species abundance is lower than $1e-04$, the curve is close to a plateau, and the genus of most samples is between 100 and 200. b: flora structure

and cluster analysis. The flora structures of all samples at the phylum level are shown in Figure 3 and among them, Firmicutes, Bacteroidetes and Proteobacteria accounted for a higher proportion in each sample, and all of them are the dominant flora. Tenericutes accounted for a higher proportion in a total of 22 samples, including 8 samples (24.2%) in the pre-group and 14 samples (37.8%) in the post- group. Actinobacteria accounted for a higher proportion in a total of 32 samples, including 4 samples (12.1%) in the pre-group and 28 samples (75.7%) in the post- group. Cyanobacteria accounted for a slightly higher proportion in a total of 5 samples including two samples in the pre-group and three samples in the post- group. The above results showed that after the intervention, the proportion of flora in each sample changed and the abundance of Actinobacteria and Tenericutes increased. Cluster analysis showed that the pre-group represented the baseline status and the post- group represented the status at the end of trial, and the overall performance was that the samples in the pre-group and the samples in the post- group clustered first in the group. and the 9 samples in the post- group clustered together at the top of the tree diagram of phylum level similarity analysis shown in Figure 3, followed by 7 and 8 samples in the pre- group clustered and merged, indicating that the gut microbiota of the samples in the same group has high similarity. In the overall tree diagram, there was a crossed and clustered position between the pre- group and post- group, which is related to the complexity of gut microbiota in patients with diabetes and relatively many confounding factors. c: Genus level analysis showed that compared with the baseline status, the number of the subjects with increased intestinal probiotics and with decreased conditional pathogens all increased at the end of the trial. The subjects with increased Bifidobacterium under Actinobacteria in probiotics accounted for 62.2%. The subjects with increased L.Lactobacillus in Lactobacillus under Firmicutes increased by 21.6%. In terms of the conditional pathogens, the subjects with decreased Escherichia coli

Table 1. Effect of joint intervention on the subjects' blood glucose, blood lipid and insulin resistance

	Baseline	End of trial	t	P
FBG (mmol/L)	10.36±3.63	7.81±3.15*	6.68	<0.001
Blood glucose 2h after meals(mmol/L)	18.12±6.35	17.35±5.22	1.02	0.31
HbA1c (%)	8.14±2.47	7.82±1.46	1.21	0.23
TC (mmol/L)	5.38±1.27	5.27±1.16	0.99	0.33
TG (mmol/L)	1.86 (1.15, 2.87)	2.00 (1.30, 2.80)	-0.91	0.37
FCP (ng/ml)	1.25±0.75	1.10±0.68	1.15	0.26
HOMA-IR	0.68±0.21	0.55±0.17*	3.45	0.03

* $P<0.05$

under *Escherichia* accounted for 29.7% and the subjects with decreased *Enterococcus* 43.2%. It is further indicated that probiotics can increase the proportion of beneficial bacteria in the gut microbiota of some diabetics and reduce the proportion of harmful bacteria.

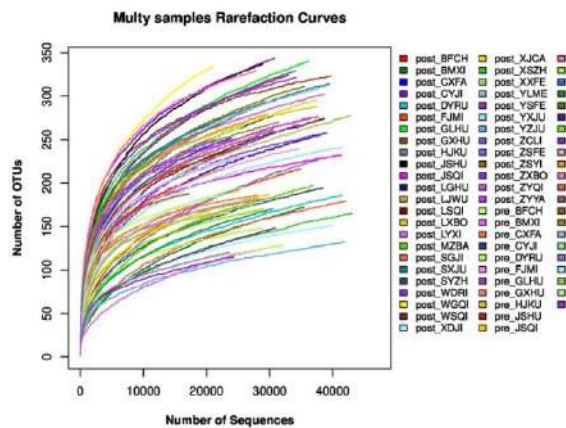


Figure 1. OUTs dilution curve of each sample

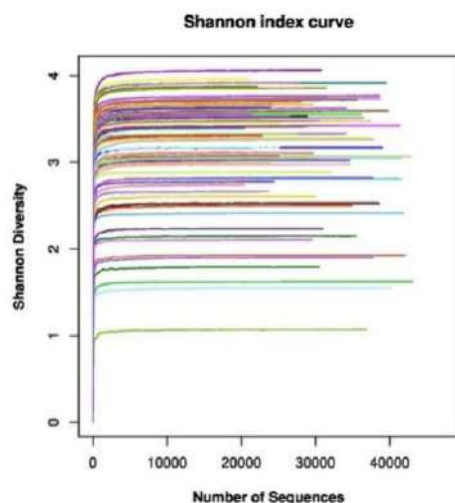


Figure 2. Shannon index curve of each sample

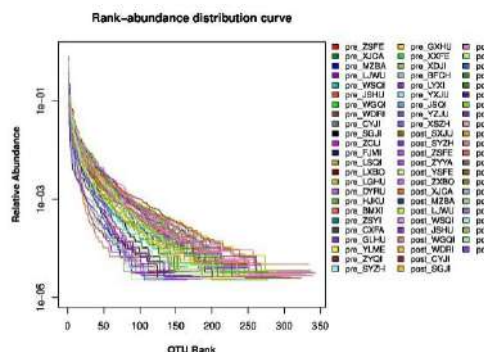


Figure 3. Rank-Abundance curve of each sample

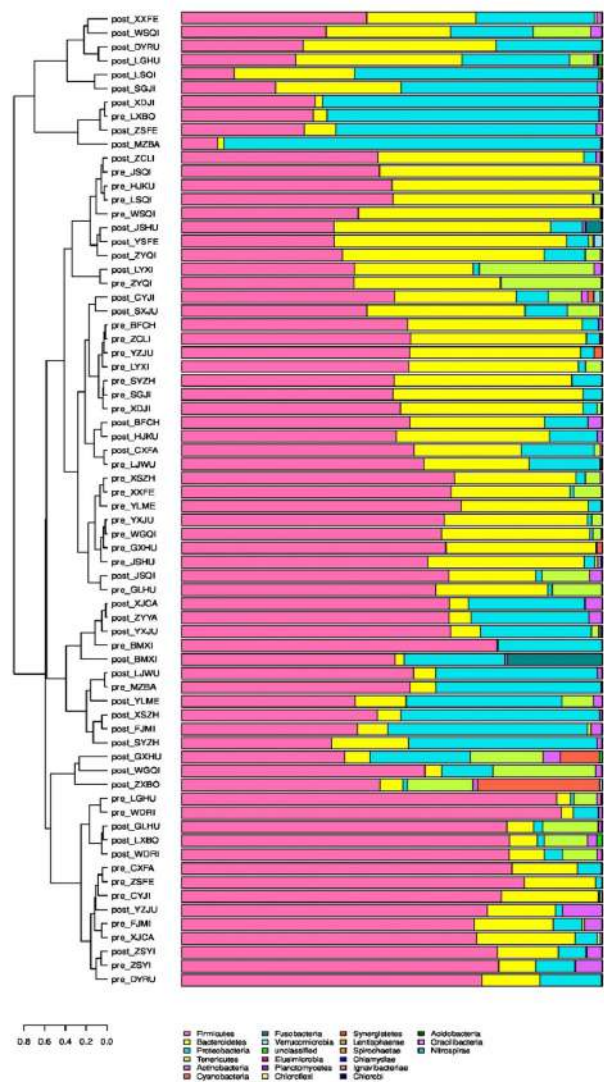


Figure 4. Tree diagram and histogram of phylum-level clustering of each sample

4. Discussions

Commensal intestinal bacteria and their metabolites are involved in metabolic abnormalities and diseases by affecting the host's metabolism and immune system. Studies have found that patients with abnormal glucose metabolism are accompanied by an imbalance of gut microbiota. On the one hand, the number of gram-negative bacteria increases causing the increases of lipopolysaccharide (LPS). After LPS enters the human body and is recognized by immune cells, it produces multiple inflammatory factors and induces the occurrence and development of systemic chronic inflammation [3,4]. On the other hand, the bacteria producing butyrate

decreases, increasing insulin sensitivity, and weakening the barrier function to reduce inflammation and protect intestinal mucosal, and then inducing the occurrence and development of diabetes ^[5]. Metagenome technology refers to the technology to directly extract the total DNA from the environment to study the sum of microbial genes without the microbial culture stage. 16srRNA high-throughput sequencing technology used in this study is the main method of metagenome technology. The variable region of bacteria 16srRNA gene has the species specificity and the taxonomic characteristics of bacteria can be obtained by analyzing the sequence of the variable region. Therefore, this method is more accurate and specific than the traditional PCR method. In this study, Type 2 diabetes patients took orally probiotics for joint intervention for 24 weeks. The intestinal bacteria were classified and identified and accurately quantified by high-throughput sequencing at baseline and after intervention respectively. The results showed that all samples from all subjects had enough test depth and abundant species, reflecting the microbial information in samples. In this study, the Firmicutes, Bacteroidetes, and Proteobacteria were the dominant bacteria in the intestinal tract of the subjects with Type 2 diabetes. After 24 weeks of intervention, the number of the subjects with significantly increased Firmicutes, Actinobacteria, and Cyanobacteria in the samples increased, indicating that the flora structure of each sample changed after intervention. The study has shown that the proportion of Actinobacteria/Firmicutes and Firmicutes/Bacteroidetes in patients with Type 1 diabetes decreased, and that the beneficial bacteria producing butyrate decreased ^[6]. The sequencing results of this study were similar to the above. After the intervention, the proportion of Firmicutes, Actinobacteria and Cyanobacteria in some samples increased significantly, and the Lactobacillus under Firmicutes increased. Cluster analysis showed that most samples in the post- group and the pre- group could cluster in the group, indicating that the probiotics in this study changed the proportion of all types of bacteria in the gut microbiota of Type 2 diabetes patients and there were some similarities in the changes of flora.

Comparing the glucose and lipid metabolism indexes of subjects at the baseline and end of the trial, it was found that after the intervention, fasting blood glucose (FBG) was significantly improved, blood lipid standard-reaching rate increased, HOMR-IR index decreased, and insulin resistance was improved. At the end of the trial, the number of subjects with increased intestinal probiotics and with decreased conditional pathogens all increased. The subjects with increased Bifidobacterium under

Actinobacteria in probiotics increased by 62.2%, and the subjects with increased L.Lactobacillus that belongs to Lactobacillus under Firmicutes increased by 21.6%. It is considered that these changes are related to probiotics intervention combined with this research plan. Changle capsule contains Bifidobacterium bifidum, Lactobacillus acidophilus, and Streptococcus thermophilus, without hypoglycemic components. The effect of Jiangtangqi granule is to increase the sense of satiety and reduce the intake of other foods by taking it before meals, so the diet variation of each patient can be well controlled. The carbohydrate in the granule plays a role similar to prebiotics, conducive to the absorption of probiotics in the Changle capsule and reproduction in the intestinal tract, but there is no composition of directly reducing blood glucose in the capsule. In this study, joint intervention by increasing probiotic intake is used to effectively supplement the probiotics/prebiotics and regulate the metabolism of fatty acids to regulate the gut microbiota of Type 2 diabetes patients, thus improving fasting blood glucose at the end of the trial. Animal studies showed that the rats fed a high-fat diet were fed with probiotics in advance, which has certain preventive effects on the formation and development of Type 2 diabetes in the rats. Moreover, the hypoglycemic effect of probiotics is related to the improvement of the structure of gut microbiota, inhibition of the reproduction of harmful bacteria, reduction of the expression of inflammatory factors TNF- α and IL-6 ^[7]. Amar, et al. found that Bifidobacterium and Lactobacillus could change the early bacterial translocation in the rats with diabetes induced by a high-fat diet, thereby reducing the expression of some cytokines such as TNF- α , IL-1 β , PAI-1 and IL-6, and improving insulin sensitivity and glucose metabolism ^[8]. Therefore, now many scholars believe that probiotics, as a kind of active microorganisms regulating the intestinal microecological balance of the host, can improve energy metabolism in the body, reduce chronic inflammation and oxidative stress by changing gut microbiota and its metabolites. The application of probiotics has gradually become a research focus in preventing and controlling the occurrence and development of Type 2 diabetes ^[9].

In this study, after increasing the probiotics intake, no obvious abnormality found in the liver and kidney functions of patients, and the subjects had no obvious discomfort, so this method has better safety. Although the results showed that the gut microbiota changed after the intervention, and the glucose metabolism, insulin resistance and lipid metabolism were improved, the correlation analysis and attribution analysis could not be well made because of the less strict grouping and more

confounding factors before intervention. Therefore, we should strictly group and increase the sample size in future study. Meanwhile, inflammatory indexes and oxidative stress indexes should be measured and determined for correlation analysis and attribution analysis. In conclusion, the intake of intestinal probiotics can regulate the gut microbiota of Type 2 diabetes patients, promote fasting blood glucose to reach the standard, and improve insulin resistance to help lipid metabolism reach the standard.

References

- [1] Ti, Y., Xie, G.L., Wang, Z.H., et al., 2012. A metagenome-wide association study of gut microbiota in type 2 diabetes. *Nature*. 490, 55-60.
- [2] Panwar, H., Rashmi, H.M., Batish, V.K., et al., 2013. Probiotics as potential biotherapeutics in the management of type 2 diabetes: prospects and perspectives. *Diabetes Metab Res Rev*. 29(2), 103-112.
- [3] Lu, Y.C., Yeh, W.C., Ohashi, P.S., et al., 2008. LPS/TLR4 signal transduction pathway. *Cytokine*. 42, 145-151.
- [4] DeFuria, J., Belkina, A.C., Jagannathan-Bogdan, M., et al., 2013. B cells promote inflammation in obesity and type 2 diabetes through regulation of T-cell function and an inflammatory cytokine profile. *Proc Natl Acad Sci USA*. 110, 5133-5138.
- [5] Karlsson, F.H., Tremaroli, V., Nookaew, I., et al, 2013. Gut metagenome in European women with normal, impaired and diabetic glucose control. *Nature*. 498(7452), 99-103.
- [6] Mejia-Leon, M.E., Petrosino, J.F., Ajami, N.J., et al., 2014. Fecal microbiota imbalance in Mexican children with Type 1 diabetes. *Sci Rep*. 4, 3814.
- [7] Zhang, H.P., Li, W., Li, R.Y., et al., 2018. Effects of probiotic fermented milk on blood glucose levels and intestinal microbiota in diabetic rats, *Acta Nutrimenta Sinica*. 40(5), 454-458.
- [8] Amar, J., Chabo, C., Waget, A., et al., 2011. Intestinal mucosal adherence and translocation of commensal bacteria at the early onset of type 2 diabetes: molecular mechanisms and probiotic treatment. *EMBO Mol Med*. 3(9), 559-572.
- [9] Li, X.L., Gu, Y.Y., Zhang, Y.F., 2017. Mechanisms of probiotics to I prove type 2 diabetes. *Journal of Shanghai Jiaotong University (Medical Science)*. 37(9), 1309-1314.

Research Progress on Effective Implementation of Whole Process Nursing Model for Patients with Cervical Cancer

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ABSTRACT

Cervical cancer has a high mortality rate in clinic. This disease seriously threatens the physical and mental health and life safety of patients. At present, radical surgery is mainly used for treatment, but in order to reduce the incidence of intraoperative and postoperative complications, corresponding nursing needs to be coordinated. This time focuses on the complications after radical surgery for cervical cancer, and puts forward the nursing methods of common complications of transabdominal radical surgery for cervical cancer. In order to improve the quality of nursing and life of patients, this paper summarizes the effective implementation of the whole process nursing model after cervical cancer surgery.

1. Introduction

Cervical cancer is a common gynecologic disease clinically, and it is a malignant tumor. The incidence rate of cancer in situ is 30~35 years old. The incidence of cervical cancer is increasing in 45~55 years old. With the change of living standard and lifestyle, the incidence of cervical cancer is increasing. Cervical cytology screening can detect and treat precancerous lesions and cervical cancer as early as possible, and reduce the incidence rate and mortality of cervical cancer. Surgery is suitable for the disease treatment needs of patients with early cervical cancer. It can completely remove the focus while preserving the patient's fertility. Affected by the disease and concerns about surgery, patients with cervical cancer will have varying degrees of adverse emotions PJ, affecting the smooth progress of the operation and the expected aftereffects. Therefore, perioperative nursing

intervention is very important. This aspect needs in-depth study and continuous analysis.

2. Radical Operation of Cervical Cancer

Cervical cancer is the second most common tumor in women. Combined with the statistical treatment of the International Cancer Research Center under who, it can be effectively obtained^[1]. At present, the vast majority of new cases of cervical cancer in the world every year are in developing countries, which occupies the first place of malignant tumors of female reproductive system in China^[2]. U.S. surgeons rapidly shifted from minimally invasive to open hysterectomy for cervical cancer. Decreasing utilization of minimally invasive surgery was associated with an increase in perioperative complications and longer hospital^[3]. Wang Zhi^[4] thinks postoperative cervical cancer is easy to affect the quality of life of patients. Improving or preventing postoperative vaginal

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contracture has a positive impact on patients' life, which can effectively improve the safety, effectiveness and safety of patients' treatment, and promote the satisfaction of patients with cervical cancer. It also fully shows that this method can be widely used in clinic and improve the quality of life of patients with cervical cancer after operation. Yang Fan Chun's ^[5] research shows that cervical cancer surgery has a history of more than 100 years, from open surgery to minimally invasive surgery (MIS). Since the era of clinical exploration and practice, minimally invasive gynecological surgeons have been exploring new frontiers in the field of gynecological surgery. Compared with laparotomy, the postoperative complications of cervical cancer surgery are relatively small. The main focus is on reducing the incidence rate and duration of hospitalization. This is also an important method for treating early cervical cancer. In 2018, the clinical research article on cervical cancer surgery published in the New England Journal of medicine clearly made laparoscopic surgery for early cervical cancer subject to more rigorous review and negative views. Most studies have begun to explore the concept of standardized surgery for early cervical cancer. When outlining the standardized characteristics of cervical cancer surgery. The current situation of cervical cancer surgery was analyzed to improve the surgical treatment of cervical cancer.

Patients with cervical cancer surgery will worry that the surgery will cause the loss of female characteristics, sexual function and fertility, will be despised and abandoned by their husbands, friends and society, will also be more afraid of losing their position due to illness, fear of losing their economic source, and are more likely to have psychological problems such as anxiety, depression and fatigue after surgical treatment. Anxiety in patients undergoing cervical cancer surgery is a common phenomenon, and the important reason for anxiety is the fear that poor recovery will affect their future sexual life and easy aging. It is concluded that most patients' understanding of cervical cancer surgery is not correct, which is also an important reason for patients' anxiety. Sexual dysfunction is common in postoperative patients with cervical cancer. The quality of sexual life is one of the important contents to evaluate the quality of life of patients with cervical cancer. This is mainly because the fear of tumor makes the mental pressure too heavy and it is difficult to have sexual interest. Therefore, psychological disorder is an important reason to affect the quality of sexual life of postoperative patients with cervical cancer. Pelvic floor dysfunction and ovarian endocrine function decline caused by cervical cancer surgery are also important factors affecting the quality of

life of patients.

Most important factors affecting the quality of life of cancer patients involve family support, and better social and family support is more conducive to cancer patients to obtain better quality of life and psychological state. The spouses of some cervical cancer patients are very important elements of social and family support. The spouse's attitude and wrong understanding, such as some spouses think that their wife loses sexual function after operation, worry that the tumor is infectious, etc., have significantly reduced the couple's quality of sexual life. Some studies have also shown that family factors are significantly related to patients' emotional disorders, and even the risk of emotional disorders can be determined by evaluating the degree of family harmony. The quality of life of cervical cancer patients is affected by many factors. Due to various reasons, such as poor postoperative incision healing, disease control, physical weakness. After treatment, complications, chemotherapy and other factors can affect their quality of life. The characteristics of patients will also have an impact on the quality of life. Therefore, we need to pay attention to the nursing situation of patients after surgical treatment, and pay attention to the analysis of the implementation and specific development direction of the whole process nursing model in the nursing of patients with cervical cancer after surgery.

In clinical practice, total hysterectomy, sub extensive total hysterectomy and pelvic lymph node dissection, extensive total hysterectomy and pelvic lymph node dissection are generally used to treat patients, and the appropriate operation methods are selected according to whether the patients have the requirements of preserving reproductive function and different stages. The operation will cause physical and psychological stress reactions to the patients. Therefore, it is necessary to implement active nursing intervention to enable patients to recover as soon as possible. After the implementation of surgical treatment of cervical cancer, the nursing of vital signs monitoring and diet nursing for patients is an important part of traditional nursing for cervical cancer surgery. The prognosis of patients can be effectively improved to a certain extent, but traditional nursing has mechanical and limitations to a certain extent. Nurses implement nursing operations according to the doctor's instructions. It can not find and deal with complications in time, resulting in high incidence of complications and poor prognosis. Therefore, choosing a more comprehensive, overall and detailed nursing model is very important to improve the quality of life of patients with cervical cancer.

3. Effective Implementation Path of Whole Process Nursing Model for Patients with Cervical Cancer

The condition of cervical cancer disease is complex and the psychological burden of patients is heavy. Poor cooperation will affect the treatment effect. Therefore, it is particularly important to carry out effective nursing intervention for patients. The whole process nursing intervention can be applied to the treatment of cervical cancer patients, alleviate the tension of patients, enable patients to cooperate more actively with the treatment and significantly improve the treatment effect. At the same time, through the explanation of nursing staff, the patients can master the basic knowledge and precautions of the disease and speed up the recovery of the disease. The whole process nursing intervention has important clinical application value for the treatment of cervical cancer. It can alleviate the anxiety of patients, improve the nursing satisfaction of patients, significantly shorten the length of hospital stay, reduce the hospitalization cost, significantly improve the treatment effect and promote the recovery of patients.

Binggang Ye ^[6] thinks holistic health care includes the prevention and treatment of diseases and the regulation of sub-health status. On the basis of whole course nursing, it can promote blood circulation and regulate various physiological parameters, which has an overall effect in overall health nursing. Duan Xia ^[7] think nursing quality evaluation is an important part of medical quality management. It is of great practical significance and research value for nursing supervisors to understand the shortcomings in the process of nursing quality evaluation and then improve the overall nursing quality. Data were collected through in-depth interviews and analyzed by content analysis. It is of great practical significance to further improve the evaluation standard of nursing quality, modify the evaluation content guided by the needs of patients, use scientific evaluation methods to evaluate the nursing quality, and scientifically and reasonably compare the nursing quality between hospitals, as well as the longitudinal comparison of hospital nursing quality. These methods can enhance the core competitiveness of the hospital and benefit more patients.

3.1 High Quality Psychological Care

The nursing staff should actively communicate with the patients and the language should be easy to understand. They should always listen to the patients' ideas, timely dredge the patients' bad emotions, selectively use music therapy to relieve the patients' emotions, actively share

successful cases with the patients, help the patients establish the confidence to overcome the disease, and can effectively relieve the patients, So that patients can actively cooperate in postoperative rehabilitation, which has a positive impact on the early recovery of patients. Guifeng Xue ^[8] to analyze and comprehensively study the clinical effect of humanized psychological nursing model in general surgery nursing. The subjects were randomly divided into study group and control group. Number of samples in each group $n = 100$. Patients in the control group received routine general surgery nursing plan, while patients in the study group received the same nursing plan, but added humanized psychological nursing mode. The two groups of indicators were compared and analyzed. There was significant difference in patients' satisfaction with nursing service ($P < 0.05$). It can fully show that the implementation effect of humanized psychological nursing model in general surgery nursing is remarkable, and the patients' psychological state and satisfaction with nursing services have been improved. Therefore, it is worthy of clinical application and further promotion.

Redondo Elvira Tamara ^[9] review and analyze the most influential variables for patients to achieve their mental health level, verify that spirit, resilience and social support are the basic pillars of mental health construction and have an impact on patients' disease rehabilitation, clearly use the terms of mental well-being, discomfort and quality of life to replace mental well-being, and There is a certain consensus on whether spiritual and social support are predictors of psychological well-being. In the process of effective disease treatment, the resilience, social support and spirit of patients are highly related variables at the end of life, which plays a decisive role in mental health.

Lingens Solveigh P ^[10] Relevant studies believe that it can provide important psychological care for cancer patients and have an important impact on patients' disease treatment. However, if we can pay attention to the impact of disease treatment on fatigue, we can better determine the fatigue track during psychological care, check the factors that distinguish these tracks, and predict the fatigue severity of patients after psychological care. In potential class growth analysis, repeated measurement analysis and linear regression analysis. It can be concluded that the fatigue of patients after surgical treatment is statistically significantly reduced, but this reduction has nothing to do with clinical practice. RMA showed that fatigue trajectory time had a major impact on depression, anxiety, personal control and disease cognition. The severity of fatigue and physical symptoms at T1, rather than demographic or clinical factors, can predict the severity of fatigue at T3. Cooperating with the psychological nursing model during

the patient's tumor treatment can alleviate the symptoms of fatigue, depression, anxiety and physical symptoms. Therefore, it is necessary to strengthen the implementation of fatigue treatment for patients.

3.2 Postoperative Nursing Intervention

Observe the postoperative reaction of patients and treat them in time according to the doctor's advice. Relevant health education was carried out after operation. Attention should be paid to patients' subjective feelings, timely intervention of dry mouth and pain after operation, using mume spray to solve the problem of dry mouth, and developing corresponding pain relief methods. The nursing staff recorded the patient's heart rate and average artery every 15 - 30 minutes. Blood pressure and blood oxygen saturation. After the patient's vital signs are stable, it can be recorded every 4 hours. The whole nursing staff used intermittent clamping catheter to train the bladder function of patients, so as to better promote the faster recovery of micturition function. After the patient's physical condition improves, the nursing staff can guide the patient to effectively carry out limb function recovery training, so as to promote the recovery of limb function and prevent the complications of disuse syndrome.

3.3 Ward Nursing

Carry out nursing intervention on the ward where the patient is located to keep the ward ventilated, clean and comfortable. Jacqueline Peet RN ^[11] believes that understanding and creatively involving nurses in potential ward management is a prerequisite for forming more safe and effective hospital nursing. Therefore, according to the practical research results, promoting front-line nurses and teams to develop a people-centered workplace is the key to sustainable improvement of patient safety.

3.4 Diet Care

Formulate corresponding diet for patients, focusing on balanced nutrition and easy digestion. Follow up the patient's eating situation in each shift and adjust the patient's diet plan in time. Papadimitriou Nikos ^[12] shows that diet and nutrition are modifiable risk factors for several cancers, but due to the inherent bias, the association between the two may be defective, and the patient's disease recovery also largely depends on a single assessment of diet using the food frequency questionnaire. We conducted a comprehensive review of the meta-analysis of observational studies, focusing on the strength and effectiveness of the evidence for the association between food / nutrient intake and 1 patient's cancer

treatment and risk of death.

3.5 Develop Continuous Care Plan

After the surgical treatment of cervical cancer patients, when the patients are discharged from the hospital, they need to issue relevant health prescriptions to help the patients understand the precautions for disease recovery, and follow up the patients on time in combination with Wechat and telephone, so as to follow up the patients' diet, the degree of cooperation and relevant contents in patients' rehabilitation exercise and follow-up. Patients are encouraged to normally participate in the process of social interaction, so as to avoid adverse emotions such as inferiority complex, so that the postoperative rehabilitation process of patients will not be adversely affected by emotions.

4. Conclusions

The surgical treatment of cervical cancer, i.e. extensive hysterectomy and pelvic lymph node dissection, is relatively common in the treatment of early cervical cancer. The advantage of this operation is that it can implement individualized and standardized treatment, better preserve the ovarian endocrine function, and is not easy to affect the vaginal function. However, when performing transabdominal cervical cancer surgery, patients will also be more prone to urinary retention and urinary tract infections. Based on this, we should take corresponding nursing measures to reduce the incidence of complications. At this stage, according to the continuous renewal and enrichment of medical concepts, the whole process high-quality nursing method is fully applied to the nursing of cervical cancer patients. This method is a nursing method that can make corresponding intervention according to the physiological, social and emotional needs of patients. Based on the "people-oriented" concept, through high-quality nursing in preoperative, intraoperative and postoperative stages, It is effective to adjust patients' bad psychological state, improve patients' treatment safety, promote patients' compliance behavior, and improve patients' quality of life. With its comprehensive and scientific nursing method, the whole process nursing measures can comprehensively improve the quality of life of cervical cancer patients and effectively improve the treatment compliance. It has high clinical value and is worth popularizing.

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References

- [1] Lee, K.K., Lee, J.Y., Nam, J.M., et al., 2015. High-dose-rate vs. low-dose-rate intracavitary brachytherapy for carcinoma of the uterine cervix: Systematic review and meta-analysis. *Brachytherapy*. 4(4), 449-457.
- [2] Müller, D.A., Capanna, R., 2015. The surgical treatment of pelvic bone metastases. *Adv Orthop*. 525363.
- [3] Matsuo Koji, Mandelbaum Rachel S., Klar Maximilian, Ciesielski Katharine M., Matsushima Kazuhide, Matsuzaki Shinya, Roman Lynda D., Wright Jason D., 2021. Decreasing utilization of minimally invasive hysterectomy for cervical cancer in the United States. *Gynecologic Oncology*. 162(1).
- [4] Wang Zhi, Zeng Ang, Long Fei, Wu Ming, Tan Xian Jia, Liu Zi Wen, Wang Xiao Jun, 2021. Use of Vaginal Reconstructive Surgery in Cervical Cancer Patients to Prevent Vaginal Stump Contracture. *Journal of Investigative Surgery*. 34(7).
- [5] Yang Fan Chun, Huang Wei, Yang Weihong, Liu Jie, Ai Guihai, Luo Ning, Guo Jing, Chua Peng Teng, Cheng Zhongping, 2021. Cervical Cancer Surgery: Current State of Affairs. *Gynecology and minimally invasive therapy*. 10(2).
- [6] Binggang Ye, Zhouyi Guo, Hanchuan Huang, Xicheng Yang, Pedro Cabrales, 2015. Thermal Tomography Imaging in Photonic Traditional Chinese Medicine Information Therapy with Holistic Effect for Health Whole Nursing. *BioMed Research International*.
- [7] Duan Xia, Shi Yan, 2014. Current status of quality evaluation of nursing care through director review and reflection from the Nursing Quality Control Centers. *International journal of clinical and experimental medicine*. 7(10).
- [8] Guifeng Xue, Huafang Yi, Ping Xue, Wenmin Sun, 2021. The Effects of Humanized Psychological Nursing Model in General Surgery Nursing. *Proceedings of Anticancer Research*. 5(4).
- [9] Redondo Elvira Tamara, Ibáñez Del Prado Celia, Cruzado Juan Antonio, 2021. Psychological well-being in palliative care: A systematic review. *Omega*.
- [10] Lingens Solveigh P, Hagedoorn Mariët, Zhu Lei, Ranchor Adelita V, van der Lee Marije, Garssen Bert, Schroevers Maya J, Sanderman Robbert, Goedendorp Martine M, 2021. Trajectories of fatigue in cancer patients during psychological care. *Psychology & health*.
- [11] Jacqueline Peet RN, Karen Theobald PhD, RN, Clint Douglas PhD, RN., 2019. Strengthening nursing surveillance in general wards: A practice development approach. *Journal of Clinical Nursing*. 28(15-16).
- [12] Papadimitriou Nikos, Markozannes Georgios, Kanellopoulou Afroditi, Critselis Elena, Alhardan Sumayah, Karafousia Vaia, Kasimis John C, Katsaraki Chrysavgi, Papadopoulou Areti, Zografou Maria, Lopez David S, Chan Doris S M, Kyrgiou Maria, Ntzani Evangelia, Cross Amanda J, Marrone Michael T, Platz Elizabeth A, Gunter Marc J, Tsilidis Konstantinos K., 2021. An umbrella review of the evidence associating diet and cancer risk at 11 anatomical sites. *Nature communications*. 12(1).

Observation of the Effect of Gait-induced Functional Electrical Stimulation on Stroke Patients with Foot Drop

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ABSTRACT

Objective: To explore the effects of functional electrical stimulation and functional mid frequency electrical stimulation on lower limb function and balance function in stroke patients. **Methods:** 20 cases of stroke patients with foot drop after admission were randomly divided into the observation group and the control group, 10 cases in each group. On the basis of the two groups of patients, the observation group used the gait induced functional electrical stimulation to stimulate the peroneal nerve and the pretibial muscle in the observation group. The control group used the computer medium frequency functional electrical stimulation to stimulate the peroneal nerve and the anterior tibial muscle for 2 weeks. Before and after treatment, the lower extremity simple Fugl-Meyer scale (FMA), the Berg balance scale (BBS) and the improved Ashworth scale were evaluated respectively, and the comparative analysis was carried out in the group and between the groups. **Results:** After 2 weeks of treatment, the scores of FMA and BBS in the two groups were significantly higher than those before the treatment ($P < 0.05$), and the scores of FMA and BBS in the observation group were higher than those in the control group ($P < 0.05$), and the flexor muscle tension of the ankle plantar flexor muscle of the observed group was lower than that of the control group ($P < 0.05$). **Conclusions:** Exercise therapy combined with gait induced functional electrical stimulation or computer intermediate frequency functional electrical stimulation can significantly improve lower limb function and balance function in patients with ptosis, and the therapeutic effect of functional electrical stimulation combined with gait is better.

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1. Introduction

Stroke is more common in middle-aged and elderly people, because the patient's central nervous system is damaged, which can lead to abnormalities in the patient's limb function, leading to symptoms of hemiplegia. Although the walking pattern of more than 80% of stroke patients will be greatly improved, about 20% of stroke patients will have foot drop and varus problems^[1,2], which directly leads to the formation of circle gait. This inefficient and abnormal walking pattern leads to shortened step length, slower pace, excessive physical exertion, and decreased walking stability, which increase the risk of falling^[3]. Therefore, how to improve the foot drop of stroke patients, correct the ankle varus deformity, and establish a safe and stable normal gait pattern is something that rehabilitation therapists and patients must consider. At present, most of the clinical use of functional electrical stimulation in the computer intermediate frequency therapeutic apparatus is used to treat the foot drop and varus problems in stroke patients. However, the patient is required to not move the treatment limb during the treatment, which has relatively large restrictions on the patient's movement. The foot drop walking aid is a convenient gait-inducing functional electrical stimulation device, which can timely send out electric signals to stimulate the common peroneal nerve during different walking cycles of the patient, so that the tibialis anterior muscle and the peroneus brevis muscle can be stimulated in a timely manner. This promotes the dorsiflexion movement of the ankle joint during the walking cycle, creating a more three-dimensional walking experience for the patient, and can give timely electrical stimulation to the tibialis anterior muscle and the peroneus brevis muscle during walking training. Xiao Feina^[4] et al. found through research that exercise training combined with foot drop walker training can reduce muscle tension of the lower limbs. Exercise therapy plus gait-induced functional electrical stimulation or computer mid-frequency functional electrical stimulation and its effect on balance function have not been reported in the literature. Therefore, this experiment is mainly to explore the therapeutic effects of gait-induced functional electrical

stimulation and computer intermediate frequency functional electrical stimulation on the lower limb function and balance function of stroke patients with foot drop, and to explore a comprehensive physical therapy method that is more suitable for stroke patients with foot drop.

2. Materials and Methods

2.1 Clinical Data

From January to December 2020, 60 cases of stroke and foot drop patients in Zhengzhou Central Hospital Affiliated to Zhengzhou University were selected. Inclusion criteria: 1) Good cognitive function, able to cooperate with therapist's treatment and guidance, MMSE score greater than or equal to 23 points; 2) Primary disease is stroke; 3) Lower limb Brunnstrom staging \geq stage II; 4) Lower limb muscle tone modified Ashworth Grade 2 and below; 5) Have foot drop symptoms and can walk with assistance; 6) The patient understands and accepts the treatment plan of this study. Exclusion criteria: 1) Accompanied by other organ dysfunction; 2) Mental disorders and cognitive impairment, MMSE score less than 23 points; 3) Severe stroke complications that affect rehabilitation; 4) Patients with pacemakers in their bodies. The cases were randomly divided into experimental group and control group. The specific conditions of the patients are shown in Table 1.

Statistical comparison of the data in the table shows that there is no significant difference between the groups ($P > 0.05$), which is comparable.

2.2 Method

The experimental group was treated with exercise therapy and foot drop walker for 20 minutes, once a day, for 5 days a week, for 2 consecutive weeks. The conventional comprehensive treatment is the same as the control group. Foot drop walking aid treatment method: Use the XFT-2001D foot drop walking aid, let the patient take a sitting position, slightly bend both knees, wipe the skin of the electrode pad area with alcohol cotton balls, and take the corresponding lower limbs. Run

Table 1. Clinical data of the two groups ($\bar{x} \pm s$)

Group	Number of cases	gender		age	Course of disease (months)	Paralyzed side (example)	
		male	Female			Left	Right
test group	30	15	15	59.3 \pm 8.2	4.7 \pm 1.2	14	16
Control group	30	15	15	59.8 \pm 11.6	4.0 \pm 1.7	15	15

the instrument, use warm water to moisten the quick positioning electrode pads, tie the host to the affected calf, let the quick positioning electrode contact the superficial peroneal nerve of the calf, turn on the power switch of the host and remote control, select the training mode and then adjust The intensity of electrical stimulation and the movement of the electrodes according to the patient's specific conditions to find a significant valgus and dorsiflexion movements. Then switch to walking mode, use the programmer to analyze the patient's gait, adjust the electrical stimulation parameters according to the patient's sensitivity and the results of the gait analysis (the stimulation parameters are voltage 3.7 V, pulse width 100-200-300 μ S, current 0-100 mA, Frequency 16.7-33 Hz). Set the starting angle, landing angle and standing angle of the programmer, and the programmer will determine the most suitable stimulation method for the patient in the gait analysis system.

The control group was treated with exercise therapy and computerized intermediate frequency functional electrical stimulation of the tibial anterior muscle for 20 minutes, once a day, for 5 days a week, and both were treated continuously for 2 weeks. The prescription number for the computerized intermediate frequency functional electrical stimulation of the tibialis anterior muscle is intermediate frequency I. The two electrode pads are used to stimulate the tibialis anterior muscle and the common peroneal nerve. The treatment time is 20 minutes.

Exercise therapy includes: pulling the Achilles tendon, pressing and stimulating the tibialis anterior and peroneus brevis muscles, increasing the mobility of the ankle joint, guiding the ankle dorsiflexion movement, strengthening the ankle dorsiflexor muscle strength, walking function training, and balance function training

2.3 Observation Items

Before treatment and after two weeks of treatment, the two groups of patients were evaluated on the affected lower extremity short-form Fugl-Meyer scale score (FMA), Berg balance scale score (BBS), and modified Ashworth grading score.

The Fugl-Meyer scale is divided into 17 sub-items, each item has a minimum score of 0 and a maximum of 2 points. The score range is 0-32 points. The higher the score, the better the function. The Fugl-Meyer scale can make accurate and quantitative assessments of the limb function of stroke patients. The Fugl-Meyer scale is used for evaluation with detailed content, is closely related to the patient's daily activities, and can change the patient's abnormal movement patterns. Intuitive reflection^[5].

The Berg Balance Scale is divided into 14 sub-items.

Each item has a minimum score of 0 and a maximum of 4 points. The minimum total score is 0 points, and the full score is 56 points. The higher the score of the scale, the better the patient's balance and can be accurate. Assess the patient's balance ability, which is suitable for clinical and scientific research applications^[3,6].

Modified Ashworth Scale (MAS) is a widely recognized clinical evaluation index. It is divided into 0-4 grades. The higher the grade, the higher the muscle tension. The grading standard is assessed by manual testing and subjective feeling. Spasms^[7].

2.4 Statistical Methods

The SPSS19.0 software package was used for statistical analysis. The following statistical methods are mainly used: 1) Describe the evaluation results of the FMA score and BBS score of the affected lower extremity before and after treatment with the mean and standard deviation of each group of samples. 2) The paired sample t test was used to compare the differences between the experimental group and the control group before and after treatment on the simplified FMA scale score and the BBS balance scale score of the affected side. 3) The independent sample t test was used to compare the difference between the experimental group and the control group before and after the treatment of the affected side of the lower extremity FMA scale score and the BBS balance scale score difference. 4) The paired sample t test was used to compare the difference between the FMA scale score and the BBS balance scale score of the affected side of the lower extremity before treatment in the experimental group and the control group. 5) The independent sample t test was used to compare the difference of the modified Ashworth scale score difference between the experimental group and the control group before and after treatment.

3. Results

The FMA, BBS scores and modified Ashworth grading data before and after treatment in the experimental group and the control group are as follows. See Table 2, 3, 4.

There was no significant difference in FMA, BBS scores and modified Ashworth scores between the two groups of patients before treatment ($P>0.05$); after 2 weeks of treatment, the FMA and BBS scores of the two groups of patients were significantly higher than before treatment ($P<0.05$). The difference in FMA and BBS scores of the experimental group was higher than that of the control group ($P<0.05$), and the reduction of muscle tension in the experimental group was higher than that of the control group ($P<0.05$), indicating that exercise therapy combined

Table 2. FMA score results of experimental group and control group ($\bar{x} \pm s$)

Group	Number of cases	before therapy	After treatment	Before and after difference	P value
Observation group	30	17.0 \pm 5.5	24.8 \pm 5.7	7.8 \pm 3.3	0.010
Control group	30	21 \pm 3.5	24.0 \pm 3.8	3.3 \pm 0.9	0.010
P value		0.085		0.010	

Note: P<0.05 is statistically significant.

Table 3. BBS score results of experimental group and control group ($\bar{x} \pm s$)

Group	Number of cases	before therapy	After treatment	Before and after difference	P value
Observation group	30	12.5 \pm 15.0	20.5 \pm 14.5	8.0 \pm 2.9	0.010
Control group	30	15.5 \pm 3.5	19.5 \pm 18.1	3.7 \pm 0.8	0.010
P value		0.108		0.010	

Note: P<0.05 is statistically significant.

Table 4. BBS score results of experimental group and control group ($\bar{x} \pm s$)

Group	Number of cases	before therapy	After treatment	Before and after difference	P value
Observation group	30	1.9 \pm 0.2	1.4 \pm 0.3	-0.6 \pm 0.32	0.010
Control group	30	1.9 \pm 0.2	1.7 \pm 0.3	-0.2 \pm 0.26	0.037
P value		1.00		0.011	

Note: P<0.05 is statistically significant.

with gait inducing function electrical stimulation or computer mid-frequency functional electrical stimulation can significantly reduce the ankle plantar flexor muscle tension in patients with stroke and foot drop, improve the motor function and balance function of the lower limbs, and combine with gait-induced functional electrical stimulation to have a better therapeutic effect.

4. Discussion

4.1 Current Status of Foot Drop in Stroke Patients

In recent years, the incidence of stroke is getting higher and higher, and the age of onset is getting younger and younger, but the treatment of stroke is not as optimistic as expected. Although the walking pattern of more than 80% of stroke patients will be greatly improved, about 20% of stroke patients will have foot drop and varus problems, which are likely to cause circle gait. The circular gait is due to insufficient hip flexion and knee flexion during the swing phase, and hip flexion and knee flexion are accompanied by abduction and external rotation of the hip joint, while weakness of the tibialis anterior and peroneus brevis muscles and foot drop cause the foot to drag the floor. The long-term use of this inefficient and abnormal walking pattern can easily lead to slower walking speed, shorter step length, excessive physical exertion, and decreased walking stability and safety. Due to the lack of

adequate ankle dorsiflexion, the feet cannot fully touch the ground when walking, which can easily lead to inefficient gait and increase the risk of falls. Many patients want to walk down the ground due to premature walking training, but its function has not reached this level, which will also make the symptoms of foot drop and inversion more obvious. Therefore, improving foot drop, correcting ankle varus deformity, thereby enhancing gait rhythm and stability, helping to establish a normal walking pattern, is of great significance for the rehabilitation of stroke patients.

4.2 Reasons Why the Two Types of Functional Electrical Stimulation Have Therapeutic Effects for Patients with Foot Drop after Stroke

Rehabilitation treatment methods currently used in clinical practice include: conventional sports training, functional electrical stimulation treatment, ankle-foot orthosis treatment, intramuscular sticking treatment, surgical treatment, etc. Previous studies have shown that long-term use of functional electrical stimulation can have a good therapeutic effect because functional electrical stimulation can strengthen the residual corticospinal tract connections in stroke patients. In short, long-term sensory stimulation and walking training can activate the remaining corticospinal tract connections, thereby increasing the strength of the tibialis anterior and peroneal

brevis muscles and the self-control ability of the ankle joint^[8]. Wang Guili^[9] and other studies have shown that gait-induced functional electrical stimulation can further promote the recovery of lower limb motor function and balance function in patients with stroke, foot drop and varus. In this experiment, the control group used computer mid-frequency functional electrical stimulation, and the experimental group used XFT-2001D foot drop walker to treat the symptoms of foot drop in stroke patients. The FMA and BBS scores of the patients in both groups were obtained before and after treatment. The significant improvement $P < (0.05)$ also confirmed that the foot drop walker treatment has a good effect on improving the ankle dorsiflexion disorder of patients with foot drop after stroke.

4.3 The Mechanism of Action of the Foot Drop Walker on Improving the Ankle Dorsiflexion Function of Stroke Patients

Clinically, when using computer mid-frequency functional electrical stimulation to induce ankle dorsiflexion activities, patients often adopt the lying or sitting position, which is more passive stimulation, and it is difficult for patients to participate in active ankle dorsiflexion exercises. The foot drop walking aid can be carried out at the same time as walking training. The patient actively contracts the tibialis anterior muscle to produce ankle dorsiflexion during the walking swing period and avoids dragging the lower limbs. At this time, the foot drop walker can perform on the tibialis anterior muscle. Functional electrical stimulation causes more pronounced ankle dorsiflexion. The foot drop walking aid has the effect of instantly correcting foot drop. It can improve the walking pattern by stimulating the common peroneal nerve through functional electrical stimulation to induce ankle dorsiflexion. On the other hand, long-term functional electrical stimulation can produce physiological effects on the ankle joint. The changes can increase the strength of the ankle dorsi flexor muscle, the control of the ankle joint, and the degree of motion of the ankle joint. Even if the device is closed, some therapeutic effects can be produced when the device is closed. Long-term sensory stimulation and walking training can activate the remaining corticospinal tract connections, thereby increasing the muscle strength of the tibialis anterior and peroneus brevis and the self-control ability of the ankle joint. Therefore, people can walk faster and safer without using the foot drop walking aid.

Li Wei^[10] and others have shown through research that the foot drop walker has a significant therapeutic effect on reducing the abnormal muscle tension of the

three heads of the calf in children with spastic cerebral palsy, thereby improving the ankle dorsiflexion function of the children. In this experiment, the reduction of calf triceps muscle tension in the experimental group was significantly higher than that in the control group ($P < 0.05$), indicating the therapeutic effect of the foot drop walking aid in reducing calf triceps muscle tension and improving ankle dorsiflexion function. It is better than computer mid-frequency functional electrical stimulation.

4.4 The Influence of Foot Drop Walking Aids and Computer Intermediate Frequency Treatment Devices on the Balance of Stroke Patients with Foot Drop

When walking, a stable contact surface and support surface cannot be formed, resulting in unstable weight bearing on the affected side in the early stage of support, increasing the risk of falling, and reducing the patient's balance function. Both foot drop walking aids and computer mid-frequency functional electrical stimulation can improve the patient's balance during walking by improving the patient's ankle motion control. As early as 1961, Liberson^[11] and others used functional electrical stimulation to successfully treat the foot drop gait of patients with hemiplegia. A clinical randomized study^[12] pointed out that functional electrical stimulation combined with walking training can improve the safety and stability of walking in stroke patients with foot drop.

However, when a patient with foot drop after a stroke uses computer intermediate frequency functional electrical stimulation to stimulate the tibial anterior muscle to induce ankle dorsiflexion, the electrode sheet is easy to fall and the equipment is limited, so it is impossible to walk on the patient. While training, stimulate the ankle dorsiflexion and valgus movements, and give timely stimulation during the appropriate walking cycle. The foot drop walking aid, as a convenient and portable functional electrical stimulation device, can timely send out electric signals to stimulate the common peroneal nerve during different walking cycles of the patient, and stimulate the tibialis anterior muscle and the peroneus brevis muscle in a more timely and appropriate manner. To create a more three-dimensional walking experience for the patient, and the patient's dynamic balance function is also significantly improved. In this study, patients reported that their walking stability has been improved after wearing a foot drop walker. Through the treatment of foot drop walker, patients with stroke and foot drop can complete a safer, more natural and stable walk.

Domestic Yan Tiebin^[13] and others have also done clinical research on the application of FES, but the postures adopted by patients during treatment are sitting and lying positions, which do not fully meet the definition of functional electrical stimulation. Liu Cuihua^[14] and others reported that gait-induced functional electrical stimulation can significantly increase the patient's walking speed and reduce physical energy consumption. Huang Guozhi^[15] and others have shown through research that the foot drop walker can improve the safety, independence and stability of walking in stroke patients. In this experiment, comparing the control group who used the foot drop walking aid for treatment and the observation group who used computer mid-frequency functional electric puncture, the BBS scores before and after treatment were poor, and it was found that the effect of the experimental group was better than that of the control group ($P < 0.05$), indicating that the foot drop walking aid is better than the computer intermediate frequency treatment device in improving the balance function of stroke foot drop.

4.5 Advantages of Foot Drop Walking Aids in Community Rehabilitation of Stroke Patients

The XFT-2001 foot drop walking aid is small in size, does not affect the appearance, and is mild in stimulation. It can be continuously stimulated for a long time. It is more convenient to carry than the computer's mid-frequency functional electrical stimulation. In this experiment, the patient had no resistance to the foot drop walking aid. In addition, the price of the XFT-2001 foot drop walking aid is only half of the computer intermediate frequency therapy device, which can reduce the family burden of patients who want to go back to their homes for community rehabilitation.

On the one hand, the foot drop walking aid includes improving the movement function of the patient's ankle joint and correcting the abnormal walking pattern. On the other hand, the patient can use the foot drop walking aid to walk safely and independently in the family and community, prompting the patient to walk. Return to family and society as soon as possible.

In our clinic, the frequency of use of computer intermediate frequency therapeutic devices is more extensive than that of foot drop walking aids. The main reason is that the use of foot drop walking aids has not been promoted in China, and many people do not know the effect of its use. Therefore, we need to increase our publicity so that patients can get better and more effective treatment.

5. Conclusions

Both gait-induced functional electrical stimulation and computer intermediate-frequency functional electrical stimulation can significantly improve the function and balance of the lower limbs of patients with stroke and foot drop. The therapeutic effect of gait-induced functional electrical stimulation is better than that of computer intermediate frequency functional electrical stimulation. In addition, it has a compact size, does not affect the aesthetics, is mildly stimulated, and can be continuously stimulated for a long time. It is more convenient to carry than neuromuscular electrical stimulation, and can be used at the same time during walking, so it is worthy of promotion.

References

- [1] O'Dell, M.W., Dunning, K., Kluding, P., et al., 2014. Response and prediction of improvement in gait speed from functional electrical stimulation in persons with poststroke drop foot. *PM&R*. 6(7), 587-601.
- [2] Bethoux, F., Rogers, H.L., Nolan, K.J., et al., 2014. The effects of peroneal nerve functional electrical stimulation versus ankle-foot orthosis in patients with chronic stroke: a randomized controlled trial. *Neurorehabil Neural Repair*. 28(7), 688-697.
- [3] Begg, R.K., Tirosh, O., Said, C.M., et al., 2014. Gait training with real-time augmented toe-ground clearance information decreases tripping risk in older adults and a person with chronic stroke. *Front Hum Neurosci*. 8(3), 471-475.
- [4] Xiao, F.N., Lin, Ch.Sh., 2016. The effect of foot drop stimulator on lower limb motor function of patients with stroke and foot drop. *Practical Integrated Traditional Chinese and Western Medicine*. (06), 43-45.
- [5] Shen, F., 2011. Application of Fugl-Meyer Scale in the Evaluation of Rehabilitation Efficacy of Stroke Rehabilitation in Community. *Proceedings of the Fifth Academic Conference of China Disabled Rehabilitation Association*. 405-407.
- [6] Weng, Ch.Sh., Wang, J., Wang, G., et al., 2007. Conceptual validity of the Berg balance scale in stroke patients. *Chinese Journal of Rehabilitation Medicine*. 11, 974-977.
- [7] Deng, S.Y., Lu, Q., Xi, Sh.Y., et al., 2016. Research on the correlation between isokinetic test indexes and modified Ashworth scale for ankle spasticity assessment. *Chinese Rehabilitation Theory and Practice*. 02, 178-183.
- [8] *Neurorehabilitation and Neural Repair* 27(7) 579-

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DOI: <https://doi.org/10.1177/1545968313481278>.

- [9] Wang, G.L., Jia, J., 2016. Observation on the efficacy of functional electrical stimulation in the treatment of stroke with foot drop and varus. *Chinese Rehabilitation*. 06, 434-437.
- [10] Li, W., Zhang, R., Luo, Y.L., et al., 2013. Observation on the effect of gait-induced functional electrical stimulation on improving lower limb motor function in children with spastic diplegic cerebral palsy. *Chinese Journal of Rehabilitation Medicine*. 28(12), 1126-1130.
- [11] Liberson, W.T., Holmquest, H.J., Scot, D., et al., 1961. Functional elec-trotherapy: stimulation of the peroneal nerve synchronized with the swing phase of the gait of hemiplegic patients. *Archives of Physical Medicine and Rehabilitation*. 42, 101-105.
- [12] Embrey, D.G., Hohz, S.L., Alon, G., et al., 2010. Functional electrical stimulation to dorsiflexors and plantar flexors during gait to improve walking in adults with chronic hemiplegia. *Arch Phys Med Rehabil*. 91(5), 687-696.
- [13] Yan, T., Hui-chan, C.W., Li, L.S., 2005. Functional electrical stimulation improves motor recovery of the lower extremity and walking ability of subjects with first acute stroke:a randomized placebo-controlled trial. 36(1), 80-85.
- [14] Liu, C.H., Zhang, P.D., Rong, X.Ch., et al., 2011. Observation on the effect of gait-induced functional electrical stimulation on stroke patients with foot drop. *Chinese Journal of Rehabilitation Medicine*. 26(12), 1136-1139.
- [15] Shan, Sh.R., Huang, G.Zh., Zeng, Q., et al., 2013. The effect of gait-induced functional electrical stimulation on gait spatiotemporal parameters in patients with foot drop after stroke. *Chinese Journal of Rehabilitation Medicine*. 28(6), 558-563.

Hemichorea Associated with Non-ketotic Hyperglycemia: A Case Report and Review of the Literature

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ABSTRACT

Hemichorea associated with non-ketotic hyperglycemia (HC-NH) is a rare disease. The purpose of this case report is to introduce a patient with HC-NH and provide a schedule of examination and follow-up treatment. We also reviewed the current understanding of pathophysiology and treatment and how to apply it to our patients. The case involved a 37-year-old Asian diabetic man who had a 9-day history of losing movement in left limbs and face. His initial blood glucose level was 10.13 mmol/L. HbA1c was 13.6%. Before admission, head CT scan showed suspicious small pieces of left brainstem with slightly high-density shadow and right putamen nucleus with high-density shadow. On the day of admission, head MRI showed punctate T1WI low signal shadow, T2WI high and low mixed signal shadow, T1WI high signal shadow and T2WI low signal shadow of right putamen nucleus. The case findings were consistent with his displayed motor pattern and with the HC-NH diagnosis. Gradual control of the blood glucose levels alleviates his choreiform symptoms. The endocrinology follow-up 6 months after discharge found that his symptoms did not recur after the outpatient's medication compliance was improved. HC-NH is a rare manifestation of poor diabetes control, but it should also be noticed by clinicians. Early recognition and gradual treatment of elevated blood glucose levels seem to completely alleviate choreiform symptoms.

1. Introduction

Chorea is brief, quasi-purposeful, irregular muscle contractions, not repetitive or rhythmic, but flows from one muscle to the next and athetosis is slow, writhing,

continuous movements of distal extremities (chiefly the fingers). Metabolic causes have been documented earlier, not worthy of that being Diabetes. Choreoathetosis has been reported earlier in elderly women. We now report a

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case of hemichoreoathetosis in an Asian male diabetic.

2. Case Presentation

A 37-year-old Asian male presented to our hospital on 29 May 2017 with a 9-day history of acute-onset choreoathetoid movements affected his left limbs and facial muscles. As explained by the patient, the movements were persistent, aggravated with mental strain, and disappeared during sleep. It prevented him from performing his normal daily activities. His medical history included hypertension and weakness in the right limbs from a brainstem hemorrhage which occurred approximately six months prior to the current presentation. He had been diagnosed with diabetes mellitus half a year ago, but was not on any treatment. There was no other relevant past history and family history. The patient had prescriptions for Nifedipine, Irbesartan and Arotinolol. He was not taking any anti-psychotic or anti-seizure medications.

On physical examination, he was revealed to be conscious, had slurring of speech and had repetitive shrugs and rapid swing of his left limbs with no limb weakness, nystagmus or other cerebellar signs. Due to which, the heel-knee-tibia test and finger-nose test could not be performed accurately on his left side. The rest of the nervous system examination was normal.

Common causes of chorea in adult (Sydenham chorea, chronic progressive chorea, acanthocytosis, neoplastic disorders, ischemic or hemorrhagic stroke, and drug toxicity) were considered and were ruled out by appropriate investigations. On admission, his vital signs were as follows: height, 174 cm; weight, 74 kg; blood pressure, 138/92 mmHg; pulse rate, 72 beats/min;

and body temperature, 36.6 °C. No abnormal chest or abdominal findings or edema in his lower extremities were identified on a physical examination. On a laboratory examination, his blood urea nitrogen, and creatinine levels were all elevated. Laboratory examinations on admission showed poorly controlled diabetes mellitus. His fasting blood glucose and hemoglobin levels were 10.13 mmol/L (normal range:3.9-6.1) and 13.6% respectively, urine glucose (++++), and urine ketone (-)(see Table). Renal function tests revealed renal insufficiency. Full blood count, liver function tests, inflammatory markers, thyroid function tests, myocardial enzymogram, blood coagulation, immune index, homocysteine, urine protein electrophoresis, anti-neutrophilic cytoplasmic antibodies and electrocardiogram were normal. A cranial CT scan (29 May 2017) revealed a hyperdense area in the right putamen but no evidence of any acute intracranial pathology (see Figure 1). Brain MRI on day 1 showed high signal intensity on T1-weighted images and low signal intensity on T2-weighted in the same region in addition to the old hemorrhagic sequel lesion. This finding is classic for hyperglycemia-induced hemichorea syndrome.

Based on the above results, the hemichorea induced by the diabetic nonketotic hyperosmolar state was diagnosed. He was started on insulin and good glycemic control was achieved on day 4. The clinical improvement of his condition was correlated to better hyperglycemic control. A week later, the abnormal movements disappeared completely. The patient refused to have a follow-up brain MRI. During his 6 months of follow-up, the patient's blood sugar level was 10 mmol/L and chorea did not recur.

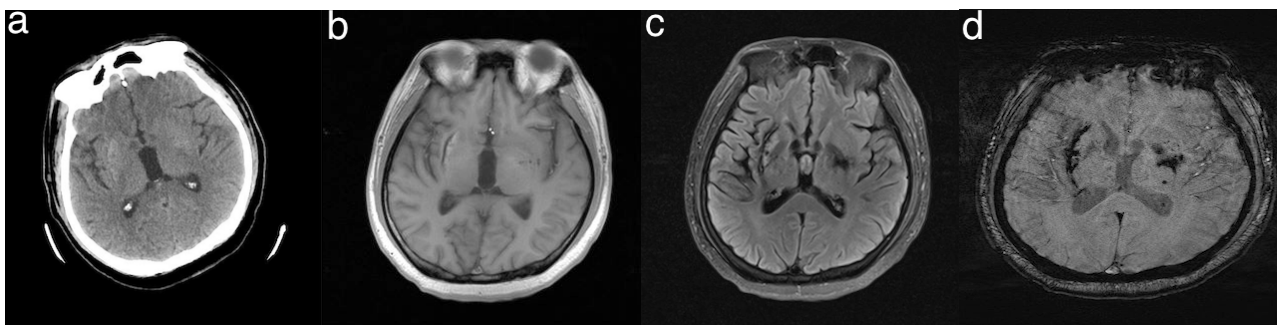


Figure 1. a: Cranial CT shows slight hyperdensity of the right putamen; b: MRI T1-weighted image shows remarkable hyperintensity of the right putamen; c: MRI T2-weighted image shows heterogeneous hyperintensity of the right putamen; d: SWI shows slight hyperintensity of the lesion

Table 1. Laboratory Findings on Admission

Hematology and biochemistry			
WBC	$6.46 \times 10^9 /L$	BUN	15.37 mmol/L
RBC	$4.1 \times 10^9 /L$	Cr	273.7 $\mu\text{mol/L}$
Hb	125g/L	Na	140.0 mmol/L
Plt	$155 \times 10^9 /L$	K	4.5 mmol/L
Tp	61.6 g/L	CL	110 mmol/L
T-Bil	16.7 $\mu\text{mol/L}$	CK	289 U/L
AST	30.7 U/L	Amy	98 IU/L
ALT	28.3 U/L	NT-pro BNP	187 pg/mL
LDH	235 U/L	Glu	10.13 mmol/L
ALP	81.9 U/L	HbA1c	13.6 %
γ -GTP	52.1 U/L	eGFR	46 mL/min/1.732
ChE	5.8 U/L	D-dimer	1.3 $\mu\text{g/mL}$
Urinalysis: pH 5.5 Glucose (++++Protein (-) Occult blood (-)Acetone body (-)			

3. Discussion

Hemichorea associated with non-ketotic hyperglycemia (HC-NH) is a rare movement disorder which was first described in 1960^[1]. It is observed in type 2 diabetes and is very rare in patients with type 1 diabetes and diabetic ketoacidosis (DKA). It occurs predominantly in elderly diabetics with unsatisfactory blood glucose control, and women more often than men^[2], which could be related to an underlying genetic predisposition^[3]. In a meta-analysis of 53 patients^[4], mean age was reported as 71 years, while male to female ratio was 1:1.8. A systematic review included 286 patients showed that women and non-ketotic hyperglycemia (NKH) patients were the most frequently affected (63% and 92%, respectively)^[5]. Chorea is a relatively uncommon neurological manifestation of diabetes mellitus. Chang CV et al.^[6]. Reported 3 cases of new-onset chorea-ballism induced by NKH, highlighting that chorea may be the first manifestation of undiagnosed decompensated diabetes mellitus.

Most patients with chorea associated with NKH have acute or subacute limb involuntary movement (more common on one side), and sometimes involuntary movements of facial muscle, chin, and tongue, accompanied by severe increase in blood glucose and negative ketones in urine. The typical manifestation of NKH chorea is triad: non-ketotic hyperglycemia, hemichorea, and basal ganglia shows high signal in MRI T1 scan or high density in CT scan^[7]. In examining this patient, we regarded this as a case of HC-NH due to the unilateral choreoathetotic movement, hyperglycemia on presentation with poor glycemic control, and absent urine ketones, contralateral T1 hyperintensity in the putamen with no restriction on the ADC map, and the absence of

other metabolic derangements.

In general, diabetic lateral chorea caused lesions in the striatum^[8]. The development of putamen lesions is unchanged, and there are similar lesions are observed in globus pallidus and caudate nucleus. Neurodegenerative diseases that cause basal ganglia injury include Huntington's disease, spinocerebellar degeneration, such as dentatorubral pallidoluysian atrophy, and Creutzfeldt-Jakob disease, which involves elevated ubiquitin levels. These two neurological diseases are progressive in nature, and the treatment has not been determined. These diseases were also excluded because the patient's symptoms improved. Globus pallidus lesions can also be caused by carbon monoxide poisoning; in this case, the lesion shows low signal intensity on T1-weighted images. Other diseases particularly associated with diabetes include mitochondrial diseases, Stiff-syndrome caused by decreased GABA activity, and myoclonus caused by muscular atrophy of diabetes. The 3243 point mutation in mitochondrial DNA nucleotide sequence is associated with family history of diabetes, and is also observed in mitochondrial encephalomyopathy, lactic acidosis and stroke like episodes (MELAS). It is reported that there is ataxia in MELAS with diabetes mellitus. MELAS showed cerebral infarction like lesions in the occipital region. Stiff-person syndrome is characterized by epileptic muscle spasm in the muscles of the trunk and proximal limbs, which spreads to the whole body within a few months. In our patients, involuntary movement was only present in the left upper and lower limbs; Therefore, Stiff-person syndrome was also excluded.

There are characteristic radiographic manifestations under normal circumstances: the contralateral striatum in MRI T1-weighted show high signal changes and equal

or low signal in MRI T2-weighted, mostly high-density changes in head CT ^[9]. The radiological abnormalities are completely reversible^[10]. Despite characteristic imaging findings and clinical manifestations, the underlying mechanism is still unclear. Positron emission tomography (PET) studies were performed in 3 patients at 3 weeks, 5 weeks, and 7 months after clinical onset, showed the markedly reduced rates of cerebral glucose metabolism in the corresponding lesions on MRI T1-weighted^[11]. Additionally, proton MR spectroscopy (MRS) was performed and revealed a decreased N-acetylaspartate/creatine and N-acetylaspartate/choline ratio, indicating neuronal damage of the contralateral putamen ^[12]. Findings of the patients' brain have produced an argue about the pathology. In our patient, we can find the contralateral T1 hyperintensity in the putamen. The putamen showed multiple foci of recent infarcts associated with interneuronal response and reactive astrocyte. This suggests a reaction to microinfarction. But histologic examination of the cerebral tissue was obtained some time. There was no blocked vessels. Therefore, histological studies related to brain MRI results are still inconclusive. This requires further research through pathological studies including a large number of patients.

In addition, as mentioned above, few patients have a negative performance on MRI or CT scan. Most patients with this condition have a good prognosis. Controlling blood glucose is the most important treatment. With the decline of blood glucose level, some patients' involuntary movements can be alleviated. To date, only a few negative imaging cases have been reported by other researchers ^[13]. According to the current reported cases, we believe that the syndrome can be divided into 2 types: diabetes, ketone negative, hyperglycemia, unilateral or bilateral chorea, while typical imaging changes in head MRI or CT scan are the most common type, and diabetes, hyperglycemia, ketone negative, unilateral or bilateral chorea and negative imaging changes are relatively rare types. We wish to emphasize that NKH chorea with normal imaging can represent a subtype, although this subtype is not common.

At present, the specific mechanism of NKH chorea is not clear. The possible mechanism is that when hyperglycemia occurs, the metabolism of brain cells gradually changes to anaerobic metabolism due to the decrease of local cerebral blood flow and the failure of glucose metabolism. Then γ -aminobutyric acid (GABA) has become the main energy source of brain cells. Acetoacetic acid from ketosis patients can be used to synthesize GABA. GABA in patients with non-ketotic hyperglycemia is rapidly depleted due to lack of acetoacetic acid, so the normal activities of basal ganglia

are impaired ^[14]. Scine patients with NKH are prone to chorea.

The pathophysiology of chorea remains to be fully elucidated, but it is believed that it involves the destruction of the balance of neural network activities between the motor cortex and the basal ganglia, including metabolic disorders or structural damage in the subcortical nucleus, caudate nucleus, subthalamic nucleus and thalamus. Potential pathogenetic mechanisms include relative dopaminergic hypersensitivity, impaired synthesis of acetylcholine or gamma-aminobutyric acid, or an undefined effect of hyperosmolarity, perhaps unmasking a previously subclinical lesion of the basal ganglia. In previous studies, typical sites of hemichorea included subthalamic, striatum and basal ganglia ^[15]. Functional imaging revealed neuronal loss and dysfunction in many chorea syndromes, as well as changes in metabolism and presymptomatic dopaminergic dysfunction ^[16].

Because there are many causes of chorea, the treatment is very challenging. Doctors should collect comprehensive medical history, including medication history of potential pathogens and recent history of streptococcal infection, and examine the nervous and mental systems of patients with symptoms ^[17]. Neuroimaging, gene detection and laboratory examinations can confirm the suspected diagnosis of chorea. Mild chorea may not need treatment ^[18]. Primary chorea can be treated with dopaminergic antagonists, including antipsychotics; However, side effects including Parkinson's disease and delayed syndrome ^[17]. Dopamine depletors that inhibit presynaptic dopamine release and block postsynaptic dopamine receptors are effective, especially in combination with dopamine antagonists ^[17]. In the treatment of secondary chorea, the main etiology should be solved. In diabetic chorea, blood glucose control should be optimized. If chorea is caused by drugs or toxicity, the pathogen should be withdrawn. Drugs for the treatment of primary chorea can be used to treat the symptoms of secondary chorea ^[17]. Surgical treatments such as pallidotomy and deep brain stimulation may also be an option ^[18].

However, not all HC-NH patients can prove this theory through extensive investigation, because of the cost of investigation, such as MRI. In this case, the most likely diagnosis can be obtained using clinical sensitivity and appropriate diagnostic methods. For this patient, combined with clinical history and investigation, other common causes of hemiplegia were excluded. A brain CT scan was performed to rule out other potential risk causes, such as stroke. MRI is undoubtedly the best diagnostic method; however, in some cases, this is not allowed due to accessibility and cost. Nevertheless, it should not be

a limiting factor for primary care doctors to make this diagnosis. Other clinical aspects of medical history and clinical findings can also be used to help diagnose. Due to the elusive nature of this report, clinicians can easily miss it. Therefore, clinicians must be vigilant and keep in mind that such abnormal exercise may occur in patients with poor long-term blood glucose level control, especially in the elderly in Asia. Patients need to be hospitalized for blood glucose normalization, and other potential causes must be excluded. Usually, once the blood glucose level drops to the normal range, abnormal exercise disappears or decreases significantly. However, complete remission varies within days, weeks and months after blood glucose normalization. In some cases, abnormal exercise may last more than a year.

Although this Hemichorea secondary to hyperglycemia is benign and usually has a good prognosis, it has a great impact on patients and their families. Because of this abnormal movement, patients feel disabled and painful, because most of their basic activities take longer to complete, and they need the help of other family members. This has also brought heavy losses to the families. In these cases, it is important to recognize the underlying causes, because correcting potential hyperglycemia usually can quickly alleviate the symptoms. Therefore, clinicians should be resourceful in dealing with patients' biological, psychological and social problems. This case demonstrates that uncontrolled diabetes can be seen as a rare disorder of movement. Being unfamiliar with these situations may lead the attending physician to attribute them to psychological or mental disorders. For all primary care doctors dealing with this common medical problem, a high degree of doubt is necessary.

References

- [1] Bedwell, S.F., 1960. Some observations on hemiballismus. *Neurology*. 10, 619-22.
- [2] Postuma, R.B., Lang, A.E., 2003. Hemiballism: revisiting a classic disorder. *Lancet Neurol*. 2(11), 661-668.
- [3] Kranick, S.M., Price, R.S., Prasad, S., et al., 2008. Clinical reasoning: a 52-year-old woman with subacute hemichorea. *Neurology*. 71(20), e59-62.
- [4] Oh, S.H., Lee, K.Y., Im, J.H., et al., 2002. Chorea associated with non-ketotic hyperglycemia and hyperintensity basal ganglia lesion on T1-weighted brain MRI study: a meta-analysis of 53 cases including four present cases. *J Neurol Sci*. 200(1-2), 57-62.
- [5] Gomez-Ochoa, S.A., Espin-Chico, B.B., Pini-la-Monsalve, G.D., et al., 2018. Clinical and neuroimaging spectrum of hyperglycemia-associated chorea-ballism: systematic review and exploratory analysis of case reports. *Funct Neurol*. 33(4), 175-187.
- [6] Chang, C.V., Felicio, A.C., Godeiro Cde, O., Jr., et al., 2007. Chorea-ballism as a manifestation of decompensated type 2 diabetes mellitus. *Am J Med Sci*. 333(3), 175-177.
- [7] Bizet, J., Cooper, C.J., Quansah, R., et al., 2014. Chorea, Hyperglycemia, Basal Ganglia Syndrome (C-H-BG) in an uncontrolled diabetic patient with normal glucose levels on presentation. *Am J Case Rep*. 15, 143-146.
- [8] Nakajima, N., Ueda, M., Nagayama, H., et al., 2014. Putaminal changes before the onset of clinical symptoms in diabetic hemichorea-hemiballism. *Intern Med*. 53(5), 489-491.
- [9] Zaitout, Z., 2012. CT and MRI findings in the basal ganglia in non-ketotic hyperglycaemia associated hemichorea and hemi-ballismus (HC-HB). *Neuroradiology*. 54(10), 1119-1120.
- [10] Lin, J.J., Lin, G.Y., Shih, C., et al., 2001. Presentation of striatal hyperintensity on T1-weighted MRI in patients with hemiballism-hemichorea caused by non-ketotic hyperglycemia: report of seven new cases and a review of literature. *J Neurol*. 248(9), 750-5.
- [11] Hsu, J.L., Wang, H.C., Hsu, W.C., 2004. Hyperglycemia-induced unilateral basal ganglion lesions with and without hemichorea. A PET study. *J Neurol*. 251(12), 1486-1490.
- [12] Achilles, E.I., Maus, V., Fink, G.R., et al., 2016. [Hemichorea with Contralateral High Signal Intensity Putaminal Lesion on T1-Weighted Images in Non-Ketotic Hyperglycemia]. *Fortschr Neurol Psychiatr*. 84(4), 222-225.
- [13] Branca, D., Gervasio, O., Le Piane, E., et al., 2005. Chorea induced by non-ketotic hyperglycaemia: a case report. *Neurol Sci*. 26(4), 275-277.
- [14] Cheema, H., Federman, D., Kam, A., 2011. Hemichorea-hemiballismus in non-ketotic hyperglycaemia. *J Clin Neurosci*. 18(2), 293-294.
- [15] Chung, S.J., Im, J.H., Lee, M.C., et al., 2004. Hemichorea after stroke: clinical-radiological correlation. *J Neurol*. 251(6), 725-729.
- [16] Ehrlich, D.J., Walker, R.H., 2017. Functional neuroimaging and chorea: a systematic review. *J Clin Mov Disord*. 4, 8.
- [17] Bhidayasiri, R., Truong, D.D., 2004. Chorea and related disorders. *Postgrad Med J*. 80(947), 527-534.
- [18] Pandey, S., Chorea, J., 2013. *Assoc Physicians India*. 61(7), 471-4, 483.

Analysis of the Association between Intestinal Microflora and Long-lived Elderly People

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ABSTRACT

The intestinal microbiota is the cornerstone of the human intestinal microecosystem and plays an unnegligible role in the growth and health maintenance of the human body. In recent years, many studies have been committed to exploring the potential connection of gut flora and the elderly population. The changes of gut flora are affected by various factors such as age increase, disease, medication, living habits, nutritional structure, and the intestinal flora is expected to be applied to the comprehensive evaluation of elderly health and longevity in the future. Based on this, the research progress of the general elderly and its related influencing factors.

1. Introduction

Microbes symbiotic with human body play an important role in the metabolic activities of human body, and the common pain coding of human innate genes and gut flora is involved in the completion of human metabolism. It is extremely difficult to change the metabolic characteristics by changing human genes, but the change of gut flora genes is specific and ethical. Therefore, the human intestinal flora has become the focus of research in health and longevity, prevention and solution of diseases. There are a gastrointestinal tract of tens of thousands of intestinal bacteria symbiotic with the human body. They significantly affect the absorption and metabolism of nutrients, human immune regulation, and

the spread of intestinal infectious diseases, which will then significantly affect human health and life span. The gut flora is a special organ of the human body, constantly changing with age, dietary structure and environmental factors. Therefore, the intestinal microecological communities of long-lived elderly people may have unique characteristics and can provide a reference for exploring the intrinsic mechanisms of longevity.

2. Characteristics of the Intestinal Flora of the General Elderly Population

Regarding the composition of the elderly intestinal flora, the academic classification basis and results now differ at the genus level, but the bacterial phyla classification

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level results are more consistent^[1-3]. The levels of the gut flora are mainly Bacteroides (Bacteroidetes) and Firmicutes (Firmetes), which constitute the vast majority of the human gut microbiota. In contrast to the adult gut microbiota, most older populations had higher gut Bacteroidetes content than phylum Firmetes. Different schools of theories have different opinions, and the mainstream theory in the scientific community believes that the elderly gut flora is Bacteroides (Bacteroides), Plucella type (Prevotella) are common and play an important metabolic role in the elderly population. Bacteroides types are generally coborn in the digestive and respiratory tract of humans and animals. He can break down the protein or glucose in the gut, produce acids to promote absorption, and a few species can also produce dark black pigment. The molecular content of G+C is more than half in DNA. A recent study on European Journal of Nutrition, classifying the gut flora of 99 healthy individuals based on the Prevotella / Bacteroides ratio, found that ratios did not affect the metabolic response to barley kernel bread but could be beneficial for metabolic regulation of the host^[4,5].

3. Characteristics of the Intestinal Flora of Long-living Elderly People

Long-lived populations are the best model to reveal the relationship between complex human and environmental interactions and aging health, where natural long-lived populations may help explore the symbiotic states and associations of more realistic host and flora. Longevity flora research mainly involves four countries: Italy, Japan, South Korea and China. The main differences between longevity flora research in China and other countries are that most of the longevity population specimens collected in China are from natural longevity population specimens, while the elderly groups in other developed countries are from advanced groups under high-end medical care, and the number of groups is inconsistent, so the results of longevity flora research vary greatly. The intestinal flora of Clostridium_XIVa, Ruminococcaceae and centenarians in Dujiangyan and Ya'an considered the composition of Akkermansia as significant characteristic vectors of longevity traits, and the Chao coefficient and OTU number of centenarians were higher than in the adult group. However, Faecalibacterium and Akkermansia abundance in Chinese Bama centenarians were smaller than younger controls, and Escherichia and Methanobrevibacter abundance were higher than young controls. In addition, studies have confirmed that the centenarians' intestinal butyrate bacteria are mainly Anaerotruncus colihominis and F.prausnitzii and other populations are mostly of Rumi

nococcusobeum, Roseburia intestinalis et al.^[6].

4. Analysis of Related Factors Influencing the Gut Flora in the Elderly Population

4.1 Effect of Age on the Gut Flora

Elderly flora with age showed enhanced heterogeneity and short-term stability in individual, which gradually changed with age with no significant temporal segmentation points. Gut flora heterogeneity in older groups refers to the large difference of specific flora among individuals. 187 elderly gut flora sequencing shows Bacteroidetes composition of 3%~92%; 7%~94% Firmicutes; Proteobacteria content of 11%~23%, much above average content. This heterogeneity reflects the large difference in health status of older individuals^[7-12]. Similar to adults, the intestinal flora of older individuals is more stable in the short term. For example, the magnitude of intestinal flora change within 3 months is still smaller than the inter-individual flora difference of^[13]. To sum up, the intestinal flora with different races, number and clustering method clustering units, but the change law is generally: the young core flora with aging and with intestinal small abundance flora proliferation to form a new old core flora, so the overall core flora in the gut is not big, individual core flora alternately.

4.2 Relationship between Chronic Diseases for the Elderly and Intestinal Flora

4.2.1 The Relationship between Senile Weakness and Intestinal Flora

At present, elderly debilitating is mainly through exercise and dietary nutrition interventions, in which "diet-flora-debilitating" constitutes three elements of the interaction, in which flora can be used as a marker of early debilitating assessment. Deuotion was found negatively correlated with flora α diversity, and Eubacterium dolichum and Eggerthella lenta may be risk factors for the debilitating state, while Faecalibacterium prausnitzii is its protective factor. Similar to the above studies, the number of Lactobacillus decreased 25-fold, and the content of Bacteroides/Prevotella and Faecalibacterium prausnitzii also decreased with the debilitating state.

4.2.2 The Relationship between Chronic Diseases and Gut Flora

Chronic elderly diseases include cardiovascular disease, diabetes, chronic obstructive pulmonary disease, etc. Elderly people often coexist with multiple chronic diseases and take multiple drugs, which has a great impact

on the intestinal flora. Therefore, there is no flora research on chronic diseases in the elderly. It has been shown that one of the risk triggers of atherosclerosis may be trimethylamine oxide (Trimethylamine-Noxide,TMAO) produced after metabolism of intestinal flora. Type 2 diabetes may be related to^[14] in intestinal short chain fatty acids and secondary bile acid fermentation flora. The study of the elderly chronic bacteria group remains to be carried out, among which the strong individual heterogeneity and mixed multiple drugs in the elderly will be the biggest bottleneck of the later research.

4.2.3 Relationship between Senile Myopenia and Gut Microbiota

Myopenia is increased protein consumption and decreased anabolism, resulting in decreased muscle content, reduced activity and accompanied by physiological weakness to form. There is no direct evidence for the association of myopenia and intestinal microflora, and both muscle strength and fatigue were found to improve 13 weeks after intervention with prebiotic formula in people over 60 years. At present, there is a lack of muscle measurement incision suitable for Chinese population in the diagnosis of sarcopenia. Therefore, the diagnostic method of intestinal flora as a marker will supplement the diagnosis criteria of sarcopenia from the side^[15-17].

4.3 Relationship between Health and Longevity and Intestinal Flora

In terms of delaying aging, probiotics and their surface molecules in the intestinal flora, such as lipophosphatidic acid, can enhance the vitality of the antioxidant system, improve immune function, and relatively inhibit the expression of genes related to aging, and then play the effect of delaying aging. Ananthaswamy^A with isolated from intestinal fermentation of intestinal bacteria in healthy mice to natural aging mice continuous lavage for a month, after extracting mouse serum, liver and brain tissue and determine the content of related superoxide dismutase and peroxidase, found that HC group anti-aging index are significantly improved, the results show that lactic acid bacteria has antioxidant activity, can increase cell activity, delay aging^[18-21]. Healthy intestinal flora has important functions in promoting material metabolism, enhancing immune barrier, preventing and controlling diseases and delaying aging, among which the anti-aging function of intestinal probiotics is attracting more attention.

The intestinal flora maintains human homeostasis and prevention of disease by regulating absorption and

metabolism, but a single intestinal flora can not play the function of promoting longevity and health. The function of the intestinal flora in promoting healthy life depends on the diversity of the intestinal microflora, structural stability and balance. Since we can adjust the intestinal flora of the human body through scientific means, so that the intestinal flora becomes the “physiological control center” that we can go to operate and regulate. As a special organ of the human body, the function of the intestinal flora profoundly affects the human health and the occurrence of disease, and coordinates the life span of the human body. Future studies should combine more intestinal flora and long-lived elderly people, and then explore the more accurate internal connection between intestinal flora and human health and longevity, so as to provide a theoretical basis for life extension and health promotion.

References

- [1] Kundu, P., Blacher, E., Elinav, E., et al., 2017. Our gut microbiome: the evolving inner self. *Cell*. 171(7), 1481-1493.
- [2] Arumugam, M., Raes, J., Pelletier, E., et al., 2011. Enterotypes of the human gut microbiome. *Nature*. 506(7489), 516.
- [3] Biagi, E., Franceschi, C., Rampelli, S., et al., 2016. Gut microbiota and extreme longevity. *Current Biology*. 26(11), 1480-1485.
- [4] Jeffery, I.B., Lynch, D.B., 2016. Opposition and temporal stability of the gut microbiota in older persons. *ISME Journal*. 10(1), 170.
- [5] Claesson, M.J., Cusack, S.O., et al., 2011. Composition, variability, and temporal stability of the intestinal microbiota of the elderly. *Proc Natl Acad Sci USA*. 108(Suppl1), 4586-4591.
- [6] Ananthaswamy, A., 2011. Faecal transplant eases symptoms of Parkinson. *New Scientist*. 209(2796), 8-9.
- [7] Zeng Yi, 2011. Interdisciplinary Studies of Health Impact Factors on Aging. *Scientific Bulletin*. 56(35), 2929-2940.
- [8] Claesson, M.J., Jeffery, I.B., Conde, S., et al., 2012. Gut microbiota composition correlates with diet and health in the elderly. *Nature*. 488(7410), 178-184. DOI: <https://doi.org/10.1038/nature11319>.
- [9] La, D., CF M, RN C, et al., 2014. Diet rapidly and reproducibly alters the human gut microbiome. *Nature*. 505(7484), 559.
- [10] Han Xiaoyun, Deng Hong, Cai Yan, et al., 2009. Intestinal Microbiology and Chronic Diseases. *Chinese Journal of MicroEcology*. 21(11), 1039-1042.

- [11] Jackson, M.A., Jeffery, I.B., Beaumont, M., et al., 2016. Signatures of early frailty in the gut microbiota. *Genome Medicine*. 8(1), 8.
- [12] Li Lanjuan, 2009. Progress in infection microecology — Impact of intestinal microbiota on body metabolism. *Chinese Journal of MicroEcology*. 21.
- [13] Kamo, T., Akazawa, H., Suzuki, J., et al., 2017. Novel concept of a heart-gut axis in the pathophysiology of heart failure. *Korean Circulation Journal*. 47(5), 663-669.
- [14] Li, J., Zhao, F., Wang, Y., et al., 2017. Gut microbiota dysbiosis contributes to the development of hypertension. *Microbiome*. 5(1), 14.
- [15] Qin, J., Li, Y., Cai, Z., et al., 2012. A metagenome-wide association study of gut microbiota in type 2 diabetes. *Nature*. 490(7418), 55-60.
- [16] Jie, Z., Xia, H., Zhong, S.L., et al., 2017. The gut microbiome in atherosclerotic cardiovascular disease. *Nature Commun*. 8(1), 1-12.
- [17] Ticinesi, A., Lauretani, F., Milani, C., et al., 2017. Aging gut microbiota at the cross-road between nutrition, physical frailty, and sarcopenia: is there a gut-muscle axis? *Nutrients*. 9(12), 1303.
- [18] Zhao, L.P., Zhang, Ch.Y., 2010. Obesity-related structural dynamics and functional analysis of gut microbial communities. *Life Sciences*. 22(12), 1247-1251.
- [19] Clarke, S.F., Murphy, E.F.O., et al., 2014. Exercise and associated dietary extremes impact on gut microbial diversity. *Gut*. 63(12), 1913-1920.
- [20] Cristina, B., Julio, F.G., Leo, P., et al., 2016. Effect of a prebiotic formulation on frailty syndrome: a randomized, double-blind clinical trial. *IntJ MolSci*. 17(6), 932.
- [21] Young, V.B., Hayden, M.K., 2016. Environmental management in the gut: fecal transplantation to restore the intestinal ecosystem. *Infectious Diseases*. 48 (8), 593-595.

A Research on the Relationship between Intestinal Flora and Human Longevity

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ABSTRACT

The exploration of human life and health is advancing with the changes of the times. With the growth of age, the occurrence of chronic diseases of human immunity and organ system is frequent, which has a serious impact on human health. Genes, environment and other random factors determine the outcome of longevity, and intestinal flora is considered to be a decisive factor affecting human health and longevity, mainly because of its huge impact on human immunity, growth and development. The study of the relationship between intestinal flora and longevity is beneficial to improve the health status of the elderly and improve the overall life level of human beings, which has great scientific research value. This review will review the role of intestinal flora in longevity.

1. The Necessity of Intestinal Microbiota Studies in Longevity Studies

1.1 The Intestinal Flora of Normal People

Abundant microorganisms grow in the intestinal tract of the organism, especially bacteria, whose number varies from 500 to 1000 and reaches 10¹² to 10¹⁴. Among them, the number of genes existing in human body is only one hundredth of the number of genes owned by microorganisms, and the number is more than 9.87 million according to relevant data ^[1,2]. Intestinal flora is interdependent and interacts with each other to maintain

the ecological balance in the intestinal tract. It plays an important role in intestinal immunity, digestion and absorption, growth and development, and biological antagonism, etc., and constitutes an essential part of life ^[3]. Intestinal flora can be roughly divided into three categories: 1) Dominant flora: mainly obligate anaerobic bacteria, including *Bacteroides*, *bifidobacterium*, *Eubacter*, *lactobacillus*, etc., which can be colonized in the deep surface of intestinal mucosa and are beneficial to the health of the host, with low immunogenicity; 2) Opportunistic pathogens: most of them are facultative anaerobic bacteria, including *enterococcus* and *enterobacter*, which are not the dominant flora of the

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intestinal tract. They are symbiotic with the host and generally not infectious. When the human immune system is low or the intestinal flora is disturbed, it will cause harm to human health. 3) Pathogenic bacteria: they can swim on the surface of the intestinal lumen, and are less likely to colonize in the intestinal lumen for a long time. Most of them are passing bacteria, which will cause damage to human body only when the number reaches a certain level ^[4].

1.2 Intestinal Flora and Longevity

Longevity refers to people have a healthy constitution, to ensure the quality of life, and to get a longer life. Factors affecting human longevity are numerous and complex. In general, in addition to natural disasters, human-made disasters, disease, plague and other factors, there are genetic genes, nature, social, family, gender, disease, diet, lifestyle, psychological state and other factors ^[5]. Back in 1908, a scientist from Russia won the Nobel of “probiotics in the gut” and systematically expounded the association between “beneficial bacteria” and the secret of longevity ^[6]. They found that the human gut contains 10¹³-10¹⁴ microorganisms, which are mainly bacteria, and their total number is about 10 times that of human cells. The human gut flora is a complex system, mainly in Firmicutes, Bacteroides, proteobacteria, Actinobacteria and Wartinobacteria. However, with the development of science and technology, people gradually realize that the relationship between intestinal flora and human body is not only simple parasitic and parasitism, but also its complex relationship needs to be constantly explored ^[7,8]. The intestinal flora indirectly affects human health by affecting the immune system, causing related diseases, and affecting growth and metabolism, thus acting as a factor affecting human longevity ^[9].

2. The Effect of Intestinal Flora on Longevity

2.1 Intestinal Flora and the Immune System

Intestinal flora contributes to antigen exposure in early life and is one of the richest sources of early immune stimulation and adaptation ^[10]. The continuation of life and health is closely related to the normal functioning of the body's immune system. The diversity and sufficiency of intestinal flora in normal individuals play an indispensable role in the normal activation of the immune system, so as to ensure the normal progress of the body's life activities ^[11,12]. Innate lymphoid cells (ILCs) and T lymphocytes are widely distributed in the gastrointestinal mucosa, which play an important role in the regulation of intestinal flora and the function of the immune system.

At the same time, intestinal flora can also directly or indirectly regulate the growth and development of ILCs ^[13,14]. Nikolaeva by normal human and animal physiology such as gastrointestinal tract flora of live microorganisms extracted by drug made of probiotics applied in 60 days weaned 60 newborn calf and 45 days weaned 60 found on big white piglets injected extracted by gastrointestinal flora probiotics drug research object innate immune factors have along with the age and the characteristics of the activated ^[15]. Intestinal flora plays an important role in T lymphocyte polarization and function regulation. Studies have shown that TLR can be expressed in gastrointestinal epithelial cells to regulate intestinal flora, activate TLR2-4 and NF- κ B signaling pathways, secrete regulatory T cell polarizing cytokines, and specifically bind to B cell κ -light chain, thereby ensuring bacterial tolerance and maintaining normal immune function ^[16,17]. Intestinal flora is an important factor in the immune system of the body, which plays a crucial role in the homeostasis of the internal environment, life health and longevity.

2.2 Intestinal Flora and Chronic Diseases

The harm of chronic diseases is a major obstacle to ensuring the longevity and health of individuals. Intestinal flora is interdependent with the body and plays an indispensable role in maintaining the homeostasis of the body's internal environment and resisting the invasion of foreign pathogens ^[18]. Abstract: Intestinal flora plays an important role in the regulation of obesity in typical chronic diseases by promoting the production of short-chain fatty acids, reducing the content of fast-induced Adipose Factor (FIAF), and resisting chronic mild inflammatory response. To improve obesity and inflammation. However, long-term high-fat diet can still inhibit the improvement of intestinal microflora structure ^[19,20]. At the same time, the increase of gastrointestinal flora promotes the generation of short-chain fatty acid bacteria and plays a certain role in the hypoglycemic effect in the treatment of diabetes ^[21,22]. Studies have shown differences in gastrointestinal flora such as Bacteroides and actinomycetes between diabetic patients and healthy subjects, and complex changes were observed during the treatment of low-fat diet through the 6-month follow-up of subjects. Butyrate producing bacteria *Anarunotruncus* showed a slight increase, while *Roseburia* significantly increased at T1 stage, but at later stage gradually decrease ^[23]. Changes in the structure of gastrointestinal flora and other physical and chemical properties can lead to the destruction of pancreatic β cells and increase the incidence of diabetes. Therefore, the normal diversity and abundance of intestinal flora are important factors affecting the

occurrence and development of chronic diseases, and thus play an important role in individual health and longevity.

2.3 Intestinal Flora and Growth Metabolism

Intestinal flora is a complex microbial community in human body, which plays a very important role in cell growth and development, nutrient uptake and other aspects^[24]. Gill's team used large-scale shotgun sequencing and 16S RRNa-based full-length gene technology to comprehensively understand functional genes of intestinal flora and found that they play a significant role in human metabolic pathways and processes^[25,26]. In addition, there is also A research by used at the same time based on nuclear magnetic resonance (NMR) and mass spectrometry (GC - MS) metabolomics technology, dynamic detection and monitoring of family member's overall metabolic spectrum (urine metabolism of 1 HNMR spectrum) characteristics change, first discovered the human microbiome can affect human body metabolic phenotype, and found that affect the function of human body metabolic phenotype bacteria such as *B.thetaiotaomicron*, *Pseudobutyrvibrio* main sequence Similar to *Clostridium* and *Bacteroidetes*, and related human metabolites were found^[24]. In addition, the study of Thaiss CA et al. on intestinal G- showed that the activation of il-23-IL-22 pathway in myeloid cells inhibited the transcriptional activity of rhythm gene *Nr1d1*, thus activating NFIL3 and further regulating CD36 and other molecules to promote lipid metabolism in vivo^[27]. At the same time, Watad A et al., through their studies on the occurrence and development of diseases in different seasons, showed that intestinal flora can monitor the normal expression of rhythmic lipid metabolic procedures in the body by regulating the transcription of NFIL3 gene in intestinal epithelial cells and some internal clocks^[28], thus further affecting metabolism in the body.

3. Summary and Outlook

With the rapid development of sequencing and genome technology in the scientific field, it has become possible to explore the composition and function of intestinal microbes^[29], and the study on intestinal flora and longevity has also become hot. At present, some existing research from basic research "intestinal flora and regulating mechanism of aging" "gut bacteria to improve the mechanism of different diseases" and "bacteria biological rhythm biorythm of relations" with the host and so on, at the same time, also have to centenarians intestinal flora and its way of life, environmental factors such as the relevance of research^[30-32]. However, intestinal

flora is in a complex relationship with the human body to achieve ecological balance in vivo, and can interact with the host through metabolism and genetic inheritance^[33]. Therefore, it is very important to reveal the dynamic relationship between intestinal flora and longevity and one of the important directions of future research on intestinal flora and longevity is to carry out personalized regulation of intestinal flora on the basis of understanding the characteristics of intestinal flora. In addition, the study on the intestinal flora of the families of long-lived people can also further explore the influence of genetic factors on the intestinal flora.

References

- [1] Qin, J., Li, R., Raes, J., et al., 2010. A human gut microbial gene catalogue established by metagenomic sequencing. *Nature*. 464(7285), 59-65.
- [2] Li, J., Jia, H., Cai, X., et al., 2014. An integrated catalog of reference genes in the human gut microbiome. *Nat Biotechnol*. 32(8), 834-841.
- [3] Zhe Luan, Bin Yan, Gang Sun, 2018. Research progress on longevity and intestinal microecology. *Chinese Journal of Gerontology*. 3(13), 3321-3323.
- [4] Wangjing Tang, Xiangdong Zhu, Rui Shen, et al., 2018. Research progress of ulcerative colitis and intestinal microflora. *Journal of Shaanxi University of Traditional Chinese Medicine*. 109-114.
- [5] Haiyan Cen, Yuqi Zhang, 2018. Research progress on influencing factors related to longevity. *Guangxi Medical*. 40(12), 1351-1353.
- [6] Podolsky, S.H., 2012. Metchnikoff and the microbiome. *Lancet*. 380(9856), 1810-1811.
- [7] Kim, K.A., Jeong, J.J., Yoo, S.Y., et al., 2016. Gut microbiota lipopolysaccharide accelerates inflamm-aging in mice. *BMC Microbiol*. 16, 9.
- [8] Heintz, C., Mair, W., 2014. You are what you host: microbiome modulation of the aging process. *Cell*. 156(3), 408-411.
- [9] Biagi, E., Franceschi, C., Rampelli, S., et al., 2016. Gut microbiota and extreme longevity. *Curr Biol*. 26(11), 1480-1485.
- [10] Öner Özdemir, 2013. Mechanisms of preventative and therapeutic role of probiotics in different allergic and autoimmune disorders. *Journal of Immunology*. (3), 103-118.
- [11] Yang, R.Y., Zhang, F., Jin, J.X., et al., 2020. Research progress on the relationship between diet and intestinal microflora. *Chinese Journal of Microecology*. 32(9), 113-1117.
- [12] Qinm, Q.Q., Miao, J.J., Wang, Sh.Y., et al., 2017. Association between intestinal flora and immunity in

- middle-aged and aged people by PCR-DGGE. *Journal of Hygiene Research*. 46(1), 40-45.
- [13] Pan, D.D., Qin, H.L., 2018. Advances in the study of innate lymphocytes in intestinal homeostasis and disease. *Chinese journal of Microbiology and Immunology*. 38(6), 464-467.
- [14] Zhang, H., Wang, Y., Chen, H.Y., 2020. Research progress on the role and mechanism of intestinal flora in host immune response. *Microbiologica Sinica*. 60(4), 629-640.
- [15] Nikolaeva, O., Andreeva, A., Altynbekov, et al., 2020. Probiotic drugs impact on the innate immunity factors. *Journal of Global Pharma Technology*. 12(1), 38-45.
- [16] Yang, X.Zh., 2018. Research progress on the relationship between TLR2 and gastrointestinal diseases. Chongqing Medical University.
- [17] Wang, Y., 2018. To explore the therapeutic mechanism of Gegenqinlian Decoction in treating T2DM metabolic endotoxemia based on intestinal flora and LPS/TLR-4/NF- κ B signaling pathway. Gansu University of Traditional Chinese Medicine.
- [18] Wang, D., Wu, H., Liang, X.Y., et al., 2019. Advances in the Application of Intestinal Flora in Anti-Tumor Therapy. *Journal of Nutritional Oncology*. (2), 59-66.
- [19] Zhou, Y.M., Zhao, Sh., Jiang, Y., et al., 2019. Regulatory Function of Buckwheat-Resistant Starch Supplementation on Lipid Profile and Gut Microbiota in Mice Fed with a High-Fat Diet. *Journal of Food Science*. 84(9).
- [20] Li, X.X., Yu, M.L., Lu, Sh.F., et al., 2017. The role and significance of intestinal microflora and intestinal epithelial cells in type 2 diabetes induced by high fat and high sugar. *Chinese Journal of Diabetes*. 25(9), 842-846.
- [21] Fei, J., Luo, J.T., Zhang, X.Y., et al., 2018. Role of short-chain fatty acids in regulating human energy metabolism by intestinal flora. *Chinese Journal of Diabetes*. 10(5), 370-373.
- [22] Sun, Y., Huang, Y.Ch., Ye, F.H., et al., 2020. Effects of probiotics on glycemic control and intestinal dominant flora in patients with type 2 diabetes mellitus: A protocol for systematic review and meta-analysis. *Medicine*. 99(46), e23039.
- [23] Liu, Ch.G., Shao, W., Gao, M., et al., 2020. Changes in intestinal flora in patients with type 2 diabetes on a low-fat diet during 6 months of follow-up. *Experimental and therapeutic medicine*. 20(5), 40.
- [24] Wang, B.H., 2007. Study on intestinal microbial diversity and its correlation with human metabolism. Zhejiang university.
- [25] Gill, S.R., Pop, M., Deboy, R.T., et al., 2006. Metagenomic analysis of the human distal gut microbiome. *Science*. 312, 1355-1359.
- [26] Schloss, P.D., Larger, B.R., Handelsman, J., 2004. Integration of microbial ecology and statistics: a test to compare gene libraries. *Appl Environ Microbiol*. 70(9), 5485-5492.
- [27] Thaïss, C.A., Nobs, S.P., Elinav, E., 2017. NFIL-1 α training the host circadian rhythm-microbes fine-tune the epithelial clock. *Cell Metab*. 26(5), 699-700.
- [28] Watad, A., Azrielant, S., Bragazzi, N.L., et al., 2017. Seasonality and autoimmune diseases: the contribution of the four seasons to the mosaic of autoimmunity. *J Autoimmun*. 82(6), 13-30.
- [29] Heping Zhang, 2019. Probiotics, Gut microbiota and health. *Chinese Science Bulletin*. 7.
- [30] None, 2020. Improving gut flora may prolong life. *Hyology*. 128.
- [31] Shirong Wang, Zhen Tian, Zhuoming Qin, 2014. Discussion on the correlation between intestinal health and longevity. *Chinese Journal of Microecology*. 26(08), 991-993.
- [32] Tiancheng Xu, Lixia Pei, Lu Chen, et al., 2019. Bio-rhythm phenomenon of bacterial flora and its clinical significance. *Medical Schools of Thought Contend*. 10(5), 4-7.
- [33] Collino, S., Montoliu, I., Martin, F.P., et al., 2013. Metabolic signatures of extreme longevity in northern Italian centenarians reveal a complex remodeling of lipids, amino acids, and gut microbiota metabolism. *PLoS One*. 8(3), e56564.

Study on the Effect of High-quality Nursing Combined with Breathing Exercises on Patients with Chronic Obstructive Pulmonary Disease

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ABSTRACT

Objective: To study the effect of high-quality nursing combined with breathing exercises on patients with COPD. **Methods:** Using the random number table method of medical experiments, 60 patients with COPD received in our hospital from March 2020 to March 2021 were used as research samples. According to the differences in treatment measures, they were equally divided into control group and intervention group. Symptomatic support treatment and nursing routine, high-quality nursing combined with respiratory function exercise treatment and nursing were given respectively, and the application effects of the two groups were compared and analyzed. **Results:** The controllable rate of disease between the intervention group and the control group was 93.33% (28/30) and 66.67% (20/30) respectively, which was statistically significant ($P < 0.05$). The comparison between the intervention group and the control group on the pulmonary function indexes of VT, TPTEF/Te, VEF/Te, Ti/Te was statistically significant ($P < 0.05$). The results of the intervention group on exercise pulse and 6-minute walking distance were significantly higher than those of the control group ($P < 0.05$). **Conclusions:** The combination of high-quality nursing care and breathing exercises has outstanding disease controllable rate in patients with COPD, especially in improving the lung function of the patients and the level of treatment and care. It can be used as a feasible measure in the subsequent clinical treatment and nursing practice of patients. It is worthy of clinical promotion and implementation.

1. Introduction

Chronic obstructive pulmonary disease (COPD) is a common disease in respiratory medicine, which mostly

occurs in the elderly. The clinical manifestations of patients include chronic cough, sputum expectoration, and obvious shortness of breath during activities, which can cause great harm to the quality of life of patients [1].

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Conventional treatment is mainly symptomatic treatment, but the progressive progress of the disease can cause further damage to the patient's lung function indicators, and the application of respiratory function exercises in conjunction with high-quality nursing methods in the patient's practice will play a role in the patient's disease treatment practice A prominent effect ^[2]. This article is to explore the impact of high-quality nursing combined with respiratory exercises on lung function and exercise endurance of patients with COPD. An experimental study was conducted on 60 patients with COPD from March 2020 to March 2021 in the Department of Respiratory Medicine of our hospital. The relevant information is summarized. as follows:

2. Materials and Methods

2.1 General Information

Using the random number table of medical experiments, 60 patients with chronic obstructive pulmonary disease received in our hospital from March 2020 to March 2021 were used as research samples. All patients included in the research category are in compliance with the *Chronic Obstructive Pulmonary Disease Diagnosis and Treatment Standards (2011 edition)* diagnostic criteria ^[3]. According to the difference of treatment measures, they were equally divided into control group and intervention group. And the comparison of the control group and the intervention group's numerical comparisons on the gender ratio, age, and average age were 12 cases/18 cases: 13 cases/17 cases, (60-72) years: (61-71) years, (65.25±0.35)) Years old: (65.35±0.25) years old. The difference in clinical data between the two groups is relatively small, and the comparability of this study is relatively strong.

2.2 Method

Symptomatic support treatment and nursing routine, high-quality nursing combined with respiratory function exercise treatment and nursing were given respectively, and the application effects of the two groups were compared and analyzed.

2.2.1 Control Group

Stable lung treatment, including low-flow oxygen inhalation therapy, that is, anti-inflammatory, anti-asthmatic, phlegm, relieving cough, symptomatic and supportive treatment. Correct life-threatening hypoxemia, make blood oxygen saturation >90%, and require oxygen therapy, including long-term oxygen therapy. Take a simple ventilator to assist oxygen therapy during

night sleep. Use respiratory stimulants to make the pH value>7.2; give anti-inflammatory, anti-asthmatic, anti-cough, phlegm and treatment of the primary disease. Prevent and treat complications, such as anti-heart failure, improving respiratory failure, etc.

2.2.2 Intervention Group

On the basis of the control group, high-quality nursing combined with respiratory function exercise treatment and nursing; 1) Instruct patients to participate in exercises appropriately daily to enhance body resistance, pay attention to weather changes, add clothing appropriately, and beware of colds. Once the condition worsens, seek medical treatment in time. Take a walk, jogging, Taijiquan, Qigong and other exercises in a planned way every day. It is advisable not to feel fatigued. It can be regarded as proper COPD breathing exercises, which can avoid breathing difficulties caused by overwork and relieve them of strengthening breathing exercises. 2) Inhale through your nose and exhale through your mouth. When you exhale, your lips will shrink and look like a fish mouth. Hold your abdomen with your hand to exhale. Use a deep and slow breathing rate of eight to ten times per minute, daily do several exercises for 10-20 minutes each time. 3) When singing or recitation loudly, it expands and contracts the chest muscles and abdominal muscles rhythmically, enlarges the range of movement of the diaphragm, increases lung capacity, and enhances lung function; the lip-shrinking breathing method helps to improve the patient's lung function. The specific method is to inhale slowly and deeply through the nose until you can no longer inhale; shrink the lip, like a whistle; keep the lip shrinking posture and exhale slowly; abdominal breathing like diaphragm breathing, take a standing position (the weak can take a semi-recumbent/sitting position), Half-bend both knees or a small pillow under the knees to relax the abdominal muscles. Place the left and right hands on the abdomen and chest respectively. Relax your muscles and breathe at rest. Relax the whole body, first exhale and then inhale, inhale the drum and deflate, pass through the mouth during exhalation, pass through the nose during inhalation, exhale deeply, and do not use force. According to the patient's cardiac function, walk slowly (60-80 steps/min, medium-speed 80-100 steps/min, fast 100-120 steps/min. The walking link can be combined with upper limb chest expansion assisting movements to increase the effect. Use ventilators and oxygen generators to help patients with COPD live better. High-quality care, such as opening windows for ventilation. 4) High-quality care: regular indoor air disinfection, such as vinegar, to avoid the stimulation of smoke and dust, smokers. You should

quit smoking. In the cold season or when the climate changes suddenly, keep warm to prevent colds and prevent respiratory infections; pay attention to clean oral skin and wash frequently. When there is a mild oral infection, use normal saline and rinse your mouth before going to bed; excessive sputum Those who cough up sputum as much as possible, especially those who cough early in the morning and have thick sputum, appropriately take expectorants or atomized to dilute the sputum. Elderly or infirm persons should pat their backs and plan daily exercises, such as walking, jogging, and beating. Tai Chi, Qigong, etc., to avoid breathing difficulties caused by overwork; regarding diet, usually pay attention to dietary norms and strengthen nutrition. Mainly use easy-to-digest foods, and eat moderate amounts of high-calorie, high-protein, and rich in various vitamins. Food, it is best to eat small meals, avoid spicy, irritating foods and drink plenty of water.

2.3 Statistical Analysis

SPSS 23.0 (Statistical Software Package for Social Sciences) was used to record and analyze this study. Enumeration data and measurement data were expressed in% and ($\bar{x} \pm s$), respectively. X² and t test were used.

$P < 0.05$ was considered statistically significant.

3. Results

3.1 The Controllable Rate of Diseases in the Two Groups

The controllable rate of disease between the intervention group and the control group was 93.33% (28/30) and 66.67% (20/30) respectively, which was statistically significant ($P < 0.05$). As shown in Table 1:

3.2 The Pulmonary Function Indicators of the Two Groups

The comparison between the intervention group and the control group on VT, TPTEF/Te, VEF/Te/, Ti/Te pulmonary function indexes was statistically significant ($P < 0.05$). As shown in Table 2:

3.3 Two Groups of Treatment Effects

The results of the intervention group on exercise pulse and 6-minute walking distance were significantly higher than those of the control group ($P < 0.05$). As shown in Table 3:

Table 1. Comparison of disease controllable rate between the two groups of patients (%)

group	Number of cases	Take effect	Markedly effective	Bad Disease	controllable rate
Control group	30	9 (30.00)	9 (30.00)	12 (40.00)	20 (60.00)
Intervention group	30	13 (43.33)	15 (50.00)	2 (6.67)	28 (93.33)
t	/	/	/	/	7.458
P	/	/	/	/	0.000

Table 2. Comparison of lung function indicators between the two groups ($\bar{x} \pm s$)

group	Number of cases	VT (ml/kg)	TPTEF/Te (%)	VEF/Te/ (%)	Ti/Te
Control group	30	8.52±0.19	30.04±6.19	31.15±5.06	10.62±0.14
Intervention group	30	13.46±0.27	33.13±4.60	36.37±13.18	39.25±12.07
t	/	81.954	2.194	2.025	12.991
P	/	0.000	0.032	0.047	0.000

Table 3. Comparison of treatment effects between the two groups ($\bar{x} \pm s$)

group	Number of cases	Exercise pulse (times/min)	6 minutes walking distance (m)
Control group	30	118.49±6.82	384.57±3.65
Intervention group	30	140.81±7.96	457.29±2.43
t	/	11.485	87.309
P	/	0.002	0.000

4. Discussion

The combination of high-quality nursing care and breathing exercises has played a prominent role in the clinical application of COPD patients, which has been fully confirmed in the above-mentioned studies in Table 1, Table 2, and Table 3.

The research results of previous studies on this topic further show that the standing Baduanjin exercise applied to patients with stable COPD can improve their lung function, reduce clinical symptoms, improve mobility and quality of life; especially after 6 months of intervention, FEV1, FVC, FEV1/FVC, FEV1% level, 6 min walking distance, sputum expectoration, dyspnea, housework, energy, total score of CAT, difference in activity ability, symptoms, life impact, quality of life total score after 6 months of intervention Outstanding ($P<0.05$)^[4]. Nursing follow-up for patients with chronic obstructive pulmonary disease can improve health behaviors and effectively improve lung function; especially in FEV1(L) and PEF, it has more application value, and it can also improve patients' respiratory function training, smoking cessation, physical exercise, nutrition supply, etc. Health behaviors have been significantly improved ($P<0.05$)^[5]. Multiple methods such as breathing exercises and diet care can effectively improve the adverse symptoms of patients with COPD and promote the recovery of the disease as soon as possible; especially in the overall effect of the patient's psychological, physical, and social functions; it has a significant effect on the comparison of ventilation function and hospital recovery time ($P<0.05$)^[6].

In general, improve the high-quality nursing service management system, and actively provide patients with high-quality nursing services through disease observation, life care, health education, etc.; implement continuous scheduling and flexible scheduling to reduce the number of shifts and ensure patients Get continuous, full, and efficient care; it also provides the possibility to improve the enthusiasm of patient caregivers; breathing function

exercise can improve the prognosis of patients and enhance the effect of disease control.

To sum up, the combination of high-quality care and breathing exercises has outstanding disease controllability rates for COPD patients, especially in improving the lung function of patients and the level of care, which can be used as a follow-up clinical treatment and nursing practice for patients. Feasible measures should be promoted and implemented.

References

- [1] Xie, Y.H., 2018. Analysis of the impact of high-quality nursing on lung function and quality of life in elderly patients with chronic obstructive pulmonary disease. *Chinese and Foreign Medical Research*. 16(18), 74-76.
- [2] Rao, Sh., 2021. The clinical nursing value of respiratory function exercise combined with diet nursing in patients with chronic obstructive pulmonary disease. *Kang Yi*. (11), 97.
- [3] Huang, A.H., Xu, J., Jin, L.J., 2021. Analysis of the nursing effect of the health belief model applied to elderly patients with stable chronic obstructive pulmonary disease. *Chinese and Foreign Medicine*. 40(5), 128-131.
- [4] Yu, P., Jiang, X.F., 2021. Analysis of the effect of standing Baduanjin exercise in patients with stable COPD. *International Journal of Nursing*. 40(3), 493-496.
- [5] Zhang, L.Y., 2020. The effect of nursing follow-up on the health behavior and lung function of patients with chronic obstructive pulmonary disease. *Family medicine. Seeking medicine*. (6), 327.
- [6] Shao, Ch.F., 2020. Application of lip-shrinking abdominal breathing combined with vertical breathing exercises in the community nursing of patients with chronic obstructive pulmonary disease. *Friends of Health*. (24), 10.

Research Progress of Tonifying Kidney and Promoting Blood Circulation in the Treatment of Steroid-induced Necrosis of Femoral Head

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ABSTRACT

Osteonecrosis of the femoral head is a common disability disease of the hip joint in China, and osteonecrosis of the femoral head caused by hormone factors is the most common, which is related to the gradual increase in the utilization rate of glucocorticoids in recent years. It is a refractory disease in orthopaedics with a poor prognosis. For this disease, the treatment of traditional Chinese medicine has certain advantages. In view of this, the author reads, analyzes and summarizes its materials by searching China Journal full-text Database and Wanfang Database. This paper reviews the mechanism and clinical research progress of tonifying kidney and activating blood circulation in the prevention and treatment of steroid-induced osteonecrosis of the femoral head, hoping to provide help for the clinical treatment of hormone-related osteonecrosis of the femoral head.

1. Introduction

Osteonecrosis of the femoral head is caused by the interruption or damage of the blood supply of the femoral head due to various factors, resulting in the death of osteocytes and bone marrow components^[1], which leads to local structural changes of the femoral head, collapse of the femoral head, hip pain and functional limitation^[2]. Steroid-induced avascular necrosis of the femoral head is the most common, accounting for 57% of the total incidence of non-traumatic osteonecrosis of the femoral head^[3]. The occurrence of steroid-induced

osteonecrosis of the femoral head is caused by a variety of mechanisms, because the pathogenesis has not been completely determined, so the disease can not be cured^[4]. At present, there are mainly some surgical treatments, such as osteotomy, bone grafting, decompression, hip arthroplasty and so on. Although the operation is gradually mature, it is harmful to the body, and the probability of postoperative complications is high. Patients' acceptance of the operation is low. Therefore, non-operative treatment has been paid more and more attention. Traditional Chinese medicine has been recognized by patients in the treatment of the disease. Clinical guidelines

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also mention that traditional Chinese medicine can effectively prevent the occurrence of osteonecrosis of the femoral head and alleviate the existing symptoms^[5]. Improve the quality of life of patients. Among them, the method of tonifying kidney and promoting blood circulation plays an important role in steroid-induced osteonecrosis of femoral head. This paper discusses its research content in recent years.

2. Understanding of TCM Theory on Steroid-induced Femoral Head Necrosis

In the classical records of traditional Chinese medicine, there is no exact term of “osteonecrosis”. According to the clinical manifestations and characteristics of the disease, osteonecrosis of the femoral head can be attributed to “bone erosion, bone arthralgia” and so on. The compilation of notes on Ling Su Festival said, “the evil of deficiency is also deep in the body.”... Then rotten flesh and rotten muscle is pus, internal injury bone, for bone erosion. Hormone-induced warm heat belongs to the “pure yang product” in traditional Chinese medicine, which is similar to the traditional Chinese medicine “aconite, cinnamon” and so on. Hormone application, resulting in temporary hyperactivity of kidney yang, “hyperactivity of yang is yin absolute”, hyperactivity of yang is bound to burn true yin, bone is not nourished, and then osteonecrosis occurs. Taking hormones for a long time can produce “strong fire”. “always ask about yin and yang should be like a big theory” said: “the qi of strong fire is declining.” Strong fire to eat gas, gas to eat less fire, “strong fire” will damage the vital energy of the human body. Spleen is the acquired foundation, vital qi injury, weak temper, unable to promote blood line, re-feeling the evil of wind, cold and dampness, stagnation of qi and blood, stopping for blood stasis; spleen soil failure, spleen yang weakness, fluid accumulation into dampness, accumulation of dampness into phlegm, phlegm blocking pulse channel, blood stasis, phlegm and blood stasis, qi and blood can not reach the extremities, muscles and muscles have nothing to be proud of. Blood stasis caused by phlegm, phlegm caused by blood stasis, and the combination of phlegm and blood stasis are the most important pathological manifestations in the early stage of the disease. The kidney is the congenital foundation, the main bone produces pulp, hormone is medicine evil, damage the essence of the kidney, lack of kidney essence, bone marrow biochemical passive, bone marrow decreased, bone loss nourishment, no growth, development, repair. Kidney essence also depends on spleen qi and blood nourishment, spleen and stomach weakness can not ascend clear, kidney essence does not

give birth, premature decline, bone withering and waste hair as the disease.

3. Relationship between Tonifying Kidney and Activating Blood and Steroid-Induced Osteonecrosis

The method of tonifying the kidney and invigorating the blood is a flexible application of the method of tonifying the kidney and invigorating the blood, which belongs to the treatment method of “attacking and tonifying at the same time”^[8]. Professor Zhang Daning firstly proposed “kidney deficiency and blood stasis” and “tonifying the kidney and invigorating the blood”^[9]. Hormonal femoral head necrosis is a state of deficiency. Kidney deficiency is the key source of the disease, and “where evil comes from, its Qi must be deficient”. The two are intertwined and affect each other. The “Suwen - Inverse Regulation” says: “Kidney is also water, and born in the bone, kidney does not produce, then the marrow can not be full ... the disease is called bone paralysis”, indicating that the occurrence of bone disease is mostly related to kidney deficiency, the kidney is the main bone marrow, the kidney collects essence, essence produces marrow, marrow nourishes bone, the three are a whole, if the kidney essence is lacking, the marrow transformation and production of no source, the bone is not nourished, then If there is a lack of kidney essence, the marrow has no source of growth and the bone is not nourished, the development is slow. Therefore, the fundamental method is to nourish the kidney. Blood stasis is a pathological factor, especially in paralytic diseases, where the mechanism of blood stasis accompanies the entire development of the disease, and the theory of Chinese medicine mentions that if blood stasis does not go, it is difficult to support kidney energy. Therefore, the treatment of injury diseases lies in the activation of blood. Blood activation includes two kinds, one is “eliminating blood stasis” and the other is “generating new blood”. The method of tonifying the kidney and invigorating the blood is often used to invigorate the blood and move the qi, such as astragalus, Chuanxiong, Danshen, etc., with insects and vines, such as the dragon, scorpion, etc., to break the blood can also solve the function of hormone medicine evil, and at the same time with the medicine to benefit the liver and kidney, such as Eucommia, sequestra, mulberry, can not only benefit the liver and kidney, but also strengthen the tendons and bones. The origin of the disease is in the bone, the source is in the blood, and the root is in the kidney^[10], therefore, the treatment of tonifying the kidney and activating the blood is its basic treatment.

4. Study on the Mechanism of Tonifying Kidney and Activating Blood in Treating Steroid-induced Femoral Head Necrosis

4.1 Intravascular Coagulation Theory

The most common pathological changes of steroid-induced osteonecrosis of the femoral head are intravascular coagulation and thromboembolism. The study found that the patient's hemorheology is abnormal^[11]. In the hypercoagulable state, the blood flow is slow or even interrupted, the blood supply is insufficient, and osteonecrosis occurs. Duan Weifeng et al.^[12] by injecting hormone and endotoxin, the model of osteonecrosis of the femoral head was made and fed with Bushen Quyu recipe suspension in the traditional Chinese medicine group. The experiment shows that Bushen Quyu recipe can alleviate the hypercoagulable state of blood circulation and increase the blood supply of the femoral head. Promote the repair and regeneration of the femoral head. Ran Lei et al.^[13] successfully induced rabbit model of steroid-induced osteonecrosis of the femoral head and fed Quyu Shengxin prescription for 12 weeks. Venous blood samples were collected for hemorheological measurement, including erythrocyte aggregation index, plasma viscosity, hematocrit, and so on. The experimental results show that Quyu Xin recipe can effectively improve blood viscosity, inhibit platelet aggregation and alleviate hemorheology. Intravascular coagulation is the direct cause of osteonecrosis. Tonifying the kidney and activating blood circulation can not only activate blood but also promote blood circulation. However, its specific molecular mechanism and gene expression are not clear, which is only proved by some hematological indicators. Therefore, it is necessary to carry out in-depth discussion.

4.2 Bone Marrow Mesenchymal Stem Cell Differentiation Theory

Bone marrow mesenchymal stem cells (BMSc) is a kind of stem cells with multi-directional differentiation potential, which has the characteristics of self-proliferation and differentiation. It is widely used in tissue engineering technology to repair local osteonecrosis, slow down the progress of disease and improve the quality of life. Some experiments have shown that the proliferation and directional differentiation ability of BMSc decrease due to the necrosis of femoral head caused by hormones. Zhang Ying et al. to cultivate good bone marrow mesenchymal stem cells as the experimental object, the dry concentration of kidney-tonifying and blood-activating drugs and femoral head necrosis Yu

capsule water extract dissolved in the experimental object, through MTT to observe the drug regulation of BMSc. The results showed that the expression of BMP-2, Osteonin, Runx-2, OPN and ALP in the experimental group was significantly increased. It can be concluded that Bushen Huoxue medicine combined with Yushui extract of femoral head necrosis can effectively improve the proliferation ability of Ambuscade and increase osteogenic differentiation. Yu et al. obtained the serum containing Bushen Huoxue Decoction by feeding the mouse model. The serum containing different concentrations was used to regulate BMSc. The ALP activity of BMSc was quantitatively analyzed by 4-nitrophenyl phosphate disodium salt (PNPP) azo method, and the deposition of calcium salt was analyzed by alizarin red staining method. Meanwhile, the osteogenic differentiation gene of BMSc was detected by fluorescence quantitative method. Finally, the experimental data show that Bushen Huoxue Decoction promotes osteogenic differentiation of BMSc by enhancing ALP activity, and it can also be concluded that Bushen Huoxue Decoction promotes osteogenic differentiation and mineralization of BMSc.

4.3 Osteoporosis Theory

Long-term use of large doses of hormones can cause osteoporosis. Some studies have shown that glucocorticoid can inhibit the activity of osteoblasts, enhance the activity of osteoclasts and inhibit the absorption of osteoclasts, which not only destroys the structure of the femoral head, but also inhibits its bone turnover^[19,20]. Some scholars have pointed out that excessive hormones can inhibit intestinal calcium absorption and increase renal calcium excretion to affect calcium balance and develop into osteoporosis^[21]. Xu Haibin et al.^[22] used Xianlinggubao capsule combined with calcium D to give the rat model. It is suggested that both of them may effectively improve bone metabolic index and bone structure, promote the activity of osteoblasts and accelerate local bone repair and remodeling by increasing the numerical expression of TGF β 1, p-Smad2/3 and Smad4 and inhibiting Smad7. Li Zhimin et al.^[23] the model experiment of osteonecrosis of the femoral head in rabbits showed that Bushen Huoxue decoction could significantly improve the structural and mechanical indexes of steroid-induced femoral head, reduce bone mass loss, enhance bone hardness and density, and alleviate osteoporosis. prevent osteonecrosis. The method of tonifying the kidney and activating blood circulation is also used as a method for the treatment of osteoporosis, which has a significant improvement in the structural mechanics of bone, but the stress point and load-bearing mode of animals are different from those of

human beings. Whether this method has the same curative effect for patients in the later stage, further comparative study is needed.

4.4 Lipid Metabolism Disorders

One of the causes of steroid-induced osteonecrosis of the femoral head is the disorder of lipid metabolism. At present, it is believed that the use of hormones leads to an increase in blood lipids, resulting in microvascular fat embolism and fat deposition in osteocytes^[24]. Hormones can promote the differentiation of bone marrow mesenchymal stem cells into adipocytes, reduce the differentiation of osteoblasts, and induce osteonecrosis of the femoral head. Liang Xuezheng^[25] used network pharmacology and bioinformatics as theoretical guidance to understand the active components and disease specific targets of Bushen Huoxue capsule, followed by KEGG signal pathway enrichment, and then selected the regulation of lipid metabolism and angiogenesis as the research direction. In the experiment, the experimental group was fed with Bushen Huoxue capsule, and it was found that the protein level of VEGFA in the drug group was higher, while the protein level of PPARG was lower in each group. The data show that Bushen Huoxue capsule can promote angiogenesis and inhibit its adipogenic differentiation. The disorder of lipid metabolism is mainly manifested in the early stage of the disease, and this method has a good effect on balancing lipid homeostasis. However, the depth of the research is insufficient and the specific mechanism is unknown.

4.5 Theory of Osteocyte Apoptosis

Osteocyte apoptosis is one of the most recognized causes of this disease at present. Studies have shown that the use of glucocorticoids can increase the death of osteoblasts and osteocytes and destroy the mechanical sensation of the bone cell network^[26]. Bone trabeculae are sparse, bone mass is reduced, and osteonecrosis occurs. Xu Xilin^[27] used the rabbit model of osteonecrosis of the femoral head and gave Huogu injection and Guanxinling injection to detect the expression of caspase-3 protein. Caspase-3 family plays an important role in transmitting the signal of apoptosis. As a result, both of them inhibit cell apoptosis from multiple targets to achieve bone repair, but the inhibition and repair ability of the method of tonifying kidney and activating blood circulation is stronger than the simple method of activating blood circulation. Zhou Zhengxin et al.^[28] after intragastric administration of Gubitongxiao granule, apoptosis was detected by TUNEL method. The results suggested

that Gubitongxiao granule could effectively inhibit cell apoptosis by reducing blood viscosity, inhibiting platelet aggregation and improving local microcirculation. The method of tonifying kidney and promoting blood circulation is based on the theory of “deficiency from blood stasis”. It has a strong effect on the inhibition of osteocyte apoptosis, but apoptosis is regulated by a variety of different genes and protein synthesis. This method is not clear, and still needs a lot of research.

5. Clinical Study on Treating Steroid-induced Osteonecrosis of Femoral Head by Tonifying Kidney and Activating Blood

Based on the basic pathogenesis of deficiency and blood stasis, the method of tonifying the kidney and promoting blood circulation has become the basic treatment of steroid-induced osteonecrosis of the femoral head. Liu Jinbao et al.^[29] included 80 patients with ARCO stage I and II steroid-induced osteonecrosis of the femoral head, which were divided into Bushen Huoxue capsule treatment group and Xianlinggubao control group. Harris, WOMAC scale score and imaging examination were performed later. It is found that Bushen Huoxue capsule can relieve pain, improve the activity degree and range of hip joint, and effectively reduce the collapse rate of femoral head. Yang Chen et al.^[30] divided the patients with steroid-induced osteonecrosis of the femoral head into treatment group and drug group. The treatment group was treated with Tongluo Shenggu recipe and the control group was treated with high energy shock wave in vitro. Harris, SX-36 scale score and X-ray imaging examination of both hips were performed in the follow-up. According to the Harris scale, Tongluo Shenggu recipe can relieve hip pain, repair hip joint function and reduce deformities. From the SX-36 scale, the quality of life of patients has been improved due to the reduction of pain. Zhang Shenyao^[31] chose Bushen Jianpi Tongluo recipe to treat steroid-induced osteonecrosis of the femoral head. The clinical results showed that the prescription could improve the function of hip joint and increase local bone mineral density. Deng Changcui^[9] analyzed Professor Shen's experience in the use of drugs from the aspects of drug performance, classification and frequency of drugs for the first diagnosis and treatment of “arthralgia syndrome” during Professor Shen Fengjun's 3-year period. It is known that Professor Shen Fengjun uses most drugs for tonifying deficiency, activating blood circulation and removing blood stasis, mainly for *Angelica sinensis*, *Chuanxiong*, *Eucommia ulmoides*, *Shu Di*, etc., which is consistent with Professor Shen Fengjun's point of view, that is, kidney deficiency is the key and blood stasis is

the fundamental for arthralgia disease. Therefore, the treatment is tonifying the kidney and promoting blood circulation.

6. Conclusions

In recent years, with the non-standard use of hormones and the increasingly serious degree of aging, the number of patients with steroid-induced osteonecrosis of the femoral head is increasing. Steroid-induced osteonecrosis of the femoral head belongs to the field of bone arthralgia in traditional Chinese medicine, and kidney deficiency and blood stasis is the basic pathogenesis. Tonifying the kidney and activating blood circulation, as the basic treatment of steroid-induced osteonecrosis of the femoral head, has considerable curative effect in long-term clinical application. Tonifying the kidney and promoting blood circulation were deeply studied from the mechanisms of intravascular coagulation, disorder of lipid metabolism, differentiation of bone marrow mesenchymal stem cells, osteoporosis, osteocyte apoptosis and so on, in order to achieve the purpose of prevention and treatment. However, at present, the mechanism of steroid-induced osteonecrosis of the femoral head is not very clear, and the development of the disease is also a combination of multiple mechanisms, or cross-action, and its molecular mechanism is complex, so our later study can not be limited to a single mechanism. We have to look at it as a whole. From the perspective of evidence-based medicine, the insufficient sample size and observation time of many experiments may affect the experimental results. From the point of view of molecular biology, the signal pathway is also the research direction at present, and the specific mechanism of various signal pathways involved in the development of disease is not very clear. Most of the studies are animal and in vitro experiments, aiming at the potential targets of the pathway. From the perspective of genetics, gene polymorphism has become a research direction, to find the target of genes and diseases, to carry out individual treatment, and to achieve accurate treatment. In clinic, we should closely combine the current classification and staging, and explore the methods of diagnosis and treatment based on the idea of dialectical treatment. We should not use the method of tonifying the kidney and activating blood circulation, but should pay attention to the characteristics of the disease and be closely combined with the clinic.

References

[1] Liu, H.P., Jia, H.P., 2020. Observation on the therapeutic effect of lumbar sympathetic ganglion radio

frequency combined with anhydrous ethanol in the treatment of femoral head necrosis pain. *China Journal of pain Medicine*. (12), 955-958.

[2] Wen, Y.Y., Sun, H.R., Jia, Y.D., Liu, Y.W., 2019. The latest research progress of traditional Chinese medicine in the prevention and treatment of steroid-induced osteonecrosis of the femoral head. *Systems Medicine*. 4(02), 187-189.

[3] Pei, J., Fan, L., Nan, K., Li, J., Chi, Z., Dang, X., Wang, K., 2017. Excessive Activation of TLR4/CONFAB Interactively Suppresses the Canonical Ant/a-carbonate Pathway and Induces SANFH in SD Rats. *Sci Rep. Cep* 20. 7(1), 11928.

[4] Li, Sh.B., Lai, Y., Zhou, Y., Liao, J.Zh., Zhang, X.Y., Zhang, X., 2021. The pathogenesis of steroid-induced osteonecrosis of the femoral head and the target effect of related signal pathways. *Tissue Engineering Research in China. Magi* 25(06), 935-941.

[5] Clinical diagnosis and treatment of femoral head necrosis in Chinese adults refers to Nannan, 2020. *Zhonghua Orthopaedic Chronicles*. 40(20), 1365-1376.

[6] Su, Sh.Y., Yao, X.Sh., Yu, D.D., 2020.. Research on the application of traditional Chinese medicine in the prevention and treatment of osteonecrosis of the femoral head. *Journal of practical traditional Chinese Medicine and Internal Me2020 dicine. Journal of Internal Medicine*. 34(06), 17-20.

[7] Zhang, W., 2017. Siwei and strategy of traditional Chinese medicine in glucocorticoid therapy. *Theory and practice of Medical Science*. 30(18), 2683-2684-2678.

[8] Tian, T.T., Shi, Q.Y., Li, W.Y., Zhang, L.F., 2020. Theoretical Analysis on the method of tonifying Kidney and activating Blood Circulation in the treatment of traumatic femoral head Necrosis. *Chinese traditional Chinese Medicine Emergency*. 29(08), 1424-1426, 1446.

[9] Deng, Ch.C., 2019. Professor Shen Fengjun explores the connotation of tonifying kidney and activating blood circulation and the law of drug use in the treatment of arthralgia disease. *Guizhou University of traditional Chinese Medicine*.

[10] Xing, B.Q., Sun, H.Sh., Fu, Ch.Sh., Li, G., 2013. Research on tonifying Kidney and activating Blood Circulation in the treatment of steroid-induced osteonecrosis of the femoral head. *China National Pharmaceutical Industry*. 22(24), 15-17.

[11] Wang, D.D., Yang, Y.M., Wang, Q.F., 2019. Study on the mechanism of repairing osteonecrosis of femoral head with healing capsule of osteonecrosis of femoral head. *Guide of traditional Chinese Medicine*. 25(08), 122-125.

- [12] Duan, W.F., Liu, J.Y., Du, Zh.J., Liu, Y.W., 2019. Effect of tonifying kidney and dispelling blood stasis on blood fat and coagulation index of rabbits with femoral head necrosis induced by hormone. *Western Chinese Medicine*. 32(11), 26-31.
- [13] Ran, L., Cheng, Y., Dou, Q.L., Yang, J., 2019. Effect of Quyu Shengxin recipe on rheology and bone parenchyma of early steroid-induced femoral head ischemic necrotic blood in rabbits. *Shi Zhengguo Medical Medicine*. 30(08), 1858-1859.
- [14] Wen, J.F., Wei, B.F., 2020. Progress in the study of osteogenic differentiation of mesenchymal stem cells in steroid-induced osteonecrosis of the femoral head. *Jiefang Journal of military Medicine*. *Journal of military Medicine*. 45(11), 1858-1859.
- [15] Marrakesh, S., Paparazzi, N., Remand, M.H., 2018. Hymeneal stem cell-derived extra cellular vesicles: novel frontiers in regenerative medicine. *Stem Cell Res Her*. 9(1), 63.
DOI: <https://doi.org/10.1186/s13287-018-0791-7>.
- [16] Yang, G.J., Bu, Y.D., Zhou, B.K., Huang, R., 2015. The proliferation and orientation induction ability of intermedullary mesenchymal cells in steroid-induced femoral head necrosis model rats were decreased. *Tissue Engineering Research in China*. 19(41), 6579-6583.
- [17] Zhang, Y., Zhang, L.L., Sun, R.B., Liu, Y.W., Chai, Y.N., He, W., 2018. The effect of tonifying kidney and activating blood circulation on osteogenic ability of human bone marrow mesenchymal stem cells and the inhibitory effect of miR-93-5p on it [J]. *Chinese Journal of traditional Chinese Medicine*. 33(02), 667-671.
- [18] Yu, L.J., Luo, Y.W., Xiong, Y.P., Liu, Y.M. Effect of medicated serum of Bushen Huoxue decoction on osteogenic differentiation of bone marrow mesenchymal stem cells. *Guangzhou University of traditional Chinese Medicine*.
- [19] Guo, G., Feng, G., Meng, B.F., Wang, Zh.L., He, N., 2020. Mieman. Progress in the treatment of glucocorticoid-induced osteoporosis. *Medical Review*. 26(21), 4173-4178.
- [20] Gao, Y.Ch., Feng, Y., Zhang, Ch.Q., 2018. Progress in the study of the mechanism of steroid-induced osteonecrosis of the femoral head. *International Journal of Orthopaedics*. 39(04), 231-234.
- [21] Hardy, R.S., Zhou, H., Seibel, M.J., Cooper, M.S., 2018. Glucocorticoids and Bone: Consequences of Endogenous and Exogenous Excess and Replacement Therapy. *Endocr Rev*. 39(5), 519-548.
DOI: <https://doi.org/10.1210/er.2018-00097>.
PMID:29905835.
- [22] Xu, H.B., Huang, Y.H., 2018. Effects of Xianlingguobao capsule combined with calqi D on treatment and TGF- β 1/Mads signal regulation in rats with glucocorticoid-induced osteoporosis. *Shaanxi traditional Chinese Medicine*. 39(06), 687-690.
- [23] Li, Zh.M., Zhou, L.X., Li, X.J., Duan, Zh., Qi, Zh.X., 2016. Effect of Bushen Huoxue decoction on biomechanics of steroid-induced avascular necrosis of femoral head. *Shi Zhengguo Medical Medicine*. 27(06), 1286-1289.
- [24] Fan, W., 2018. Study on the effect of Guxieling capsule on Lipid Metabolism of early steroid-induced Necrosis of the femoral head. *Nanchang University*.
- [25] Liang, X.Zh., Luo, D., Xu, B., Liu, J.B., Li, G., 2019. Study on the molecular mechanism of Bushen Huoxue capsule in the treatment of osteonecrosis of femoral head [J]. *Chinese Journal of traditional Chinese Medicine*. 34(05), 2188-2193.
- [26] Luo, H., Lan, W., Li, Y., Lian, X., Zhang, N., Lin, X., Chen, P., 2019. Microarray analysis of long-noncoding RNAs and mRNA expression profiles in human steroid-induced avascular necrosis of the femoral head. *J Cell Biochem*. 120(9), 15800-15813.
DOI: <https://doi.org/10.1002/jcb.28850>. Epub 2019 May 12. PMID: 31081170.
- [27] Xu, X.L., Zhang, X.F., Lu, H., Li, X.D., Su, H., Liu, P.R., Wang, Sh., Xie, X.Y., 2017. Effect of tonifying Kidney / activating Blood Circulation on caspase-3 expression of Avascular Necrosis of femoral head induced by liquid nitrogen freezing in Rabbits. *Journal of traditional Chinese Medicine*. 45(05), 36-39.
- [28] Zhou, Zh.X., Li, W.H., Zhu, L., Han, Sh.D., 2018. Effect of Gubitongxiao granule on fine cell apoptosis in rabbits with steroid-induced osteonecrosis of the femoral head. *Tissue Engineering Research in China*. 22(20), 3190-3194.
- [29] Liu, J.B., 2018. Clinical and experimental study of Bushen Huoxue capsule based on Ant/a-Carbonate signal pathway in the treatment of steroid-induced osteonecrosis of the femoral head. *Shandong University of traditional Chinese Medicine*.
- [30] Yang, Ch., Zhang, G.K., Yuan, X.Ch., Yu, W.X., Hao, Y.Q., Lu, Ch., 2020. Prospective clinical study of Tongluo Shenggu recipe in the treatment of ARCO II non-traumatic osteonecrosis of the femoral head. *Journal of Hainan Medical College*, 26(24), 1865-1868, 1873.
- [31] Zhang, Sh.Y., 2019. Clinical observation of Bushen Jianpi Tongluo recipe in the treatment of steroid-induced femoral head necrosis. *Practical use of miscellaneous records of traditional Chinese medicine and traditional Chinese medicine*. 35(07), 841-842.

Analysis of the Effect of Parathoracic Nerve Block and Compound Propofol Anesthesia on the Perioperative Period of Elderly Thoracotomy

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ABSTRACT

Objective: To explore the application of thoracic nerve block and propofol anesthesia in the treatment and perioperative period.

Methods: A total of 40 patients with thoracotomy for esophageal cancer between May 2020 and September 2021 in the hospital were selected to participate in this study. All the patients were divided into reference and experimental groups according to the anesthesia protocol. For the experimental group, the parathoracic vertebral nerve block scheme was used under ultrasound guidance, with general anesthesia in the same manner, and after the surgical treatment of both groups, the patient-controlled intravenous analgesia (PCIA) regimen was applied to both patients. The time of surgery for the two patient groups, intraoperative propofol, postoperative pain conditions and postoperative blood glucose and NE, E, DA levels were measured and conducted for comparative analysis. **Results:** There is no significant differences between the two groups, besides, in the experimental group, propofol in surgery was less than that in the reference group; At the T6~T9 timepoint, patients in the experimental group had lower VAS scores in quiet and active conditions than those in the reference group; At the T9 timepoint, blood glucose and NE levels were higher than the T1, T4, T5 time point levels in each group; At the T4, T4 timepoint, E levels in both groups were lower than the T1, T9 time point level in each group; at T9 time point, the DA level was higher in the reference group than the T1, T4 time point level in each group; at T9 Time point, blood glucose and NE, E, DA were lower than those in the reference group. **Conclusions:** In the treatment of thoracotomy in elderly patients, thoracic paravertebral nerve block compound propofol anesthesia program can be used to patients, with striking anesthesia effect and remarkable recovery effect in perioperative period, which is conducive to relieving postoperative pain and worth promotion and application.

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1. Introduction

In recent years, accelerated rehabilitation surgery has developed rapidly, and regional block has gradually become a key medical research field. In the treatment of surgical patients, simple general anesthesia scheme is generally applied to patients, and thoracic epidural block scheme can also be jointly applied to patients to achieve good analgesic effect. However, according to clinical research, if epidural anesthesia is applied to patients, it will have a great impact on patient hemodynamics, and there are many operational risk factors, and some patients have a high incidence of postoperative complications. In recent years, parathoracic nerve block has been gradually applied in surgical treatment, which will only have a block effect on the surgical side of the patient, and will not exert a great adverse impact on the patient's body. In recent years, visual anesthesia technology has been prominently improved, and parathoracic nerve block technology has been gradually promoted and applied^[1]. In this regard, in this study, a total of 40 patients with thoracic surgery for esophageal cancer between May 2020 and September 2021 were selected to take part in this study, to deeply explore the application of parathoracic vertebral nerve block compound propofol anesthesia in the treatment of elderly thoracotomy and the impact on the perioperative period of patients.

2. Materials and Methods

2.1 General Information

A total of 40 patients with thoracotomy for esophageal cancer between May 2020 and September 2021 in our hospital were chosen to participate in this study, with American Anesthesia Association (American society of anesthesiologists, ASA) grade I or grade II, between 62 and 82 years, and average (69.1 ± 9.3). All patients were conscious and had normal cardiopulmonary function and did not receive preoperative radiotherapy, chemotherapy or blood transfusion regimens. During the perioperative period, none of the patients were treated with hormonal drugs. According to the different anesthetic protocols, all patients were divided into a reference group and an experimental group, in which 20 patients in the reference group were applied a simple continuous patient-controlled intravenous analgesia protocol, while 20 patients in the experimental group were applied a continuous thoracic paravertebral nerve block combined with a continuous patient-controlled intravenous analgesia protocol.

2.2 Methods

Atropine 0.5 mg was applied to patients in both groups prior to surgical treatment, and was administered by intramuscular injection; after entering the operating room, patients were closely monitored, including heart rate (HR), bispectral index (BIS) and pulse oxygen saturation (SpO_2) etc. Venipuncture was performed into the patient's right jugular and a double-tailed central vein catheter injected to prepare for intraoperative rehydration and venous blood extraction.

For the experimental group, an ultrasound-guided parathoracic vertebral nerve block protocol was used. The patient was assisted to take the lateral position, select the midline 1.5 cm~2.0 cm space of the rib space in the open chest, use it as the puncture point, routine skin disinfection, and 1% lidocaine was applied to the puncture point. Color Doppler ultrasound diagnostic instrument is chosen. For the ultrasound probe, it can be placed in the transverse plane and the perimeter of the puncture site is checked. During the exploration, the perpendicularity between the probe and the spine is maintained vertical, and a hyperechoic band, i.e., the mural pleura, is visible laterally, while the anechoic region is the lung. In addition, on exploration above the mural pleura, dark echogenic strips were seen, i.e., the patient's ribs, and the thoracic paravertebral nerve was in the area between the above three. After the paravertebral space images were obtained by ultrasound exploration, the images were analyzed, and a 21G-long 100 mm contrast puncture needle was inserted from the side of the ultrasound probe, and the anesthesia needle was placed into the paravertebral space under the guidance of the ultrasound machine, and 15 mL of 0.5% ropivacaine was injected after no blood was drawn back, and then the catheter was placed and fixed with a patch to assist the patient to lie flat^[2]. After 10min, the effect of the nerve block was checked, and after passing the examination, the patient could be induced by general anesthesia.

The general anesthesia was the same in both groups, with mask oxygen inhalation and midazolam 0.05 mg/kg~0.10 mg/kg, propofol 1.0 mg/kg~1.5 mg/kg, rocuronium bromide 0.6 mg/kg and fentanyl 4 mg/kg~6 mg/kg, by intravenous injection. The left two-cavity bronchial catheter is inserted and the ventilator is adjusted to intermittent positive pressure ventilation (IPPV) mode, the tidal volume can be controlled between 8 mL/kg~10 mL/kg, frequency 12 / min~14 / min aspiration ratio 1:2 and 35 mmHg~40 mmHg. In order to maintain the general anesthesia effect, propofol and remifentanyl should be applied to patients by continuous intravenous infusion. Apart from

that, rocuronium bromide is applied to patients and intermittent intravenous injection to maintain a good muscle relaxation effect. During the procedure, the patient blood pressure level and BIS value were closely monitored, and the anesthetic dosage was adjusted to control the patient blood pressure fluctuations within 20% of the preoperative monitoring value, while the patient BIS value was controlled between 50~60. In both groups of patients, 30 min before the surgical treatment, patients should also be applied dizocine 5 mg, tramadol 100 mg, tolterstone 6 mg^[3].

After the completion of surgical treatment in both groups, intravenous patient-controlled analgesia (PCIA) protocol was applied to the patients. 2 µg/kg of sufentanil citrate, 10 mg/kg of tramadol and 8 mg of toltersetron were selected and added to 0.9% sodium chloride solution to prepare 100 mL of the mixture, and the continuous dose was set at 2 mL/h, 2 mL each time, and the locking time was set at 15 min. On top of that, for patients in the experimental group, an electronic pump formulation of 300 mL of 0.15% ropivacaine hydrochloride at a continuous dose of 6 mL/h was applied.

2.3 Observing Indicators

Time of surgery for the two patient groups, intraoperative propofol, postoperative pain conditions and postoperative blood glucose and NE, E, DA levels were measured and conducted for comparative analysis. The perioperative period varied from pre-anesthesia (T1), time (pre-induction (T2), immediate tracheal intubation (T3), surgical 2h (T4), postoperative (T5), 1h (T6), 4h (T7), 8h (T8), 24h (T9), 48h (T10). For the assessment of patients' pain, the pain visual analogue scale (VAS) was used, with a score out of 10, the higher the score, the more intense the postoperative pain felt by the patient. At the detection of patient epinephrine (E), norepinephrine (NE), dopamine (DA) concentrations, after internal jugular vein sampling for 1h, plasma was collected by centrifugation at 2000 r/min for 5 min, placed into a -70 °C cryogenic refrigerator for storage and assayed by radioimmunoassay.

3. Results

3.1 Comparison of Surgical Time and Intraoperative Medication between the Two Patient Groups

The time of surgery and the intraoperative medication statistics are shown in Table 1. The operation time difference between the two groups was not significant, and the amount of propofol in the experimental group was less than that of the reference group.

Table 1. Time of operation and intraoperative medication of the patients in the two groups

Group (n)	Time of surgery (h)	intraoperative propofol (mg)
Experimental Group (n=20)	4.0±0.6	960.0±216.8
Reference Group (n=20)	4.0±0.7	1242.5±200.1

3.2 Comparison of Postoperative VAS Scores between the Two Patient Groups

Postoperative VAS scores in both groups are shown in Table 2, at time points T6 to T9, the VAS scores of patients in the experimental group were lower than those of patients in the reference group when they were quiet as well as when they were active.

Table 2. Postoperative VAS scores and Ramsay sedation scores for the two patient groups (points)

Group (n)	Time point	VAS score in quiet	VAS score at activity
Experimental Group (n=20)	T6	0.5±0.1	1.6±1.0
	T7	0.6±0.2	1.2±1.0
	T8	0.7±0.1	2.0±0.7
	T9	0.7±0.1	2.0±0.8
	T10	1.5±0.6	2.9±0.7
Reference Group (n=20)	T6	1.2±0.8	3.1±0.6
	T7	1.6±0.6	3.1±0.8
	T8	1.9±0.7	3.3±0.6
	T9	1.8±0.6	3.6±0.6
	T10	1.6±0.4	3.6±0.7

3.3 Comparison of Postoperative Blood Glucose and NE, E, DA Levels between the Two Patient Groups

The postoperative blood glucose and NE, E, DA levels are shown in Table 3, where the blood glucose and NE levels were higher than the T1, T4, T5 time point, the T1, T9 time point, the T9 time point, and the T9 time point, the blood glucose and NE, E, DA in the experimental group were lower than the reference group.

Table 3. Postoperative blood glucose and NE, E, DA levels in the two groups

Group (n)	Time point	Blood glucose (nmol/L)	NE(ng/L)	E(ng/L)	DA(ng/L)
Experimental Group (n=20)	T1	5.4±0.4	196.6±55.6	176.6±55.6	36.7±15.6
	T4	5.7±0.8	155.0±26.4	85.0±26.4	72.0±23.4
	T5	5.3±1.1	142.5±25.0	62.4±35.0	19.4±29.9
	T9	7.4±1.2	321.0±43.0	170.1±69.0	57.5±34.0
Reference Group (n=20)	T1	5.6±0.6	189.7±48.6	175.6±54.1	39.8±18.6
	T4	5.7±1.1	149.0±26.2	69.0±24.4	862.2±18.1
	T5	6.3±1.1	139.4±22.0	52.4±24.0	62.5±18.9
	T9	8.9±1.1	467.0±40.0	207.1±71.0	92.2±33.1

4. Discussion

Thoracotomy will cause great trauma to patients, and it is easy to induce stress reactions. The incidence of postoperative adverse reactions is relatively high. Elderly patients have varying degrees of physiological decline and more perioperative complications. After thoracotomy, many patients experience cognitive dysfunction and significant pain, and the effect of anesthesia has a greater impact on the patient's postoperative recovery. In recent years, the technique of regional block complex general anesthesia has developed rapidly and is more commonly used in thoracic surgical treatment^[4]. By comparing the thoracic paravertebral nerve block with the epidural tissue protocol, a good block of the torso on the operated side can be achieved without depressing the patient's heart.

In this study, for both groups of patients, for the experimental group, the ultrasound-guided thoracic paravertebral nerve block protocol was used, and the general anesthesia was the same for both groups, and the intravenous patient-controlled analgesia (PCIA) protocol was applied to the patients after the completion of surgical treatment in both groups. Time of surgery for the two patient groups, intraoperative propofol, postoperative pain conditions and postoperative blood glucose and NE, E, DA levels were measured and conducted for comparative analysis. When applying the thoracic collateral nerve block composite general anesthesia scheme to the patients in the experimental group, ultrasound technology was jointly used to ensure the location, direction and depth control effect of the puncture, and the operation success rate was relatively high^[5].

According to the study, the experimental group patients' perioperative indicators are better than the reference group patients. It can be seen that in the treatment of

thoracotomy in elderly patients, a thoracic paravertebral nerve block compounded with propofol anesthesia protocol can be applied to patients, which has significant anesthetic effect and the patient's perioperative recovery effect is significant and is conducive to the relief of postoperative pain, and is worth promoting and applying.

References

- [1] Yang, J., Xia, Q., He, W., etc., 2018. Effect of thoracic paravertebral nerve block on pain level, stress response, and immune response after thoracoscopic radical lung cancer surgery. *Journal of Hainan Medical University*. 03(v.24;No.202), 75-78.
- [2] Cao, Q., 2018. Effect of ultrasound-guided thoracic paravertebral nerve block and epidural block on analgesia and hemodynamics in patients undergoing unilateral thoracotomy for lung cancer under general anesthesia. *Sichuan Journal of Anatomy*. 026(003), 84-87.
- [3] Wang, Y.L., Zhang, W., Yao, Y.Y., etc., 2018. Effect of ultrasound-guided thoracic paravertebral nerve block on stress response and postoperative analgesia in patients undergoing thoracotomy. *Chinese Journal for Clinicians*. 46(05), 101-104.
- [4] Huang, R.Ch., Zhang, Sh., Ye, Y.Y., etc., 2019. Effect of continuous thoracic paravertebral nerve block combined with general anesthesia on serum lipocalin and postoperative cognitive function in elderly patients undergoing thoracotomy. *Journal of Guangxi Medical University*. 36(02), 43-48.
- [5] Zhang, Y.Q., Wang, Sh.G., 2018. Analysis of ultrasound-guided paravertebral nerve block anesthesia in clinical thoracotomy. *China Continuing Medical Education*. 10(012), 68-69.

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