

## ***Research progress of high colonic dialysis in the treatment of chronic renal failure***

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**Abstract:** Chronic renal failure has become one of the public health problems endangering the world. As renal function progressively declines, the ability of the kidneys to excrete toxins also declines. Through the continuous improvement of traditional enema methods, the effective clearance of intestinal toxins has gradually developed from traditional low retention enema to high colon dialysis, and the high level colon dialysis can replace the ability of kidney to excrete toxins to a certain extent, and has become a new treatment for chronic renal failure. This article reviews the research progress of high colon dialysis in the treatment of chronic renal failure by reading a lot of relevant literature.

### **1. Introduction**

Chronic renal failure is the final outcome of the progressive deterioration of various chronic kidney diseases. In order to delay the progressive decline of renal function, its treatment mainly includes nutritional therapy, drug therapy and renal replacement therapy. Renal replacement therapy can be divided into hemodialysis, peritoneal dialysis, colon dialysis and kidney transplantation. For patients with advanced or non-essential dialysis, colon dialysis has the advantages of economy, non-invasiveness, simple operation, and easy acceptance compared with other dialysis<sup>[1]</sup>. Studies have shown that the colon is an important organ for the production of uremic toxins. These toxins can damage the intestinal mucosal barrier in patients with chronic kidney disease, leading to a systemic micro-inflammatory state and aggravating the damage to renal function<sup>[2]</sup>. Colon uremia can be removed by colon dialysis. Symptomatic toxin can relieve the symptoms and complications of uremia in patients with chronic renal failure. With the continuous development of science and technology, the emergence of colon dialysis machines makes high colon dialysis non-invasive, painless, free of side effects, inexpensive, effective, safe and simple to operate. It is now widely used in the treatment of patients with chronic renal failure. Clinically, the syndrome differentiation of patients with chronic renal failure is complex, and the selection of dialysate, the selection of traditional Chinese medicine during retention enema, the selection of treatment stages, and the selection of frequency need to be analyzed in combination with clinical practice.

## 2. The basic principle of high colon dialysis

The basic principle of high colonic dialysis treatment is to use the colonic mucosa with biological semi-permeable membrane properties to establish different ion gradients for trans-colonic mucosal transport, and through diffusion and osmosis, the toxic metabolites retained in the blood circulation enter the dialysate and absorb into the dialysate. Substances useful to the human body; At the same time, the small dialysis pool formed by the colonic bag, under the frequent peristaltic movement of the colon, makes the dialysis fluid in full contact with the colonic mucosa, which can accelerate the exchange of water and solutes between the intestinal cavity and blood, and achieve the effect of eliminating pathogens and toxins, toxic substances and metabolic waste generated by the intestinal cavity and intestinal mucosa<sup>[3]</sup>. Therefore, to a certain extent, colon dialysis can replace the filtration and reabsorption functions of the kidneys to maintain water, electrolyte and acid-base balance in the body.

The ancients proposed traditional enema methods such as "pig bile guide method" and "honey decoction guide method" for a long time, but there are some problems such as shallow administration, uncleaned intestines before administration, insufficient amount of drugs retained in the intestinal tube, and easy defecation leads to shortcomings such as short retention time of drugs, which can not reach expectations treatment effect<sup>[4]</sup>. After continuous improvement, the emergence of high colonic dialysis may make up for these deficiencies. At present, high-position colon dialysis treatment machines mostly use modern electronic technology, supplemented by specially designed dialysis probes, and the dialysate or perfused drugs can be squeezed through the high-position probe or catheter and peristaltic pump to reach the high colon (intestinal cavity more than 50 cm to the transverse colon) Instead of pressure-holding perfusion, it has high safety; it can realize intelligent operation on the temperature, flow, pressure, perfusion area and depth, dialysis time, irrigation and drainage volume, etc. ions and drugs are fully exchanged and absorbed, and at the same time, the toxins are excreted in time. At present, high colon dialysis treatment is simple, non-invasive, and low-cost, and has become a common choice for most patients with chronic renal failure.

## 3. Clinical application of high colonic dialysis in the treatment of chronic renal failure

### 3.1 Selection of dialysate

#### 3.1.1 Comprehensive configuration of western medicine

According to the principle of colon dialysis, the factors affecting the dialysis effect are mainly related to the ion concentration, pH value and osmotic pressure of the dialysate. The ideal colonic dialysate maintains constant solute clearance and ultrafiltration, replenishes the nutrients the patient needs without increasing metabolic complications, absorbs little or no osmotic substances, and corrects electrolyte and acid-base balance, can be sterile, non-pyrogenic and inhibit the growth of bacteria and fungi, can not damage the body's defense function and colon membrane, and can contain no toxic substances and other characteristics. While configuring the pH value of the dialysate to correct the physiological abnormalities of the patient's colon, the osmotic ultrafiltration effect formed by the osmotic pressure needs to be comprehensively considered in combination with the patient's underlying disease. For patients with kidney disease, the concentrated dialysate is generally used, namely, the dialysis solution A mainly composed of potassium chloride, sodium chloride, magnesium chloride, calcium chloride and citric acid, and the dialysis solution B mainly composed of sodium bicarbonate, diluted according to the proportion of hemodialysate, and proportioned into a dialysate similar to that of hemodialysate. However, there is still a lack of uniformity in the specific formulation of colon dialysate<sup>[5]</sup>. Zeng Xiaoqin performed colon dialysis on 120 patients with chronic renal

failure<sup>[6]</sup>. Type A dialysate was mainly composed of sodium chloride, potassium chloride and magnesium chloride, while group B used sodium chloride and sodium bicarbonate. The two dialysates of B and B were added with purified water for dilution, and the dialysate was prepared according to pure water: A:B=140:4:6; Yang Youli and others chose 100 ml of 50% glucose solution, 500 ml of 5 % sodium bicarbonate solution and 500 ml of 20% mannitol, and then pure water was added to make a total of 5000 ml of colon dialysis solution<sup>[7]</sup>; Li Ning and others used 2 L of peritoneal dialysis solution and 6 L of clean water to make colon dialysis liquid<sup>[8]</sup>. Due to the different formulations of dialysate, the degree of toxins in the blood will be different through dispersion, and the therapeutic effect will also be different. Doctors need to conduct in-depth discussions in combination with clinical practice.

### 3.1.2 Comprehensive treatment of traditional Chinese medicine

Combining with the theory of TCM that "The six fu-organs are used to pass through, and to obey is to descend", and through the principle of dialectical treatment, it is also possible to use traditional Chinese medicine for colon dialysis, such as raw rhubarb, dandelion, salvia, calcined oyster, aconite, red peony, etc.<sup>[9]</sup>. Liu Jie and others used traditional Chinese medicine dialysate (30 g of astragalus, 30 g of rhubarb, 30 g of calcined oyster, 30 g of calcined keel, 15 g of safflower, 15 g of Guizhi) on the basis of routine medical treatment for 38 patients with chronic renal failure, for artificial high colon dialysis, the results show that traditional Chinese medicine high colon dialysis has a significant effect on the treatment of patients with chronic renal failure, can improve renal function, and delay the progression of the disease<sup>[10]</sup>. Lin Sama et al. performed modified traditional Chinese medicine high colon dialysis in 32 patients with CKD stage 4-5<sup>[11]</sup>, and used chronic kidney failure enema formula (Rhubarb, Shenglongmu, Dandelion, Junexue, Angelica) to perfuse the transverse colon for dialysis treatment. At the same time, they all received the integrated treatment of chronic renal failure and the traditional Chinese medicine treatment based on syndrome differentiation. After one month of treatment, the serum creatinine and blood urea nitrogen levels of the patients decreased compared with those before treatment, and the glomerular filtration rate increased compared with those before treatment. Dry knot and other clinical symptoms were significantly relieved, indicating that the improved Chinese medicine high colon dialysis has a certain clinical effect. Liang Xiaoping used a self-made Chinese herbal formula (15 g of rhubarb, 20 g of Hedyotis diffusa, 50 g of oysters, 20 g of Salvia miltiorrhiza) in 67 patients with early and mid-stage chronic renal failure with spleen and kidney yang deficiency and mutual resistance between turbidity and blood stasis, Xianlingpi 20 g) for high colon dialysis with traditional Chinese medicine decoction and conventional western medicine treatment<sup>[12]</sup>, the results show that high colon dialysis of self-made Chinese herbal decoction can improve the clinical symptoms of chronic renal failure and improve the renal function of patients. It can be seen that Chinese medicine high colonic dialysis has a clear curative effect in the treatment of patients with chronic renal failure.

### 3.2 Combined with traditional Chinese medicine retention enema

In the current clinical practice research, it has been clearly confirmed that high colon dialysis combined with traditional Chinese medicine retention enema has a good effect in the treatment of patients with chronic renal failure. Xin Yu et al. selected 140 patients with chronic kidney disease as research objects when discussing high colon dialysis treatment combined with Shenkang Suppository retention enema, and randomly assigned them, 70 cases in each group, and the control group used high colon dialysis method<sup>[13]</sup>. The observation group was given Shenkang Suppository retention enema on the basis of high colon dialysis treatment. After 10 treatments, the therapeutic effects of the two groups were compared. The effective rate of the observation group was significantly better than

that of the control group, Ccr, UA and other indicators have decreased, indicating that high colon dialysis combined with Shenkang Suppository retention enema has a good therapeutic effect on chronic kidney disease, and can relieve the clinical symptoms and renal function progress of patients. Zhu Xueyan and others studied 100 patients with chronic renal failure, and combined high colon dialysis combined with Niaoduqing retention enema therapy in addition to general treatment, and observed blood urea nitrogen, creatinine, uric acid, phosphorus, and parathyroid glands after treatment<sup>[14]</sup>. Hormones and clinical symptoms of patients were improved, indicating that high colon dialysis combined with Niaoduqing Granules retention enema therapy has a significant effect on patients with chronic renal failure. Feng Li et al. randomly divided 95 patients with chronic renal failure<sup>[15]</sup>, among which the treatment group received high colon dialysis combined with the self-made recipe of expelling turbid urine and removing poisonous substances (30 g of raw rhubarb, 30 g of salvia, 30 g of white horse bone, 30 g of calcined keel) , Sophora japonica 20 g, calcined oyster 30 g) traditional Chinese medicine retention enema, the control group was given simple traditional Chinese medicine retention enema, the results of serum creatinine, blood urea nitrogen, serum hs-CRP, TNF- $\alpha$  levels in the treatment group were lower than those in the control group, indicating that the high colonic Dialysis combined with traditional Chinese medicine retention enema can significantly reduce the level of inflammatory mediators in patients with chronic renal failure, inhibit the body's inflammatory response, improve renal function, and delay the progression of chronic renal disease. Wang Yan et al. treated 50 patients with chronic kidney disease with spleen-kidney qi deficiency type based on TCM syndrome differentiation<sup>[16]</sup>. On the basis of symptomatic treatment based on the control group, the observation group was treated with high colon dialysis combined with traditional Chinese medicine (30 g of wine-made rhubarb, 30 g of Junexue, 30 g of raw salvia, 30 g of keel, 30 g of oyster) retention enema, the clinical symptoms, serum creatinine, blood urea nitrogen, uric acid indexes of the observation group were significantly better than those of the control group after treatment, and high colon dialysis combined with traditional Chinese medicine Retention enema plays an important role in metabolic indexes and quality of life in patients with chronic kidney disease with spleen-kidney qi deficiency. Zou Fangpeng et al. took 80 patients with chronic renal failure with syndrome of kidney deficiency and turbidity as the research object<sup>[17]</sup>. The control group was given Niaoduqing Granules retention enema, and the treatment group was given the traditional Chinese medicine Sitan Decoction (Eucommia charcoal 30 g, Muli charcoal 30 g) g, rhubarb charcoal 30 g, wax gourd peel charcoal 30 g) retention enema combined with colon dialysis treatment, BUN, Scr, Ccr, UA in both groups improved after 4 weeks, and the treatment group had more significant curative effect, high colon dialysis combined with traditional Chinese medicine retention Enema can remove intestinal toxins and improve the clinical symptoms of patients. Wang Liyuan and others studied 80 patients with chronic renal failure with damp-heat syndrome<sup>[18]</sup>. After randomization, 40 patients in the control group were treated with high colon dialysis, and 40 treatment groups were treated with high colon dialysis combined with Jiedu Xiezhuo granules (rhubarb, calcined oyster, Salvia, Junexue, Tuckahoe, Quan scorpion) retention enema. After 8 weeks, the TCM symptom scores, serum CysC, Scr, PTH and BUN levels in the two groups were observed to decrease, and serum ALB and HB levels increased. The clinical effective rate was significantly higher than that of the control group, indicating that Jiedu Xiezhuo Granules retention enema combined with high colon dialysis can help improve the nutritional status, clinical symptoms and renal function of patients with chronic renal failure with damp-heat syndrome. Wang Yaping and others used high-level colon purification, dialysis combined with homemade Paidu Jianshen Decoction (rhubarb, oyster, cooked aconite, coptis, Zhuru, Pinellia, ginger, tangerine peel, etc.) or Niaoduqing Granule retention enema, the results showed that 3 patients delayed the time of entering hemodialysis or peritoneal dialysis, and 1 patient had adhered to this method<sup>[19]</sup>. For 8 years, the daily urine output has remained at about 1500 ml, and the current quality of life and application status are good, which provides a transition period for

patients to enter complete replacement therapy, and its curative effect is significant, which can prolong the survival time of patients. Due to the different stages and clinical manifestations of patients with chronic renal failure, it is necessary to dialectically select prescriptions based on the rich clinical experience of clinicians, and fully combine high-level colon dialysis with traditional Chinese medicine retention enema, so that patients can receive better and more comprehensive treatment.

### 3.3 Selection of different stages and dialysis frequency

The timing of high colon dialysis is closely related to the stage of chronic renal failure patients, and the number of dialysis times each time also affects the treatment effect of patients. Wang Mei divided 92 CRF patients into azotemia stage, renal failure stage and uremia stage according to CRF staging standard, and all of them were treated with traditional Chinese medicine enema and colon dialysis high-level sequential therapy<sup>[20]</sup>. The results of serum phosphorus and serum uric acid showed that traditional Chinese medicine enema combined with colon dialysis high sequential therapy has better curative effect on patients with early and middle CRF, and the clinical symptoms can be significantly improved. Mao Dongdong and others randomly divided 90 patients with CKD stage 3 to 5 into group A (once every other day), group B (twice a week) and group C (once a week). Colon dialysis plus basic treatment for 12 weeks, through the analysis of changes in laboratory indicators, high colon dialysis can effectively improve renal function, micro-inflammatory state and nutritional status in patients with CKD stage 3 to 5 to varying degrees, high colon 2 times a week Dialysis is more practical<sup>[21]</sup>. Hu Xi used high colon dialysis combined with homemade traditional Chinese medicine decoction (30 g of raw rhubarb, 30 g of white horse bone, 30 g of calcined keel, 30 g of calcined oyster, 20 g of Sophora japonica, 30 g of Salvia miltiorrhiza) enema for 3 to 5 periods. In patients with chronic kidney disease, the improvement of gastrointestinal symptoms and renal function in patients with dialysis frequency of once every other day was better than that of patients with dialysis twice a week, indicating that the frequency of dialysis once every other day had better curative effect<sup>[22]</sup>. At present, the selection of different stages and dialysis frequency of patients with high colon dialysis is still inconclusive, and further research is still needed.

### 3.4 Adverse reactions and precautions

In the process of colon dialysis, toxin removal is accompanied by some adverse reactions. Due to the number of dialysis exchanges, excessive osmotic agent or ultrafiltration exceeding a reasonable number of times, patients are prone to symptoms of collapse, such as palpitation, anxiety, and frequent sweating; intestinal spasm, incomplete cleaning of enema, or blockage of intestinal lumen caused by low dialysate temperature. Abdominal distention, abdominal pain and other symptoms may occur; due to improper thickness of the anal canal, repeated intubation may easily lead to hemorrhoids, anal pain and bleeding may occur; due to excessive perfusion volume, relaxation of anal sphincter and excessive perfusion speed, fecal incontinence may occur. At the same time, the high insertion position of colon dialysis will be affected by the patient's own constitution and tolerance. The occurrence of various adverse events should be fully considered during treatment, and preparations should be made to respond to critically ill patients at any time.

For patients with chronic renal failure, not only have to face the damage to the body during long-term treatment, but also have negative emotions such as huge psychological fear and economic pressure when facing the disease. Targeted psychological intervention can improve the patient's health. Anxiety and depression are helpful for disease recovery and maintenance of healthy behaviors<sup>[23]</sup>. Therefore, while providing dialysis treatment for patients, we can let patients listen to some pleasant music to relieve tension or gradually guide patients to understand the purpose<sup>[24]</sup>, process, requirements and effects of dialysis when communicating with patients, and give patients enough

Psychological comfort can improve the compliance of patients, help patients establish confidence in overcoming the disease, and develop a good doctor-patient relationship in order to achieve better therapeutic effects.

#### 4. Problems and prospects

Since the development of high colonic dialysis, its therapeutic effect is beyond doubt. However, there is still no unified standard for the lavage fluid, dialysate, and retention fluid required for dialysis, and the evaluation system for toxin clearance is also lacking in standardization, and the treatment and preventive measures for complications during the treatment process are still incomplete, the selection of staging and treatment frequency of chronic renal failure suitable for treatment is still unclear, and more prospective, multi-center, randomized, large-sample, and long-term clinical studies are needed to investigate. High colonic dialysis has a significant effect on toxin removal in patients with chronic renal failure, and has the advantages of high safety, low price, and simple operation. It is suitable for patients in primary medical institutions and has a good development prospect. Therefore, how to further standardize and popularize the high colonic dialysis treatment method to relieve the progress of renal function in patients with chronic renal failure requires continuous exploration by clinical researchers, summarizing their own set of plans on the basis of integrated traditional Chinese and western medicine, so that more patients with renal disease benefit.

#### References

- [1] Mao Dongdong and Xiong Fei, Discussion on the current situation and problems of colon dialysis treatment of chronic renal failure. *Journal of Hubei University for Nationalities (Medical Edition)*, 2017. 34(03): pp. 70-72.
- [2] Fang Jingai, Colon dialysis in the treatment of chronic kidney disease from the perspective of integrated traditional Chinese and Western medicine. *China Journal of Integrated Traditional Chinese and Western Medicine*, 2019. 39(07): pp. 773-775.
- [3] Wang Qing, Ji Qin and Zhang Chunyan, Application status and analysis of colon dialysis machine. *China Journal of Integrated Traditional Chinese and Western Medicine Nephrology*, 2010. 11(12): pp. 1123-1125.
- [4] Qin Zuolian, Liu E and Lu Lijuan, Research progress of traditional Chinese medicine colon dialysis in chronic renal failure. *Nursing Practice and Research*, 2020. 17(04): pp. 38-40.
- [5] Xiong Fei et al. Efficacy and safety of colon dialysis in the treatment of chronic renal failure. *Chinese Journal of Integrative Medicine Nephrology*, 2013. 14(12): pp. 1108-1110.
- [6] Zeng Xiaoqin, On the clinical observation and nursing points of colon dialysis in the treatment of chronic renal failure. *Electronic Journal of Cardiovascular Diseases of Integrated Traditional Chinese and Western Medicine*, 2018. 6(14): p.124.
- [7] Yang Youli, Wang Fei and Hu Shunjin, Research progress on the therapeutic effect of traditional Chinese medicine colon dialysis on chronic kidney disease. *Journal of Clinical Chinese Medicine*, 2012. 24(06): pp. 586-588.
- [8] Li Ning and Mo Wenjuan, Observation of the efficacy of peritoneal dialysis solution colon dialysis combined with traditional Chinese medicine retention enema in the treatment of chronic renal failure. *Clinical Medicine Research and Practice*, 2018. 3(03): pp. 119-120.
- [9] Weekly, Lv Dongning and Zeng Haipei, Advances in the clinical application of traditional Chinese medicine colon dialysis in the treatment of chronic renal failure. *Journal of Guangxi University of Traditional Chinese Medicine*, 2019. 22(02): pp. 63-65.
- [10] Liu Jie et al. Observation on the efficacy of traditional Chinese medicine high colonic dialysis in the treatment of chronic renal failure in 38 cases. *Science and Technology Innovation*, 2017(22): pp. 16-17.
- [11] Lin S. and Deng Yueyi, Clinical observation of modified traditional Chinese medicine high colonic dialysis in the treatment of chronic kidney disease, in 2018 Academic Annual Meeting of the Renal Disease Professional Committee of the Chinese Association of Integrative Medicine in 2018: Chongqing, China. Page 1.
- [12] Liang Xiaoping, Observation on the efficacy of high-level colon dialysis with Chinese herbal decoction in the treatment of chronic renal failure. *Journal of Clinical Chinese Medicine*, 2016. 28(03): pp. 371-374.
- [13] Xin Yu et al. Clinical efficacy analysis of high colon dialysis combined with Shenkang Suppository retention enema in the treatment of chronic kidney disease. *Chinese Medicine Guide*, 2019. 17(28): pp. 47-48.
- [14] Zhu Xueyan et al. Clinical observation of high colonic dialysis combined with Niaoduqing retention enema to delay

*the progression of chronic renal failure. China Practical Medicine, 2016. 11(29): pp. 184-185.*

[15] Feng Li and Bloomberg, *Effects of high colonic dialysis combined with traditional Chinese medicine retention enema on renal function and inflammatory mediators in patients with chronic renal failure. World Latest Medical Information Digest, 2019. 19(28): pp. 189+192.*

[16] Wang Yan et al., *Effects of high colonic dialysis combined with traditional Chinese medicine retention enema on metabolic indexes and quality of life in patients with chronic kidney disease with spleen and kidney qi deficiency. Journal of Chronic Diseases, 2018. 19(S1): pp. 63-64+66.*

[17] Zou Fangpeng and Meng Zhaochen, *Lu Guidong's clinical experience of treating patients with renal failure with kidney deficiency and turbidity by using Sitan Decoction Chinese medicine enema combined with colon dialysis. Electronic Journal of Clinical Medicine Literature, 2016. 3(29): pp. 5891+5893.*

[18] Wang Liyuan et al. *Effects of retention enema combined with high colon dialysis on the levels of CysC, PTH and nutrition in patients with chronic renal failure with damp-heat syndrome. Shaanxi Traditional Chinese Medicine, 2020. 41(07): pp. 917-919.*

[19] Wang Yaping, *Clinical observation of high-level colon cleansing, dialysis, and traditional Chinese medicine retention enema in the treatment of renal failure. Chinese Journal of Health Medicine, 2013. 15(04): pp. 335-336.*

[20] Wang Mei, *Efficacy analysis of high-level sequential therapy of traditional Chinese medicine colon dialysis on chronic renal failure in different periods. World Journal of Integrative Medicine, 2016. 11(02): pp. 235-237+244.*

[21] Mao Dongdong et al. *Observation of the curative effect of high colonic dialysis with different treatment frequencies on patients with chronic kidney disease stage 3 to 5. China Journal of Integrated Traditional Chinese and Western Medicine Nephrology, 2018. 19(08): pp. 697-699.*

[22] Hu Xi, *Effects of two frequencies of high colonic dialysis on renal function in patients with chronic kidney disease stages 3-5. Electronic Journal of Cardiovascular Diseases of Integrative Medicine, 2020. 8(22): pp. 177-178.*

[23] Yi Dan, *The effect of psychological intervention on the negative emotions of patients with chronic renal failure in the early and middle stages of colon dialysis. Contemporary Nurses (late issue), 2012(06): pp. 156-159.*

[24] Cheng Suping, *Clinical nursing countermeasures for colon dialysis treatment of chronic renal failure. Electronic Journal of Cardiovascular Diseases of Integrated Traditional Chinese and Western Medicine, 2018. 6(13): p.141.*