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The study of calcitriol, cinacalcet combined with nursing intervention effect of SHPT, calcium, phosphorus metabolism and parathyroid hormone on MHD patients

Le Chen[1]✉, Xiao−Yun Wu[2]

[1] *Department of Facial Features, Second Affiliated Hospital of Hebei North University 075100*

[2] *Department of Renal Medicine, Second Affiliated Hospital of Hebei North University 075100*

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ABSTRACT

Objective: To investigate calcitriol, cinacalcet plus comprehensive intervention on maintenance hemodialysis (MHD) patients with secondary hyperparathyroidism (SHPT) calcium (Ca), phosphorus (P) metabolism and parathyroid hormone (PTH) effect. **Methods:** A total of 80 cases of patients with SHPT from January 2014 to January 2016 in our hospital were randomly divided into observation group and control group, control group to eat the whole piece of cinacalcet hydrochloride oral tablets, the initial dose of 25 mg/d, every 2 to 4 weeks, according to Ca×P, parathyroid hormone (iPTH) test results adjust the dose, the maximum dose of not more than 75 mg/d, the observation group in the control group on the basis of oral administration of Calcitriol Soft Capsules 0.25 g/d, 3 times/week, 2 groups were given comprehensive intervention measures, to evaluate the curative effect after 3 months of treatment. The 2 groups before and after treatment collected fasting peripheral venous blood, the determination of Ca, P and alkaline phosphatase by colorimetric method (ALP), Ca, P product calculation (Ca×P), to detect the level of iPTH before and after treatment by ELISA method; TY-6858-HI type ultrasound instrument, measuring length, width and thickness of the parathyroid glands, and calculate the parathyroid gland volume. **Results:** in the observation group after treatment, Ca, Ca×P increased degree, P, ALP, iPTH lower than the control group, the size of the parathyroid gland was better than the control group. **Conclusion:** calcitriol, cinacalcet combined intervention therapy has good clinical effect in patients with MHD SHPT, Ca, P can effectively improve the metabolism, reduce the level of iPTH, reduce the parathyroid gland volume is worthy of promotion.

1. Introduction

Secondary hyperparathyroidism (SHPT) is in maintenance hemodialysis (MHD) patients with major complications, showed high transfer of bone and calcium (Ca), phosphorus (P) metabolic disorder caused by long-term abnormal mineral metabolism, bone disease and vascular calcification, lead to the occurrence of cardiovascular accident[1,2]. Calcitriol can inhibit the secretion of parathyroid function and promote intestinal absorption of calcium ion Ca^{2+}[3]. Si Bernard Casey is a parathyroid gland surface Ca^{2+} sensitive receptor (CaSR) agonist, which is referred to as reversible chemical removal of parathyroid glands by Si Bernard Casey therapy[4]. This study used Calcitriol, cinacalcet plus comprehensive intervention treatment of patients with MHD SHPT, clinical received satisfactory result, report as follows now.

2. Data and methods

2.1 general information

From January 2014 to January 2016 in our hospital 80 cases of

✉Corresponding author: Le Chen, female, undergraduate, charge nurse, research direction: secondary hyperparathyroidism.
Tel: 13623360101
E-mail:chenle23360101@163.com
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patients with SHPT as the research object, randomly divided into observation group and control group, 40 cases in the observation group, 24 cases were male, 16 were female; age ranged from 60 to 78 years old, the average (63.7±5.8) years; dialysis ages 10-105 months, the average (59.3±13.6 months). The control group of 40 cases, male 25, female 15; age 61-78 years old, average (64.1±5.6) years old; dialysis age 10-104 months, average (58.7±13.7) months. There was no significant difference in age, sex, and dialysis age between the 2 groups (P>0.05).

2.2 inclusion and exclusion criteria

Selection criteria: meet the diagnostic criteria of SHPT [5], parathyroid hormone (PTH) levels, accompanied by low blood Ca, high blood P; hemodialysis 3 times a week, at least for more than 6 months of hemodialysis, and stable disease; voluntary subjects and signed informed consent. Exclusion criteria: Patients with surgical indications, including bone pain, skin itching, hypercalcemia; with severe cardiovascular, respiratory and digestive system diseases; exclusion of mental disorder, consciousness and cases.

2.3 method

In the control group when eating the whole piece of cinacalcet hydrochloride oral tablets[Concord (Chinese) fermentation kylin Pharmaceutical Co. Zhunzi J20140122], the initial dose of 25 mg/d, every 2 to 4 weeks, according to Ca P, parathyroid hormone (iPTH) test results to adjust the dose, the maximum dose is less than 75 mg/d. The observation group in the control group on the basis of Calcitriol Soft Capsules (Germany Catalent Germany oral Eberbach GmbH, Zhunzi J20100056) 0.25 g/d, 3 times / week. 2 groups were treated for 3 months after the efficacy evaluation.

2.4 observation index

Before and after treatment, the 2 groups were collected in the early morning fasting peripheral venous blood. The Ca, P, alkaline phosphatase (ALP) levels were measured by the colorimetric method, and the product of P and Ca (P × Ca) was calculated, and the iPTH level was detected by ELISA method. Before and after treatment, the TY-6858-HI type B ultrasound instrument was used to measure the length, width and thickness of the parathyroid glands.

2.5 statistical analysis

Count data using χ^2 test, measurement data using t test, to $(\bar{x}\pm s)$; data entry using SPSS 18 analysis software such as P<0.05, said the difference was statistically significant.

3. Results

3.1 comparison of blood biochemical indexes before and after treatment

The 2 groups after treatment of Ca (mmol/L), Ca×P (mmol^2/L^2) increased, P (mmol/L), ALP (U/L), iPTH (ng/L) decreased, compared with the same group before treatment was significantly different (P<0.05), the observation group Ca, Ca×P, P, ALP increased, and iPTH decreased than the control group, there was significant difference between the 2 groups (P<0.05). See table 1.

3.2 comparison of parathyroid volume before and after treatment

The 2 groups after treatment of parathyroid hormone (cm), long width (cm), thickness (cm), volume (cm^3) decreased, compared with the same group before treatment was significantly different (P<0.05), the observation group of parathyroid size than control group, there were significant differences between the 2 groups (P<0.05). See table 2.

Table 1

Comparison of blood biochemical indexes before and after treatment

Group	n	Time	Ca	P	Ca×P	ALP	iPTH
Observation group	40	Before treatment	1.89±0.21	1.96±0.11	3.51±0.41	161.74±23.43	421.37±57.69
		After treatment	2.76±0.18$^{*\#}$	1.52±0.07$^{*\#}$	4.12±0.39$^{*\#}$	74.36±12.48$^{*\#}$	216.57±23.48$^{*\#}$
Control group	40	Before treatment	1.91±0.16	1.96±0.10	3.53±0.39	159.56±24.17	422.26±53.75
		After treatment	2.26±0.15*	1.73±0.07*	3.76±0.48*	115.31±15.42*	318.27±38.79*

Note: compared with before treatment $^{*}P$<0.05, compared with the control group $^{\#}P$<0.05

Table 2

Comparison of parathyroid volume before and after treatment

Group	n	Time	Long	Wide	Thick	Volume
Observation group	40	Before treatment	0.93±0.03	0.52±0.06	0.44±0.03	1.71±0.24
		After treatment	0.67±0.08$^{*\#}$	0.36±0.04$^{*\#}$	0.28±0.04$^{*\#}$	0.84±0.15$^{*\#}$
Control group	40	Before treatment	0.92±0.04	0.53±0.05	0.43±0.04	1.70±0.25
		After treatment	0.82±0.06*	0.45±0.06*	0.36±0.03*	1.18±0.23*

Note: compared with before treatment $^{*}P$<0.05, compared with the control group $^{\#}P$<0.05

4. Discussion

MHD patients due to Ca and P metabolic disorders, VitD metabolic abnormalities, CaSR down, PTH resistance and other factors, leading to the proliferation of parathyroid cells and function, so that PTH excessive synthesis and secretion, resulting in SHPT[7]. SHPT is a common complication of chronic renal failure, mainly for parathyroid hyperplasia and increased secretion of PTH, resulting in high transport bone disease causing serious damage to bones, can cause nervous system damage, vascular calcification, anemia, skin pruritus and cardiovascular disease[8,9]. Research shows[10],Cardiovascular mortality and total mortality were significantly increased in patients with high PTH, and the level of cardiovascular disease was positively correlated with the degree of vascular calcification. Therefore, effective control of PTH levels and treatment of SHPT, in order to achieve the goal of improving the quality of life of patients with MHD, improve the survival rate.

The chemical composition of Calcitriol Soft Capsules is 1,25-dihydroxyvitamin D_3 (1,25- (OH) $_2$-D_3, VitD) is a preparation for improving iPTH strongest biological activity, can be directly added in patients with deficient 1,25- (OH) $_2D_3$, effectively promote the absorption of intestinal Ca alleviate hypocalcaemia, inhibit excessive secretion of indirect PTH, thereby reducing the incidence[11,12]. Calcitriol Soft Capsules had a direct role in parathyroid gland, reduce the transcription of PTH gene, thus reducing parathyroid cell proliferation, increase the number of parathyroid D receptors, to avoid the occurrence of SHPT[13]. Si Bernard Casey hydrochloride as the second generation of CaSR agonists, with mineral metabolism regulation and VitD, CaSR expression enhancement, can activate CaSR, improve the sensitivity of Ca^{2+}, VitD, Ca^{2+} enhanced inhibition of iPTH secretion, reduce the level of iPTH[14,15]. Reported[16], Calcitriol Soft Capsules and cinacalcet hydrochloride combined application, can effectively regulate the blood of patients with SHPT Ca and P levels, reduce the incidence of iPTH and related adverse reaction. This study shows that Ca, Ca × P in observation group after treatment increased the level of ALP, P, and iPTH decreased than the control group (P<0.05), parathyroid smaller than control group (P<0.05), suggesting that cinacalcet ossification in three alcohol, combined with comprehensive intervention can effectively adjust the Ca and P level, decreased the level of iPTH. Reduce the volume of parathyroid gland.

In summary, Calcitriol, cinacalcet combined intervention therapy has good clinical effect in patients with MHD SHPT, Ca, P can effectively improve the metabolism, reduce the level of PTH, reduce the parathyroid gland volume is worthy of promotion.

Reference

[1] Lun Lide, Liu Dong, Gao Zhuo, et al. Effect of parathyroid gland resection on the quality of life of uremic patients with secondary hyperthyroidism. *China Blood Purification* 2014; **13**(1): 23-26.

[2] Tang Xueqin, Chen Zejun, Gan Hua. Maintenance hemodialysis patients with secondary hyperparathyroidism alfacalcidol treatment impact analysis of Meta magazine. *Renal Transplant* 2014; **23**(2): 128-135.

[3] Song Fangrong, Cheng Hai, Zhao Dongming. Lanthanum carbonate of ossification in three alcohol shock treatment of chronic renal failure in patients with continuous ambulatory peritoneal dialysis blood calcium, blood phosphorus secondary hyperparathyroidism effect. *Chin Evidence–Based Medical J* 2014; **14**(6): 651-654.

[4] Li Caifeng, Hu Yuqing, Shen Shuqiong. Cinacalcet treatment of blood dialysis patients with secondary hyperparathyroidism: analysis of 7 cases. *Nephropathy Chin Combining Tradit Chin Western Med J* 2015; **16**(6): 529-530.

[5] Wang Zhigang. Blood purification. second edition. Beijing: *Beijing Science and Technology Press*; 2010, p. 752-755.

[6] Shan Guanghong, Zhang Ying, Du Juan. Drug combined nursing intervention for the prevention and treatment of secondary parathyroid function in maintenance hemodialysis patients clinical observation. *Northern Pharm* 2014; **11**(1): 64-65.

[7] Zhang Ling. Treatment strategy of secondary parathyroid function. *Chin J Kidney Dis Res* 2015; **4**(3): 118-122.

[8] Ma Lijie, Li Zhongxin, Liu Jing, et al. Study on bone metabolism and bone mineral density in hemodialysis patients with secondary parathyroid function. *Beijing Med* 2014; **36**(10): 812-815.

[9] Gao Yang. Calcitriol shock treatment on chronic renal failure peritoneal dialysis secondary hyperparathyroidism in patients with FGF23, iPTH, calcium and phosphorus effect. *China Pract Med* 2015; **10**(28): 136-138.

[10]Xu Fang, Shen Yu, Qi Yongling. Low calcium dialysate combined with Calcitriol shock treatment of maintenance hemodialysis patients with secondary hyperparathyroidism to observe the curative effec. *Hainan Med J* 2016; **27**(14): 2286-2288.

[11]Han Ying won, Wang Tong, Zhang Wenyu, et al. Clinical observation of Calcitriol combined with cinacalcet treatment of blood dialysis patients with secondary hyperparathyroidism. *Modern Clin Med* 2015; **30**(12): 1451-1454.

[12]Guo Jianying, Li Tong, Lin Haiyan. To observe the curative effect of cinacalcet in hemodialysis in treatment of secondary hyperparathyroidism. *Evaluation Analy Drug Use Chin Hosp* 2016; **16**(7): 918-920.

[13]Xia Xiong Fang. Clinical observation on the treatment of patients with secondary parathyroid function after maintenance hemodialysis with the impact of Calcitriol. *Clin Rational Drug Use* 2014; **7**(6): 15-17.

[14]Pu Zhengchuan, Ran Yuli, Liao Xuejiao. Cinacalcet treatment maintained prospective study of hemodialysis patients with secondary hyperparathyroidism. *Baotou Med J* 2016; **40**(2): 72-75.

[15]Wang Henan, Guo Zengyu, Wang Chaomin, et al. Cinacalcet treatment of blood dialysis patients with secondary hyperparathyroidism to observe the efficacy and safety. *Chin J Tradit Chin Western Med* 2016; **17**(7): 625-626.

[16]Kuang bin. The curative effect of cinacalcet combined with ossification in three alcohol on hemodialysis patients with secondary hyperparathyroidism. *Modern Diagn Treatment* 2016; **27**(10): 1771-1773.