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低钙透析液联合醋酸钙对血液透析患者高磷血症的影响

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摘要 目的:研究低钙透析液联合醋酸钙治疗对血液透析患者血磷、血钙及甲状旁腺激素 iPTH 水平的影响。方法:将 30 例维持性血液透析患者随机分为试验组和对照组,在试验期间所有患者均低磷饮食,两组透析液钙浓度均为 1.25 mmol/L,试验组同时给予醋酸钙治疗,对照组不应用醋酸钙治疗,三个月后观察和比较两组患者的血钙、血磷及血 iPTH 水平的变化。结果:治疗前,两组各血磷、血钙、血磷和血 iPTH 的水平比较差异均无统计学意义($P>0.05$)。治疗后,对照组血钙水平明显下降($P<0.05$),血 iPTH 水平略上升但无统计学意义($P>0.05$),血磷水平无显著变化($P>0.05$);试验组血 iPTH 水平略下降($P>0.05$),血钙水平无明显变化($P>0.05$),但血磷明显下降($P<0.05$);且试验组血磷水平较对照组明显下降($P<0.05$),血钙水平显著高于对照组($P<0.05$),但在正常范围内,两组血 iPTH 水平比较无统计学意义($P>0.05$)。结论:低钙透析液联合醋酸钙治疗可有效降低血液透析患者的血磷水平,且不会导致高钙血症的发生。

关键词: 低钙透析液;醋酸钙;高磷血症;血液透析

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Influence of low Calcium Dialysate Combined with Calcium Acetate on Hyperphosphatemia of Patients with Hemodialysis

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ABSTRACT **Objective:** To study the effect of low calcium dialysate combined with calcium acetate on serum phosphorus, calcium and parathyroid hormone iPTH level of patients with hemodialysis. **Methods:** 30 cases of maintenance hemodialysis patients were randomly divided into the experimental group and control group. During the test, patients were supplemented with low phosphorus diet, and dialysate calcium concentration of the two groups were 1.25 mmol/L. The experimental group was given calcium acetate for the treatment at the same time. The control group did not use it, then the changes in serum calcium, phosphorus and parathyroid hormone level of the two groups patients were observed and compared after three months. **Results:** Before treatment, no significant difference was found in the serum calcium, phosphorus and parathyroid hormone levels between the two groups($P>0.05$). The serum calcium level of the control group was decreased significantly ($P<0.05$), the serum iPTH level was slightly increased but had no statistical significance ($P>0.05$), no change was found in serum phosphorus level ($P>0.05$). The serum iPTH level of experimental group was slightly decreased ($P>0.05$), no change was observed in serum calcium level ($P>0.05$), but the serum phosphorus decreased significantly ($P<0.05$); the serum phosphorus level of experimental group was significantly lower than that of the control group ($P<0.05$), the serum calcium level was significantly higher than that of the control group ($P<0.05$), but in the normal range, no statistical difference of serum iPTH level was observed between the two groups ($P>0.05$). **Conclusion:** Low calcium dialysate combined with calcium acetate could efficiently reduce the serum phosphate level of hemodialysis patients and hypercalcemia won't occur.

Key words: Low calcium dialysate; Calcium acetate; Hyperphosphatemia; Hemodialysis

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前言

高磷血症是维持性血液透析患者的主要并发症之一,在几乎 100%给予磷结合剂的情况下,仍有大约 50%的患者发生高磷血症^[1,2]。由于患者肾脏功能衰竭,健存肾单位进行性减少,肾脏自身调节钙磷代谢的能力基本消失,排磷减少,血磷浓度逐

渐升高,与血钙结合成磷酸钙沉积于组织,进而致血钙降低。但随着透析年限的增加,透析患者往往会出现高钙血症。钙磷代谢失调可导致转移性血管、心瓣膜等钙化^[3],透析患者心血管事件和死亡的危险程度增加^[4]。高磷血症使血管中层钙化,细胞外液钙磷乘积升高,刺激甲状旁腺增生,引起继发性甲状旁腺功能亢进^[5,6],甲状旁腺激素 iPTH 浓度升高,进而导致肾性骨营养不良^[7],严重影响血液透析患者的生存及生活质量。因此,保持钙磷代谢平衡具有重要的临床意义。高磷血症较难治疗,除限磷饮食和充分透析外,主要使用磷结合剂。目前,磷结合剂主要有含钙的磷结合剂、含铝的磷结合剂和不含钙铝的磷结合剂,应用含铝的磷结合剂易致铝中毒,导致神经系统病变,不含钙

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铝的磷结合剂价钱较贵,很多家庭难以承受,含钙的结合剂易导致高钙血症。如何使纠正血液透析患者的钙磷代谢紊乱,且不增加其发生高钙血症的风险对改善血液透析患者的预后具有重要的临床意义。我科应用低钙透析液联合醋酸钙治疗血液透析患者,并观察了治疗前后患者的血钙、血磷、iPTH 水平的变化,现报道如下。

1 材料与方法

1.1 病例资料

选择我院 2012 年 3 月 -2012 年 5 月收治的 30 例维持性血液透析患者,其中男 20 例,女 10 例,年龄 20-75 岁,平均年龄 51.13 ± 10.88 岁,维持血液透析时间 3-5 年。原发病分别为糖尿病肾病 10 例,高血压肾病 8 例,慢性肾小球肾炎 6 例,慢性间质性肾炎 3 例,病因不明 3 例。所有患者均行规律性血液透析治疗,每周透析 3 次,每次透析 4h。血管通路均为动静脉内瘘,血流量 200-250 ml/min,透析液流量 500 ml/min,所用透析器相同,要求患者血磷 >1.78 mmol/L, 1.8 mmol/L $<$ 血钙 <2.54 mmol/L,血清甲状旁腺激素 iPTH <1000 pg/ml,所有患者均低磷饮食。

1.2 研究方法

将全部患者随机分为试验组和对照组,两组透析液钙浓度

均为 1.25 mmol/L,试验组应用醋酸钙治疗,根据患者钙磷水平选择合适的剂量,对照组不应用醋酸钙,观察治疗前和治疗三个月后患者的血钙、血磷及甲状旁腺激素水平的变化。

1.3 观察指标

所有患者进入试验前检查血钙、血磷及血甲状旁腺激素水平,每个月复查上述指标。所有血液标本均在透析治疗前采集。

1.4 统计学处理

采用 SPSS19.0 统计软件进行统计学处理,计量资料用均数 $\pm$ 标准差 $\bar{x} \pm s$ 表示,两组治疗前后比较选用配对 t 检验,组间比较选用成组 t 检验,以 $P < 0.05$ 为差异有统计学意义。

2 结果

治疗前,两组各组血磷、血钙、血磷和血 iPTH 的水平比较差异均无统计学意义($P > 0.05$)。治疗后,对照组血钙水平明显下降($P < 0.05$),血 iPTH 水平略上升但无统计学意义($P > 0.05$),血磷无显著变化($P > 0.05$);试验组血 iPTH 水平略下降($P > 0.05$),血钙水平无明显变化($P > 0.05$),但血磷明显下降($P < 0.05$);试验组血磷水平较对照组明显下降($P < 0.05$),血钙水平显著高于对照组($P < 0.05$),但在正常范围内,两组血 iPTH 水平比较无统计学意义($P > 0.05$)。

表 1 两组患者治疗前后血钙、血磷及血 iPTH 水平的比较

Table1 Comparison of the serum calcium, phosphorus and iPTH levels before and after the treatment between two groups

Group	n	Time	Serum phosphorus (mmol/L)	Serum calcium (mmol/L)	iPTH (pg/ml)
Control group	15	Before treatment	2.14 ± 0.19	2.19 ± 0.13	505.41 ± 111.00
		After treatment	2.09 ± 0.20	$1.99 \pm 0.04^{\#}$	517.33 ± 88.82
Experimental group	15	Before treatment	2.06 ± 0.14	2.19 ± 0.12	512.55 ± 110.81
		After treatment	$1.94 \pm 0.08^{**}$	$2.26 \pm 0.33^{**}$	495.07 ± 109.72

* 注:与对照组比较 $^{**} P < 0.05$;与治疗前比较 $^{\#} P < 0.05$ 。

Note: Compared with the control group $P < 0.05$; Compared with before the treatment $^{\#} P < 0.05$.

3 讨论

维持性血液透析患者残存的肾小球不足以清除每日膳食中吸收的磷,表现为正磷平衡^[8],虽然保持低磷饮食而且血液透析能清除体内一部分滞留的磷,但仍往往合并高磷血症。高磷血症是引起继发性甲状旁腺功能亢进,肾性骨病及异位钙化的重要因素。甲状旁腺功能亢进和骨病会使患者骨痛、肌无力、骨骼畸形、皮肤坏死等,血磷过高会导致钙磷乘积升高 ≥ 70 mg/dl,进而诱发广泛的钙化形成,致动脉硬化性血管病^[9]。有研究表明血磷每增加 0.323 mmol/L,对冠状动脉钙化造成的危险性相当于增加 2.5 年的血液透析时间^[11],可导致左心室变大、心律失常和猝死等^[12],还可使细胞氧亲和力降低,引起心肌对运动耐受力明显下降等等,增加了心血管事件的发生率。因此,使血磷控制在合理范围内具有重要意义。目前透析患者降磷除了限磷饮食和充分透析外,主要依靠磷结合剂治疗,含铝磷结合剂不可以长期应用,因其可导致铝相关性骨病、贫血和铝中毒性脑病等神经系统症状^[13]。不含钙铝的磷结合剂如碳酸镧及盐

酸司维拉姆价格太贵,大多数透析患者家庭不能承受。含钙的磷结合剂碳酸钙具有含较高钙离子、价格便宜等优点,在临床上得到了广泛的应用,但碳酸钙在常规剂量下结合磷的能力并不很强大,而给予高剂量时容易出现高钙血症^[14],其与活性维生素 D 合用并同时使用较高钙浓度的透析液,更容易发生高钙血症,如果患者血磷或钙磷乘积过高也不可以应用含钙的磷结合剂,容易发生异位钙化,因此如何降磷同时避免高钙血症的发生成为我们要解决的重要难题。

研究发现,醋酸钙的降磷效果优于碳酸钙^[15],且钙负荷低。Borrego 等的研究表明在醋酸钙和碳酸钙达到相同降磷效果时,后者药量中的钙离子含量为前者的 4 倍^[16];邓创惠的研究也发现醋酸钙降磷的疗效较碳酸钙更早出现^[17]。因此,本研究使用低钙透析液的同时应用醋酸钙治疗血液透析患者,结果显示:治疗后患者血磷水平较仅用低钙透析液明显降低,血钙较之升高但在正常范围之内,防止了单纯应用低钙透析液发生低钙血症,以及应用含钙的磷结合剂发生高钙血症的危险。有研究还表明,长期应用低钙透析液会导致血 iPTH 上升^[18],但最近

Lund 研究发现大剂量应用含钙的磷结合剂联合低钙透析可很好的控制血磷并且不影响 iPTH 水平^[19]。本组实验中,仅用低钙透析液治疗的患者血 iPTH 有上升趋势,但治疗前后比较无统计学意义,而使用低钙透析液的同时应用醋酸钙治疗不影响患者的血 iPTH 水平,但我们还需要进一步观察应用低钙透析液同时应用醋酸钙的长期临床效果。有研究表明对于严重的甲状旁腺功能亢进的患者如果应用低钙透析液会加重甲状旁腺^[20],因此临床当中要监测患者化验指标的变化,根据患者的实际情况调整透析液的钙浓度以及降磷药物。

综上所述,维持正常的血钙和血磷水平,探索有效、安全的控制血磷的方法已成为临床血液透科医生的工作重点。控制血液透析患者的高磷血症除了应用药物治疗以外还应多鼓励患者坚持低磷饮食,控制磷的摄入量。对于维持性血液透析患者,应根据患者的临床血钙、血磷及 iPTH 的水平应用不同钙浓度的透析液,制定个体化透析方案,减少钙磷代谢紊乱的发生,同时减少血液透析患者长期并发症发生的发生率。

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