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低钠血症与老年股骨转子间骨折的相关性研究*

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摘要 目的:探讨低钠血症与老年股骨转子间骨折的相关性。**方法:**于2011年2月至2017年8月在承德医学院附属医院的住院患者中选取单侧新鲜闭合性股骨转子间骨折患者340例(其中老年患者(年龄 ≥ 60 岁)282例)及同期住院的非骨折老年患者162例为研究对象,将其中444例老年患者进行分组,根据有无发生骨折分为骨折组和非骨折组。记录患者入院后首次抽血生化检验结果中钠离子值,比较两组患者的一般情况和低钠血症发生情况。在340例股骨转子间骨折患者中比较不同年龄段间骨折发生率、低钠血症发生率,分析低钠血症与老年股骨转子间骨折的相关性。**结果:**骨折组患者与非骨折组患者性别、年龄段、合并慢性疾病方面进行比较差异无统计学意义($P>0.05$)。骨折组患者低钠血症发生率明显高于非骨折组,差异有统计学意义($P<0.05$)。在年龄 ≥ 60 岁患者中,骨折发生率与低钠血症发生率呈显著正相关($P<0.05$)。**结论:**低钠血症与老年股骨转子间骨折的发生相关,纠正低钠血症有助于预防老年股骨转子间骨折的发生。

关键词:低钠血症;老年股骨转子间骨折;骨质疏松

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Research on the Relationship between Hyponatremia and Intertrochanteric Fracture in the Elderly*

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ABSTRACT Objective: To investigate the correlation of hyponatremia with intertrochanteric fracture in the elderly patients.

Methods: 340 cases of inpatients with new unilateral closed intertrochanteric fractures [including 282 elderly patients (≥ 60 years old)] and 162 inpatients without fractures who were admitted to the hospital from February 2011 to August 2017 were selected as the subjects. Among them, 444 elderly patients were grouped into the fracture group and the non-fracture group according to the occurrence of fractures. The sodium ion value in results of the first blood biochemical detection after admission was recorded. The general situation and incidence of hyponatremia were compared between the two groups. The incidence of fractures and hyponatremia was compared between patients of different age in the 340 patients with intertrochanteric fractures. The correlation between hyponatremia and intertrochanteric fracture in the elderly was analyzed. **Results:** There was no significant difference between the two groups in gender, age group or chronic diseases ($P>0.05$). The difference of hyponatremia in the fracture group was significantly higher than that in the non-fracture group ($P<0.05$). In patients ≥ 60 years old, the incidence of fracture was positively correlated with the incidence of hyponatremia ($P<0.05$). **Conclusion:** Hyponatremia is associated with the incidence of intertrochanteric fractures in the elderly. Correcting hyponatremia is conducive to preventing the occurrence of intertrochanteric fractures in the elderly.

Key words: Hyponatremia; Intertrochanteric fracture in the elderly; Osteoporosis

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前言

股骨转子间骨折常见于老年人,多合并有一定程度的骨质疏松,多为低能量损伤引起。股骨转子间骨折患者多高龄,常合并多种慢性疾病及一定程度的电解质紊乱。低钠血症是指血钠浓度低于 135 mmol/L,是医务工作者在临床工作中最常处理的电解质紊乱。近几年,虽然有一些老年患者与低钠血症相关性的研究报道,但尚无低钠血症与老年股骨转子间骨折相关性研究的报道。本研究主要探讨了低钠血症与老年股骨转子间骨折的关系,结果报道如下。

1 材料与方法

1.1 一般资料

2011 年 2 月到 2017 年 8 月在承德医学院附属医院住院的患者中,选取股骨转子间骨折患者 340 例及同期非骨折患者 301 例作为研究对象,其中老年患者 162 例作为对照组,收集患者相关临床资料,记录患者的年龄、性别、入院首次生化全项结果、患者是否患有高血压、消化系统疾病、心血管疾病、糖尿病、脑血管疾病、肝肾功能不全、代谢性疾病等内科疾病。纳入标准:相关资料完整,低能量损伤导致的单侧新鲜股骨转子间骨折患者,无骨折的同龄住院患者,既往无急慢性消化系统疾病,非多发性创伤,无严重基础疾病。排除标准:高能量损伤所致的股骨转子间骨折;伴有颅脑或颈髓损伤的患者;开放骨折患者;多发骨折患者;多发伤患者;合并有肾功能不全的患者;患有影响钠离子、钾离子及水代谢的内分泌系统疾病患者;近期或长期服用利尿剂、三环类抗抑郁药、环磷酰胺等影响钠离子代谢的药物。共有 502 例患者符合纳入标准。骨折患者 340 例,非骨折患者 162 例。

1.2 记录资料

患者入院后 24 小时内完成血常规、生化全项等常规化验检查,记录患者入院后首次血钠离子检测值,记录患者受伤机制及合并的高血压、心血管疾病、脑血管疾病、糖尿病等基础疾病,记录患者既往及近期有无服用利尿剂、三环类抗抑郁药等影响钠离子、水代谢的药物。

1.3 分组

将所收集的 444 例老年患者进行分组,根据有无发生骨折分为骨折组和非骨折组,比较两组患者在不同性别、不同年龄段、合并慢性疾病如高血压、心血管疾病、脑血管疾病、糖尿病,低钠血症发生率方面有无差异。在 340 例股骨转子间骨折患者中,比较年龄 ≥ 60 岁与年龄 <60 岁患者之间低钠血症发生率有无差异,在所收集的全部骨折患者中,进一步分析不同年龄段间低钠血症的发生率、骨折发生率的情况。

1.4 统计学分析

统计软件采用 SPSS 19.0,计数资料采用百分比(%)方式表示,组间比较采用卡方 χ^2 检验,相关性分析采用 Pearson 相关系数,以 $P<0.05$ 为差异有统计学意义。

2 结果

年龄 ≥ 60 岁的骨折患者与非骨折患者性别分布、年龄、并存慢性疾病比较差别无统计学意义($P>0.05$)(见表 1)。骨折组低钠血症的发生率高于非骨折组,差别有统计学意义($P<0.05$)(见表 2)。在骨折组中,年龄 ≥ 60 岁患者低钠血症发生率高于年龄 <60 岁患者,差异有统计学意义(见表 3)。在年龄 ≥ 60 岁患者中,骨折发生率与低钠血症发生率增加的趋势基本一致,经 Pearson 相关分析显示两者呈正相关。(见图 1、图 2、表 4)。

表 1 骨折组和非骨折组患者的一般情况比较

Table 1 Comparison of the general condition between fracture group and non-fracture group

	Fracture group	Non-fracture group	P
Gender			0.749
Man	95	57	
Woman	187	105	
Age			0.066
60-69	42	72	
70-79	103	65	
80-	137	28	
Combined disease			
Hypertension			0.590
Yes	100	72	
No	182	90	
Cardiovascular disease			0.395
Yes	71	42	
No	211	135	
Diabetes			0.594

表 1 骨折组和非骨折组患者的一般情况比较(续表)

Table 1 Comparison of the general condition between fracture group and non-fracture group

	Fracture group	Non-fracture group	P
Yes	44	27	0.055
No	238	135	
Cerebrovascular disease			
Yes	65	25	
No	217	137	

表 2 骨折组与非骨折组之间低钠血症发生情况比较

Table 2 The comparison of incidence of hyponatremia between the two groups

	Fracture group	Non-fracture group	P
hyponatremia			0.000
Yes	48	3	
No	234	159	

表 3 骨折组中,老年人与非老年人低钠血症发生情况比较

Table 3 The comparison of incidence of hyponatremia between the two groups in different age

	≥ 60 years	<60 years	P
hyponatremia			0.025
Yes	48	3	
No	234	55	

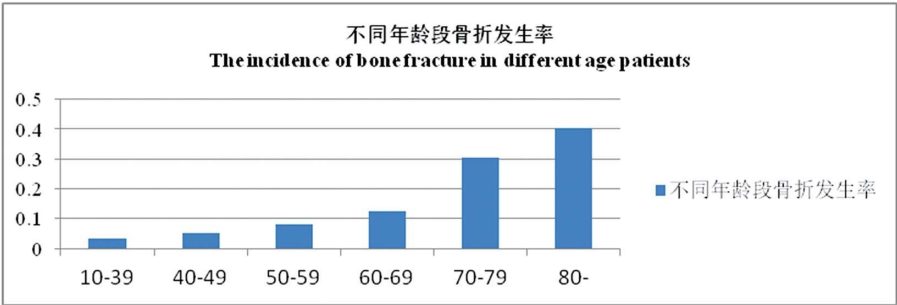


图 1 骨折组患者不同年龄段骨折发生率

Fig.1 The incidence of hyponatremia in different age patients

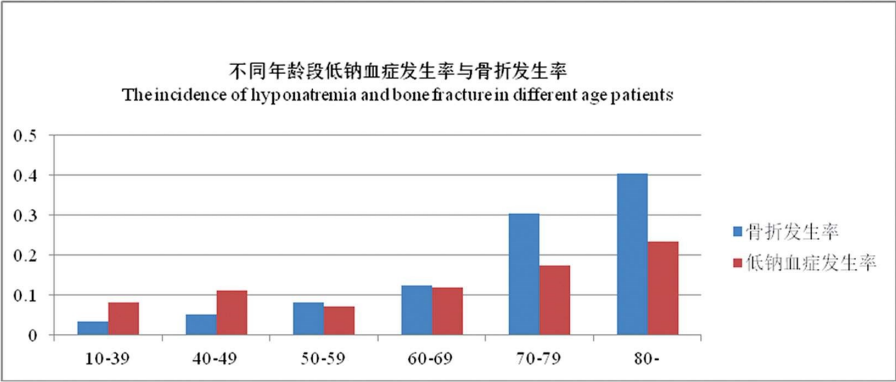


图 2 骨折组患者不同年龄段低钠血症发生率与骨折发生率

Fig.2 The incidence of hyponatremia and bone fracture in different age patients

3 讨论

股骨转子间骨折患者多数年龄较高, 病因多为轻度外伤, 多伴有不同程度的骨质疏松。老年人常合并多种慢性内科疾

表 4 老年患者中,骨折发生率与低钠血症发生率皮尔逊相关分析

Table 4 The Pearson correlation analysis of the incidence of hyponatremia and bone fracture in patients ≥ 60 years old

		The incidence of bone fracture	The incidence of hyponatremia
The incidence of bone fracture	Pearson correlation	1	0.229
	Significance (bilateral)		0.000
	N	444	444
The incidence of hyponatremia	Pearson correlation	0.229	1
	Significance (bilateral)	0.000	
	N	444	444

病,常存在不同程度的电解质紊乱,以低钠血症最为多见。近些年,对于低钠血症的研究主要集中在急性、重度、难纠正的低钠血症。而对于无明显临床症状的轻中度低钠血症,由于其病史较长,病因复杂,影响因素较多,往往被临床医生所忽视^[1]。目前,虽然有一些老年患者发生低钠血症的研究报道,但是却鲜有低钠血症与骨折的相关性研究报道。股骨转子间骨折患者多年龄较大,伴有一定程度的骨质疏松。骨基质中富含钠离子,人体的钠离子约 1/3 储存在骨基质中,骨骼可能是人体的 " 钠库 ",大量的钠离子可以在短时间内释放进入血液循环,当血液中钠离子浓度降低时,骨骼中的钠离子释放入血以维持机体内环境的稳定,钠离子释放入血的同时会加速骨钙的流失,长期持续的低钠血症将通过钙的流失引起骨质疏松。Verbalis 等^[2]研究发现低钠可以激活大鼠骨质中的破骨细胞,使破骨细胞数目增加,引起骨钙流失增多,进而造成骨质疏松。Barsony 等^[3]在体外试验证实低钠情况下可以诱导分化的破骨细胞数量增多,体积增大,活性增强,引起钙流失增多,从而间接证实了低钠可引起骨质疏松。人骨髓间充质干细胞是祖细胞,在多种调控因素的作用下,在分化为成骨细胞和脂肪细胞方向上保持平衡。Fibbi 等^[4]研究显示低钠血症时,人骨髓间充质干细胞向成骨细胞分化减少,引起骨质疏松。低钠血症的患者血管加压素在体内增高,Tamma 等^[5]通过实验显示,血管加压素是骨代谢的关键调控因子,成骨细胞和破骨细胞均有血管加压素受体,其通过与受体结合,促进破骨细胞的形成,增加骨吸收,引起骨质疏松。近些年,越来越多的临床数据^[6,7]、动物及体外实验均证实骨骼能够感受细胞外液钠离子的浓度变化,通过促进骨吸收,减少骨形成,最终导致骨质疏松。骨骼细胞可以通过钠受体感知细胞外液钠离子浓度影响骨代谢,Tseng^[8]等研究发现骨骼细胞中高表达一种电压门控钠离子通道,它可以感受细胞外液张力的变化,它也是骨骼细胞中钠感受受体,当钠离子通过此通道时有助于修复骨骼微结构,当低钠血症时此机制受损,骨质量下降,诱发骨质疏松。Verbalis^[2]在动物实验中观察到低钠血症会直接降低骨密度,并在低钠血症小鼠骨骼组织病理中观察到骨小梁和皮质骨含量降低,破骨细胞数量增加。本研究结果显示在年龄、性别、合并慢性疾病之间无明显差异的情况下,低钠血症发生率在骨折组患者中明显高于非骨折组患者,差异具有统计学意义。在 340 例股骨转子间骨折患者中,年龄 ≥ 60 岁患者低钠血症发生率高于年龄 <60 岁患者,差异显著。在所有老年患者中,骨折发生率与低钠血症发生率增加的趋势基本一致,低钠血症与老年股骨转子间骨折之间存在相关性,低钠血

症可能通过引起骨质疏松这一发病机制引起骨折。

临床上足够重视急性、重度低钠血症,而轻中度慢性低钠血症由于无明显临床症状未被充分重视。最近研究证实,慢性低钠血症可能会影响患者的神经认知功能^[9],进而引起不同程度的定向障碍、反应迟钝、步态不稳、注意力不集中等^[10-12],从而使患者容易跌倒而发生骨折。同时,近期研究发现,轻度、慢性低钠血症患者可存在多种多样的临床表现,比如全身乏力、食欲减退、恶心呕吐、慢性腹泻、淡漠嗜睡、烦躁不安等症状,这些症状长期存在一方面会引起患者摄入减少、营养不良,进而影响骨形成,引起骨质疏松,导致脆性增加;另一方面这些症状长期存在可能使患者摔伤的易感性增加,从而增加骨折的风险。Vanderghyeyst 等^[13]研究发现低钠的状态下神经传导速度延迟,机体反应迟钝。Renneboog 等^[14]对慢性低钠血症的研究证实,低钠血症会影响患者的注意力集中,影响患者的步态平稳性,使患者容易跌倒。Fujisawa 等^[15]从动物实验的角度进一步证实了低钠血症对神经功能的影响。这也从侧面证实了低钠血症与摔伤的易感性相关。可见低钠血症的患者伴有不同程度的骨质疏松,又存在跌倒摔伤的易感因素,受到轻微的外力就可能跌倒造成骨折,老年股骨转子间骨折就属于该类骨折。

本研究明确了低钠血症与老年股骨转子间骨折的相关性,低钠血症可能通过引起骨质疏松和增加摔伤的易感性导致骨折。临床上要对低钠血症给予充分重视,尤其是轻中度慢性低钠血症,要及时纠正可能的致病因素来完全纠正低钠血症。此外,长期监测血钠浓度可能有助于了解患者骨质疏松的程度,预测骨折发生的风险,及时纠正低钠血症有利于纠正骨质疏松,预防老年股骨转子间骨折的发生。本研究为回顾性单中心研究,样本量不大,以患者入院后首次血钠浓度作为低钠血症诊断标准有一定的局限性,低钠血症与老年股骨转子间骨折的关系尚需大样本多中心前瞻性研究来证实。

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(上接第 2565 页)

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