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单侧与双侧穿刺入路 PKP 术对骨质疏松性胸腰椎压缩骨折患者手术效果、生活质量以及血清应激因子的影响 *

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摘要 目的:探讨单侧与双侧穿刺入路经皮椎体后凸成形术(PKP)对骨质疏松性胸腰椎压缩骨折(OVCF)患者手术效果、生活质量以及血清应激因子的影响。**方法:**回顾性选取 2016 年 7 月~2019 年 7 月期间我院接收的行 PKP 的 OVCF 患者 83 例。根据入路方式的不同分为 A 组(n=41,单侧穿刺入路)和 B 组(n=42,双侧穿刺入路),对比两组患者围术期指标、影像学指标、视觉模拟评分法(VAS)评分、Oswestry 腰椎功能障碍指数(ODI)评分、健康调查生活质量量表(SF-36)评分、血清应激因子以及并发症发生情况。**结果:**A 组手术时间短于 B 组,骨水泥用量、术中透视次数少于 B 组($P<0.05$)。两组术后 6 个月 VAS 评分、ODI 评分降低, SF-36 评分升高($P<0.05$)。两组术后 3d 去甲肾上腺素(NE)、肾上腺素(E)、皮质醇(Cor)均升高,但 A 组低于 B 组($P<0.05$)。两组术后 6 个月椎体前缘高度、后凸 Cobb 角均升高($P<0.05$)。两组并发症发生率比较差异无统计学意义($P>0.05$)。**结论:**单侧穿刺入路 PKP 可获得与双侧穿刺入路 PKP 相当的治疗效果和安全性,同时可缩短手术时间,减少骨水泥用量及术中透视次数,减轻机体应激反应。

关键词:单侧穿刺入路;双侧穿刺入路;经皮椎体后凸成形术;骨质疏松性胸腰椎压缩骨折;手术效果;生活质量;应激因子
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The Effect of Unilateral and Bilateral Puncture Approach PKP on the Operative Effect, Quality of Life and Serum Stress Factors in Patients with Osteoporotic Thoracolumbar Compression Fracture*

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ABSTRACT Objective: To investigate the effect of unilateral and bilateral puncture approach percutaneous kyphoplasty (PKP) on the operative effect, quality of life and serum stress factors in patients with osteoporotic thoracolumbar compression fracture. **Methods:** 83 patients with OVCF who were received in our hospital from July 2016 to July 2019 were selected retrospectively. According to the different approaches, the patients were divided into the group A (n=41, unilateral puncture approach) and group B (n=42, bilateral puncture approach). Perioperative indexes, imaging indexes, visual analogue scale (VAS) score, Oswestry lumbar dysfunction index (ODI) score, quality of life scale (SF-36) score, serum stress factors and complications were compared between the two groups. **Results:** The operation time of group A was shorter than that of group B, the amount of bone cement and the times of intraoperative fluoroscopy were less than those of group B ($P<0.05$). The scores of VAS and ODI decreased, and SF-36 increased in the two groups at 6 months after operation ($P<0.05$). The norepinephrine (NE), epinephrine (E) and cortisol (Cor) were increased in both groups at 3d after operation, but the levels in group A were lower than those in group B ($P<0.05$). The anterior height of vertebral body and convex Cobb angle increased in both groups at 6 months after operation ($P<0.05$). There was no significant difference in the incidence of complications between the two groups ($P>0.05$). **Conclusion:** Unilateral puncture approach PKP can achieve the same therapeutic effect and safety as that bilateral puncture approach PKP, and it can shorten the operation time, reduce the amount of bone cement and the times of intraoperative fluoroscopy, and reduce the stress response of the body.

Key words: Unilateral puncture approach; Bilateral puncture approach; Percutaneous kyphoplasty; Osteoporotic thoracolumbar compression fracture; Operative effect; Quality of life; Stress factors

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前言

骨质疏松症是以单位体积内骨组织量减少为特点的代谢性骨病变,表现为腰背疼、驼背、身长缩短、易骨折等^[1]。其中骨质疏松性胸腰椎压缩骨折(OVCF)是其最严重的并发症之一,随着我国人口老龄化的加剧,OVCF的发病率呈逐年递增趋势^[2]。OVCF发病后不仅可破坏脊柱的解剖稳定结构,严重者甚至合并脊髓神经损伤进而导致肢体功能障碍,严重影响患者生活质量^[3]。经皮椎体后凸成形术(PKP)是一种较为理想的OVCF治疗方法,其通过对后凸的椎体进行球囊扩张和灌注骨水泥使骨折塌陷的椎体复位,恢复椎体力学强度^[4,5]。但有关PKP中穿刺入路的选择尚存在一定争议。因此本文通过分析我院选取的不同穿刺入路方式治疗的OVCF患者的手术效果、生活质量以及血清应激因子的变化,以期对OVCF患者的PKP临床穿刺入路方式选择提供数据支持。

1 资料和方法

1.1 一般资料

回顾性选取2016年7月~2019年7月期间我院接收的OVCF患者83例。纳入标准:(1)均经X线骨密度仪检查腰椎骨密度诊断为骨质疏松,均经影像学检查确诊为OVCF,且无神经损伤;(2)均为压缩性骨折;(3)均为新鲜骨折(骨折时间不超过三周);(4)可耐受手术治疗者,具备手术指征者;(5)临床资料完整,均完成随访研究者。排除标准:(1)严重复合伤及多发伤者;(2)多个节段的椎体骨折;(3)无法纠正凝血机制障碍和出血倾向者;(4)合并精神疾患,无法正常沟通交流者;(5)合并高血压病、糖尿病等基础疾病者。本次研究经本院伦理委员会审核批准。上述患者根据入路方式的不同分为A组(n=41,单侧穿刺入路)和B组(n=42,双侧穿刺入路),其中A组男18例,女23例,年龄46~71岁,平均(61.74±3.92)岁;骨折部位:胸椎21例,腰椎20例;受伤原因:高处坠落伤12例,摔伤10例,交通事故19例;骨质疏松分级:一级12例,二级15例,三级14例。B组男15例,女27例,年龄45~73岁,平均(61.09±4.35)岁;骨折部位:胸椎23例,腰椎19例;受伤原因:高处坠落伤13例,摔伤11例,交通事故18例;骨质疏松分级:一级13例,二级16例,三级13例。两组临床资料对比无差异($P>0.05$)。

1.2 方法

两组患者术前平卧硬板床休息,行常规查体、影像学检查及实验室检查,对患者手术耐受力进行评估,常规禁水、禁食、备皮等。在此基础上,气管插管,全麻后,患者取俯卧位。C臂机

透视下确定病变椎体椎弓根位置并定位,穿刺点局部浸润麻醉。A组给予单侧穿刺入路方式:取椎弓根投影右侧2点、左侧11点为穿刺点,进针方向与矢状面成 $10^{\circ}\sim 25^{\circ}$,缓慢穿刺到椎体中后1/3处,将穿刺针内芯抽出,导针引导下插入扩张套管并留置套管外鞘作为工作套管,置入扩张球囊,注入造影剂进行扩张复位,复位满意后退出球囊,注入拉丝期的骨水泥,充实满意时立即停止,并观察患者双下肢感觉、运动情况,伤口缝合1针,无菌敷料外敷。B组给予双侧穿刺入路方式:穿刺方法同A组,先行一侧椎弓根穿刺后行球囊扩张,在对侧行同样操作,在持续透视下双侧同时将骨水泥推注入椎体,伤口缝合1针,无菌敷料外敷。两组患者术后均静滴抗生素一次,仰卧休息24h,密切观察生命体征的变化。

1.3 观察指标

(1)记录两组围术期指标情况:包括手术时间、骨水泥用量、术中透视次数。(2)记录两组术后并发症发生情况。(3)两组患者术后均采用门诊复查的形式随访6个月,于术前、术后6个月采用视觉模拟评分法(VAS)^[6]、Oswestry腰椎功能障碍指数(ODI)^[7]、健康调查生活质量量表(SF-36)^[8]评价患者疼痛、腰椎功能及生活质量。其中VAS评分0~10分,10分表示剧烈疼痛,0分表示无痛,分数越高,疼痛感越强烈。ODI包括疼痛(对睡眠的影响、疼痛程度)、单向功能(站立、坐、提物、行走)、个人综合功能(社会活动、日常活动能力、性生活和郊游),总分50分,得分越高说明腰椎功能障碍越严重。SF-36包括生理机能、情感职能、躯体疼痛、精神健康、活力、生理职能、健康状况、社会功能这8个维度,每个维度均为100分,分数越高,生活质量越好。(4)抽取患者术前、术后3d的空腹静脉血3mL,经常规离心处理(3600 r/min离心12min,离心半径14cm)后,分离上清液,参考试剂盒(北京百泰克生物技术有限公司)说明书步骤,采用酶联免疫吸附法检测去甲肾上腺素(NE)、肾上腺素(E)、皮质醇(Cor)。(5)于术前、术后6个月测量两组患者伤椎椎体前缘高度、后凸Cobb角。

1.4 统计学方法

研究数据采用SPSS25.0进行统计分析。观测数据中的计量资料,用均数±标准差($\bar{x}\pm s$)描述,行t检验。计数资料采用比或率描述,采用 χ^2 检验。检验标准设置为 $\alpha=0.05$ 。

2 结果

2.1 两组围术期指标情况

A组手术时间短于B组,骨水泥用量、术中透视次数少于B组($P<0.05$);详见表1。

表1 两组围术期指标情况($\bar{x}\pm s$)
Table 1 Perioperative indexes of the two groups($\bar{x}\pm s$)

Groups	Operation time(min)	Amount of bone cement(mL)	Times of intraoperative fluoroscopy (times)
Group A(n=41)	35.57±4.48	3.72±0.26	10.99±1.75
Group B(n=42)	47.73±5.07	5.59±0.37	21.75±2.87
t	11.569	26.582	20.561
P	0.000	0.000	0.000

2.2 两组 VAS、ODI、SF-36 评分比较

两组术前、术后 6 个月 ODI、VAS、SF-36 评分组间比较无

差异($P>0.05$);两组术后 6 个月 ODI、VAS 评分降低,SF-36 评分升高($P<0.05$);详见表 2。

表 2 两组 VAS、ODI、SF-36 评分比较 ($\bar{x} \pm s$, 分)

Table 2 Comparison of VAS, ODI and SF-36 scores between the two groups ($\bar{x} \pm s$, scores)

Groups	VAS		ODI		SF-36	
	Before operation	6 months after operation	Before operation	6 months after operation	Before operation	6 months after operation
Group A(n=41)	5.64± 1.42	1.52± 0.23*	34.76± 4.63	16.97± 2.26*	42.15± 5.21	82.78± 7.19*
Group B(n=42)	5.68± 1.15	1.57± 0.18*	35.03± 4.02	17.06± 2.71*	41.86± 6.24	82.23± 8.14*
t	0.141	1.104	0.284	0.164	0.230	0.326
P	0.888	0.273	0.777	0.870	0.819	0.745

Note: compared with before operation, * $P<0.05$.

2.3 两组应激因子指标比较

两组术前 NE、E、Cor 比较差异无统计学意义($P>0.05$);两

组术后 3 d NE、E、Cor 均升高,但 A 组低于 B 组($P<0.05$);详见表 3。

表 3 两组应激因子指标比较 ($\bar{x} \pm s$)

Table 3 Comparison of stress factors between the two groups ($\bar{x} \pm s$)

Groups	NE(ng/mL)		E(ng/mL)		Cor(nmol/L)	
	Before operation	3 d after operation	Before operation	3 d after operation	Before operation	3 d after operation
Group A(n=41)	41.32± 4.54	58.32± 5.28*	38.44± 5.02	52.31± 4.35*	162.24± 14.21	198.23± 15.19*
Group B(n=42)	41.57± 5.43	69.60± 5.41*	38.63± 4.19	64.05± 5.13*	161.01± 12.74	241.99± 25.23*
t	0.227	9.610	0.187	11.232	0.415	9.544
P	0.821	0.000	0.852	0.000	0.679	0.000

Note: compared with before operation, * $P<0.05$.

2.4 两组影像学指标比较

两组术前、术后 6 个月椎体前缘高度、后凸 Cobb 角组间比

较无差异($P>0.05$);两组术后 6 个月后凸 Cobb 角、椎体前缘高度均升高($P<0.05$);详见表 4。

表 4 两组影像学指标比较 ($\bar{x} \pm s$)

Table 4 Comparison of imaging indexes between the two groups ($\bar{x} \pm s$)

Groups	Anterior height of vertebral body(mm)		Convex Cobb angle(°)	
	Before operation	6 months after operation	Before operation	6 months after operation
Group A(n=41)	18.75± 2.04	22.86± 2.52*	10.83± 1.46	13.81± 1.59*
Group B(n=42)	18.48± 2.57	22.74± 2.75*	10.76± 1.65	13.75± 1.62*
t	0.529	0.207	0.205	0.170
P	0.598	0.836	0.838	0.865

Note: compared with before operation, * $P<0.05$.

2.5 并发症发生率比较

A 组发生骨水泥渗漏 1 例,慢性疼痛 1 例,邻近椎体压缩性骨折 1 例,并发症发生率 7.32%(3/41);B 组发生神经根疼痛 1 例,骨水泥渗漏 3 例,慢性疼痛 2 例,并发症发生率 14.29%(6/42)。两组并发症发生率比较差异无统计学意义($\chi^2=1.042$, $P=0.307$)。

3 讨论

骨质疏松症多发于绝经后妇女及老年人群,其会导致患者在轻微外伤甚至没有外伤的作用下均有可能发生骨折。椎体为

骨质疏松症最易发生骨折的部位,近年来在临床愈发多见^[9,10]。OVCF 的治疗分为保守治疗和手术治疗,其中保守治疗需长期卧床休息,可引发多器官、多系统的并发症或基础内科疾病加重或恶化,加之长期卧床制动导致缺钙,进一步加重骨质疏松症的恶性循环^[11,12]。故此时手术治疗成了绝大多数患者的首选治疗方案。PKP 现已成为治疗 OVCF 较为成熟的方案,既可恢复压缩椎体刚度及强度,又可矫正后凸畸形,疗效满意^[13-15]。起初 PKP 均采用双侧椎弓根穿刺球囊扩张后注入骨水泥,而近年来不少学者提出单侧穿刺入路 PKP 也能达到相同的临床效果^[16],目前临床上对于 PKP 单侧或双侧穿刺入路的分歧较大,

由于 OVCF 的治疗主要关键点在于恢复伤椎高度并矫正畸形、有效缓解疼痛、减少围术期刺激以降低并发症发生率、避免长期卧床降低患者生活质量,故本研究通过分析以上指标以期明确上述两种穿刺入路方式的优劣^[17-19]。

本次研究结果显示,单侧穿刺入路的患者手术时间更短,骨水泥用量、术中透视次数均更少。既往有研究结果显示^[20],骨水泥的大量注入会增加渗漏率,且小剂量的骨水泥即可满足椎体力学特征恢复的需求。而双侧穿刺入路较单侧穿刺入路多一侧手术步骤,故而延长手术时间,增加透视次数^[21]。同时,两组术后 VAS、ODI、SF-36 评分及后凸 Cobb 角、椎体前缘高度较术前均有显著改善,但组间比较未见明显差异,可见两种穿刺入路方式均可获得较好的椎体恢复情况,有效缓解疼痛,获得相当的生活质量改善。可能是因为两种穿刺入路方式均属于微创操作,疼痛较轻,患者容易耐受^[22,23]。加之 PKP 对患者的生理机能影响较小,术后限制患者活动时间较短,减少了因活动不适带来的生活质量下降情况,同时利于患者术后康复,促进椎体功能恢复^[24,25]。李庆伟等^[26]通过评价经双侧与经单侧穿刺入路对椎体的刚度、强度、椎体高度变化的影响,结果认为双侧与单侧手术效果无显著差异,与本次研究结果基本一致。PKP 对机体的创伤除了表现为肌肉组织损伤,同时也体现在 OVCF 患者全身的应激反应上,NE、E、Cor 是临床常用的反应机体应激反应的生物学指标,对人体脏器血流灌注、能量代谢和机体抵御伤害性刺激的机制均具有重要影响^[27,28]。本次研究中两组术后 3dNE、E、Cor 均升高,但 A 组低于 B 组,提示两种穿刺入路方式均可使患者产生一定的人体应激反应激活作用,但单侧穿刺入路的应激反应明显更轻,可能与单侧穿刺入路创伤更小,对肌肉组织造成牵拉程度和损伤程度更轻,且术中耗时较短,减少了患者各种生理、心理刺激有关,进而更好的减轻机体应激反应^[29,30]。另两组并发症发生率比较差异无统计学意义,可见两种穿刺入路方式均安全可靠。单侧穿刺入路 PKP 需注意以下几点:单侧穿刺时应尽量沿椎弓根的外侧缘腹侧进针,以防止穿刺进入椎管;骨水泥注入时需透视下缓慢注入,以降低骨水泥渗漏发生率;骨水泥填充结束时推杆不要拔出,待其凝固后方可拔出推杆和外套筒;无需过于强调注入最大限度的骨水泥,待骨水泥弥散均匀超过椎体中线即可;单侧入路的穿刺技术较双侧穿刺要求较高,需要有经验的术者操作。

综上所述,单侧穿刺入路 PKP 治疗 OVCF 患者可获得与双侧穿刺入路相当的治疗效果和安全性,同时可缩短手术时间,减少骨水泥用量及术中透视次数,减轻机体应激反应。

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