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骨水泥强化椎弓根螺钉联合椎间融合复位治疗老年重度腰椎滑脱的临床研究*

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摘要 目的:观察椎间融合复位联合骨水泥强化椎弓根螺钉治疗老年重度腰椎滑脱的临床效果。**方法:**回顾性分析我院于2016年3月~2019年3月期间收治的老年重度腰椎滑脱患者92例,根据治疗方案的不同可将患者分为A组(n=44)和B组(n=48),A组给予椎弓根螺钉联合椎间融合复位治疗,B组给予骨水泥强化椎弓根螺钉联合椎间融合复位治疗,对比两组视觉疼痛模拟评分(VAS)、Oswestry功能障碍指数(ODI)及日本骨科协会(JOA)腰腿痛评分、临床指标、滑脱距离、滑脱率、椎间隙高度、椎间融合率、椎间孔高度、并发症及螺钉松动情况。**结果:**术后12个月,两组VAS、ODI、JOA评分均下降,且B组低于A组($P<0.05$)。两组术中出血量对比组间无统计学差异($P>0.05$),B组手术时间长于A组,住院时间短于A组,椎间融合率高于A组($P<0.05$)。术后12个月,两组滑脱距离、滑脱率均下降,且B组小于A组($P<0.05$)。术后12个月,两组椎间隙高度、椎间孔高度均升高,且B组高于A组($P<0.05$)。两组并发症发生率组间对比无差异($P>0.05$)。**结论:**老年重度腰椎滑脱患者椎间融合复位联合骨水泥强化椎弓根螺钉治疗,虽一定程度上延长了手术时间,但可促进临床症状,改善椎间高度及腰椎滑脱程度,缩短住院时间,且不增加并发症发生率。

关键词:骨水泥;椎弓根螺钉;椎间融合复位;老年;重度;腰椎滑脱;临床研究

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Clinical Study of Bone Cement Reinforced Pedicle Screw Combined with Interbody Fusion in the Treatment of Elderly Patients with Severe Lumbar Spondylolisthesis*

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ABSTRACT Objective: To observe the clinical effect of bone cement reinforced pedicle screw combined with interbody fusion in the treatment of elderly patients with severe lumbar spondylolisthesis. **Methods:** 92 elderly patients with severe lumbar spondylolisthesis who were treated in our hospital from March 2016 to March 2019 were retrospectively analyzed. According to different treatment schemes, the patients were divided into group A (n=44) and group B (n=48). Group A was given pedicle screw combined with intervertebral fusion reduction, and group B was given bone cement reinforced pedicle screw combined with intervertebral fusion reduction. Visual pain simulation score (VAS), Oswestry disability index (ODI) and Japanese Orthopaedic Association (JOA) low back and leg pain score, clinical indicators, slip distance, slip rate, intervertebral space height, intervertebral fusion rate, intervertebral foramina height, complications and screw loosening in the two groups. **Results:** 12 months after operation, VAS, ODI and JOA scores of the two groups decreased, and the group B was lower than the group A ($P<0.05$). There was no significant difference in intraoperative blood loss between the two groups ($P>0.05$). The operation time of group B was longer than that of group A, and the hospitalization time was shorter than that of group A, the intervertebral fusion rate was higher than group A ($P<0.05$). 12 months after operation, the slip distance and the slip rate in both groups decreased, and the group B was smaller than the group A ($P<0.05$). 12 months after operation, the intervertebral space height and intervertebral foramen in both groups increased, and the group B was higher than the group A ($P<0.05$). There was no difference in the incidence of complications between the two groups ($P>0.05$). **Conclusion:** Although the intervertebral fusion reduction combined with bone cement enhanced pedicle screw treatment for elderly patients with severe lumbar spondylolisthesis can prolong the operation time to some extent, it can promote clinical symptoms, improve the height of intervertebral space and the degree of lumbar spondylolisthesis, shorten the hospitalization time, and do not increase the incidence of complications.

Key words: Bone cement; Pedicle screw; Interbody fusion reduction; Elderly; Severe; Lumbar spondylolisthesis; Clinical research

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前言

腰椎滑脱是指腰椎椎体因创伤、劳损等原因造成相邻椎体骨性连接异常而发生的上位椎体与下位椎体部分或全部滑移,临床症状主要表现为坐骨神经受累、腰骶部疼痛、间歇性跛行等,严重影响患者生活质量^[1-3]。重度腰椎滑脱则是指 Meyerding III度及以上的滑脱,临床对于此类患者的治疗通常以椎弓根内固定术进行固定、复位,并联合椎间融合复位进行综合治疗^[4,5]。针对老年重度腰椎滑脱患者,由于其身体各项机能减退,多伴有各种慢性疾病,单靠钉棒系统复位较为困难,若强行复位,可因切割椎体而导致内固定失败,同时老年重度腰椎滑脱患者对手术的耐受力较差,导致治疗存在一定难度^[6-8]。现临床发现注射骨水泥强化椎弓根螺钉有利于复位和固定^[9]。本研究通过探讨椎间融合复位联合骨水泥强化椎弓根螺钉治疗老年重度腰椎滑脱的临床效果,以期临床治疗提供一定的参考。

1 资料与方法

1.1 一般资料

回顾性分析我院于 2016 年 3 月~2019 年 3 月期间收治的老年重度腰椎滑脱患者 92 例,研究方案通过我院伦理学委员会批准进行。根据治疗方案的不同可将患者分为 A 组(n=44)和 B 组(n=48),其中 A 组男 24 例,女 20 例,年龄 60~81 岁,平均(72.06±3.96)岁;病程 8~43 月,平均(28.62±4.31)月;III度滑脱 41 例,IV度滑脱 3 例;滑脱节段:L3 椎体 1 例,L4 椎体 8 例,L5 椎体 35 例。B 组男 29 例,女 19 例,年龄 62~83 岁,平均(72.12±4.39)岁;病程 10~44 月,平均(28.71±5.16)月;III度滑脱 43 例,IV度滑脱 5 例;滑脱节段 L3 椎体 2 例,L4 椎体 5 例,L5 椎体 41 例。两组一般资料比较无差异($P>0.05$),具有可比性。

1.2 纳入排除标准

纳入标准:(1)临床表现均为顽固性下腰部疼痛或下肢疼痛,均经 CT 和 MRI 检查结果显示椎管狭窄和神经根受压;(2)所有患者均同意此次研究并完成随访;(3)经过半年以上保守治疗后临床症状未得到缓解。排除标准:(1)合并椎管内肿瘤、脊柱结核、脊柱感染疾病;(2)既往有腰椎外伤史;(3)存在先天性髋关节发育不良、先天性下肢畸形;(4)存在手术禁忌,无法进行手术治疗的。

1.3 方法

两组患者均取俯卧位,采用全身麻醉,常规消毒、铺无菌

巾,术前确认好病变节段,标记滑脱椎棘突作为切口,切开后依次切开皮肤及皮下组织,显露滑脱椎上下关节突、椎板、横突根部和棘突,用椎弓根探子制备椎弓根通路,B 组随后采用 5.0 mm 攻丝改锥扩大进针通道,将调制呈拉丝状态的骨水泥置入椎弓根通道内,骨水泥量约为 2 mL,之后放置椎弓根螺钉。置入所有螺钉后,减压神经根管、常规椎管;并将椎间盘切开,取出部分间盘和髓核组织;松解椎间隙,进一步处理骨性终板植骨床;滑脱满意复位固定后,椎间植骨,放置融合器,尝试复位,复位完成后,放置引流管,逐层缝合伤口。A 组患者则于攻丝改锥扩大后直接放置椎弓根螺钉,后续操作同 B 组。术后两组患者均以门诊复查的形式随访 12 个月。

1.4 观察指标

(1)采用视觉疼痛模拟评分(VAS)^[10]、Oswestry 功能障碍指数(ODI)^[11]及日本骨科协会(JOA)^[12]腰腿痛评分评价两组患者术前、术后 12 个月的疼痛情况、腰椎功能及腰痛情况。ODI 包括个人综合功能(日常活动能力、社会活动、性生活和郊游)、单向功能(提物、坐、站立、行走)、疼痛(疼痛程度、对睡眠的影响),总分 50 分,得分越高说明腰椎功能障碍越严重。VAS 评分 0~10 分,0 分无痛,10 分剧痛,分数越高,痛感越强。JOA 包括主观症状(麻木程度、腰腿疼痛程度)、客观症状(肌力、椎旁压痛、放射痛、直腿抬高试验)、日常工作能力(每天卧床时间、行走距离或时间、工作能力、弯腰及提重物),总分 30 分,分数越高,腰痛情况越严重。(2)记录两组术中出血量、椎间融合率、手术时间、住院时间。(3)记录两组术后下肢疼痛或麻木、渗漏、切口感染、血流动力学障碍等并发症发生情况。(4)于术前、术后 12 个月记录两组滑脱距离及滑脱率,采用 Taillard 指数测量两组滑脱率。(5)于术前、术后 12 个月采用 Quint 法评价椎间隙高度及椎间孔高度。(6)记录两组螺钉松动情况。

1.5 统计学方法

采用 SPSS22.0 进行统计分析,以率(%)表示计数资料,行 χ^2 检验,计量资料以($\bar{x} \pm s$)表示,行 t 检验。将 $\alpha=0.05$ 作为检验标准。

2 结果

2.1 两组 VAS、ODI、JOA 评分对比

术前,两组 VAS、ODI、JOA 评分对比无统计学差异($P>0.05$),术后 12 个月,两组 VAS、ODI、JOA 评分均下降,且 B 组低于 A 组($P<0.05$),详见表 1。

表 1 两组 VAS、ODI、JOA 评分对比($\bar{x} \pm s$, 分)

Table 1 Comparison of VAS, ODI and JOA scores between the two groups($\bar{x} \pm s$, scores)

Groups	VAS		ODI		JOA	
	Before operation	12 months after operation	Before operation	12 months after operation	Before operation	12 months after operation
Group A(n=44)	5.26±1.18	1.83±0.51*	34.78±6.25	18.69±5.34*	21.65±3.21	14.37±2.14*
Group B(n=48)	5.31±1.22	1.29±0.46*	34.58±8.64	10.47±3.08*	21.42±3.59	8.56±2.09*
t	0.200	5.340	0.127	9.137	0.324	13.168
P	0.842	0.000	0.899	0.000	0.747	0.000

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

2.2 两组临床指标对比

术时间长于 A 组,住院时间短于 A 组,椎间融合率高于 A 组
两组术中出血量对比组间无统计学差异($P>0.05$),B 组手 ($P<0.05$),详见表 2。

表 2 两组临床指标对比

Table 2 Comparison of clinical indicators between the two groups

Groups	Operation time(min)	Intraoperative blood loss (mL)	Hospitalization time(d)	Intervertebral fusion rate
Group A(n=44)	193.96± 11.24	291.12± 25.33	15.48± 1.64	30(68.18)
Group B(n=48)	231.15± 14.28	292.64± 28.52	10.35± 1.41	42(87.50)
χ^2/t	13.880	0.270	16.087	5.036
P	0.000	0.888	0.000	0.025

2.3 两组滑脱距离、滑脱率比较

术后 12 个月,两组滑脱距离、滑脱率均下降,且 B 组小于 A 组
术前,两组滑脱率、滑脱距离对比无统计学差异($P>0.05$), ($P<0.05$),详见表 3。

表 3 两组滑脱距离、滑脱率比较($\bar{x} \pm s$)

Table 3 Comparison of slip distance and slip rate between the two groups($\bar{x} \pm s$)

Groups	Slip distance(mm)		Slip rate(%)	
	Before operation	12 months after operation	Before operation	12 months after operation
Group A(n=44)	17.47± 2.59	11.93± 1.87*	31.81± 3.26	9.17± 1.75*
Group B(n=48)	17.28± 2.65	7.89± 1.28*	31.59± 4.38	4.86± 1.51*
t	0.348	12.178	0.273	12.676
P	0.729	0.000	0.785	0.000

2.4 两组椎间隙高度、椎间孔高度比较

两组术后 12 个月椎间隙高度、椎间孔高度均升高,且 B 组高于
术前,两组椎间隙高度、椎间孔高度对比无差异($P>0.05$), A 组($P<0.05$),详见表 4。

表 4 两组椎间隙高度、椎间孔高度比较($\bar{x} \pm s$,mm)

Table 4 Comparison of intervertebral space height and intervertebral foramen height between the two groups($\bar{x} \pm s$, mm)

Groups	Intervertebral space height		Intervertebral foramen height	
	Before operation	12 months after operation	Before operation	12 months after operation
Group A(n=44)	4.43± 0.54	8.19± 1.24*	8.67± 1.52	10.62± 2.57*
Group B(n=48)	4.49± 0.63	10.57± 1.83*	8.62± 1.43	13.26± 2.83*
t	0.490	7.236	0.162	4.669
P	0.625	0.000	0.871	0.000

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

2.5 两组随访期间并发症发生及螺钉松动情况对比

A 组随访期间 2 例切口感染,经常规抗感染治疗后切口愈合,2 例患者出现术后下肢麻木加重或疼痛,经甲钴胺营养神经、甘露醇消肿后缓解。A 组并发症发生率为 9.09%(4/44)。B 组随访期间 3 例患者出现术后下肢疼痛或麻木加重、1 例切口感染、2 例渗漏,B 组并发症发生率为 12.50%(6/48)。两组均未见明显血流动力学障碍患者出现。两组并发症发生率组间对比无差异($\chi^2=0.531$, $P=0.628$)。A 组螺钉松动 3 例,无螺钉断裂情况;B 组螺钉松动 1 例,无螺钉断裂情况。

3 讨论

腰椎滑脱的常见发病部位有 L3、L4 或 L5,以 L5 最为常见,约占总腰椎滑脱的 82%~90%^[13,14]。患者一旦发生腰椎滑脱,可导致脊柱力线前移,而当人体直立行走时,身体上半部的重量均集中于滑脱节段下位椎体前缘,致使腰椎生理性前凸代偿性增大^[15-17]。这时,在滑脱节段会出现应力集中点,多次的应力集中刺激可使病变节段周围的韧带增生肥厚,邻近肌肉呈痉挛状态,若未能予以及时治疗,滑脱程度进一步加重或者肌肉痉挛过度,除了可引起常见的腰椎疼痛外,还可引起屈髋屈膝步态^[18-20]。老年重度腰椎滑脱患者常处于骨小梁较稀疏、骨密度较低、骨皮质层较薄的身体状态,这种身体状态可导致骨-螺钉之间的界面连接不牢固,难以发挥良好的把持力和固定效果,

极易出现松动现象,而内固定失效会导致椎间融合失败,局部形成假关节,最终导致手术失败^[21-23]。以往的研究证实^[24],老年重度腰椎滑脱患者手术失败的发生率大约为1%~25%,因此,在老年重度腰椎滑脱患者中,如何降低滑脱率、提高椎弓根螺钉的把持力和固定效果等发生率至关重要。

现临床有关提高椎弓根螺钉把持力的方法较多,包括经椎弓根螺钉注射骨水泥、膨胀螺钉或是在骨水泥凝固前放置椎弓根螺钉等。由于膨胀螺钉、经椎弓根螺钉注射骨水泥需定制特殊的椎弓根螺钉,导致临床应用受限,故临床多采用骨水泥强化椎弓根螺钉治疗方案^[25-27]。本次研究结果显示,虽然应用骨水泥强化椎弓根螺钉的患者手术时间较长,但其有更短的住院时间,且术中出血量未见增加。同时在术后12个月的随访期间发现,骨水泥强化椎弓根螺钉在VAS、ODI、JOA评分以及滑脱距离、椎间孔高度、椎间隙高度及滑脱率等结果的效果较好,提示其具有良好的固定强度,可获得较为理想的复位效果。通过注射骨水泥,可将骨水泥均匀挤压到螺钉周围的骨质中,骨水泥可增加与骨的接触面,提高骨与椎弓根螺钉-骨水泥之间的把持力,从而增强螺钉的稳定性,提升脊柱固定阶段抗疲劳能力,提高手术治疗效果^[28-30]。另两组并发症发生率组间对比无差异,可见骨水泥强化椎弓根螺钉联合椎间融合复位治疗安全有效。值得注意的是,骨水泥的应用具有一定的危险性,骨水泥聚合后可产生一定的高热性,若发生误注、溢出等情况时,易对周围骨组织产生影响,因此,需严格把握注入量和注入时间。笔者总结经验,注射需在透视下进行,且若在手术过程中发生渗漏则应立即停止输注。本次研究的不足之处在于,病例数较少,随访时间不长,且为回顾性研究,其远期效果有待进一步长期随访研究。

综上所述,老年重度腰椎滑脱患者椎间融合复位联合骨水泥强化椎弓根螺钉治疗,虽一定程度上延长了手术时间,但可促进临床症状,有效促进椎间高度及腰椎滑脱程度改善,缩短住院时间,且不增加并发症发生率。

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