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后路椎体间融合术与经椎间孔入路腰椎融合术治疗退行性腰椎滑脱症的疗效对比及对 AGEs、IL-6 的影响 *

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摘要 目的：探讨后路椎体间融合术与经椎间孔入路腰椎融合术治疗退行性腰椎滑脱症的疗效对比及对晚期糖基化终末产物（AGEs）、白细胞介素 6（IL-6）的影响。**方法：**选择 2019 年 1 月 -2019 年 12 月在我院接受治疗的 100 例退行性腰椎滑脱症患者，根据手术选择方式分为观察组（n=51）和对照组（n=49）。对照组给予后路椎体间融合术(PLIF)治疗，观察组给予经椎间孔入路腰椎融合术(TLIF)治疗。比较两组患者的临床优良率、血清 AGEs、IL-6、手术情况、视觉模拟评分（AVS）、Oswestry 功能障碍指数（ODI）评分变化情况及并发症发生情况。**结果：**治疗后，两组总优良率分别为 90.20%，71.43%，差异显著（P<0.05）；观察组手术时间、术中出血量、术后引流量及卧床时间均显著低于对照组，差异显著（P<0.05）；治疗前，两组血清 AGEs、IL-6 水平无明显差异；治疗后，两组血清 AGEs 水平均显著降低，且观察组低于对照组，IL-6 水平显著上升，观察组低于对照组（P<0.05）；治疗前，两组 AVS、ODI 评分水平无明显差异；治疗后，两组 AVS、ODI 评分水平均显著降低，且观察组低于对照组（P<0.05）；两组并发症总发生率为 3.92%、18.37%，差异具有统计学意义（P<0.05）。**结论：**在退行性腰椎滑脱症患者中应用经椎间孔入路腰椎融合术临床效果更好，术后 AGEs、IL-6 水平更低，且并发症较少。

关键词：后路椎体间融合术；经椎间孔入路腰椎融合术；退行性腰椎滑脱症；晚期糖基化终末产物；白细胞介素 6
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The Effect of Posterior Interbody Fusion on Degenerative Lumbar Spondylolisthesis and the Influence on Ages and IL-6*

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ABSTRACT Objective: To study The effect of posterior interbody fusion on degenerative lumbar spondylolisthesis and the influence on Advanced glycation end products (ages), interleukin-6 (IL-6). **Methods:** 100 patients with degenerative lumbar spondylolisthesis who were treated in our hospital from January 2019 to December 2019 were selected and divided into an observation group (n=51) and a control group (n=49) according to the surgical selection method. The control group was treated with posterior interbody fusion (PLIF), and the observation group was treated with lumbar fusion via interbody foramen (TLIF). The clinical good and good rates, serum AGEs, il-6, surgical conditions, visual analogue scale (AVS), Oswestry dysfunction index (ODI) scores and complications of the two groups were compared. **Results:** After treatment, the total excellent and good rates of the two groups were 90.20% and 71.43% respectively, with significant difference (P < 0.05); the operation time, intraoperative bleeding volume, postoperative drainage volume and bed time of the observation group were significantly lower than those of the control group, with significant difference (P < 0.05); before treatment, there was no significant difference in serum ages and IL-6 levels between the two groups; after treatment, the serum ages levels of the two groups were significantly reduced, and the observation group was lower than the control group The level of IL-6 in the observation group was significantly higher than that in the control group (P < 0.05); before treatment, there was no significant difference in the scores of AVS and ODI between the two groups; after treatment, the scores of AVS and ODI in the two groups were significantly lower than that in the control group (P<0.05); the total incidence of complications in the two groups was 3.92% and 18.37%, the difference was statistically significant (P<0.05). **Conclusion:** In patients with degenerative lumbar spondylolisthesis, the clinical effect of lumbar fusion via intervertebral foramen is better, the levels of ages and IL-6 are lower, and the complications are less.

Key words: Posterior interbody fusion; Lumbar interbody fusion via foramen approach; Degenerative lumbar spondylolisthesis;

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前言

腰椎滑脱症在骨科中属于常见的慢性疾病，是由于先天性发育不良、创伤等原因造成相邻椎体骨性连接异常发生的上位椎体与下位椎体部分滑移，临床表现为腰骶部疼痛、坐骨神经受累等症状[1,2]。退行性腰椎滑脱症是腰椎滑脱症的一种，是由于椎间盘退变引起，多见于中老年人，较多患者早期会忽视疾病，可造成疾病反复复发，影响患者正常生活[3]。该病发病原因较为复杂，除了与先天性发育缺陷及外力损伤外有关外，有研究显示可能与血清中 AGEs 表达变化与疾病有一定关系[4,5]。手术是治疗该病的常用方法，其中后路椎体间融合术与经椎间孔入路腰椎融合术是治疗腰椎滑脱症的主要方式，都具有一定的疗效，但不同手术入路对患者术后恢复情况也有所不同[6,7]。为了进一步明确退行性腰椎滑脱症的最优手术方法，本研究对后路椎体间融合术与经椎间孔入路腰椎融合术治疗退行性腰椎滑脱症的研究进行了对比，并观察其对 AGEs、IL-6 的影响，现报道如下。

1 资料与方法

1.1 一般资料

选择 2019 年 1 月 -2019 年 12 月在我院接受治疗的 100 例退行性腰椎滑脱症患者，根据手术选择方式分为 2 组，观察组 51 例：男 28 例，女 23 例，年龄 40-75 岁，平均(62.51±3.41)岁，病程 2 ~11 年，平均(5.41±1.22)年；对照组 49 例，男 28 例，女 21 例，年龄 41-73 岁，平均(62.15±3.31)岁，病程 2~12 年，平均(5.50±1.19)年。两组基线资料无明显差异，可比较。

参照《退行性腰椎滑脱症》[8]，(1)偶发性背部疼痛；(2)慢性下腰痛；(3)神经间歇性跛行等临床症状；(4)影像检查确诊。

纳入标准：(1)符合上述诊断标准；(2)保守治疗无效者；(3)满足手术指征；(4)术后随访资料完整者；(5)知情且签署知情同意书。排除标准：(1)严重肝肾疾病者；(2)患有意识障碍、精神障碍者；(3)多节段退行性病变明显患者；(4)妊娠、围产、哺乳期妇女的患者；(5)严重脑血管疾病；(6)严重骨质疏松；(7)手术治疗史者；(8)不耐受手术者。

1.2 方法

对照组给予后路椎体间融合术：麻醉后，放置椎弓根螺钉于滑脱的椎体间隙的上、下椎体中，将滑脱复位的椎体提拉，在融合椎间隙上下椎体定位、置入椎弓根螺钉，椎板及神经根管减压，切除椎间盘，椎弓根钉棒撑开复位、刮除融合椎体上下终板，椎间融合器植骨加压融合。观察组采用经椎间孔入路腰椎融合术：麻醉后，俯卧位。取后正中切口，切开皮肤、皮下、浅筋膜及深筋膜，在症状侧(或主要症状侧)显露，沿棘突、椎板剥离竖脊肌至关节突外缘，C 型臂 X 线机透视定位下行单侧椎弓根钻孔、置入螺钉。行半椎板切除减压至棘突根部，切除上位椎的下关节突和下位椎上关节突的内部，显露该侧的硬膜、融合的椎间隙及相应的神经根，对于神经根管狭窄者给予充分减压。向内侧牵开神经根及硬膜囊后，用小尖刀切开纤维环，再使用髓核钳、刮匙及椎间盘绞刀彻底清除椎间盘和处理上、下软骨板，将椎间融合器(Cage)试模放入椎间隙，试模满意后将切下的部分椎板及小关节突去除软组织和软骨，咬碎后部分填充于椎间融合器(Cage)内，其余均填充于椎间隙前方，然后将 Cage 斜向植入椎间隙的中后部。透视确定位置合适后安装连接杆，视情况加压固定。

1.3 观察指标

采集空腹静脉血 5 mL，以 3000 r·min^{-1} 的速度进行离心，时间 10 min，提取上层血清后，置于零下 20℃的冷冻箱内存储以备检测，采用双抗体夹心酶联免疫吸附法测定 AGEs、IL-6 水平；视觉模拟评分法：0 分表示无痛；分值越高，疼痛感越强；ODI 评分：分值越高，功能障碍越严重；记录手术情况及并发症发生情况。

优良率评定标准：优：症状消失，功能恢复，患者可以正常活动；良：临床症状消失，偶有疼痛，但不影响行动；中：功能部分恢复，正常活动受到影响；差：症状未改善或加重，优＋良为优良率。

1.4 统计学分析

以 spss18.0 软件包处理，符合正态分布计量资料用均数±标准差($\bar{x}\pm s$)表示，组间比较使用独立样本 t 检验，计数资料以率表示，χ^2 检验，$P<0.05$ 表示差异具有统计学意义。

2 结果

2.1 两组疗效比较

两组总优良率分别为 90.20%，71.43%，差异显著($P<0.05$)见表 1。

表 1 两组优良率比较[n(%)]

Table 1 Comparison of excellent rate between the two groups[n(%)]

Groups	n	Excellent	Good	Centre	Difference	Excellent rate
Observation group	51	29(56.86)	17(33.33)	4(7.84)	1(1.96)	46(90.20)
Control group	49	16(32.65)	19(38.78)	10(20.41)	4(8.16)	35(71.43)
χ^2 value						5.719
P value						0.017

2.2 两组手术情况比较

观察组手术时间、术中出血量、术后引流量及卧床时间均显著低于对照组，差异显著（P<0.05），见表 2。

表 2 两组手术情况比较（$\bar{x}\pm s$）

Table 2 Comparison of operation between the two groups（$\bar{x}\pm s$）

Groups	n	Operation time(min)	Intraoperative hemorrhage(mL)	Postoperative drainage (mL)	Bed time(d)
Observation group	51	103.24±22.47	367.58±42.14	131.28±17.41	6.21±0.78
Control group	49	158.79±16.39	608.59±37.18	207.28±25.16	8.46±1.34
t value		14.076	30.281	17.624	10.311
P value		0.000	0.000	0.000	0.000

2.3 两组 AGEs、IL-6 水平比较

治疗前，两组血清 AGEs、IL-6 水平无明显差异；治疗后，两组血清 AGEs 水平均显著降低，且观察组低于对照组，IL-6 水平显著上升，观察组低于对照组（P<0.05），见表 3。

表 3 两组 AGEs、IL-6 水平比较（$\bar{x}\pm s$）

Table 3 Comparison of ages and IL-6 levels between the two groups（$\bar{x}\pm s$）

Groups	n	AGEs(AU/mL)		IL-6(μg/L)	
		Preoperative	Postoperative	Preoperative	Postoperative
Observation group	51	7.49±1.03	4.29±0.91	6.13±1.51	21.41±6.41
Control group	49	7.51±1.05	5.64±1.12	6.09±1.48	32.59±6.35
t value		0.096	6.627	0.134	8.759
P value		0.924	0.000	0.894	0.000

2.4 两组 AVS、ODI 评分比较

治疗前，两组 AVS、ODI 评分水平无明显差异；治疗后，两组 AVS、ODI 评分水平均显著降低，且观察组低于对照组，（P<0.05），见表 4。

表 4 两组 AVS、ODI 评分比较（$\bar{x}\pm s$，分）

Table 4 Comparison of AVS and ODI scores between the two groups（$\bar{x}\pm s$, branch）

Groups	n	AVS		ODI	
		Preoperative	Postoperative	Preoperative	Postoperative
Observation group	51	7.39±1.92	1.97±0.71	18.27±2.38	3.78±1.02
Control group	49	7.42±1.87	2.86±1.24	18.19±2.42	4.26±0.95
t value		0.079	4.426	0.167	2.433
P value		0.937	0.000	0.868	0.017

2.5 两组并发症比较

两组并发症总发生率为 3.92%、18.37%，差异具有统计学意义（P<0.05），见表 5。

表 5 两组并发症比较[n(%)]

Table 5 Comparison of complications between the two groups[n(%)]

Groups	n	Incision exudation	Infected	Nerve root injury	Total incidence
Observation group	51	1	1	0	2(3.92)
Control group	49	2	4	3	9(18.37)
χ^2 value					5.327
P value					0.021

3 讨论

腰椎峡部指上、下关节突之间的狭窄部分，该处骨质结构相对薄弱，由于长期的体力劳动或意外损伤，容易导致患者的腰椎峡部出现崩裂，当峡部崩裂后，椎弓分为上、下两部分，两者之间失去骨性联结，表现为椎体上向前滑移，称为腰椎滑

脱[9-11]。近年来随着社会压力的增加,腰椎问题呈年轻化趋势,长期困扰着中老年人的身体健康[12]。退变性腰椎滑脱症是腰椎滑脱的一种类型,通常发生在腰椎活动节断的退化过程中,可引起会产生脊柱狭窄、神经原性跛行和腿部疼痛等不良影响,是老年患者的一种常见疾病[13-15]。临床通常以手术治疗为主,在手术时应注意去除压迫神经,矫正畸形的脊柱,使椎体的稳定性和椎间高度恢复,但此类患者多存在神经根管狭窄,手术减压时需超出椎间关节的 1/3,增加椎弓根内进行固定使脊柱的后方稳定性,减少脊柱的不稳定性[16-18]。

后路椎体间融合术是治疗腰椎滑脱症的标准术式,能显著提高患者植骨融合率,在退行性腰椎滑脱症中有一定的治疗效果,但该入路手术双侧置钉,创伤大,对机体软组织剥离较多,且难度较高,易造成硬膜囊撕裂,导致患者术后腰背痛等并发症较高,影响患者脊柱功能及生活质量[19-21]。近年来,随着微创外科的发展,经椎间孔入路腰椎融合术应运而生,经椎间孔入路腰椎融合术是一种在后路椎体间融合术的基础上形成的椎间融合术,改进了较多后路椎体间融合术中的弊端,具有一定优势[22-24]。经椎间孔入路腰椎融合术是以一侧进行入路,单侧置钉,能保留对侧椎板以及周围组织,降低手术带来的创伤性,且对脊柱后柱的影响力较小[25,26]。目前认为经椎间孔入路腰椎融合术有以下优势[27];(1)该手术是由单侧入路手术,不咬除另外一侧的椎板,可保护脊柱后稳定;(2)该手术术中无需牵拉神经根,降低神经损伤的风险;(3)该手术相关微创,对机体损伤小,术中出血量及术后引流量较少。本研究结果显示,使用经椎间孔入路腰椎融合术治疗的患者,总优良率为 90.20%,明显高于对照组患者,且手术时间、术中出血量、术后引流量及卧床时间均显著低于对照组,结果提示,经椎间孔入路腰椎融合术可治疗退行性腰椎滑脱症具有较好的效果,能降低手术时间及术中出血量,缩短卧床时间。国外研究显示,后路椎体间融合术与经椎间孔入路腰椎融合术都能明显改善患者腰椎功能,但使用经椎间孔入路腰椎融合术患者并发症较少 [28]。本研究结果也显示,采用经椎间孔入路腰椎融合术的患者并发症总发生率为 3.92%,明显低于对照组患者,进一步证实了经椎间孔入路腰椎融合术对患者损伤较小,具有较高的安全性。分析其原因可能是因为后路椎体间融合术术中可将椎板切除但保留关节突,术中将硬膜囊及神经根向一侧进行提拉,导致神经根被拉伤,而经椎间孔入路腰椎融合术术中会减少对神经根和硬膜牵拉,较好的保护神经根,降低其损伤的发生率。

近年来有研究发现,退行性腰椎滑脱症患者血清中 AGEs 表达变化与疾病有一定关系[29]。AGEs 是过量的糖和蛋白质结合的产物,可与身体的组织细胞相组合并破坏,加速人体衰老,导致较多慢性退化型疾病的发生[30]。国外较多研究显示,AGEs 水平升高可提高退行性腰椎滑脱症的风险,随着病情的加重,水平表达增多[31]。有研究报道显示,退行性腰椎滑脱症患者血清 AGEs 水平显著高于正常人,且其水平变化与患者的病情呈正相关,可作为预测疾病的中医指标。手术时患者机体会产生损伤,可导致较多指标产生变化,IL-6 是由内皮细胞、成纤维细胞和单核细胞分泌产生的,可反映手术导致机体损伤的严重程度及机体炎症反应程度[35]。本研究结果显示,治疗后,两组血清 AGEs 水平均显著降低,且观察组低于对照组,IL-6 水平显著上升,观察组低于对照组,结果提示,后路椎体间融合术与经椎间孔入路腰椎融合术都可导致患者炎性反应增加,但采用经椎间孔入路腰椎融合术的患者炎症因子水平低于对照组。分析其原因可能是因为经椎间孔入路腰椎融合术可借助于可扩张通道系统,通过最长肌与多裂肌间隙进入,无需剥离皮下软组织,较好地保留了椎旁软组织的生理功能,对机体损伤小,从而有效抑制炎症水平,修复 AGEs 破坏的组织细胞。此外,本研究结果还显示,治疗后,两组 AVS、ODI 评分水平均显著降低,且观察组低于对照组,进一步证实了经椎间孔入路腰椎融合术对患者机体损伤较小,可降低患者疼痛。但该手术也具有一定的局限性,适应症较窄,2 个节段以上的椎体滑脱患者不宜使用。

综上所述,在退行性腰椎滑脱症患者中应用经椎间孔入路腰椎融合术临床效果更好,术后 AGEs、IL-6 水平更低,且并发症较少。

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