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## 经皮椎间孔镜 TESSYS 术与 TLIF 术治疗腰椎间盘突出症合并神经根管狭窄的疗效对比研究 \*

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**摘要 目的:**对比经皮椎间孔镜 TESSYS 术与经椎间孔入路腰椎椎体间融合术(TLIF)治疗腰椎间盘突出症(LDH)合并神经根管狭窄的疗效。**方法:**回顾性分析 2016 年 4 月~2019 年 4 月期间徐州医科大学附属医院沭阳医院收治的 96 例 LDH 合并神经根管狭窄患者的临床资料,根据手术方式的不同将患者分为 A 组(n=48,采用 TLIF 术式治疗)和 B 组(n=48,采用经皮椎间孔镜 TESSYS 术治疗),比较两组优良率、视觉疼痛模拟评分(VAS)、Oswestry 功能障碍指数(ODI)、椎间高度、滑脱程度、隐神经、腓肠神经等感觉神经传导速度(SCV)和胫神经、腓总神经等运动神经传导速度(MCV),记录两组并发症发生情况。**结果:**B 组优良率高于 A 组( $P<0.05$ )。两组患者术后 6 个月 VAS 评分、ODI 评分以及滑脱程度均降低,且 B 组低于 A 组( $P<0.05$ )。两组患者术后 6 个月椎间高度、隐神经 SCV、腓肠神经 SCV、胫神经 MCV、腓总神经 MCV 升高,且 B 组高于 A 组( $P<0.05$ )。B 组并发症发生率低于 A 组( $P<0.05$ )。**结论:**与 TLIF 术式相比,经皮椎间孔镜 TESSYS 术治疗 LDH 合并神经根管狭窄的疗效显著,可有效减轻患者疼痛,提高腰背功能,明显改善双下肢神经功能,提高筋膜代偿能力,且并发症发生率更低,临床应用价值更高。

**关键词:**经椎间孔入路腰椎椎体间融合术;经皮椎间孔镜 TESSYS 术;腰椎间盘突出症;疗效;神经根管狭窄

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## A Comparative Study on the Therapeutic Effect of Percutaneous Intervertebral Foraminoscopy and TLIF in the Treatment of Lumbar Disc Herniation with Nerve Root Canal Stenosis\*

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**ABSTRACT Objective:** To compare the therapeutic effect of percutaneous transforaminal microsurgery (tessys) and transforaminal lumbar interbody fusion (TLIF) in the treatment of lumbar disc herniation (LDH) with nerve root canal stenosis. **Methods:** The clinical data of 96 patients with LDH and stenosis of nerve root canal received in Shuyang Hospital Affiliated to Xuzhou Medical University from April 2016 to April 2019 were analyzed retrospectively. According to the different operation methods, the patients were divided into two groups: group A (n=48, TLIF) and group B (n=48, transdermal endoscopic tessys). The excellent rate, visual pain simulation score (VAS), Oswestry dysfunction index (ODI), intervertebral height, degree of slippage, sensory nerve conduction velocity (SCV) of saphenous nerve, sural nerve and motor nerve conduction velocity (MCV) of tibial nerve and common peroneal nerve were compared between the two groups, and the complications of the two groups were recorded. **Results:** The excellent and good rate of group B was higher than that of group A ( $P<0.05$ ). The vas, ODI scores and the degree of slippage of the two groups were lower than those of group A ( $P<0.05$ ). The intervertebral height, saphenous nerve SCV, sural nerve SCV, tibial nerve MCV and common peroneal nerve MCV of the two groups were higher than those of group A ( $P<0.05$ ). The incidence of complications in group B was lower than that in group A ( $P<0.05$ ). **Conclusion:** Compared with TLIF, percutaneous transforaminal microsurgery (tessys) is effective in the treatment of LDH with nerve root canal stenosis. It can effectively improve the pain of patients, improve the back function, improve the nerve function of both lower limbs, and improve the ability of fascial compensation, with fewer complications, and has higher clinical application value.

**Key words:** Transforaminal lumbar interbody fusion; Percutaneous intervertebral foraminoscopy; Lumbar disc herniation; Therapeutic effect; Nerve root canal stenosis

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## 前言

腰椎间盘突出症(Lumbar disc herniation, LDH)是指腰椎间盘的各部分发生不同程度的退行性改变,当遭到外力刺激后,椎间盘的纤维环破裂,髓核组织从破裂处突出或脱出,致使邻近神经根受压,最终产生腰部疼痛等一系列临床症状<sup>[1-3]</sup>。神经根管狭窄是LDH的常见并发症之一,其根本病变在于神经根受到骨性和纤维性组织压迫,若未能给予有效治疗,可出现脊柱结构、稳定性变化<sup>[4-6]</sup>。经椎间孔入路腰椎椎体间融合术(Transforaminal lumbar interbody fusion, TLIF)是临床治疗LDH合并神经根管狭窄的常用术式,可获得一定的治疗效果,但该术式创伤较大,术后恢复慢,且存在一定的复发风险<sup>[7,8]</sup>。随着医学技术的发展,微创技术开始应用于临床,经皮椎间孔镜TESSYS术逐渐应用于LDH的治疗中。现临床有关上述两种术式治疗LDH合并神经根管狭窄孰优孰劣尚存在一定的争议。本研究就此展开分析,以期对临床治疗LDH合并神经根管狭窄提供参考。

## 1 资料与方法

### 1.1 一般资料

回顾性分析2016年4月~2019年4月期间徐州医科大学附属沭阳医院收治的96例LDH合并神经根管狭窄患者的临床资料,纳入标准:(1)临床表现为腰部疼痛伴单侧下肢疼痛麻木症状;(2)CT、MRI等影像学检查明确患有LDH,双下肢肌电图证实有神经根压迫;(3)临床资料完整者;(4)均具备手术适应症者;(5)均为单椎体病变者。排除标准:(1)既往有脊柱手术史者;(2)合并心肝肾等重要脏器功能障碍者;(3)合并凝血功能障碍者;(4)妊娠或哺乳期妇女;(5)合并恶性肿瘤者;(6)合并严重骨质疏松症等不宜手术治疗者;(7)合并精神疾患无法配合治疗者。根据手术方式的不同将患者分为A组(n=48,采用TLIF术式治疗)和B组(n=48,采用经皮椎间孔镜TESSYS术治疗),其中A组男28例,女20例,年龄35~73岁,平均(51.89±7.22)岁;病程1~9年,平均(4.83±0.86)年;病变部位:L3-L4者16例,L4-L5者19例,L5-S1者13例。B组男26例,女22例,年龄38~76岁,平均(52.97±6.48)岁;病程1~7年,平均(4.71±0.73)年;病变部位:L3-L4者14例,L4-L5者20例,L5-S1者14例。两组患者一般资料对比未见统计学差异( $P>0.05$ ),具有可比性。本研究已获取徐州医科大学附属沭阳医院伦理学委员会批准进行。

### 1.2 方法

A组患者给予TLIF术式治疗,操作如下:全麻,呈俯卧位,通过C臂机确定患者的病变间隙并定位。依次切开皮肤及皮下筋膜,双侧椎旁肌剥离以显露椎板,置入椎弓根螺钉,予以神经

根管减压,减压结束后探查神经压迫情况,切除椎间盘及上下终板软骨,透视下确认合适位置植入Cage。手术结束后常规放置引流管。B组给予经皮椎间孔镜TESSYS术,操作如下:全麻,呈俯卧位,通过C臂机确定患者的病变间隙并定位穿刺点。常规消毒铺巾,透视下将18号穿刺针经穿刺位点进针,注射器推入2 mL 0.5%利多卡因。随后将造影剂与美兰混合制剂注入椎间隙行椎间盘造影,插入导丝,沿导丝逐步置入导杆、套管、椎间孔镜,经椎间孔镜置入工作套管,可见蓝染突出的髓核组织,取出蓝染椎间盘、椎间孔及侧隐窝增生的黄韧带,予以神经根管减压。术野内行电凝止血,纤维环撕裂口采用双射频电凝行皱缩成形术处理,结束后缓慢拔出工作通道管,免缝胶条粘合切口,盖敷料。两组患者术后行常规抗炎、抗感染处理。3个月内避免剧烈活动。

### 1.3 观察指标

采用门诊复查形式随访6个月,于术后6个月评价患者治疗效果。采用改良Mac Nab评价患者临床疗效<sup>[9]</sup>,优:腰背痛等临床症状消失,可正常活动及工作;良:腰背痛等临床症状大部分消失,可做轻体力工作;可:腰背痛等临床症状有所改善,但仍有疼痛,对正常工作及日常生活影响较大;差:症状未见改善甚至加重,需进一步治疗。优良率=优率+良率;(2)于术前、术后6个月采用视觉疼痛模拟评分(Visual analogue scale, VAS)<sup>[10]</sup>、Oswestry功能障碍指数(Oswestry disability index, ODI)<sup>[11]</sup>对患者疼痛症状、腰椎功能进行评价,其中VAS评分0~10分,分数越高,疼痛症状越明显;ODI量表包括10项,每项计分0~5分,分数越高,腰椎功能障碍越严重。(3)于术前、术后6个月拍摄腰椎正侧位X线片,测量两组椎间高度和滑脱程度。其中椎间高度:两个椎体前部与后部高度的平均值;滑脱程度:经过两腰椎后缘两切线间的距离。(4)于术前、术后6个月采用美国Nicolet公司生产的viking select8肌电诱发电位仪检测隐神经、腓肠神经等感觉神经传导速度(Sensory nerve conduction velocity, SCV)和胫神经、腓总神经等运动神经传导速度(Motor nerve conduction velocity, MCV)。(5)记录术后并发症。

### 1.4 统计学方法

研究数据经SPSS25.0软件处理,以( $\bar{x} \pm s$ )表示计量资料,采用t检验,以(%)表示计数资料,采用 $\chi^2$ 检验,检验标准 $\alpha=0.05$ 。

## 2 结果

### 2.1 两组疗效比较

A组疗效优12例,良28例,可6例,差2例;B组疗效优17例,良29例,可2例,差0例。B组优良率为95.83%(46/48)高于A组的83.33%(40/48)( $P<0.05$ );详见表1。

表1 两组疗效比较例(%)

Table 1 Comparison of efficacy between the two groups n(%)

| Groups        | Excellent | Good      | Can      | Bad     | Excellent and good rate |
|---------------|-----------|-----------|----------|---------|-------------------------|
| Group A(n=48) | 12(25.00) | 28(58.33) | 6(12.50) | 2(4.17) | 40(83.33)               |
| Group B(n=48) | 17(35.42) | 29(60.41) | 2(4.17)  | 0(0.00) | 46(95.83)               |
| $\chi^2$      |           |           |          |         | 4.019                   |
| P             |           |           |          |         | 0.045                   |

2.2 VAS、ODI 评分比较 6 个月 VAS、ODI 评分均降低,且 B 组低于 A 组( $P<0.05$ );详见表 2。  
两组术前 VAS、ODI 评分比较无差异( $P>0.05$ );两组术后

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

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

| Groups        | VAS              |                          | ODI              |                          |
|---------------|------------------|--------------------------|------------------|--------------------------|
|               | Before operation | 6 months after operation | Before operation | 6 months after operation |
| Group A(n=48) | 6.87± 1.24       | 2.17± 0.42*              | 36.27± 4.26      | 24.73± 3.46*             |
| Group B(n=48) | 6.72± 1.32       | 1.09± 0.24*              | 36.81± 5.25      | 14.19± 2.35*             |
| t             | 0.574            | 15.468                   | 0.553            | 17.459                   |
| P             | 0.567            | 0.000                    | 0.581            | 0.000                    |

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

2.3 两组影像学指标比较 ( $P>0.05$ );两组患者术后 6 个月椎间高度升高,且 B 组高于 A 组  
两组患者术前椎间高度、滑脱程度比较差异无统计学意义 ( $P<0.05$ );滑脱程度降低,且 B 组低于 A 组( $P<0.05$ );详见表 3。

表 3 两组影像学指标比较( $\bar{x} \pm s$ )

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

| Groups        | Intervertebral height(mm) |                          | Slippage degree(%) |                          |
|---------------|---------------------------|--------------------------|--------------------|--------------------------|
|               | Before operation          | 6 months after operation | Before operation   | 6 months after operation |
| Group A(n=48) | 3.58± 0.46                | 6.97± 0.64*              | 26.39± 3.31        | 18.93± 2.17*             |
| Group B(n=48) | 3.69± 0.58                | 9.19± 0.58*              | 26.41± 2.86        | 11.30± 1.85*             |
| t             | 1.029                     | 17.808                   | 0.032              | 18.538                   |
| P             | 0.306                     | 0.000                    | 0.975              | 0.000                    |

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

2.4 两组双下肢神经传导速度比较 后 6 个月隐神经 SCV、腓肠神经 SCV、胫神经 MCV、腓总神经  
两组患者术前隐神经 SCV、腓肠神经 SCV、胫神经 MCV、MCV 均升高,且 B 组高于 A 组( $P<0.05$ );详见表 4。  
腓总神经 MCV 比较差异无统计学意义( $P>0.05$ );两组患者术

表 4 两组双下肢神经传导速度比较( $\bar{x} \pm s$ )

Table 4 Comparison of nerve conduction velocity between two groups( $\bar{x} \pm s$ )

| Groups        | Saphenous nerve SCV(m/s) |                          | Sural nerve SCV(m/s) |                          | Tibial nerve MCV(m/s) |                          | Common peroneal nerve MCV(m/s) |                          |
|---------------|--------------------------|--------------------------|----------------------|--------------------------|-----------------------|--------------------------|--------------------------------|--------------------------|
|               | Before operation         | 6 months after operation | Before operation     | 6 months after operation | Before operation      | 6 months after operation | Before operation               | 6 months after operation |
| Group A(n=48) | 43.93± 5.08              | 47.78± 5.11*             | 40.56± 5.47          | 45.28± 5.51*             | 41.79± 4.24           | 45.51± 5.29*             | 39.65± 4.21                    | 44.49± 5.73*             |
| Group B(n=48) | 44.28± 4.47              | 52.49± 4.08*             | 40.19± 4.52          | 49.93± 4.78*             | 41.21± 5.26           | 49.36± 5.15*             | 40.23± 5.84                    | 48.23± 6.85*             |
| t             | 0.358                    | 4.990                    | 0.361                | 4.417                    | 0.595                 | 3.613                    | 0.558                          | 2.901                    |
| P             | 0.721                    | 0.000                    | 0.719                | 0.000                    | 0.553                 | 0.000                    | 0.578                          | 0.005                    |

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

## 2.5 两组并发症发生率比较

B 组中出现 3 例暂时性下肢感觉功能异常,保守治疗 1 周后症状缓解,并发症发生率为 6.25%(3/48)。对照组中出现 3 例肢体无力,经保守治疗恢复至术前水平;4 例切口感染,切口引流后愈合;5 例术后感觉过敏,经保守治疗后症状缓解;并发症发生率为 25.00%(12/48)。两组均未出现神经根损伤、定位错误等严重并发症。B 组并发症发生率较 A 组降低( $\chi^2=6.400, P=0.011$ )。

## 3 讨论

LDH 是引起慢性腰腿痛的常见疾病,该病好发于中老年群体,且病史较长,故患者多合并椎管狭窄、椎间盘钙化、神经根管狭窄、腰椎失稳等并发症<sup>[12,13]</sup>。其中神经根管狭窄主要由机体黄韧带压迫、椎间盘突出等因素所致。相比于单纯的 LDH 患者,LDH 合并神经根管狭窄者往往存在间歇性跛行这一临床

表现,主要是由于患者出行根和行走根会承受不同程度的压迫,继而引发下肢疼痛感和感觉障碍等情况<sup>[14-16]</sup>。以往多数患者在摘除髓核后行神经根检查时才可发现患者合并神经根管狭窄,近年来,随着CT、MRI影像学技术的进步,LDH合并神经根管狭窄的确诊率逐渐提升,LDH合并神经根管狭窄的治疗方式也愈发受到关注。常规开放TLIF虽通过固定、减压等方式可减轻患者腰腿疼痛,但该术式术后创伤严重,加之术后并发症发生率较高,不利于患者预后<sup>[17,18]</sup>。近年来,随着“舒适医疗”理念的兴起,越来越多的患者及临床工作者倾向于选择微创治疗。经皮椎间孔镜TESSYS术采用多角度双极射频电极,可直接消融髓核,并将破裂的纤维环修复,具有切口小、安全有效、恢复快等优点,临床应用越来越广泛<sup>[19,20]</sup>。

本次研究结果显示,B组优良率高于A组,B组术后6个月VAS、ODI评分及影像学指标、双下肢神经传导速度等改善情况均优于A组,表明与TLIF术式相比,经皮椎间孔镜TESSYS术治疗LDH合并神经根管狭窄,可有效改善患者临床症状,提高筋膜代偿能力,获得较为理想的治疗效果。究其原因,TLIF术式虽可提供清晰的视野,但其对椎旁肌的损伤较大,严重影响脊柱稳定性。而经皮椎间孔镜TESSYS术作为微创术式,手术切口小,较少侵犯正常解剖结构,可精准地除去致压物及狭窄部位,同时较好地保护后路结构组织,使疼痛的减轻及腰椎功能的改善效果更优<sup>[21,22]</sup>,加之经皮椎间孔镜TESSYS技术使用了镜下动力磨钻、镜下咬骨钳等器件,术中可顺利咬除肥厚黄韧带,并将增生骨赘打磨,从而有效解压神经根管,提高治疗效果<sup>[23,24]</sup>。此外,经皮椎间孔镜TESSYS术对椎间盘的组织破坏较小,可清除病变,并行椎间孔减压,使神经根管内外趋于平衡,提高脊柱稳定性<sup>[25,26]</sup>。本次研究结果还显示,B组并发症发生率低于A组,可能是因为TLIF术创伤大,而经皮椎间孔镜TESSYS术可避免正常腰椎结构的破坏<sup>[27,28]</sup>。据研究显示,经皮椎间孔镜TESSYS技术具有一定的手术风险,譬如硬膜囊撕裂、术后感染等<sup>[29,30]</sup>。故手术中应注意以下几点以提高手术成功率:严格掌握手术适应证、施术者需要有丰富的临床手术经验、准确定位、尽量避免破坏患者的稳定腰椎结构。本次研究尚存在样本量偏小、未能观察患者远期预后等不足,后续将通过增加样本量、延长随访时间等方式完善研究并进行进一步的深入分析。

综上所述,与TLIF术式相比,经皮椎间孔镜TESSYS术治疗LDH合并神经根管狭窄疗效显著,可提高腰背功能,减轻疼痛,双下肢神经功能明显改善,且并发症发生率较低,临床应用价值较高。

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