doi: 10.13241/j.cnki.pmb.2017.27.024

腰椎旁神经阻滞联合超短波对腰椎间盘突出症患者疼痛及腰背肌生物力学性能的影响 *

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摘要 目的：探讨腰椎旁神经阻滞联合超短波对腰椎间盘突出症疼痛及腰背肌生物力学性能的影响。**方法：**选择我院 2014 年 2 月~2016 年 8 月收治的 98 例腰椎间盘突出症患者，按抽签法分组对照组与研究组。对照组采用腰椎旁神经阻滞治疗，研究组基于对照组加用超短波治疗。观察两组的临床疗效、治疗前后视觉模拟评分(VAS)、60° /s 角速、120° /s 角速平均功率(AP)、峰力矩(PT)、腰背屈 / 伸比值(F/E)、血清 P 物质(SP)、β- 内啡肽(β-EP)、白细胞介素 -6(IL-6)、肿瘤坏死因子 -α(TNF-α)水平的变化及不良反应的发生情况。**结果：**研究组总有效率为 95.91%，显著高于对照组，差异有统计学意义(P<0.05)。治疗后，两组 F/E 值、血清 SP、IL-6、TNF-α 水平均较治疗前显著降低，且研究组以上指标均明显低于对照组，两组 AP、PT、血清 β-EP 水平均较治疗前明显上升，且研究组以上指标显著高于对照组，差异均有统计学意义(P<0.05)。两组不良反应的发生率比较差异无统计学意义(P>0.05)。**结论：**腰椎旁神经阻滞联合超短波治疗腰椎间盘突出症的效果明显优于单用腰椎旁神经阻滞治疗，其可有效缓解疼痛及改善腰背肌生物力学性能，并减轻炎症反应。

关键词：腰椎间盘突出症；腰椎旁神经阻滞；超短波；疼痛；腰背肌生物力学性能

中图分类号：R681.53 **文献标识码：**A **文章编号：**1673-6273(2017)27-5298-04

Effect of Lumbar Spinal Nerve Block Combined with Ultrashort Wave on Pain and Biomechanics of Lumbar Back Muscle of Patients with Lumbar Disc Herniation*

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ABSTRACT Objective: To research the effect of lumbar spinal nerve block combined with ultrashort wave on the pain and biomechanics of lumbar back muscle of patients biomechanics with lumbar disc. **Methods:** 98 patients with lumbar disc herniation in our hospital from February 2014 to August 2016, according to the lottery method divided into control group and research group. The control group was treated with Lumbar spinal nerve block. The research group was based on the control group treated with ultrashort wave, clinical curative effect, changes of the visual analogue scale (VAS), 60 ° /s angular velocity, 120° /s average apical power (AP), peak torque (PT), lumbar dorsiflexion / dorsal flexion (F/E), serum levels of substance P (SP), β-endorphin (β-EP), interleukin-6 (IL-6), tumor necrosis factor-α (TNF-α) before and after treatment, and adverse reactions were compared between two groups. **Results:** The total effective rate of research group was95.91%, which was significant higher than that of the control group, the difference was statistically significant (P<0.05). After treatment, The VAS, F/E, serum levels of SP, IL-6 and TNF-α of two groups were significantly lower than those before treatment, the above indicators of research group were significantly lower than those of the control group. The AP, PT and serum levels of β-EP between two groups were significantly higher than those before treatment, the above indicators of research group were significantly higher than those of the control group (P<0.05). No statistical difference was found in the incidence of adverse effects between the two groups (P>0.05). **Conclusion:** Umbar spinal nerve block combined with ultrashort wave was more effective than lumbar paravertebral nerve block treatment alone in the treatment of lumbar disc herniation, it could effectively relieve the pain and improve the low back muscle biological mechanics performance and reduce the inflammatory response.

Key words: Lumbar disc herniation; Lumbar paravertebral nerve block; Ultrashort wave; Pain; Lumbodorsal muscle biomechanical properties

Chinese Library Classification (CLC): R681.53 Document code: A

Article ID: 1673-6273(2017)27-5298-04

* 基金项目：广西壮族自治区卫计委自筹项目(桂卫自筹 Z2016304)

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(收稿日期：2017-04-22 接受日期：2017-05-18)

前言

腰椎间盘突出症是一种临床常见综合征，主要由腰椎间盘退变、髓核突出压迫马尾神经、脊神经根所致，多于中青年人群发病，下肢放射性疼痛、腰痛、跛行等是其常见临床表现[1]。临床研究显示腰椎间盘突出症患者腰背肌生物学性能多存在不同程度的异常，表现为腰部肌肉疲劳或者收缩能力减弱[2]。口服镇痛药、按摩、针灸等是既往腰椎间盘突出症的常用疗法，部分患者的效果肯定，但仍有部分患者的疗效欠佳[3]。有研究表明腰椎旁神经阻滞对于顽固性腰椎间盘突出症患者的短期疗效较好，操作方便且安全性高，可使开放手术的可能性降低，但难以达到长期疗效[4]。近年来，超短波等物理疗法是临床研究的热点，现已用于椎管狭窄、椎间盘突出等治疗中，可缓解无菌性严重、减轻神经根水肿，从而缓解患者疼痛[5]。本研究旨在探讨腰椎旁神经阻滞联合超短波对腰椎间盘突出症患者疼痛及腰背肌生物力学性能的影响，现报道如下。

1 资料与方法

1.1 一般资料

将 98 例腰椎间盘突出症患者按抽签法分组，经医院伦理委员会许可，且签署家属与患者知情同意书。入选标准[6]：(1)与腰椎间盘突出症相关诊断标准相符：突发性下肢放射痛及腰痛、活动受到限制，相应棘突可见压痛、直腿抬高试验呈阳性(患侧)、下肢感觉反射、肌力可见异常，腰椎影像学检查对应椎间盘可见突出；(2)属膨隆型腰椎间盘突出症状，纤维环完整，且无手术指征；(3)腰腿症状经系统治疗后未见明显改善。排除严重内科疾病；腰椎结核或者腰椎伴创伤、手术史；椎管严重狭窄、马尾神经受压；妊娠或者哺乳阶段。对照组 27 例男，22 例女；年龄 22~63 岁，平均(44.58± 4.65)岁；受累椎间盘数目：27 例 1 个，14 例 2 个，8 例 3 个。研究组 25 例男，24 例女；年龄 21~65 岁，平均(44.11± 4.87)岁；受累椎间盘数目：25 例 1 个，15 例 2 个，9 例 3 个。两组一般临床资料比较差异均无统计学意义(P>0.05)，有可比性。

1.2 治疗方法

对照组采用腰椎旁神经阻滞，患者为侧卧位，保持患侧在上，屈曲两侧髋膝，取腰椎棘突中线上缘 3/1 交界处并沿患侧旁开 2.5 cm 作为穿刺点。标记并消毒皮肤，由内侧倾斜 15° 左右进针，待针尖到达第 4、5 腰椎关节突旁后，将针尖退至皮下。再垂直进针 5 cm 左右，待针尖接触横突边缘时，并越过横突约 1 cm 左右。回抽未见脑脊液及血液流出后，缓慢注射 10 mL 0.5%利多卡因(山东大陆药业有限公司，2 mL:40 mg，国药准字 G14023559，批号 140125)，并注射 10 mg 曲安奈德(江西德成制药有限公司，1 mL:40 mg，国药准字 H53021604，批号 140123)与 5 mL0.9 氯化钠 (广东联康药业有限公司，500 mL:0.45 g，国药准字 H35020289，批号 140120)的混合液，每周 1 次，持续治疗 4 周。研究组基于对照组加用超短波治疗，选用超短波治疗仪(DL-C-B 型，北京天合康星科技有限公司)进行，波长设定为 6.7 m，输出功率在 100~120W 之间(以患者存在温热感为度)，选用中号电极。指导患者为仰卧位，于腰椎棘突两侧放置电极，间隔在 5~6 cm，每次 25 min，每天 1 次，持续治疗 4 周。期间两组均配合营养神经、推拿、骨盆牵引等治疗，嘱患者多卧床休息，避免久坐及弯腰。于治疗结束时评估各指标。

1.3 观察指标

1.3.1 疗效观察 治愈：腰部功能未见异常，直腿抬高试验在 70° 以上，患处腰椎未见压痛，恢复正常生活；显效：腰部功能显著缓解，直腿抬高试验在 20° ~70° 之间，能够完成日常生活，但劳累过度可见痛觉；好转：腰部功能有一定改善，直腿抬高试验在 10° ~70° 之间，能够完成日常生活，但有难度，且腰部疼痛感比较明显；无效：腰部活动与疼痛等未见显著改变。治愈、显效及好转均视作总有效[7]。

1.3.2 视觉模拟评分(VAS) 分值为 0 至 10 分，0 分表示无痛；3 分以下表示轻微疼痛，能够耐受；4 至 6 分表示疼痛已对睡眠产生影响，但能够耐受；7 至 10 分表示疼痛剧烈，无法耐受[8]。

1.3.3 腰背肌生物力学性能测定 采用等速测试急性进行，包含 60° /s 角速、120° /s 角速平均功率(AP)、峰力矩(PT)、腰背屈 / 伸比值(F/E)。

1.3.4 血液指标检测 于治疗前后抽取患者 2 mL 晨起静脉血，常规处理后低温放置取血清。P 物质(SP)、β- 内啡肽(β-EP)按酶联免疫吸附法进行测定。白细胞介素 -6(IL-6)、肿瘤坏死因子 -α(TNF-α)按放射免疫法进行测定。

1.4 统计学分析

选择 spss18.0 行数据统计，计量资料用均数± 标准差($\bar{x}$± s)表示，用 t 检验比较，计数资料用[(n)%]表示，用 x^2 检验比较，以 P<0.05 为差异有统计学意义。

2 结果

2.1 两组临床疗效的比较

研究组总有效率为 95.91%，明显高于对照组，差异有统计学意义(P<0.05)，见表 1。

表 1 两组疗效的比较[例(%)]

Table 1 Comparison of the curative effect between two groups [n(%)]

Groups	Get well	Markedly	Better	Invalid	Total effective rate
Control group(n=49)	12(24.49)	15(30.61)	14(28.58)	8(16.32)	41(83.67)
Research group(n=49)	17(34.70)	19(38.77)	11(22.45)	2(4.08)	47(95.91)

Note: Compared with the control group, #P<0.05.

2.2 两组治疗前后 SP、β-EP 及 VAS 的变化比较

治疗前，两组 SP、β-EP 及 VAS 比较差异无统计学意义(P>0.05)；治疗后，两组 SP 均水平均较治疗前显著上升，且研究组以上指标明显高于对照组，两组 β-EP 及 VAS 水平均较治疗前显著降低，且研究组以上指标明显低于对照组，差异有统计学意义(P<0.05)，见表 2。

表 2 两组治疗前后 SP、β-EP 及 VAS 水平的变化比较($\bar{x}\pm$ s)

Table 2 Comparison of the changes of SP, β-EP and VAS between two groups before and after treatment ($\bar{x}\pm$ s)

Groups	Time	SP(ng/L)	β-EP(ng/L)	VAS(分)
Control group(n=49)	Before treatment	650.21± 81.25	161.75± 20.12	7.12± 0.89
	After treatment	504.59± 63.20▽	205.60± 25.63▽	2.63± 0.32▽
Research group(n=49)	Before treatment	651.04± 80.85	162.54± 20.87	7.30± 0.85
	After treatment	436.87± 54.51▽#	243.58± 30.38▽#	1.45± 0.17▽#

Note: Compared with the control group, #P<0.05; Compared with before treatment, P<0.05.

2.3 两组治疗前后腰背肌生物力学性能的比较

治疗前，两组 60°/s 角速、120°/s 角速 AP、PT、F/E 比较差异均无统计学意义(P>0.05)；治疗后，两组 60°/s 角速、120°/s 角速 AP、PT 水平均较治疗前显著上升，且研究组以上指标显著明显高于对照组，两组 F/E 均较治疗前明显降低，且研究组以上指标显著低于对照组，差异有统计学意义(P<0.05)，见表 3、4。

表 3 两组治疗前后 60°/s 角速腰背肌生物力学性能的变化比较($\bar{x}\pm$ s)

Table 3 Comparison of the changes of 60°/s back muscle biomechanics angle speed performance between two groups before and after treatment ($\bar{x}\pm$ s)

Groups	Time	AP(W)	PT(Nm)	F/E(%)
Control group(n=49)	Before treatment	31.52± 3.93	71.68± 8.89	82.50± 10.25
	After treatment	37.40± 4.67▽	78.35± 9.77▽	77.31± 9.63▽
Research group(n=49)	Before treatment	31.98± 3.98	71.02± 8.87	82.12± 10.25
	After treatment	42.25± 5.31▽#	88.95± 11.20▽#	72.10± 9.11▽#

表 4 两组治疗前后 120°/s 角速腰背肌生物力学性能的变化比较($\bar{x}\pm$ s)

Table 4 Comparison of the 120°/s back muscle biomechanics angle speed performance between two groups before and after treatment ($\bar{x}\pm$ s)

Groups	Time	AP(W)	PT(Nm)	F/E(%)
Control group(n=49)	Before treatment	15.63± 1.95	59.76± 7.37	72.85± 9.10
	After treatment	20.12± 2.51▽	64.23± 8.02▽	67.91± 8.45▽
Research group(n=49)	Before treatment	15.22± 1.90	59.10± 7.19	72.16± 9.03
	After treatment	28.50± 3.56▽#	68.75± 8.51▽#	63.14± 7.88▽#

Note: Compared with control group, #P<0.05; Compared with before treatment, ▽#P<0.05.

2.4 两组治疗前后血清炎症因子水平的比较

治疗前，两组血清 IL-6、TNF-α 水平比较差异无统计学意义(P>0.05)；治疗后，两组 IL-6、TNF-α 水平均较治疗前明显降低，且研究组以上指标均明显低于对照组，差异有统计学意义(P<0.05)，见表 5。

表 5 两组治疗前后血清炎症因子水平变化的比较($\bar{x}\pm$ s)

Table 5 Comparison of the changes of serum inflammatory factors between two groups before and after treatment ($\bar{x}\pm$ s)

Groups	Time	IL-6(ng/L)	TNF-α(μg/L)
Control group(n=49)	Before treatment	138.54± 17.25	1.95± 0.24
	After treatment	127.60± 15.84▽	1.56± 0.19▽
Research group(n=49)	Before treatment	137.96± 17.12	1.94± 0.24
	After treatment	116.25± 14.50▽#	1.35± 0.16▽#

Note: Compared with control group, #P<0.05; Compared with before treatment, ▽P<0.05.

2.5 两组不良反应发生情况的比较

对照组有 5 例、研究组有 4 例发生注射部位不适，两组均未见其他不良反应，不良反应发生率比较差异无统计学意义(P>0.05)。

3 讨论

腰椎间盘突出症是脊柱科的常见疾病，下肢放射痛及腰痛是其典型临床表现，可明显降低患者的生活质量[9]。多数患者经非手术治疗后可得到明显缓解，既往临床上多于正中硬膜外注射糖皮质激素治疗，但药物难以直接作用于病灶，且容易出现硬膜外血肿，影响疗效[10]。经腰椎旁神经阻滞可确保药物直达病灶，并于腰大肌间沟与椎间孔之间扩散，以充分接触腰骶神经，缓解神经的水肿及无菌性炎症，消除肌肉痉挛[11]。国外研究报道腰椎旁阻滞基础上结合物理疗法可明显提高疗效[12]。超短波疗法是于机体应用超高频交流电，经热效应增加局部阻滞的温度，促进淋巴及血液循环，提高血管通透性，从而发挥治疗目的[13]。本结果显示联合超短波治疗组总有效率显著高于腰椎旁神经阻滞组，证实二者联合治疗可促进疗效的提高，可能与超

短波可促进血液循环,提高病灶内的浓度有关。

临床研究显示椎间盘、腰椎的退行性变化可诱导椎间孔产生狭窄,导致其神经血管受到牵拉、压迫等刺激,从而诱发疼痛;同时腰部肌肉、韧带等慢性劳损也是疼痛的关键诱因[14]。此外病变腰椎可诱导水肿及无菌性炎症,导致根性疼痛,并促进神经末梢释放疼痛介质。SP 能够于脊髓背神经节中大量分布,椎间盘退变后可激活神经末梢感受器,引起 SP 大量释放,从而传递疼痛[15]。β-EP 作为一种内阿片肽,可于疼痛传递中起着关键作用,长时间的慢性疼痛可导致 β-EP 降低,增加 SP 释放,进一步加剧疼痛[16]。本结果显示,联合超短波治疗后 SP 浓度明显降低,增加 β-EP,且 VAS 显著降低,进一步证实二者联合治疗可有效缓解疼痛,减轻患者痛苦,其机制可能与超短波治疗能够增加腰部血流量及流动速度,促进疼痛物质及病理产物的清除,从而减轻疼痛[17]。

临床研究表明腰椎间盘突出症发病与脊柱外内源性稳定性降低有关,其中外源性稳定系统由内压、肌腱、肌肉组成,其稳定性破坏可引起腰背肌生物力学性能减弱[18]。AP、PT 可客观反映腰背部伸、屈肌的最大输出力量与肌肉做功,存在良好的可重复性及准确性[19]。基础研究发现,腰椎稳定性主要取决于腰部屈伸肌,F/E 值可反映腰椎的肌力平衡[20]。本研究显示,联合超短波治疗后 60°/s 角速、120°/s 角速 AP、PT 均上升,P/E 值显著降低,表明联合超短波治疗可利于腰部拮抗肌群与主动肌群平衡协调能力的恢复。

韧带及肌肉退化、椎间盘压力增加等系列因素可诱导神经周围组织出现炎性反应,引起神经水肿、粘连[21]。TNF-α 是一种存在多种生物活性的细胞因子,多由单核 - 巨噬细胞所分泌,能够参与机体的免疫应答与炎症反应,刺激中性粒细胞产生趋化作用并且发生局部性浸润[22]。IL - 6 是机体内重要的免疫调节因子,能够参与调节体液免疫与机体炎症的整个病理过程,也能够促进分泌 TNF-α 等炎性因子的分泌,加重机体的炎性反应[23]。本结果显示联合超短波治疗后 TNF-α、IL-6 浓度显著下降,说明二者联合治疗可促进机体炎症的缓解,从而利于疾病的改善。同时,两组仅少数患者出现注射部位不适,其余未见其他明显不良反应,安全性均较高。

综上所述,腰椎旁神经阻滞联合超短波治疗腰椎间盘突出症的效果明显优于单用腰椎旁神经阻滞治疗,其可有效缓解疼痛及改善腰背肌生物力学性能,并减轻炎症反应。

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