

实验研究

# 扳提手法治疗腰椎间盘突出症的实验研究

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**摘要** 作者借鉴Nachemson的方法, 模拟扳提手法, 动态测量了3具完整新鲜尸体髓核内压在手法中的变化情况。实验结果为 L<sub>3-4</sub>、L<sub>4-5</sub> 间隙髓核内压在手法过程中呈增高变化, L<sub>5</sub>-S<sub>1</sub> 间隙髓核内压在手法过程中呈降低变化。作者对实验结果进行了分析, 认为扳提手法不能使突出的髓核还纳, 而有可能使突出的髓核与受压的神经根之间的位置发生变化。

**关键词** 腰椎间盘突出症 正骨手法 生物力学 实验研究

俯卧位扳提健侧大腿向后伸和向患侧旋转的手法 (简称扳提手法) 是治疗腰椎间盘突出症疗效较好的一种手法。作者参考 Nachemson<sup>[1]</sup> 的方法, 在尸体上动态测量了模拟扳提手法过程中髓核内压的变化情况。

### 材料与方法

本实验所用传感器为航天工业部生产的 YH-型压力传感器, 放大及显示装置为河南开封医用电子仪器厂生产的 HM004-1 型骨内压测量仪, 记录装置为日产松下 M<sub>7</sub> 型摄像机。

取完整新鲜青壮年尸僵前尸体, 俯卧位放置于实验床上, 在 L<sub>2</sub>~S<sub>2</sub> 棘突上做后正中切口, 全椎板切除方式显露 L<sub>3</sub>~S<sub>1</sub> 部椎管, 完整保留各部腰椎小关节。用连接传感器的穿刺针 (传感器连接骨内压测量仪) 从后外侧插入待测间盘髓核, 记录下髓核内压的初始值。然后显示器调零, 并在尸体上模拟实际的扳提手法。手法成功后, 以手法基本相同的速度, 使尸体恢复到手法前的体位。用摄像机对显示器进行连续录像, 动态记录下手法过程中髓核内压的变化情况。共测量了 20~30 岁新鲜男尸 3 具, 每具尸体测 L<sub>3-4</sub>、L<sub>4-5</sub>、L<sub>5</sub>~S<sub>1</sub> 3 个间盘, 每个间盘测左右各一次手法过程中的髓核内压变化情况。

### 结 果

1. 俯卧静止时测得髓核内压初值均为负值, 即髓核内压初值较大气压低。数据见表 1。

表 1 髓核内压初值 (单位 Pa)

	男1	男2	男3
L <sub>3-4</sub>	-106.66	-289.32	-266.64
L <sub>4-5</sub>	-159.98	-387.69	-426.62
L <sub>5-S<sub>1</sub></sub>	-146.65	-678.47	-879.91

$\bar{x} \pm SD: -371.33 \pm 259.61 \text{ Pa}$

与插入前零值比较,  $t = 4.29, P < 0.01$ 。说明测量到的髓核内压较大气压低的结果不是抽样误差引起。

2. L<sub>3-4</sub>、L<sub>4-5</sub> 间盘髓核内压手法过程中均呈增大变化, 且手法成功时髓核内压值达高峰, 此 12 次的髓核内压变化见表 2。

表 2 L<sub>3-4</sub>、L<sub>4-5</sub> 间盘手法过程中髓核内压变化情况

序号	手法前 (Pa)	手法成功时 (Pa)	回到原体位时 (Pa)
1	0	1813.15	-93.32
2	0	653.27	213.31
3	0	493.28	-26.66
4	0	653.27	26.66
5	0	1093.22	-266.64
6	0	746.59	226.64
7	0	2493.08	1359.86
8	0	1039.90	53.33
9	0	1253.21	-399.96
10	0	533.56	-933.24
11	0	1066.56	-399.96
12	0	3652.97	13.32

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手法成功时髓核内压与手法前比较,  $t = 4.74, P < 0.01$ , 回复到手法前体位时的髓核内压与手法前比较,  $t = 0.31, P > 0.05$ 。因此,  $L_3-4$ 、 $L_4-5$ 间隙手法成功时髓核内压增高, 手法后回复到原体位时的髓核内压与手法前稍有差异, 但为抽样误差引起。

3.  $L_5 \sim S_1$  间盘髓核内压手法过程中呈减小变化, 且在手法成功时髓核内压值达到最低值, 此6次的髓核内压变化见表3。

表3  $L_5 \sim S_1$  间盘手法过程中髓核内压变化情况

序号	手法前 (Pa)	手法成功时 (Pa)	回复到原体位时 (Pa)
1	0	-13891.94	-13.33
2	0	-11078.89	79.99
3	0	-24450.89	66.66
4	0	-13172.02	-133.32
5	0	-11558.84	133.32
6	0	-10972.24	13.33

手法成功时髓核内压与手法前比较,  $t = 6.73, P < 0.01$ , 回复到手法前体位时的髓核内压与手法前比较,  $t = 0.64, P > 0.05$ 。因此,  $L_5 \sim S_1$  间盘扳提手法过程中髓核内压呈降低的变化。手法后回复到原体位时的髓核内压与手法前稍有差异, 但为抽样误差引起。

### 讨 论

脊柱由椎体、椎间盘和韧带组成。韧带的牵张力对椎间盘起作用, 使椎间盘保持一定的压力。本文的实验证明, 静止的间盘具有一定的压力 (尽管此压力较大气压低)。髓核具有运动性和不可压缩性<sup>[2]</sup>。脊柱后伸时, 减小了脊柱后侧的间隙, 髓核向前移动, 纤维环前侧的纤维承受压力增加。脊柱旋转运动时, 减小了脊柱旋转的间隙, 髓核向脊柱旋转侧的对侧移动, 纤维环的斜行方向的纤维按运动的相反方向受到牵张。由于脊柱运动时纤维环外周层的凸侧承受最大的张力, 在其凹侧承受最大的压力, 势必会使髓核的内压增高。理论上说, 脊柱运动造成髓核内压增高也是有一定条件的, 即既有脊柱的运动, 又在运动中不致使容纳髓核的容积增大, 反之, 髓核内压会朝着相反的方向

变化, 即髓核内压较前降低。本组实验中  $L_3-4$ 、 $L_4-5$  间隙髓核内压在扳提手法过程中增加,  $L_5-S_1$  间隙髓核内压在扳提手法过程中减小即可说明这一点。因为  $L_3-4$ 、 $L_4-5$  间隙受腰椎小关节的限制, 后伸的程度较小, 不致使容纳髓核的容积增大。而  $L_5-S_1$  间隙由于结构的特殊性, 后伸程度可较两个间隙大得多, 这样虽  $L_5-S_1$  后侧间隙在后伸过程中减小, 但间隙前侧伸张的程度限制较小, 可在前纵韧带和前侧纤维环的弹性限度内极度扩张, 这样就可使容纳髓核的容积增大, 以致使髓核内压降低。

髓核内压增高, 不能使突出的髓核还纳, 而扳提手法过程中  $L_5-S_1$  间隙髓核内压降低也不会使突出的髓核还纳, 因为发生间盘突出的髓核, 都已发生了退变, 其流动性和连续性较正常髓核相差甚远, 脊柱后伸时, 后侧间隙的减小可关闭突出髓核的退路, 且即使少量髓核组织由于负压的因素退缩, 手法后的髓核内压及髓核容积的复原, 也会使突出髓核依旧呈现突出状态。

扳提复位手法, 实际是在脊柱后伸和旋转运动过程中, 患椎再行与脊柱旋转方向相反方向的部分旋转, 即移位小关节的复位过程, 只是这种旋转相对于脊柱的旋转要小得多。脊柱旋转时髓核向旋转方向的对侧移动, 加之脊柱的运动会引起椎管内的神经根产生相应运动, 这就极有可能使突出的髓核与原先受压的神经根的位置关系发生改变。本组实验的重点未在神经根, 故尚不能证实这一点极有可能发生的位置移动, 但已经明确的是, 扳提手法和腰椎坐位旋转手法<sup>[3]</sup>一样, 不能使突出的髓核还纳。

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## Abstracts of Original Articles

### Experimental study on prolapsed lumbar intervertebral disc treated by Ban Ti manipulation

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Drew on the experience of Nachemson's method, and mimicing Ban Ti manipulation, the changes of nuclear pressure of the intact fresh cadaver were measured in motion. The results of experiment indicated that there were an increasing tendency of the internuclear pressure during the process of manipulation between L<sub>3-4</sub> and L<sub>4-5</sub>, and a decreasing of the internuclear pressure between L<sub>5-S<sub>1</sub></sub>. The author realized that the Ban Di manipulation couldn't restore the prolapsed nucleus, but it could probably change the relation between the position of the prolapsed nucleus and the compressed nerve root.

**Key words** Prolapse of lumbar intervertebral disc Manipulation of bone setting Biomechanics Experimental study

(Original article on page 5)

### Experimental study on Shang Tong Yi Cha Ling in treating soft tissue injury

Jiang Meng-liang(蒋孟良)et al

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In this article, observation was made on the animal experimental muscle injury, and proved that Shang Tong Yi Cha Ling bore the effect of alleviation of the degree of muscular necrosis, decreasing the scar. And it explored the mechanism of treating trauma via semi-quantitative analysis of the pathology and plasma fibrinogen contents and pH value of the traumatic muscles.

**Key words** Shang Tong Yi Cha Ling Soft tissue injury Pharmacology Experimental study

(Original article on page 7)

### Biomechanical tests on the adjustment fixator and knee joint functional frame

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Better clinical results had been obtained with the adjustment fixator and knee joint functional frame in treating intercondylar fracture of the femur designed by

the Department of Traumatology, Tianjin Hospital. In this Paper, clinical biomechanical measurements were made, the results indicated that the traction force of the external and internal supporter were 5.5kg and 6.8kg respectively, the pressure force underneath the pressing cushion was about 4.5kg. Results of the motive measurement indicated that the pressure value of all parts bore a fluctuation around 10-20%. It accorded with the theory of elastic fixation of fracture treatment.

**Key words** Fracture fixator Biomechanics Experimental study

(Original article on page 9)

**Prolapsed lumbar intervertebral disc treated with traditional Chinese medicine based on syndrome-differentiation**

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In this article, the author applied traditional Chinese medicine with syndrome-differentiation, such as Chinese medication orally as well as external application, combined with pelvic traction in treating 281 cases of prolapsed lumbar intervertebral disc. The results were cured, 96 cases; markedly effective, 178 cases; ineffective, 7 cases; with a total effective rate of 97.4%.

**Key words** Prolapse of lumbar intervertebral disc traditional Chinese medicinal therapy treated by syndrome-differentiation

(Original article on page 11)

**Protrusion of lumbar intervertebral disc and tumor of cauda equina**

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There are plenty of similarities among clinical manifestations between tumor of cauda equina and protrusion of lumbar intervertebral disc, so they are easily to be mixed. Through clinical analysis of 17 cases of surgical proved tumor of cauda equina, the author realizes that the ailment has an evident characteristics of waist and leg pain, negative in Laseque's sign, tenderness over the paravertebral space, less than half of them with parasthesia around the saddle area. positive CSF protein content qualitatively, elevation of the protein content quantitatively, a large cup-like defect in the myelography, early X-ray film showed flattening of the pedicle of vertebral arch, rarely there is broadening between the distance within these pedicles. CT scanning and MRI examination can't be relied on. Early operation is recommended.

**Key words** Tumor of cauda equina Protrusion of lumbar intervertebral disc Differential diagnosis Operative therapy

(Original article on page 28)