

· 临床研究 ·

经皮椎间孔镜在治疗中老年腰椎间盘突出症中的应用

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【摘要】 目的 评价应用经皮椎间孔镜(PTED)治疗中老年腰椎间盘突出症的临床效果和价值。**方法** 前瞻性研究分析2016年3月至2018年9月空军特色医学中心骨科采用PTED切除突出椎间盘髓核减压治疗的50~72岁腰椎间盘突出症患者,共50例,并以同期常规开放椎板开窗或半椎板切除减压突出椎间盘髓核切除手术的50~71岁患者50例为对照组。比较2组患者术中出血量、手术时间、术后住院时间。以术后1d、1个月、3个月疼痛视觉模拟评分(VAS)和术后3个月Oswestry功能障碍指数(ODI),及术后6个月改良MacNab标准评定手术疗效。手术前及术后3~6个月行MRI检查,观察手术前后椎管及椎间盘突出度的变化。使用STATA 12.0统计软件进行统计分析。**结果** 2组患者年龄、术前VAS和ODI评分差异无统计学意义($P>0.05$),术后VAS和ODI评分较术前均显著下降($P<0.01$);PTED组术后1d、1个月的VAS评分显著低于对照组($P<0.01$)。术后3个月,2组VAS和ODI评分差异无统计学意义($P>0.05$);术后6个月,2组改良MacNab标准评定功能差异无统计学意义($P>0.05$);PTED组术中出血量、术后住院时间显著少于对照组($P<0.01$);2组手术时间无统计学差异($P>0.05$)。MRI检查结果显示,与术前比较,2组术后3~6个月椎间盘突出均消失或明显减小,椎管通畅、面积明显增大。**结论** PTED技术治疗中老年腰椎间盘突出症,中期疗效与单纯开放手术相当,但PTED早期疗效好、损伤小、恢复快、并发症少。

【关键词】 中年人;老年人;腰椎间盘突出症;外科;经皮椎间孔镜

【中图分类号】 R687.3 **【文献标志码】** A **【DOI】** 10.11915/j.issn.1671-5403.2020.10.168

Percutaneous transforaminal endoscopic discectomy in treatment of lumbar disc herniation for middle-aged and elderly patients

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【Abstract】 Objective To evaluate the clinical efficacy and value of percutaneous transforaminal endoscopic discectomy (PTED) in the treatment of lumbar disc herniation in middle-aged and elderly patients. **Methods** A prospective study was performed to analyze 50 patients (50 to 72 years old) with lumbar disc herniation undergoing PTED resection of the nucleus pulposus of the intervertebral disc in our department from March 2016 to September 2018. Another 50 patients aged 50–71 years who underwent fenestration or semi-laminar resection and decompression of the disc nucleus pulposus during the same period were recruited and served as control group. The intraoperative blood loss volume, operation time, postoperative length of hospital stay, pain visual analogue scale (VAS) scores at 1 day, 1 and 3 months postoperatively, and Oswestry dysfunction index (ODI) at 3 months postoperatively, and results of modified MacNab criteria at 6 months postoperatively were used to assess the efficacy of surgery. MRI was performed in 3–6 months after operation to observe the changes of the spinal canal and intervertebral disc protrusion before and after operation. STATA statistics 12.0 was used to perform the statistical analysis. **Results** No significant difference was seen in age and VAS and ODI scores before operation between the two groups ($P>0.05$), but the postoperative VAS and ODI scores were significantly decreased than those before surgery ($P<0.01$). The VAS scores in 1 day and 1 month were significantly lower in the PTED group than the control group ($P<0.01$), but no such difference was observed in the scores at 3 months postoperatively ($P>0.05$). The results of modified MacNab criteria at 6 months after surgery indicated that there was no significant difference in the function between the two groups ($P>0.05$). The PTED group had less intraoperative blood loss and shorter postoperative length of hospital stay than the control group ($P<0.01$), and no difference in operation time ($P>0.05$). As shown by MRI, compared with preoperative conditions, the herniation of intervertebral disc

收稿日期:2019-12-09; 接受日期: 2020-02-02
基金项目: 军队十二五课题(CKJ-12J024);军队十三五重大课题(AKJ15J003)
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disappeared or decreased obviously, and the spinal canal was unobstructed and the area was increased obviously in 3–6 months after operation. **Conclusion** PTED technique can obtain similar mid-term outcomes as open surgery in the treatment of intervertebral disc herniation in middle-aged and elderly patients. PTED has good short-term effect, less damage, quick recovery and less complications.

[Key words] middle-aged; aged; lumbar disc herniation; surgery; percutaneous transforaminal endoscopic discectomy

This work was supported by the “12th Five-Year’s Plan” of PLA (CKJ-12J024) and the Major Project of the “13th Five-Year’s Plan” of PLA (AKJ15J003).

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随着我国人口老龄化加剧,中老年腰椎退变如腰椎间盘突出症(lumbar disc herniation, LDH)发病率呈上升趋势,已成为老年人腰腿痛、影响日常生活的常见原因。传统开放式单纯椎板切除或开窗切除突出腰椎间盘突出手术(简称开放手术),是治疗腰椎间盘突出症的金标准,但有创伤大、破坏脊柱结构、血栓等并发症而使治疗效果欠佳^[1]。近几年,随着经皮椎间孔镜(percutaneous transforaminal endoscopic discectomy, PTED)下治疗腰椎间盘突出技术的发展和应

用,使腰椎手术治疗趋于微创化,临床报道逐渐增多^[1-6],也逐渐出现 PTED 在中老年中的应用报道^[3,7,8],但对其疗效也存在争议。本研究中采用前瞻性随机对照研究,评估我院 2016 年 3 月至 2018 年 9 月采用 PTED 治疗的 50~71 岁 LDH 患者 50 例,并将同期 50~72 岁接受常规开放手术的 50 例 LDH 患者作为对照,对其疗效进行分析,旨在探讨 PTED 在老年 LDH 患者中的临床应用价值,现报道如下。

1 对象与方法

1.1 研究对象

100 例患者,男 56 例,女 44 例,年龄 50~72 岁,病程 0.5~12.0 年、平均 3.3 年,合并心脏病 20 例(20%)、高血压 15 例(15%)、糖尿病 22 例(22%)、肺部疾病 6 例(6%)、肾功能异常 5 例(5%)、肾囊肿 5 例(5%)。所有内科疾病均在术前治疗调整为正常,或不影响手术。所有患者均确诊为 LDH,部分有继发腰椎管狭窄,突出部位为腰椎下三个间隙中的一个。参照 MRI、CT 等影像结果,若是单间隙,直接行手术;若是两个间隙以上,术前行选择性神经根阻滞术或诱发实验,确定责任椎间隙。100 例按入院顺序编号,采用随机数表随机分为 2 组:PTED 组和对照组,每组 50 例。2 组一般资料比较差异无统计学意义($P>0.05$;表 1),具有可比性。

纳入标准:(1)患者有典型的腰腿麻疼或神经根症状;(2)均经 CT 及 MRI 等影像学证实有相应阶段椎间盘突出,压迫硬膜囊或神经根;(3)且椎间盘

突出狭窄阶段控制 1 节以内,若有两节,以一节为主;(4)影响日常生活,系统保守治疗 3~6 个月效果不佳;(5)病例资料完整,且患者签署知情同意书。

排除标准:(1)影像学提示侧隐窝骨性狭窄、腰椎不稳,腰椎大于 II 度滑脱,或存在多节段;(2)严重骨性椎管狭窄;(3)合并严重心肺疾病,术前无法短期调整至正常,有精神疾病或有焦虑恐惧等心理问题不能耐受局部麻醉;(4)有腰部手术、感染、肿瘤等疾患史。

表 1 2 组患者基线情况比较

Table 1 Comparison of baseline data between two groups (n = 50)

Item	PTED group	Control group	P value
Age (years, $\bar{x} \pm s$)	61.6 $\pm$ 5.6	60.9 $\pm$ 5.8	0.6335
Gender (male/female, n)	27/23	26/24	0.8496
VAS before operation (points, $\bar{x} \pm s$)	7.7 $\pm$ 1.2	7.6 $\pm$ 1.2	0.9675

PTED: percutaneous transforaminal endoscopic discectomy; VAS: visual analogue scale.

1.2 手术方法及围手术处理

1.2.1 PTED 手术过程 采用脊柱椎间孔镜手术系统(德国 Jiomax 公司),患者取俯卧位,选择临床症状较为严重的一侧为椎间孔镜入路(图 1A)。以左侧 L4-5 入路手术为例,G 臂机下定位椎间隙,取 L4-5 椎间隙左侧距后正中中线约 9~11 cm 处为穿刺点。术区常规消毒、铺巾,1%利多卡因浸润麻醉穿刺点皮肤、皮下、神经根周围及黄韧带、椎间盘纤维环。G 臂机显示穿刺针在位良好后,经穿刺针置入导丝,逐级扩张管扩张,置入工作通道(图 1B,C),经工作通道置入椎间孔镜,见左侧椎间盘有突出髓核,可用髓核钳去除髓核(图 1D),钙化髓核可用镜下环锯、镜下磨钻及髓核钳清除,解除出口神经根及左侧下行神经根的压迫;撤出套筒及镜后,可见神经根及硬膜囊恢复搏动,头尾端没有顶压物,至此方减压完毕。必要时可去除后纵韧带及对侧突出椎间盘,清除髓核约 2~6 ml。

卧床休息 6~24 h 后可佩戴腰围或支具下地行走活动,同时加静滴广谱抗生素 1 次。建议患者术

后第1个月,多卧硬板床,3周后逐渐加强腰背肌锻炼。

1.2.2 常规开放手术 X线透视定位后,全麻下剥离椎旁肌肉,行椎板开窗或半椎板切除减压、暴露、寻找并牵开神经根及硬膜囊,显露切除突出椎间盘髓核,完成手术。若有双侧突出,可行双侧椎板开窗减压。术后拔出引流管后或3d后下地活动,余同PTED。

所有手术均由副主任以上医师完成,均熟练掌握脊柱腰椎手术5年以上。

1.3 评价指标

记录患者的手术时间、术中出血量和术后住院时间,通过来院复查或电话方式进行随访,记录术前及术后1d、1个月、3个月的疼痛视觉模拟评分(visual analogue scale, VAS), Oswestry 功能障碍指数(Oswestry disability index, ODI),评价患者的功能改善情况。基于改良MacNab标准评定术后6个月患者的功能改善情况及临床疗效。MRI评估术前、术后3~6个月患者椎管减压程度。

1.4 统计学处理

使用STATA 12.0统计软件进行统计分析。计量资料用均数±标准差($\bar{x} \pm s$)表示,组内或组间比较采用单因素方差分析;计数资料用例数(百分率)表示,非参数等级资料采用秩和(Z)检验。 $P < 0.05$ 为差异有统计学意义。

2 结果

2.1 手术情况

2组手术平均时间相近;PTED组中,单一节段腰椎术中出血2~20ml,显著少于对照组($P < 0.001$),无输血;术中可见神经根完全减压,伤口微小(见图1E, F, G);术后平均住院时间显著少于对照组($P < 0.001$);主要并发症为神经根瞬间感觉异

常,3d后恢复,1例椎管骨性狭窄术后疼痛不见好转,后二期开放融合治愈;1例术后1周复发突出,由于症状不重,保守治疗后逐渐缓解;无硬脊膜撕裂、感染等并发症。对照组主要并发症为硬脊膜撕裂、神经根损伤各1例,后期恢复;感染1例后期行清创缝合术后愈合。详见表2。

2.2 脊髓功能改善情况

两种术式术后1d、1个月及3个月的VAS和术后3个月的ODI较术前均改善,差异均有统计学意义($P < 0.05$)。PTED术后1dVAS评分显著优于对照组($P < 0.001$),术后1个月也优于对照组($P = 0.001$)。术后3个月VAS评分及ODI评分与对照组基本相同。术后6个月MacNab疗效评定结果显示,PTED组中优32例、良10例、可6例、差2例,优良率为84.0%,与对照组功能恢复相近,无统计学差异($P > 0.05$)。详见表2。

2.3 腰椎MRI

与术前比较,术后3~6个月MRI的椎间盘突出消失或明显减小,椎管通畅、面积明显增大(见图1I, J)。

3 讨论

LDH是目前中老年人患病率最高的骨科疾病,发病率越来越高,目前手术治疗方法有微创和传统开放治疗。传统开放椎板开窗或半椎板切除手术是“金标准”,采用后方入路,剥离肌肉组织,咬除椎板和黄韧带,牵拉神经和硬膜囊,显露突出椎间盘,切除突出髓核等组织,创伤较大,出血多,不仅破坏脊柱后路骨性稳定结构,而且破坏腰椎周围肌肉软组织,骚扰神经根及硬膜囊,后期恢复时间长,并不适用于年老体弱、合并多种基础病的老年患者,且术后并发症多,如术后粘连、神经根损伤、脑脊液漏、伤口感染或不愈合、便秘、肺炎、脑梗死等^[1]。

表2 2组患者术前、术中及术后治疗结果比较
Table 2 Comparison of treatment effect of pre-OP and after-OP between two groups (n=50, $\bar{x} \pm s$)

Item	PTED group	Control group	F/Z	P value
Bleeding(ml, $\bar{x} \pm s$)	8.8±5.4	87.8±55.1	50.22	0.000 1
Hospital-stay duration after operation (d, $\bar{x} \pm s$)	2.9±1.7	5.7±1.8	29.95	0.000 1
Operation time(min, $\bar{x} \pm s$)	60.9±17.8	62.8±17.4	0.36	0.6988
VAS(points, $\bar{x} \pm s$)				
before operation	7.7±1.2	7.6±1.2	0.03	0.967 5
1 day after operation	2.7±1.9	4.9±1.5	21.24	0.000 1
1 month after operation	2.0±1.3	2.9±1.2	7.13	0.001 0
3 months after operation	1.3±1.2	1.7±1.2	1.26	0.286 9
ODI(points, $\bar{x} \pm s$)				
before operation	34.6±5.9	34.4±5.2	0.11	0.894 2
3 months after operation	8.0±5.4	8.1±5.6	0.02	0.984 0
MacNab E&G at 6 months after operation[n(%)]	42(84.0)	44(88.0)	0.23	0.7972

VAS: visual analogue scale; ODI: Oswestry disability index; E&G: excellence and good.

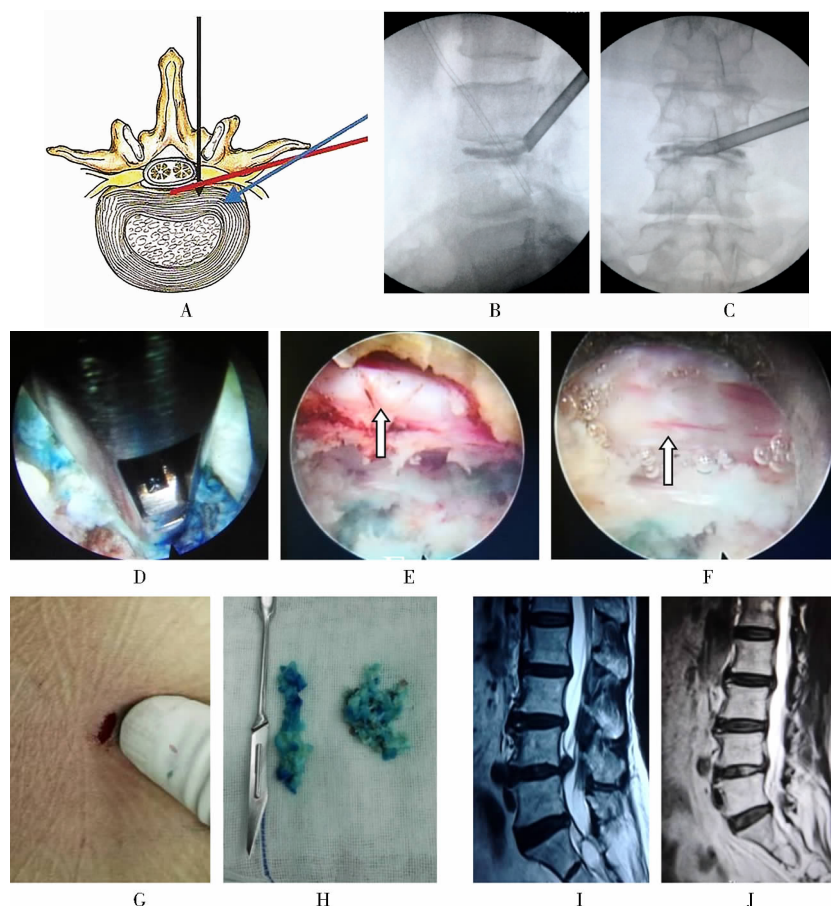


图 1 PTED 术中操作及手术前后腰椎 MRI

Figure 1 Surgical procedure and lumbar MRI before and after PTED

(A) schematic surgical approach; (B,C) intraoperative X perspective positioning film; (D, E, F) intraoperative microscopic operation; (E) ipsilateral descending nerve root (arrow); (F) contralateral descending nerve root (arrow); (G) size of postoperative wound; (H) removed nucleus pulposus of the intervertebral disc; (I) preoperatively L4-5 intervertebral disc was herniated; (J) postoperatively, visible L4-5 protrusions were taken out. PTED: percutaneous transforaminal endoscopic discectomy.

Yeung 等^[5]和 Hoogland 等^[6]发明了 PETD 技术治疗 LDH。PTED 技术是目前治疗 LDH 创伤最小的手术方式^[1-6], 而且对于极外侧 LDH 患者更有优势^[2]。其从侧后方椎间孔即天然的骨性通道入路, 从神经根下方的 Kambin 三角安全区进入突出的椎间盘区域内, 直接切除突出的椎间盘纤维环、髓核组织或钙化髓核, 从而直接去除对神经根及硬膜囊的压迫, 完全松解减压神经根, 并且可以减压对侧神经根, 损伤小、出血少、恢复快, 是目前治疗 LDH 的发展方向^[3,4,7,9,10]。

PTED 组患者出血量非常微少 ($P < 0.001$), 术后恢复很快, 术后 4h 即可下地, 术后住院时间也显著缩短 ($P < 0.001$), 术后疼痛 VAS 评分等不适也明显减轻 ($P < 0.001$), 术后 1 个月内, 明显优于对照组; 而且术后患者没有出现 1 例伤口不愈合或感染的情况, 术后并发症极低。对照组患者术后卧床时

间显著延长; 1 例伤口感染不愈合、清创后方愈合, 1 例脑脊液漏, 2 周后逐渐好转, 1 例神经根损伤。但术后 3 个月时 2 组患者的 VAS/ODI 疼痛评分和 6 个月时 MacNab 功能恢复基本相似, 无显著差异。说明 PTED 可以减轻患者术后早期痛苦, 但中期效果与常规开放手术基本接近。本研究中 2 组手术时间差异无统计学意义; 但杨林等^[11]报道, PTED 手术时间显著少于开放手术。对于骨质疏松的患者, PTED 仍然可以适用^[7,11]。

PTED 对机体创伤小、应激少, 可能是患者恢复快的原因。其可能原理: (1) PTED 内镜手术不损伤后柱骨和肌肉, 术后腰椎前凸角、骨盆及骶骨倾斜角等生物力学能快速恢复正常^[13]; (2) 老年患者 PETD 术后分泌应激激素如脑啡肽, 胶质纤维酸性蛋白、前列腺素 E2 显著减少, 从而促进神经功能和腰部功能的恢复^[8]。而且从麻醉方式上看, 开放手术需要全身麻醉或硬膜

外麻醉,PTED 局部麻醉即可,避免了部分老年患者心肺功能不佳、不能耐受全身麻醉或硬膜外的限制,同时由于患者术中清醒,可以和其沟通交流,避免神经损伤^[3]。术后恢复时,建议患者术后第1个月多卧硬板床休息,佩戴腰围4~6周,以利于纤维环愈合,减少椎间盘突出复发,3周后逐渐加强腰背肌功能锻炼。

然而,PTED 技术虽系微创手术,但仍有局限性。PTED 手术视野较小、不能根除多发病灶,存在一定的复发率和并发症^[14,15]。本研究中 PTED 组有1例患者由于有双侧侧隐窝骨性重度狭窄,术后效果不佳,二期行开放融合手术。同时学习曲线陡峭,术中可能会损伤腰部动脉等,出现严重并发症^[15]。另外,本研究样本量有限,随访时间短,远期疗效仍有待进一步观察。

总之,PTED 治疗中老年 LDH,创伤小,恢复快,并发症少,但应掌握好手术适应证。

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(编辑: 连学飞)