

经皮内镜椎弓根锚定技术治疗高度游离型腰椎间盘突出症

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【摘要】 目的:探讨经皮脊柱内镜经椎弓根锚定技术治疗高度脱垂游离型腰椎间盘突出症的临床疗效,分析其手术技巧。方法:2016 年 5 月至 2018 年 6 月,运用经皮脊柱内镜技术经椎弓根入路治疗向下高度脱垂游离型腰椎间盘突出症患者 24 例。其中男 11 例,女 13 例;L_{2,3} 1 例,L_{3,4} 5 例,L_{4,5} 18 例;年龄 48~72(59.5±7.2)岁;病程 8~26(16.2±6.3)个月。所有患者采用局部浸润麻醉,在术前 1 d,术后 1 周及术后 3、6、12 个月运用疼痛视觉模拟评分(visual analogue scale, VAS)及 Oswestry 功能障碍指数(Oswestry Disability Index, ODI)评估患者症状改善情况,并采用改良 Macnab 评价体系评估临床疗效,对所取得的数据运用 SPSS 22.0 进行统计分析。结果:术后所有患者获得随访,时间 12~24(17.5±5.3)个月。手术时间(69.8±14.2)min,1 例出现脑脊液漏,术后平卧休息后好转,其余 23 例未出现手术并发症,术后所有患者腰腿部疼痛、下肢麻木有不同程度的好转。术前 1 d,术后 1 周及术后 3、6、12 个月腰痛 VAS 评分分别为 6.36±1.27, 3.94±1.03, 1.62±0.87, 0.44±0.27, 0.37±0.29, 术后不同时间腰痛 VAS 评分均较术前改善(P<0.05);腿痛 VAS 评分分别为 8.28±1.74, 3.16±1.24, 2.83±1.13, 0.83±0.31, 0.46±0.31, 术后不同时间腿痛 VAS 评分均较术前改善(P<0.05)。术前 1 d, 术后 1 周及术后 3、6、12 个月 ODI 分别为 (48.79±9.83)%, (36.51±11.24)%, (21.05±6.35)%, (9.83±4.62)%, (7.24±4.72)%, 术后不同时间 ODI 评分均较术前改善(P<0.05)。术后 1 年随访时采用改良 Macnab 评价体系评价患者的临床疗效,优 19 例,良 3 例,中 2 例,差 0 例。结论:经皮脊柱内镜经椎弓根锚定技术治疗向下高度脱垂游离型腰椎间盘突出症可有效改善患者的临床症状,并且具有创伤小、出血少、恢复快、髓核摘除完全、患者痛苦小等优点,其临床疗效确切,可操作性较强,值得推广使用。

【关键词】 腰椎; 椎间盘移位; 脊柱内镜手术; 微创外科手术

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Transforaminal percutaneous endoscopic lumbar discectomy combined with anchorage technique of pedicle for the treatment of high prolapse free lumbar disc herniation WANG Xiang-fu, YE Bing-lin, SUN Feng-qi, and CHEN Wei-guo. Gansu Provincial Hospital of Traditional Chinese Medicine, Lanzhou 730050, Gansu, China

ABSTRACT Objective:To investigate the clinical effects of percutaneous spinal endoscopy (percutaneous endoscopy) in the treatment of high prolapse free lumbar disc herniation. **Methods:**From May 2016 to June 2018, 24 patients with highly prolapse free lumbar disc herniation were enrolled in this study, including 11 males and 13 females, ranging in age from 48 to 72 years old, with an average of (59.5±7.2) years old. There were 1 case of L_{2,3}, 5 cases of L_{3,4}, 18 cases of L_{4,5}. The course of disease ranged from 8 to 26 months, with an average of (16.2±6.3) months. All the patients were subjected to local infiltration anesthesia. The clinical outcomes were evaluated by visual analog scale (VAS) for leg pain, low back pain and Oswestry Disability Index (ODI) at preoperative, first day after operation and 6 month after surgery. All data were statisticed by SPSS 22.0. **Results:**All the patients were followed up, and the duration ranged from 12 to 24 months, with a mean of (17.5±5.3) months. The average operation time was (69.8±14.2) minutes. One patient had cerebrospinal fluid leakage, which improved after supine rest. VAS scores of lower back pain were 6.36±1.27, 3.94±1.03, 1.62±0.87, 0.44±0.27, 0.37±0.29. VAS scores of leg pain were 8.28±1.74, 3.16±1.24, 2.83±1.13, 0.83±0.31, 0.46±0.31, and the differences were statistically significant (P<0.05). The ODI were (48.79±9.83)%, (36.51±11.24)%, (21.05±6.35)%, (9.83±4.62)% and (7.24±4.72)% 1 day before and 1 weeks, 3 months, 6 months and 1 year after the operation, respectively. One year after the operation, the modified Macnab evaluation system was used to evaluate the clinical efficacy of the patients, 19 patients got an excellent result, 3 good, 2 fair and 0 poor.

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Conclusion: Percutaneous endoscopic pedicle anchoring technique for the treatment of high prolapse free lumbar disc herniation can effectively improve the clinical symptoms of patients, and has the advantages of less trauma, less bleeding, rapid recovery, complete removal of the nucleus pulposus, and less pain of patients, etc., its clinical efficacy is accurate, operability is strong, it is worth promoting in the clinical use.

KEYWORDS Lumbar vertebrae; Intervertebral disc displacement; Spinal endoscopic surgery; Minimal surgical procedures

随着微创理念的发展,对于腰椎间盘突出症(lumbar disc herniation, LDH)的患者,临床上大都采用经皮脊柱内镜技术代替开放手术治疗,目前经皮脊柱内镜技术主要包括椎间孔镜入路及椎板间入路^[1-3]。但是对于向下高度脱垂游离型腰椎间盘突出症的患者,由于髓核游离到椎管中,偏离椎间隙较远,常规的手术入路常常无法彻底摘除游离的髓核组织,并且容易造成神经根、硬膜囊的损伤^[4-5]。经椎弓根锚定技术采用靶向治疗的方式,通过克氏针从椎弓根进行锚定,将工作套筒放至髓核游离的部位,进行靶点治疗,避免神经根的牵拉,摘除向下高度脱垂游离的髓核组织。2016年5月至2018年6月,共收治24例向下高度脱垂游离型腰椎间盘突出症的患者,均采用经皮脊柱内镜经椎弓根锚定技术治疗,取得了良好的临床疗效,现报告如下。

1 资料与方法

1.1 纳入标准

(1)单节段腰椎间盘突出症,临床表现为单侧神经根症状。(2)CT、MRI提示突出的髓核组织向下高度脱垂游离到椎管中,并处于上位椎弓根下缘1/2或下位椎弓根上缘1/2。(3)临床表现及影像学检查相一致。(4)生命体征平稳,能够耐受经皮脊柱内镜治疗者。(5)经严格保守治疗6周无效者。(6)自愿接受经皮椎弓根锚定技术治疗,并签订“知情同意书”。

1.2 排除标准

(1)存在腰椎滑脱、腰椎管狭窄者。(2)节段性不稳定。(3)椎弓根骨性结构异常。(4)L₅S₁椎间盘突出者。(5)合并有严重内科疾病、神经病变、骨肿瘤等其它病史者。(6)不能按规定接受治疗者。

1.3 一般资料

共纳入符合标准患者24例,男11例,女13例;L_{2,3}1例,L_{3,4}5例,L_{4,5}18例;年龄48~72(59.5±7.2)岁;病程8~26(16.2±6.3)个月。

1.4 治疗方法

患者均采用局部浸润麻醉,取俯卧位。C形臂X线机下透视定位病变节段并体表标记,棘突间隙旁开10~13 cm体表标记为穿刺点。术区常规消毒,铺无菌巾单。0.5%利多卡因1 ml穿刺点局部麻醉,根据髓核突出游离的位置,选用2.0克氏针经穿刺点向病变节段椎间孔方向穿刺,透视见穿刺针前段位

于游离髓核平面(图1a,1b)。位置准确后,将克氏针钉入以固定,行关节突及深筋膜处行局部浸润麻醉。穿刺点处切开皮肤约0.7 cm。沿克氏针旋入逐级软组织扩张套管、工作通道,行关节突3级环锯成形,最大环锯直径为6 mm,取出软组织套管,置入工作套筒,经椎弓根进入椎管(图1c)。台下调试影像系统至图像清晰。经工作通道置入内镜,持续生理盐水冲洗,术野镜下双极电凝止血。经骨性隧道镜下摘除游离髓核,探查神经根波动良好(图1d),松解理想。与患者交流,双下肢无明显不适。镜下观察无活动性出血,退出内镜,1 ml甲强龙神经根周围注射,退出工作通道,切口内罗哌卡因2 ml局部浸润麻醉。缝合,无菌辅料包扎。

术后给予抗炎止痛及营养神经等对症治疗,术后第2天佩戴腰围下地活动,6周后开始腰背肌功能锻炼。

1.5 观察项目与方法

对所有患者术前、术后1周、术后3个月、术后6个月及术后1年腰腿痛视觉模拟评分(visual analogue scale, VAS)^[6]及Oswestry功能障碍指数(Oswestry Disability Index, ODI)^[7]进行记录,末次随访采用Macnab评价体系评估临床疗效^[8]:优,腰腿痛症状及体征完全消失,活动不受限,恢复的正常工作及生活;良,腰腿痛症状轻微或偶有发作,不影响正常工作及生活;中,腰腿痛症状有所缓解但仍有间歇性疼痛发作,需改变工作及生活方式;差,疼痛及功能均无明显改善,需二次手术或其他治疗。

1.6 统计学处理

采用SPSS 22.0统计软件(美国,IBM公司)进行统计分析,不同时间点腰痛VAS评分、腿痛VAS评分及ODI的比较采用重复测量数据的方差分析,检验水准 $\alpha=0.05$,以 $P<0.05$ 为差异有统计学意义。

2 结果

术后所有患者获得随访,时间12~24(17.5±5.3)个月。24例患者手术时间(69.8±14.2) min,术后复查腰椎MRI及CT,术后MRI及CT提示突出髓核彻底摘除(图1)。

2.1 手术前后腰腿痛VAS及ODI比较

手术前后腰痛、腿痛VAS评分见表1,术后不同时间腰痛VAS评分、腿痛VAS评分均较与术前改

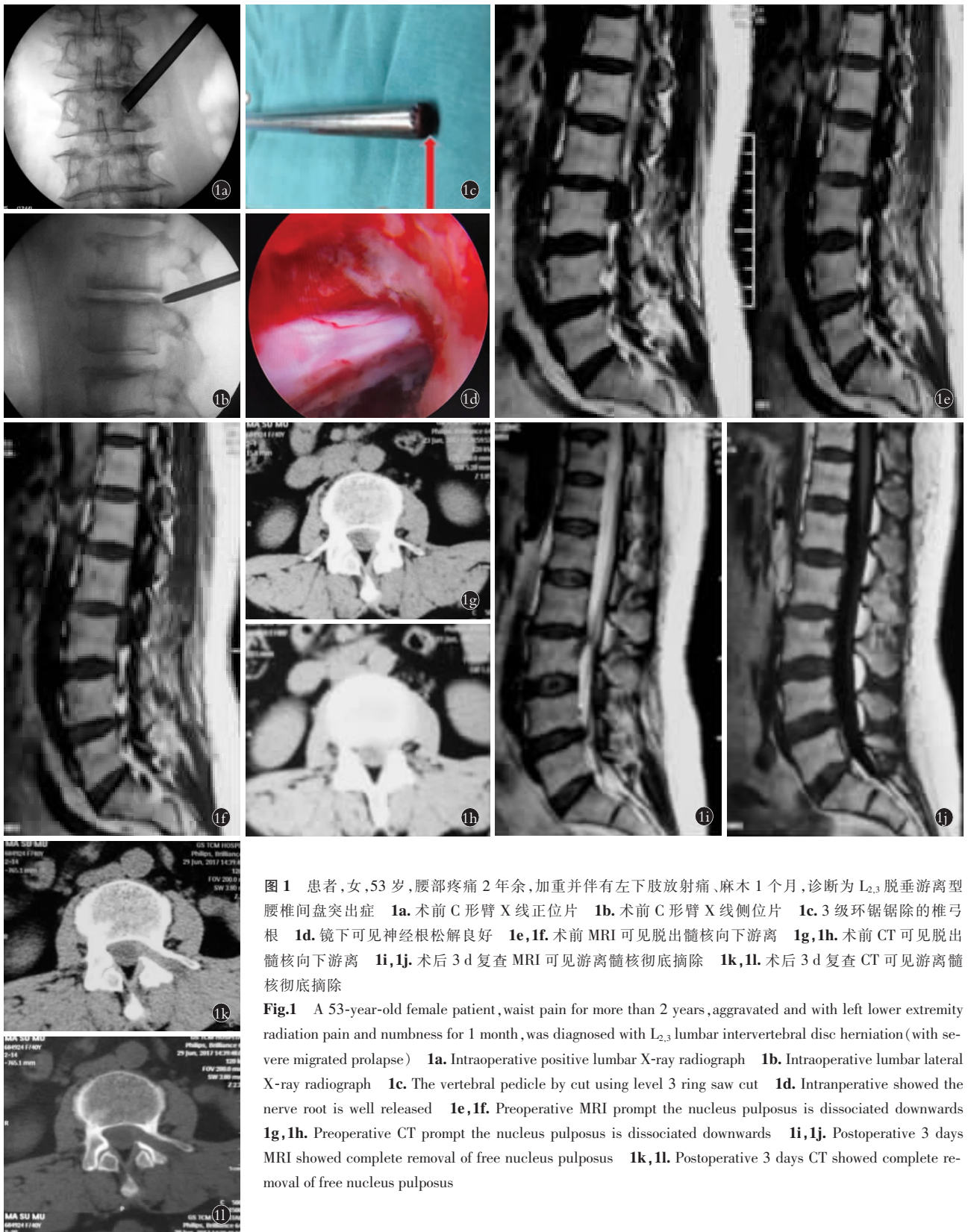


图 1 患者,女,53 岁,腰部疼痛 2 年余,加重并伴有左下肢放射痛、麻木 1 个月,诊断为 L_{2,3} 脱垂游离型腰椎间盘突出症 **1a**. 术前 C 形臂 X 线正位片 **1b**. 术前 C 形臂 X 线侧位片 **1c**. 3 级环锯锯除的椎弓根 **1d**. 镜下可见神经根松懈良好 **1e,1f**. 术前 MRI 可见脱出髓核向下游离 **1g,1h**. 术前 CT 可见脱出髓核向下游离 **1i,1j**. 术后 3 d 复查 MRI 可见游离髓核彻底摘除 **1k,1l**. 术后 3 d 复查 CT 可见游离髓核彻底摘除

Fig.1 A 53-year-old female patient,waist pain for more than 2 years,aggravated and with left lower extremity radiation pain and numbness for 1 month,was diagnosed with L_{2,3} lumbar intervertebral disc herniation (with severe migrated prolapse) **1a**. Intraoperative positive lumbar X-ray radiograph **1b**. Intraoperative lumbar lateral X-ray radiograph **1c**. The vertebral pedicle by cut using level 3 ring saw cut **1d**. Intranoperative showed the nerve root is well released **1e,1f**. Preoperative MRI prompt the nucleus pulposus is dissociated downwards **1g,1h**. Preoperative CT prompt the nucleus pulposus is dissociated downwards **1i,1j**. Postoperative 3 days MRI showed complete removal of free nucleus pulposus **1k,1l**. Postoperative 3 days CT showed complete removal of free nucleus pulposus

善,术后不同时间 ODI 均较术前减小。

2.2 Macnab 评价临床疗效

末次随访时采用改良 Macnab 评价临床疗效,其中优 19 例,良 3 例,中 2 例,差 0 例。

2.3 术后并发症

术后无感染、瘫痪等并发症,1 例出现脑脊液漏,术后平卧休息后好转,其余 23 例未出现手术并发症,术后所有患者腰腿部疼痛、下肢麻木均有不同

表 1 高度脱垂游离型腰椎间盘突出症患者 24 例手术前后腰腿痛 VAS 评分及 ODI 指数比较 ($\bar{x} \pm s$)

Tab.1 Results of VAS scores and ODI of lumbar and leg before and after operation of 24 patients with high prolapse free lumbar disc herniation ($\bar{x} \pm s$)

时间	腰痛 VAS(分)	腿痛 VAS(分)	ODI(%)
术前	6.36±1.27	8.28±1.74	48.79±9.83
术后 1 周	3.94±1.03	3.16±1.24	36.51±11.24
术后 3 个月	1.62±0.87	2.83±1.13	21.05±6.35
术后 6 个月	0.44±0.27	0.83±0.31	9.83±4.62
术后 1 年	0.37±0.29	0.46±0.31	7.24±4.72
F 值	257.239	338.120	230.365
P 值	<0.05	<0.05	<0.05

程度的好转。

3 讨论

脱垂游离型腰椎间盘突出在临床中较为常见,占椎间盘突出 35%~72%,重度游离脱垂为 13%~25%,其向下游离较向上游离多见^[9-10]。对于该类患者的手术治疗目前多推荐传统开放手术方式,由于开放手术过程中需要剥离椎旁肌,切除椎板和关节突,从而导致脊柱运动节段失稳和术后顽固性腰痛。经皮脊柱内镜技术由于其具有和传统开放手术相同的临床疗效,并具有并发症少等特点,目前被认为是传统手术方式的替代技术,随着器械和技术不断发展,其可从最初的间接减压到镜下直接摘除突出或脱出的椎间盘碎片^[11-12]。该技术当前的主流入路为椎间孔入路和椎板间入路,对于软性腰椎间盘突出症具有明显的优势^[13-14]。但是对于高度脱垂游离型腰椎间盘突出症患者,使用传统入路进行髓核摘除时需要切除部分椎弓根和上关节突^[15]。因此,关节突磨损以及碎片摘除不彻底等风险变得不可避免,进而导致节段性不稳定,部分患者后续需要再次行开放手术进行翻修治疗^[16-17]。由于该技术在治疗向下高度脱垂游离型腰椎间盘突出症患者的疗效欠佳,目前对该类患者推荐使用开放手术方式治疗。当前认为,视野的局限性、暴力不充分以及镜下椎间盘碎片的抓取困难是导致传统经皮内窥镜下腰椎髓核摘除技术(percutaneous endoscopic lumbar discectomy, PELD) 治疗高度脱垂游离型腰椎间盘突出症的主要原因^[18]。

随着技术和器械的不断进步,使得 PELD 治疗向下高度脱垂游离型腰椎间盘突出症成为可能。Wu 等^[19]使用双工作通道治疗 2 例脱垂游离型腰椎间盘突出症患者,取得满意疗效,2 例术后 VAS 评分均得到明显改善,但是该技术为个案报道,其临床

应用需要进一步明确。另外,该技术增加手术时间及放射量,且到达椎弓根中部时管道无法摆动,容易残留部分髓核。Ahn 等^[20]将椎间孔镜技术和导航技术相结合治疗该类患者,随访 6 周后,其 VAS 评分和 ODI 评分较术前明显改善,其 Macnab 评价手术疗效,优良率为 84.6%,症状缓解率为 92.3%。但是该研究随访时间较短,对于基层医院以及无导航设备的医疗单位,该技术的使用及推广受到一定的限制。Ying 等^[21]使用经椎弓根上缘入路治疗向下游离的腰椎间盘突出症患者,随访末期其 VAS 及 ODI 评分均明显改善,但是在该研究中,术后部分患者存在相关并发症,尤其是碎片的摘除不彻底,需再次行开放手术,并且成熟掌握该技术需要较长的学习曲线。另外有学者使用椎板间入路治疗脱垂游离型腰椎间盘突出症^[22],但是经椎板间入路治疗重度游离脱垂型椎间盘突出可取得不错的疗效,但在黄韧带咬除后无黄韧带保护时该入路对硬膜损伤风险大,容易出现脑脊液漏。在该研究中,笔者使用经皮椎间孔镜下椎弓根锚定技术治疗高度脱垂游离型腰椎间盘突出症患者,即在影像学技术精准定位的基础上,首先用克氏针从椎弓根进行锚定,沿克氏针旋入逐级软组织扩张套管、3 级环锯,行关节突 3 级环锯成形,成形完成后置入工作通道,取出软组织套管,经椎弓根将工作套筒放至髓核游离的部位,进行靶点治疗,避免神经根的牵拉,摘除向下高度脱垂游离的髓核组织。观察其术后 1 周、3、6 个月及 1 年的腰腿痛 VAS 评分、ODI 评分较术前均得到明显改善,临床疗效满意,术后复查腰椎 MRI 可见椎间盘碎片彻底摘除,术后 1 年随访时采用改良 Macnab 评价体系评价患者的临床疗效,疗效满意。

在该技术中,笔者使用椎间孔镜下椎弓根锚定技术治疗向下高度脱垂游离型腰椎间盘突出症患者,取得满意疗效。该技术改变常规穿刺途径及管道位置,经椎弓根入路有利于椎管内操作,将穿刺点下移至椎弓根,减少神经的损伤,并且更接近靶点,有利于彻底清除脱出的髓核;同时,穿刺点固定,不会因体位改变而穿刺点位移,减少术中医患射线暴露次数,靶点止于椎弓根,穿刺点下移,可避开近端出口根,减少术后感觉异常等并发症;术后影像学显示经椎弓根锚定技术主要切除松质骨,后期有自愈功能,不会影响椎间稳定性,并且其采用精准穿刺技术,对患者骨质破坏更少,笔者将会在长期的随访中进一步对骨质情况。在该技术操作过程中,由于脱垂型髓核大部分位于下位椎弓根周围,通道应最大限度接近靶点游离髓核,对于年龄较大患者,由于骨质较疏松,采用该技术可用环锯凿穿骨质;若为年轻患

者, 须使用镜下动力刨削系统。笔者的研究结果表明, 经皮椎间孔镜下椎弓根锚定技术治疗向下高度脱垂游离型腰椎间盘突出症患者可取得满意的临床疗效, 镜下可彻底摘除游离的椎间盘碎片, 并且并发症少。其近期临床疗效显著, 远期临床疗效有待于进一步随访观察。

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