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单侧双通道内镜治疗青年多节段腰椎间盘突出伴椎管狭窄症1例及文献综述

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摘　要

腰椎间盘突出症(Lumbar Disc Herniation, LDH)主要临床症状为腰腿痛，是腰椎间盘退变后，纤维环破裂，窦椎神经和神经根受到突出髓核的刺激或压迫而引起的一种综合征。目前，多节段LDH多见于中老年人群，年轻患者中较为少见。对于多节段发病患者保守治疗疗效欠佳，而手术以多节段融合或内镜处理单一责任节段为主，内镜治疗多节段较为少见。单侧双通道脊柱内镜技术(Unilateral Biportal Endoscopic technology, UBE)是利用关节镜系统来进行治疗，具有术野清晰、操作灵活、减压充分等特点，在内窥镜手术治疗多节段腰椎间盘突出症中有独特优势。本文报道1例就诊于湖北省中医院并接受UBE微创治疗3个节段巨大腰椎间盘突出伴腰椎管狭窄、椎间盘钙化的年轻患者临床资料，并对相关文献进行综述。

关键词

单侧双通道内镜，腰椎间盘突出症，腰椎管狭窄症，微创脊柱手术

Unilateral Biportal Endoscopic Treatment of Multisegmental Lumbar Disc Herniation with Spinal Stenosis in a Young: A Case Report and Literature Review

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Abstract

Lumbar Disc Herniation (LDH), the main clinical symptom of which is low back pain, is a syndrome caused by degeneration of the lumbar disc, rupture of the annulus fibrosus, and irritation or compression of the sinus nerve and nerve roots by the protruding nucleus pulposus. At present, multisegmental LDH is mostly seen in the middle-aged and elderly population, and is less common in younger patients. Conservative treatment for patients with multisegmental onset is ineffective, while surgery is dominated by multisegmental fusion or endoscopic management of a single responsible segment, and endoscopic treatment of multisegmental is less common. Unilateral Biportal Endoscopic technology (UBE) is the use of arthroscopic system to carry out treatment, with a clear field of operation, flexible operation, decompression is sufficient and other characteristics, endoscopic surgery in the endoscopic treatment of multisegmental lumbar disc herniation has a unique advantage. In this paper, we report the clinical data of a young patient who visited Hubei Provincial Hospital of Traditional Chinese Medicine and underwent minimally invasive UBE for the treatment of 3-segment giant lumbar disc herniation with lumbar spinal stenosis and disc calcification, and provide a review of the relevant literature.

Keywords

Unilateral Biportal Endoscopic, Lumbar Disc Herniation, Lumbar Spinal Stenosis, Minimally Invasive Spine Surgery

1. 引言

腰椎间盘突出症(Lumbar Disc Herniation, LDH)主要临床症状为腰腿痛，是腰椎间盘退变后，纤维环破裂，窦椎神经和神经根受到突出髓核的刺激或压迫而引起的一种综合征[1]。目前，多节段 LDH 多见于中老年人群，年轻患者中较为少见[2]。对于多节段发病患者保守治疗疗效欠佳，而手术以多节段融合[3]或内镜处理单一责任节段[4] [5]为主，内镜治疗多节段较为少见。单侧双通道脊柱内镜技术(Unilateral Biportal Endoscopic technology, UBE)是一种用于治疗脊柱疾病的新型内窥镜手术，其方法类似于关节镜手术和视频辅助胸腔镜手术，拥有 2 个不同的通道。在 UBE 中，在同一侧创建两个通道：一个用于光学仪器和灌溉系统，另一个用于进行减压或椎间盘切除术的手术器械。工作门路仅用于手术器械，因此，仪器的搬运和移动不受限制，方便快捷；此外，标准脊柱器械可以通过工作门户插入和使用，给予了手术医师十分的自由灵活性[6]。UBE 具有单独的观察通道，可提供宽阔的可视角度，放大数倍的手术区域允许安全和充分的减压[7]。在程序和解剖学上与传统手术过程相似[8]。经验丰富的外科医生可以将他们对经典脊柱解剖学的知识与脊柱内窥镜检查的技能相结合，利用肌肉之间的天然间隙来避免对脊柱和相关结构造成不必要的损害[9]。UBE 技术被认为是传统开放手术和内窥镜手术的良好结合，具有术野清晰、操作灵活、减压充分等特点，在内窥镜手术治疗多节段腰椎间盘突出症中有独特优势[10] [11]。本文报道 1 例就诊于湖北省中医院并接受 UBE 微创治疗 3 个节段巨大腰椎间盘突出伴腰椎管狭窄、椎间盘钙化的年轻患者临床资料，并对相关文献进行综述。

2. 病例资料

患者，女，24 岁。因“腰及右臀部、右下肢疼痛不适 1 年余”入院。患者诉 1 年前久坐后出现腰部酸胀疼痛，伴右臀部、右小腿外侧疼痛，本地医院以“腰椎间盘突出症”诊治，行局部物理治疗及先后 5 次硬膜外类固醇药物注射治疗，疗效不佳。随后间断反复出现腰部酸痛，右臀部刺痛，右小腿后侧、外侧、内侧疼痛不适，并有双下肢乏力，神经源性跛行。入院刻下症：腰部酸胀疼痛，右臀部刺痛，右小腿外侧疼痛。否认外伤史、手术史、糖尿病等病史。入院完善腰椎 X 线片、腰椎 CT、腰椎 MRI (见图 1、图 2、图 3)。专科检查：腰椎生理曲度存在，腰部肌肉稍僵硬。L3-S1 棘突下压痛(+)、叩痛(+)，棘旁压痛(+)，右侧较甚。右侧直腿抬高试验 30˚ (+)，右侧股神经牵拉试验(+)，右足踇背伸肌力约 4 级。排除手术禁忌症后在全身麻醉下行 UBE 下腰椎间盘突出伴腰椎管狭窄椎间盘髓核摘除、椎管减压、脊神经根松解术。

手术方法：麻醉成功后取俯卧位，使腋前和腹部悬空。双上肢外展固定，双髋关节、膝关节呈半屈曲。透视定位责任节段，设计切口，建立操作通道(见图 4)。术中见 L5、S1 神经根腋下巨大椎间盘突出，髓核游离，与神经根粘连严重，神经根管骨性狭窄，神经根明显受压水肿变扁，咬除部分黄韧带，射频消融神经根周围粘连的组织，咬除患侧神经根管狭窄骨质，将其周围压迫物清除。射频消融脊神经后支区域，松解粘连的组织，髓核钳摘除突出的髓核，等离子刀处理破裂的纤维环边缘。探查 L4 神经根见神经根腋下巨大椎间盘突出并钙化，神经根稍受压，咬除狭窄的神经根管周围骨质，用磨钻磨薄钙化灶，脊柱花刀压平突出间盘，射频松解神经根周围粘连组织，未摘除髓核。镜下探查见神经根背侧腹侧压迫已解除，硬膜囊搏动明显，无明显出血点后结束手术(见图 5)。术后腰椎 CT 示椎管减压充分，关节突关节完整(见图 6)。手术前后腰腿疼痛视觉模拟 VAS 评分(VAS)、Oswestry 功能障碍指数(ODI)、日本骨科协会评估治疗分数(JOA)对比见表 1。

Table 1. Comparison of VAS scores, ODI scores, and JOA scores by time period before and after surgery
表 1. 手术前后各时段 VAS 评分、ODI 评分、JOA 评分对比

时间	VAS 评分	ODI 评分	JOA 评分
术前	6	44.4%	9
术后 3 天	2	31.4%	20
术后 1 个月	0	14.3%	25
术后 3 个月	0	5.0%	27
术后 6 个月	0	2.5%	29

Figure 1. Preoperative radiograph showed lumbar scoliosis
图 1. 术前 X 线片示腰椎侧弯

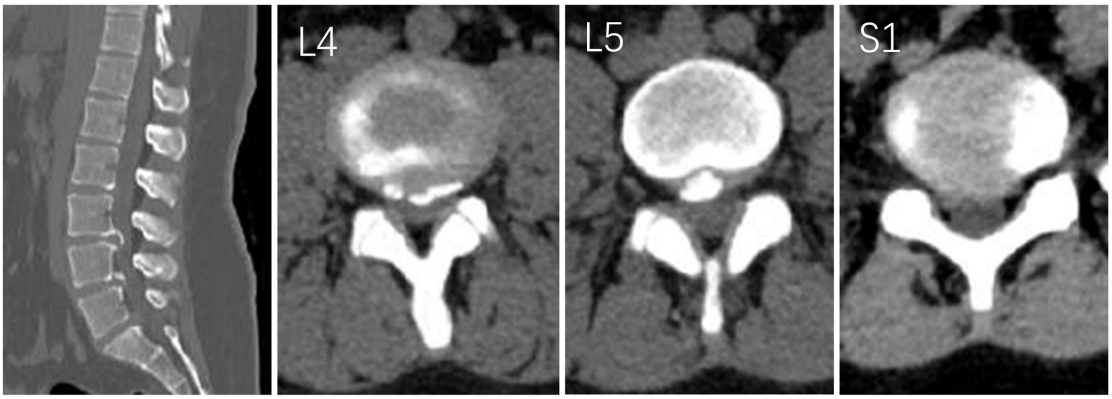

Figure 2. Preoperative lumbar spine CT showed L3/4 and L4/5 disc herniation with disc calcification, prolapsed disc at L5/S1, and spinal stenosis in the corresponding segments
图 2. 术前腰椎 CT 示 L3/4、L4/5 椎间盘突出伴有椎间盘钙化，L5/S1 椎间盘脱出，相应节段椎管狭窄

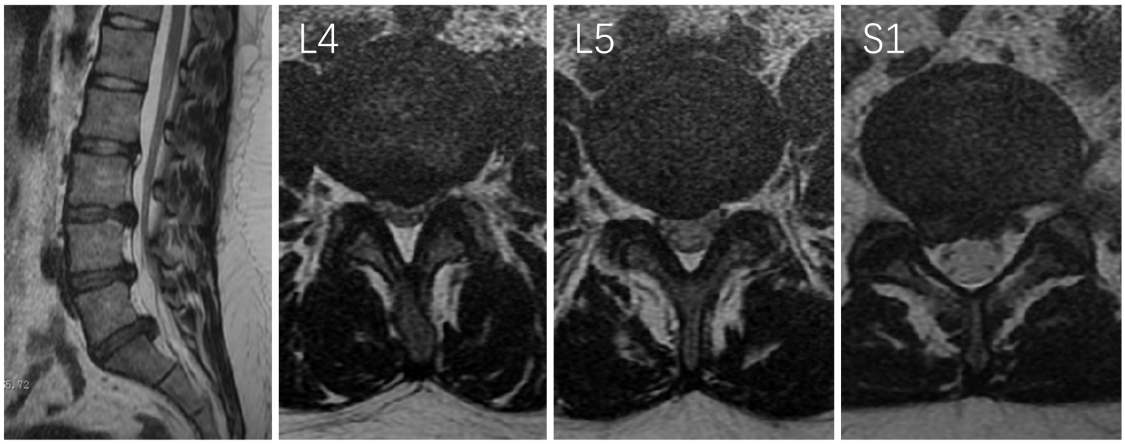

Figure 3. Preoperative MRI of lumbar spine showed herniated discs at L2/3, L3/4, and L4/5, prolapsed disc at L5/S1, and dural sac compression and canal stenosis in the corresponding segments
图 3. 术前腰椎 MRI 示 L2/3、L3/4、L4/5 椎间盘突出，L5/S1 椎间盘脱出，相应节段硬膜囊受压、椎管狭窄

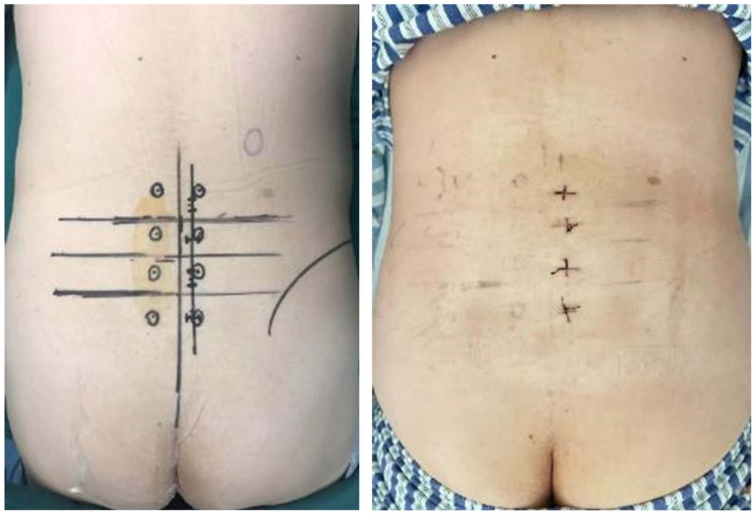

Figure 4. Preoperative incision design drawing, postoperative incision drawing
图 4. 术前切口设计图，术后切口图

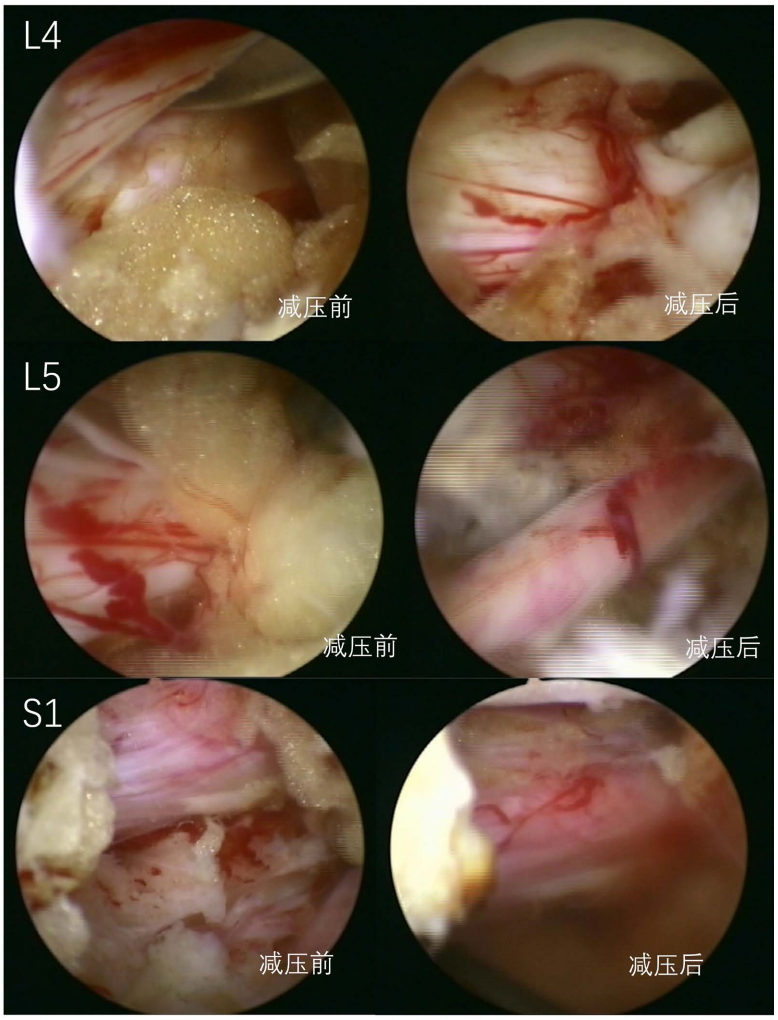

Figure 5. Intraoperative microscopic view of the nerve root before and after decompression
图 5. 术中镜下所见减压前后的神经根

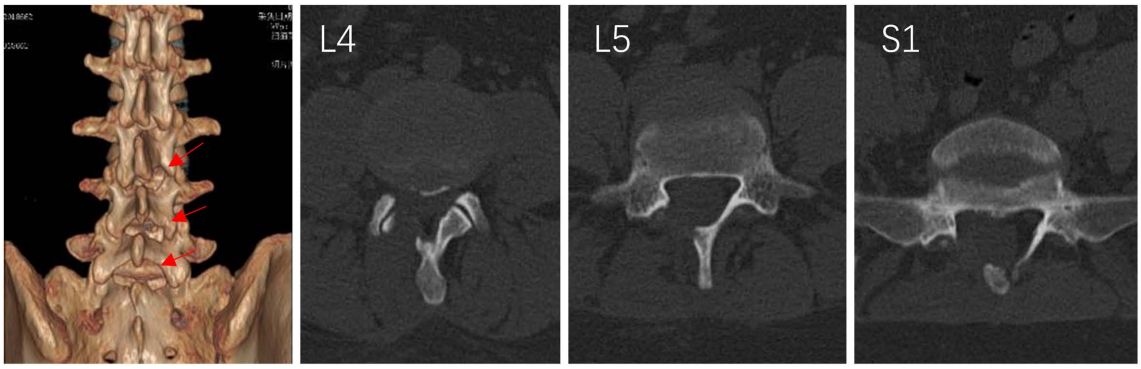

Figure 6. Postoperative lumbar spine CT showed adequate decompression of the spinal canal and intact articular synovial joints
图 6. 术后腰椎 CT 示椎管减压充分，关节突关节完整

3. 讨论

腰椎间盘突出症是腰椎退行性病变中最常见的诊断，其根本原因是腰椎间盘退变，主要原因是积累

性损伤[12]。研究表明，肥胖、吸烟、性别、BMI、年龄、糖尿病、经常重体力活动、纤维环撕裂程度以及既往脊柱手术等因素均与 LDH 有一定相关性[13]-[19]。研究显示，LDH 的发病率约为 2%~3% [20]，且多发于中老年人群[21]。虽然 Fjeld 等[22]对 34,639 例接受手术治疗 LDH 患者的报道中发现，18~39 岁年龄段占比不少，为 36.7%，但多为单节段发病。多节段发病且接受手术治疗的患者多为老年人。针对通过 UBE 治疗多节段椎间盘突出症的青年患者病例目前尚未有相关报道。

多节段腰椎间盘突出症临床表现为腰腿疼痛、行动不便等，为患者带来极大困扰。针对该病的治疗目前主要分为保守治疗与手术治疗。保守治疗是大多数患者的一线治疗方案[23]。主要方式有药物、物理治疗、牵引、脊柱推拿、硬膜外类固醇注射，以及针灸、针刀、中药等中医方法治疗。此外，还有向椎间盘内注射臭氧[24]的治疗方式，这些治疗方法的主要目的是缓解疼痛。一项对 817 名脊柱外科医生进行的调查显示，接近半数的外科医生认为保守治疗 4~8 周是决定进行手术之前的最短时间[25]。但一份荷兰的指南认为，当保守治疗 6 周后无明显疗效或有进行性神经症状时，需要手术治疗[26]。

开放性单纯开窗或半椎板减压髓核摘除手术是治疗多节段腰椎间盘突出症经典而有效的治疗方法，在对侧隐窝彻底减压的同时，最大限度地保持脊柱中后柱的结构[27]。但多节段椎间盘切除可能会导致脊柱不稳或邻近节段退变。对于多节段椎间盘突出或合并有椎间失稳的病例，在减压的同时应该考虑重建腰椎的稳定性行腰椎融合术[28]。然而，传统开放手术往往手术时间、出血量、术后疼痛评分和住院天数显著高于内窥镜手术[29]。虽然随着科技的进步和微创技术的发展，椎间盘镜下髓核摘除术和显微镜下髓核摘除术被开发并得到广泛运用。此类手术是通过管状通道，借助显微镜或放大镜获得放大清晰的手术视野，运用内镜辅助进行与开放手术相同的操作，与传统开放手术相比具有切口小、术中出血量少、并发症发生率低等优点。但此类术式属于微创或有限开放手术，在 AOspine 专家共识中不属于全内窥镜脊柱手术范围[30]。

全内窥镜脊柱手术是指使用可持续冲洗系统和可视化内窥镜工作通道的手术。一些研究证实，内窥镜手术与传统开放手术在手术效果方面没有统计学上的显著差异($P > 0.05$) [31] [32] [33] [34] [35]。Park 等[36]对双门内镜脊柱手术术后临床转归及并发症进行综合系统评价及分析，并发症发生率小，发现临床结果证明有效。Han 等[37]对微创内镜融合腰椎手术的 13 项研究和 949 名患者进行 meta 分析，评估其短期临床疗效和安全性，发现其具有术中失血少、术后住院时间短、恢复快等优势。Wang 等[38]对 80 名接受脊柱内镜手术的高龄患者进行了临床疗效评估，虽然老年患者(≥80 岁)健康状况较差，合并症较多，但内镜手术可以达到令人满意的结果，证明了其有效性和安全性，并且没有增加并发症。由此可见，与其他微创或传统开放手术相比，全内窥镜脊柱手术的围手术期和术后并发症的发生率低得多[29]。全内窥镜脊柱手术可以通过单切口(单通道内窥镜)或双切口(双通道内窥镜)进行。

经皮内窥镜腰椎间盘切除术(Percutaneous Endoscopic Lumbar Discectomy, PELD)是常用于 LDH 的单通道微创手术，其通过侧方入路的经椎间孔安全三角穿刺或者后方入路的经椎板间穿刺到达突出的椎间盘，放置工作套筒，在水介质的工作环境中通过内镜直视下摘除突出的髓核组织并进行纤维环成型[39]。PELD 可以在局麻下通过经椎间孔或椎板间入路进行操作，其对后部结构，如上下椎板、韧带、肌肉等的保护作用优于传统开放手术，从而降低术后节段不稳的风险[29]。但此类内镜手术受到器械自身局限性(即单通道)的影响，在操作时灵活度受到限制，因此具有一定的禁忌症，如不适用于广泛钙化的腰椎间盘、L5-S1 节段(尤其是高髂嵴患者)、多于一个节段的突出(相对禁忌症)、椎管和椎间孔狭窄(相对禁忌症)、腰椎滑脱等[40]。

双通道内镜技术不仅兼顾了 PELD 微创、可视化等优点，也弥补了其灵活性不足的缺点。UBE 拥有两个独立的通道，分别为观察通道和工作通道。它既提供了一个清晰和放大的手术视野，又提高了手术的灵活性，术者可以进行精确和广泛的减压[15]。De Antoni 等[41]在 1996 年最早应用于腰椎间盘突出症，但这

项技术在最近几年才得到了迅速的应用。它使用扩张器分离肌肉组织，双极射频探头细致地止血和持续盐水冲洗，在椎板间隙创造一个工作空间。因此，UBE 提供了神经根周围软组织、血管和骨骼结构的高清视野，从而为精细的神经操作和轻松安全的减压创造了有利的环境，具有内窥镜及器械可操作角度大、减压效果与开放手术相近、允许常规使用普通骨科器械、椎旁肌破坏小、不影响脊柱稳定性等优势[42] [43]。

此外，还有髓核化学溶解术、经皮激光椎间盘减压术、腰椎间盘置换术等手术方式。然而，这些手术在改善腿痛 VAS 和 Oswestry 功能障碍指数评分方面、手术成功率方面表现较差。髓核化学溶解术不能精准地控制髓核组织溶解速度，故而治疗效果不佳，复发率较高[44]。经皮激光椎间盘减压术在短期和长期缓解疼痛方面的证据等级有限[45]。虽然腰椎间盘置换术可以降低邻近节段退变的发生率，但缺乏多节段腰椎间盘置换术的临床研究，并且其有较多的并发症，如假体下沉、移位、磨损、异位骨化等。因此，这些手术方式没有得到广泛应用。

本例患者年仅 24 岁，体重却 90 kg，BMI 达 33.9，超重与高 BMI 是导致腰椎间盘退变的重要影响因素。近 1 年来反复腰及右臀部疼痛不适，间断出现小腿内侧、外侧、后侧的麻木及疼痛，本次就诊时以小腿外侧疼痛为主，已有右足踇背伸肌力减退。多节段腰椎间盘突出通常表现为多处神经根的受压，临床上小腿内侧、外侧、后侧的麻木或疼痛分别定位为 L4、L5、S1 神经根受累。有学者认为，多节段减压会明显增加病人创伤、出血、费用以及手术并发症，后期存在脊柱结构不稳，需再次行融合手术保证脊柱稳定性[4]。然而，某一节段神经根受压较重时常常会掩盖另一节段的症状，若只处理单节段，术后另一病变节段相应的症状有可能会再次出现，进而影响手术效果需再次手术。从术前影像学资料能看到，L3/4、L4/5、L5/S1 巨大椎间盘突出伴椎管狭窄、椎体后缘骨化，L2/3 椎间盘亦有变性、突出。若选择单节段融合，后期出现邻近节段退变需翻修的几率并不低。而多节段融合对年仅 24 岁的患者而言，在创伤、出血量、手术时间、费用等方面，不利影响更突出。从年龄、症状、影像学考虑，并不适合 PELD 及腰椎融合术，并且目前尚无确凿的临床证据支持在切除突出椎间盘时常规行腰椎融合手术的必要性。因此，运用 UBE 进行探查及减压是可行做法。术中见 L5、S1 神经根受压严重，且周围存在较多结缔组织粘连，可能与患者接受过 5 次硬膜外注射有关。探查 L4 神经根发现存在受压，但受压情况不如 L5、S1 神经根严重，神经根腋下可见巨大椎间盘突出并钙化，故而仅咬除狭窄的神经根管周围骨质，用磨钻磨薄钙化灶，不摘除髓核，如此既保证了该节段的稳定性，又解除了钙化对硬膜囊腹侧的压迫。

全内窥镜脊柱手术可能出现减压不完全、硬脊膜撕裂、出血和感染等并发症，需要开放翻修。本例患者术后未出现严重的早期临床并发症，如硬脊膜撕裂、神经根损伤以及椎间隙感染等。这表明 UBE 治疗多节腰椎间盘突出症的临床效果显著，且并发症发生率低，但仍需多样本临床数据加以验证。总之，在治疗多节段腰椎间盘突出症的众多手术方法中，UBE 具有视野清晰、操作灵活、减压充分、创伤小、恢复快、并发症发生率低等特点，值得推广应用。

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