

METR_x 系统辅助下显微外科手术治疗 腰椎间盘突出症

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【摘要】 目的 探讨 METR_x 系统辅助下腰椎间盘突出症显微外科手术的技术特点和临床疗效。
方法 于 METR_x 系统辅助下显微外科手术治疗 51 例腰椎间盘突出症患者(L₄₋₅ 椎间盘突出 24 例、L₅-S₁ 椎间盘突出 27 例),记录手术时间、术中出血量和住院时间,并于术前和术后 1 周、3 个月、末次随访时采用视觉模拟评分(VAS)和 Oswestry 功能障碍指数(ODI)评价手术前后疼痛改善情况,复查腰椎 MRI 评价椎管减压程度。**结果** 51 例患者手术成功率为 98.04%(50/51),平均手术时间为 125 min、术中出血量为 50 ml、住院时间 5 d、术后随访 24 个月。与术前相比,术后 1 周($P = 0.036, 0.029$)、3 个月($P = 0.018, 0.023$)和末次随访时($P = 0.007, 0.013$)VAS 和 ODI 评分均减少;至末次随访时,ODI 改善率为 35.37%。无手术相关感染、术后脑脊液漏和神经功能缺损加重、手术切口感染病例。术后 1 例出现附件炎,1 例神经根刺激症状明显,均经对症治疗后痊愈。**结论** METR_x 系统辅助下显微外科手术治疗腰椎间盘突出症,可以有效解除神经根压迫、保护硬脊膜囊和神经根、减少手术并发症的发生。

【关键词】 椎间盘移位; 腰椎; 显微外科手术; 外科手术,微创性

Clinical study on microsurgical treatment of lumbar disc herniation assisted by METR_x system

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【Abstract】 Objective To explore the techniques and curative effect of microsurgical procedures assisted by minimal exposure tubular retractor system (METR_x) in the treatment of lumbar disc herniation (LDH). **Methods** A total of 51 LDH patients, including 24 patients with L₄₋₅ herniation and 27 patients with L₅-S₁ herniation, underwent discectomy assisted by METR_x system. The operation time, intraoperative blood loss, postoperative complications and hospital stay were recorded. Visual Analogue Scale (VAS) and Oswestry Disability Index (ODI) were used to evaluate the degree of low back pain before operation, one week, 3 months after operation, and in the last follow-up. Lumbar MRI was used to evaluate the decompression of spinal canal. **Results** The success rate of operations in 51 cases was 98.04% (50/51). The average operation time was 125 min, the average intraoperative blood loss was 50 ml, the mean hospital stay was 5 d, all patients were followed up for 6-48 months (average 24 months). Compared with preoperation, both VAS and ODI scores decreased significantly one week after operation ($P = 0.036, 0.029$), 3 months after operation ($P = 0.018, 0.023$) and in the last follow-up ($P = 0.007, 0.013$). The improvement rate of ODI was 35.37% in the last follow-up. No infection, postoperative cerebrospinal fluid (CSF) fistula, neurological defects or incision infection was found. One patient presented acute abdominalgia on the 2nd day after operation, and was diagnosed as annexitis. One patient showed nerve root irritation symptoms after operation caused by thick nerve root during the surgery. They were cured after symptomatic treatment. **Conclusions** Microsurgical procedures for treating LDH assisted by METR_x system can effectively relieve

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nerve root compression, protect the dural sac and nerve roots, and reduce surgical complications.

【Key words】 Lumbar disk displacement; Lumbar vertebrae; Microsurgery; Surgical procedures, minimally invasive

经过 30 余年的临床实践,腰椎管内病变显微外科手术的优越性和疗效已获得充分肯定。通常采用可扩张微创通道系统(METRx)为显微外科手术提供有效的工作通道,保证手术的微创性和安全性。我们回顾分析近年来首都医科大学三博脑科医院神经外科于 METRx 系统辅助下行显微外科手术治疗的 51 例腰椎管内病变患者的临床资料,总结手术经验,以指导临床实践。

资料与方法

一、临床资料

选择 2008 年 3 月-2015 年 3 月在我院神经外科于 METRx 系统辅助下行显微外科手术治疗的 51 例腰椎间盘突出症患者,均为单节段病变,L₄₋₅椎间盘突出 24 例、L₅-S₁椎间盘突出 27 例。男性 37 例,女性 14 例;年龄 18~65 岁,平均 43 岁;病程 1 周至 6 个月,平均 3 个月;临床主要表现为突发单侧或双侧下肢剧烈疼痛。术前视觉模拟评分范围(VAS)5.20~8.20 分,中位评分 7.00 分;Oswestry 功能障碍指数(ODI)32~66 分,中位分数 46 分。神经系统查体和术前肌电图检查显示单侧或双侧 L₄~S₁神经根受累。腰椎 MRI 检查显示,L₄₋₅或 L₅-S₁椎间盘突出,硬脊膜囊受压(图 1a)。

二、研究方法

1. 手术方法 患者俯卧位,气管插管全身麻醉,“C”型臂 X 线定位手术椎体节段(图 1b),确定手术间隙上下椎弓根中点并标记,同侧上下椎弓根中点连线即为手术切口线,于背部后正中线旁开 0.50 cm 处做长约 3 cm 的直切口,经切口中点向内侧倾斜 15°~20°插入定位针,沿定位针逐级置入 METRx 系统(美国 Medtronic 公司)扩张导管,撑开肌肉纤维,置入深度适宜的工作套管,与蛇形臂连接固定。手术显微镜下于直径 2.50~3.00 cm 工作通道内电凝附着于椎板的软组织,髓核钳摘除软组织,充分显露椎板边缘,以小型弯刮匙伸入椎板下缘,以辨认手术入路,将黄韧带从其边缘剥离,显露硬脊膜和神经根,神经剥离子牵开神经根及硬脊膜囊(<http://www.cjcn.org/index.php/cjcn/pages/view/v1644>)。

若神经根难以牵开或神经根管狭窄,可将神经根附近骨质和较厚的黄韧带咬除、松解以彻底解压,显露突出的椎间盘,“十”字形切开纤维环,髓核钳摘除髓核和变性的椎间盘组织(图 1c, 1d)。切除 L₄₋₅椎间盘时,仅磨除上下关节突内侧骨缘;切除 L₅-S₁椎间盘时,仅切除椎间隙上方黄韧带。同时行术中神经电生理学监测以评价双下肢和肌门括约肌功能。术后 1 d 鼓励患者佩戴腰围离床活动,术后 3 d 即可恢复正常行走和活动。

2. 疗效和安全性评价 (1)疗效评价:记录手术时间、术中出血量和住院时间,并分别于术前和术后 1 周、3 个月、末次随访时采用 VAS 和 ODI 量表评价手术前后疼痛改善情况^[1-3],复查腰椎 MRI 评价椎管减压程度。VAS 评分 0 分,无疼痛;1~3 分,轻微疼痛,可以忍受;4~6 分,疼痛影响睡眠,但可以忍受;7~10 分,强烈疼痛,难以忍受。ODI 量表包括疼痛强度、生活自理、提物、步行、坐位、站立、干扰睡眠、性生活、社会生活、旅游共 10 项条目,每项条目评分为 0~5 分,总评分为 50 分,评分方法为实际分值/50×100%,评分越高、功能障碍越严重;同时计算 ODI 改善率[改善率(%)=(1-术后 ODI/术前 ODI)×100%],改善率>75%为优,50%~75%为良,25%~49%为可,<25%为差。(2)安全性评价:观察手术相关感染、术后脑脊液漏和神经功能缺损加重、手术切口感染,以及其他并发症发生情况。

3. 统计分析方法 采用 SPSS 16.0 统计软件进行数据处理与分析。呈非正态分布的计量资料以中位数和四分位数间距[M(P₂₅, P₇₅)]表示,手术前后 VAS 和 ODI 评分的比较采用 Friedman 秩和检验,两两比较行 Mann-Whitney U 检验。以 P≤0.05 为差异具有统计学意义。

结 果

本组 51 例患者均于 METRx 系统辅助下行显微外科手术完成 L₄₋₅或 L₅-S₁椎间盘切除,手术成功率为 98.04%(50/51)。手术时间为 90~150 min,平均 125 min;术中出血量 30~75 ml,平均 50 ml;住院时间 3~7 d,平均 5 d;术后随访 6~48 个月,平均 24 个

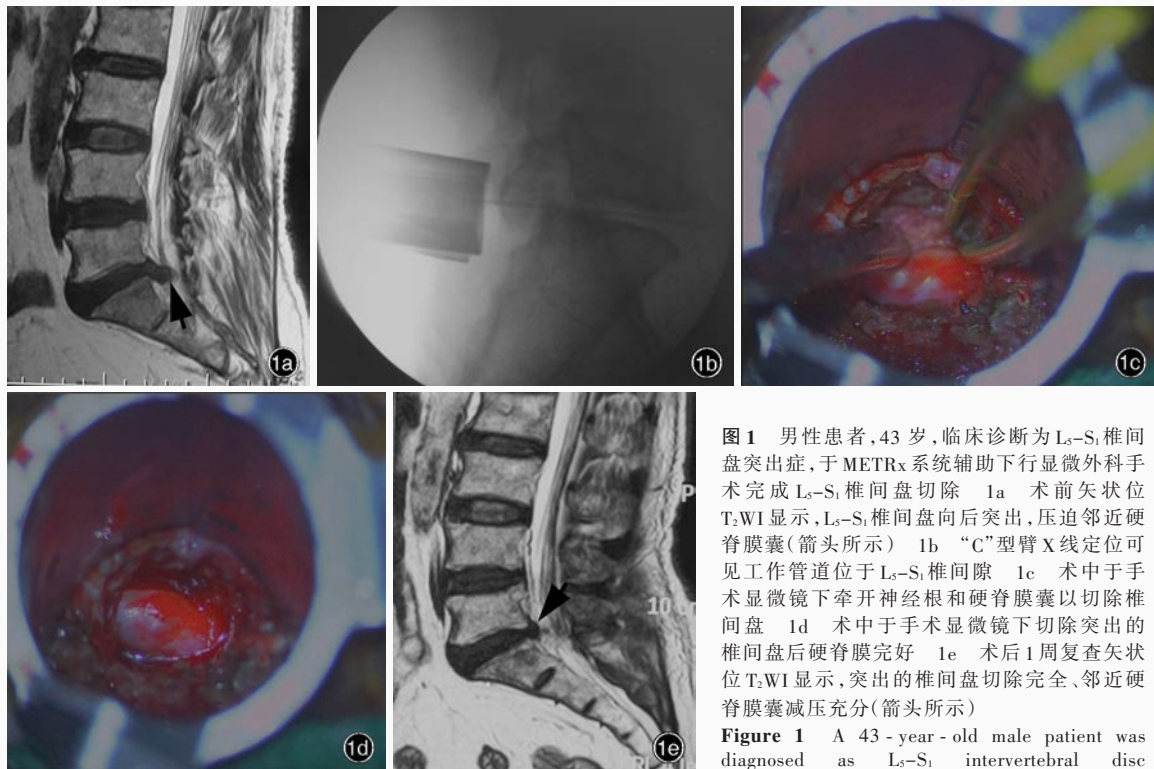


图1 男性患者,43岁,临床诊断为L₅-S₁椎间盘突出症,于METRx系统辅助下行显微外科手术完成L₅-S₁椎间盘切除 1a 术前矢状位T₂WI显示,L₅-S₁椎间盘向后突出,压迫邻近硬脊膜囊(箭头所示) 1b “C”型臂X线定位可见工作管道位于L₅-S₁椎间隙 1c 术中于手术显微镜下牵开神经根和硬脊膜囊以切除椎间盘 1d 术中于手术显微镜下切除突出的椎间盘后硬脊膜完好 1e 术后1周复查矢状位T₂WI显示,突出的椎间盘切除完全、邻近硬脊膜囊减压充分(箭头所示)

Figure 1 A 43-year-old male patient was diagnosed as L₅-S₁ intervertebral disc herniation, and underwent L₅-S₁ discectomy assisted by METRx system. Preoperative sagittal T₂WI showed L₅-S₁ intervertebral disc herniation, and the dural sac was compressed (arrow indicates, Panel 1a). C-arm X-ray positioning showed the operating channel was located in the L₅-S₁ intervertebral space (Panel 1b). During the surgery, nerve root and dural sac were pulled to remove intervertebral disc (Panel 1c). The dural sac was intact after removing the intervertebral disc (Panel 1d). Sagittal T₂WI one week after operation showed the intervertebral disc was removed completely, and decompression was achieved (arrow indicates, Panel 1e).

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月。术后1周复查腰椎MRI显示,椎间盘切除完全、硬脊膜囊减压充分(图1e)。与术前相比,术后1周($P = 0.036, 0.029$)、3个月($P = 0.018, 0.023$)和末次随访时($P = 0.007, 0.013$)VAS和ODI评分均减少且差异具有统计学意义(表1,2);至末次随访时,ODI改善率为35.37%。

本组无手术相关感染、术后脑脊液漏和神经功能缺损加重、手术切口感染患者。有1例青年女性患者,术后第2天出现急性腹痛,诊断为附件炎,予以氧氟沙星400 mg/d静脉滴注抗感染治疗5 d后痊愈;1例患者术中发现受累神经根粗大,考虑为突出的椎间盘长期炎症刺激所致,术后神经根刺激症状明显,遂予以甲泼尼龙80 mg/d静脉滴注治疗1周、氯诺昔康8 mg(2次/d)静脉滴注和加巴喷丁100 mg(3次/d)口服治疗2周后症状缓解。

讨 论

微创技术是现代脊柱外科的发展趋势,采用METRx系统配合手术显微镜切除椎间盘,可以清晰

显露术区硬脊膜囊、神经根与突出椎间盘位置的关系,而且能够直视手术视野,完整切除椎间盘和增生的骨质、黄韧带,充分减压神经根,彻底止血。同时行术中神经电生理学监测,能够最大程度地保护神经根,避免严重并发症的发生。本组患者手术成功率为98.04%(50/51)。

微创脊柱外科技术的前提是准确定位病变椎间隙,由于METRx系统工作管道直径为1.60 cm,粗略定位很可能因体位变化而不准确,故术前应于“C”型臂X线引导下精确定位,并于置入工作管道后再次经X线确认。术中咬除病变椎间隙上下椎板不超过5 mm,能够有效保留脊柱中柱和后柱结构,维持脊柱生物力学稳定性,明显降低术后脊柱滑脱、下腰痛等并发症的发生率^[4-6]。

手术的关键是适应证的选择。研究显示,手术适应证选择不当是微创脊柱外科技术效果不佳的主要原因^[7-8]。该项技术的适应证主要是单节段椎间盘突出或脱出;伴局限性椎管狭窄和侧隐窝狭窄的腰椎间盘突出症。传统观点认为,单节段椎间盘

表 1 患者手术前后 VAS 和 ODI 评分的比较 [$M(P_{25}, P_{75})$, 评分]

Table 1. Comparison of preoperative and postoperative VAS and ODI scores [$M(P_{25}, P_{75})$, score]

Time	N	VAS	ODI
Preoperation (1)	51	7.00 (5.00, 8.00)	46.00 (40.00, 56.00)
1 week after operation (2)	51	3.00 (2.00, 4.00)	20.00 (18.00, 24.00)
3 months after operation (3)	51	2.00 (1.00, 2.00)	16.00 (14.00, 18.00)
The last follow-up (4)	51	1.00 (0.00, 2.00)	6.00 (4.00, 8.00)
M value		16.810	14.000
P value		0.013	0.027

VAS, Visual Analogue Scale, 视觉模拟评分; ODI, Oswestry Disability Index, Oswestry 功能障碍指数

表 2 患者手术前后 VAS 和 ODI 评分的两两比较

Table 2. Paired comparison of preoperative and postoperative VAS and ODI scores

Paired comparison	VAS		ODI	
	U value	P value	U value	P value
(1) : (2)	6.000	0.036	6.000	0.029
(1) : (3)	2.000	0.018	1.000	0.023
(1) : (4)	2.000	0.007	2.000	0.013

突出症术后复发是微创脊柱外科技术的禁忌证,但是由于微创技术联合手术显微镜可使手术视野更清晰,更能有效清除瘢痕组织对神经根和硬脊膜的粘连和压迫,因此,腰椎间盘突出症复发是微创脊柱外科技术的相对适应证^[1,9-11]。而年龄较大的伴椎管狭窄患者、小关节内聚且骨质增生严重患者、中央型椎管狭窄或神经根管出口狭窄患者、椎间盘突出严重钙化患者则考虑传统开放式手术^[6,12]。

微创脊柱外科技术可以有效避免传统开放式手术视野大、组织损伤严重和骨关节结构破坏严重等缺点^[4,6,13],最大程度地保留脊柱后纵韧带(PLL)复合结构的完整性,从而有效降低术后瘢痕组织粘连和腰椎失稳发生率,而且该项技术具有手术创伤小、术中出血量少、住院时间短、恢复迅速等优点,一般术后 1 天可离床大小便、3 天可离床活动、5 天可出院^[4,6,13-14]。本组 51 例腰椎间盘突出症患者,术后 1 天即可佩戴腰围离床活动,无特殊不适,无大小便障碍;腰痛和下肢痛症状明显改善。

随着显微医疗器械的发展、微创技术的提高、METRx 系统操作经验的积累,METRx 系统辅助微创腰椎后入路手术的应用更加广泛,并且可以用于切除 1~2 个节段的脊髓脊柱肿瘤,如脊膜瘤、神经鞘瘤、胆脂瘤、皮样囊肿、室管膜瘤等^[2]。

综上所述,随着科学技术的进步,现代医学飞速发展,微创脊柱外科技术作为近年来一项将传统开放式手术与微创技术相结合的新兴技术,可以显著减少手术创伤、有效保护椎体正常结构与完整性,从而减轻患者术后疼痛、缩短住院时间,并且术后很快恢复正常生活和工作^[6-7,13],在脊柱外科手术中具有广泛的应用前景。

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Epigenetic Methods in Neuroscience Research published

Epigenetic Methods in Neuroscience Research (ISBN: 978-1-4939-2753-1, eBook ISBN: 978-1-4939-2754-8) will be published by Springer in 2016. The editor of this book is Nina N. Karpova, Neuroscience Center, University of Helsinki, Finland.

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Neuropsychological Formulation: A Clinical Casebook published

Neuropsychological Formulation: A Clinical Casebook (ISBN: 978-3-319-18337-4, eBook ISBN: 978-3-319-18338-1) was published by Springer International Publishing. The editor of this book is Jamie A.B. Macniven.

This forward-looking book defines and illustrates the process and themes of formulation in neuropsychology and places it in the vanguard of current practice. The book explains the types of information that go into formulations, how they are gathered, and how they are synthesized into a clinically useful presentation describing psychological conditions resulting from neurological illness or injury. Cases highlight the relevance and flexibility of narrative- and diagram-based formulation methods in approaching a diverse range of issues and conditions, from decisional capacity to cultural considerations, Huntington's disease to deep dyslexia. Throughout this volume, formulation is shown as integral to treatment and rehabilitation planning alongside clinical assessment, cognitive testing, and diagnosis. Neuropsychologists, clinical psychologists and rehabilitation specialists will find *Neuropsychological Formulation* of critical importance not only to the literature of the field, but also to the developing role of clinical neuropsychology within healthcare systems.

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