

- 1976), 2006, 31(17):1983-2001.
- [8] Pflugmacher R, Beth P, Schroeder RJ, et al. Balloon kyphoplasty for the treatment of pathological fractures in the thoracic and lumbar spine caused by metastasis: one-year follow-up[J]. Acta Radiol, 2007, 48(1): 89-95.
- [9] Zhu RS, Kan SL, Ning GZ, et al. Which is the best treatment of osteoporotic vertebral compression fractures: balloon kyphoplasty, percutaneous vertebroplasty, or non-surgical treatment? A Bayesian network meta-analysis[J]. Osteoporos Int, 2019, 30(2): 287-298.
- [10] Yu WB, Jiang XB, Liang D, et al. Risk factors and score for recollapse of the augmented vertebrae after percutaneous vertebroplasty in osteoporotic vertebral compression fractures[J]. Osteoporos Int, 2019, 30(2): 423-430.
- [11] He CJ, Liu GD. Comparison of the efficacy and safety of bone-filling mesh container and simple percutaneous balloon kyphoplasty in the treatment of osteoporotic vertebral compression fractures[J]. Pain Physician, 2018, 21(3): 259-268.
- [12] 唐海, 贾璞, 陈浩, 等. 新型 Vessel-X 经皮椎体强化系统在脊柱微创治疗的临床应用[J]. 中华医学杂志, 2017, 97(33): 2567-2572.
- TANG H, JIA P, CHEN H, et al. Clinical research of minimally invasive spine surgery with Vesselplasty[J]. Zhonghua Yi Xue Za Zhi, 2017, 97(33): 2567-2572. Chinese.
- [13] Klingler JH, Sircar R, Deininger MH, et al. Vesselplasty: a new minimally invasive approach to treat pathological vertebral fractures in selected tumor patients-preliminary results[J]. Rofo, 2013, 185(4): 340-350.
- [14] 盛斌, 袁友超, 刘向阳, 等. 应用骨填充网袋椎体成形术治疗胸腰椎溶骨性转移瘤[J]. 中国脊柱脊髓杂志, 2017, 27(9): 806-811.
- SHENG B, YUAN YC, LIU XY, et al. Bone filling mesh container in the treatment of thoracolumbar osteolytic metastases[J]. Zhongguo Ji Zhu Ji Sui Za Zhi, 2017, 27(9): 806-811. Chinese.
- [15] 贾璞, 陈浩, 包利, 等. 国产骨填充网袋治疗 posterior 椎体转移瘤疗效[J]. 中国骨与关节杂志, 2018, 1(1): 72-76.
- JIA P, CHEN H, BAO L, et al. Early clinical efficacy of bone filling mesh for vertebral metastases with posterior vertebral wall breakage[J]. Zhongguo Gu Yu Guan Jie Za Zhi, 2018, 1(1): 72-76. Chinese.
- [16] Yeom E, Kang YJ, Lee SJ. Changes in velocity profile according to blood viscosity in a microchannel[J]. Biomicrofluidics, 2014, 8(3): 34110.

(收稿日期: 2019-11-01 本文编辑: 王宏)

两种颈前路减压融合术治疗两节段脊髓型颈椎病的疗效分析

陈恩良, 王楠, 全仁夫

(杭州市萧山区中医院骨科, 浙江 杭州 311201)

【摘要】 目的: 探讨颈前路椎间盘切除融合术(anterior cervical discectomy with fusion, ACDF)与颈前路椎体次全切除减压融合术(anterior cervical corpectomy with fusion, ACCF)治疗相邻两节段脊髓型颈椎病的临床疗效。方法: 对 2016 年 1 月至 2017 年 12 月收治的相邻两节段脊髓型颈椎病 37 例患者的临床资料进行回顾性分析, 男 15 例, 女 22 例, 年龄 43~69 岁, 平均 54.6 岁。根据手术方法的不同分为 ACDF 治疗组(A 组, 17 例)和 ACCF 治疗组(B 组, 20 例)。记录两组患者的手术时间、术中出血量, 比较两组患者术前及术后 1、12 个月颈椎融合节段 Cobb 角、颈椎曲度, 采用日本矫形外科协会(Japanese Orthopaedic Association, JOA)评分评价临床疗效, 并观察两组术后并发症情况。结果: 所有患者获得随访, 时间 12~24 个月, 平均 18.5 个月。手术时间、术中出血量 A 组分别为(106.3±22.6) min、(52.2±26.4) ml, B 组分别为(115.6±16.8) min、(61.7±20.7) ml, 手术时间组间差异无统计学意义($P>0.05$), B 组术中出血量大于 A 组($P<0.05$)。术前及术后 1、12 个月颈椎曲度和颈椎融合节段 Cobb 角 A 组分别为(11.28±1.40)°、(17.56±1.90)°、(16.64±1.80)°和(4.93±4.20)°、(9.44±2.60)°、(9.25±2.80)°, B 组分别为(10.59±1.20)°、(16.26±2.10)°、(15.76±2.50)°和(4.75±3.90)°、(7.98±2.10)°、(7.79±3.00)°。两组患者术后颈椎融合节段 Cobb 角、颈椎曲度均较术前明显改善, 且 A 组较 B 组恢复更明显($P<0.05$)。术前及术后 1、12 个月 JOA 评分 A 组分别为 9.46±1.70、11.56±1.40、14.86±1.20, B 组分别为 9.11±1.50、11.40±1.30、15.12±1.60。两组患者术后 JOA 评分较术前均明显改善($P<0.05$), 组间同时间段比较差异无统计学意义($P>0.05$)。末次随访 A 组出现吞咽梗阻感 2 例, cage 移位 1 例, 未发生钛板螺钉松动; B 组出现吞咽梗阻感 4 例, 钛网沉降 2 例, 钛板螺钉松动 1 例。结论: 两种颈前路减压融合术治疗两节段脊髓型颈椎病, 均能有效减压, 改善病椎 Cobb 角及颈椎生理曲度。ACDF 术式可直接去除椎间水平的致压物, 椎体破坏小, 颈椎生理曲度恢复良好; ACCF 术式椎体次全切除, 操作空间大, 易于去除椎体后缘骨赘及钙化的后纵韧带。长期随访显示, ACDF 与 ACCF 术式效果良好, 技术成熟, 疗效接近。

通讯作者: 王楠 E-mail: wangnan1105@126.com

Corresponding author: WANG Nan E-mail: wangnan1105@126.com

【关键词】 脊髓型颈椎病； 颈前路椎间盘切除融合术； 颈前路椎体次全切减压融合术； 减压术； 脊柱融合术
中图分类号：R681.5

DOI:10.12200/j.issn.1003-0034.2020.09.010

开放科学(资源服务)标识码(OSID):



Comparison of clinical effects of two anterior cervical decompression with fusion on treating two-segment cervical spondylotic myelopathy CHEN En-liang, WANG Nan, and QUAN Ren-fu. Department of Orthopaedics, Xiaoshan Hospital of Traditional Chinese Medicine, Hangzhou 311201, Zhejiang, China

ABSTRACT Objective: To explore the clinical effects of anterior cervical discectomy with fusion (ACDF) and anterior cervical corpectomy with fusion (ACCF) in treating adjacent two-segment cervical spondylotic myelopathy (CSM). **Methods:** The clinical data of 37 patients with adjacent two-segment CSM treated from January 2016 to December 2017 were retrospectively analyzed, including 15 males and 22 females, aged from 43 to 69 years old with an average of 54.6 years. The patients were divided into ACDF group (group A, n=17) and ACCF group (group B, n=20) according to the different surgery. The operation time and intraoperative blood loss were recorded; the Cobb angle and cervical curvature in the cervical fusion segments before surgery and 1, 12 months after surgery were observed; Japanese Orthopaedic Association (JOA) score was used to evaluate the surgical efficacy, and the postoperative complications were analyzed. **Results:** All patients were followed up for 12 to 24 months with an average of 18.5 months. Operation time and intraoperative blood loss in group A were (106.3±22.6) min, (52.2±26.4) ml, respectively, while were (115.6±16.8) min, (61.7±20.7) ml in group B. There was no statistically significant in operation time between two groups (P>0.05); intraoperative blood loss in group B was larger than group A (P<0.05). The preoperative and postoperative 1 and 12 months, cervical curvature and Cobb angle of cervical fusion segment in group A were (11.28±1.40)°, (17.56±1.90)°, (16.64±1.80)° and (4.93±4.20)°, (9.44±2.60)°, (9.25±2.80)°, respectively, and in group B were (10.59±1.20)°, (16.26±2.10)°, (15.76±2.50)° and (4.75±3.90)°, (7.98±2.10)°, (7.79±3.00)°. The cervical curvature and Cobb angle in all cervical fusion segments at 1, 12 months after surgery were obviously improved, and group A recovered more significantly than group B (P<0.05). The JOA scores in group A were 9.46±1.70, 11.56±1.40, 14.86±1.20 before operation and 1 and 12 months after operation, and group B were 9.11±1.50, 11.40±1.30, 15.12±1.60, respectively. The postoperative JOA scores of the two groups were significantly improved (P<0.05), and there was no statistically significant difference between two groups at the same time (P>0.05). At the final follow-up, in group A, dysphagia occurred in 2 cases, cage displacement in 1 case, and no titanium plate screw loose was found; and in group B, dysphagia occurred in 4 cases, titanium mesh collapse in 2 cases, titanium plate screw loose in 1 case. **Conclusion:** Two types of anterior cervical decompression and fusion for the treatment of two-segment cervical spondylotic myelopathy can effectively decompress and improve the Cobb angle and cervical curvature of the affected vertebra. The ACDF surgical procedure can directly remove the compressive thing at intervertebral level, which will lead to little vertebral body damage and favorably recovered cervical curvature. The ACCF surgical procedure has a large operation space, which can easily remove the posterior vertebral osteophyte and the calcified posterior longitudinal ligament. Long-term follow-up shows that ACDF and ACCF have good surgical procedures, mature technology, and close efficacy.

KEYWORDS Cervical spondylotic myelopathy; Anterior cervical discectomy with fusion; Anterior cervical corpectomy with fusion; Decompression; Spinal fusion

脊髓型颈椎病(cervical spondylotic myelopathy, CSM)是由于颈椎间盘退行性病变及继发椎间关节退变,导致椎间盘突出、局部椎间隙后缘骨赘增生、后纵韧带钙化,引起脊髓压迫,产生相应临床症状的一种疾病,严重者需要手术治疗^[1]。颈部前路手术经组织间隙进入,可以直接去除脊髓致压物,减压椎管,支撑植骨固定,改善颈椎生理曲度,应用广泛^[2]。在临床治疗中,常用的经典颈椎前路手术方式主要有两种,Smith-Robinson 颈前路椎间盘切除融合术(anterior cervical discectomy with fusion, ACDF),颈前路椎体次全切减压融合术(anterior cervical corpectomy with fusion, ACCF)^[3]。ACDF 手术是治疗单纯的颈椎间盘突出导致的脊髓压迫的“金标准”,能直接解除突出或脱出的颈椎间盘对脊髓的压迫,术后疗效

稳定^[4]。当椎体后缘出现较大骨赘、后纵韧带骨化压迫时,则采用 ACCF 术式,其减压范围更为广泛,植骨更充分^[5]。国内外手术治疗多节段(≥2 个)脊髓型颈椎病,手术方式的选择仍未取得共识。临床治疗中,需要考虑 ACDF 术式可能无法彻底减压,ACCF 术后颈椎生理曲度变直,钛网沉降的缺点^[6]。笔者回顾性分析 2016 年 1 月至 2017 年 12 月诊治的相邻两节段脊髓型颈椎病患者 37 例,分别采用 ACDF 与 ACCF 术式治疗,比较两者的优劣,指导临床工作,现报告如下。

1 资料与方法

1.1 病例选择

纳入标准:符合颈椎病的诊断标准,CT 和 MRI 证实存在颈椎间盘突出、颈椎不稳定,伴明显脊髓压

迫症状,保守治疗 3 个月无效;影像学检查显示相邻两个节段颈椎脊髓腹侧受压,受压主要来自椎间盘、椎体后缘骨赘和程度较轻的后纵韧带钙化,在 C₃-T₁ 节段。排除标准:颈椎创伤或者其他因素导致脊髓压迫症状急剧加重者;脊椎感染、肿瘤、颈椎后纵韧带骨化、椎体发育畸形者;合并严重的骨质疏松者。

1.2 一般资料

选择 2016 年 1 月至 2017 年 12 月接受 ACDF 及 ACCF 治疗的相邻两节段脊髓型颈椎病患者 37 例,其中男 15 例,女 22 例,年龄 43~69 岁,平均 54.6 岁。根据治疗方法分为颈前路椎间盘切除融合术治疗组(A 组,17 例),颈前路椎体次全切减压融合术治疗组(B 组,20 例)。A 组男 7 例,女 10 例,年龄 43~64 (52.4±4.9)岁,病程 3~36(10.8±3.2)个月,病变节段 C₃-C₅ 4 例,C₄-C₆ 7 例,C₅-C₇ 有 6 例;B 组男 8 例,女 12 例,年龄 46~69(55.9±6.3)岁,病程 3~48(14.2±4.5)个月,病变节段 C₃-C₅ 5 例,C₄-C₆ 8 例,C₅-C₇ 7 例。两组患者一般资料比较差异无统计学意义,见表 1。所有患者术前颈椎正侧位及动力位 X 线片显示手术节段椎间高度改变,椎体后缘骨质增生,颈椎生理弧度欠佳,无明显后凸畸形,颈椎各节段无明显失稳和滑脱。CT 显示后纵韧带无明显骨化和严重钙化。MRI 提示受累的相邻节段均有不同程度的脊髓压迫。

1.3 治疗方法

1.3.1 手术方法 全身麻醉成功后,取仰卧位,于右颈部做横形切口长约 5 cm,切开颈阔肌,做钝性分离,分离颈动脉鞘和内脏间隔,显露责任椎间隙,置入定位针,C 形臂 X 线透视定位,撑开椎间隙。A 组采用标准 ACDF 法,减压过程中首先切除责任椎间隙的颈椎椎间盘,处理上下软骨终板,刮匙刮除椎体后缘骨赘,切除增生肥厚的后纵韧带,探查硬膜囊膨隆良好,椎管减压彻底。测量责任椎间隙高度,试模后悬着合适大小的 cage,在 cage 中填充术中切除的碎骨,适当撑开椎间隙后置入 cage。椎体前方以颈前路钢板固定;B 组采用标准 ACCF 法,首先摘除病变的两节段椎间盘,切除责任椎体,勾刀切开后纵韧带,

咬除椎体后缘骨赘,小心切除增生肥厚的后纵韧带,选取合适长度钛网,将减压过程中切除的碎骨填入钛网,将钛网置入骨槽,撑开恢复颈椎高度,以颈前路钢板固定。手术器械均由美敦力公司提供,手术均由同一主刀医生完成。

1.3.2 术后处理 所有患者术后 24 h 停用抗生素,术后 48 h 内拔除引流管后协助患者佩戴颈托后下地行走,康复科指导患者加强四肢功能锻炼,嘱咐患者术后佩戴颈托固定 1 个月。

1.4 观察项目与方法

1.4.1 一般情况观察 记录两组患者性别、年龄、病程、病变节段、手术时间、术中出血量。

1.4.2 影像学观察 观察两组患者术前及术后 1、12 个月颈椎融合节段 Cobb 角、颈椎曲度。(1)颈椎融合节段 Cobb 角测量方法:在标准的颈椎侧位 X 线片上测量融合节段头椎上终板平行线与尾椎下终板平行线垂直线的夹角。(2)颈椎曲度又称颈椎前凸 Cobb 角,测量 C₂-C₇ 前凸角度,采用 4 线法测量,在 C₂ 下缘和 C₇ 下缘各画 1 条平行线,各自垂直线相交所得的锐角角度即为颈椎曲度。

1.4.3 临床疗效评定 术前及术后 1、12 个月随访时分别依照日本矫形外科学会(Japanese Orthopaedic Association,JOA)评分法评定神经功能,并计算改善率。改善率=[(术后评分-术前评分)/(17 分-术前评分)]×100%。疗效评定标准:优,改善率>75%;良,改善率 50%~74%;好转,改善率 25%~49%;无效,改善率<25%。

1.4.4 并发症观察 随访时观察两组并发症情况,包括伤口感染,吞咽梗阻感,内固定移位、松动、断裂,植骨节段融合情况及 C₅ 神经根麻痹等。

1.5 统计学处理

采用 SPSS16.0 统计软件。定量资料以均数±标准差($\bar{x}\pm s$)表示。两组年龄、病程、手术时间、术中出血量及手术前后颈椎曲度、颈椎融合节段 Cobb 角、JOA 评分比较采用独立样本 t 检验,两组性别、病变节段分布比较采用 χ^2 检验。以 P<0.05 为差异有统计学意义。

表 1 两组脊髓型颈椎病患者一般资料比较

Tab.1 Comparison of the general data between two groups with cervical spondylotic myelopathy

组别	例数	年龄 ($\bar{x}\pm s$, 岁)	性别(例)		病程 ($\bar{x}\pm s$, 月)	病变节段分布(例)		
			男	女		C ₃ -C ₅	C ₄ -C ₆	C ₅ -C ₇
A 组	17	52.4±4.9	7	10	10.8±3.2	4	7	6
B 组	20	55.9±6.3	8	12	14.2±4.5	5	8	7
检验值		t=0.221	$\chi^2=0.357$		t=-0.483	$\chi^2=0.530$		
P 值		0.801	0.507		0.586	0.596		

2 结果

2.1 一般情况比较

两组患者均获随访,时间 12~24 个月,平均 18.5 个月。两组患者手术时间差异无统计学意义($P>0.05$); A 组术中出血量少于 B 组($P<0.05$),见表 2。

表 2 两组脊髓型颈椎病患者术后一般情况比较($\bar{x}\pm s$)

Tab.2 Comparison of postoperative general conditions of patients with cervical spondylotic myelopathy between two groups($\bar{x}\pm s$)

组别	例数	手术时间(min)	术中出血量(ml)
A 组	17	106.3±22.6	52.2±26.4
B 组	20	115.6±16.8	61.7±20.7
<i>t</i> 值		4.97	11.53
<i>P</i> 值		>0.05	<0.05

2.2 影像学观察结果

两组患者术前颈椎曲度、颈椎融合节段 Cobb 角比较差异均无统计学意义($P>0.05$);术后 1、12 个月颈椎曲度、颈椎融合节段 Cobb 角均较术前明显改善($P<0.05$),A 组较 B 组恢复更明显($P<0.05$),见表 3。

2.3 临床疗效

术后 1、12 个月两组患者 JOA 评分较术前均显著升高($P<0.05$),但组间同时间段比较差异无统计学意义($P>0.05$),见表 4。

2.4 术后并发症

A 组患者术后发生吞咽梗阻感 2 例,术后 cage 移位 1 例,未发生钛板螺钉松动,并发症发生率 17.6%。B 组患者术后发生吞咽梗阻感 4 例,术后钛网沉降移位 2 例,钛板螺钉松动 1 例,术后切口感染 1 例加强换药后缓解,并发生发生率 40.4%。A 组并发症发生率小于 B 组。所有随访者未发生术中脊髓损伤、血管损伤、慢性食道瘘、死亡等严重并发症。典型病例见图 1,2。

3 讨论

3.1 颈前路经典术式的比较及选择

颈前路手术椎管减压直接,椎间高度及生理曲度恢复有效,植骨融合率较高,手术操作安全简洁,成为临床较常用的单一术式^[7]。ACDF 适用于因轻中度颈椎间盘突出或退变引起的脊髓型颈椎病。主要适应证:短节段来自椎管前方的压迫;颈椎节段性后凸,相邻两节段生理曲度的改变;颈椎不稳^[8]。该术式创伤小、出血少,可以直接去除椎间盘致压物,减压效果良好。同时椎间融合器植入后,可一定程度上撑开病变椎间隙,增加椎间高度,适当恢复颈椎生理曲度,给予椎管内组织足够空间,为神经脊髓的功能恢复创造条件。但该术式手中视野范围小,操作空间有限,椎体后方减压困难^[9-10]。ACCF 适用于椎管内压迫主要位于椎体后壁的脊髓型颈椎病,压迫组织包括椎体后缘增生的骨赘、钙化的后纵韧带和巨大

表 3 两组脊髓型颈椎病患者手术前后颈椎影像学参数比较($\bar{x}\pm s, ^\circ$)

Tab.3 Comparison of pre-and post-operative image data between two groups with cervical spondylotic myelopathy($\bar{x}\pm s, ^\circ$)

组别	例数	颈椎曲度			颈椎融合节段 Cobb 角		
		术前	术后 1 个月	术后 12 个月	术前	术后 1 个月	术后 12 个月
A 组	17	11.28±1.40	17.56±1.90	16.64±1.80	4.93±4.20	9.44±2.60	9.25±2.80
B 组	20	10.59±1.20	16.26±2.10	15.76±2.50	4.75±3.90	7.98±2.10	7.79±3.00
<i>t</i> 值		0.72	0.88	2.65	0.38	0.79	3.34
<i>P</i> 值		>0.05	<0.05	<0.05	>0.05	<0.05	<0.05

表 4 两组脊髓型颈椎病患者手术前后 JOA 评分比较($\bar{x}\pm s, \text{分}$)

Tab.4 Comparison of pre-and post-operative JOA scores between two groups with cervical spondylotic myelopathy($\bar{x}\pm s, \text{score}$)

时间	A 组(例数=17)					B 组(例数=20)				
	上肢功能	下肢功能	感觉	膀胱功能	总分	上肢功能	下肢功能	感觉	膀胱功能	总分
术前	2.25±0.40	2.47±0.20	3.41±0.50	1.62±0.30	9.46±1.70	2.13±0.30	2.61±0.50	3.50±0.50	1.45±0.30	9.11±1.50
术后 1 个月	4.62±0.40	3.82±0.40	4.92±0.30	2.51±0.60	11.56±1.40 ^①	4.51±0.40	3.72±0.50	4.71±0.40	2.20±0.20	11.40±1.30 ^③
术后 12 个月	4.51±0.40	3.81±0.50	5.01±0.40	2.72±0.50	14.86±1.20 ^②	4.60±0.50	3.86±0.40	5.04±0.30	2.59±0.50	15.12±1.60 ^④

注:两组总分比较:术前, $t=1.89, P=0.51$;术后 1 个月, $t=0.42, P=0.62$;术后 12 个月, $t=1.87, P=0.56$ 。与术前总分比较,^① $t=-11.27, P=0.00$,^② $t=-17.48, P=0.00$,^③ $t=-18.56, P=0.00$,^④ $t=-19.71, P=0.00$

Note: Comparison of total score between two groups, preoperative, $t=1.89, P=0.51$; one month after operation, $t=0.42, P=0.62$; twelve months after operation, $t=1.87, P=0.56$. Compared with preoperative total score, ^① $t=-11.27, P=0.00$; ^② $t=-17.48, P=0.00$; ^③ $t=-18.56, P=0.00$; ^④ $t=-19.71, P=0.00$

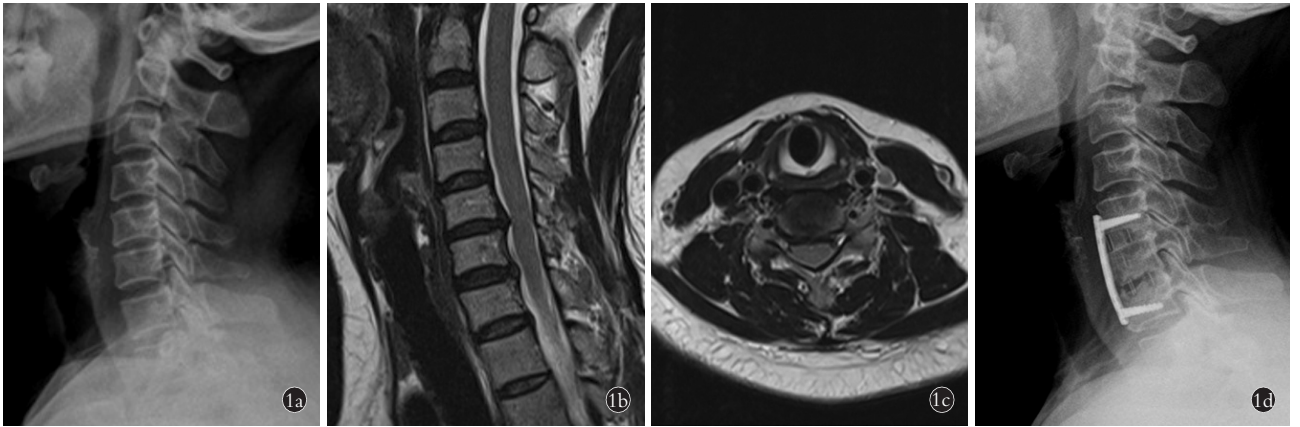


图 1 女性患者,47 岁,C₅-C₇ 两节段脊髓型颈椎病,行 ACDF 术 **1a**. 术前颈椎侧位 X 线片 **1b,1c**. 术前颈椎 MRI 中 T2 加权影像显示 C₅-C₇ 两节段椎间盘突出,脊髓受压 **1d**. 术后 12 个月随访时侧位 X 线片示颈椎 C₅-C₇ 节段内固定稳定,椎间融合器无明显下沉,位置良好

Fig.1 An 47-year-old female patient with C₅-C₇ cervical spondylotic myelopathy was treated with anterior cervical discectomy and fusion **1a**. Preoperative lateral X-ray film **1b,1c**. Preoperative MRI showed the intervertebral disc herniation of C₅-C₇ with the corresponding spinal cord compression **1d**. At 12 months after operation, the lateral X-ray film of the cervical vertebra showed the internal fixation was stable with good position, no obvious cage collapse was found



图 2 女性患者,57 岁,C₄-C₆ 两节段脊髓型颈椎病,行 ACCF 术 **1a**. 术前颈椎侧位 X 线片示椎体后缘骨髓明显 **1b,1c**. 术前颈椎 MRI 中 T2 加权影像显示 C₄-C₆ 两节段脊髓受压明显,椎管狭窄 **1d**. 术后 12 个月随访时侧位 X 线片示颈椎 C₄-C₆ 节段钛网植入融合良好,前方钛板内固定稳定

Fig.2 A 57-year-old female patient with C₄-C₆ cervical spondylotic myelopathy was treated with anterior cervical corpectomy with fusion **1a**. Preoperative lateral X-ray film showed obvious bone marrow at the posterior edge of vertebral body **1b,1c**. Preoperative T2 weighted images of MRI showed that the C₄-C₆ spinal cord was significantly compressed and the spinal stenosis **1d**. At 12 months after operation, the lateral X-ray showed that the implantation and fusion of titanium mesh were good and the internal fixation of anterior titanium plate was stable in the cervical spine C₄-C₆ segment

椎间盘突出等^[11]。主要适应证:椎间盘、骨赘等致压物超过椎间隙后缘,可合并后纵韧带骨化;合并颈椎不稳的椎管狭窄;不可纠正的颈椎后凸畸形^[12]。该术式通过颈椎椎体次全切除,可以在较好的视野条件下充分减压,广泛清除椎体后缘的致压物,建立良好的颈椎曲度,获得较高的植骨融合率^[6]。但该术式因切除范围较大,破坏邻近椎体前、中柱,容易造成固定钛板移位松动失效,植入钛网沉降,颈椎生理弧度减小甚至反向畸形等^[13]。在临床中,治疗多节段(≥ 3 个)脊髓型颈椎病多采用“混合式”减压技术,当涉及节段较多时,对不同节段的压迫情况,灵活选择不

同的减压术式减压融合^[14]。本组治疗相邻两节段脊髓型颈椎病时,根据致压物情况不同,分别采用单一 ACDF 或 ACCF 术式治疗,观察其手术适应证及并发症情况,为临床治疗中对颈椎前路经典术式的选择提供了参考。

3.2 手术操作注意事项

ACDF 术式治疗相邻两节段颈椎病,椎体破坏小,需要清除颈椎相邻节段间的纤维环、髓核和软骨终板等组织。务必保护骨性终板,骨性组织可以有效避免术后融合器的下沉^[15]。试模,参照邻近椎体椎间隙大小并结合 X 线确认融合器大小后植入。选取融

合器维持椎间隙合适的高度，测量邻近上下椎间隙的大小，取均数估计大小，不可过撑。过大的融合器使椎间隙高度过增，会导致术后颈部轴性症状，包括颈肩部疼痛无力等症状^[16]。ACCF 术式中，对脊髓压迫的两节段行椎体次全切除，对相邻节段前、中柱破坏较大，术前要根据影像学检查仔细评估，确定责任间隙，明确手术节段。显露椎体前方后，使用撑开器适当撑开椎间隙，不可过撑，适度恢复椎间高度及颈椎生理曲度^[17]。在咬除椎体大部分骨块时，使用咬骨钳，当邻近椎体后缘时，清除骨赘及残余致压物时使用刮匙和咬骨钳小心操作，必要时可在显微镜下操作，以减少并发症的发生。刮匙刮除软骨终板至骨面渗血，保留骨性终板的完整性，有利于融合稳定^[18]。置入的钛网要修剪成前方长方后方的楔形，有利于颈椎生理曲度的恢复，也能一定程度上降低因钛网上下缘平行而导致终板塌陷^[19]。

3.3 术中及术后并发症情况

两者作为颈前路经典术式，技术操作均较为成熟。本研究结果显示，在两节段脊髓型颈椎病的治疗过程中，相对来说，ACDF 术式因可以直接去除椎间水平的致压物，不需要部分切除椎体，操作相对安全，具有创伤小、用时短、出血少的优势。椎间融合器 cage 具有一定的解剖形态且大小可选，术中病变椎间隙撑开后，能直接增加手术节段椎间隙高度，间接恢复颈椎生理曲度^[20]。ACCF 术式因椎体次全切除，术中得到较大的可视范围和操作空间，更易于去除椎体后缘增生的骨赘及钙化的后纵韧带^[21]。对合并严重椎管狭窄，该术式可避免术中盲目操作，降低硬膜和脊髓损伤发生率^[22]。尽管两节段颈前路手术破坏较小，仍不可避免的出现术后并发症情况。包括因喉返神经及喉上神经损伤导致声音嘶哑、吞咽困难等症状。Fountas 等^[23]随访 1 015 例行 ACDF 手术的颈椎病患者，发现其中 12.6% 出现喉返神经损伤表现。王岩等^[24]随访 168 例颈前路手术后认为，随着手术时间的延长，吞咽困难并发症显著增多，不论何种术式，应建议尽可能缩短手术时间，选择快捷的手术方式。术后植骨不融合，继而发生内固定松动也是较为常见的并发症。在颈前路融合中，随着手术节段的增加，会显著提高植骨融合的失败率^[25]。有研究报道颈前路手术中，ACDF 术式植骨块与椎体接触面较多，提供了更多的固定平台，具有良好的稳定性，有利于植骨融合；而 ACCF 术式中仅有 2 个接触面，稳定性相对较差，植骨不融合发生率也相对较高^[26]。在多节段的颈前路手术中，C₅ 神经根麻痹发生率为 4.3%^[27]，颈椎减压术后伴随着三角肌和(或)肱二头肌运动功能麻痹障碍，常伴发 C₅ 神经根支配区感觉

障碍和疼痛。此外，脑脊液漏、食管痿、感染等都是术后可能出现的并发症状。

参考文献

- [1] 刘涛,李浩曦,黄宇峰,等.下颈椎前路减压融合术后颈椎矢状位平衡的变化[J].中国脊柱脊髓杂志,2018,28(6):496-502. LIU T,LI HX,HUANG YF,et al. Changes of cervical balance after anteriorcervical discectomy and fusion[J]. Zhongguo Ji Zhu Ji Sui Za Zhi,2018,28(6):496-502. Chinese.
- [2] 徐宝山,马信龙,胡永成,等.颈椎间盘突出症的经皮内镜治疗策略[J].中华骨科杂志,2018,38(16):961-970. XU BS,MA XL,HU YC,et al. The strategy and results of percutaneous endoscopic surgery for cervical disc herniation[J]. Zhonghua Gu Ke Za Zhi,2018,38(16):961-970. Chinese.
- [3] 唐步顺,颜程,张小克,等.两种前路 Hybrid 技术治疗多节段脊髓型颈椎病的比较[J].中国骨伤,2018,31(11):1034-1040. TANG BS,YAN C,ZHANG XK,et al. Comparative analysis of two hybrid technique in treating multilevel cervical spondylotic myelopathy via anterior approach[J]. Zhongguo Gu Shang/China J Orthop Trauma,2018,31(11):1034-1040. Chinese with abstract in English.
- [4] Tzaan WC. Anterior percutaneous endoscopic cervical discectomy for cervical intervertebral disc herniation:outcome,complications, and technique[J]. J Spinal Disord Tech,2011,24(7):421-431.
- [5] 井龙飞,罗绪建,丛琳,等.前路与后路手术治疗多节段脊髓型颈椎病的比较[J].中国矫形外科杂志,2018,26(11):972-976. JING LF,LUO XJ,CONG L,et al. Anterior versus posterior surgeries for multilevel cervical spondylotic myelopathy[J]. Zhongguo Jiao Xing Wai Ke Za Zhi,2018,26(11):972-976. Chinese.
- [6] 黄凯,常步青,于潮将,等.颈前路椎体次全切除联合椎间隙减压融合治疗多节段脊髓型颈椎病[J].中国骨伤,2018,31(1):18-22. HUANG K,CHANG BQ,YU CJ,et al. Anterior corpectomy combined with intervertebral decompression and fusion for multilevel cervical spondylotic myelopathy[J]. Zhongguo Gu Shang/China J Orthop Trauma,2018,31(11):18-22. Chinese with abstract in English.
- [7] 谭明生,齐英娜,吴鑫杰.脊髓型颈椎病的外科治疗与从督论治的思考[J].中国骨伤,2018,31(1):1-4. TAN MS,QI YN,WU XJ. Thinking of the surgical treatment for cervical spondylotic myelopathy and the dredging Du meridian[J]. Zhongguo Gu Shang/China J Orthop Trauma,2018,31(1):1-4. Chinese with abstract in English.
- [8] Alvin MD,Qureshi S,Klineberg E,et al. Cervical degenerative disease:systematic review of economic analysis[J]. Spine(Phila Pa 1976),2014,39(22):53-64.
- [9] Lin Q,Zhou X,Wang X,et al. A comparison of anterior cervical discectomy and corpectomy in patients with multilevel cervical spondylitic myelopathy[J]. Eur Spine J,2012,21(1):474-481.
- [10] 赵波,秦杰,王栋,等.颈椎前路减压分段融合术和后路椎管扩大成形术治疗多节段脊髓型颈椎病的病例对照研究[J].中国骨伤,2016,29(3):205-210. ZHAO B,QIN J,WANG D,et al. Case contral study of anterior cervical decompression plus sublevel fusion and posterior cervical laminoplasty for the treatment of multileval cervical spondylotic myelopathy[J]. Zhongguo Gu Shang/China J Orthop Trau-

- ma, 2016, 29(3):205–210. Chinese with abstract in English.
- [11] Han YC, Liu ZQ, Wang SJ, et al. Is anterior cervical discectomy and fusion superior to corpectomy and fusion for treatment of multilevel cervical spondylotic myelopathy? A systemic review and meta-analysis[J]. PLoS One, 2014, 9(1):e87191.
- [12] Sah S, Wang L, Dahal M, et al. Surgical management of cervical spondylotic myelopathy[J]. JNMA J Nepal Med Assoc, 2012, 52(188):172–177.
- [13] Shamji MF, Massicotte EM, Traynelis VC, et al. Comparison of anterior surgical options for the treatment of multilevel cervical spondylotic myelopathy: a systematic review[J]. Spine (Phila Pa 1976), 2013, 38(22 Suppl 1):195–209.
- [14] 唐步顺, 颜程, 张小克, 等. 两种前路 Hybrid 技术治疗多节段脊髓型颈椎病的比较[J]. 中国骨伤, 2018, 31(11):1034–1040. TANG BS, YAN C, ZHANG XK, et al. Comparative analysis of two hybrid technique in treating multilevel cervical spondylotic myelopathy via anterior approach[J]. Zhongguo Gu Shang/China J Orthop Trauma, 2018, 31(11):1034–1040. Chinese with abstract in English.
- [15] 江兵, 曹燕庆, 潘宏, 等. 自稳型颈椎融合器在颈椎前路融合手术中的临床应用[J]. 中国骨伤, 2015, 28(4):294–299. JIANG B, CAO YQ, PAN H, et al. Clinical application of stand-alone MC+PEEK cage in the anterior cervical fusion[J]. Zhongguo Gu Shang/China J Orthop Trauma, 2015, 28(4):294–299. Chinese with abstract in English.
- [16] 徐良丰, 周景和, 水小龙, 等. 颈前路手术治疗双节段脊髓型颈椎病的疗效及预后因素分析[J]. 中国骨伤, 2011, 24(2):149–153. XU LF, ZHOU JH, SHUI XL, et al. Analysis of outcome and prognostic factors of anterior approach for two level cervical spondylotic myelopathy[J]. Zhongguo Gu Shang/China J Orthop Trauma, 2011, 24(2):149–153. Chinese with abstract in English.
- [17] 蒋欣, 谭明生. 颈椎前路融合术后发生症状性邻近节段退变的临床研究[J]. 中国骨伤, 2007, 20(2):808–811. JIANG X, TAN MS. Symptomatic adjacent segment disease after a nterior cervical interbody fusion[J]. Zhongguo Gu Shang/China J Orthop Trauma, 2007, 20(2):808–811. Chinese with abstract in English.
- [18] Shi JS, Lin B, Xue C, et al. Clinical and radiological outcomes following hybrid surgery in the treatment of multilevel cervical spondylosis: over a 2 years follow up[J]. J Orthop Surg Res, 2015, 10:185.
- [19] 朱佳福, 严宁, 徐卫星, 等. 前路联合术式与后路单开门治疗 3 节段脊髓型颈椎病的疗效观察[J]. 中国骨伤, 2018, 31(1):37–42. ZHU JF, YAN N, XU WX, et al. Comparison of clinical effects between anterior cervical discectomy combined with corpectomy and cervical posterior single open-door laminoplasty in treating three-segment cervical spondylotic myelopathy[J]. Zhongguo Gu Shang/China J Orthop Trauma, 2018, 31(1):37–42. Chinese with abstract in English.
- [20] 李磊, 刘春花, 黄卫民, 等. 3 种前路术式治疗相邻两节段脊髓型颈椎病的疗效分析[J]. 新疆医科大学学报, 2016, 39(10):1253–1256. LI L, LIU CH, HUANG WM, et al. Analysis of curative effect for three anterior approaches in treatment of adjacent two segments cervical spondylotic myelopathy[J]. Xin Jiang Yi Ke Da Xue Xue Bao, 2016, 39(10):1253–1256. Chinese.
- [21] Dickeman RD, Reynolds AS, Morgan B. Polyetheretherketone (PEEK) cage filed with bone morphogenic protein and demineralized bone matrix in anterior cervical discectomy and fusion[J]. Int Orthop, 2008, 32(5):717.
- [22] 宋科冉, 袁文, 王新伟, 等. 椎体次全切除与椎间隙减压治疗多节段颈椎病的疗效比较[J]. 脊柱外科杂志, 2011, 9(2):102–107. SONG KR, YUAN W, WANG XW, et al. Clinical outcome of anterior cervical corpectomy with fusion versus anterior cervical discectomy with fusion for multilevel cervical spondylosis[J]. Ji Zhu Wai Ke Za Zhi, 2011, 9(2):102–107. Chinese.
- [23] Fountas KN, Kapsalaki EZ, Nikolakakos LG, et al. Anterior cervical discectomy and fusion associated complications[J]. Spine (Phila Pa 1976), 2007, 32(21):2310–2317.
- [24] 王岩, 白一冰, 肖嵩华, 等. 颈椎病前路择期手术后早期并发症分析[J]. 中华骨科杂志, 2004, 24(9):538–542. WANG Y, BAI YB, XIAO SH, et al. Evaluation of early complications of selective anterior cervical surgery[J]. Zhonghua Gu Ke Za Zhi, 2004, 24(9):538–542. Chinese.
- [25] 许良, 孔鹏, 徐展望. 颈前路椎体次全切除减压钛网植骨融合联合钛板固定治疗多节段脊髓型颈椎病[J]. 中国骨伤, 2016, 29(3):211–215. XU L, KONG P, XU ZW. Anterior corpectomy decompression and titanium mesh bone graft fusion combined with titanium plate fixation for the treatment of the multilevel cervical spondylotic myelopathy[J]. Zhongguo Gu Shang/China J Orthop Trauma, 2016, 29(3):211–215. Chinese with abstract in English.
- [26] 袁文, 王新伟, 陈德玉, 等. 保留椎体后壁的椎体次全切除扩大减压术[J]. 中华骨科杂志, 2005, 25(11):667–669. YUAN W, WANG XW, CHEN DY, et al. Subtotal corpectomy with the posterior vertebral wall retention for the extensive decompression[J]. Zhonghua Gu Ke Za Zhi, 2005, 25(11):667–669. Chinese.
- [27] Sakanna H, Hosono N, Mukai Y, et al. C₅ palsy after decompression surgery for cervical myelopathy: review of the literature[J]. Spine (Phila Pa 1976), 2003, 28(21):2447–2451.

(收稿日期:2019-06-19 本文编辑:王宏)