

## · 临床研究 ·

## 后路单开门短节段侧块螺钉内固定结合“锚定法”椎管扩大椎板成形术治疗不稳定型脊髓型颈椎病

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**【摘要】目的** 探讨后路单开门短节段侧块螺钉内固定结合“锚定法”椎管扩大椎板成形术治疗不稳定型脊髓型颈椎病(CSM)的临床疗效。**方法** 回顾性分析2014年1月—2016年1月采用短节段侧块螺钉内固定结合“锚定法”椎管扩大椎板成形术治疗的35例不稳定型CSM患者(A组)临床资料,并与同期采用微型钛板内固定结合椎管扩大椎板成形术治疗27例不稳定型CSM患者(B组)临床资料进行比较。记录并比较2组手术时间、术中出血量、术后引流量等临床指标及手术前后颈椎曲度、颈椎活动度(ROM)、椎管矢状径及扩大率、椎管横截面积、脊髓后移距离等影像学参数,采用日本骨科学会(JOA)评分、疼痛视觉模拟量表(VAS)评分及颈椎功能障碍指数(NDI)评估疗效,并观察术后轴性症状、C<sub>5</sub>神经根麻痹、椎板“再关门”等并发症发生情况。**结果** 所有手术顺利完成。2组随访时间、术中出血量、术后引流量组间比较差异无统计学意义( $P>0.05$ )。手术时间B组长于A组,末次随访时颈椎ROM A组优于B组,差异均有统计学意义( $P<0.05$ )。末次随访时,2组颈椎曲度、颈椎ROM、椎管矢状径、椎管横截面积、JOA评分、VAS评分、NDI较术前明显改善,差异均有统计学意义( $P<0.05$ );颈椎曲度、椎管扩大率、椎管横截面积、脊髓后移距离、JOA评分、VAS评分、NDI组间比较差异均无统计学意义( $P>0.05$ )。A组术后发生轴性症状2例,并发症发生率为5.71%(2/35);B组术后发生轴性症状5例、C<sub>5</sub>神经根麻痹2例,并发症发生率为25.93%(7/27);2组术后均未发生椎板“再关门”;并发症发生率组间比较差异有统计学意义( $P<0.05$ )。**结论** 后路单开门短节段侧块螺钉内固定结合“锚定法”椎管扩大椎板成形术治疗不稳定型CSM,可明显改善患者脊髓功能,维持颈椎曲度及稳定性,降低并发症发生率,临床疗效满意。

**【关键词】** 颈椎; 颈椎病; 内固定器; 椎板成形术; 减压术, 外科

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# Posterior single-door short-segmental lateral mass screw fixation combined with “anchoring” method in laminoplasty for unstable cervical spondylotic myelopathy

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**【Abstract】Objective** To investigate the clinical efficacy of posterior single-door short-segmental lateral mass screw fixation combined with “anchoring” method in laminoplasty for the treatment of unstable cervical spondylotic myelopathy (CSM). **Methods** The clinical data of 35 patients with unstable CSM treated with posterior single-door short-segmental lateral mass screw fixation combined with “anchoring” method of laminoplasty (group A) from January 2014 to January 2016 were retrospectively analyzed, and the clinical data of 27 patients with unstable CSM treated by mini-titanium internal fixation combined with laminoplasty (group B) were compared. The clinical indicators such as operation time, intraoperative blood loss and postoperative drainage volume, and the imaging parameters such as cervical curvature, cervical range of motion (ROM), sagittal diameter and expansion rate of spinal canal, spinal canal cross-sectional area and spinal cord backward distance before and after operation were recorded and compared between the 2 groups. Japanese Orthopaedic Association (JOA) score, pain visual analogue scale (VAS) score and neck disability index (NDI) were used to evaluate the clinical efficacy. Postoperative complications such as axial symptoms, C<sub>5</sub> nerve root paralysis, and lamina “reclosure” were observed. **Results** All the operations were completed successfully. There were no statistically significant differences in the follow-up time, intraoperative blood loss and postoperative drainage volume between the 2 groups ( $P>0.05$ ). The operation time of group B was longer than that

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of group A, and the cervical ROM was better in group A than group B at the final follow-up, both with a statistically significant difference ( $P < 0.05$ ). At the final follow-up, cervical curvature, cervical ROM, sagittal diameter, cross-sectional area of the spinal canal, JOA score, VAS score and NDI were significantly improved in the 2 groups compared with those before surgery, and the differences were statistically significant ( $P < 0.05$ ); there were no statistically significant differences in cervical curvature, spinal canal expansion rate, spinal canal cross-sectional area, spinal cord retrograde distance, JOA score, VAS score or NDI score between the 2 groups ( $P > 0.05$ ). In group A, axial symptoms occurred in 2 cases, and the complication rate was 5.71% (2/35). In group B, axial symptoms occurred in 5, and C<sub>5</sub> nerve root paralysis occurred in 2 after operation, and the complication rate was 25.93% (7/27). No lamina “reclosure” occurred in both groups. The difference in complication rate between groups was statistically significant ( $P < 0.05$ ). **Conclusion** Posterior single-door short-segmental at lateral mass screw fixation combined with “anchoring” method for laminoplasty in the treatment of unstable CSM can significantly improve the spinal cord function, maintain the cervical curvature and stability, reduce the incidence of complications, and the clinical effect is satisfactory.

【Key Words】Cervical vertebrae; Cervical spondylosis; Internal fixators; Laminoplasty; Decompression, surgical

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颈椎后路单开门椎管扩大椎板成形术由 Hirabayashi 等<sup>[1]</sup>首次报道, 现已在临床广泛应用, 疗效得到脊柱外科医师及患者的认可, 尤其在颈椎退行性疾病的治疗上疗效可靠<sup>[2]</sup>。长期的临床应用中, 逐渐发现其有多种术后并发症, 包括颈部轴性疼痛、门轴处骨折、椎板“再关门”、颈椎曲度及颈椎活动度 (ROM) 丢失等, 影响其临床疗效, 降低患者生活质量。“弓弦理论”是颈椎后路手术的基本原理, 其基本要求是颈椎生理曲度良好, 能为脊髓术后自行漂移减压提供条件<sup>[3-5]</sup>。但许多患者就诊时, 常合并颈椎运动单元不稳定或颈椎曲度变化明显, 且术中一定程度上会破坏颈部肌肉、韧带、关节等结构的稳定性, 术后远期可能加重颈椎不稳, 甚至出现颈部畸形。为解决此类问题, 许多骨科医师在椎管扩大椎板成形术中采用颈椎微型钛板内固定, 但临床观察发现, 此类固定会导致颈椎 ROM 明显丢失及颈椎不稳加重等问题, 出现颈部肌肉长期疼痛、萎缩等并发症, 且是一种不可逆性损伤, 给患者生活带来痛苦<sup>[6]</sup>。为减少上述并发症并提高临床疗效, 本研究对脊髓型颈椎病 (CSM) 合并颈椎不稳的患者采用后路单开门短节段侧块螺钉内固定结合“锚定法”椎管扩大椎板成形术治疗, 并与微型钛板内固定结合椎管扩大椎板成形术的疗效、影

像学参数及术后并发症进行对比分析, 旨在为临床工作提供更好的数据支持及手术方式选择参考, 现报告如下。

## 1 资料与方法

### 1.1 一般资料

纳入标准: ①进行性的颈源性神经症状及体征, 明确诊断为不稳定型 CSM; ②颈椎 MRI 及 CT 示多节段脊髓受压; ③术前颈椎过伸过屈位 X 线片示颈椎不稳 (相邻椎体间水平位移  $> 3$  mm 或成角位移  $> 10^\circ$ )。排除标准: ①合并肌萎缩性脊髓侧索硬化症、脊髓肿瘤、颈部外伤、多发性末梢神经炎等疾病; ②既往有颈椎手术史, 同时行前后路联合手术; ③合并严重的肝肾功能不全等全身性疾病无法耐受手术; ④合并上颈椎疾患且需手术治疗; ⑤合并颈椎畸形。按照上述标准, 纳入 2014 年 1 月—2016 年 1 月收治的不稳定型 CSM 患者 62 例, 采用后路单开门短节段侧块螺钉内固定结合“锚定法”椎管扩大椎板成形术治疗 35 例 (A 组), 采用微型钛板内固定结合椎管扩大椎板成形术治疗 27 例 (B 组)。2 组患者术前一般情况差异无统计学意义 ( $P > 0.05$ , 表 1), 具有可比性。所有手术均由同一手术团队实施。

表 1 2 组患者一般资料

Tab. 1 General data of 2 groups

| 组别<br>Group | n  | 年龄 / 岁<br>Age/year | 性别<br>Gender |             | 椎管狭窄节段<br>Level of canal stenosis |                  |                  |                  |                  |                  | 颈椎不稳<br>Cervical instability |                       |
|-------------|----|--------------------|--------------|-------------|-----------------------------------|------------------|------------------|------------------|------------------|------------------|------------------------------|-----------------------|
|             |    |                    | 男<br>Male    | 女<br>Female | C <sub>3-5</sub>                  | C <sub>3-6</sub> | C <sub>3-7</sub> | C <sub>4-6</sub> | C <sub>4-7</sub> | C <sub>5-7</sub> | 单节段<br>Single segment        | 双节段<br>Double segment |
|             |    |                    |              |             |                                   |                  |                  |                  |                  |                  |                              |                       |
| A           | 35 | 61.3 ± 10.5        | 21           | 14          | 5                                 | 4                | 5                | 5                | 10               | 6                | 24                           | 11                    |
| B           | 27 | 57.5 ± 9.6         | 19           | 8           | 3                                 | 2                | 6                | 6                | 6                | 4                | 18                           | 9                     |

## 1.2 手术方法及术后处理

A组: 采用气管插管全身麻醉, 患者取俯卧位, Mayfield头架固定头部, 维持颈部轻度屈曲位。做颈部后正中切口, 于棘突两侧骨膜下剥离并显露椎板, 显露范围为C<sub>3</sub>上缘至C<sub>7</sub>下缘(手术减压节段为C<sub>3-7</sub>)。用咬骨钳剪除C<sub>3-7</sub>部分棘突, 选择症状较重侧为开门侧, 根据术前动力位X线片确定不稳定节段, 于该节段双侧置入侧块螺钉, 在其他侧块门轴侧置入带线铆钉, 在椎板和侧块移行处用高速磨钻行开门侧开槽, 磨透全层椎板。在对侧磨制“V”形骨槽至椎板深层皮质, 作为门轴侧铰链。把椎板向门轴侧逐个缓慢掀起, 同时清除椎板边缘黄韧带、硬膜囊上的粘连带, 将椎板固定于连接棒或铆钉上, 然后将咬除的棘突制成细小骨粒, 将不稳定节段处的关节突关节制成植骨床, 放置植骨粒。术中注意保持C<sub>3-7</sub>各椎板间黄韧带和棘间韧带的完整以保证开门侧的整体完整性。术毕冲洗伤口, 放置引流管, 逐层关闭切口。术后24~48 h根据引流量拔除引流管。术后3 d鼓励患者在颈托保护下下床活动, 颈托保护3~4周后进行康复训练。

B组: 采用气管插管全身麻醉, 患者取俯卧位, 显露方法同A组, 保留棘上、棘间部分韧带, 切除过长棘突, 在椎板和侧块移行处用高速磨钻行开门侧开槽, 开门侧磨透全层椎板, 在对侧磨制“V”形骨槽至椎板深层皮质, 作为门轴侧铰链。把椎板向门轴侧逐个缓慢、轻柔掀起, 同时清除椎板边缘黄韧带、硬膜囊上的粘连带, 根据开门大小选择合适的微型钛板置于两端侧块与棘突根部椎板处, 并采用自攻螺钉进行固定, 后续处理同A组。

## 1.3 评价指标

记录2组手术时间、术中出血量、术后引流量。所有患者术后复查颈椎X线片、CT及MRI。在手术前后影像学资料上测量颈椎曲度(C<sub>2-7</sub> Cobb角)、颈椎活动度(ROM)、椎管矢状径及扩大率、椎管横截

面积、脊髓后移距离。C<sub>2-7</sub> Cobb角为C<sub>2</sub>下终板与C<sub>7</sub>下终板平行线的垂线间的夹角。颈椎ROM为颈椎过伸过屈位X线片C<sub>2-7</sub> Cobb角的角度总和。椎管扩大率(%)=(术后椎管矢状径-术前椎管矢状径)/术前椎管矢状径×100%。采用日本骨科学会(JOA)评分<sup>[7]</sup>评价神经功能改善情况。采用疼痛视觉模拟量表(VAS)评分<sup>[8]</sup>及颈椎功能障碍指数(NDI)<sup>[9]</sup>评价疼痛程度及颈椎功能。记录术后颈部轴性症状、C<sub>5</sub>神经根麻痹、椎板“再关门”等并发症发生情况。

## 1.4 统计学处理

采用SPSS 13.0软件对数据进行统计学分析。符合正态分布的计量资料采用 $\bar{x} \pm s$ 表示, 手术前后组间比较采用配对样本 $t$ 检验, 组间同项指标比较采用两独立样本 $t$ 检验, 计数资料采用 $\chi^2$ 检验; 以 $P < 0.05$ 为差异有统计学意义。

## 2 结 果

所有手术顺利完成。2组随访时间、术中出血量、术后引流量组间比较差异无统计学意义( $P > 0.05$ , 表2)。手术时间B组长于A组, 末次随访时颈椎ROM A组优于B组, 差异均有统计学意义( $P < 0.05$ , 表2)。末次随访时, 2组颈椎曲度(C<sub>2-7</sub> Cobb角)、颈椎ROM、椎管矢状径、椎管横截面积、JOA评分、VAS评分、NDI较术前明显改善, 差异均有统计学意义( $P < 0.05$ , 表2); 颈椎曲度(C<sub>2-7</sub> Cobb角)、椎管扩大率、椎管横截面积、脊髓后移距离、JOA评分、VAS评分、NDI组间比较差异均无统计学意义( $P > 0.05$ , 表2)。A组术后发生轴性症状2例, 并发症发生率为5.71%(2/35); B组术后发生轴性症状5例、C<sub>5</sub>神经根麻痹2例, 并发症发生率为25.93%(7/27); 2组均未发生椎板“再关门”; 并发症发生率组间比较差异有统计学意义( $P < 0.05$ )。2组典型病例影像学资料见图1、2。

表2 2组影像学参数及临床疗效比较

Tab. 2 Comparison of imaging parameters and clinical efficacy between 2 groups

| 组别<br>Group | n  | 随访时间/月<br>Follow-up<br>period/month | 手术时间/<br>min<br>Operation<br>time/min | 术中出血量/<br>mL<br>Intraoperative<br>blood loss/mL | 术后引流量/mL<br>Postoperative<br>drainage volume/<br>mL | C <sub>2-7</sub> Cobb角/(°)<br>C <sub>2-7</sub> Cobb's angle/(°) |                          | 颈椎ROM/(°)<br>Cervical ROM/(°) |                          |
|-------------|----|-------------------------------------|---------------------------------------|-------------------------------------------------|-----------------------------------------------------|-----------------------------------------------------------------|--------------------------|-------------------------------|--------------------------|
|             |    |                                     |                                       |                                                 |                                                     | 术前<br>Pre-operation                                             | 末次随访<br>Final follow-up  | 术前<br>Pre-operation           | 末次随访<br>Final follow-up  |
|             |    |                                     |                                       |                                                 |                                                     |                                                                 |                          |                               |                          |
| A           | 35 | 20.5 ± 2.5                          | 119.0 ± 24.4 <sup>*</sup>             | 145.0 ± 58.4                                    | 231.0 ± 53.5                                        | 23.1 ± 9.1                                                      | 19.6 ± 12.4 <sup>△</sup> | 18.5 ± 14.5                   | 22.5 ± 15.5 <sup>△</sup> |
| B           | 27 | 21.4 ± 1.5                          | 149.0 ± 23.5                          | 155.0 ± 60.5                                    | 254.0 ± 46.7                                        | 22.9 ± 8.7                                                      | 19.5 ± 8.4 <sup>△</sup>  | 18.6 ± 15.5                   | 19.6 ± 14.6 <sup>△</sup> |

续表 2

| 组别<br>Group | 椎管矢状径<br>Sagittal diameter of spinal canal |                               |                             | 椎管横截面积/mm <sup>2</sup><br>Cross-sectional area of spinal canal/mm <sup>2</sup> |                           | 脊髓后移距离/mm<br>Distance of spinal cord<br>backward/mm |
|-------------|--------------------------------------------|-------------------------------|-----------------------------|--------------------------------------------------------------------------------|---------------------------|-----------------------------------------------------|
|             | 术前/mm<br>Pre-operation/mm                  | 末次随访/mm<br>Final follow-up/mm | 扩大率(%)<br>Expansion rate(%) | 术前<br>Pre-operation                                                            | 末次随访<br>Final follow-up   |                                                     |
|             |                                            |                               |                             |                                                                                |                           |                                                     |
| A           | 12.7 ± 1.5                                 | 19.3 ± 2.2 <sup>△</sup>       | 52.5 ± 20.4                 | 108.8 ± 18.5                                                                   | 175.9 ± 31.2 <sup>△</sup> | 2.0 ± 0.9                                           |
| B           | 12.8 ± 1.1                                 | 18.9 ± 1.8 <sup>△</sup>       | 51.5 ± 18.5                 | 109.1 ± 19.2                                                                   | 169.5 ± 29.1 <sup>△</sup> | 2.1 ± 1.0                                           |

| 组别<br>Group | JOA 评分<br>JOA score |                         | VAS 评分<br>VAS score |                         | NDI                 |                         |
|-------------|---------------------|-------------------------|---------------------|-------------------------|---------------------|-------------------------|
|             | 术前<br>Pre-operation | 末次随访<br>Final follow-up | 术前<br>Pre-operation | 末次随访<br>Final follow-up | 术前<br>Pre-operation | 末次随访<br>Final follow-up |
|             |                     |                         |                     |                         |                     |                         |
| A           | 9.3 ± 1.3           | 14.7 ± 1.1 <sup>△</sup> | 7.5 ± 1.2           | 1.5 ± 0.5 <sup>△</sup>  | 55.6 ± 3.4          | 33.5 ± 3.2 <sup>△</sup> |
| B           | 8.9 ± 1.1           | 14.5 ± 1.2 <sup>△</sup> | 7.2 ± 1.5           | 1.6 ± 0.7 <sup>△</sup>  | 54.2 ± 3.4          | 34.1 ± 3.1 <sup>△</sup> |

注：\*与B组相比， $P<0.05$ ； $\Delta$ 与术前相比， $P<0.05$ 。  
Note：\* $P<0.05$ , compared with group B； $\Delta$   $P<0.05$ , compared with pre-operation.

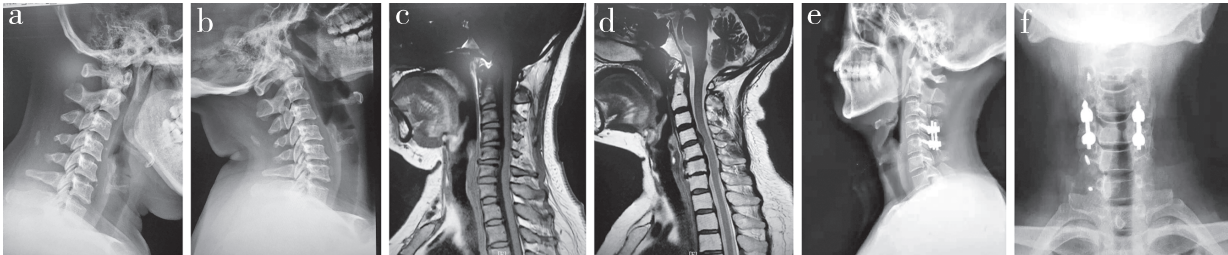


图 1 A 组典型病例影像学资料

Fig. 1 Imagine data of a typical case in group A

男，69岁 a、b：术前颈椎过伸过屈位X线片示C<sub>4</sub>/C<sub>5</sub>节段不稳 c、d：术前颈椎MRI示C<sub>4</sub>/C<sub>5</sub>/C<sub>6</sub>/C<sub>7</sub>椎间盘突出合并后纵韧带增厚，椎管狭窄，脊髓受压 e、f：术后12个月颈椎X线片示颈椎曲度恢复，内固定位置良好  
Male, 69 years old a, b: Preoperative hyperextension and hyperflexion roentgenographs show C<sub>4</sub>/C<sub>5</sub> instability c, d: Preoperative MRIs show C<sub>4</sub>/C<sub>5</sub>/C<sub>6</sub>/C<sub>7</sub> disc herniation combined with thickening of longitudinal ligament, obvious spinal canal stenosis and spinal cord compression e, f: MRIs at postoperative 12 months show cervical curvature has been restored and internal fixation position is good

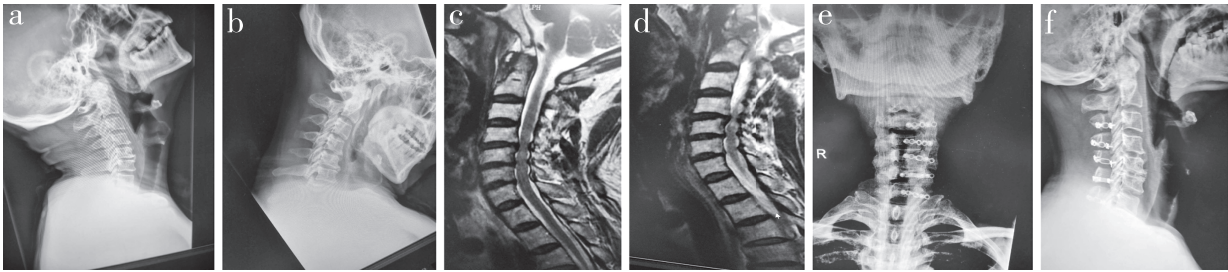


图 2 B 组典型病例影像学资料

Fig. 2 Imagine data of a typical case in group B

女，61岁 a、b：术前颈椎过伸过屈位X线片示C<sub>5</sub>/C<sub>6</sub>节段不稳 c、d：术前MRI示C<sub>5</sub>/C<sub>6</sub>/C<sub>7</sub>椎间盘突出合并后纵韧带增厚，椎管明显狭窄，脊髓受压变性 e、f：术后12个月颈椎X线片示术后颈椎曲度良好，微型钛板位置良好  
Female, 61 years old a, b: Preoperative hyperextension and hyperflexion roentgenographs show C<sub>5</sub>/C<sub>6</sub> instability c, d: Preoperative MRIs show C<sub>5</sub>/C<sub>6</sub>/C<sub>7</sub> disc herniation combined with thickening of longitudinal ligament, obvious spinal canal stenosis and spinal cord compression degeneration e, f: MRIs at postoperative 12 months show cervical curvature has been restored and micro-titanium internal fixation position is good

3 讨 论

CSM是一种中老年常见病，大部分可采用非手术治疗，但部分患者症状明显，出现行走困难、踩

棉花感、四肢麻木乏力或活动障碍<sup>[10]</sup>，影像学检查表现为颈椎椎间盘突出，韧带增厚、硬化导致椎管严重狭窄，部分患者还伴有明显颈椎不稳，甚至轻微外伤即可导致严重的颈脊髓损伤<sup>[11]</sup>，此类患者多

数需要手术治疗,临床上多采用后路手术来解除压迫,缓解临床症状<sup>[12]</sup>。

后路单开门椎管扩大椎板成形术是治疗颈椎病的常用术式,其原理是直接解除后方致压物的同时,通过椎管扩大、脊髓向后方漂移获得前方间接减压的效果<sup>[13]</sup>,但丝线缝合固定椎板强度有限,牢固性及可靠性较差,且丝线固定需要暴露椎间关节外侧,破坏了关节囊、肌肉及局部韧带组织,对局部软组织破坏较大,因固定不牢固可能导致门轴侧不愈合,甚至出现椎板“再关门”现象<sup>[14-15]</sup>,另外,丝线缝合固定还可导致颈神经后支损伤、术后颈椎生理曲度丢失及ROM下降等,严重影响患者术后康复<sup>[16]</sup>。“锚定法”是将铆钉固定在侧块上,再利用尾线固定开门的椎板,具有以下优点<sup>[17-20]</sup>。①铆钉固定在颈椎侧块上,不需要过多地剥离肌肉、韧带等软组织,创伤相对较小,操作简单。②铆钉体型细小,只需透一层皮质骨就可达到稳定固定,不会切割小关节囊、椎旁肌导致松动;不需要穿透对侧皮质,降低损伤神经根及椎动脉等的风险,降低术后颈部轴性疼痛发生率,提高手术的安全性。

后路手术后局部软组织及骨性结构的破坏势必导致局部运动单元的力学分布受到影响,从而引起颈椎运动单元稳定性差及颈部轴性疼痛等并发症<sup>[21]</sup>,远期可能引起颈椎后凸畸形<sup>[22]</sup>。有研究发现,后路单开门椎管扩大椎板成形术后颈椎后凸畸形的发生率为2%~4%、颈椎运动单元不稳的发生率为14%~47%,上述并发症的发生不利于神经功能的恢复,导致患者临床症状缓解不明显,甚至加重病情,降低手术疗效<sup>[6, 23]</sup>。特别对于颈椎椎管狭窄同时伴有运动单元不稳定的患者,对此类患者术前要谨慎制订手术方案,仔细评估患者颈椎的影像学改变,选择正确有效的内固定方式。良好的颈椎曲度是采用后路单开门椎管扩大椎板成形术的前提条件,如患者颈椎运动单元不稳定,术中则需行有效的内固定,重建颈椎曲度及运动单元的稳定性,目前常用的方式是微型钢板内固定。

但微型钛板内固定术过度重视椎板的稳定性及减压效果,且只提供横向稳定性,在颈椎的矢状位及冠状位无法提供稳定性,术后远期易出现颈部肌肉萎缩、ROM减小,颈椎退行性变加速,加重症状及颈椎失稳,形成恶性循环,给患者造成较大痛苦<sup>[16]</sup>。有研究报道,微型钛板留置体内可形成异物反应,导致局部炎性反应或骨质疏松;颈椎椎板的厚度在C<sub>4,5</sub>处最窄,螺钉把持力降低,固定不够牢固;金属

与骨密度及弹性模量不同,存在应力差异,从而加速机械性疲劳,隐匿地增加螺钉松动等风险<sup>[24]</sup>。此外,微型钛板内固定还存在手术时间长、创伤大、出血量多等缺点,严重的骨质疏松症患者椎体骨密度降低,微型钛板及螺钉的体积较小,导致螺钉的应力部位相对集中,单靠螺钉、钛板将开门侧椎板和侧块连为一体,容易引起螺钉松动,造成钛板固定失效,严重者易发生椎板“再关门”或椎体骨折。本研究结果也显示,微型钛板组手术时间较长,因术中暴露组织较多,术后颈部软组织粘连明显,颈椎ROM减小,邻近节段退行性变加速等,后期轴性症状等并发症明显,与既往研究<sup>[25]</sup>结果一致。

本研究中,短节段侧块螺钉内固定组术前应用颈椎动力位X线片确定不稳定节段,然后采用短节段内固定,术后效果良好。侧块螺钉短节段内固定,在保持有效的复位及稳定的同时,维持颈椎的生理曲度,对于稳定节段可以保留其活动功能,减少术后颈椎后凸畸形及失稳的发生率,具有较好的生物力学稳定性。同时减少了内固定物的使用,减少体内异物反应,减轻了患者的经济负担。有研究表明,颈椎侧块螺钉内固定可提供良好的固定效果,颈椎的屈曲稳定性增加92%,伸直稳定性增加60%<sup>[26]</sup>。Houten等<sup>[27]</sup>的研究表明,颈椎后路减压手术结合侧块螺钉内固定较颈椎前路手术具有明显的优势,能避免前路手术的并发症,同时后路内固定避免了单纯后路椎板切除术后颈椎后凸畸形进一步发展的可能性。因此,结合患者症状及影像学评估,在颈椎后路手术中必要的侧块螺钉内固定是一种稳妥的方法。

对于颈椎后路手术,手术疗效与术前评估及手术方式选择有重要的联系,术前对于临床症状及影像学改变的分析是必要的。对于不稳定型CSM,颈椎后路减压内固定是首选手术方式。本研究结合术前影像学评估,确定颈椎不稳定节段,针对不稳定节段采用短节段侧块螺钉内固定,保留了必要的颈椎运动单元,术后疗效良好。综上,后路单开门短节段侧块螺钉内固定结合“锚定法”椎管扩大椎板成形术治疗不稳定型CSM,可明显改善患者脊髓功能,维持颈椎曲度及稳定性,减少并发症发生率,临床疗效满意。

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