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颈椎后路单开门椎管扩大椎板成形术对颈椎矢状面平衡的影响

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摘要 目的:探讨颈椎后路单开门椎管扩大椎板成形术对颈椎矢状面平衡的影响。**方法:**收集 2012 年 1 月至 2015 年 1 月在我院接受治疗的 85 例脊髓型颈椎病患者,均行颈椎后路单开门椎管扩大椎板成形术。观察比较手术前后患者的日本骨科协会(JOA)评分、生活质量评分(SF-36)、颈椎功能障碍指数(NDI)以及疼痛视觉模拟评分(VAS)情况,手术前及末次随访时患者的 X 线侧位片 C2 椎体与颅底连线的夹角(Cobb)、C2 椎体矢状面的垂直轴线与 C7 椎体上缘的长度(SVA)、T1 椎体上缘线和水平线的夹角(T1-Slope)以及三者间的相关性。**结果:**患者术后 JOA 评分较术前显著升高,升高量为 (2.6 ± 0.2) 分($P < 0.05$),神经功能改善率为 50.1%,术后 SF-36、NDI 及 VAS 评分均有显著改善($P < 0.05$)。相较于手术前,患者末次随访时的 C2-C7 SVA、C0-2 Cobb 夹角以及 T1-Slope 均有显著升高,C2-C7 SVA 升高量与 C0-2 Cobb 夹角、T1-Slope 的升高量呈显著正相关性 ($r=0.475, P < 0.001; r=0.327, P=0.003$)。手术前,患者的 JOA 评分与 C2-C7 SVA 呈一定负相关($r=-0.229, P=0.032$),手术后两者间无明显相关性($P > 0.05$)。**结论:**颈椎后路单开门椎管扩大椎板成形术显著影响颈椎矢状面平衡,以颈椎前倾为主要表现,而引起患者颈椎肌肉持续性收缩、上颈椎过度前凸。

关键词:颈椎病;颈椎;矢状面平衡

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Influence of Cervical Expansive Open-door Laminoplasty on the Sagittal Balance of Cervical Spine

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ABSTRACT Objective: To investigate the influence of cervical expansive open-door laminoplasty on sagittal balance of cervical spine. **Methods:** Eighty-five patients with cervical spondylotic myelopathy admitted into our hospital from January 2012 to January 2015 were treated with cervical expansive open-door laminoplasty. The JOA score, SF-36, NDI, and VAS before and after operations were observed and compared. And the cervical sagittal parameters including C0-2 Cobb angle, C2-C7 SVA, and T1-Slope based on lateral view radiographs before operation and at the last follow-up were also compared, and correlation between those three parameters was analyzed. **Results:** After operation, the JOA score of all patients were showed significant increase ($P < 0.05$), and the increment was 2.6 ± 0.2 with 50.1% of improvement rate. The score of SF-36, NDI, and VAS had markedly improvement ($P < 0.05$). Compared to before operation, C0-2 Cobb angle, C2-C7 SVA, and T1-Slope at last follow-up indicated remarkable increase ($P < 0.05$). Additionally, at last follow-up, the variation of C0-2 Cobb angle and T1-Slope were positively correlated with those of C2-C7 SVA, respectively ($r=0.475, P < 0.001; r=0.327, P=0.003$). And the JOA score showed a negative correlation with C2-C7 SVA ($r=-0.229, P=0.032$) before operation, while there was no correlation between them after operation ($P > 0.05$). **Conclusion:** Cervical expansive open-door laminoplasty had an obvious influence on sagittal balance of cervical spine with main symptoms of forward tilting of cervical vertebra, and resulting in excessive high-strength contraction of posterior muscle, and lordosis in upper cervical spine.

Key words: Cervical spondylosis; Cervical vertebrae; Sagittal balance

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前言

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脊髓型颈椎病是临床上常见的骨科疾病,多发于中老年人,主要表现为四肢肌力、感觉障碍以及大小便障碍等,严重影响患者的健康及生活^[1,2]。颈椎后路单开门椎管扩大椎板成形术是目前临床上治疗脊髓型颈椎病常采用的手术方法^[3],但手术过程中会难以避免地引起一定程度的颈部肌肉韧带复合体损伤,而可能引起颈椎矢状面失衡,造成颈椎曲度平直,严重时还

可能出现后凸畸形^[9]。郑召民等^[9]研究显示胸腰椎的矢状面失衡会对手术的效果及患者术后康复造成严重影响。然而,目前有关颈椎矢状面在颈椎后路手术后的参数变化的研究仍鲜有报道。本研究拟探讨分析颈椎后路单开门椎管扩大椎板成形术对颈椎矢状面平衡的影响,现报道如下。

1 资料与方法

1.1 病例资料

收集 2012 年 1 月至 2015 年 1 月在榆林市第一医院骨科接受治疗的 85 例脊髓型颈椎病患者,均行颈椎后路单开门椎管扩大椎板成形术。纳入标准:①影像学检查表现为连续性后纵韧带骨化、椎间盘病变导致的椎管狭窄及发育性颈椎管狭窄的患者;②出现脊髓损害的体征或症状者。排除标准:①骨赘或椎间盘突出引起的椎管侵占率在 50%以上者;②在本次治疗的基础上,还需要进行一期、二期的前路手术者;③并发有结核、肿瘤或创伤者。在本次收集的 85 例患者中,采用锚定法术式有 34 例,男性患者 20 例,女性患者 14 例,年龄 42~80 岁,平均(63.1±8.2)岁;保留一侧肌肉韧带复合体术式有 51 例,男性患者 31 例,女性患者 20 例,年龄 35~76 岁,平均(60.3±7.7)岁。

1.2 手术方法

待患者全麻成功后,患者取俯卧位屈颈,躯干抬高角度为 30°。后正中入路完全显露后,给予纵向切开皮肤及皮下组织,以 C2 和 C7 棘突为标志。保留一侧肌肉韧带复合体手术:采用钝性结合锐性的方法对 C3-C7 左侧椎旁肌进行分离,待左侧椎板完全显露后,于 C2 棘突处切断一部分颈半棘肌附着点,随后于 C3-C7 棘突根部进行截骨,然后将切割下的棘突及附着肌肉韧带翻向右侧,最后将右侧椎板上附着的小肌群完全剥离,完全露出右侧椎板。锚定法手术:完全剥离双侧的椎旁肌,露出双侧的椎板。以上两种手术方法均于椎板交界和关节突关节处进

行开槽,右侧给予保留内层皮质,而左侧则完全切断椎板的全层。保留一侧肌肉韧带复合体手术:采用钛缆穿过于 C3-C7 游离棘突的根部以及相对的左侧椎板孔,以颈椎作为中立位,以约为 2.5 Kg 的拉力拉紧钛缆,确保棘突及椎板右侧的肌肉韧带完全坐于开门后的左椎板之上。锚定法手术:于棘突的根部打孔,随后于右侧侧块将带线的锚定螺钉拧入,确保线完全穿过棘突根部的穿孔,然后在掀起椎板后缝线。修补被切断的 C2 棘突颈半棘肌附着点。两组患者均进行 18 个月的随访。

1.3 观察指标及疗效评定标准

(1)影像学评定:手术前后对所有患者进行颈椎侧位的 X 线检查,并测定、记录患者的影像学参数,取平均值。观察比较术前和末次随访患者的 X 线侧位片 C2 椎体与颅底连线的夹角(Cobb)、C2 椎体矢状面的垂直轴与 C7 椎体上缘的长度(SVA)、T1 椎体上缘线和水平线的夹角(T1-Slope)。(2)采用生活质量评分量表(SF-36)评价患者的生活质量改善情况;颈椎功能障碍指数(NDI)评价患者颈部功能;疼痛视觉模拟评分(VAS)评价患者手术前后疼痛程度;日本骨科协会(JOA)17 分标准对患者的神经功能的改善情况进行评价^[6];改善率=[(术后得分-术前得分)/(17-术前得分)]100%。

1.4 统计学分析

采用 SPSS18.0 统计学软件进行数据处理,计量资料用均数±标准差($\bar{x} \pm s$)表示,组间比较行 t 检验,计数资料使用百分比(%)表示,采用 χ^2 检验,相关性分析采用 Pearson 相关分析法,以 $P < 0.05$ 表示差异具有统计学意义。

2 结果

2.1 患者手术前后 JOA 评分比较

患者术后 JOA 评分较术前显著升高,升高量为(2.6±0.2)分($P < 0.05$),神经功能改善率为 50.1%,详见表 1。

表 1 患者手术前后 JOA 评分比较($\bar{x} \pm s$)

Table 1 Comparison of the JOA score before and after operation ($\bar{x} \pm s$)

n	JOA score ($\bar{x} \pm s$)		Improvement rate(%)
	Before operation	After operation	
85	11.9±0.2	14.5±0.3 ^①	50.1

Note: Compared with before operation, ^① $P < 0.05$.

2.2 患者手术前后生活质量评分比较

患者术后 SF-36、NDI 及 VAS 评分均较术前显著改善,

差异具有统计学意义($P < 0.05$),详见表 2。

表 2 患者手术前后生活质量评分比较($\bar{x} \pm s$)

Table 2 Comparison of the quality of life scores before and after operation ($\bar{x} \pm s$)

Evaluation indexes	Before operation	Last follow-up	variation
SF-36	42.5±5.9	52.2±6.4 ^①	+9.7
NDI	22.3±4.8	10.6±4.5 ^①	-11.7
VAS	3.0±1.3	1.3±0.8 ^①	-1.7

Note: "+" represents increase; "-" represents decrease; Compared with before operation, ^① $P < 0.05$.

2.3 患者手术前后颈椎矢状面平衡情况比较

相较于术前,患者末次随访时的 C2-C7 SVA、C0-2 Cobb

夹角以及 T1-Slope 均显著升高,差异具有统计学意义($P < 0.05$),详见表 3。

表 3 患者手术前后颈椎矢状面平衡情况比较($\bar{x} \pm s$)Table 3 Comparison of the sagittal balance of cervical spine before and after operation ($\bar{x} \pm s$)

Detection time	C2-C7 SVA (mm)	C0-2 Cobb (°)	T1-Slope (°)
Before operation	20.5 $\pm$ 0.9	20.0 $\pm$ 0.8	24.9 $\pm$ 0.6
Last follow-up	23.1 $\pm$ 1.0 [°]	23.2 $\pm$ 1.1 [°]	26.3 $\pm$ 0.8 [°]

Note: Compared with that before operation, [°] P<0.05.

2.4 矢状面参数的相关性分析

末次随访时, 患者的 C2-C7 SVA 升高量与 C0-2 Cobb 夹角、T1-Slope 的升高量呈显著正相关性($r=0.475, P<0.001; r=0.327, P=0.003$)。手术前, 患者的 JOA 评分与 C2-C7 SVA 呈一定负相关($r=-0.229, P=0.032$), 手术后两者间无明显相关性($P>0.05$)。

3 讨论

脊髓型脊柱病临床上多合并颈椎管腔狭窄、纵韧带和 / 或黄韧带骨化^[7], 颈椎后路单开门椎管扩大椎板成形术作为临床上治疗该疾病的主要术式, 可有效扩大椎管容积及前后径, 减轻脊髓压力, 降低脊柱轴向的张力, 改善脊髓微循环^[8,9]。然而, 该术式在操作过程中极易对颈部肌肉韧带复合体造成损伤引起颈椎矢状面平衡受到影响^[10], 而脊柱矢状面的失衡会引起患者剧烈疼痛, 影响脊柱的运动功能, 严重影响患者的健康及生活质量^[11]。因此, 手术中脊柱矢状面平衡的变化及其对手术疗效的影响已逐渐受到广大医疗从业者的关注^[12,13]。本研究探究了颈椎后路单开门椎管扩大椎板成形术对颈椎矢状面平衡的影响。

C2-C7 SVA、C0-2 Cobb 夹角及 T1-Slope 分别反映了颈椎前倾的程度、上颈椎前凸的程度以及颈胸段后凸的程度^[14,15]。有研究表明接受颈椎后路单开门多阶段侧块固定术患者的 C2-C7 SVA 与 SF-36 量表评分呈显著负相关关系, 而当 C2-C7 SVA 在 40 mm 以上时会严重影响手术效果^[16]。Smith 等^[17]研究显示 CMS 术前患者的 C2-C7 SVA 与 JOA 评分呈显著负相关关系, 而 C2-C7 SVA 的平均值为 32.3 mm。本研究中, 患者术后 SF-36、NDI 及 VAS 评分均有显著变化, 表明患者经过治疗后生活质量有明显改善。此外, 相较于手术前, 末次随访时患者的 C2-C7 SVA、C0-2 Cobb 夹角以及 T1-Slope 均有显著升高, 提示颈椎后路单开门椎管扩大椎板成形术后, 颈椎矢状面平衡发生了明显变化。末次随访时, 患者的 C2-C7 SVA 升高量与 C0-2 Cobb 夹角、T1-Slope 的升高量呈显著正相关性, 患者手术前的 JOA 评分与 C2-C7 SVA 呈一定负相关, 手术后两者间无明显相关性, 提示术后 C2-C7 SVA 的升高并没有明显促使 JOA 改善率的降低, 而使术后患者的神经功能得到明显的改善。因此, C2-C7 SVA 可能仅可用于术前患者症状的评价, 而难以适用于椎管扩大椎板成形术后的评估^[18]。该结果可能解释为单开门成形术后充分减轻了脊髓的压力, 促使脊髓向后漂移, 横断面面积升高, 而最终使患者的神经功能得到明显改善^[19]。此外, Ams 等^[20]研究表明健康人的下颈椎畸形(前凸或后凸)也有可能引起腰椎曲度的变化, 若颈椎过度后凸会引起患者腰椎前凸角逐步增大, 过度前凸可能造成患者腰椎前凸角逐步降

低。本研究中, T1-Slope 的明显升高以及 C2-C7 SVA 的增加值呈显著正相关关系表明, T1-Slope 作为反映颈胸段后凸程度指标, 其角度增大可能是引起颈椎前倾的关键因素, 而下颈椎出现失衡会引起上颈椎的继发性变化。

总之, 颈椎后路单开门椎管扩大椎板成形术显著影响颈椎矢状面平衡, 以颈椎前倾为主要表现, 而引起患者颈椎肌肉持续性收缩、上颈椎过度前凸。

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