

前路或后路手术治疗颈椎后纵韧带骨化症的中期疗效观察

汪文龙, 海涌, 关立, 刘玉增, 陈小龙, 朱文艺, 陈龙

(首都医科大学附属北京朝阳医院骨科 100020 北京市)

【摘要】目的:观察颈椎前路椎体次全切减压融合术(ACCF)和颈椎后路单开门椎管扩大成形术在治疗颈椎后纵韧带骨化症(OPLL)的中期临床疗效和影像学改善情况。**方法:**2010年1月~2012年12月我院收治33例颈椎OPLL患者,男17例,女16例;年龄41~78岁(58.6±8.8岁)。其中16例骨化块累及2个节段及以内者通过ACCF切除骨化块减压(A组);17例骨化块累及2个节段以上、前路切除有困难者采用后路单开门椎管扩大成形术(B组)。所有患者术前、术后3个月、1年、2年、3年和末次随访时进行JOA评分。通过配对样本 t 检验分析两组患者术前、术后和末次时的JOA评分、颈椎曲度及椎管狭窄率的变化情况。**结果:**A组1例术后发生吞咽困难;B组1例发生脑脊液漏,1例发生切口感染。均经对症处理后痊愈。A组随访48.56±8.02个月,B组随访52.59±8.88个月。两组患者术后JOA评分均较术前有显著性改善($P<0.05$);术后和末次随访时颈椎曲度较术前无明显差异($P>0.05$);A组末次随访骨化块面积明显大于术后($P<0.05$),B组末次随访骨化块面积较术后无明显差异($P>0.05$)。**结论:**对于颈椎OPLL,ACCF和后路单开门椎管成形术均为有效且安全的术式,中期随访疗效满意。前者通过切除或“漂浮”骨化块达到有效减压;后者能够扩大椎管缓解脊髓压迫,中期随访椎管狭窄率维持稳定。

【关键词】 颈椎后纵韧带骨化症;手术;椎管狭窄率;中期随访

doi: 10.3969/j.issn.1004-406X.2016.07.01

中图分类号:R681.5 文献标识码:A 文章编号:1004-406X(2016)-07-0577-08

Anterior or posterior approaches for cervical ossification of posterior longitudinal ligament: a mid-term follow-up/WANG Wenlong, HAI Yong, GUAN Li, et al//Chinese Journal of Spine and Spinal Cord, 2016, 26(7): 577-584

【Abstract】 Objectives: To observe the mid-term clinical outcomes and radiological parameters of anterior cervical corpectomy and fusion(ACCF) and posterior single-door laminoplasty in cervical ossification of posterior longitudinal ligament(OPLL). **Methods:** All 33 cervical OPLL cases(17 males, 16 females; mean age, 58.6±8.8 years; range, 41 to 78 years) treated in our department between January 2010 and December 2012 were analyzed retrospectively. 16 cases with less than 2 segments involved were treated by ACCF (group A). 17 cases with more than 2 segments involved were treated by the posterior single-door laminoplasty(group B). All patients included in the study had preoperative, postoperative cervical X-rays, CTs and MRIs. Japanese Orthopaedic Association (JOA) score was used to evaluate the clinical outcomes of the two groups. Curvature angle and canal stenosis rate before surgery and at the follow-up were analyzed. The clinical and radiographic differences between the two groups were compared by using the paired t -test. **Results:** The mean follow-up time in group A and B was 48.56±8.02 and 52.59±8.88 months, respectively. One case presented postoperative dysphagia in group A and recovered by self in the follow-up. One case occurred cerebrospinal fluid leakage and one case occurred postoperative wound infection in group B, they recovered by delayed drainage and placing drainage-tube respectively. The postoperative JOA score was significantly higher than the preoperative($P<0.05$). Cervical curvature showed no significant difference($P>0.05$) before surgery, at post operation immediately and the last follow-up. At the last follow-up, ossified mass area was significantly higher than the

第一作者简介:男(1990-),医学硕士,研究方向:脊柱外科

电话:(010)85231229 E-mail:wangwenlongmiss@sina.com

通讯作者:海涌 E-mail:spinesurgeon@163.com

postoperative in group A($P<0.05$), but not in group B($P>0.05$). **Conclusions:** For cervical OPLL, the ACCF and posterior single-door laminoplasty appear to be efficient and safer approaches. Posterior single-door laminoplasty is able to enlarge the canal and relieve compression, and the canal stenosis rate can maintain stable through mid-term follow-up. ACCF surgery can decompress cervical canal stenosis better by removing ossified mass. And the clinical outcomes of two procedures are satisfying in early and middle term.

[Key words] Ossification of the posterior longitudinal ligament; Cervical surgery; Canal stenosis ratio; Mid-term follow-up

[Author's address] Department of Orthropeadics, Affiliated Chaoyang Hospital of Capital Medical University, Beijing, 100020, China

颈椎后纵韧带骨化症(ossification of the posterior longitudinal ligament, OPLL)是造成颈脊髓压迫的常见原因,在亚洲人群的发病率约为 0.4%~3%^[1]。对于 OPLL 造成的持续性脊髓压迫而产生的严重神经功能损害,保守治疗往往无效,大部分患者往往需要手术治疗^[2]。颈椎 OPLL 的手术治疗方式通常包括前路手术、后路手术和前后路联合手术^[3-4],颈椎前路椎体次全切减压融合术(anterior cervical corpectomy and fusion, ACCF)和后路单开门椎管扩大成形术 (posterior single-door laminoplasty)是目前临床上广泛应用治疗颈椎 OPLL 的两类手术,本研究通过回顾两种手术方式治疗颈椎 OPLL 的临床疗效和影像学参数变化,观察两种术式治疗颈椎 OPLL 的中期随访结果。

1 资料和方法

1.1 一般资料

对 2010 年 1 月~2012 年 12 月在我院骨科接受手术治疗的颈椎 OPLL 患者进行回顾性研究。共有 33 例患者纳入本研究,男 17 例,女 16 例;年龄 41~78 岁(58.6±8.8 岁)。其中行 ACCF 手术的患者 16 例(A 组),行后路单开门椎管扩大成形术的患者 17 例(B 组)。两组患者一般情况见表 1。

1.2 手术策略

所有患者的手术均由同一术者主刀完成。骨化块累及 2 个节段及以内,通过椎体切除能够达到并切除骨化块的患者采用 ACCF;骨化块累及 2 个节段以上,预计前路切除困难者采用后路单开门椎管扩大成形术;对于节段型和孤立型 OPLL,椎管狭窄率较高(>30%)、合并发育性椎管狭窄者采用后路单开门椎管扩大成形术,反之采用 ACCF。ACCF 手术节段的选择根据患者临床体征和影像学综合判断,以最大可能切除骨化块解除脊髓压迫,对于切除困难、骨化块与硬膜粘连难以

分离者,部分切除骨化块,未切除部分予以“漂浮”;对于多节段者采用椎体切除+椎间隙切除,以最大程度切除已发生骨化但尚未产生压迫的后纵韧带;采用前路钢板螺钉系统、钛网重建颈椎稳定性。非孤立型的 OPLL 和 C7 后纵韧带受累的 OPLL 采用 C3~C7 单开门椎管成形术;C7 后纵韧带未受累的 OPLL,为保留 C7 棘突及肌肉附着,减少术后轴性症状发生的可能,采用 C3~C6 单开门椎管成形术。应用侧块铆钉固定。

1.3 评价方法

回顾分析所有患者术前和术后随访的病历资

表 1 两组患者的一般资料
Table 1 General data between two groups

	A组(ACCF 手术) Group A(ACCF surgery)	B组(后路 单开门手术) Group B (Single- door Laminoplasty)
患者数(例) Number	16	17
年龄(岁) Age (years)	56.9±9.9	60.1±7.6
性别(男:女) Sex (male:female)	7:9	10:7
骨化块范围(节段数) Ossified mass range (segments)	1.56±0.51	2.18±0.95
受累节段(例) Lesion segment(cases)		
C2/3	0	2
C4/5	9	13
C5/6	12	12
C6/7	4	2
分型 ^[5] (例) Classification		
连续型 Continuous	0	5
节段型 Segmental	4	5
孤立型 Localized	12	3
混合型 Mixed	0	4

料和影像学资料,分析两种手术方式的手术情况。采用日本骨科学会 (JOA)17 分法评定临床疗效。使用通用电气医疗放射信息系统软件 V2.0 在术前、术后颈椎 X 线片上测量 C2-C7 颈椎前凸角 (图 1a);颈椎活动度=过伸位颈椎前凸角-过屈位颈椎前凸角;在 CT 横断位上测量骨化块最大面积和椎管面积,椎管狭窄率=骨化块面积/椎管面积 (图 1b、1c)。同时观察并发症的发生情况。

1.4 统计学处理

所有数据采用 SPSS 20.0 统计软件进行数据统计分析,两组患者术前、术后和末次随访对比采用配对样本 t 检验,计数资料采用 χ^2 检验, $P<0.05$ 为差异有统计学意义。

2 结果

33 例患者术后随访 50.64 ± 8.59 个月 (37~67 个月);其中 A 组患者术后随访 37~63 个月 (48.56 ± 8.02 个月);B 组患者术后随访 37~67 个月 (52.59 ± 8.88 个月)。两组患者手术情况详见表 2。16 例采用 ACCF 手术的患者中 4 例完全切除骨化块,12 例患者采用部分切除骨化块,未切除的骨化块采取“漂浮”。所有患者术前和术后不同时间随访时的 JOA 评分见表 3,两组患者术后各时间点的 JOA 评分与术前比较均有显著性改善 ($P<0.05$)。两组患者术后颈椎曲度较术前无明显变化 ($P>0.05$);A 组末次随访颈椎活动度明显下降 ($P<0.05$),B 组末次随访颈椎活动度无明显改变 ($P>0.05$)。A 组末次随访骨化块面积明显大于术后 ($P<0.05$),B 组末次随访骨化块面积较术后无明显差异 ($P>0.05$,表 4)。

3 讨论

3.1 前路和后路手术的适应证选择

就颈椎 OPLL 而言,ACDF 有时很难完整切除骨化块,从而导致减压不充分和术后骨化继续进展^[6],因此常采用 ACCF 以达到充分减压的目的。

表 2 两组患者手术情况

Table 2 Surgical data in two groups

	A组 Group A	B组 Group B
手术时间 (min) Operation time (min)	178.44 $\pm$ 31.18	152.35 $\pm$ 32.69
术中出血量 (ml) Blood loss (ml)	340.63 $\pm$ 124.12	391.18 $\pm$ 303.75
术后平均住院 (日) Postoperative hospital stay (days)	6.31 $\pm$ 2.02	8.24 $\pm$ 4.31
输血占比 Blood transfusion ratio	2/16	2/17
并发症比率 Postoperative complication ratio	2/16	1/17

表 3 两组患者术前和术后不同时间点的 JOA 评分情况

Table 3 The preoperative and postoperative JOA scores in two groups

	A组 Group A	B组 Group B
术前 Preoperation	8.13 $\pm$ 1.02	7.41 $\pm$ 1.06
术后 3 个月 3 months after surgery	13.50 $\pm$ 1.21	14.47 $\pm$ 1.01
术后 1 年 1 year after surgery	13.06 $\pm$ 1.44	13.00 $\pm$ 0.01
术后 2 年 2 years after surgery	13.50 $\pm$ 1.10	13.71 $\pm$ 1.05
术后 3 年 3 years after surgery	14.44 $\pm$ 0.96	14.18 $\pm$ 0.88
末次随访 Final follow up	14.75 $\pm$ 0.68	14.71 $\pm$ 0.69

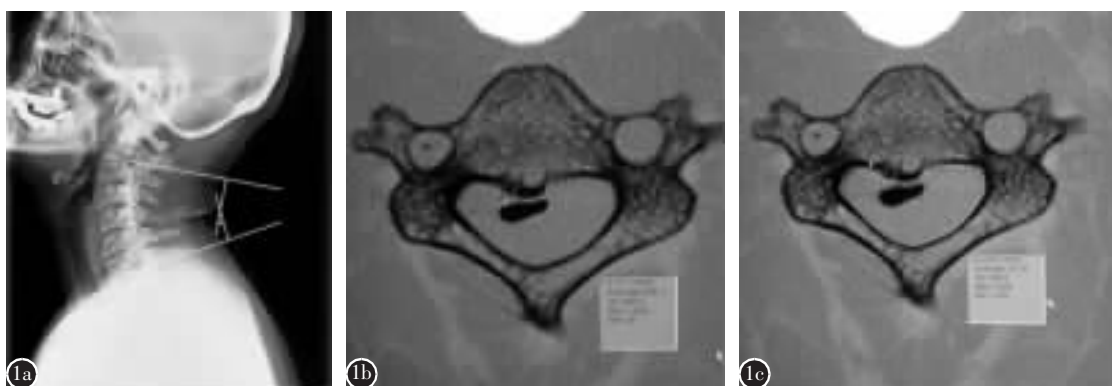


图 1 a 颈椎前凸角测量 b 测量骨化块横断面积 c 测量椎管横断面积 (椎管狭窄率=骨化块横断面积/椎管横断面积)

Figure 1 a Cervical curvature angle b To measure the ossified mass area with the software c To measure the canal area with the software (Canal stenosis rate=ossified mass area/canal area)

表 4 两组患者术前、术后和末次随访时的影像学测量结果

	groups	
	A组 Group A	B组 Group B
颈椎曲度(°) Cervical curvature angle		
术前 Preoperation	16.26±10.57	12.21±8.93
术后 Postoperation	16.55±7.97	12.14±8.61
末次随访 Final follow-up	18.73±8.61	14.28±5.52
颈椎活动度(°) Cervical ROM		
术前 Preoperation	39.48±11.19	32.28±11.27
末次随访 Final follow-up	34.34±13.22 ^①	32.28±9.58
椎管面积 ^① (mm ²) Canal area		
术前 Preoperation	217.09±44.76	209.87±41.64
术后 Postoperation	219.70±44.52	349.98±66.26 ^①
末次随访 Final follow-up	220.39±42.66	347.21±60.85 ^①
骨化块面积 ^① (mm ²) Ossified mass area		
术前 Preoperation	33.79±10.63	56.82±21.82
术后 Postoperation	6.43±2.23 ^①	57.72±21.65
末次随访 Final follow-up	8.40±1.52 ^{①②}	57.61±20.52
椎管狭窄率(%) Canal stenosis rate		
术前 Preoperation	28.15±7.78	39.82±13.90
术后 Postoperation	10.44±3.64 ^①	18.87±9.61 ^①
末次随访 Final follow-up	12.51±3.50 ^①	18.49±9.51 ^①

注:①与术前比较 $P<0.05$; 与术后比较 $P<0.05$
Note: ①Compared with preoperation, $P<0.05$; compared with postoperation, $P<0.05$

的。颈椎后路椎管扩大成形术与椎板切除术相比能更好地维持颈椎的稳定,减少了硬膜外瘢痕的形成,术后一般不易出现后凸畸形,故一般不需要固定^[7],颈椎单开门操作简单,手术效果确切,在多节段颈椎病的治疗中后路单开门手术一直被广泛应用。目前,多数学者认为采用前路或后路手术取决于许多因素例如脊髓压迫程度、累及的节段、颈椎的曲度和术者对于手术方式的熟悉程度^[8],术者在确定颈椎 OPLL 手术方式时常会考虑骨化

块的形状、是否存在颈椎后凸畸形、MRI 上脊髓信号、术前神经功能状况、患者年龄和术者的经验等诸多问题^[9]。但关于颈椎 OPLL 治疗尚未达成共识,对严重颈椎后凸患者常选择前路手术^[10],有些学者认为在高龄患者(>65 岁)、高椎管狭窄率($\geq 60\%$)、无明显颈椎后凸畸形、3 个或 3 个以上节段的 OPLL 患者后路椎管扩大成形术优于 ACCF 手术^[11,12]。相比后路椎管扩大成形术颈椎前路减压技术要求更高,手术并发症更多,这也使得很多术者倾向于后路手术,椎管扩大成形术通过脊髓后移达到间接减压的目的,然而很多研究表明后路术后颈椎序列改变和骨化块的生长会导致症状加重和再手术^[13,14]。ACCF 手术通过切除骨化的后纵韧带达到直接减压的目的,手术效果能够维持较长时间^[15],术后症状进展的发生率低于 1%^[16]。然而,近期一篇对比多节段颈椎病的 Meta 分析指出,颈椎前路手术后神经功能优于后路手术,但术后神经功能恢复率两者并无统计学差异^[17]。我院在颈椎 OPLL 治疗上对于前后路术式的选择主要考虑是否存在发育性椎管狭窄、骨化块累及的范围和大小等方面。通过对 33 例患者的随访,无论 ACCF 还是后路单开门椎管扩大成形术,中期随访均满意,患者末次随访均可自理生活,部分患者仍继续之前的工作。就本研究而言,随着随访时间的延长的确观察到 ACCF 术后存在未完全切除的骨化块继续生长的情况,但未造成明显椎管狭窄和脊髓压迫,患者也未出现明显的临床症状。

3.2 前路和后路手术的并发症

颈椎前路或后路手术的并发症严重影响患者的手术效果,但无论哪种术式都无法避免并发症的发生。Liu 等^[18]进行一项关于比较 ACCF 和后路椎板成形术治疗多节段颈椎病的 Meta 分析,指出 ACCF 的并发症明显高于后路椎板成形术,ACCF 的主要并发症来自内置物、手术入路和邻近节段退变再手术等方面;而对于后路手术主要的并发症是术后 C5 神经麻痹、轴性症状和颈椎后凸畸形。Li 等^[19]对 27 篇文献共 1558 例颈椎 OPLL 患者进行了系统回顾分析,结果显示颈椎 OPLL 手术治疗总的并发症发生率为 21.8%,其中常见的为神经功能障碍(8.3%)、脑脊液漏(5.1%)、轴性疼痛(3.5%)、内置物相关并发症(3.5%);前路手术和后路手术的并发症发生率无明显差别,脑脊液漏、内置物相关并发症、喉返神经损伤声音嘶



图 2 患者女, 61 岁 a-d 术前颈椎正侧位、过伸过屈位 X 线片示颈椎生理曲度和活动度正常 e 术前颈椎 MRI 矢状位 T2 加权像示多节段脊髓压迫 f 术前颈椎 CT 矢状位重建示 C3~C6 后纵韧带骨化 g 术前颈椎 CT 示骨化块侵入椎管压迫脊髓 h 术后颈椎 CT 示椎管明显扩大, 脊髓压迫缓解 i 末次随访(术后 60 个月)颈椎 CT 示椎管仍维持术后水平, 骨化块无明显生长 j 末次随访(术后 60 个月)颈椎侧位 X 线片示颈椎生理曲度维持良好

Figure 2 Patient A, 61 years old, female, diagnosed as cervical spondylosis a-d Cervical A-P, lateral and dynamic position X-ray films showed normal cervical curvature angle and ROM e Preoperative cervical sagittal T2-weighted MRI showed multi-segmental compression f Preoperative cervical CT sagittal reconstruction showed C3~C6 OPLL g Preoperative cervical CT showed the ossified mass invaded into canalis vertebralis and compressed spinal cord h Postoperative cervical CT showed the canal area increased i The last follow-up's CT showed the canal didn't change, without ossified mass growing(60 months after the surgery) j The last follow-up's lateral X-ray film showed the cervical curvature remained(60 months after the surgery)



图3 患者女,45岁 a~d 术前颈椎正侧位、过伸过屈位X线片示颈椎生理曲度消失,颈椎活动度正常 e 术前颈椎MRI矢状位T2加权像示C6/7节段脊髓压迫 f 术前颈椎CT矢状位重建示C6/7后纵韧带骨化 g 术前颈椎CT示骨化块侵入椎管压迫脊髓 h 术后颈椎CT示骨化块被完全切除,脊髓压迫缓解 i 末次随访(术后42个月)时颈椎CT示椎管内未见骨化块生长 j 末次随访(术后42个月)时颈椎侧位X线片示内固定位置良好

Figure 3 Patient B, 60 years old, female, diagnosed as cervical spondylosis a~d Cervical A-P, lateral and dynamic position X-ray films showed decreased cervical curvature angle and normal ROM e Preoperative cervical sagittal T2-weighted MRI showed C6/7 compression f Preoperative cervical CT sagittal reconstruction showed C6/7 localized OPLL g Preoperative cervical CT showed the ossified mass invaded into canalis vertebralis and compressed spinal cord h Postoperative cervical CT showed the ossified mass was removed completely i The last follow-up's cervical CT, without ossified mass growing in canal (42 months after surgery) j The last follow-up's lateral X-ray film showed the implants remained well(42 months after surgery)

哑、吞咽困难和呼吸困难等并发症更常见于前路手术,而 C5 神经麻痹、轴性疼痛常发生于后路手术。本研究 33 例患者中 1 例颈椎后路手术患者术后出现脑脊液漏,通过延迟拔出引流管等保守治疗后恢复;1 例颈椎后路手术患者术后出现感染,二次行伤口冲洗置管引流术后恢复;1 例颈椎前路手术患者术后半年复查见钛板螺钉移位,出现吞咽困难症状,10 个月后症状逐渐缓解,未行二次手术。3 例出现手术并发症的患者末次随访效果仍较满意。

3.3 前路和后路手术的临床疗效

对于颈椎 OPLL, 尽管前路手术操作难度大于后路单开门手术, 但许多学者报道前路手术神经功能的恢复和远期临床疗效优于后路手术^[1], Tani 等^[20] 报道前路手术患者神经功能恢复率为 58%, 而后路椎板成形术神经功能恢复率为 13%, 同时 5 例接受后路手术的患者术后出现明显的神经功能恶化, 其中 4 例患者术后即出现恶化, 1 例患者后期随访出现神经功能恶化; Iwasaki 等^[21] 报道颈椎后路椎管扩大成形术 5% 的患者术后当时出现了神经功能恶化, 16% 的患者出现迟发性神经功能恶化。尽管报道后路椎管扩大成形术后 OPLL 进展的发生率高达 70%, 但症状的发生率却很低^[22]。Kommu 等^[3] 认为对于颈椎 OPLL, ACCF 手术效果优于后路手术, 同时年轻患者、术前 Nurick 分级较低的患者术后改善几率更大; Masaki 等^[23] 对 59 例颈椎 OPLL 患者的手术结果进行分析, 前路手术症状平均改善率 68.4%, 后路手术后症状平均改善率 52.5%, 15 例患者术后症状改善率低于 40%, 其中 2 例接受前路手术, 13 例接受后路手术; Mizuno 等^[24] 报道了 107 例颈椎 OPLL 患者行 ACCF 手术直接切除骨化块, 89% 的患者获得良好的手术结果。本研究对所有患者术前、术后 3 个月和末次随访进行 JOA 问卷评分评价患者术后症状改善率, 两种术式末次随访 JOA 评分改善率无明显差异, 1 例接受 ACCF 手术的患者术后症状无明显缓解, 于术后 1 年二次行后路单开门椎管扩大成形术, 术后效果满意; 1 例行后路单开门椎管扩大成形手术的患者术后症状无明显缓解, 6 个月后出现双手持物不稳, 行高压氧等保守治疗后, 症状稍有缓解, 未行二次手术。

综上所述, 两种手术方式治疗颈椎 OPLL 均能获得较好的满意率, 术前仔细询问病史并进行

详细的体格检查, 结合患者术前颈椎 X 线等影像学检查把握好前后路手术适应证, 两种手术方式中期疗效满意。但本研究纳入的患者数量较少, 有待今后进一步对更多患者进行更长时间的随访和研究。

4 参考文献

1. Chen Z, Liu B, Dong J, et al. Comparison of anterior corpectomy and fusion versus laminoplasty for the treatment of cervical ossification of posterior longitudinal ligament: a meta-analysis[J]. Neurosurg Focus, 2016, 40(6): E8.
2. Gu YF, Shi JQ, Cao P, et al. Clinical and imaging predictors of surgical outcome in multilevel cervical ossification of posterior longitudinal ligament: an analysis of 184 patients[J]. PLoS One, 2015, 10(9): e0136042.
3. Kommu R, Sahu BP, Purohit AK. Surgical outcome in patients with cervical ossified posterior longitudinal ligament: a single institutional experience[J]. Asian J Neurosurg, 2014, 9(4): 196–202.
4. An HS, Al-Shihabi L, Kurd M. Surgical treatment for ossification of the posterior longitudinal ligament in the cervical spine[J]. J Am Acad Orthop Surg, 2014, 22(7): 420–429.
5. Tsuyama N. Ossification of the posterior longitudinal ligament of the spine[J]. Clin Orthop Relat Res, 1984, (184): 71–84.
6. Chen Y, Yang L, Liu Y, et al. Surgical results and prognostic factors of anterior cervical corpectomy and fusion for ossification of the posterior longitudinal ligament [J]. PLoS One, 2014, 9(7): e102008.
7. Kiely PD, Quinn JC, Du JY, et al. Posterior surgical treatment of cervical spondylotic myelopathy: review article[J]. HSS J, 2015, 11(1): 36–42.
8. Sun YF, Li L, Zhao JH, et al. Comparison between anterior approaches and posterior approaches for the treatment of multilevel cervical spondylotic myelopathy: a meta-analysis [J]. Clin Neurol Neurosurg, 2015, 134: 28–36.
9. Kim B, Yoon DH, Shin HC, et al. Surgical outcome and prognostic factors of anterior decompression and fusion for cervical compressive myelopathy due to ossification of the posterior longitudinal ligament[J]. Spine J, 2015, 15(5): 875–884.
10. Saetia K, Cho D, Lee S, et al. Ossification of the posterior longitudinal ligament: a review[J]. Neurosurg Focus, 2011, 30(3): E1.
11. Iwasaki M, Okuda S, Miyauchi A, et al. Surgical strategy for cervical myelopathy due to ossification of the posterior longitudinal ligament(Part 2): advantages of anterior decompression and fusion over laminoplasty[J]. Spine, 2007, 32(6): 654–660.
12. Mizuno J, Nakagawa H. Ossified posterior longitudinal ligament: management strategies and outcomes[J]. Spine J, 2006,

- 6(6 Suppl): 282-288.
13. Shibuya S, Komatsubara S, Oka S, et al. Differences between subtotal corpectomy and laminoplasty for cervical spondylotic myelopathy[J]. Spinal Cord, 2010, 48(3): 214-220.
 14. Tokuhashi Y, Ajiro Y, Umezawa N. A patient with two re-surgeries for delayed myelopathy due to progression of ossification of the posterior longitudinal ligaments after cervical laminoplasty[J]. Spine, 2009, 34(2): 101-105.
 15. Yang HS, Chen DY, Lu XH, et al. Choice of surgical approach for ossification of the posterior longitudinal ligament in combination with cervical disc hernia[J]. Eur Spine, 2010, 19(3): 494-501.
 16. Choi S, Lee SH, Lee JY, et al. Factors affecting prognosis of patients who underwent corpectomy and fusion for treatment of cervical ossification of the posterior longitudinal ligament: analysis of 47 patients [J]. J spinal Disord Tech, 2005, 18(4): 309-314.
 17. Zhu B, Xu Y, Liu X, et al. Anterior approach versus posterior approach for the treatment of multilevel cervical spondylotic myelopathy: a systemic review and meta-analysis [J]. Eur Spine J, 2013, 22(7): 1583-1593.
 18. Liu X, Min S, Zhang H, et al. Anterior corpectomy versus posterior laminoplasty for multilevel cervical myelopathy: a systematic review and meta-analysis[J]. Eur Spine J, 2014, 23(2): 362-372.
 19. Li H, Dai LY. A systematic review of complications in cervical spine surgery for ossification of the posterior longitudinal ligament[J]. Spine J, 2011, 11(11): 1049-1057.
 20. Tani T, Ushida T, Ishida K, et al. Relative safety of anterior microsurgical decompression versus laminoplasty for cervical myelopathy with a massive ossified posterior longitudinal ligament[J]. Spine, 2002, 27(22): 2491-2498.
 21. Iwasaki M, Kawaguchi Y, Kimura, et al. Long-term results of expansive laminoplasty for ossification of the posterior longitudinal ligament of the cervical spine: more than 10 years follow up[J]. J Neurosurg, 2002, 96(2 Suppl): 180-189.
 22. Ogawa Y, Toyama Y, Chiba K, et al. Long-term results of expansive open-door laminoplasty for ossification of the posterior longitudinal ligament of the cervical spine [J]. J Neurosurg Spine, 2004, 1(2): 168-174.
 23. Masaki Y, Yamazaki M, Okawa A, et al. An analysis of factors causing poor surgical outcome in patients with cervical myelopathy due to ossification of the posterior longitudinal ligament: anterior decompression with spinal fusion versus laminoplasty[J]. J Spinal Disord Tech, 2007, 20(1): 7-13.
 24. Mizuno J, Nakagawa H. Outcome analysis of anterior decompressive surgery and fusion for cervical ossification of the posterior longitudinal ligament: report of 107 cases and review of the literature[J]. Neurosurg Focus, 2001, 10(4): E6.
- (收稿日期:2016-01-06 末次修回日期:2016-06-07)
(英文编审 唐翔宇/贾丹彤)
(本文编辑 卢庆霞)

消息

《中国脊柱脊髓杂志》上颈椎专刊征稿通知

上颈椎位于头颈交界部,毗邻生命中枢,部位狭小,解剖复杂,是脊柱外科治疗中难度大、风险高的领域。20 世纪末我国治疗寰枢椎脱位等上颈椎疾病多采用保守治疗的方法。近年来,随着上颈椎的基础研究和内固定技术、计算机辅助技术、微创治疗技术的出现,上颈椎疾病的外科治疗有了重大的突破,已成为脊柱外科关注的热点。与此同时,在上颈椎疾病的诊断、治疗和手术技术等方面仍然存在许多分歧。《中国脊柱脊髓杂志》编辑部拟定于 2017 年第 1 期出版脊柱上颈椎专刊,现在全国范围内征稿。

征稿内容:(1)上颈椎畸形的病因与发病机制;(2)寰枢椎脱位的综合诊断;(3)上颈椎创伤、脱位的保守治疗;(4)上颈椎创伤/脱位的手术治疗(包括前路钢板、中空螺钉,后路经关节螺钉、侧块螺钉、椎弓根螺钉等)、并发症及预防;(5)上颈椎肿瘤的诊断及治疗对策;(6)枕颈融合、寰枢融合在上颈椎手术中的选择。

投稿请参照本刊稿约要求撰写论文,截稿日期:2016 年 11 月 15 日,编辑部拟于 11 月底组织专家召开定稿会,经定稿会审稿通过的稿件将刊登于 2017 年第 1 期。

投稿邮箱:谭明生 zrtanms@sina.com,或吕国华 spinelv@163.com。邮件请注明“上颈椎专刊征稿”,请勿通过《中国脊柱脊髓杂志》远程投稿系统投稿。