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(收稿日期: 2013-11-04 本文编辑: 王宏)

颈椎减压钛网植骨术后的前路再手术治疗

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【摘要】 目的: 分析颈椎减压钛网植骨术后疗效不佳的原因, 探讨经前路再手术治疗该类患者的临床疗效。方法: 自 2004 年 1 月至 2011 年 12 月, 采用经颈前路再次减压手术治疗颈椎钛网植骨术后患者 16 例, 男 7 例, 女 9 例, 年龄 46~75 岁, 平均 61 岁。脊髓型颈椎病 11 例, 神经根颈椎病 2 例, 混合型颈椎病 3 例。首次手术至再次手术时间 4~12 年, 平均 7 年。所有患者首次手术均行前路椎体次切钛网植骨内固定术, 钛网植骨节段 C₃-C₅ 2 例, C₄-C₆ 8 例, C₄-C₇ 2 例, C₅-C₇ 4 例, 其中 C₄ 椎体次切钛网植入+C_{5,6} 椎间盘摘除 cage 植入 1 例。患者术后症状好转或消失后再次复发 13 例; 术后症状无明显改善 2 例; 术后症状持续加重 1 例。所有患者再手术前行颈椎正侧位片、CT、MRI 检查, 12 例患者融合节段的邻近节段退变引起脊髓或神经根的压迫, 其中上节段 4 例, 下节段 8 例; 3 例患者因减压节段椎体后缘骨赘形成, 造成脊髓或神经根受压; 1 例患者因前路减压不彻底脊髓仍受压。应用日本骨科协会 (JOA) 评分系统, 颈部功能障碍指数 (ODI) 及 Odom 分级标准来评价临床效果。结果: 全部患者通过前路完成二次手术减压, 手术时间 80~150 min, 平均 110 min; 出血量 30~200 ml, 平均 160 ml。1 例患者出现 30 ml 较清引流液, 怀疑脑脊液漏, 术后第 2 天拔除引流液管后缝合引流口, 10 d 后拆线切口 I/甲级愈合。其余患者无饮水呛咳、声音嘶哑、喉头水肿等并发症。16 例均获随访, 时间 12~28 个月, 平均 16 个月。JOA 评分及 ODI 指数术后 2 个月及末次随访与术前比较差异均有统计学意义 ($P < 0.01$), 术后 2 个月与末次随访比较差异也有统计学意义 ($P < 0.01$)。末次随访 JOA 评分改善率为 (72.9±0.2)%。按照 Odom 临床效果分级标准: 优 12 例, 良 3 例, 可 1 例。结论: 颈椎减压钛网植骨术后, 因手术减压不彻底、术后邻近节段的退变或新形成的各种致压因素、内植物引起的各种并发症等需要再次手术, 而经前路再手术治疗患者能获得较好的临床疗效。

【关键词】 颈椎病; 减压; 手术后并发症; 复发; 再手术

DOI: 10.3969/j.issn.1003-0034.2014.02.010

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Anterior revision surgery for the treatment of cervical spondylosis after anterior decompression and titanium mesh fusion CHEN Bin-hui, GU Shi-rong, ZHANG Ming, SANG Pei-ming, and LI Jie. The Second Department of Orthopaedics, Li Hui Li Hospital of Ningbo Medical Center, Ningbo 315040, Zhejiang, China

ABSTRACT Objective: To analyze the reasons why anterior decompression and titanium mesh fusion for cervical spondylosis always show poor therapeutic effects, and to investigate the clinical effects of anterior revision surgery in these patients. **Methods:** From January 2004 to December 2011, 16 patients underwent anterior decompression and titanium mesh fusion for cervical myelopathy were treated with anterior revision surgery. There were 7 males and 9 females with an average age of 61 years old (ranged from 46 to 75 years), including 11 cases with cervical spondylotic myelopathy, 2 cases with nerve root cervical spondylosis and 3 cases with mixed type cervical spondylosis. Average duration from the first operation to reoperation was 7 years (ranged from 4 to 12 years). In the first operation, titanium mesh segment located in C₃-C₅ (2 cases), C₄-C₆ (8 cases), C₄-C₇ (2 cases), C₅-C₇ (4 cases), and one of them, titanium mesh implantation in C₄ and C_{5,6} intervertebral disk removal and cage fusion. After the first operation, symptom of 13 patients recurred after improvement or disappearance, 2 patients did not show obvious improvement, and 1 patient aggravated. Cervical spine radiography, CT scan and MRI were performed in all patients before re-operation. There were 12 patients with compression of the spinal cord or nerve root caused by degenerative changes in adjacent segments of fusion segments, 4 cases in upper segments, and 8 cases in lower segments; 3 patients with compression of the spinal cord or nerve root caused by vertebral posterior osteophyte of decompressed segments; 1 patient with compression of the spinal cord caused by incomplete anterior decompression. JOA, NDI and Odom classification were used to assess the clinical effects. **Results:** All anterior revision surgery were successful with a mean time of 110 min (80 to 150 min) and mean bleeding of 160 ml (30 to 200 ml). There was 30 ml clear drainage fluid in 1 patient suspected of cerebrospinal fluid leakage. But the 2nd day after operation, the tube was removed and the drainage opening was sutured, and the suture incision healed in grade A after 10 days. Other patients had no complications such as dysdipsia, hoarseness, and laryngeal edema, etc. All patients were followed up for 12 to 28 months with an average of 16 months. Two months after operation and at last follow-up, JOA scores and ODI index had obviously improved than preoperation ($P < 0.01$), and there was significant difference between postoperative 2 months and last follow-up ($P < 0.01$). At the final follow-up, improvement rate of JOA was $(72.9 \pm 0.2)\%$. According to the standard of Odom, 12 cases got excellent results, 3 good, 1 fair. **Conclusion:** After surgery of cervical decompression and bone graft fusion with titanium mesh, the patients need re-operation because of incomplete decompression, degenerative changes in adjacent segments or newly formed compression factors, and complications caused by implants. Anterior revision surgery can obtain good clinical effects.

KEYWORDS Cervical spondylosis; Decompression; Postoperative complications; Recurrence; Reoperation

Zhongguo Gu Shang/China J Orthop Trauma, 2014, 27(2): 132-136 www.zggszz.com

颈椎前路减压钛网植骨钢板内固定术广泛应用于治疗颈椎病,在颈椎术后稳定、融合率及减少并发症上有独特的优势,临床上取得了较好的疗效^[1]。但随着时间的推移,部分患者发生邻近融合节段的退变^[2],或者融合节段钙化灶引起椎管狭窄等原因,再次出现神经根或脊髓受压的临床症状,需要再次手术。笔者 2004 年 1 月至 2011 年 12 月共收治 16 例颈椎减压钛网植骨术后需再次手术患者,经颈前路再次手术减压治疗,效果满意,报告如下。

1 资料与方法

1.1 一般资料 本组 16 例,男 7 例,女 9 例,年龄 46~75 岁,平均 61 岁。脊髓型颈椎病 11 例,神经根颈椎病 2 例,混合型颈椎病 3 例。首次手术至再次手术时间 4~12 年,平均 7 年。所有患者首次手术均行前路椎体次切钛网植骨内固定术,钛网植骨节段 C₃-C₅ 2 例, C₄-C₆ 8 例, C₄-C₇ 2 例, C₅-C₇ 4 例,其中 C₄ 椎体次切钛网植入+ C_{5,6} 椎间盘摘除 cage 植入 1 例。患者术后症状好转或消失后再次复发者 13 例;术后症状无明显改善者 2 例;术后症状持续加重者 1 例。

影像学上,所有患者再手术前均行颈椎正侧位片、CT、MRI 检查,12 例患者融合节段的邻近节段退变引起脊髓或神经根的压迫,其中上节段 4 例,下节段 8 例;3 例患者因减压节段椎体后缘骨赘形成,造成脊髓或神经根受压;1 例患者因前路减压不彻底脊髓仍受压。

1.2 再次手术方法 所有患者再次手术均从前路进行,其中 6 例患者行钛网翻修减压术,10 例患者行邻近退变节段椎间盘摘除 cage 植入术。

钛网翻修减压手术方法:患者全麻后,取仰卧位,常规消毒铺巾,根据手术节段长短取右侧原横行切口或纵行切口,逐层切开皮肤、筋膜,沿胸锁乳突肌内侧间隙进入,将血管鞘牵向外侧,暴露椎前间隙钢板内固定系统,咬除钢板部分骨赘后拆除钢板及螺钉,先用尖嘴咬骨钳咬除钛网四周骨质,尽量露出钛网上半部分,然后用高速磨钻继续在钛网周围开槽(靠近退变节段椎间盘的椎体一端开槽尽量大),注意边磨边用生理盐水冷却,只留钛网底部较薄一层骨质后,利用咬骨钳咬住钛网中段后均匀用力使

之变形松动后取出。减压不彻底的患者通过扩大减压窗及清除骨赘等压迫组织,邻近节段退变者继续往退变节段行椎体次切,减压脊髓后见硬脊膜回弹良好,彻底止血后,取合适大小、长度钛网,中间植入自体松质骨后植入颈椎减压窗内,外用合适长度钢板及螺钉重新固定,C形臂 X 线机检查位置好,彻底止血后逐层关闭切口,皮下置负压引流管 1 根,术毕。

邻近退变节段椎间盘摘除 cage 植入手术方法:入路同前,暴露椎前间隙钢板内固定系统,咬除钢板部分骨赘后拆除钢板及螺钉,将邻近节段退变椎间盘彻底摘除后,取合适试模试 cage 大小,取部分髂骨松质骨植入 cage,确认局部无出血后将 cage 打入退变椎间隙,外用合适长度钢板及螺钉重新固定,C形臂 X 线机检查位置好,彻底止血后逐层关闭切口,皮下置负压引流管 1 根,术毕。

1.3 术后处理 辅助性应用广谱抗生素 24 h 预防感染,若有根性疼痛症状可适当口服加巴喷汀及西乐葆,常规 1~2 d 拔除引流管后,患者佩带颈托即可起床活动,患者术后 4~6 d 切口无明显渗液后出院,1 周后拆线,颈托继续固定 1.5~2 个月。

1.4 观察项目与方法 记录手术时间、出血量及引流量。术前、术后 2 个月、末次随访时采用日本骨科协会(JOA)评分系统^[3]进行评分,并计算末次随访时 JOA 评分改善率,改善率=[(术后评分-术前评分)/(17-术前评分)]×100%;同时记录颈部功能障碍指数(ODI)^[4],ODI 是用于患者自我量化功能障碍的问卷调查表,包括疼痛(疼痛程度及其对睡眠影响),单项功能(提物、坐、站立、行走)和个人综合功能(日常自理能力、社会活动和郊游)3 方面的评定,共有 9 项,每项 0~5 分,较单一疼痛评定更全面,将 9 个项目的选择答案相应得分累加后除以 45 所得百分比。按 Odom 分级标准^[5]评价临床效果:优,无颈椎病相关主诉,能完成日常工作;良,有间歇性不适但对工作无明显影响;可,自觉症状有改善,但日常生活仍受限;差,与术前相比无改善甚至加重。

1.5 统计学处理 所有数据以均值±标准差表示,并使用 SPSS 13.0 软件对术前、术后 2 个月和末次随访时数据进行方差分析,组间两两比较用 LSD-t 检验。以 P<0.05 为差异有统计学意义。

2 结果

全部患者通过前路完成二次手术减压,手术时间 80~150 min,平均 110 min;出血量 30~200 ml,平均 160 ml。1 例患者出现 30 ml 较清引流液,怀疑脑脊液漏,术后第 2 天拔除引流液管后缝合引流口,10 d 后拆线切口 I/甲级愈合。其余患者无饮水呛咳、声

音嘶哑、喉头水肿等并发症。16 例均获随访,时间 12~28 个月,平均 16 个月。术后 2 个月、末次随访时 JOA 评分及 ODI 均较术前明显改善 (P<0.01),术后 2 个月与末次随访比较差异有统计学意义 (P<0.01)。末次随访 JOA 评分改善率为 (72.9±0.2)%,见表 1~2。按照 Odom 临床效果分级标准评价:优 12 例,良 3 例,可 1 例。典型病例见图 1。

表 1 颈椎前路再手术 16 例患者不同时期的 JOA 评分比较
($\bar{x}\pm s$,分)

Tab.1 Comparison of JOA scores of reoperative 16 patients in different periods($\bar{x}\pm s$,score)

项目	术前	术后 2 个月	末次随访时
上肢运动功能	1.8±1.2	2.8±1.2	3.2±1.3
下肢运动功能	1.9±1.5	3.2±0.9	3.4±0.8
感觉	2.2±0.8	3.8±1.2	5.2±1.3
膀胱功能	2.3±0.4	2.3±0.4	2.3±0.4
总分	7.9±0.2	12.3±0.2*	14.5±0.2**

注:不同时期总分比较,F=4 839.9,P<0.01。与术前相比,*t=-4.4,P<0.01;**t=-6.6,P<0.01。*与**相比,t=-2.2,P<0.01

Note:Comparison of total score among different periods,F=4 839.9,P<0.01. Compared with preoperative,*t=-4.4,P<0.01;**t=-6.6,P<0.01.

*vs**,t=-2.2,P<0.01

表 2 颈椎前路再手术 16 例患者不同时期的 ODI 评分比较
($\bar{x}\pm s$,分)

Tab.2 Comparison of ODI of reoperative 16 patients in different periods($\bar{x}\pm s$,score)

项目	术前	术后 2 个月	末次随访时
疼痛	2.1±0.5	1.3±0.3	1.2±0.6
单项功能	5.3±0.9	4.3±0.5	4.2±0.8
个人综合功能	1.8±0.3	1.8±0.7	1.6±0.4
总分	18.8±0.2	12.3±0.2*	8.9±0.1**

注:不同时期总分比较,F= 13 676.6,P<0.01。与术前相比,*t=-6.8,P<0.01;**t=-10.2,P<0.01。*与**相比,t=-3.2,P<0.01

Note:Comparison of total score among different periods,F=13 676.6,P<0.01. Compared with preoperative,*t=-6.8,P<0.01;**t=-10.2,P<0.01.

*vs**,t=-2.2,P<0.01

3 讨论

3.1 颈椎再手术原因的分析 随着颈椎手术技术的提高及内固定的发展,各类颈椎手术日益普及。同时,颈椎的二次手术也与日俱增。而二次颈椎手术原因主要有以下几方面^[6-8]:①第 1 次手术减压不彻底,脊髓和神经根残留压迫。②颈椎前路融合为术后邻近节段的退变或新形成的各种致压因素。③内植物引起的各种并发症等。本文患者中有 12 例因术后邻近节段退变引起,颈椎前路手术后生物力学的



图 1 患者,男,65 岁,因“颈椎术后 6 年,再发四肢乏力麻木 1 年”入院 1a,1b. 正侧位 X 线片示颈椎术后钛网植骨融合内固定下,融合好 1c. 颈椎管狭窄明显,尤其 C_{3,4} 节段平面压迫明显 1d,1e. CT 示 C_{3,4} 平面骨赘增生,左侧明显,减压窗减小闭合伴椎管狭窄 1f,1g. 术后 CT 示减压窗扩大,骨赘摘除,颈椎管扩大 1h,1i. 术后 14 个月正侧位 X 线片内固定位置好 1j. 术后 19 个月 MRI 示脊髓压迫解除,脊髓信号恢复好。

Fig.1 A 65-year-old male patient admitted for "6 years after anterior decompression surgery, recurrence limb acratia and numbness for one year" 1a,1b. AP and lateral X-rays showed cervical fused well after anterior decompression and titanium mesh fusion 1c. MRI showed that cervical spinal canal was obviously stenosed, especially in C_{3,4} 1d,1e. CT scan showed C_{3,4} with osteophytosis on the left, the decompression area reduced

with cervical canal stenosed 1f,1g. Postoperative CT scan showed decompression window and cervical canal were expanded, osteophytes have been removed 1h,1g. X-ray showed the position of internal fixation was good 14 months after revision surgery 1j. MRI showed spinal cord compression removed, spinal cord signal recovered well 19 months after revision surgery

紊乱已经得到了普遍共识,针对这个问题,各种人工椎间盘、人工髓核等近年来也得到了普遍应用,但只局限于单纯椎间盘突出或者退变节段合适并较局限的患者,对于严重椎管狭窄、后缘骨赘形成的患者,颈椎前路椎体次切钛网植骨内固定术仍是目前较好的选择。3 例患者减压节段椎体后缘骨赘形成,因椎体开窗减压后钛网植骨后,颈椎的应力发生了变化,机体的保护机制促使两侧剩余的椎体及钛网间发生骨质增生以达到稳定,这时减压窗变小,并且形态不规则,特别是术中开窗较小、减压偏于一侧致对侧增生明显者及第 1 次减压不彻底者更容易造成椎管得

再狭窄,而需二次手术再减压。

3.2 颈椎再手术的入路及方式选择 颈椎翻修手术入路有前路、后路和前后路联合 3 种,具体选择何种入路再次手术减压视病变所处的解剖位置及病情的严重程度综合考虑后决定。如致压物位于前方或者前方为主则行前路手术;黄韧带骨化等致压物在后方时宜行后路手术;当前路减压不彻底或者情况复杂及技术因素无法减压时可行后路减压或者前后路联合减压。术前应严格慎重的分析影像学资料,碰到手术部位不宜再次翻修的情况,应该另选手术入路。本文 16 例患者致压因素全来自前方,故在不破

坏患者后方稳定系统的原则上,先尝试前路二次减压手术,并全部再次减压成功。笔者前路手术方式有以下几种:①针对减压节段后缘骨赘形成的 3 例患者及 1 例首次减压手术不彻底患者全部行钛网取出并扩大减压窗后再植入新的钛网及钢板系统。②针对 12 例邻近节段退变病例,如有骨赘形成或椎管狭窄明显等单纯椎间盘摘除不易减压彻底者,或者上位颈椎间盘突出位置过高(如 C_{2,3})植入 cage 困难者,行钛网取出并延长退变节段椎体次切扩大减压窗后再植入合适的钛网及钢板系统;如果患者病情局限,退变情况允许,拆除钢板后行邻近节段椎间盘摘除减压 cage 植入,再取合适长度钢板固定;如果患者内固定系统未干扰退变节段操作,可取带卡齿的 cage 植入,而无须拆除原钢板,患者经济条件许可情况下,也可行退变节段椎间盘摘除减压后再植入人工椎间盘,从而最大限度地保留患者颈椎的活动度及减少生物力学的改变,降低邻近节段的进一步退变^[9-10]。

3.3 颈椎前路再手术的相关体会 主要有以下几点:①术前应该完善 CT 及 MRI 等重要的影像学检查,可以明确术前诊断,判断压迫的来源点,从而指导手术减压方式。②当涉及二次手术颈椎前路压迫节段较多,或者较大骨化灶与硬脊膜粘连较明显时,容易造成减压失败或造成脑脊液漏等严重并发症,最好选择后路手术,如后路单开门椎管扩大减压术在颈椎的二次手术中也取得了较好的疗效^[11-12],本文 16 例患者压迫节段 3 节以内,无巨大骨赘或钙化灶,术中发现与硬脊膜无明显粘连。③钛网植骨术后复发的前路再手术,由于钛网跟上下椎体往往已经融合,重新取出钛网较困难,而且前路首次手术往往瘢痕组织明显,同样增加了手术难度^[13]。所以必要时可从对侧入路进行手术,为了不再增加患者切口,本组患者全部采用原入路,因首次手术往往经肌间隙进入,瘢痕增生处仔细分离后皆可暴露清晰,由于内固定的存在定位也较容易确定。在取钛网时应注意以下几点:①一定要有高速磨钻这种动力系统,方能给手术带来安全的保障。②在钛网周围开槽时不应过大,以保障露出钛网边缘及保障视野为前提,四周深度均匀磨出,如果一侧椎体需减压则可扩大开窗范围,获得更好的视野结合 CT 来判断钛网的深度,过程中注意不断地应用生理盐水冲洗冷却。③在最后一层骨皮质与钛网联合时,不可从单头拉起或硬拉钛网,钛网下缘的增生骨质往往跟硬脊膜有粘连,容易损伤硬脊膜,术中最好用尖嘴咬骨钳咬住钛网体中部使劲用力,钛网往往容易发生变形松动,必要

时可左右平行用力,在磨钻留较薄一层骨质时,一般都能将钛网取出。④对于术后复发患者一经确诊,应立即手术,但术前应严格手术适应证、术前详细制定手术方案,需要翻修钛网时应由有经验的高年资医生主刀,确保手术的安全及术中脑脊液漏并发症的正确处理。

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(收稿日期: 2013-09-09 本文编辑: 王宏)