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·临床研究·

AOPC 截骨内固定治疗陈旧性单节段胸腰段 OVCF 伴后凸畸形的疗效

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[摘 要] **目的** 探讨后路前方撑开—后方闭合(AOPC)截骨矫形术治疗陈旧性单节段胸腰段骨质疏松性椎体压缩骨折(OVCF)伴后凸畸形的临床疗效。**方法** 纳入陈旧性单节段胸腰段 OVCF 患者 53 例进行回顾性分析,均接受 AOPC 截骨矫形术治疗。记录患者围术期指标及并发症发生情况。术前及末次随访时行脊柱胸腰椎正侧位 X 射线检查测量胸椎后凸 Cobb 角、胸腰段后凸角和腰椎前凸角等矢状位参数。采用日本骨科学会(JOA)评分评价脊髓功能,分别采用视觉模拟量表(VAS)及 Oswestry 功能障碍指数(ODI)评价腰背部疼痛及腰椎功能。**结果** 所有患者手术均顺利完成,手术时间为(287.1±19.9)min,术中出血量为(1 240.9±105.1)mL,住院时间为(11.7±1.4)d;围术期未出现严重神经及血管损伤等并发症,末次随访时所有患者内固定位置良好、牢靠。术后 6 个月胸椎后凸 Cobb 角与术前比较,差异无统计学意义($P>0.05$),胸腰段后凸角较术前减小($P<0.05$),腰椎前凸角较术前增大($P<0.05$)。术后 6 个月 JOA 评分高于术前($P<0.05$),VAS 评分及 ODI 低于术前($P<0.05$)。**结论** AOPC 截骨矫形术治疗陈旧性单节段胸腰段 OVCF 可充分进行环形 360°脊髓减压,恢复脊髓神经功能,重建脊柱序列,疗效满意。

[关键词] 后路前方撑开—后方闭合截骨矫形术;骨质疏松性椎体压缩骨折;脊柱后凸畸形;后凸 Cobb 角;内固定

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Outcome of AOPC osteotomy and internal fixation for old single-level thoracolumbar OVCF with kyphosis

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Abstract: Objective To investigate the clinical outcome of anterior opening-posterior closing (AOPC) osteotomy in the treatment of old single-level thoracolumbar osteoporotic vertebral compression fracture (OVCF) with kyphosis. **Methods** A total of 53 patients with old single-level thoracolumbar OVCF who received AOPC osteotomy treatment were retrospectively enrolled. The perioperative indicators and the occurrence of complications were recorded. The sagittal parameters such as the Cobb angle of the thoracic kyphosis, thoracolumbar kyphosis angle, and the lumbar lordosis angle were measured by spine thoracolumbar positive and lateral X-rays before operation and at the last follow-up. The spinal cord function was evaluated by the Japanese Orthopaedic Association (JOA) score, and the visual analogue scale (VAS) and the Oswestry dysfunction index (ODI) were used to evaluate the back pain and lumbar function respectively. **Results** The operations for all patients were successfully completed, with the operation time of (287.1±19.9) minutes, the intraoperative blood loss of (1 240.9±105.1) mL, and the hospital stay of (11.7±1.4) days; there were no complications related to serious nerves or blood vessels injuries during the perioperative period, and the internal fixation position of all patients was good and reliable at the last follow-up. There was no significant difference in the Cobb angle of the thoracic kyphosis 6 months after operation compared with that before operation ($P>0.05$), the thoracolumbar kyphosis angle was smaller than that before operation ($P<0.05$), and the lumbar lordosis angle was larger than that before operation ($P<0.05$). The JOA score 6 months after operation was higher than that before operation ($P<0.05$), and the VAS score and ODI 6 months after operation were lower than those before operation ($P<0.05$). **Conclusion** AOPC osteotomy in the treatment of old single-level thoracolumbar OVCF can fully perform circular 360° spinal decompression, restore spinal nerve function and reconstruct spinal alignment, with satisfactory efficacy.

Keywords: anterior opening-posterior closing osteotomy; osteoporotic vertebral compression fracture; spine kyphosis; kyphosis Cobb angle; internal fixation

目前脊柱畸形的治疗方法较多,主要有 Smith-Peterson 截骨矫形术、经椎弓根截骨矫形术、后路后凸节段切除—双轴旋转矫形术、后路全椎体切除术、椎体部分去松质骨截骨术、后路前方撑开—后方闭合(anterior opening-posterior closing, AOPC)截骨矫形术等[1-3]。尽管截骨矫形术存在创伤大、风险高、截骨量大、神经损伤发生率高等不足,但是对于后凸 Cobb 角>30°的患者通过手术减压可恢复脊髓和神经功能,获得坚强的融合内固定,缓解疼痛[4-6]。脊柱骨质疏松性椎体压缩骨折(osteoporotic vertebral compression fracture, OVCF)多发生于胸腰段,非手术或手术不当治疗后常发生后凸畸形,引起脊柱节段序列改变、失平衡,

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并出现胸背部疼痛、神经功能障碍等严重并发症[7-8]。既往研究多通过脊髓神经功能、患者主观感受评估脊柱畸形术后的临床疗效[7-8],未涉及脊柱矢状位影像学参数变化。因此,本研究通过脊柱矢状位影像学参数变化来探讨 AOPC 截骨矫形术治疗陈旧性单节段胸腰段 OVCF 伴后凸畸形的临床疗效。

1 资料与方法

1.1 临床资料

纳入陈旧性单节段胸腰段 OVCF 患者53 例进行回顾性分析,其中男 23 例,女 30 例;年龄 68 ~ 81 岁,平均(75.0 ± 5.1)岁,BMI(23.7 ± 2.6)kg/m^2。损伤节段 T_{11} 有 9 例,T_{12} 有 23 例,L_1 有 13 例,L_2 有 8 例。纳入标准:①胸腰段单椎体 OVCF,受伤时间超过 3 个月;②胸腰段后凸 Cobb 角 >30°且存在明显的脊髓神经压迫症状;③严格非手术治疗 3 个月无效。排除标准:①依从性差,临床资料不全,失访;②随访期间出现手术节段外的脊柱新发骨折及骨盆、髋、膝等运动系统骨折或其他损伤。本研究经我院伦理委员会批准。

1.2 手术方法

患者全身麻醉后取俯卧位,调整矫形床,常规消毒铺巾。以骨折椎为中心,选择后路正中切口,显露骨折椎上下各 2 个或 3 个椎体的棘突和椎板,于截骨面邻近上下 2 个或 3 个椎体置入椎弓根螺钉(共 8 枚或 12 枚)。切除截骨椎体的部分棘突、横突、椎板、上位椎体下关节突及软骨终板,显露伤椎上邻椎空间隧道,钛网填充自体骨后支撑中前柱,咬除椎弓根内壁,用反向刮匙插入硬膜腹侧,将截骨区的椎体后壁推向腹侧,调整手术台前后倾折叠角度,并用器械撑开加压对截骨处进行加压合拢,缓慢闭合截骨面矫正后凸畸形,安装连杆固定(手术截骨减压范围如图 1)。手术全程均在脊髓电生理监测下完成,术中常规进行唤醒试验。手术均由同一组医师完成,内固定螺钉钛板及椎间融合器均由强生公司提供。

所有患者术后 3 d 常规抗感染治疗,引流量持续 3 d低于 50 mL 时拔管。拔管后即可佩戴辅具下床活动,嘱患者佩戴辅具 3 ~ 6 个月。

1.3 观察指标

记录患者手术时间、术中出血量及并发症发生情况等指标。术前及末次随访时,通过胸腰椎正侧位 X 射线检查测量局部胸椎后凸 Cobb 角、胸腰段后凸角及腰椎前凸角;采用日本骨科学会(Japanese orthopaedic association,JOA)评分评价脊髓功能,视觉模拟量表(visual analogue scale,VAS)评估腰背部疼痛,Oswestry 功能障碍指数(Oswestry disability index,ODI)评价腰椎功能。术后随访 6 ~ 12 个月,末次随访时通过影像学检查评估内固定是否松动。



a:经上位椎体下终板及下位椎体椎弓根上缘截骨范围;b:截骨完成后示意图;c:截骨完成后前柱撑开后路固定

图 1 手术截骨减压范围

1.4 统计学方法

采用 SPSS 20.0 软件进行数据统计学分析。数据正态性采用 *Kolmogorov-Smirnov*(*K-S*)检验,计量资料以均数 ± 标准差($\bar{x} \pm s$)表示,行配对样本 t 检验。$P<0.05$为差异有统计学意义。

2 结果

2.1 围术期及随访结果

所有患者手术均顺利完成,手术时间 249 ~ 322 min,平均(287.1 ± 19.9)min;术中出血量 950 ~ 1 420 mL,平均(1 240.9 ± 105.1)mL;平均住院时间(11.7 ± 1.4)d;围术期未出现严重神经及血管损伤等并发症。术后随访 6 ~ 12 个月,平均(7.2 ± 1.6)个月;末次随访时,患者内固定良好、牢靠。

2.2 手术前后影像学及功能评分

术后 6 个月胸椎后凸 Cobb 角与术前比较,差异无统计学意义($P>0.05$);与术前比较,术后 6 个月胸腰段后凸角减小,腰椎前凸角增大,差异均有统计学意义($P<0.05$)。术后 6 个月 JOA 评分高于术前,VAS 评分及 ODI 低于术前,差异均有统计学意义($P<0.05$),见表 1。

表 1 手术前后影像学及功能评分情况

时间点	胸椎后凸 Cobb 角/°	胸腰段后凸角/°	腰椎前凸角/°	JOA 评分/分	VAS 评分/分	ODI/%
术前	22.7 ± 1.1	40.4 ± 4.5	24.5 ± 0.6	9.6 ± 1.0	6.2 ± 0.7	37.8 ± 1.4
术后 6 个月	22.9 ± 0.7	22.1 ± 3.0	35.2 ± 1.6	14.6 ± 0.8	2.6 ± 0.7	20.9 ± 1.3
t	−0.991	−41.357	−41.357	−28.305	29.663	56.078
P	0.326	0.000	0.000	0.000	0.000	0.000

3 讨论

胸腰段椎体骨折占脊柱骨折的60%以上,大部分胸腰椎骨折通过早期非手术或手术治疗可获得良好的临床疗效。若治疗不及时或治疗不当,骨折节段可能出现局部后凸畸形[9]。后凸畸形可导致胸腰椎节段不稳及人体矢状位重力失衡,背部椎旁肌肉群受到持续的牵拉,且脊柱序列不稳可导致邻近节段退变加重[10-11],继发难以忍受的疼痛。同时,胸腰椎后凸畸形亦可使脊柱前中柱受到额外异常应力的压迫,长期刺激周围软组织,使其出现增生、钙化、增厚,导致相应椎管狭窄,严重者会出现如疼痛、肢体麻木等脊髓神经刺激相关症状。此时,行截骨矫形术可获得满意的效果[12]。

脊柱截骨矫形治疗的目的是恢复局部和整体平衡、重建脊柱生物力学结构、缓解症状以及改善脊髓神经和心肺功能。老年骨质疏松性陈旧胸腰椎骨折常由于伤椎前中柱结构压缩或爆裂,局部形成压迫脊髓的角状后凸,甚至出现脊髓神经损害症状。OVCF伴后凸畸形的治疗较为复杂、棘手[13]。截骨矫形术治疗OVCF伴后凸畸形,除了要充分进行脊髓神经根减压外[14],还要考虑到螺钉把持力降低、钉棒松动等情况。故手术时为保证椎弓根螺钉强度,应避免反复调整钉道,尽可能选用更粗、更长的螺钉;且利用骨水泥螺钉可增强把持力[10,15],提供术中及术后稳定内固定,以恢复神经功能及维持脊柱序列[16-17]。

AOPC截骨矫形术在伤椎前中柱置入适当高度的钛网,以此柱为支点,通过前期置入的椎弓根螺钉在后方加压后直接完成后凸的矫正,恢复了伤椎的大部分高度及脊柱局部后凸角度,有效避免了由于脊柱短缩和椎间孔变小造成的脊髓、韧带褶皱和神经根卡压,同时实现了椎管的直接和间接减压,改善脊髓神经损害症状[18-19]。本研究患者术后JOA评分高于术前,VAS评分及ODI低于术前,提示神经功能得到改善,疼痛得到有效缓解,进一步证实AOPC截骨矫形术可直接有效进行脊髓360°环形减压,对胸腰段脊柱后凸畸形造成的脊髓压迫症状具有显著的改善作用。

AOPC截骨矫形术将整个脊柱完全截断后,易造成术中脊柱极不稳定,脊柱两端非对称位移,导致脊髓机械性损害;且截骨量大,前中柱钛网支撑不够牢靠,植骨接触面不够广泛,融合不良会导致矫形效果不佳、后期钉棒断裂等。故本研究在截骨矫形前将单侧钉棒临时固定,并予足量自体骨植入钛网及截骨间隙,以获得前中柱强力支撑和后柱坚强内固定[20]。此种处理方法亦有利于减少患者站立时截骨节段的高度再丢失,维持局部脊柱序列。本研究患者术后脊柱胸腰段后凸角小于术前,充分表明AOPC截骨矫形术可重建脊柱矢状位序列及内固定,保证脊柱稳定性,对胸腰段OVCF引起的后凸畸形有满意的临床疗效。

综上所述,AOPC截骨矫形术治疗陈旧性单节段胸腰段OVCF伴后凸畸形可直接进行充分脊髓神经根减压,重建脊柱序列,恢复脊髓神经功能,获得满意临床疗效。但本研究在样本筛选、脊柱矢状位影像学参数的测量上可能存在偏倚,且目前对于AOPC截骨矫形术治疗陈旧性单节段胸腰段OVCF的研究较少,极少涉及脊柱—骨盆矢状位参数C7矢状位垂直距离、T_1骨盆角等变化的研究,因此,本研究结论尚需进一步研究证实。

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·临床研究·

甲状旁腺素检测试剂于术中快速识别及保护甲状旁腺的作用

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[摘 要] **目的** 探讨甲状旁腺素(PTH)检测试剂在甲状腺全/近全切除联合中央区淋巴结清扫术中快速识别及保护甲状旁腺的临床价值。**方法** 纳入44例甲状腺癌患者,根据术中是否使用PTH检测试剂分为观察组(使用PTH检测试剂)和对照组(未使用PTH检测试剂),每组22例。观察组患者于术中遇到疑似的甲状旁腺,由手术医生进行标记,对疑似的甲状旁腺进行PTH检测,根据检测结果确定是否切除;对照组根据经验判断是否切除。记录2组患者甲状旁腺检出结果,并比较2组患者手术前后血清钙、PTH水平及术后并发症情况。**结果** 2组甲状旁腺检出比较,差异无统计学意义($P>0.05$)。2组患者术前血清钙及PTH水平比较,差异无统计学意义($P>0.05$);观察组患者术后PTH水平及血清钙水平明显高于对照组,差异有统计学意义($P<0.05$)。2组术后低钙症状比较,差异有统计学意义($P<0.05$);2组患者术后均未出现永久性甲状旁腺功能受损。**结论** PTH检测试剂可快速识别甲状旁腺,防止其被误切除,从而降低患者术后甲状旁腺功能减退及低血钙的发生。

[关键词] 甲状旁腺素;甲状旁腺;甲状腺全切;甲状旁腺素检测试剂;甲状腺癌

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Effect of parathyroid hormone detection reagent in rapid identification and protection of parathyroid gland during operation

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Abstract: Objective To investigate the clinical value of parathyroid hormone (PTH) detection reagent in rapid identification and protection of parathyroid gland during total/near-total thyroidectomy combined with central lymph node dissection. **Methods** A total of

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