

强直性脊柱炎后凸畸形患者截骨矫形后腹部变化及消化功能的改变

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【摘要】目的:探讨强直性脊柱炎(AS)后凸畸形患者截骨矫形术后腹部变化及消化功能的改变。**方法:**2009 年 1 月~2013 年 7 月在我院行截骨矫形术的 AS 后凸畸形患者 53 例,其中男 48 例,女 5 例。均采用经椎弓根椎体截骨术(pedicle subtraction osteotomy, PSO)治疗,截骨节段为 L1~L3。在术前及术后 18 个月的站立位全脊柱正侧位 X 线片上测量脊柱最大后凸 Cobb 角 (GK), 在全脊柱三维 CT 重建图像上测量正中矢状面腹部面积 (AMSPA)、正中矢状面剑突到脊柱前缘的最短距离 (MD) 及肝门、两侧肾门、脾门到耻骨联合上缘中点的距离。记录术前、术后 18 个月体重、ODI 及脊柱侧凸研究学会-22(SRS-22)量表评分。术后 18 个月对患者消化功能进行评估,食量增加不明显为 A 组,食量明显增加为 B 组;大便频率无明显改变(3~4 天 1 次)为 1 组,大便频率改善明显(1~2 天 1 次)为 2 组。**结果:**术后 18 个月 53 例患者 ODI 及 SRS-22 量表评分较术前改善明显 ($P < 0.05$), GK 较术前明显变小 ($P < 0.05$), MD、AMSPA 和体重较术前明显增大 ($P < 0.05$), 肝门、脾门、左侧肾门到耻骨联合上缘中点的距离均较术前明显增大 ($P < 0.05$), 右侧肾门到耻骨联合上缘中点的距离较术前差异无统计学意义 ($P > 0.05$)。术后 18 个月 29 例患者大便频率较术前有所增加, 24 例改善不明显; 33 例食量较术前明显增加, 20 例食量增加不明显。术后 18 个月 1 组与 2 组患者的年龄及病程均无明显差异 ($P > 0.05$), A 组与 B 组的年龄、病程均无明显差异 ($P > 0.05$), 1 组 GK 明显大于 2 组 ($P < 0.05$), A 组 GK 明显大于 B 组 ($P < 0.05$)。**结论:**对 AS 后凸畸形患者,通过截骨矫形手术可以缓解脊柱屈曲对脏器的挤压、改善受挤压脏器的位置;术后患者消化功能得到明显的改善。

【关键词】强直性脊柱炎;胸腰椎后凸畸形;腹部;消化功能

doi: 10.3969/j.issn.1004-406X.2015.09.07

中图分类号: R682.3, R593.23 文献标识码: A 文章编号: 1004-406X(2015)-09-0805-06

Improvement of abdomen and digestive function in patients with ankylosing spondylitis kyphosis following pedicle subtraction osteotomy/ZHAO Lu, LIU Chao, ZHANG Yonggang, et al//Chinese Journal of Spine and Spinal Cord, 2015, 25(9): 805-810

【Abstract】 Objectives: To investigate the improvement of abdomen and digestive function in patients with ankylosing spondylitis kyphosis following pedicle subtraction osteotomy. **Methods:** From January 2009 to July 2013, 53 patients in our department with severe ankylosing spondylitis kyphosis and undergoing pedicle subtraction osteotomy were studied, there were 48 males and 5 females. All the patients underwent pedicle subtraction osteotomy(PSO), the segment of osteotomy was L1-L3. The globe kyphosis(GK) was measured in the whole spine X-ray photo preoperatively and at 18 months after surgery. Three-dimensional reconstruction was performed on all patients. The average of abdominal median sagittal plane(AMSPA) and the minimum distance (MD) between xiphoid process and spine or between abdominal wall and spine when the abdominal wall was folded into abdomen were measured on the three-dimensional computed tomography(3D-CT) scans. A health related quality of life including Oswestry Disability Index and Scoliosis Research Society outcomes instrument-22 and weight were recorded preoperatively and at 18 months after surgery. Digestive function assessment included the food intake(FI), and the change of defecate frequency was recorded at 18 months after surgery, the patients were divided into group A(no change) and group B(obviously increased according to intake changes),

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and group 1 (no change) and group 2 (significantly increased according to the defecate frequency changes).

Results: Obvious improvement in ODI, weight and SRS-22 in all the patients at 18 months after surgery ($P < 0.05$) was noted. The GK decreased significantly at 18 months after surgery ($P < 0.05$). MD and AMSPA increased significantly compared with pre-operation ($P < 0.05$). The distances from porta hepatic, hilum of spleen, left renal hilum to margo superior of symphysis pubis were longer compared with those of pre-operation ($P < 0.05$). The distance between right renal hilum and margo superior of pubic symphysis showed no statistical significance compared with that of pre-operation ($P > 0.05$). 29 patients showed significant improvement of defecate frequency at 18 months after surgery, however 20 patients showed no change ($P < 0.05$). 33 patients showed significant improvement of food intake at 18 months after surgery, however 24 patients showed no change. There were no significant differences in terms of age, course of diseases between group A and group B ($P > 0.05$). GK value of group A was significantly greater than that in group B, which was the same with group 1 and group 2 ($P < 0.05$). **Conclusions:** The conditions of extrusion of viscus by trunk flexion and decreased volume of the abdominal cavity are improved in patients with ankylosing spondylitis kyphosis after osteotomy, followed by digestive function improvement.

[Key words] Thotacolumbar kyphosis; Ankylosing spondylitis; Abdomen; Digestive function

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强直性脊柱炎 (ankylosing spondylitis, AS) 是一种主要累及中轴骨的慢性炎症性疾病, 病变通常起始于骶髂关节及腰椎, 随后逐渐向上端发展, 进而引起全脊柱的僵直。晚期可发展为严重的胸腰椎后凸畸形, 导致患者出现腰背疼痛、卡压腹部脏器、身体前倾、步态改变、食欲下降、便秘和肺功能损害等并发症, 严重影响患者的生活质量^[1-4]。1945 年 Smith-Petersen 等^[5]首次报道手术矫正 AS 后凸畸形。近年来, 随着手术的不断改良, AS 患者术后一定程度上恢复了矢状位平衡, 多项生理功能得到改善, 并取得了良好的临床效果^[6]。然而, 目前鲜有关于截骨矫形术后患者腹部及消化功能改变的文献报道。本研究旨在探讨 AS 后凸畸形患者截骨矫形术后腹部变化及消化功能的改变。

1 资料与方法

1.1 一般资料

符合以下标准的患者纳入本研究: (1) 由两位以上经验丰富的风湿免疫科医师做出 AS 诊断; (2) 伴有胸腰椎后凸畸形; (3) 无吸烟史和心血管疾病; (4) 术前行肺功能测试及扫描到骶骨及耻骨的全脊柱 CT 三维重建; (5) 术前测定两次间隔 24 周的红细胞沉降率 (erythrocyte sedimentation rate, ESR) 和 C 反应蛋白 (C reactive protein, CRP) 均在正常范围。排除标准: (1) 伴有颈-胸畸形; (2) 存在脊柱病理性骨折或假关节; (3) 进行过可能影响肺功能的腹部和胸腔手术。我院 2009 年

1 月~2013 年 7 月符合上述标准的行截骨矫形术的 AS 胸腰椎后凸畸形患者 53 例, 其中男 48 例, 女 5 例。均采用经椎弓根椎体截骨术 (pedicle subtraction osteotomy, PSO) 治疗, 截骨节段为 L1~L3; 18 例行双节段截骨, 35 例行单节段截骨。记录术前、术后 18 个月 Oswestry 功能障碍指数 (Oswestry disability index, ODI) 及脊柱侧凸研究学会-22 (Scoliosis Research Society-22, SRS-22) 量表评分。

1.2 影像学测量

1.2.1 Cobb 角的测量 在术前、术后 18 个月的包括腰骶椎、骨盆在内的站立位全脊柱侧位 X 线片上测量 T1 上缘切线与 S1 上缘切线所形成的 T1~S1 Cobb 角, 即脊柱最大后凸角 (global kyphosis, GK)。为减小误差, 所有数据均连续测量 3 次, 取平均值进行数据分析。

1.2.2 CT 测量 (1) CT 数据采集及测量设备: Siemens Somatom Sensation 64 排螺旋 CT (德国西门子公司)。所有患者资料均在 CT 室直接使用 CT 配套 MMWP 工作站及 Syngo 软件进行测量。西门子 MMWP (SyngoMulti Modality) 工作站及 Syngo 软件是 Siemens Somatom Sensation 64 排螺旋 CT 的专用软件, 可根据 CT 值不断调整窗口, 可对各类组织进行准确的三维重建。在进行三维重建后, 可截取任意平面进行操作、测量。(2) 测量指标: 所有患者术前及术后 18 个月均进行全脊柱三维 CT 检查, 在全脊柱 CT 片上测量以下指

标。①正中矢状面腹部面积,在正中矢状面测量以下四条界限围成区域的面积(AMSPA),即由剑突到 T12 椎体前下缘的连线、由剑突到耻骨联合上缘的连线、由耻骨联合上缘到 S1 前上角的连线、脊柱 T12 前下角到 S1 前上角的连线。②正中矢状面腹部最窄处的距离,在正中矢状面测量由剑突到脊柱前缘的最短距离(MD)。如果患者存在明显的腹壁内折,则测量腹壁内折尖端到脊柱前缘的最短距离。③内脏位置的测量,测量手术前后肝门、两侧肾门及脾门到耻骨联合上缘中点的距离。

1.3 消化功能评估

截骨矫形术前、后对患者进行包括食量改变、体重及大便频率等消化功能指标的问卷调查,评价手术对患者消化功能的影响。为排除围手术期并发症、术后卧床时间、佩戴支具时间等的影响,在术后随访至少 18 个月时才对患者进行术后消化功能的评估。由于具体的进食量难以进行准确的测量,主要根据患者术后 18 个月的自我感觉分为两组:A 组,食量增加不明显;B 组,食量明显增加。一般情况下,临床 AS 患者大便频率为 3~4 天 1 次,由此对截骨矫形术后患者进行分组:1 组,大便频率无明显改变(3~4 天 1 次);2 组,大便频率改善明显(1~2 天 1 次)。

1.4 统计学分析

使用 SPSS 16.0 软件进行统计学分析,计量资料采用均数±标准差表示,对所有患者手术前后的 MD、AMSPA 及内脏位置的数据进行 *t* 检验;同样,对患者的 GK、ODI 及 SRS-22 量表评分进行 *t* 检验;对 1 组、2 组患者的病程、年龄及 GK 分别进行 *t* 检验;对 A 组、B 组患者的病程、年龄及 GK 分别进行 *t* 检验。 $P<0.05$ 表示有统计学意义。

2 结果

所有患者术后均获得了满意的影像学 and 临床效果,无神经损伤发生。在术中及术后随访过程中未出现血管损伤和断钉断棒现象。术后 18 个月 ODI 及 SRS-22 量表评分较术前改善明显 ($P<0.05$),体重较术前明显增加 ($P<0.05$),GK 较术前明显变小 ($P<0.05$),MD、AMSPA 较术前明显增大 ($P<0.05$,表 1,图 1)。术后 18 个月内脏位置的测量结果见图 2 和表 2,肝门到耻骨联合上缘中点的距离、脾门到耻骨联合上缘中点的距离、左侧肾门到耻骨联合的距离均较术前明显增大 ($P<$

0.05),右侧肾门到耻骨联合的距离较术前差异无统计学意义 ($P>0.05$)。

29 例患者术后 18 个月大便频率较术前有所增加,24 例患者自觉改善不明显。术后 18 个月 33 例患者食量明显增加,20 例患者食量增加不明显。术后 18 个月 1 组与 2 组患者的年龄及病程均无明显差异 ($P>0.05$),A 组与 B 组的年龄、病程均无明显差异 ($P>0.05$),1 组 GK 明显大于 2 组 ($P<0.05$),A 组 GK 明显大于 B 组 ($P<0.05$,表 3,表 4)。

3 讨论

AS 胸腰椎后凸畸形患者可出现下腰部剧烈疼痛、身体前倾、步态发生变化、食欲下降等症状,而且可发生心血管病变、胸廓扩张度减少导致的肺部病变、骨质疏松和骨折等并发症,严重影响患者生活质量^[7]。由于脊柱后凸卡压导致的腹部脏器受压,进而影响到患者的消化吸收功能以及由此带来的饮食减少和大便频率减少等症状更是对

表 1 手术前后的 GK、ODI、SRS-22、MD、AMSPA 与体重

Table 1 GK、ODI、SRS-22、MD、AMSPA、Weight data of patients before and after surgery

	术前 Preoperative	术后 18 个月 Postoperative	df
脊柱最大后凸角 GK(°)	56.68±15.36	7.87±12.04 ^①	52
ODI(分)	37.67±2.93	11.75±1.18 ^①	52
SRS-22 量表评分 SRS-22 score			
功能 Function	2.60±0.50	4.19±0.33 ^①	52
疼痛 Pain	2.57±0.80	4.42±0.38 ^①	52
表现 Appearance	1.72±0.46	4.35±0.32 ^①	52
精神状态 Mental	2.49±0.94	4.32±0.49 ^①	52
满意度 Satisfaction		4.76±0.34	
MD(cm)	10.45±3.68	13.19±2.17 ^①	20
AMSPA(cm ²)	170.80±42.48	216.0±31.28 ^①	20
体重(kg) Weight	58.09±7.02	63.92±9.29 ^①	52

注:MD,正中矢状面剑突到脊柱前缘的最短距离;AMSPA,正中矢状面腹部面积;①与术前比较 $P<0.05$

Note: MD, the minimum distance between the xiphoid process and the anterior border of spine; AMSPA, the acreage of the abdominal median sagittal plane. ①Compared to preoperative group, $P<0.05$

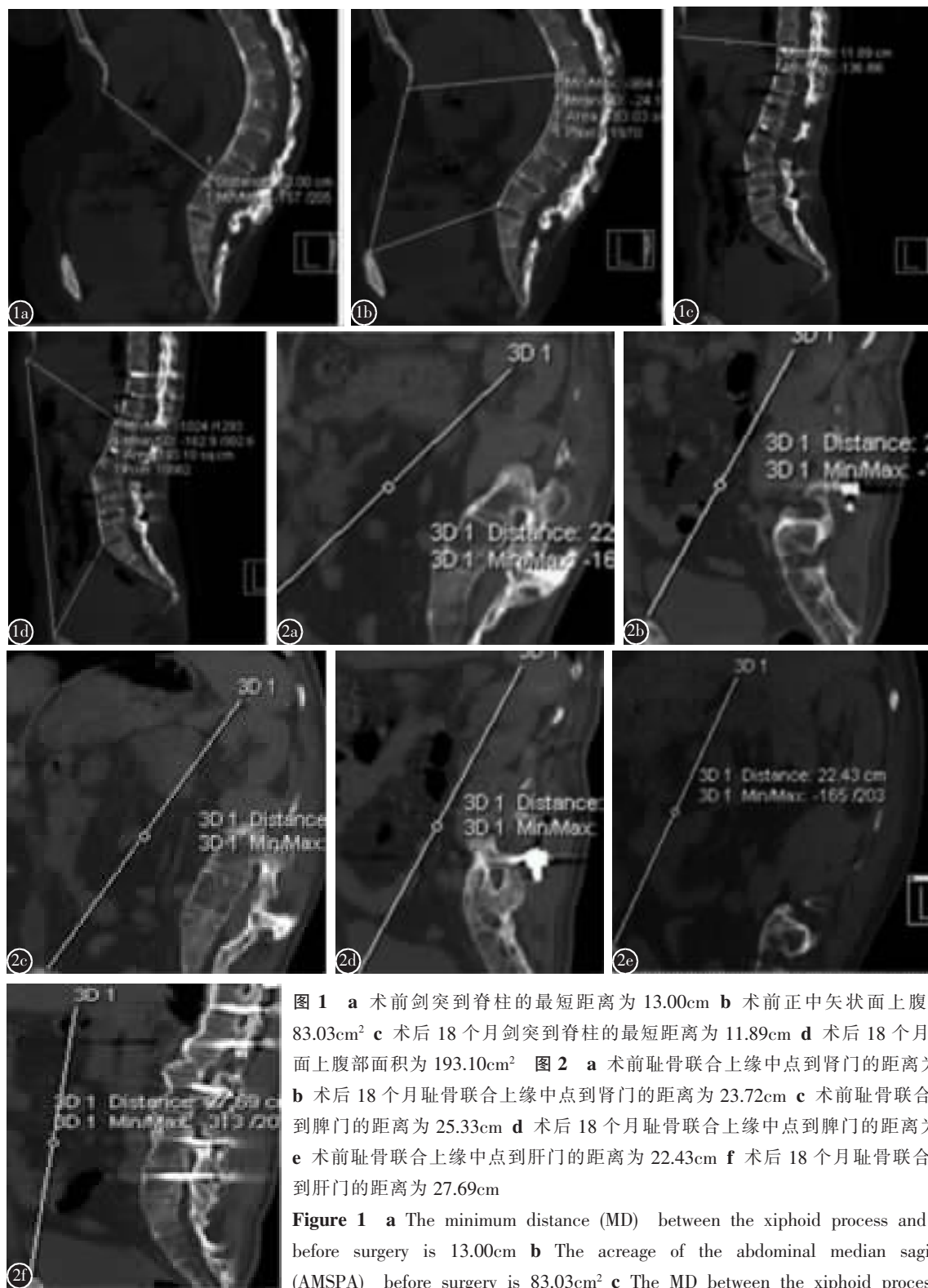


图 1 **a** 术前剑突到脊柱的最短距离为 13.00cm **b** 术前正中矢状面上腹部面积为 83.03cm² **c** 术后 18 个月剑突到脊柱的最短距离为 11.89cm **d** 术后 18 个月正中矢状面上腹部面积为 193.10cm² **图 2** **a** 术前耻骨联合上缘中点到肾门的距离为 22.65cm **b** 术后 18 个月耻骨联合上缘中点到肾门的距离为 23.72cm **c** 术前耻骨联合上缘中点到脾门的距离为 25.33cm **d** 术后 18 个月耻骨联合上缘中点到脾门的距离为 29.53cm **e** 术前耻骨联合上缘中点到肝门的距离为 22.43cm **f** 术后 18 个月耻骨联合上缘中点到肝门的距离为 27.69cm

Figure 1 **a** The minimum distance (MD) between the xiphoid process and the spine before surgery is 13.00cm **b** The acreage of the abdominal median sagittal plane (AMSPA) before surgery is 83.03cm² **c** The MD between the xiphoid process and the spine 18 months after surgery is 11.89cm **d** The AMSPA 18 months after surgery is 193.10cm² **Figure 2** **a** The distance between syphysis pubis and hilum of renal before surgery is 22.65cm **b** The distance between syphysis pubis and hilum of renal 18 months after surgery is 23.72cm **c** The distance between syphysis pubis and hilum of spleen before surgery is 25.33cm **d** The distance between syphysis pubis and hilum of spleen 18 months after surgery is 29.53cm **e** The distance between syphysis pubis and porta hepatic before surgery is 22.43cm **f** The distance between syphysis pubis and porta hepatic 18 months after surgery is 27.69cm

表 2 手术前、后腹部内脏位置的变化 (cm)

Table 2 The change of viscera position of patients before and 18 months after surgery

	术前 Preoperative	术后 18 个月 18 months after surgery	df
D1	19.78±3.73	25.67±3.13 ^①	20
D2	23.68±2.77	27.60±2.97 ^①	20
D3	22.39±2.34	22.98±2.18	20
D4	22.12±2.27	23.05±2.83 ^①	20

注: D1, 肝门到耻骨联合的距离; D2, 脾门到耻骨联合的距离; D3, 右侧肾门到耻骨联合的距离; D4, 左侧肾门到耻骨联合的距离。①与术前比较 $P<0.05$

Note: D1 is the distance between porta hepatic and the symphysis pubis; D2 is the distance between hilum of spleen and the symphysis pubis; D3 is the distance between hilum of right renal and the symphysis pubis; D4 is the distance between hilum of left renal and the symphysis pubis. ①Compared with preoperation, $P<0.05$

表 3 术后 18 个月 1 组与 2 组患者的 GK、年龄及病程

Table 3 The GK, age and course of disease of patients 18 months after surgery between group 1 and group 2

	1组 Group 1	2组 Group 2	df
GK (°)	61.17±17.77	55.06±13.37 ^①	51
年龄(岁) Age(y)	40.29±5.75	37.11±8.56	51
病程(月) Course(month)	14.06±5.46	15.14±5.21	51

注: GK, 脊柱最大后凸角; ①与 1 组比较 $P<0.05$

Note: GK, the Globe kyphosis; ①Compared to group 1, $P<0.05$

表 4 术后 18 个月 A 组与 B 组患者的 GK、年龄及病程

Table 4 The GK, age and course of disease between group A and group B 18 months after surgery

	A组 Group A	B组 Group B	df
GK (°)	61.96±14.66	52.31±14.77 ^①	51
年龄(岁) Age(y)	38.54±6.09	37.76±38.54	51
病程(月) Course(month)	13.75±5.38	15.72±5.11	51

注: GK, 脊柱最大后凸角; ①与 A 组比较 $P<0.05$

Note: GK, the Globe kyphosis; ①Compared to group A, $P<0.05$

患者的生活质量产生了极大的负面影响。

AS 后凸畸形可以通过脊柱截骨矫形手术治疗, 术后患者各项生理功能可得到一定程度的改善^[6]。1945 年 Smith-Petersen^[5]首次报道了腰椎后路楔形截骨矫形术矫正 AS 后凸畸形, 此后国内外学者先后报道了通过不同的术式而达到良好的矫形效果, 进而不同程度地改善了患者的生理功

能和生活质量^[8-10]。有学者报道了改良的单节段 Smith-Petersen 截骨(SPO)治疗 AS 后凸畸形, 通过改良的手术方式, 可得到更大的矫形角度, 从而使患者术后更大程度的恢复^[11-14]。而 SPO 主要是通过闭合脊柱后方、张开前方取得矫形角度, 同时伴有前纵韧带断裂及前柱延长, 易损伤神经及造成内脏和前方大血管损伤。为降低以上并发症的发生率, 有学者对 AS 患者行改良的多节段 SPO 手术, 取得了矫正率高、安全性好、及并发症少、患者生理功能恢复良好等优点^[15-20]。

晚期 AS 患者, 由于严重的脊柱后凸畸形导致躯干卡压腹部内脏、腹部容积的减小而导致消化系统功能下降^[21]。与之相关的消化系统症状主要包括纳差、食量减少、便秘。脊柱截骨矫形术是目前唯一有效的治疗 AS 后凸畸形并改善脊柱矢状位平衡及患者腹部状况的手术方式。同样, 理论上通过截骨矫形可以改善患者消化功能。本研究通过测量术前及术后各脏器到耻骨联合上缘的距离变化, 说明截骨矫形术后患者腹部脏器位置发生明显变化, 可以一定程度上改善 AS 后凸畸形对腹部脏器的压迫。术后患者腹部容积及脊柱对脏器的卡压程度都有很大程度的改善。同样, 患者术后消化功能改善非常明显。以上症状均为脊柱后凸畸形导致, 理论上应该后凸越重以上症状越明显。同样研究结果表明术后进食量明显增加的患者 GK 明显大于其他患者, 而年龄、病程并无明显差异。术后大便频率明显改善患者的 GK 明显大于其他患者, 且年龄、病程并无显著性差异。主要原因可能是不同患者对腹部变化的耐受程度不同, 及由于胸腰段及腰段脊柱前凸减小或变为后凸在一定的程度上对卡压腹部脏器及腹部容积减小有一定的代偿^[21]。由于本研究统计资料为作用于 L1~L3 节段的截骨矫形术式, 且为了排除围手术期并发症、术后卧床时间、佩戴支具的时间等因素的影响, 我们在术后随访至少到第 18 个月时才对患者进行术后消化功能的评估, 其余节段截骨矫形术后腹部改善情况尚待进一步统计, 因此性别、围手术期并发症、卧床时间及其他不确定因素对截骨矫形术后腹部消化道功能改变的影响仍需对更多患者进行更深入的研究。

综上所述, 截骨矫形是治疗 AS 后凸畸形的一种有效的治疗方法; AS 后凸畸形可导致躯干对腹部脏器的卡压, 而此种卡压可通过截骨矫形手术

改善;通过截骨矫形改善腹部容积及内脏位置,进而改善患者的消化功能。

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(收稿日期:2015-05-25 末次修回日期:2015-09-02)

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(本文编辑 李伟霞)