

强直性脊柱炎患者腰椎骨化程度和后凸程度与生活质量的相关性分析

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【摘要】目的:探讨强直性脊柱炎(ankylosing spondylitis, AS)患者腰椎骨化程度和后凸程度与生活质量的相关性。**方法:**从 2011 年 4 月~2014 年 10 月在我院就诊的 AS 患者中筛选出具有完整临床资料的患者 106 例, 其中男 98 例, 女 8 例; 年龄 36.4 ± 9.5 岁(20~64 岁); 病程 12.4 ± 7.5 年(1~37 年)。临床资料包括患者的年龄、发病年龄、病程、全脊柱最大后凸角(global kyphosis, GK)、Oswestry 功能障碍指数(Oswestry disability index, ODI)、Bath AS 疾病活动性指数(Bath ankylosing spondylitis disease activity index, BASDAI)、Bath AS 功能指数(Bath ankylosing spondylitis functional index, BASFI)、血沉(ESR)和 C 反应蛋白(CRP)。应用 Stoke 脊柱病变评分(Stoke ankylosing spondylitis spinal score, SASSS)评估 AS 患者腰椎韧带骨化情况。根据 SASSS 分组:A 组, $SASSS \leq 36$ 分; B 组, $SASSS > 36$ 分。运用独立样本 t 检验比较两组间各参数的差异; 采用 Pearson 相关性检验分析各临床参数间的相关性, 寻找导致 SASSS 增加的危险因素。**结果:**A 组 61 例患者, 男 58 例, 女 3 例, SASSS 得分 18.6 ± 9.4 分; B 组 45 例患者, 男 40 例, 女 5 例, SASSS 得分 59.1 ± 21.4 分。两组患者年龄、病程、GK 和 BASFI 有显著性差异($P < 0.05$); 而发病年龄、ODI、BASDAI、ESR、CRP 无显著性差异($P > 0.05$)。AS 患者的 SASSS 与年龄、病程、GK、ODI 及 BASFI 显著相关($r = 0.505, 0.650, 0.414, 0.219, 0.319, P < 0.05$); 病程、SASSS 和 GK 均与 ODI 和 BASFI 显著相关($r = 0.228, 0.219, 0.230, P < 0.05; r = 0.258, 0.319, 0.314, P < 0.05$)。**结论:**年龄增加、病程延长和 GK 增大可能是 AS 患者腰椎韧带骨化程度增加的危险因素; AS 患者腰椎骨化程度增加和后凸畸形加重会显著降低患者生活质量。

【关键词】强直性脊柱炎; 骨化; 后凸畸形; 生活质量

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【Abstract】 Objectives: To investigate the correlations of lumbar syndesmophytes and global kyphosis with quality of life in ankylosing spondylitis(AS) patients. **Methods:** From April 2011 to October 2014, 106 AS patients were included. There were 98 males and 8 females, with an average age of 36.4 ± 9.5 years (range, 20-64 years) and a mean disease duration of 12.4 ± 7.5 years(1-37 years). The clinical data consisted of age, age of onset, disease duration, global kyphosis(GK), Oswestry disability index(ODI), Bath ankylosing spondylitis disease activity index(BASDAI), Bath ankylosing spondylitis functional index(BASFI), erythrocyte sedimentation rate(ESR) and C-reaction protein(CRP). Lumbar syndesmophytes were evaluated by Stoke ankylosing spondylitis spinal score (SASSS). The subjects were divided into group A and group B according to SASSS (group A, $SASSS \leq 36$; group B, $SASSS > 36$). The differences of the parameters between group A and group B were analyzed by the independent t -test. Pearson correlation was used to evaluate the relationships among clinical parameters and to investigate the risk factors correlated with SASSS. **Results:** 61 AS patients were included in

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group A(58 males and 3 females) and the mean SASSS score was 18.6 ± 9.4 . 45 AS patients were included in group B(40 males and 5 females) and the mean SASSS score was 59.1 ± 21.4 . Age, disease duration, GK and BSFI were observed significantly different between group A and group B($P < 0.05$); age of onset, ODI, BASDAI, ESR, and CRP were observed no significantly different between group A and group B($P > 0.05$). Age, disease duration, GK, ODI and BSFI were found significantly correlated with SASSS($r = 0.505, 0.650, 0.414, 0.219, 0.319$; $P < 0.05$). Disease duration, SASSS and GK were remarkably correlated with ODI($r = 0.228, 0.219, 0.230$; $P < 0.05$) and BASFI($r = 0.258, 0.319, 0.314$; $P < 0.05$). **Conclusions:** Older age, longer disease duration and larger GK are high risk factors of SASSS in AS patients. The quality of life in AS patients is severely affected by the higher SASSS and larger GK.

【Key words】 Ankylosing spondylitis; Syndesmophytes; Kyphosis; Quality of life

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强直性脊柱炎(ankylosing spondylitis, AS)是一种慢性炎症性疾病,主要累及中轴关节,同时侵犯脊柱旁软组织及外周关节^[1]。新骨形成是 AS 重要病理学特征之一,其发生机制仍不明确^[1-3]。有研究认为,AS 新骨形成是由于骶髂关节和脊椎关节附近的肌腱和韧带等软组织发生炎症性改变,继发纤维化和钙化所致^[2-4]。脊椎韧带骨化可造成脊柱活动能力下降,严重的脊柱骨化可致椎体间骨桥形成,脊柱发生“竹节样”改变,患者脊柱关节出现不可逆的强直状态,严重影响患者的生活质量^[5]。另外,晚期 AS 患者常伴发僵硬胸腰椎后凸畸形,出现躯干前倾,骨盆后旋,膝关节和踝关节出现代偿性屈曲畸形,行走及平视功能受到严重限制,生活质量显著下降^[6-8]。有关腰椎骨化程度与后凸程度及生活质量的相关性研究未见报道,本研究拟对此进行探讨。

1 资料与方法

1.1 一般资料

回顾性分析 2011 年 4 月~2014 年 10 月在我院就诊的 AS 患者,入选标准:(1)符合 1984 年修订的 AS 诊断标准^[9];(2)有站立位全脊柱正侧位 X 线片;(3)填写 Oswestry 功能障碍量表(Oswestry disability index, ODI)^[10]、AS 疾病活动性量表(Bath ankylosing spondylitis disease activity index, BASDAI)^[11]及 AS 功能量表(Bath ankylosing spondylitis functional index, BASFI)^[12];(4)有血沉(erythrocyte sedimentation rate, ESR)和 C 反应蛋白(C-reaction protein, CRP)检查结果。排除标准:(1)脊柱骨折或脊柱假关节形成;(2)脊柱手术史;(3)椎间盘炎;(4)冠状面上存在 Cobb 角 $>10^\circ$ 的脊

柱侧凸;(5)髋关节屈曲挛缩畸形或髋关节置换术后。符合上述标准的 AS 胸腰椎后凸畸形患者 106 例,其中门诊患者 45 例,住院接受截骨矫形患者 61 例;年龄 36.4 ± 9.5 岁(20~64 岁);病程 12.4 ± 7.5 年(1~37 年)。

1.2 影像学指标的测量及脊柱韧带骨化程度评估

在医学影像传输系统(PACS)中的站立位全脊柱侧位 X 线片上测量全脊柱最大后凸角(global kyphosis, GK)^[13],测量方法为:最倾斜的上端椎上终板与最倾斜的下端椎下终板的夹角(图 1)。运用 Stoke 脊柱病变评分(Stoke ankylosing spondylitis spinal score, SASSS)^[14]评估 AS 患者腰椎韧带骨化情况,评估方法为:T12 椎体的下缘到 S1 椎体的上缘,同时评估椎体的前上、后上、前下和后下位点;0 分,椎体正常;1 分,椎体出现骨侵蚀、骨硬化和椎体方形变;2 分,椎体骨赘增生;3 分,椎体间骨桥形成(图 2)。总评分范围为 0~72 分。

1.3 数据分析及统计方法

根据 SASSS 评分^[14]分为两组:A 组, SASSS ≤ 36 分;B 组, SASSS > 36 分。采用 SPSS 18.0 软件进行统计学分析,运用独立样本 t 检验比较两组间临床资料及影像学参数。运用 Pearson 相关性分析研究各临床资料及影像学参数之间的相关性。 $P < 0.05$ 为有统计学差异。

2 结果

A 组 61 例,男 58 例,女 3 例, SASSS 为 0~36 分,平均 18.6 ± 9.4 分;B 组 45 例,男 40 例,女 5 例, SASSS 为 37~72 分,平均 59.1 ± 21.4 分。独立

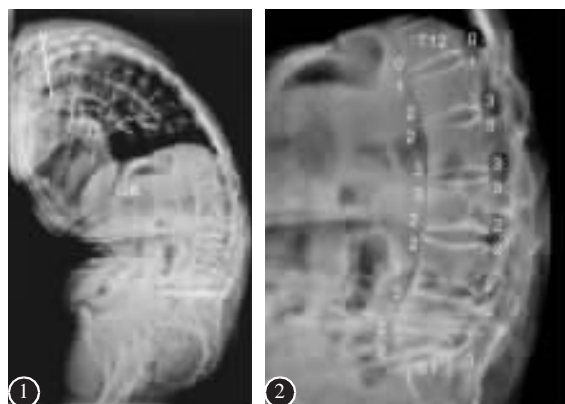


图 1 全脊柱最大 Cobb 角(GK)测量方法:脊柱后凸节段最倾斜的上端椎上终板与下端椎下终板之间的夹角 图 2 Stoke 脊柱病变评分(SASSS)方法:T12 椎体的下缘到 S1 椎体的上缘,评估每个椎体,0 分,椎体正常;1 分,椎体出现骨侵蚀、骨硬化和椎体方形变;2 分,椎体骨赘增生;3 分,椎体间骨桥形成;最大总分 72 分

Figure 1 Global kyphosis (GK) on X-ray: from the upper endplate of superior end vertebra to the lower endplate of inferior end vertebra **Figure 2** Stoke ankylosing spondylitis spinal score (SASSS): all corners of each vertebra between the lower border of T12 and the upper border of S1 were examined

and scored 0 for normal, 1 for erosion, squaring or sclerosis, 2 for syndesmophyte formation, and 3 for total bony bridging, giving a maximum possible score of 72

样本 t 检验结果显示 A、B 两组患者年龄、病程、GK 和 BASFI 存在显著性差异($P<0.05$)(表 1),而发病年龄、ODI、BASDAI、ESR、CRP 无显著性差异($P>0.05$)。

Pearson 相关性分析结果显示,患者 SASSS 与年龄、病程、GK、ODI 及 BASFI 显著相关($P<0.05$);GK 与发病年龄、病程、SASSS、ODI 及 BASFI 显著相关($P<0.05$);病程、SASSS 和 GK 均与 ODI 和 BASFI 显著相关($P<0.05$)(表 2 和图 3、4)。

3 讨论

AS 椎体病变早期,炎性细胞和增生血管翳侵犯邻近软组织后在椎体上下缘形成肉芽组织,随后发生软骨破坏和软骨下骨硬化、关节间隙狭窄,使椎体前缘凹面消失形成方形变;晚期,椎旁软组织及韧带发生广泛钙化,脊柱呈“竹节样”变,严重者发生骨性强直^[2-4]。随着病情进展,发生在脊柱、小面关节、关节突关节和肋椎关节的韧带骨赘可致脊柱活动度下降和不可逆性僵硬,严重影响患者的生活质量^[4-5]。

脊柱韧带骨化和强直是 AS 患者最具特征性的临床表现,脊柱韧带骨化程度受到多重因素的影响^[2-5]。Boonen 等^[5]回顾性分析 619 例 AS 患者的临床资料,发现 AS 患者脊柱韧带骨化程度与发病年龄、病程和性别显著相关,即发病年龄早、病程长和男性是脊柱韧带骨化的高危因素。Brophy 等^[15]对 571 例 AS 患者的临床资料进行分析,发现 AS 患者腰椎病变和骨化的危险因素为年龄、病程、颈椎病变程度及髋关节病变程度。尽管大多数

表 1 A 组与 B 组患者临床资料及影像学参数比较

Table 1 Comparison of clinical data and radiographic parameters between group A and group B

	A组(n=61) Group A	B组(n=45) Group B
年龄(y) Age	32.9±8.6	41.2±9.9 ^①
发病年龄(y) Age of onset	24.5±8.4	23.2±7.1
病程(y) Disease duration	8.3±5.5	17.9±7.8 ^①
全脊柱最大后凸角(°) Global kyphosis	54.1±21.3	69.1±21.4 ^①
AS脊柱病变影像学评分(分) Stoke ankylosing spondylitis spinal score	18.6±9.4	58.2±11.2 ^①
Oswestry功能障碍指数(%) Oswestry disability index	25.5±15.7	30.7±17.3
AS疾病活动性指数(分) Bath ankylosing spondylitis disease activity index	3.9±4.7	3.6±2.1
AS功能障碍指数(分) Bath ankylosing spondylitis functional index	2.5±2.2	3.5±2.2 ^①
血沉(mm/h) Erythrocyte sedimentation rate	30.7±24.8	22.2±13.9
C反应蛋白(mg/l) C-reaction protein	29.3±30.1	20.9±19.7

注:①与 A 组比较 $P<0.05$

Note: ①Compared with group A, $P<0.05$

研究认为脊柱韧带骨化程度与 AS 病程相关,但也有研究未证实这种联系,如 Baraliakos 等^[16]对 116 例 AS 患者进行随访,发现患者的脊柱骨化程度与基线韧带骨赘情况显著相关,即基线韧带骨赘多的患者更容易发生脊柱韧带骨化,但该研究并未发现病程与脊柱骨化相关。本研究结果显示,AS 患者腰椎韧带骨化程度与患者年龄、病程、GK、ODI 和 BASFI 显著相关($P<0.05$),而与发病

表 2 临床资料及影像学参数间的 Pearson 相关性分析的相关系数

Table 2 Pearson correlation test to investigate the relationships of clinical data and radiographic parameters									
	发病年龄 Age of onset	病程 Disease duration	GK	SASSS	ODI	BASDAI	BASFI	ESR	CRP
年龄 Age	0.617 ^①	0.649 ^①	0.162	0.505 ^①	0.155	0.048	0.137	-0.086	-0.203
发病年龄 Age of onset		-0.198 ^①	-0.286 ^①	-0.022	-0.036	-0.104	-0.092	0.022	-0.085
病程 Disease duration			0.479 ^①	0.650 ^①	0.228 ^①	0.160	0.258 ^①	-0.129	-0.171
GK				0.414 ^①	0.230 ^①	-0.009	0.314 ^①	-0.107	-0.066
SASSS					0.219 ^①	-0.057	0.319 ^①	-0.133	-0.186
ODI						0.286 ^①	0.599 ^①	0.036	-0.075
BASDAI							0.214 ^①	0.032	-0.099
BASFI								0.145	0.006
ESR									0.572 ^①

注:GK,全脊柱最大后凸角;SASSS,AS 脊柱病变影像学评分;ODI,Oswestry 功能障碍指数;BASDAI,AS 疾病活动性指数;BASFI,AS 功能障碍指数;ESR,血沉;CRP,C 反应蛋白。① $P<0.05$

Note: GK, global kyphosis; SASSS, Stoke ankylosing spondylitis spinal score; ODI, Oswestry disability index; BASDAI, Bath ankylosing spondylitis disease activity index; BASFI, Bath ankylosing spondylitis functional index; ESR, erythrocyte sedimentation rate; CRP, C-reaction protein. ① $P<0.05$

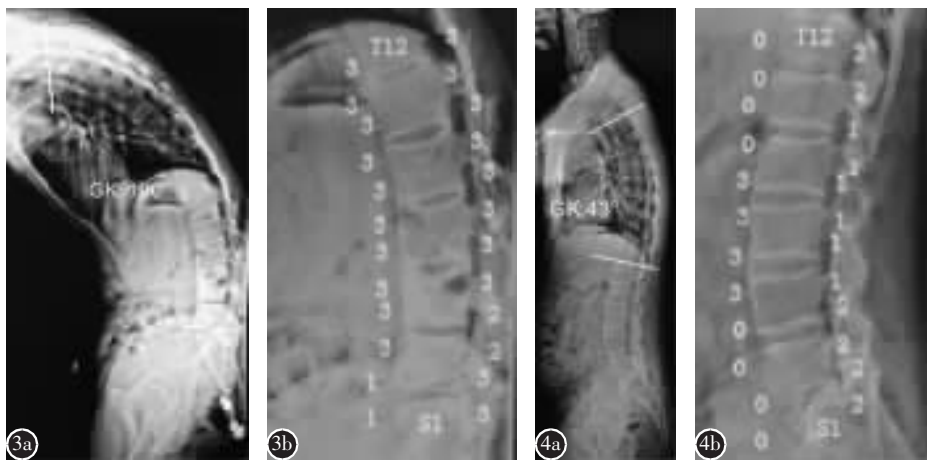


图 3 患者男,43 岁,发病年龄 24 岁,病程 19 年 a GK 为 100° b SASSS 为 66 分 图 4 患者男,38 岁,发病年龄 32 岁,病程 6 年 a GK 为 43° b SASSS 为 30 分

Figure 3 A 43-year-old male AS patient with GK of 100°, the age of onset, disease duration, and SASSS were 24 years, 19 years, and 66, respectively **Figure 4** A 38-year-old male AS patient with GK of 43°, the age of onset, disease duration, and SASSS were 32 years, 6 years, and 30, respectively

年龄、BASDAI、ESR 和 CRP 无显著相关性 ($P>0.05$)。笔者认为,AS 患者脊柱韧带骨化是一个不可逆转的过程,是炎症性病变随着患者年龄的增长和病程的延长逐渐累积的结果,病理性改变积累导致了 AS 患者脊柱影像学的改变。因此,年龄和病程是 AS 患者腰椎骨赘增生的高危因素。Jacques 等^[7]对小鼠进行尾部悬挂实验发现,经过悬挂的小鼠跟腱韧带骨赘增生程度显著低于非悬挂组,并指出悬挂组小鼠因为跟腱不受力学作用,

降低了韧带骨赘增生的作用,据此推断,脊柱关节炎患者韧带骨化程度是由生物应力因素与炎症作用共同导致。本组研究结果显示,AS 患者腰椎韧带骨化程度与胸腰椎后凸畸形程度显著相关 ($r=0.414, P<0.05$)。笔者认为,晚期 AS 患者出现胸腰椎后凸畸形,其脊柱前柱发生了明显的压缩变短,后柱相对延长,同时躯干发生前倾,重心前移,这种结构性改变使 AS 患者脊柱前后柱力学状态发生变化:前柱压力增加,后柱张力增加,这种受力

状态的改变可能促进了 AS 患者脊柱韧带骨化。本组研究结果显示,胸腰椎后凸畸形严重的患者腰椎韧带骨化程度高,我们认为 GK 增大也是 AS 患者骨赘增生的高危因素。

近期,有学者对 AS 患者的 MRI 及 X 线等资料进行了分析,证实 AS 韧带骨赘源于椎体的炎症性改变^[18,19]。Chiwchanwisawakit 等^[18]对 100 例 AS 患者进行了 2 年随访,观察其 MRI 和 X 线片变化,结果显示,MRI 上出现炎症性变化的椎体比无炎症变化的椎体在后期随访中更容易发生韧带骨赘增生,其差异有显著性。由此认为炎症性浸润能够预测骨赘增生,并推论椎体出现炎症性损伤导致韧带组织发生脂肪浸润,最终导致韧带骨化。但分析评估 AS 患者炎症水平的实验室检查结果 ESR 和 CRP,并未发现与 AS 患者脊柱韧带骨化程度存在相关性^[16]。本研究结果亦显示,SASSS 与 ESR 和 CRP 无显著相关性($P>0.05$)。可能因为脊柱骨赘增生常发生在炎症性病变之后的较长时间内,且为长时间的炎症性病变变化的结果,因此某一时刻的 ESR 和 CRP 水平并不能代表患者之前的炎症水平。

AS 的炎症活动使患者腰背部疼痛和躯干发僵,降低了患者的生存质量^[20-27]。Cho 等^[23]分析了 36 例 AS 患者,发现 AS 患者脊柱炎症性改变及炎症性改变造成的脊柱结构破坏及韧带骨化,均会导致 AS 患者脊柱僵硬和活动能力降低。脊柱韧带骨化同时累及胸廓的活动能力,损害患者的肺功能,降低患者生活质量。另外,部分晚期 AS 患者常合并僵硬性胸腰椎后凸畸形,患者通过骨盆后旋、髋关节过伸和膝关节屈曲来代偿,此时患者腰背部肌肉、韧带长时间处于紧张状态,易出现疲劳、疼痛和活动障碍;当后凸畸形进一步加重超过其代偿能力时,患者发生躯干重心前移,出现矢状面失平衡,严重影响患者的生活质量^[6,7]。钱邦平等^[6]分析了 64 例 AS 患者的生活质量与矢状面参数的关系,发现晚期 AS 患者生活质量与矢状面参数显著相关,重度胸腰椎后凸畸形患者的生活质量更差。此外,严重的 AS 胸腰椎后凸畸形由于躯干塌陷,肋骨边缘对腹内脏器形成压迫,致横膈活动幅度减小,呼吸肌疲劳,使肺扩张受限,严重影响患者肺功能^[21,22]。本研究结果显示,AS 患者病程、SASSS 和 GK 均与其 ODI 和 BASFI 显著相关。表明随着 AS 患者病程的延长、腰椎韧带骨化

加重及胸腰椎后凸畸形的增加,AS 患者的生活质量显著降低。

本研究局限处在于:(1)纳入的女性 AS 患者较少,不能进行男女患者的对比分析;(2)本研究为横向研究,无法对患者脊柱韧带骨赘及后凸畸形情况进行前后对比分析;(3)本研究纳入对象年龄范围较大,脊柱本身的退变因素未予以考虑。在未来的研究中,我们将进一步扩大样本量,同时对患者进行长时间的随访,并对不同年龄段患者进行分组比较,以便进一步阐明 AS 骨赘形成、后凸畸形、病程、年龄和生活质量等的相互关系。

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