

高频超声检查在强直性脊柱炎患者髋关节受累诊断中的临床价值

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【摘要】 目的: 分析髋关节肌骨超声评分与强直性脊柱炎(ankylosing spondylitis, AS)疾病活动的相关性, 探讨高频超声检查在 AS 髋关节受累诊断中的价值。方法: 回顾性分析 2019 年 3 月至 2022 年 3 月接受诊治的 244 例 AS 患者临床资料, 其中男 174 例, 女 70 例, 年龄 19~58(34.22±9.49)岁; AS 病程 8 个月~26 年, 平均(13.68±4.04)年。根据是否合并髋关节病变将 244 例患者分为疾病组 83 例和对照组 161 例, 并根据疾病活动情况将疾病组患者分为活动期 45 例和稳定期 38 例。比较疾病组和对照组、疾病组活动期和稳定期患者超声评分。分析 AS 患者髋关节受累的相关因素, 并分析 AS 患者超声评分与 Bath 强直性脊柱炎疾病活动评分(Bath ankylosing spondylitis disease activity score index, BASDAI)、Bath 强直性脊柱炎功能指数(Bath ankylosing spondylitis functional index, BASFI)、疼痛视觉模拟评分(visual analog score, VAS)、C 反应蛋白(C-reactive protein, CRP)、红细胞沉降率(erythrocyte sedimentation rate, ESR)的相关性, 分析髋关节囊评分、肌腱附着端评分与 BASDAI、BASFI、VAS、CRP、ESR 的相关性。**结果:** 疾病组髋关节囊评分(3.06±1.12)分、股骨头评分(1.45±0.43)分、肌腱附着端评分(3.28±1.30)分及超声总评分(6.65±2.31)分均高于对照组的(1.51±0.48)、(0.66±0.27)、(1.61±0.53)、(3.81±1.44)分($P<0.05$)。多因素 Logistic 回归分析显示患者的病程、髋关节囊评分、超声总评分为 AS 患者髋关节受累的危险因素。疾病组活动期患者髋关节囊评分(3.65±1.22)分、超声总评分(8.28±2.33)分均高于稳定期的(2.48±1.04)、(6.82±1.96)分($P<0.05$)。AS 患者髋关节囊评分、超声总评分与 BASDAI、BASFI、VAS、CRP、ESR 均呈正相关($P<0.05$, $P<0.01$); 肌腱附着端评分与 CRP 呈正相关($P<0.05$); AS 患者关节囊积液评分与 BASDAI、BASFI、VAS 呈正相关($P<0.05$, $P<0.01$); 滑膜血流评分与 BASDAI、VAS、CRP、ESR 呈正相关($P<0.05$, $P<0.01$); 滑膜厚度评分与 BASDAI、BASFI、VAS、CRP、ESR 均呈正相关($P<0.05$, $P<0.01$)。肌腱附着端评分与 BASDAI、BASFI、VAS、CRP、ESR 均无相关性。**结论:** AS 患者髋关节超声评分与临床指标存在相关性, 髋关节囊评分、超声总评分为 AS 患者髋关节受累的危险因素, 高频超声在 AS 患者髋关节受累诊断中具有较高的临床价值。

【关键词】 强直性脊柱炎; 髋关节; 高频超声

中图分类号: R445.1, R593.23

DOI: 10.12200/j.issn.1003-0034.20221291

开放科学(资源服务)标识码(OSID):



Clinical value of high frequency ultrasound in the diagnosis of hip joint involvement in patients with ankylosing spondylitis

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ABSTRACT Objective To analyze the correlation between hip joint musculoskeletal ultrasound score and ankylosing spondylitis (AS) disease activity, as well as to investigate the value of high frequency ultrasound in the assessment of hip joint involvement in AS. **Methods** The clinical data of 244 patients with AS who were treated in the rheumatology department of from March 2019 to March 2022 were retrospectively analyzed. Among them, there 174 males and 70 females, aged from 19 to 58 years old with an average of (34.22±9.49) years old; the disease duration of AS patients ranged from 8 months to 26 years,

基金项目: 山西省运城市中心医院院级课题(编号: y72022055)

Found program: Hospital Level Project of Yuncheng Central Hospital in Shanxi Province(No.y72022055)

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with an average of (13.68±4.04) years. The 244 patients were divided into disease group (83 cases) and control group (161 cases) based in the presence of hip joint involvement. According to the the disease activity, patients in the disease group were further categorized into active phase (45 cases) and stable phase (38 cases). The ultrasound scores of patients in the active and stable phases of the disease group and the control group were compared. Relevant factors of hip joint involvement in AS patients were analyzed, and analyze the correlation between ultrasound score and Bath ankylosing spondylitis disease activity score index (BASDAI), Bath ankylosing spondylitis functional index (BASFI), visual analogue score of pain (VAS), C-reactive protein (CRP), erythrocyte sedimentation rate (ESR), and the correlation between hip joint capsule score and tendon attachment end score and BASDAI, BASFI, VAS, CRP and ESR. **Results** The hip joint capsule score (3.06±1.12), femoral head score (1.45±0.43), tendon attachment end score (3.28±1.30) and total ultrasound score (6.65±2.31) of the disease group were higher than those of the control group (1.51±0.48), (0.66±0.27), (1.61±0.53), (3.81±1.44) scores ($P<0.05$). Multifactor Logistic regression analysis showed that the course of disease, hip joint capsule score and total ultrasound score were independent risk factors for hip involvement in AS patients. The hip capsule score (3.65±1.22) and total ultrasound score (8.28±2.33) in the active phase of the disease group were higher than those in the stable phase (2.48±1.04), (6.82±1.96) scores ($P<0.05$). The hip joint capsule score and total ultrasonic score of AS patients were positively correlated with BASDAI, BASFI, VAS, CRP, and ESR ($P<0.05$, $P<0.01$). The score of tendon attachment end was positively correlated with CRP ($P<0.05$). The score of joint capsule effusion in AS patients was positively correlated with BASDAI, BASFI and VAS ($P<0.05$, $P<0.01$). The synovial blood flow score was positively correlated with BASDAI, VAS, CRP and ESR ($P<0.05$, $P<0.01$). The synovial thickening score was positively correlated with BASDAI, BASFI, VAS, CRP and ESR ($P<0.05$, $P<0.01$). There was no correlation between the score of tendon attachment end and BASDAI, BASFI, VAS, CRP and ESR. **Conclusion** There is a correlation between hip joint ultrasonic score of hip joint and clinical indexes in AS patients. Hip joint capsule score and total ultrasonic score were independent risk factors for hip involvement in AS patients. High frequency ultrasound exhibits clinical value in the diagnosis of hip joint involvement in AS patients.

KEYWORDS Ankylosing spondylitis; Hip joint; High frequency ultrasound

强直性脊柱炎 (ankylosing spondylitis, AS) 是一种多发于青年男性、以脊柱、骶髂关节、外周关节受累为主要表现的自身免疫性关节炎^[1]。髋关节是人体承重、平衡和肢体运动的重要关节,也是 AS 常见的受累关节之一,19%~36% 的 AS 患者可能伴有髋关节受累^[2]。AS 髋关节受累说明疾病逐渐加重,疾病活动指数显著增加,严重者可导致关节畸形和残疾,生活质量会显著降低,甚至部分患者需接受全髋关节置换治疗^[3-4]。AS 髋关节受累早期诊断对早期针对性干预、降低致残率具有重要意义。目前 MRI 是 AS 髋关节受累敏感性较高的检查方法,但存在着检查费用高、可重复性差等不足,临床推广应用受到限制^[5]。超声检查是一种方便、快捷、可重复性好的非侵入性检查方法,肌骨超声不仅可对关节部位骨皮质和血流情况做出准确评价,还可较好地反映下肢肌腱附着部位的炎症病变程度,在 AS 的诊断和病情评估中具有重要意义^[6]。本研究回顾性分析 2019 年 3 月至 2022 年 3 月收治的 244 例 AS 患者临床资料,所有患者实施肌骨超声检查,并对髋关节囊、大转子肌腱端受累情况进行超声量化评分,分析上述评分与 AS 疾病活动的相关性,以探讨肌骨超声在 AS 患者髋关节受累诊断中的应用价值。

1 资料与方法

1.1 病例选择

纳入标准:(1)符合中华医学会风湿病学会制定

的 AS 诊断标准^[7],并结合实验室检查指标确诊。(2)病历资料完整,包括患者的一般资料和髋关节超声检查资料、超声评分、Bath 强直性脊柱炎疾病活动评分^[8](Bath ankylosing spondylitis disease activity score index, BASDAI)、Bath 强直性脊柱炎功能指数 (Bath ankylosing spondylitis functional index, BASFI)^[9]、髋关节疼痛视觉模拟评分 (visual analogue scale, VAS)、C 反应蛋白 (C-reactive protein, CRP)、红细胞沉降率 (erythrocyte sedimentation rate, ESR) 等临床资料。(3)均接受髋关节 MRI 扫描和肌骨超声检查。排除标准:(1)既往有骨盆骨折或手术史。(2)合并股骨头无菌坏死、类风湿性关节炎、痛风等其他髋关节疾病。(3)骨盆良恶性肿瘤。(4)入组前 4 周内接受 AS 相关治疗。(5)合并神经精神系统疾病。

1.2 一般资料

回顾性分析 2019 年 3 月至 2022 年 3 月接受诊治的 244 例 AS 患者临床资料,其中男 174 例,女 70 例,年龄 19~58 (34.22±9.49) 岁;AS 病程 8 个月~26 年,平均 (13.68±4.04) 年。根据 Bath 强直性脊柱炎髋关节放射学指数 (Bath ankylosing spondylitis radiology hip index, BASRI-hip)^[10]对 244 例患者分组,将 BASRI-hip≥2 的患者纳入合并髋关节病变组 (疾病组),共 83 例;BASRI-hip<2 的患者纳入不合并髋关节病变组 (对照组),共 161 例。根据 BASDAI 将疾病组患者分为活动期 (45 例) 和稳定期 (38 例);BAS-

DAI \geq 6 分为活动期, \leq 4 分为稳定期;如 BASDAI 为 4~6 分,则根据 CRP 或 ESR 判断,如 CRP $>$ 30 mg \cdot L $^{-1}$ 或 ESR $>$ 20 mm \cdot h $^{-1}$ 则判断为活动期, 达不到上述其一则为稳定期。本研究获得医院伦理委员会批准(批号: YXLL-YJ2022055), 所有患者均知情同意, 并签署协议书。

1.3 检查方法

所有患者接受髋关节肌骨超声检查, 仪器应用 GE Voluson E10 彩色超声诊断仪, 线阵探头, 频率为 1.7~13 MHz, 所有超声检查由超声科 2 位具有主治医师资格上的高年资医师实施。患者取仰卧位, 下肢伸直, 稍外旋, 充分暴露腹股沟区域, 沿股骨颈纵轴走行方向进行人体斜矢状面的扫查, 应用二维及多能量多普勒观察关节囊, 记录关节积液和关节囊扩张情况、滑膜厚度, 能量多普勒观察滑膜血流信号。观察股骨头骨质破坏情况、骨赘形成情况及软骨损伤情况(软骨部分缺损或不均匀变薄表示软骨损伤)。然后患者取侧卧位, 下肢稍屈曲, 探头置于大转子上方, 对臀小肌、臀中肌附着端进行扫查, 记录滑囊是否肿胀, 是否存在滑囊积液、囊壁增厚, 能量多普勒观察肌腱附着端血流信号。并记录是否存在骨质破坏、骨赘形成和钙化灶。扫查过程中应调整取样框范围适当, 根据每个患者的具体情况调整多普勒聚焦的位置。

1.4 观察项目与方法

比较疾病组不同活动度患者超声评分;分析 AS 髋关节受累的相关因素, 分析 AS 患者超声评分与 BASDAI、BASFI、VAS、CRP、ESR 等病情指标的相关性, 并分析 AS 患者髋关节囊评分、肌腱附着端评分与上述病情指标的相关性。

髋关节超声评分^[11]包括髋关节囊评分、股骨头评分和大转子肌腱附着端评分, 髋关节囊评分由关节囊积液评分、滑膜厚度评分和滑膜血流评分组成, 见表 1。股骨头评分内容包括骨质破坏、骨赘形成、软骨损伤, 上述表现每出现 1 项计 1 分;肌腱端评分内容包括肌腱端肿胀、钙化形成、骨质破坏、肌腱附着端血流信号, 上述表现每出现 1 项计 1 分^[12]。

对 244 例 AS 患者进行病情评估, 评估内容包括 BASDAI、BASFI、髋关节疼痛 VAS^[13], 采集患者空

腹静脉血测定 CRP、ESR。VAS, 在一条直线上画 0~10 共 10 个刻度, 0 在最左边, 表示无痛, 10 在最右边表示最剧烈的疼痛, 患者根据自己的疼痛程度标出对应的刻度值, 作为 VAS。BASDAI: 共包括疲乏、压痛、外周关节痛、晨僵等 6 个方面, 评分范围 0~10 分;BASFI: 共包括自行穿袜子或紧身衣裤、自行弯腰拿物品、在平地上由仰卧位站起等 10 个问题, 每个问题根据完成难易程度进行评分, 10 个问题的均值即为该患者 BASFI。

1.5 统计学处理

应用 SPSS 23.0 软件进行统计分析, 超声评分、活动度等定量资料以均数 \pm 标准差($\bar{x}\pm s$)表示, 组间比较采用成组设计定量资料 *t* 检验;定性资料采用 χ^2 检验;对差异有统计学意义的单因素进一步采用 Logistic 多元回归分析 AS 髋关节受累的独立危险因素;超声评分与病情指标的相关性、AS 患者髋关节囊评分、肌腱附着端评分与病情指标的相关性应用 Pearson 法进行分析;以 $P<0.05$ 为差异有统计学意义。

2 结果

2.1 AS 髋关节受累的超声表现

244 例 AS 患者共 488 个髋关节均接受肌骨超声检查, 检出髋关节囊异常 142 例, 包括单侧髋关节囊异常 96 例, 双侧髋关节囊异常 46 例。142 例髋关节囊异常患者中, 关节囊积液 62 例, 滑膜增厚 32 例, 滑膜内探及血流信号 72 例。股骨头骨质异常 84 例, 其中骨质破坏 30 例, 骨赘形成 38 例, 软骨损伤 42 例。肌腱附着端异常 150 例, 臀中肌前腱、后腱、臀小肌肌腱端钙化分别为 28 例、20 例、22 例, 肿胀分别为 24 例、18 例、10 例, 骨质破坏分别为 20 例、16 例、8 例, 超声探及血流信号为 20 例、6 例、14 例。典型病例影像学图片见图 1。

2.2 单因素分析结果

疾病组病程、CRP、髋关节囊评分、股骨头评分、肌腱附着端评分及超声总评分均高于对照组 ($P<0.05$), 两组性别、年龄、BASDAI、BASFI、ESR 差异均无统计学意义 ($P>0.05$)。见表 2。

2.3 AS 髋关节受累的相关因素分析

以 AS 患者髋关节受累为因变量, 以临床资料比较中差异有统计学意义的量为自变量, 采用

表 1 AS 髋关节受累患者髋关节囊评分
Tab.1 Hip capsule score of patients with AS hip joint involvement

项目	0 分	1 分	2 分	3 分
关节囊积液	无积液	轻度积液, 关节囊扩张 \leq 5 mm	中度积液, 关节囊扩张 6~10 mm	重度积液, 关节囊扩张 \geq 10 mm
滑膜厚度	无增厚, 厚度 $<$ 2 mm	轻度增厚, 厚度 2~5 mm	中度增厚, 厚度 6~9 mm	重度增厚, 厚度 $>$ 9 mm
滑膜血流	无血流信号	单个血流信号	血流信号范围 $<$ 50%	血流信号范围 $>$ 50%

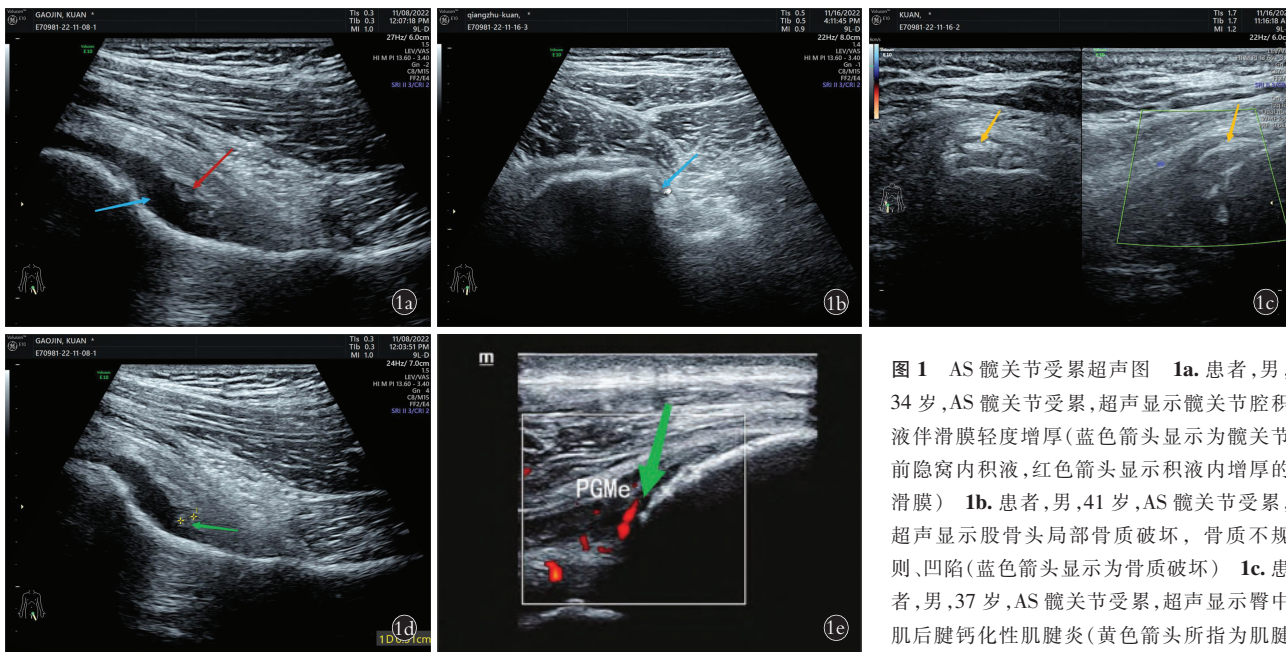


图 1 AS 髋关节受累超声图 1a. 患者,男,34 岁,AS 髋关节受累,超声显示髋关节腔积液伴滑膜轻度增厚(蓝色箭头显示为髋关节前隐窝内积液,红色箭头显示积液内增厚的滑膜) 1b. 患者,男,41 岁,AS 髋关节受累,超声显示股骨头局部骨质破坏,骨质不规则、凹陷(蓝色箭头显示为骨质破坏) 1c. 患者,男,37 岁,AS 髋关节受累,超声显示臀中肌后腱钙化性肌腱炎(黄色箭头所指为肌腱内强回声钙化) 1d. 患者,女,29 岁,AS 髋

关节受累,超声显示滑膜增厚的超声测量 1e. 患者,男,45 岁,AS 髋关节受累,超声显示臀中肌后腱附着端肿胀,内见血流信号(绿色箭头所指为血流信号)

Fig.1 Ultrasonic image of hip joint involvement in AS 1a. A 34-year-old male patient with AS hip joint involvement,ultrasound showed fluid accumulation in the hip joint cavity with slight synovial thickening (The blue arrow showed the effusion in the anterior recess of the hip joint, and the red arrow shows the thickened synovial membrane in the effusion) 1b. A 41-year-old male patient with AS hip joint involvement,ultrasound showed local bone destruction of the femoral head with irregular and concave bones (The Blue arrow showed bone destruction) 1c. A 37-year-old male patient with AS hip joint involvement,ultrasonography showed calcified tendinitis of the posterior tendon of the gluteus medius muscle (The yellow arrow showed strong echo calcification in the tendon) 1d. A 29-year-old female patient with AS hip joint involvement,ultrasonographic measurement of synovial thickening 1e. A 45-year-old, with AS hip joint involvement,ultrasound showed swelling of the attachment end of the posterior tendon of the gluteus medius muscle, with blood flow signals observed inside(The green arrow refers to blood flow signal)

表 2 疾病组和对照组 AS 患者临床资料比较

Tab.2 Comparison of general and clinical data between disease group and control group

组别	例数	性别/例		年龄 ($\bar{x}\pm s$)/岁	病程 ($\bar{x}\pm s$)/年	BASDAI ($\bar{x}\pm s$)/分	BASFI ($\bar{x}\pm s$)/分	CRP ($\bar{x}\pm s$)/(mg·L ⁻¹)
		男	女					
疾病组	83	59	24	35.17±9.56	13.89±4.21	3.44±1.12	2.87±0.94	16.52±4.59
对照组	161	115	46	33.94±9.43	12.09±3.88	3.36±1.08	2.81±0.90	12.70±4.05
检验值		$\chi^2=0.003$		$t=0.961$	$t=3.335$	$t=0.541$	$t=0.486$	$t=6.317$
P 值		0.955		0.338	0.001	0.589	0.628	0.000
组别	例数	ESR ($\bar{x}\pm s$)/(mm·h ⁻¹)		髋关节囊评分 ($\bar{x}\pm s$)/分	股骨头评分 ($\bar{x}\pm s$)/分	肌腱附着端评分 ($\bar{x}\pm s$)/分	超声总分 ($\bar{x}\pm s$)/分	
疾病组	83	42.35±6.33		3.06±1.12	1.45±0.43	3.28±1.30	6.65±2.31	
对照组	161	41.64±6.28		1.51±0.48	0.66±0.27	1.61±0.53	3.81±1.44	
检验值		$t=0.834$		$t=15.096$	$t=17.560$	$t=14.192$	$t=11.788$	
P 值		0.405		0.000	0.000	0.000	0.000	

Logistic 多元回归分析显示患者的病程、髋关节囊评分、超声总评分为 AS 患者髋关节受累的独立危险因素。见表 3。

2.4 疾病组不同活动度患者超声评分比较

疾病组活动期患者髋关节囊评分、超声总评分

均高于稳定期患者,差异有统计学意义($P<0.05$),两组股骨头评分、肌腱附着端评分差异无统计学意义($P>0.05$)。见表 4。

2.5 AS 患者超声评分与病情指标的相关性

AS 患者髋关节囊评分、超声总评分与 BASDAI、

表 3 AS 髋关节受累的多因素 Logistic 回归分析

Tab.3 Multivariate Logistic regression analysis of hip joint involvement in AS

影响因素	B 值	SE 值	Wald χ^2 值	OR 值	95%CI	P 值
病程	0.321	0.130	6.268	1.369	1.061, 1.874	0.012
CRP	0.425	0.262	2.440	1.536	0.895, 2.752	0.108
髋关节囊评分	0.209	0.104	9.013	1.224	1.008, 1.599	0.001
股骨头评分	0.778	0.405	3.683	2.077	0.979, 4.922	0.056
肌腱附着端评分	0.334	0.186	3.518	1.380	0.972, 2.057	0.061
超声总分	0.823	0.219	13.008	2.264	1.370, 3.605	0.000

表 4 疾病组稳定期和活动期患者超声评分比较($\bar{x}\pm s$)

Tab.4 Comparison of ultrasound scores between patients in stable and active phases in disease group($\bar{x}\pm s$)

组别	例数	单位:分			
		髋关节囊评分	股骨头评分	肌腱附着端评分	总分
稳定期	38	2.48 \pm 1.04	1.42 \pm 0.34	2.91 \pm 0.99	6.82 \pm 1.96
活动期	45	3.65 \pm 1.22	1.59 \pm 0.48	3.43 \pm 1.44	8.28 \pm 2.33
t 值		4.653	1.829	1.881	3.056
P 值		0.000	0.071	0.064	0.003

BASFI、VAS、CRP、ESR 均呈正相关 ($P<0.05, P<0.01$); 肌腱附着端评分与 CRP 呈正相关关系 ($P<0.05$)。见表 5。

表 5 超声评分与 BASDAI、BASFI、VAS、CRP、ESR 的相关性分析

Tab.5 Correlation analysis between ultrasound score and BASDAI, BASFI, VAS, CRP, and ESR

超声评分	BASDAI		BASFI		VAS		CRP		ESR	
	r 值	P 值	r 值	P 值	r 值	P 值	r 值	P 值	r 值	P 值
髋关节囊评分	0.311	<0.010	0.297	<0.010	0.512	<0.010	0.498	<0.010	0.434	<0.010
股骨头评分	0.039	0.688	0.143	0.171	0.058	0.624	0.108	0.214	0.204	0.054
肌腱附着端评分	0.165	0.109	0.090	0.407	0.124	0.115	0.269	0.011	0.118	0.254
超声总评分	0.329	<0.010	0.233	0.025	0.413	<0.010	0.560	<0.010	0.401	<0.010

表 6 AS 患者髋关节囊评分、肌腱附着端评分与 BASDAI、BASFI、VAS、CRP、ESR 的相关性分析

Tab.5 Correlation analysis of hip capsule score, tendon attachment score and BASDAI, BASFI, VAS, CRP, ESR in patients with AS

超声评分	BASDAI		BASFI		VAS		CRP		ESR	
	r 值	P 值	r 值	P 值	r 值	P 值	r 值	P 值	r 值	P 值
关节囊评分										
关节囊积液	0.281	0.011	0.246	0.019	0.328	<0.01	0.169	0.108	0.197	0.073
滑膜厚度	0.349	<0.010	0.277	0.024	0.511	<0.01	0.598	<0.010	0.522	<0.01
滑膜血流	0.260	0.017	0.181	0.103	0.463	<0.01	0.479	<0.010	0.465	<0.01
肌腱附着端评分										
肿胀	0.150	0.179	0.114	0.082	0.011	0.927	0.045	0.762	0.104	0.687
骨质破坏	0.071	0.548	0.184	0.166	0.083	0.280	0.202	0.167	0.055	0.532
附着端血流	0.209	0.053	0.142	0.158	0.031	0.802	0.165	0.204	0.204	0.059

2.6 AS 患者髋关节囊评分、肌腱附着端评分与病情指标的相关性

AS 患者关节囊积液评分与 BASDAI、BASFI、VAS 呈正相关 ($P<0.05, P<0.01$); 滑膜血流评分与 BASDAI、VAS、CRP、ESR 呈正相关 ($P<0.05, P<0.01$); 滑膜厚度评分与 BASDAI、BASFI、VAS、CRP、ESR 均呈正相关 ($P<0.05, P<0.01$)。肌腱附着端评分与上述各项临床指标均无相关性。见表 6。

3 讨论

3.1 高频超声应用于 AS 髋关节受累的可行性

AS 是一种缓慢进展性炎症性疾病, 骶髂关节、髋关节是本病最为常见的受累关节, 髋关节受累后可导致骨质破坏、关节间隙变窄, 严重影响运动功

能,严重者患者生活自理能力完全丧失^[14]。AS 髋关节受累会侵犯及骨皮质、滑膜、关节囊、关节软骨等结构,成为导致患者病情恶化的重要原因。目前对于 AS 髋关节受累的诊断主要应用 MRI 扫描。虽敏感性较高,但高昂的检查费用限制了临床应用。肌骨超声操作简单,方便快捷^[15],常用于风湿性疾病检查和病情评估,可作为关节、骨与软骨、肌腱等骨骼、肌肉系统疾病的诊断依据^[6]。GUTIERREZ 等^[16]的研究发现高频超声检查可准确地诊断脊柱关节病患者股骨近端肌腱端受累情况,这就充分表明应用高频超声评估 AS 髋关节受累是可行的。

3.2 AS 患者髋关节超声评分与临床指标的相关性分析

AS 髋关节受累与多种因素(人类白细胞抗原-B27、白细胞介素、WNT 蛋白等)所致的骨质破坏、修复和新骨形成有关。髋关节炎性病变更早期即可表现为滑膜增厚、毛细血管扩张、滑液分泌增多、关节囊增宽,患者表现为髋关节疼痛、肿胀、活动受限^[17-18]。本研究结果显示疾病组髋关节囊评分、股骨头评分、肌腱附着端评分及超声总评分均高于对照组,疾病组不同活动度患者髋关节囊评分、超声总评分也存在显著差异,活动期患者超声评分更高;AS 患者关节囊积液评分与 BASDAI、BASFI、VAS 呈正相关;滑膜血流评分与 BASDAI、VAS、CRP、ESR 呈正相关;滑膜厚度评分与 BASDAI、BASFI、VAS、CRP、ESR 均呈正相关,表明超声评分与 AS 髋受累患者主要病理改变是一致的。既往关于 AS 关节受累的研究主要集中于骶髂关节和多个外周关节参数之和与病情程度指标的相关性^[19],而本研究分析了髋关节各超声评分与临床指标的相关性,发现髋关节囊评分与总体超声评分均与 BASDAI、BASFI、VAS、CRP、ESR 呈正相关。BASDAI、BASFI 等临床指标虽然可较好地反应 AS 患者疾病活动状态和髋关节受累情况,却难以反应关节囊的病理状态和受累髋关节的形态学变化。而高频超声具有敏感度高、操作灵活、可重复性好等优势,恰恰能弥补临床指标的不足,通过对关节囊积液、滑膜增厚情况及滑膜内血流状况的定量评价,反映了 AS 髋关节受累的严重程度,从而有利于临床进行针对性治疗,延缓髋关节病变进展。本研究结果也显示髋关节囊评分、超声总评分为 AS 患者髋关节受累独立危险因素,有研究结果显示高频肌骨超声可检测关节滑膜厚度、滑膜内血管翳形成情况、是否关节腔积液、是否关节软骨破坏和骨皮质破坏等,从而对类风湿性关节炎滑膜炎的病理改变过程做出准确评价^[20]。美国风湿病学会和欧洲风湿病联盟也将超声检查作为类风湿性关节炎

滑膜炎有效的检查方法^[21]。但本研究结果显示关节囊超声评分与超声总评分与 BASDAI、BASFI 相关性相对较低,分析原因可能与 BASDAI、BASFI 的数据主要由研究者主观判断得来,未参考实验室检查结果有关。本研究发现 AS 患者股骨头评分、肌腱附着端评分与临床指标无相关性,可能与骨质破坏相对表浅、骨质增生掩盖等因素有关,超声对关节间隙狭窄及骨质结构敏感性低也可能是导致上述结果的重要原因。另外,肌腱附着端位置深在,同时受到部分患者体型肥胖的影响,多普勒灵敏度较低,有时不容易显示附着端的血流。

本研究还发现,作为评价 AS 病情的实验室检查指标,CRP、ESR 与滑膜血流评分、滑膜厚度评分、关节囊评分均呈显著正相关,但肌腱附着端各项评分与临床评分无相关性,因此,在肌骨超声扫描髋关节时,除了对腹股沟区进行全面扫描外,还应常规扫描大转子区域,尤其要重点观察臀中肌区域,以提高肌腱附着端炎症的检出率。

综上所述,AS 患者髋关节超声评分与临床指标存在相关性,髋关节囊评分、超声总评分为 AS 患者髋关节受累独立危险因素,尤其髋关节滑膜厚度评分、血流评分增加提示疾病处于活动期,高频超声在 AS 患者髋关节受累诊断中具有较高的临床价值。但 AS 发病机制复杂,且高频超声对于骨质破坏、髋关节间隙变化和位置较深的肌腱附着点的炎性改变评估价值有待提高,因此,对于 AS 髋关节受累程度的评价中尚需要结合其他影像学检查方法。

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(收稿日期: 2023-08-09 本文编辑: 王玉蔓)