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二维斑点追踪技术对主动脉瓣狭窄左室纵向应变的评价研究

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摘要 目的:探讨超声二维斑点追踪成像技术(2D STI)评价主动脉瓣狭窄(AS)患者左室功能早期改变的临床价值。**方法:**选取我院自2012年4月至2012年12月左室射血分数(LVEF)正常的AS(中-重度)患者30例(AS组),正常对照组30例。获取心尖位左室长轴观、二腔观和四腔观各节段收缩期纵向峰值应变(SL),并计算左室基底段、中间段、心尖段SL平均值及左室整体纵向应变值(GLS)。**结果:**AS组与对照组的左室射血分数差异无统计学意义($P > 0.05$),AS组与对照组的主动脉瓣瓣口面积及平均压差具有统计学意义($P < 0.05$);AS组患者整体、基底段、中间段、心尖段的GLS均低于对照组($P < 0.05$)。**结论:**超声二维斑点追踪成像技术能够评价主动脉瓣狭窄左室心肌收缩功能的早期异常改变。

关键词: 二维斑点追踪技术;主动脉瓣狭窄;左室纵向应变

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Application of Two-dimensional Speckle Tracking Imaging in the Evaluation of Aortic Stenosis

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ABSTRACT Objective: To investigate the value of two-dimensional speckle tracking imaging (2D STI) in assessing the left ventricular systolic function of aortic stenosis (AS). **Methods:** 2D STI was applied in 30 patients with preserved left ventricular ejection fraction (LVEF) of aortic stenosis (AS group) in our hospital from April 2012 to December 2012, 30 normal cases were used as controls. Each segment of LS of the apical left ventricular long axis view, two chamber view and four chamber view were collected. The GLS as well as SL average value of the left ventricular basal segment, the middle section and apogee were calculated. **Results:** There was no significant difference in LVEF between the two groups ($P > 0.05$), but there was statistical difference in Aortic valve area and average pressure ($P < 0.05$). The overall, basal section, the middle section, apical GLS of AS groups were lower than those of the control group ($P < 0.05$). **Conclusions:** 2D STI can provide a sensitive method for the evaluation of LV systolic function changes in AS.

Key words: Two-dimensional speckle tracking imaging; Aortic stenosis; Global longitudinal strain

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前言

主动脉瓣狭窄(aortic stenosis, AS)是最常见的心脏瓣膜疾病,它可以在较长时间内无症状,但这一阶段仍存在1%的猝死率^[1-3]。主动脉瓣置换术是治疗本病的重要手段,左室收缩功能的评价对于手术时机的选择及其预后的预测具有重要的意义^[4]。目前,常规使用左室射血分数(Left ventricular ejection fraction, LVEF)来对AS进行左室收缩功能的测定,但它欠缺精准性^[5]。二维斑点追踪技术(two dimensional speckle tracking imaging, 2D STI)可以获得心肌应变,其中纵向应变是反应心肌收缩功能的指标^[6,7]。本文旨在利用斑点追踪技术对射血分数正常的AS患者的左室心肌纵向应变进行评价,探讨AS患者左室收缩功能改变的特点。

1 资料与方法

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1.1 研究对象

选取我院自2012年4月至2012年12月住院或门诊无临床症状的AS(中或重度)患者30例(AS组),无轻度以上主动脉瓣反流,无二尖瓣狭窄或轻度以上二尖瓣反流,无高血压、冠心病病史、心房颤动、或其他严重心律失常。其中男18例,女12例,年龄50~70岁,左室射血分数(LVEF)≥50%。心尖双平面Simpson法测量LVEF,主动脉瓣狭窄程度评价参照国际标准,主动脉瓣中重度狭窄瓣口面积≤1.0 cm²。正常对照组30例,男15例,女15例,年龄45~75岁,无糖尿病、高血压、冠心病、瓣膜疾病等病史,肝、肾功能,体格检查、X线、心电图及超声心动图均无异常。AS组与对照组临床资料见表1,两组一般临床资料差异无统计学意义($P > 0.05$),资料均衡可比。

1.2 仪器与方法

仪器:采用Philips iE33彩色多普勒超声诊断仪,S5-1探头,频率2~4MHz,帧频50~80Hz(PHILIPS公司生产)。检查方法:受检者于餐后至少四小时,取仰卧位,嘱平静呼吸同步记录胸导联心电图。常规超声测量后,采集心尖左室长轴观、四腔观、两腔观3个完整心动周期的二维动态图象,光盘储存图象后进行脱机分析。脱机定量分析:在Qlab工作站二维应变软件

程序上,选取左室心尖位心内膜清晰的图像,收缩早期选取二尖瓣两个瓣环点及心尖心内膜,软件自动勾画感兴趣区,调整感兴趣区宽度,使其与心肌厚度一致,系统自动追踪感兴趣区内的回声斑点,在左室长轴方向将各室壁分为基底段、中段、心尖段共 18 节段(其中 6 个基底段,6 个中间段,6 个心尖段)并得出各节段的峰值收缩期应变 (peak systolic longitudinal strain, SL)及其曲线(见图 1),取不同切面观同一节段对应的峰值,求其平均值为该节段的平均峰值应变,计算心尖长轴基底段、中间段及心尖段 6 个室壁的平均峰值应变值和左室长轴整体应变值(global systolic longitudinal stain, GLS)。

表 1 两组临床资料比较
Table 1 Comparison of clinical data of two groups

指标 Indexes	AS 组 AS group	对照组 Control group	t / X ²	P
年龄(岁) Age(years)	65± 8	61± 10	1.711	0.093
性别(男 / 女) Gender (male / female)	18/12	15/15	0.606	0.436
收缩压(mmHg) Systolic blood pressure (mmHg)	120± 14	115± 15	1.335	0.187
体表面积(m ²) Body surface area (m ²)	1.49± 0.16	1.53± 0.14	1.031	0.307

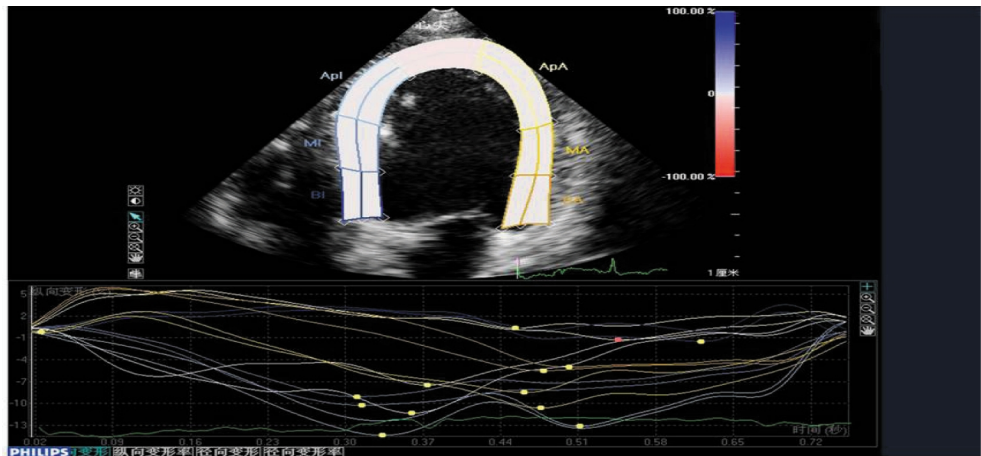


图 1 Qlab 软件二维斑点技术分析主动脉瓣患者左室纵向应变
Fig.1 Qlab software 2D STI in the analysis of GLS of AS patients

表 2 两组基础超声测量值比较
Table 2 Comparison of basic ultrasonic measurement between two groups

指标 Indexes	AS 组 AS group	对照组 Control group	t	P
左室舒张末径(mm) Left ventricular end diastolic diameter (mm)	46± 6	44± 5	1.403	0.166
左室收缩末径(mm) Left ventricular end systolic diameter(mm)	25± 3	26± 4	1.095	0.278
左室射血分数(%) Left ventricular ejection fraction(%)	65± 6	67± 4	1.519	0.135
主动脉瓣平均压差(mmHg) Aortic valve average pressure(mmHg)	37± 12*	4± 2	14.857	<0.001
主动脉瓣瓣口面积(cm ²) Aortic valve area(cm ²)	0.75± 0.17*	2.89± 0.35	30.124	<0.001

Note: *P< 0.05.

1.3 统计学分析

采用 SPSS13.0 统计软件进行统计学分析,所有计量资料以均数 $\pm$ 标准差($\bar{x}\pm s$)表示。组间比较采用成组设计的两样本均数 t 检验,显著性检验水准取双侧 $P < 0.05$ 。

2 结果

2.1 AS 组与对照组超声测量值进行对比

表 3 两组左室纵向应变(GLS)对比

Table 3 Comparison of global longitudinal strain(GLS) between two groups

指标 Indexes	AS 组 AS group	对照组 Control group	t	P
左室整体纵向应变(%) Overall global longitudinal strain(%)	-16.3 $\pm$ 2.11*	-19.1 $\pm$ 1.24	6.266	<0.001
左室基底段纵向应变(%) Basal section global longitudinal strain(%)	-13.2 $\pm$ 3.14*	-16.4 $\pm$ 2.34	4.476	<0.001
左室中间段纵向应变(%) Middle section global longitudinal strain(%)	-15.5 $\pm$ 3.20*	-18.1 $\pm$ 2.35	3.587	0.001
左室心尖段纵向应变(%) Apical global longitudinal strain(%)	-20.1 $\pm$ 5.13*	-23.2 $\pm$ 1.89	3.106	0.004

Note: * $P < 0.05$.

3 讨论

AS 是最常见的心脏瓣膜病变之一,除继发于心肌病的二尖瓣反流之外,也是最常见的致死性心脏瓣膜疾病。主动脉瓣置换术目前仍是最主要的延缓该病进展的医疗途径^[8,9]。存在临床症状的 AS 符合手术适应症,对于无临床症状的 AS, LVEF<50%或者运动试验结果阳性也都是置换术的指征^[10,11]。然而,尽管存在左室收缩功能的受损,LVEF 也可以在很长一段时间保持正常,只有在终末阶段的 AS LVEF 才会减低,这样就需要更敏感的指标来评价左室收缩功能进而指导手术时机的选择^[12-17]。

2D STI 是近年发展的新技术,可以定量评价心肌应变,反应心肌功能。心肌应变包括纵向应变、径向应变和圆周应变。其中纵向应变是计算感兴趣区中各节段室壁沿心肌纤维方向上的平均应变值,室壁缩短时为负值,伸长时为正值,它可以作为评价左室心肌收缩功能的相关指标^[18,19]。

目前评估 AS 手术指征的手段主要是 LVEF 的测量和症状学的表现,但是由于 LVEF 具有较长的代偿期,它作为评价 AS 左室收缩功能的指标,欠缺一定的敏感性,一部分主动脉瓣狭窄置换术预后并不理想,这与手术时机的选择就有很大的关联,AS 引起的心肌细胞纤维变性最先从心内膜开始,而心内膜心肌纤维主要进行纵向应变,所以应用 2D STI 对纵向应变定量分析可以更加敏感的反映心肌收缩功能的早期病变^[20]。

本文即利用 2D STI 评价心肌纵向应变来反应左室收缩功能,虽然在 LVEF 正常的主动脉瓣狭窄中,左室的纵向应变已表现为减低,纵向应变的峰值时间表现为延迟,这为左室收缩功能的评价提供了新视角,将为临床早期客观评估主动脉瓣狭窄患者左室收缩功能提供新的敏感指标,为其治疗提供更详尽

AS 组与对照组的左室舒张末径、左室收缩末径和左室射血分数差异无统计学意义($P > 0.05$),AS 组与对照组的主动脉瓣瓣口面积及压差具有统计学意义($P < 0.05$),见表 2。

2.2 AS 组与对照组左室纵向应变(GLS)对比

AS 组患者整体、基底段、中间段、心尖段左室纵向应变均低于对照组,差异有统计学意义($P < 0.05$),见表 3。

的信息。

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