

论著

## 时空关联成像技术在正常胎儿心脏超声检查中的应用

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**摘要** 摘要:目的 探讨时空关联成像(STIC)技术在正常胎儿心脏超声检查中的操作方法与应用价值。方法 110例中晚孕期正常胎儿, 经常规超声筛查心脏未见异常。采用STIC技术一次性扫描获得胎儿心脏整体容积数据, 存盘后进行脱机分析:(1)采用超声断层显像(TUI)模式, 通过调节层距和中心层位置, 分别显示四腔心, 左心室流出道、右心室流出道和三血管切面动态图像, 并采用评分方法比较TUI图像与二维超声直接获得的各切面图像质量差异。(2)采用动态正交三平面(MP)模式, 通过调节切割面和正交点位置, 在A、B、C 3个相互垂直的平面上显示心脏节段性分析中所需要的10余个标准切面, 分析主要结构的静态与动态图像。结果 110例胎儿心脏均获得满意的容积图像, 平均每次STIC扫描时间为(55±15) s。TUI模式下可重现胎儿心脏超声筛查所需的4个标准切面, 各切面图像的显示合格率与二维扫描图像差异无显著性(P>0.05)。选取39例扫描起始切面为心尖四腔心切面的样本在MP模式下进行了心脏节段性分析, 在心房、心室和大动脉3个节段的显示中, 除房室瓣口短轴的显示合格率较低(41%)外, 主要解剖结构的显示合格率为72%~100%。在心室节段中, 均可显示室间隔的完整剖面。结论 实时三维超声成像可简化胎儿心脏图像采集的过程, 减少对操作经验的依赖和对胎儿心脏的超声照射时间。

**关键词** [实时三维超声成像](#); [时空关联成像](#); [超声断层显像](#); [胎儿心脏](#)

分类号

## Application of Spatio-temporal Image Correlation in Normal Fetal Heart Ultrasonography

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**Abstract** ABSTRACT:Objective To explore the clinical application of real-time three-dimensional ultrasonography in the routine scanning of normal fetal heart. Methods A total of 110 volume datasets of normal fetal hearts in the second trimester were acquired by spatio-temporal image correlation (STIC). An off-line analysis of acquired volume datasets was performed to examine each segment of fetal heart with tomographic ultrasound imaging (TUI) and dynamic multi-planar mode (MP). The re-slice images of four-chamber view, ventricular outflow tract views, and the three vessels plane were viewed with TUI. The quality of images obtained from TUI was compared with the conventional 2D imaging mode. The volume datasets were displayed interactively with MP as a series of three-orthogonal planes. The dynamic loops of one cardiac cycle were performed by navigating the pivot point and rotational axis and shifting each re-slice image plane inside the volume datasets. Results Satisfactory gray-scale volume acquisitions were accomplished in 110 cases. The average STIC scanning time of fetal heart was (55±15) s. An offline analysis showed that four standard planes of 2D routine screening for fetal hearts were easily obtained by TUI. The quality of the images derived from volume datasets were comparable to that directly obtained from 2D echocardiography. The visualization rate had no significant difference between TUI and routine 2D screening (P>0.05). In MP mode, 39 cases with the starting plan of apical four-chamber view were obtained. Each segment of fetal heart was almost visualized off line, both in a frozen state and with heart in motion to fulfill sequential segmental analysis in fetal cardiac anatomy. The 72%- 100% main features of atria, ventricles, aorta, and the junction segments were viewed with MP by adjusting the three dimensional volume datasets, whose quality and contents met the expectations of off-line segmental analysis of normal fetal heart. A sagittal section of ventricular septum was obtained in the offline analysis, which was an unconventional view in 2D echocardiography. Conclusion Real-time three-dimensional ultrasonography can be applied for off-line segmental analysis of normal fetal hearts in the second trimester.

**Key words** [real-time three-dimensional ultrasonography](#); [spatio-temporal image correlation](#); [tomographic ultrasound imaging](#); [fetal heart](#)

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