P2-10

Real-Time 3D-Echocardiography of the Pediatric Left Ventricle - influence of different quantification software

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Background: Determining left ventricular (LV) volume and function is essential for therapy and follow-up in patients with heart disease. Real-time 3D echocardiography (RT3DE) is a promising method for LV assessment, however there is no systematic study comparing the inherent influence of different evaluation software on the resulting measurements.

Methods: 497 healthy children and adolescents (range, 1 day- 216 months) underwent RT3DE imaging of the LV (IE33, Philips, Andover, USA). 370/497 (74.4%) 3D data sets could be quantified using two different semiautomatic border detection software (Qlab9.0, Philips and TomTec LV2.7, Unterschleissheim, Germany). Using TomTec, the influence of changes of contour sensitivity was tested by 75 as well as 30 intensity units ($TomTec_{75}$ vs. $TomTec_{30}$).

Results: Analysis of identical 3D-data with the same software (TomTec) but different automatic contour finding sensitivity had a significant impact. Use of higher ($TomTec_{75}$) instead of lower (Tom Tec_{30}) sensitivity resulted in significant smaller enddiastolic, endsystolic and stroke volumes (EDV, ESV, SV) (Fig1a, Table1; p<0.001). Comparing QLab to $TomTec_{30}$, Bland-Altman analysis showed moderate bias with slightly smaller EDV using QLab (p=0.07) and larger ESV (p=0.05; Table2). Comparing QLab to $TomTec_{70,}$ using a higher contour sensitivity, the bias between both software systems was significant higher (p<0.001 for all parameters, Fig 1b).

Tbl1: 3D Volume Analysis of the Left Ventricle in Children
Agreement between high vs low contour detection sensitivity ($TomTec_{75}$ vs $TomTec_{30}$)

Para-meter	Bias (ml)	Bias (%)	SD (%)	Limit of agreement (ml)
ESV	-1.9	8.1	14.4	-8.3 to 4.5
EDV	-5.4	7.0	10,5	-17.3 to 6.6
SV	-3.7	6.7	5.5	-14.5 to 7.1
EF	0.1%		4.3	-8.2 to 8.4 %

Tbl2: RT3D Volume Analysis of the Left Ventricle in Children
Agreement between QLab and $TomTec_{30}$

Para-meter	Bias (ml)	Bias (%)	SD (%)	Limit of agreement (ml)
ESV	0.7	-0.8	6,5	-12 to 13,32
EDV	-1,2	-2.2	12,78	-26,3 to 23.8
SV	-2.0	-4.2	9,8	-21.2 to 17,2
EF	-1%		6,6	-14.8 - 11.7%

Intra- and interobserver-variation for EDV, ESV and SV were excellent both in Qlab and TomTec with intraclass correlation coefficients (ICC) between 0.91-0.99.

Conclusions: 3D-volumetric assessment of the LV is possible using different algorithms. However, resulting measurements differ depending on the software itself as well as different algorithms within the software. Therefore a set of reference values for the pediatric heart is urgently required. General agreements on analysis would be needed to overcome interobserver as well as interstudy variability**.**

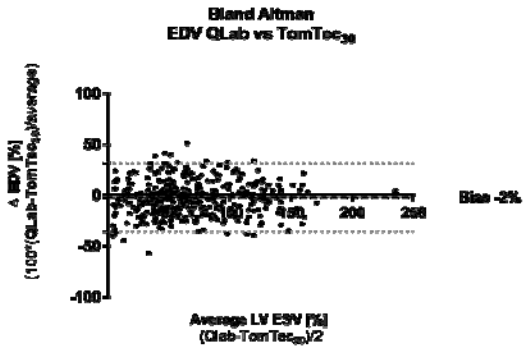

Figure 1a

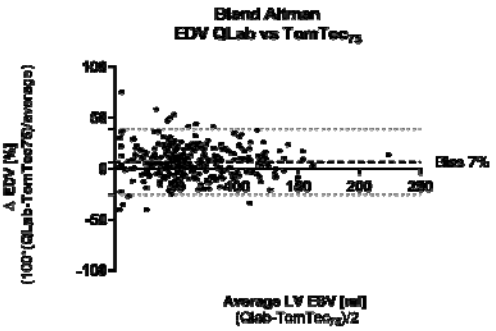

Figure 1b