

**QRS 3D VOLTAGE TIME INTEGRAL (3D QRS AREA) IN CARDIOMYOPATHY AND NARROW QRS COMPLEX**



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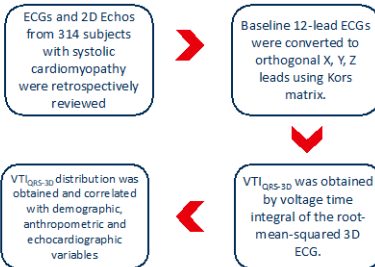
**Background**

- The instantaneous absolute 3D ECG voltage integrated over the duration of QRS (VTI<sub>QRS-3D</sub>), also measured as 3D QRS area, is a novel marker that is more sophisticated than either QRS duration or voltage<sup>(3)</sup>.
- Recent literature has evaluated 3D QRS area in heart failure patients with prolonged QRS duration to evaluate response to cardiac resynchronization therapy<sup>(1,2,4)</sup>.

**Research Question**

VTI<sub>QRS-3D</sub> has not been evaluated in cardiomyopathy patients with **normal** QRS duration (≤120 ms).

**Methods and Materials**



**Main Findings**

- VTI<sub>QRS-3D</sub> was significantly larger in patients with cardiomyopathy compared to controls (48 ± 21 vs. 38 ± 9, p<0.0001).
- VTI<sub>QRS-3D</sub> was negatively correlated with LVEF and positively correlated with LV dimensions (all p<0.0001).
- VTI<sub>QRS-3D</sub> was lower for females, whites and those with ischemic cardiomyopathy (Table).

**Conclusion**

VTI<sub>QRS-3D</sub> is increased in patients with systolic cardiomyopathy. Further, it is strongly correlated with echocardiography. It remains to be seen if automated calculation of VTI<sub>QRS-3D</sub> on routine ECG can facilitate early recognition of cardiomyopathy.

**Table**

Table. Demographic and echocardiographic associations with QRS 3D voltage time integral

Variable	n	VTI <sub>QRS-3D</sub> , μVs Mean ± SD or β-coefficient	p-value
<b>Patients with systolic cardiomyopathy (n=314)</b>			
Age, years	314	-0.02	0.8
<b>Sex</b>			
Male	206	48 ± 19	0.9
Female	108	49 ± 25	
<b>Race</b>			
White	197	45 ± 18	0.004
Black	79	54 ± 24	
Other/unknown	38	53 ± 28	
<b>Type of cardiomyopathy</b>			
Ischemic	168	45 ± 18	0.001
Non-ischemic	146	52 ± 24	
<b>Echocardiography</b>			
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LV ejection fraction, %		-0.42	<0.0001
LVIDd, cm		7.9	<0.0001
LVIDs, cm		8.1	<0.0001
Interventricular septum, cm		21	<0.0001
LV posterior wall, cm		33	<0.0001

IDd, internal dimension in diastole; IDs, internal dimension in systole; LV, left ventricular; VTI, voltage time integral

**References**



**Disclosures**

Nothing to disclose