Tissue Doppler, Speckle Tracking and Strain Imaging

Can left ventricular speckle tracking imaging be used in left ventricular non-compaction cardiomyopathy screening? A study of healthy paediatric athletes with and without echocardiographic criteria

Dorobantu D.[1]; Radulescu CR.[2]; Riding N.[3]; Mcclean G.[3]; Adamuz C.[3]; Ryding D.[4]; Perry D.[4]; Mcnally S.[4]; Stuart AG.[5]; Oxborough D.[6]; Wilson M.[7]; Williams CA.[1]; Pieles GE.[5]

[1]University of Exeter, Children's Health and Exercise Research Centre, Exeter, United Kingdom of Great Britain & Northern Ireland
[2]Carol Davila University Of Medicine And Pharm, Department of Paediatrics, Bucharest, Romania
[3]Aspetar Qatar Orthopaedic and Sports Medicine Hospital, Athlete Health and Performance Research Centre, Doha, Qatar
[4]Manchester United Football Club AON Training Complex, Football Medicine & Science Department, Manchester, United Kingdom of Great Britain & Northern Ireland
[5]University Hospitals Bristol NHS Foundation Trust, Congenital Heart Unit, Bristol, United Kingdom of Great Britain & Northern Ireland
[6]Liverpool John Moores University, Research Institute for Sport and Exercise Sciences, Liverpool, United Kingdom of Great Britain & Northern Ireland
[7]University College London, Institute of Sport Exercise and Health, London, United Kingdom of Great Britain & Northern Ireland

Background: Left ventricular non-compaction (LVNC) is a rare cardiomyopathy, with hypertrabeculation often observed in athletes. In confirmed LVNC, LV systolic strain and rotational mechanics have been shown to be abnormal. Whether healthy athletes meeting echocardiographic LVNC criteria exhibit abnormal myocardial mechanics is not known.

Purpose: The aim of this study is to evaluate the prevalence of healthy paediatric athletes meeting the Jenni criteria for LVNC and how this relates to LV systolic function and rotational mechanics.

Methods: Professional athletes under 18 years undergoing comprehensive pre-participation screening (2014-2017) at two sports academies were included. Jenni criteria for LVNC were assessed from short axis LV views. Global and segmental peak systolic longitudinal (Sl) and circumferential strain (Sc), basal rotation (basal Rot) and apical rotation (apical Rot) were calculated using speckle tracking imaging.

Results: A total of 201 boys (11.9-18 years, median 15.1 years) were included, with diverse ethnicity (47.7% Arab, 28.5% Black, 21.8% White, and 2% other) and sports background (60% football, 21.2% athletics, 18.8% other).

Of these n = 16 (8%) met the Jenni criteria for LVNC and were more likely to be of Black ethnicity than Arab or White (12.7% vs 4.4% or 9.5%). There were no differences in global, lateral or septal Sl, basal, mid or apical Sc, basal Rot or apical Rot between participants with or without Jenni criteria for LVNC (Table 1).

Conclusions: In healthy paediatric athletes, those meeting the criteria for LVNC (8%) do not have abnormal longitudinal, circumferential strain and rotational mechanics, compared to those without LVNC criteria. This finding supports the use of speckle tracking echocardiography as a tool in differentiating pathological changes reported in LVNC from exercise associated adaptations observed in athletes during pre-participation screening.

LV mechanics Jenni criteria presence

	With Jenni criteria Median (IQR)	Without Jenni criteria Median (IQR)	p value
Global LV S_l	-18.6% (-19.1;-17.7)	-18.6% (-19.7;-17.8)	0.7
Lateral S_l	-18.3% (-18.8;-17.2)	-18.5% (-19.8;-17.6)	0.5
Septal S_l	-18.6% (-20.6;-17.3)	-18.7% (-20.1;-17.7)	0.7
Basal LV S_c	-23% (-24.6;-21.6)	-23.3% (-25.7;-21.6)	0.7
Mid LV S_c	-24.9% (-27.1;-23.2)	-25.1% (-27.1;-22.5)	0.9
Apical LV S_c	-27.8% (-32.3;-24.8)	-26% (30.5;-22.4)	0.2
Basal Rot	-4º (-4.7;-2.5)	-3.8º (-5.3;-2.5)	0.9
Apical Rot	6.4º (5.2;7.1)	4.4 (2.9;7.1)	0.2