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Cardiac Ultrasound Clinical Case Study

2D Wall Motion Tracking (WMT): strain now routine with Aplio i-series

2D strain has become routine in daily practice with Aplio i-series systems

Background

The clinical use of 2D wall motion tracking strain in Cardiac assessment is now widespread, with demonstrated benefit in various Cardiac conditions, including assessment of coronary ischaemia, evaluation of cardiomyopathies, and differentiation of hypertrophy, and monitoring of patients receiving chemotherapy. 2D strain is particularly useful in the assessment of regional wall motion abnormalities, with good sensitivity and specificity compared with Cardiac MRI [1].

Global longitudinal strain (GLS) analysis is the most clinically validated technique for clinical applications because of its ease of use, time efficiency and reproducibility. 2D strain is also a useful tool for assessing patients with congestive cardiac failure as GLS can predict the risk of adverse cardiac outcomes, including heart failure readmissions and cardiac mortality [2].

Canon Medical's Aplio i-series systems allow the rapid and easy assessment of GLS by using standard apical 4 chamber, 2 chamber and long axis images.

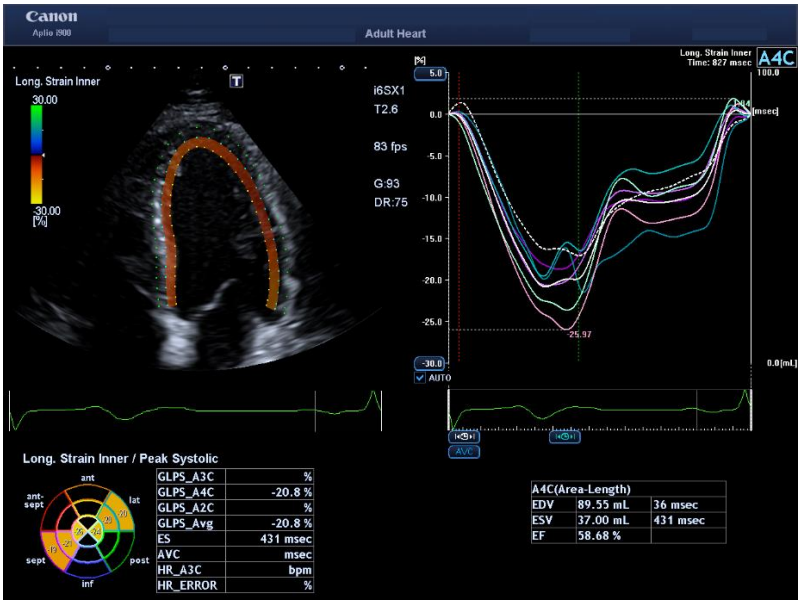

Fig 1: Global longitudinal strain in the apical 4 chamber view assesses the function of longitudinal myofibers, most vulnerable to myocardial disease

The 2D wall motion tracking software tracks the movement of echocardiographic speckles during myocardial contraction. During systole, the shortening of longitudinal myocardial fiber length assessed by GLS is denoted by negative values.

For patients with impaired LV function, GLS and LV ejection fraction have a linear relationship, with a GLS of -11 or -12 corresponding to a LV ejection fraction of 35% [3]. In contrast, GLS and LV ejection fraction have a curvilinear relationship in patients with normal LV ejection fraction [3]. The ability of GLS to detect subclinical myocardial dysfunction therefore is likely greatest for patients with normal ejection fraction. The advantage of GLS over LV ejection fraction is its sensitivity to detect early subclinical cardiomyopathy before LV ejection fraction declines [2].

The pattern of regional 2D strain variation also provides additional value when assessing underlying Cardiac disease. Qualitative wall motion scoring forms a routine part of echocardiographic assessment in particular for patients with ischaemic heart disease. Regional assessment of 2D strain can quantitatively measure regional wall motion, making it useful for evaluation of LV segmental function in both resting and stress echocardiography [2].

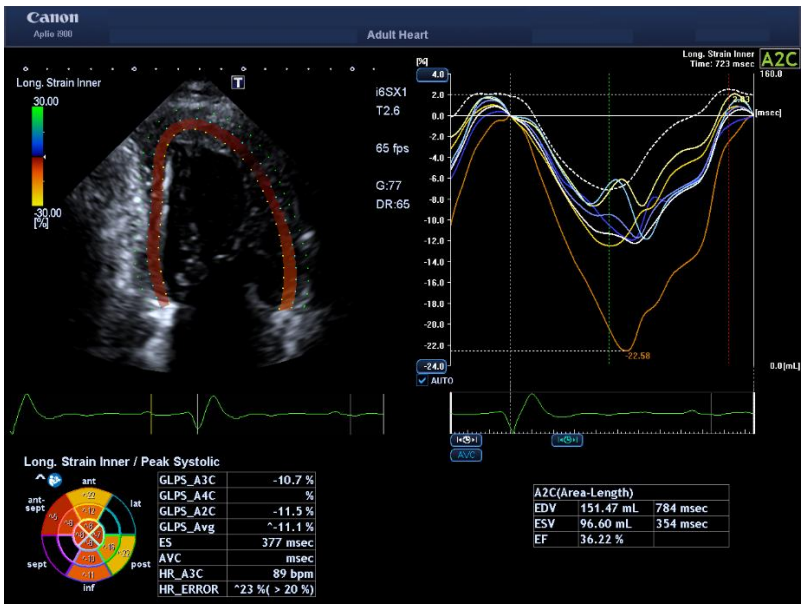

Fig 2: Global longitudinal strain in the apical 2 chamber view in a patient with impaired LV function due to ischaemic heart disease

Further Canon Medical's Aplio i-series systems can be used to identify regional 2D strain patterns in various non-ischaemic cardiomyopathies, differentiating between conditions that can cause increased ventricular wall thickness. 2D Strain is preserved with the physiologic hypertrophy of an athlete's heart, only mildly reduced in hypertensive hypertrophy, and markedly reduced in hypertrophic cardiomyopathy[4]. Contrarily, increased wall thickness due to cardiac amyloidosis causing infiltrative cardiomyopathy has a specific apical-sparing pattern [5].

2D wall motion tracking strain has increased the ease of assessment, decreased analysis times, and improved interobserver variability [6]. No guidelines exist currently on the training and competency required for 2D strain analysis. Chan et al [7] however, recently reported that a learning curve exists for 2D GLS analysis with a minimum of 50 studies recommended for accurate and reproducible reporting.

With the clinical use of 2D GLS now becoming routine and widespread, adequate training is required for physicians and sonographers.

Conclusion

2D strain uses speckle tracking for quantifying LV function, which is particularly useful in patients with borderline LV function because of the potential to identify subclinical conditions. Canon Medical's Aplio i-series systems offer the ability to detect and treat underlying disease early improving prognosis.

References

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