



ORIGINAL ARTICLE

# Longitudinal strain by two-dimensional speckle tracking to assess ventricular function in adults with transposition of the great arteries: Can serial assessment be simplified?



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## KEYWORDS

Transposition of the great arteries;  
Longitudinal strain;  
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## Abstract

**Introduction:** Transposition of the great arteries (TGA) is a rare form of congenital heart disease in which most patients reach adulthood. Right ventricular dysfunction is the most severe residual complication in long-term follow-up, both in patients treated by atrial switch and in those with congenitally corrected TGA. New echocardiographic tools such as longitudinal strain by two-dimensional (2D) speckle tracking may improve assessment of ventricular function in these patients.

**Methods and Results:** We performed a retrospective analysis of echocardiograms in adult patients with TGA (26 patients with dextro-TGA – 15 treated by atrial switch and six by arterial switch – and five with congenitally corrected TGA) and in a control group of 14 healthy individuals. Right ventricular strain was significantly worse ( $p < 0.001$ ), as was the corresponding annular plane systolic excursion ( $p = 0.010$ ) in atrial switch patients, in comparison to arterial switch patients, while no differences were found in left ventricular parameters. In the overall population, systemic right ventricular parameters were significantly less negative than pulmonary right ventricular parameters, and these were less negative than in controls. Left ventricular parameters were similar across groups, except for pulmonary left ventricular strain, which was worse than in controls ( $p = 0.008$ ) as well as pulmonary right ventricular strain.

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**PALAVRAS-CHAVE**

Transposição das grandes artérias;  
Strain longitudinal;  
Speckle tracking

**Conclusions:** Assessment of ventricular function in patients with TGA by 2D speckle tracking longitudinal strain is easy and feasible and may be a useful tool for serial follow-up. Of particular note, we found that there is also some degree of ventricular dysfunction even after re-establishment of normal connections.

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### Strain longitudinal por speckle tracking para avaliar função ventricular em adultos com transposição das grandes artérias: podemos simplificar a avaliação seriada?

**Resumo**

**Introdução:** A Transposição das Grandes Artérias (TGA) é uma cardiopatia congénita rara e a maioria dos doentes atinge a idade adulta. A alteração residual mais grave a longo-prazo é a disfunção ventricular direita (VD), quer em doentes submetidos a *switch* auricular ou em doentes com TGA congenitamente corrigida (TGAcc). Novas ferramentas ecocardiográficas, como o *strain* bidimensional por *speckle tracking* podem facilitar a avaliação da função ventricular nestes doentes.

**Métodos e resultados:** Foi realizada uma análise retrospectiva de ecocardiograma efetuados em adultos com TGA (26 doentes com dextro-TGA - 15 submetidos a *switch* auricular e seis a *switch* arterial - e cinco com TGAcc) e num grupo de controlo composto por 14 indivíduos saudáveis. O *strain* VD foi significativamente pior ( $p < 0,001$ ) bem como o *annular plane systolic excursion* correspondente ( $p = 0,010$ ) nos doentes com *switch* auricular, em comparação com dos doentes com *switch* arterial, sem diferenças na análise do ventrículo esquerdo. Na população total, os parâmetros do VD sistémico foram significativamente menos negativos do que o VD pulmonar e estes menos negativos comparativamente com o grupo controlo. Os parâmetros ventriculares esquerdos foram semelhantes em todos os grupos, exceto o *strain* do ventrículo esquerdo pulmonar que é pior comparativamente com o controlo ( $p = 0,008$ ) bem como com o VD pulmonar.

**Conclusões:** A avaliação da função ventricular em doentes com TGA por *strain* longitudinal com *speckle tracking* bidimensional é fácil e pode ser uma ferramenta útil no seguimento destes doentes. De salientar contudo, que verificámos algum grau de disfunção ventricular mesmo após restabelecimento de conexões normais.

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**List of abbreviations**

APSE	annular plane systolic excursion
ccTGA	congenitally corrected transposition of the great arteries
CHD	congenital heart disease
d-TGA	dextro-transposition of the great arteries
ECG	electrocardiogram
ICC	interclass correlation coefficient
MRI	magnetic resonance imaging
LV	left ventricular
RV	right ventricular
TGA	transposition of the great arteries

**Introduction**

In the past 50 years, remarkable advances in the diagnosis and treatment of congenital heart disease (CHD) have resulted in a dramatic improvement in survival of patients with CHD, including in transposition of the great arteries (TGA).<sup>1-5</sup> In this severe CHD, the arterial trunks are connected to the morphologically inappropriate ventricles. Presently, most patients reach adulthood both in dextro-transposition of the great arteries (d-TGA) after surgical correction and in congenitally corrected transposition of the great arteries (ccTGA). Until the 1980s, d-TGA patients underwent atrial switch repair with the creation of an atrial baffle to direct venous flow to the contralateral ventricle in the Mustard technique, or by creating a baffle out of

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