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ORIGINAL ARTICLE

Is it important to assess the ascending aorta after tetralogy of Fallot repair?

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KEYWORDS
Aortic dilatation;
Ascending aorta;
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Abstract
Introduction and Objectives: Aortic dilatation can develop late after tetralogy of Fallot repair. Its extension beyond the aortic root is not clearly understood. We aimed to assess the prevalence and predictors of ascending aorta dilatation to set up an imaging protocol.
Methods: In this prospective study including adult patients after tetralogy of Fallot repair followed at a referral center, we assessed the aorta by cardiovascular magnetic resonance and defined ascending aorta dilatation as an observed-to-expected ratio >1.5.
Results: We included 78 adults (mean age 31±10 years; 56% female), with a mean follow-up of 23±7 years since tetralogy of Fallot repair. The prevalence of ascending aorta dilatation was 11.5%. The ascending aorta was larger than the sinuses of Valsalva in 12.8% of cases. Patients with ascending aorta dilatation were older, predominantly male, with later repair and larger left ventricular mass and volumes. By multivariate analysis left ventricular mass index (LVMI) was the only factor independently associated with ascending aorta dilatation (odds ratio 1.10, 95% confidence interval 1.01-1.20, p=0.03). A cut-off value of ≥57.9 g/m^2 for LVMI had 89% sensitivity and 71% specificity for ascending aorta dilatation.
Conclusions: Ascending aorta assessment as part of a routine cardiovascular magnetic resonance study after tetralogy of Fallot repair is recommended to screen for future aortic complications, particularly in males and older patients, and those with later repair and larger left ventricles. LVMI assessment has potential as a screening tool for ascending aorta dilatation with future clinical implications.

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PALAVRAS-CHAVE
Dilatação da aorta;
Aorta ascendente;
Ressonância magnética cardiovascular;
Tetralogia de Fallot

É importante avaliar a aorta ascendente na tetralogia de Fallot operada?

Resumo
Introdução e objetivos: A dilatação da aorta é uma complicação tardia após correção da tetralogia de Fallot. A sua extensão além da raiz da aorta não está bem definida. Pretendemos avaliar a prevalência e os preditores de dilatação da aorta ascendente para elaborar um protocolo imagiológico.
Métodos: Estudo prospetivo com adultos operados a tetralogia de Fallot seguidos num centro de referência. Estudamos a aorta por ressonância magnética cardiovascular e definimos dilatação da aorta ascendente pelo rácio observado-esperado > 1,5.
Resultados: Incluímos 78 adultos (idade média 31 ± 10 anos; 56% mulheres); seguimento médio de 23 ± 7 anos desde a cirurgia. A prevalência de dilatação da aorta ascendente foi 11,5%. A aorta ascendente era maior do que os seios de Valsalva em 12,8% dos casos. Os doentes com dilatação da aorta ascendente eram mais velhos, maioritariamente homens, operados mais tarde, com massa e volumes ventriculares esquerdos maiores. Na análise multivariada a massa ventricular esquerda indexada foi a única variável independente associada a dilatação da aorta ascendente (*odds ratio* 1,10; intervalo de confiança de 95% 1,01-1,20; p = 0,03). A massa ventricular esquerda indexada ≥ 57,9 g/m^2 apresentou uma sensibilidade de 89% e uma especificidade de 71% para dilatação da aorta ascendente.
Conclusões: Recomendamos a inclusão da aorta ascendente na avaliação por ressonância magnética da tetralogia de Fallot operada, para prevenir complicações aórticas futuras, em particular em homens, doentes mais velhos, operados mais tarde e com ventrículos esquerdos maiores. A massa ventricular esquerda indexada tem potencial para ser usada no rastreio da dilatação da aorta ascendente com implicações clínicas futuras.

Introduction

Imaging follow-up of tetralogy of Fallot (TOF) patients can be challenging, due to associated thoracic deformities and previous cardiac surgeries. Cardiovascular magnetic resonance (CMR) has an important role in identifying right ventricular outflow tract obstruction, aneurysms, or residual shunts, quantifying pulmonary valve regurgitation or stenosis, and assessing biventricular systolic function. In addition, as first reported by Capelli et al.,[1] there is an increasing awareness that aortic dilatation can develop late after TOF repair. Intrinsic histological abnormalities in the aortic root and ascending aortic wall, present since infancy, can contribute to progressive dilatation.[2] This possible aortopathy led us to focus our study beyond the aortic root and reinforces the importance of a complete aortic assessment. The accuracy of CMR in the diagnosis of thoracic aortic disease,[3] including TOF,[4] is unquestionable. Although CMR is expensive, requires long scan duration and has contraindications, it can provide a complete anatomical and functional assessment.[5] We sought to assess the ascending aorta (AAo) late after TOF repair and to find possible predictors of AAo dilatation in order to set up an imaging protocol.

Methods

A total of 127 adults after TOF repair, not including those with pulmonary atresia, are currently followed as regular outpatients at our tertiary care center. This study prospectively included 78 adults after TOF repair, from March 2011 to December 2015. Inclusion criteria were age ≥18 years, with a time interval since TOF repair of>1 year, and ability to undergo a CMR study. Forty-nine patients were excluded from the study (Figure 1). Exclusion criteria were association with other congenital or acquired heart disease, genetic

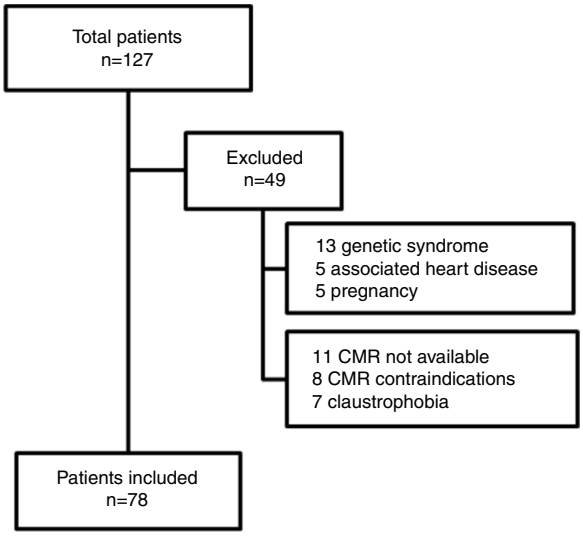

Figure 1 Graphic representation of the study population and exclusion criteria. CMR: cardiovascular magnetic resonance.