Rev Port Cardiol. 2013;32(4):281–286

Revista Portuguesa de
Cardiologia
Portuguese Journal of Cardiology
www.revportcardiol.org

ORIGINAL ARTICLE

Transcatheter aortic valve implantation: Is anatomy still the limiting factor?☆

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Received 15 April 2012; accepted 9 August 2012
Available online 16 May 2013

KEYWORDS
Transcatheter aortic valve implantation;
Anatomy;
Aortic annulus;
Iliofemoral arteries

Abstract
Introduction: Despite rapid advances in transcatheter aortic valve prostheses, anatomical constraints remain that can limit access to this treatment for patients with severe aortic stenosis. The objective of this study was to determine the proportion of patients anatomically suitable for this technique using the different devices and approaches available.
Methods: We retrospectively analyzed 145 consecutive patients referred to our center for transcatheter aortic valve implantation. Aortic annulus diameter was measured by transesophageal echocardiography and minimum iliofemoral diameter was determined by multidetector computed tomography. We determined the proportion of patients anatomically suitable for current devices (26-mm, 29-mm and 31-mm Medtronic CoreValve for transfemoral, transaxillary or transaortic approaches, and 23-mm, 26-mm and 29-mm Edwards Sapien XT for transfemoral or transapical approaches).
Results: The Medtronic CoreValve was suitable for 89% of patients via transfemoral access and 93.8% via transaxillary or transaortic approaches, while the Edwards Sapien XT was suitable for 82.1% of patients via transfemoral and 97.2% via transapical approaches. Only 1.4% of patients were anatomically unsuitable for all devices and approaches.
Conclusions: In this population, most patients were anatomically suitable for transcatheter aortic valve implantation if assessed on the basis of multiple devices and multiple access approaches.

PALAVRAS-CHAVE
Implantação percutânea válvula aórtica;
Anatomia;

Implantação percutânea de válvula aórtica: a anatomia é (ainda) o factor limitante?

Resumo
Introdução: Apesar de a rápida evolução das próteses valvulares aórticas percutâneas, persistem restrições anatómicas que podem limitar o acesso dos doentes com estenose aórtica severa

☆ Please cite this article as: Sousa O, et al. Implantação percutânea de válvula aórtica: a anatomia é (ainda) o fator limitante? Rev Port Cardiol. 2013. doi:10.1016/j.repc.2012.08.009.

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Anel aórtico;
Artérias iliofemorais

a este tratamento. O objetivo deste estudo foi determinar a proporção de doentes anatomicamente adequados para os diferentes dispositivos e acessos, numa população candidata a este tratamento.
Métodos: Análise retrospetiva de 145 doentes consecutivos referenciados ao nosso centro para implantação de válvula aórtica percutânea. A dimensão do anel aórtico foi determinada por ecocardiograma transesofágico e o diâmetro mínimo das artérias iliofemorais foi obtido por tomografia computadorizada multidetetores. Foi determinada a proporção de doentes anatomicamente adequados para as próteses actualmente disponíveis (Medtronic CoreValve de 26, 29 e 31 mm por acesso transfemoral, transaxilar ou transaórtico; Edwards Sapien XT de 23, 26 e 29 mm por acesso transfemoral ou transapical).
Resultados: Dos doentes avaliados, 89% eram adequados para as próteses Medtronic CoreValve por via transfemoral e 93,8% eram adequados para abordagem subclávia ou transaórtica. Em relação às próteses Edwards Sapien XT, 82,1% eram adequados para acesso transfemoral e 97,2% eram adequados para a via transapical. Apenas 1,4% dos doentes não apresentavam anatomia viável para esta técnica considerando todos os dispositivos e abordagens possíveis.
Conclusões: Nesta população, a maioria dos doentes foi considerada anatomicamente adequada para tratamento percutâneo, numa estratégia multi-dispositivo e multi-abordagem.

Introduction

Transcatheter aortic valve implantation (TAVI) has been shown to be effective and safe in the treatment of patients with severe aortic stenosis and high surgical risk.[1–8] The latest generation prostheses available in Europe are the Medtronic CoreValve (Medtronic Inc., Minneapolis, MN) and the Edwards Sapien XT (Edwards Lifesciences Inc., Irvine, CA). The Medtronic CoreValve is a self-expanding device, available in 26-mm, 29-mm and 31-mm sizes, and can be implanted via a transfemoral, transaxillary/subclavian or transaortic approach. The Edwards Sapien XT is a balloon-expandable valve, available in 23-mm, 26-mm and 29-mm sizes, to be implanted via a transfemoral or transapical approach. Despite rapid advances in these devices, anatomical constraints remain, particularly with regard to the diameter of the aortic annulus (for all approaches) and of the iliofemoral arteries (for transfemoral approach), which can limit patient access to this treatment. Our objective was to determine the proportion of patients referred for TAVI who were anatomically suitable for the technique using the latest devices and the various approaches available.

Methods

We retrospectively analyzed 145 consecutive patients referred to our center for TAVI between March 2007 and October 2011. All patients were assessed by transesophageal echocardiography (TEE) and multidetector computed tomography (MDCT). The aortic annulus diameter obtained by TEE in long-axis view of the left ventricle at 120–140° (Figure 1) was used whenever possible. Minimum iliofemoral diameters were determined by MDCT for the entire segment proximal to the head of the femur, the diameter selected being that of the artery with the most favorable anatomy (Figure 2). The proportion of patients considered suitable for the various devices and approaches was determined according to their respective anatomical requirements (Figure 3).

The aortic annulus diameters required for the Medtronic CoreValve are 20–23 mm for the 26-mm, 23–27 mm for the 29-mm, and 26–29 mm for the 31-mm valve. A further requirement is that the diameter of the ascending aorta be ≤40 mm for the 26-mm, and ≤43 mm for the 29-mm and 31-mm prostheses. An 18F introducer is used for transfemoral access, which requires a minimum iliofemoral diameter of 6 mm. Alternatively, the prosthesis can be delivered via the subclavian artery (also requiring a minimum diameter of 6 mm) or directly via the ascending aorta.

The required aortic annulus diameters for the Edwards Sapien XT are 18–22 mm for the 23-mm, 21–25 mm for the 26-mm, and 24–27 mm for the 29-mm valve (the latter is currently available only for a transapical approach).

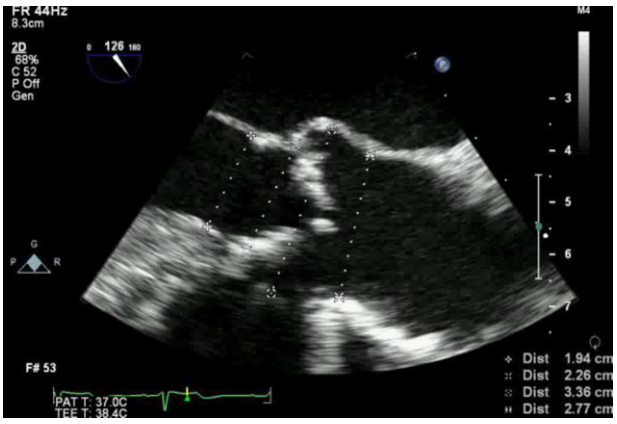

Figure 1 Measurement of aortic annulus diameter by transesophageal echocardiography.