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HOW-TO-DO-IT

Bending the Rules in Transfemoral TAVI With the SAPIEN 3: Overcoming Severe Iliac Tortuosity

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Whilst the worldwide uptake of transcatheter aortic valve implantation (TAVI) over the last 10 years has been dramatic, iliac tortuosity remains a potential barrier to the most commonly chosen access route via the femoral artery. We describe the challenges posed by severe iliac tortuosity during transfemoral TAVI and contrast a difficult procedure – at the limit of the capability of current device delivery technology – with a straightforward implantation. The use of pre-procedural multi-detector computed tomography to assess the vasculature and a bilateral stiff wire technique for managing iliofemoral tortuosity are discussed.

Keywords TAVI • Iliac tortuosity • SAPIEN 3 • MDCT

Introduction

Over the last decade the widespread uptake of transcatheter aortic valve implantation (TAVI) has rapidly altered the standard management of severe aortic stenosis. Whilst transapical TAVI remains a valuable option for patients unsuitable for transvascular valve implantation, the transfemoral approach is frequently associated with superior clinical outcomes [1,2]. However, the suitability of vascular access remains an important limiting factor when considering a transfemoral approach.

Routine vascular assessment prior to TAVI with multidetector computed tomography (MDCT) of the aortoiliac vessels enables access site planning, in addition to aortic root assessment, and annulus sizing [3]. Severe Iliofemoral arterial tortuosity – particularly in association with moderate or severe vessel wall calcification, inadequate lumen diameter, and the presence of significant focal stenosis – is considered by the European Society of Cardiology Joint Task Force to be a contraindication to transfemoral TAVI, however, there is currently no consensus method for assessing the suitability of Iliofemoral vasculature [4]. The following transfemoral cases, performed at a high volume centre, highlight the potential difficulties encountered with iliac tortuosity and how a successful outcome may be achieved despite challenging anatomy. To the best of the authors' knowledge, we describe for the first time the use of a bilateral stiff wire technique particularly suited to dealing with tortuosity during standard transfemoral TAVI (See video summary).

Case 1

An 84-year-old man – with a past history including mitral valve repair – presented with exertional dyspnoea due to severe calcific aortic stenosis. Multi-detector computed tomography (SOMATOM Force, Siemens, Munich, Germany) revealed a moderately calcified tricuspid aortic valve with a mildly calcified aortic annulus (mean diameter 29.9 mm, area 691 mm^2). Bilateral severely tortuous and mildly aneurysmal iliofemoral arteries with mild calcification (Figure 1 – Panel A) were noted. Based on an elevated

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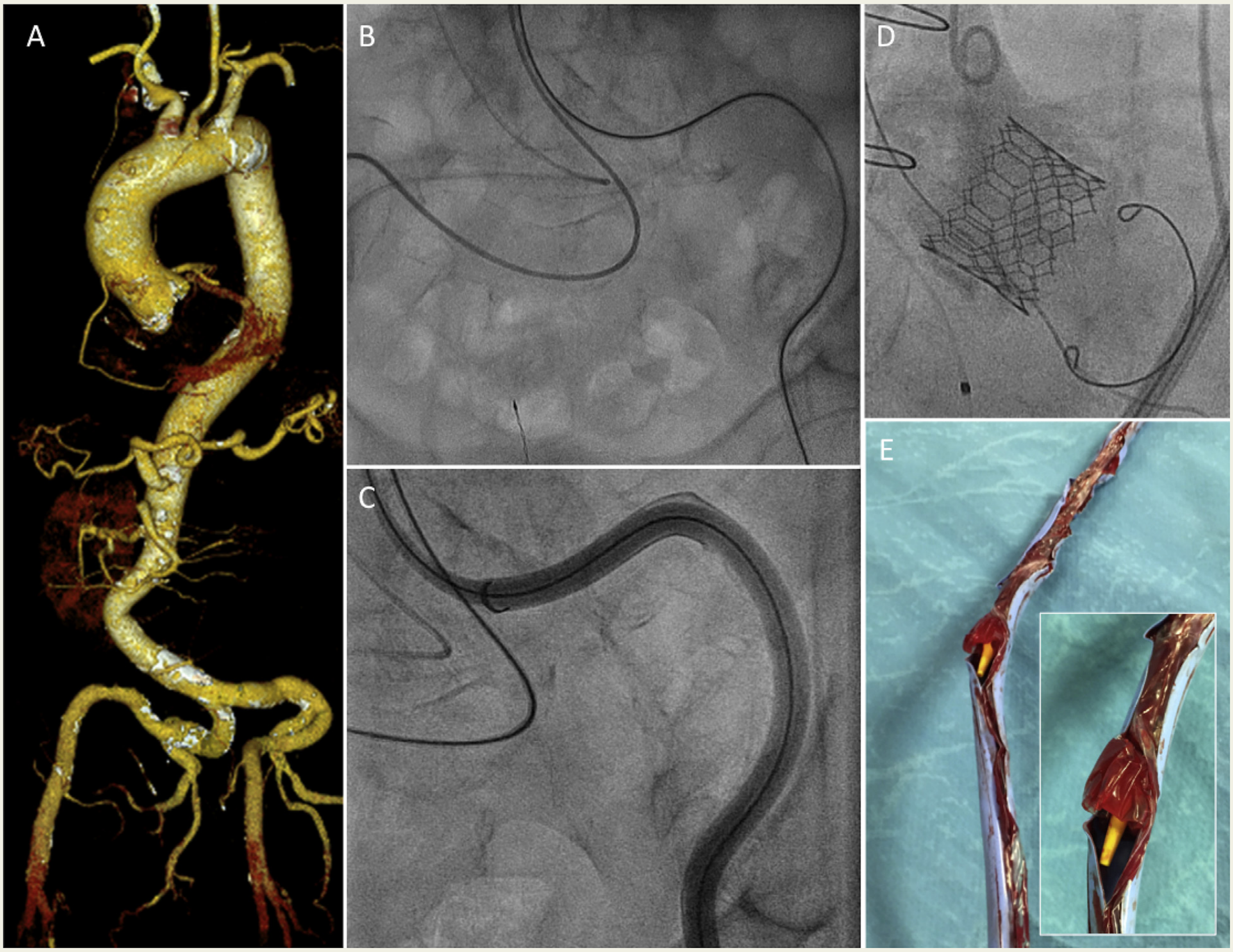

Figure 1 Case 1: Panel A – 3D MDCT reconstruction of the aorta and iliofemoral vessels demonstrating severely tortuous iliac arteries; Panel B – Frontal plane angiographic image showing severe persistent iliac tortuosity despite placement of bilateral stiff 0.035″ guidewires; Panel C – Frontal plane angiographic image during placement of a left-sided 16F vascular sheath with visible sheath malformation due to tortuosity; Panel D – Annular plane angiographic image during contrast aortography demonstrating appropriate deployment of the aortic prosthesis; Panel E – Marked disruption of the access sheath after removal with the dislocated portion of the balloon lodged within the sheath (inset).
MDCT = Multi-detector computed tomography

risk associated with redo cardiac surgery (STS mortality score = 2.4%, logistic EuroSCORE = 18.1) TAVI with a 29 mm SAPIEN 3 prosthesis (Edwards Lifesciences) was recommended by the Heart Team. In view of mild iliofemoral vessel calcification and the increasing evidence of superior outcomes with the transfemoral versus a transthoracic approach a decision was made to attempt an initial transfemoral approach.

Bilateral transfemoral access and left arteriotomy site preclosure with two percutaneous vessel suture devices (Perclose ProGlide, Abbott Vascular, Abbott Park, IL, USA) was performed. Despite using bilateral super stiff 0.035″ Back-Up Meier (Boston Scientific, Marlborough, MA, USA) support wires, it was not possible to straighten the iliofemoral vessels (Figure 1 – Panel B) and a left-sided 16-French expandable eSheath (Edwards Lifesciences, Irvine, CA, USA) was advanced with difficulty (Figure 1 – Panel C). A wire was positioned in the left ventricle using extra length catheters, however, the distance to the annulus was greater than the 105 cm length of the prosthesis delivery sheath (Commander, Edwards Lifesciences, Irvine, CA, USA) and further 16-French right-sided transfemoral arterial access was obtained, by means of a second puncture proximal to the pre-existing 6-French sheath access site. The left-sided 16-French sheath was partially withdrawn and remained in situ. Via the right-sided access, an Amplatz Extra Stiff support wire (Boston Scientific, Marlborough, MA, USA) was positioned appropriately in the left ventricle and a 29 mm SAPIEN 3 (Edwards Lifesciences, Irvine, CA, USA) prosthetic device was advanced. Positioning of the prosthesis at the optimal height within the aortic annulus was challenging, requiring maximum advancement of both the access sheath and delivery system. The prosthesis was successfully deployed achieving an excellent angiographic and haemodynamic result with

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