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Transfemoral Edwards-Novaflex valve implantation in a patient with aorto-iliac endoprosthesis and severely tortuous bilateral external iliac arteries–“Railing track”☆☆☆

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ABSTRACT

Transcatheter aortic valve implantation (TAVI) has nowadays been introduced as an alternative for surgical aortic valve replacement as a treatment for high risk aortic stenosis patients. This procedure is not free of complications: the SOURCE registry, indeed, showed that vascular complications are more frequent with the transfemoral approach. We present the case of an 82-year-old man with known history of severe aortic stenosis at high-risk for surgery. Pre-TAVI screening shows bilateral severely tortuous iliac arteries and aorto-bi-iliac endoprosthesis. Transapical TAVI as a first choice was rejected due to severe lung disease. The patient was then treated by Transfemoral TAVI using a dedicated interventional technique that is described in this case-report.

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1. Introduction

Transcatheter aortic valve implantation (TAVI) was introduced as an alternative for surgical aortic valve replacement (SAVR) as treatment for high surgical risk aortic stenosis patients. The PARTNER US Trial (Cohort B) has demonstrated its superiority over medical treatment in patients unsuitable for aortic valve surgery [1]. According to the SOURCE Registry vascular complications are more frequent with the transfemoral approach than with the transapical (11.3% Vs 2%, $P < .0001$), and their relevant clinical impact should encourage careful patient selection [2]. Clinical, anatomic and functional characteristics impact procedural outcomes and have to be considered when evaluating potential candidates. Vessel minimal luminal diameter, tortuosity and calcification of the aorta, iliac and femoral arteries must be assessed and should influence patient selection and implantation route. In patients with small, heavily calcified, tortuous arteries a transapical approach should be preferred in order to prevent serious vascular complications. However, vessel tortuosity itself should not be considered as an absolute contraindication for the transfemoral approach as long as the arteries straighten

after the insertion of a stiff guide wire [3]. The presence of an aorto-iliac endoprosthesis in patients with severe vascular disease represents a further challenge to transfemoral TAVI that, to our knowledge, has not been previously reported as a real case.

The transapical route should be preferred in the presence of a complicated anatomy, but it also presents some limitations in patients with chest wall deformity, severe lung disease, chest wall trauma or infection, severely depressed left ventricular function and previous cardiac surgery. Accordingly, other alternative access sites have been reported, such as trans-axillary, or direct trans-aortic approaches.

2. Case report

An 82-year-old male with severe aortic valve stenosis was admitted as an emergency with repeated episodes of syncope and overt heart failure. He was rejected for SAVR in view of a severe pulmonary disease with bilateral emphysematous lungs (GOLD classification stage III), left anterior descending coronary artery disease and chronic kidney disease (Euroscore 32.82). After reviewing ilio-femoral axis diameter [Fig. 1A & B] Heart Team opted for a trans-femoral approach because of the severe lung disease despite the presence of an aorto-bi-iliac endoprosthesis with severe tortuosity of the ilio-femoral axes, determining an approximately 360° loop on the right external iliac artery and a 260° loop on the left side, respectively [Fig. 2A & B]. The diameter of ilio-femoral axis was adequate.

Trans-catheter aortic valve implantation (TAVI) was then undertaken with surgical exposure of left femoral artery. As

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☆☆ The case has been presented and awarded at TCT 2011 on 10/11/2011 in San Francisco as a “Best Challenging Case”.

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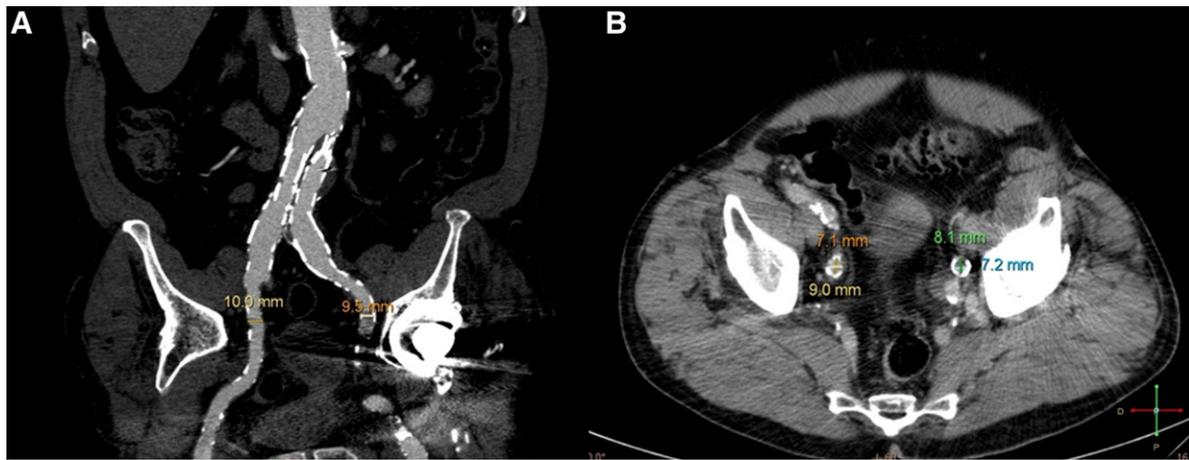


Fig. 1. A. Iliac-femoral axes showing Internal diameter at level of the common iliac artery (longitudinal section). B. Iliac-femoral axes showing Internal diameter at level of the common iliac artery (cross section).

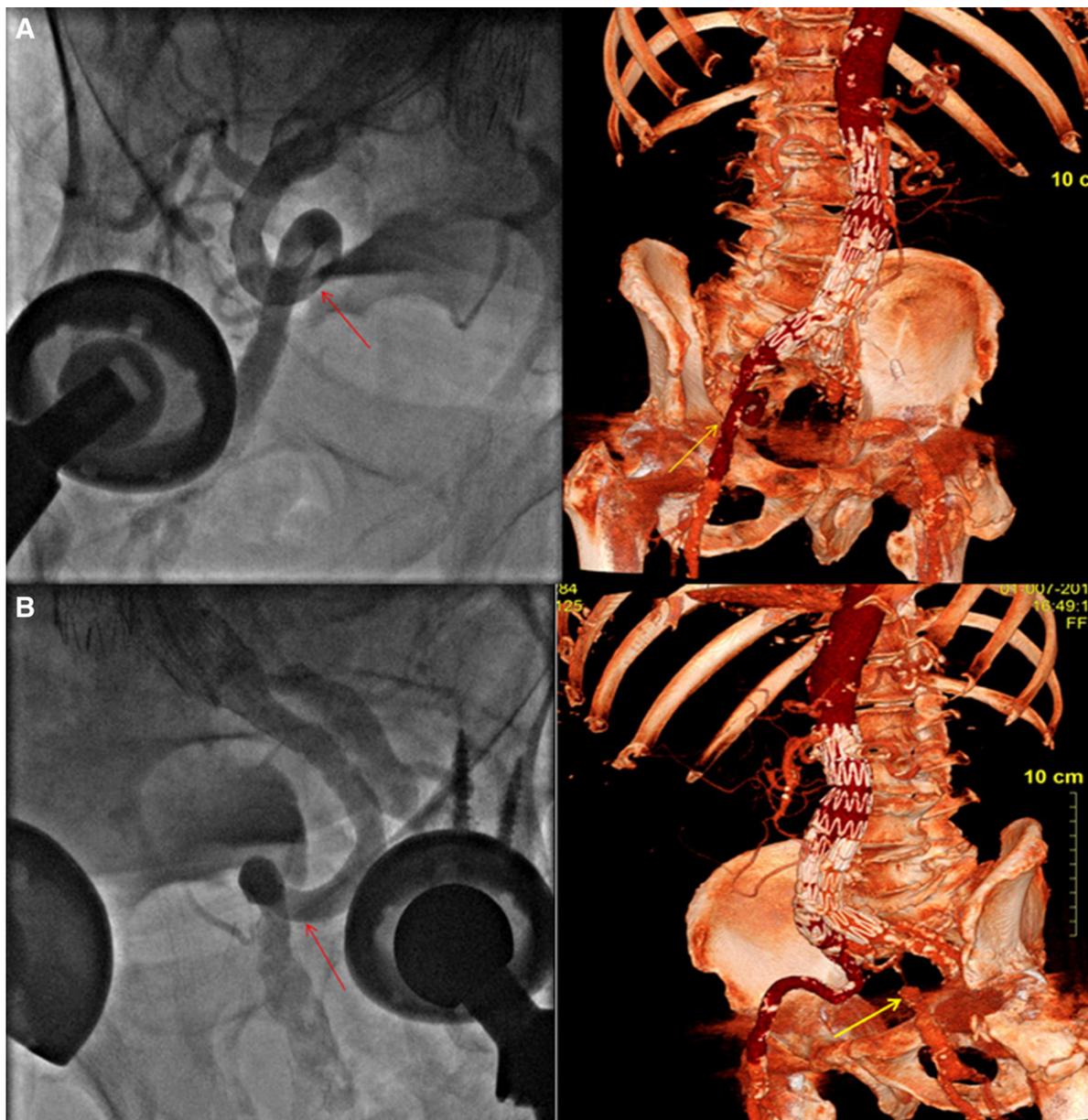


Fig. 2. A. Right iliac-femoral axes. B. Left iliac-femoral axes.

usual, an extra-stiff wire was inserted upwards through the common femoral artery to straighten the left iliac tortuosity. The 22F introducer however, could not be completely advanced beyond the endoprosthesis part of the left common iliac, and after several attempts it was removed revealing damage located at its tip, likely due to the friction against the vascular calcium and the struts of the endoprosthesis. A second extra-stiff wire was therefore advanced from the right brachial artery to the left superficial femoral artery through a multipurpose catheter for additional support [Fig. 3A]. A new 22F introducer was finally advanced with success as a “railing track” and the second wire was then removed. After conventional balloon valvuloplasty, a 23 mm Edward-Sapien XT aortic valve was successfully implanted [Fig. 3A]. Intra-operative trans-oesophageal echocardiography showed trivial para-prosthetic leak [Fig. 3B]. The femoral access was surgically repaired without complications [Fig. 3B] and the patient was discharged uneventfully on postoperative day 10. To our knowledge he is doing well three months after the procedure.

3. Discussion

The prevalence of degenerative calcified aortic valve is increasing and its prognosis is known to be poor in untreated patients. Surgical replacement of the aortic valve is considered as the gold standard [4]. However, the incidence of this disease is increasing as the population ages and many patients commonly encountered in the everyday practice may have unacceptable risk for conventional surgery. After a decade since the first human case of transcatheter aortic valve was performed by Alain Cribier, clinicians are facing remarkable developments in this novel technique and TAVI is emerging as a real therapeutic alternative for high risk aortic stenosis patients [5].

However, TAVI is not free from complications and vascular damages at the access site are the most frequent. In particular, dissection or perforation of the ilio-femoral axis remains a major challenge. According to the recently published SOURCE registry, 11.3% of trans-femoral TAVI patients had major vascular complications [2]. Vascular complication range between 13%–30% in various studies,

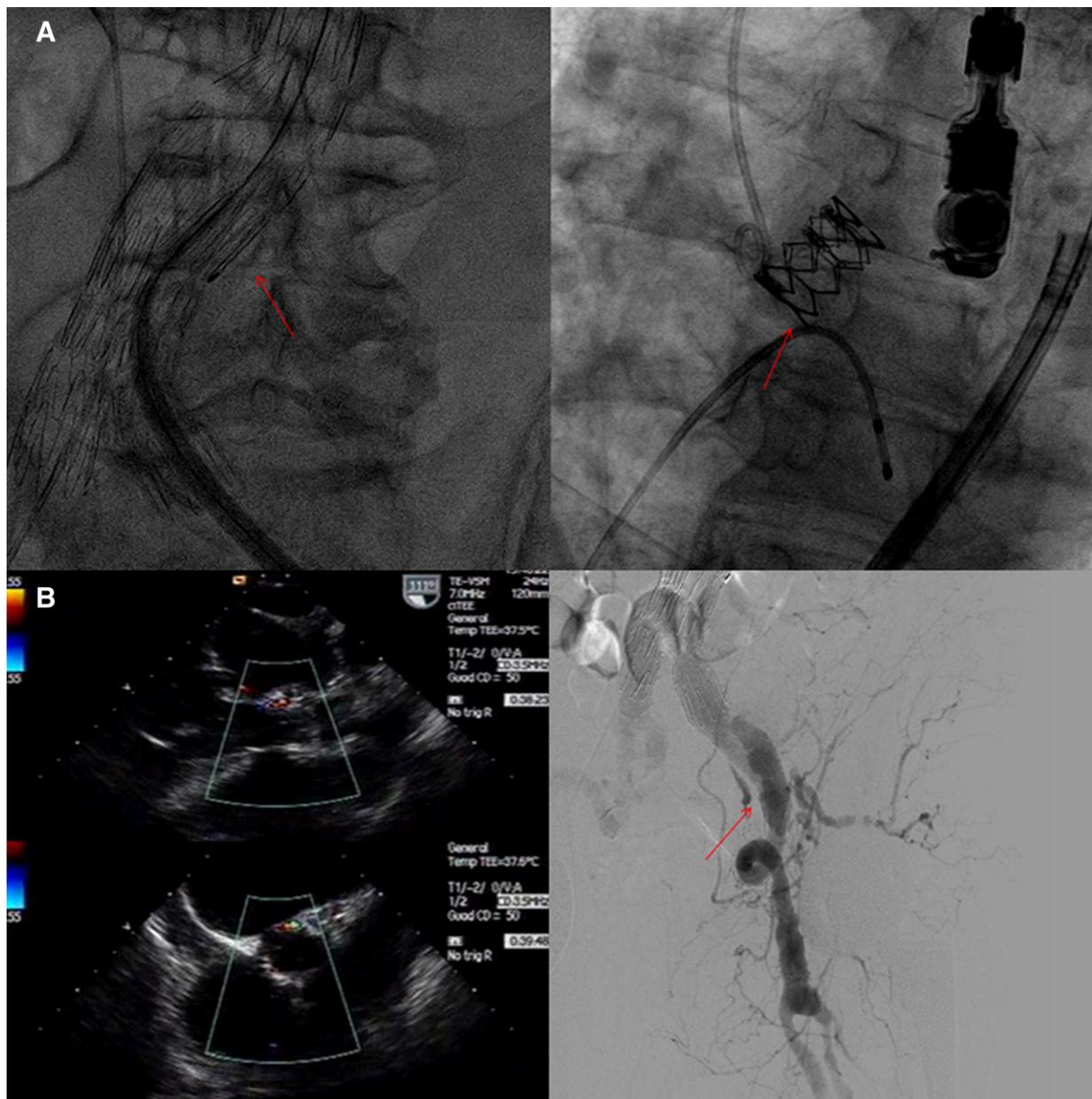


Fig. 3. A. Fluoroscopic view of introducer on Extra-stiff wire and the prosthetic aortic valve. B. Post TAVI echocardiography and peripheral angiography after surgical repair.

substantially contributing to periprocedural morbidity and mortality [1,2,6]. Newly introduced low-profile delivery systems may reduce these complications, but not eliminate them completely. Proper pre-TAVI patient screening may represent a key to success; in fact different characteristics such as vessel lumen diameter, tortuosity and calcification of the aorta and ilio-femoral axis may affect TAVI outcome. In the reported case we successfully performed transfemoral-TAVI in a patient with bilateral severely calcified, tortuous ilio-femoral axis and aorto-iliac endoprosthesis. According to the available literature vessel tortuosity should not be considered as an absolute contraindication to TAVI, as current stiff wires can straighten the arteries sufficiently enough to permit the advancement of the introducer, but very few is known about management and outcome of patients with aorto-iliac endoprosthesis. Our patient had >260° bend in the left iliac axis and a 360° loop in the right iliac axis along with aorto-iliac endoprosthesis. According to our knowledge this is the first reported case of successful TAVI through transfemoral route in a patient with aortic endoprosthesis and severely tortuous iliac-femoral axis managed by the railing tract technique.

The technique of inserting a second extra stiff wire from the right brachial artery down to the left femoral artery, which was previously used with success in the field of endovascular aortic aneurysm repair [7,8], together with an ascending extra stiff wire from the femoral access to the ascending aorta created a “railing track” that allowed the successful navigation of the 22F introducer through the marked tortuosity and the struts of the iliac endoprosthesis using constant pull and push maneuvers. The procedure was performed without complications.

4. Conclusion

TAVI is an alternative therapeutic approach for patients with severe AS, but this procedure is not free of complications. Vascular

complications are the most common and portend a dismal prognosis. These events are worst in patients with severely calcified, tortuous iliac-femoral axes, but few is known about the incidence in patients with previous aorto-iliac endoprosthesis. The present case is a successful example of a difficult transfemoral TAVI managed with a brachial artery access stiff-wire technique in a patient with severely calcified, tortuous iliac arteries and aorto bi-iliac endoprosthesis.

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