ACURATE neo™ Aortic Valve implantation via carotid artery access: First case report

Chadi Aludaat (aludaat.chadi@live.fr)
CHU Rouen: Centre Hospitalier Universitaire de Rouen https://orcid.org/0000-0002-9825-3852
Alexandre Canville
Clinique Saint Hilaire
Quentin Landolff
Clinique Saint Hilaire
Matthieu Godin
Clinique Saint Hilaire
Fabrice Bauer
University Hospital Centre Rouen: Centre Hospitalier Universitaire de Rouen
Fabien Doguet
CHU Rouen: Centre Hospitalier Universitaire de Rouen

Case report

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Abstract

Background The ACURATE *neo*™ transcatheter heart valve (Boston Scientific, Marlborough, Massachusetts) is predominantly implanted via femoral access. Implantation via the common carotid artery as an alternative arterial access has never been described.

Case presentation We present the case of an 89-year-old woman referred to us for a transcatheter aortic valve replacement (TAVR). After apparatus imaging of the aortic annulus and the peripheral vascular pathway, the heart team was confronted with a triple challenge: (i) The preferable choice of a self-expanding valve because of a small aortic annulus in an obese woman. (ii) Gaining favorable access to the coronary ostia, considering multiple recent coronary stenting. (iii) Utilizing an alternative arterial access because of staggered iliac and femoral stenosis. Implanting the ACURATE *neo*™ transcatheter heart valve via carotidal access allowed us to overcome these challenges. The procedure was performed successfully without any short-term complications.

Conclusion We report the first case of implantation of an ACURATE *neo*™ transcatheter heart valve (Boston Scientific, Marlborough, Massachusetts) via the right common carotid artery.

Background

In patients ineligible for transcatheter aortic valve replacement (TAVR) via the traditional femoral access route due to severe peripheral vascular disease, carotid artery access is a suitable alternative thoracic access route [1,2]. Self-expanding valves are the first to be implanted via this non-femoral access [2]. Herein, we report the first implantation of an ACURATE *neo*™ aortic valve system via the right common carotid artery access (RCCA).

Case Report

An 89-year-old female patient requiring surgery for colorectal cancer also suffered from severe calcified aortic valve stenosis (aortic mean gradient = 59 mmHg, aortic area = 0.4 cm²) and left main significative stenosis, which were contraindications for her cancer surgery. Two weeks before valve implantation, she underwent multiple coronary vessel stenting for unstable angina. Discussions among the local heart team led to the proposition of TAVR to treat the severe aortic stenosis, with easy access to the coronary ostia in the future being a primary concern.

Aortic root dimensions and the access site were precisely measured using computed tomography (CT) angiography, with the aortic annulus having a perimeter of 67 mm and an area of 320 mm². While heavy iliac and femoral calcifications with multiple staggered stenosis contraindicate a femoral route, the Doppler and CT studies of supra-aortic vessels did not show any abnormalities. The right common carotid artery was free from calcifications, and its internal diameter was 7 mm at puncture level. The implantation of an S-size ACURATE *neo*™ aortic valve (Boston Scientific, MA, USA) via the right carotid artery was collegially retained by the local heart team. After obtaining the patient's consent, the TAVR

procedure was performed according to local standard protocol in a hybrid operating room. Intravenous heparin was administrated to maintain an activated clotting time of ≥250 s. The patient was under dual platelet therapy for a recent previous coronary stent implantation. Surgical access for TAVR was performed under general anesthesia with a fast-track approach. A 5 Fr pigtail was advanced into the aortic root using a left radial approach. Through a 4 cm right cervical incision (Figure 1A), the right common artery was exposed. The stenotic aortic valve was then crossed using a straight-tip guide wire and an Amplatzer left 1 diagnostic catheter (Terumo Medical, Somerset, NJ). The straight-tip guidewire was then replaced with a pre-shaped extra-stiff Safari XS (Boston Scientific, MA, USA) in the left ventricle. An iSLEEVE™ (Boston Scientific, MA, USA) expandable sheet was cautiously advanced into the ascending aorta (Figure 1B). Given the heavy annular calcification, we performed a 22 mm valvuloplasty using a noncompliant balloon (Cristal balloon, BALT, Montmorency, France).

Prothesis placement was performed in the standard fashion, and the up-to-down deployment was satisfactory—with enhanced stability because of the short distance between the arterial carotid access and the aortic annulus (Figure 1C). After a satisfactory angiogram (Figure 1D), the iSLEEVE™ introducer was removed, and the common carotid artery was surgically purged and repaired using a 6–0 polypropylene running suture. Echocardiography confirmed the absence of paravalvular leak, and the mean prosthetic gradient was 7 mmHg. After continuous ECG monitoring, the patient was discharged home on the third postoperative day, per our local practice. Based on the Valve Academic Research Consortium (VARC 2) criteria, we recorded no complications.

Discussion

We describe the first implantation of an ACURATE *neo* aortic valve via right carotid artery access, which was performed successfully, without short-term complications. During the procedure, we did not encounter any issue related to the handling of the iSLEEVE™ introduced into the RCCA or strict valve positioning. The ACURATE *neo*™ (Symetis/Boston, Ecublens, Switzerland) is a new-generation self-expanding device characterized by an X-shaped stent design with a unique deployment mechanism[3]. Data from large registries demonstrate favorable outcomes with a high rate of procedural success and low 30-day and 1-year mortality. According to the current medical literature, 10% to 15% of patients are still ineligible for the transfemoral route despite technical advances in reductions to the valve introducer size[2,4]. Transapical and direct aortic TAVR were initially preferred but have since fallen out of favor due to inferior outcomes, as illustrated in the ad-hoc analysis of randomized control studies comparing TAVR to surgical aortic valve replacement (SAVR) in high-risk surgical patients. Since the first transcarotid TAVR in Lille, France, in 2010[5], this alternative access for TAVR has emerged as a reliable alternative to the more traditional non-femoral access.

Multiple propensity match studies have highlighted the feasibility and safety of this approach. Similar to other valves previously implanted via carotid artery access, the CoreValve® Evolut™ R (Medtronic, Minneapolis, MN, USA) and SAPIEN 3 (Edwards Lifesciences, Irvine, CA, USA) have been validated for these indications, demonstrating their non-inferiority compared to conventional use in a percutaneous

femoral arterial route. In our heart team unit, the carotid approach is the first choice among alternative non-femoral approaches for TAVR. The axillary artery route was also studied[6] using ACURATE *neo*™. The results obtained though this alternative access were quite encouraging for scenarios in which traditional femoral access was impossible[6]

Conclusion

We report the first case of an aortic ACURATE *neo*™ aortic valve system implantation via right carotid artery access. With the expanding indications of TAVR, further studies are required to assess this self-expandable valve as a suitable option for the treatment of aortic stenosis via carotid artery access.

List Of Abbreviations

RCCA: right common carotid artery

TAVR: Trans aortic valve replacement

ECG: electrocardiogram

Declarations

Ethics approval and consent to participate:

The case was discussed and approved collegially, and the patient was given informed consent before intervention.

Consent for publication:

The patient has given its approval to publication.

Availability of data and materials:

Not applicable

Competing interests:

All the authors have no conflict of interests.

Funding:

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Authors' contributions:

Chadi Aludaat, Alexandre Canville were TAVR operators during the procedure. Chadi Aludaat wrote and designed the article. All the authors have together contributed to the critique and proofreading of the article.

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Figures

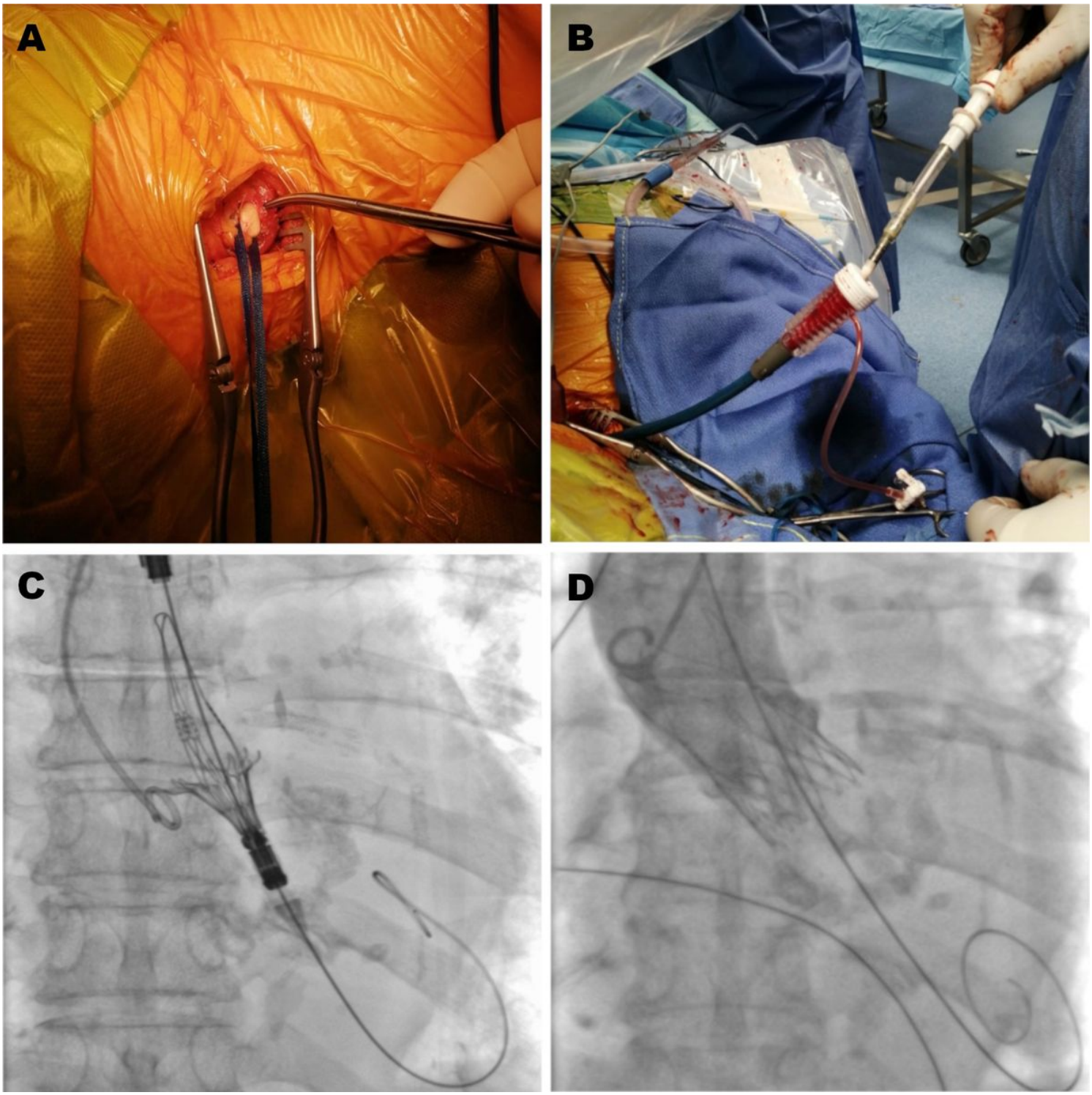

Figure 1

Cervical cut down and right common carotid artery (RCCA) exposed surgically (A); ACURATE™ neo advancement into the iSLEEVE™ through the RCCA (B) Top to down ACURATE neo deployment (C) Final aortography showing no paravalvular leak (D).