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Case Report

Coral Reef Aorta: A Rare Occlusive Disease of the Aorta Complicating Decision Making for Severe Aortic Stenosis Treatment

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ABSTRACT

The incidental finding of a severe occlusive disease of the aorta (coral reef aorta) during the assessment for transcatheter aortic valve replacement in a 75-year-old woman with severe aortic stenosis complicated the process for the Heart Team and led to the consideration of a different access route to find the safest and most appropriate strategy of intervention. A successful transapical transcatheter aortic valve replacement was eventually performed. Coral reef aorta, although rare, is associated with great morbidity and mortality, and it needs to be recognized when planning for intravascular procedures, both for a safer selection of treatment approach and for the prevention of intraprocedural and postprocedural morbidities.

RÉSUMÉ

La découverte fortuite d'une forme grave de maladie occlusive de l'aorte (atteinte coralliforme de l'aorte) à l'occasion d'une évaluation en vue d'un remplacement valvulaire aortique par cathéter chez une femme âgée de 75 ans présentant une sténose aortique grave a compliqué la tâche de l'équipe de cardiologie et l'a amenée à envisager une autre voie d'accès afin d'appliquer la stratégie d'intervention la plus sûre et la plus appropriée. Un remplacement valvulaire aortique par cathéter par voie transapicale a finalement été réalisé avec succès. L'atteinte coralliforme de l'aorte, quoique rare, est associée à des niveaux élevés de morbidité et de mortalité, et il est important de la dépister à l'étape de la planification d'une intervention intravasculaire, tant pour pouvoir choisir une approche thérapeutique plus sûre que pour prévenir les morbidités pendant et après l'intervention.

A 75-year-old woman was admitted to our department because of worsening effort dyspnoea. Her medical history comprised mild chronic obstructive pulmonary disease, hypertension, and dyslipidaemia.

Transthoracic echocardiography showed severe aortic valve stenosis (mean gradient: 40 mm Hg, peak velocity: 4.2 m/s) and associated mild regurgitation; left ventricular contractility was normal as were mitral and tricuspid valves.

Subsequent diagnostic evaluation included carotid duplex ultrasound, which showed moderate stenosis of the bilateral internal carotid arteries, and coronary angiography, which showed negative results for severe coronary artery disease.

To choose the best therapeutic option (transcatheter aortic valve replacement [TAVR] vs surgical replacement), multidetector computed tomography was performed. The examination showed 4 main findings:

1. First, the ascending aorta was severely calcific (porcelain aorta), making conventional surgical aortic valve replacement impossible (Fig. 1).
2. The aortic valve was moderately calcific, with a virtual basal ring size compatible with the currently available transcatheter valves (Fig. 1).
3. The whole descending aorta was severely calcific. A mass-like calcification with a central hypodense core was detected at the thoracic-abdominal transition point (Fig. 2); this bulge plaque produced a lumen narrowing that hindered both a conventional transfemoral approach and a transcaval access. Calcific lesions were also present in renal arteries, celiac and superior mesenteric arteries. The radiological

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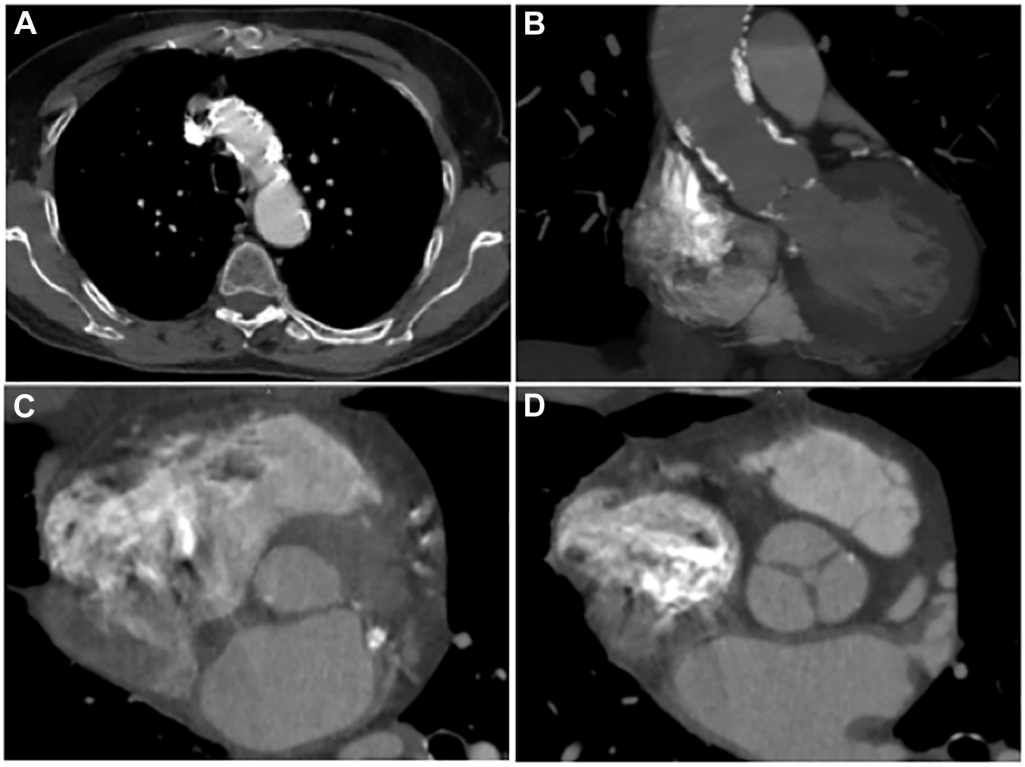

Figure 1. Computed tomography scan evaluation of the ascending aorta and of the aortic valve. (**A**, **B**) Evaluation of the ascending aorta: the main finding is severe calcific atherosclerotic disease (porcelain aorta) that precludes conventional open heart surgery. (**C**, **D**) Evaluation of the aortic valve and virtual basal ring. The annular perimeter was 67 mm, whereas the area was 342 mm^2; the perimeter-derived diameter was 21.3 mm.

aspect and location of these plaques led to the diagnosis of coral reef aorta, a rare obstructive atherosclerotic disease typically involving the suprarenal and juxtarenal aorta (Supplemental Fig. S1).

4. Supra-aortic trunks were severely atheromasic. Calcific plaques were present at the ostium of the brachiocephalic artery and left subclavian artery, making these vessels not suitable for transcatheter devices.

Therapeutic options were therefore discussed at a multidisciplinary Heart Team meeting: while conventional surgical treatment was excluded because of porcelain aorta, a transcatheter procedure was selected as the preferential strategy.[1,2] Although the transfemoral approach proved to have better performance than transthoracic access and must be considered as the first-line strategy for TAVR, it (as well as transcaval access) was excluded because of expected technical difficulties in crossing the exophytic intraluminal lesions and the high risk of embolic complications. The subclavian approach, which is nowadays the preferred alternative in our centre, was deemed not feasible due to severe atherosclerosis of supra-aortic trunks.

A transapical route was therefore selected: a successful TAVR procedure was performed with an Acurate Small (Boston Scientific, Marlborough, MA) prosthesis with a good final result (Supplemental Fig. S2). The postoperative course was uneventful, and the patient was discharged on the fifth postoperative day.

Three months after the procedure, the patient reported improved dyspnoea and functional status. Because she denied any symptoms related to the atherosclerotic disease of the aorta (ie, peripheral artery disease, abdominal angina, or renal dysfunction), we decided to defer further surgical procedures on the aorta.

Coral reef aorta is a rare occlusive disease of the aorta that can result in great morbidity and mortality due to lower limbs and visceral ischemia; in the reported case, the diagnosis was incidental and the patient did not report any symptoms. Risk factors do not seem to differ from those for other occlusive vascular diseases, so coexisting atherosclerotic disease of coronary or carotid arteries, as in our case, are common.[3] The presence of these calcifications may limit vascular accesses and represents a risk factor for ischemic events related to interventional procedures.[4] Accurate imaging is of utmost importance in the preprocedural screening for contemporary aortic valve procedures.[5] Multidetector computed tomography is fundamental for the evaluation of the atherosclerotic burden of aortic arch and thoracic and abdominal aorta, which may lead us to choose alternative vascular approaches and strategies for TAVR.

Novel Teaching Point

Coral reef aorta is a condition of extreme calcification of the aorta that can result in severe technical limits to intravascular accesses. When planning intravascular procedures, an accurate assessment of iliofemoral arteries and the aorta is crucial to recognize this condition, both for a safer selection of a treatment approach and for preventing intraprocedural and postprocedural morbidity.

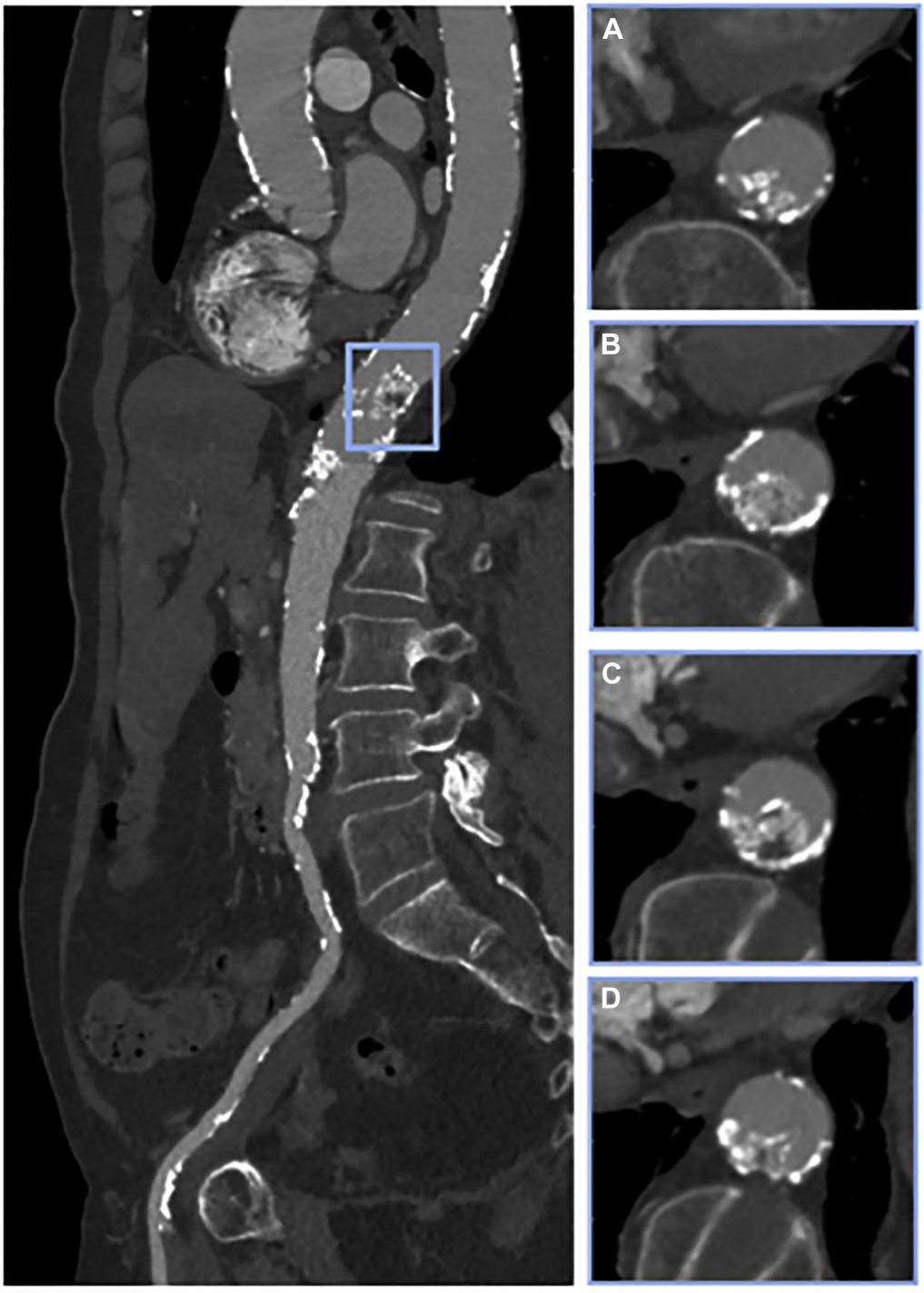

Figure 2. Computed tomography scan evaluation of the aorta. This sagittal plane evaluation showed diffusively calcified aorta and a calcific plaque at the thoracoabdominal transition point with the typical "coral reef" appearance. (**A**-**D**) The bulky plaque with subsequent lumen narrowing.

Disclosures

The authors have no conflicts of interest to disclose.

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Supplementary Material

To access the supplementary material accompanying this article, visit the online version of the *Canadian Journal of Cardiology* at www.onlinecjc.ca and at https://doi.org/10.1016/j.cjca.2019.04.020.