CASE REPORT

Endovascular repair of severe aortic coarctation, transcatheter aortic valve replacement for severe aortic stenosis, and percutaneous coronary intervention in an elderly patient with long term follow-up

Raneem Fallatah [a,b], Abdelfatah Elasfar [a,c,*], Osama Amoudi [a], Mohamed Ajaz [a], Ibraheem AlHarbi [a], Reda Abuelatta [a]

[a] Madina Cardiac Center, Adult cardiology, Madinah
[b] King AbdulAziz University, Faculty of Medicine, Jeddah
[c] Cardiology Department, Tanta University

[a,b] Saudi Arabia
[c] Egypt

To the best of our knowledge, there have not been any reports of total transcatheter approach including stenting of severe coarctation of the aorta (CoA), transcatheter aortic valve replacement (TAVR) for concomitant severe aortic valve stenosis, and percutaneous coronary intervention (PCI) to treat significant coronary artery disease in a single patient. We report a 70-year-old female, who presented with uncontrolled hypertension and acute decompensated heart failure (ADHF) and was found to have severe CoA, severe bicuspid aortic valve (BAV) stenosis, and significant proximal left anterior descending (LAD) coronary artery disease. In a multidisciplinary heart team meeting, we decided to perform an endovascular repair of both cardiac and vascular pathologies using a two-stage approach due to the significant comorbidities; mainly uncontrolled hypertension, type 2 diabetes mellitus, chronic obstructive pulmonary disease, and severe calcifications of the ascending aorta. The procedures were successfully performed and the patient was asymptomatic 30 months later at follow-up and was without any significant gradients across the coarctation or the aortic valve.

Keywords: Aortic valve stenosis, Coarctation of aorta, Covered stent, Transcatheter stenting

Introduction

Coarctation of the aorta (CoA) is a circumscribed narrowing of the aorta located at the site of ductus arteriosus insertion distal to the left subclavian artery (LSA). It is a relatively common congenital anomaly which accounts for approximately 5% to 8% of all congenital cardiovascular defects [1]. The clinical presentation

Disclosure: Authors have nothing to disclose with regard to commercial support.

Received 19 November 2017; revised 15 January 2018; accepted 28 January 2018.
Available online 9 February 2018

* Corresponding author at: Madina Cardiac Center, Khaled Ibn Elwaleed Road, 42351 Madinah, Saudi Arabia.
E-mail address: elasfar_egy@hotmail.com (A. Elasfar).

P.O. Box 2925 Riyadh – 11461KSA
Tel: +966 1 2520088 ext 40151
Fax: +966 1 2520718
Email: sha@sha.org.sa
URL: www.sha.org.sa

1016-7315 © 2018 The Authors. Production and hosting by Elsevier B.V. on behalf of King Saud University. This is an open access article under the CC BY-NC-ND license (http://creativecommons.org/licenses/by-nc-nd/4.0/).

Peer review under responsibility of King Saud University.
URL: www.ksu.edu.sa
https://doi.org/10.1016/j.jsha.2018.01.003

Production and hosting by Elsevier

varies from hypertension to symptoms of congestive heart failure (CHF) according to the time of presentation. The presence of refractory hypertension or significant CHF indicates the need for intervention. The available strategies of treatment include surgery and endovascular balloon dilatation with or without stent placement [1,2]. To the best of our knowledge, there have not been any reports of total transcatheter approach, stenting severe CoA, transcatheter aortic valve replacement (TAVR) for concomitant severe aortic valve stenosis, and percutaneous coronary intervention (PCI) to treat significant coronary artery disease (CAD).

Case report

History

A 70-year-old female with a 50-year history of uncontrolled hypertension despite a combination of antihypertensive agents including amlodipine 10 mg, spironolactone 25 mg, losartan 100 mg, and furosemide 40 mg, all used once daily. The patient was referred to our center as a case of acute decompensated heart failure (ADHF) for further workup. On admission, the patient was in severe respiratory distress consistent with the New York Heart Association (NYHA) class III–IV and was orthopneic but fully conscious with normal cognition. Physical examination showed a blood pressure of 153/93 mmHg, a heart rate of 117 beats per minute, a respiratory rate of 28 breaths per minute, and oxygen saturation of 94% on bi-level positive airway pressure ventilation. She had bilateral basal crepitation, bilateral scattered rhonchi, weak delayed femoral pulses, bilateral lower limb edema, raised jugular venous pressure, and loud second heart sound with ejection systolic murmur at the aortic area. Routine blood chemistry and urine analysis were unremarkable.

A chest X-ray revealed cardiomegaly, rib notching, and bilateral pulmonary congestion. Baseline electrocardiography showed left ventricular hypertrophy with a strain pattern. Transthoracic echocardiography showed left ventricular hypertrophy, basal infero-posterior, mid, and basal anterior wall hypokinesia with an ejection fraction of 30%, mild mitral regurgitation, severe aortic stenosis with peak pressure gradient of 118 mmHg and mean pressure gradient of 76 mmHg, and an estimated systolic pulmonary artery pressure of 50 mmHg.

A computed tomography angiogram (CTA) clearly diagnosed severe stenotic calcified concentric 11 mm long aortic coarctation located 16 mm distal to the LSA (Fig. 1A). The diameter of the narrowest part was approximately 3 mm with significant prevertebral and intercostal collaterals. There was bicuspid aortic valve (BAV) type 1 with severe asymmetric diffuse leaflet calcifications, and marked calcifications of the ascending aorta and aortic arch.

Aortography confirmed the diagnosis of severe calcified juxtaductal CoA. There was a 70-mmHg peak to peak gradient across the coarctation, a 90 mmHg gradient across the aortic valve, and the mean left ventricular pressure was 290/26 mmHg. Coronary evaluation demonstrated a significant proximal left anterior descending (LAD) lesion with a fractional flow reserve (FFR) value of 0.78 (Fig. 1B). A significant dilatation of the left internal mammary artery was also noted.

The presence of a high gradient across the coarctation together with the presence of hypertension necessitates a curative treatment. A multidisciplinary heart team of interventional cardiologists, cardiac anesthesiologists, and vascular and cardiac surgeons decided to perform endovascular repair of both cardiac and vascular pathologies using a two-stage approach due to the significant comorbidities, mainly uncontrolled hypertension, type 2 diabetes mellitus, chronic obstructive pulmonary disease, and also the presence of severe calcifications of the ascending aorta.

Procedure

The first stage was performed under conscious sedation with a surgical team on standby. The right common femoral artery (CFA) was chosen as the main access. The stenosis was crossed safely; aortography in anteroposterior (AP) and lateral projections confirmed the critical stenosis (Fig. 1C). A 14F sheath was advanced across the coarctation segment and direct implantation of a covered Cheatham-platinum stent (CP Numed, Canada) sized 39 mm and mounted on Cristal balloon sized 20/40 mm was accomplished. There were good wall apposition and brisk forward flow with no residual gradient across the coarctation segment (Fig. 1D).

One week later and under conscious sedation, TAVR was performed through right CFA access. We put access in the contralateral side as a vascular access bailout. A 14F e-sheath was used for valve deployment. We used a balloon expandable valve (SAPIEN 3 Edwards Life Sciences Inc., Irvine, CA, USA). Valve sizing was conducted according to the computed tomography (CT) measurements that showed an annulus area of