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Case Report

Ambulatory TAVR: Early Feasibility Experience During the COVID-19 Pandemic

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ABSTRACT

The COVID-19 pandemic has modified practice for patients with symptomatic aortic stenosis and could result in higher mortality rates due to treatment delays. In this clinical case series, 3 patients underwent ambulatory transcatheter aortic valve replacement (TAVR) thanks to patient and entourage willingness, careful patient selection (including a history of permanent pacemaker placement), and a minimalist procedural approach. No complications occurred during the 30-day follow-up. Performing ambulatory TAVR could reduce the clinical consequences of wait times, minimize exposure to coronavirus contamination, and reduce the use of hospital resources that might be needed for COVID-19 patients. Thanks to a scrupulous minimalist TAVR protocol, ambulatory outpatient management of aortic stenosis was possible in the context of the COVID-19 pandemic.

RÉSUMÉ

La pandémie de COVID-19 a modifié la prise en charge des patients présentant une sténose aortique symptomatique, et les retards dans les traitements pourraient entraîner une hausse des taux de mortalité. Dans le cadre de cette série de cas cliniques, trois patients ont subi un remplacement valvulaire aortique par cathéter (RVAC) ambulatoire, rendu possible grâce à la volonté des patients et de leur entourage, aux choix consciencieux des candidats (par exemple, les receveurs d'un stimulateur cardiaque implantable) et à une approche comportant des interventions minimales. On n'a observé aucune complication durant les 30 jours du suivi. Le RVAC ambulatoire pourrait atténuer les répercussions cliniques associées au temps d'attente, réduire le risque d'exposition au coronavirus et diminuer l'utilisation des ressources hospitalières, qui pourraient être consacrées aux patients atteints de la COVID-19. Un protocole méticuleux et minimaliste de RVAC a permis la prise en charge ambulatoire de la sténose aortique durant la pandémie de COVID-19.

The availability of limited beds to handle the large volume of coronary and valve interventions promotes outpatient practice, which is even more appealing with the COVID-19 pandemic. This strategy has been proven to be safe and efficient for percutaneous coronary intervention, whereas to our knowledge, only 1 case of same-day discharge after successful transcatheter aortic valve replacement (TAVR) has been described.[1] The purpose of this study was to report on a small series of outpatient TAVR procedures and to provide a protocol to facilitate patient selection for safe and fully ambulatory aortic stenosis care.

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Ethics Statement: The research reported has adhered to the relevant ethical guidelines.

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See page 731 for disclosure information.

Case

An 86-year-old man with chronic obstructive pulmonary disease and a permanent pacemaker implanted 6 months earlier for aortic valve block was admitted for ambulatory TAVR. This elective transfemoral TAVR procedure was performed with the patient under local anaesthesia and optimized using a new virtual reality google system from Deepsen (Saint-Didier-au-Mont-d'or, France) which involves a hypnosis and cardiac coherence algorithm with a 360-cinema screen (Fig. 1A). Only 1 mg of midazolam was given at the beginning of the procedure, with an anaesthesiologist providing close patient supervision throughout. During any painful steps of the procedure (punctures, valve deployment), specific analgesia was provided through the google system by sending additional visual and auditory signals.

Transfemoral vascular access was performed after locoregional block, using an echo-guided puncture technique and a percutaneous suture-based closure device. No central venous access was needed. A 5-French pigtail catheter was introduced via the left dorsal distal radial artery (Fig. 1A). Using a left

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Novel Teaching Points

- The COVID-19 pandemic has generated a deleterious delay in the management of patients with aortic stenosis.
- Ambulatory TAVR is safe in well selected patients.
- A minimalist approach is mandatory to allow same-day discharge.

ventricular Safari[2] XS (Boston Scientific, Marlborough, MA) supportive guidewire, a 26-mm Edwards Sapien valve (Edwards Lifesciences Corp, Irvine, CA) was implanted without predilatation (Fig. 1B). Cardiac standstill was obtained with direct wire pacing at 160 beats per minute for 15 seconds, avoiding the need for temporary right ventricular access and potential complications. The procedure was uneventful. Right femoral closure was assessed using a selective right iliofemoral angiogram and confirmed complete hemostasis without complications. Total procedural time was 43 minutes with 160 mL of contrast media and 47 Gy/cm^2 of dose surface area. The patient was transferred to the post procedure care unit where he underwent iliofemoral Doppler imaging and transthoracic echocardiography, which revealed a mean gradient of 4 mm Hg, an aortic valve area of 1.9 cm^2, and no intra- or paravalvular leak. Telemetry was unremarkable and ambulation was possible and well tolerated 3 hours after the femoral closure. Because the patient met strict criteria for an ambulatory TAVR strategy including no cognitive impairment, adequate social and family support, a previous pacemaker placement, no postprocedural complication, and because he was previously planned and informed for such an approach, he was home-discharged 6 hours after the procedure. A nurse visited him on day 1 and day 7 for clinical follow-up and he was seen in the outpatient clinic 1 month later. No adverse events were noticed.

To date, 3 ambulatory TAVR cases have been performed in our institution without complications in the 30 days post procedure. Baseline characteristics of each patient are described in Supplemental Table S1.

Discussion

This is, to our knowledge, the first report of a small case series of outpatient TAVR procedures. It is of particular interest in the current context of the COVID-19 pandemic, which has generated increased pressure on health care systems around the world. Ambulatory TAVR, in well selected patients and using a minimalist approach,[2] could be a safe option to: (1) reduce the clinical consequences of wait times for TAVR (several studies have shown higher mortality among patients with severe symptomatic aortic stenosis with a delay in treatment)[3]; (2) minimize potential exposure to coronavirus in patients at particularly high risk for clinical deterioration; and (3) reduce the use of hospital resources that might be needed for COVID-19 patients.[4]

In our institution, ambulatory TAVR is offered to patients with selected baseline characteristics, and procedural and postprocedural requirements as listed in Supplemental Table S2. Patients are selected only in situations of adequate social and family support. To avoid post procedural conduction disturbances, previous permanent pacemaker placement is mandatory.

Limitations include the small number of cases performed to date, and restrictive patient selection criteria. On the basis of the national French registry, approximately 15% of patients who undergo TAVR have had a permanent pacemaker placed.[5] This is an important limitation for increased use of ambulatory TAVR procedures. Moreover, this ambulatory strategy could be associated with delayed complications such

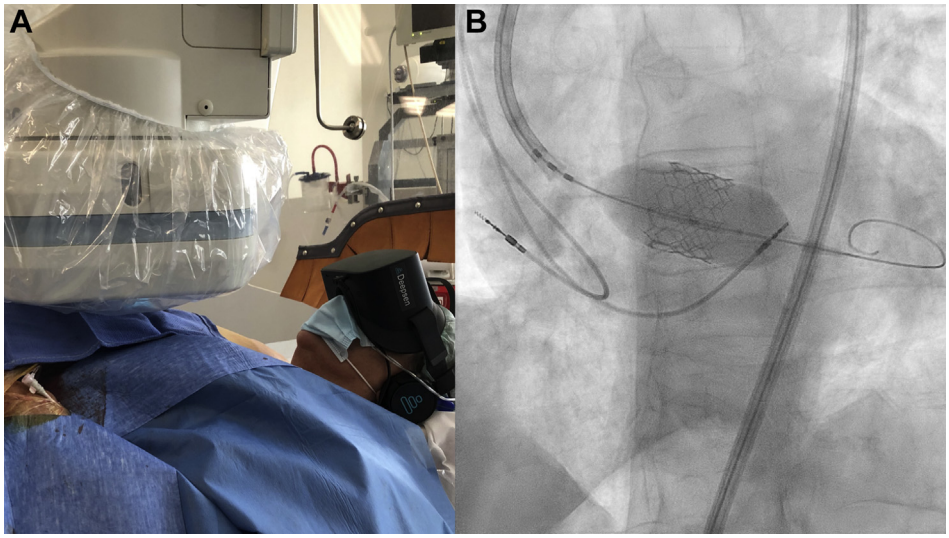

Figure 1. Example of an ambulatory transcatheter aortic valve replacement using a virtual reality google system. (A): Ambulatory transcatheter aortic valve replacement procedural set-up with virtual reality Google system to optimize conscious sedation and the left distal radial approach as secondary access. (B) Direct deployment of an Edwards Sapien 26-mm balloon-expandable valve (Edwards Lifesciences Corp, Irvine, CA) under direct left ventricular rapid pacing at 160 per minute in a patient with a previously placed permanent pacemaker.

as vascular access bleeding, emphasizing the need for careful post procedural monitoring.

Outpatient TAVR procedures are feasible and safe but require careful patient selection and a minimalist procedural approach. Increased adoption of this strategy, particularly during the COVID-19 pandemic, could lead to improve bed-flow efficiency, minimize coronavirus exposure risks, and avoid delays in treatment of severe aortic stenosis. Further studies are needed to confirm these findings.

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Disclosures

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References

1. Généreux P, Demers P, Poulin F. Same day discharge after transcatheter aortic valve replacement: are we there yet? Catheter Cardiovasc Interv 2016;87:980-2.
2. Burzotta F, Aurigemma C, Romagnoli E, et al. A less-invasive totally-endovascular (LITE) technique for trans-femoral transcatheter aortic valve replacement. Catheter Cardiovasc Interv 2020;96:459-70.
3. Elbaz-Greener G, Masih S, Fang J, et al. Temporal trends and clinical consequences of wait times for transcatheter aortic valve replacement: a population-based study. Circulation 2018;138:483-93.
4. Shah PB, Welt FGP, Mahmud E, et al. Triage considerations for patients referred for structural heart disease intervention during the coronavirus disease 2019 (COVID-19) pandemic: an ACC/SCAI consensus statement. Catheter Cardiovasc Interv 2020;13:1607-8.
5. Durand E, Avinée G, Gillibert A, et al. Analysis of length of stay after transfemoral transcatheter aortic valve replacement: results from the FRANCE TAVI registry [e-pub ahead of print]. Clin Res Cardiol https://doi.org/10.1007/s00392-020-01647-4. Accessed September 22, 2020.

Supplementary Material

To access the supplementary material accompanying this article, visit *CJC Open* at https://www.cjcopen.ca/ and at https://doi.org/10.1016/j.cjco.2020.08.005.