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Transcatheter aortic valve implantation in a patient with two severe conditions: aortic stenosis and colon cancer

Implante transcater de válvula aórtica em paciente com duas malignidades: estenose aórtica e câncer de cólon

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ABSTRACT – An octogenarian female patient, admitted for heart failure secondary to severe aortic stenosis decompensated by atrial fibrillation, with a high ventricular response. When clinically compensated, she was discharged on oral anticoagulation with a direct-acting anticoagulant, for outpatient scheduling of a transcatheter implantation of aortic valve bioprosthesis. She was readmitted early due to low digestive bleeding secondary to locally advanced stenosing colon cancer. After discussion with the Heart Team and the oncology team, a transcatheter implantation of aortic valve bioprosthesis was the treatment chosen, followed by a colectomy 1 week later. She evolved clinically stable with early discharge from hospital, on oral anticoagulation with a direct-acting anticoagulant. In the 6-month follow-up, she remained asymptomatic from the cardiovascular point of view and with no recurrence of the low digestive tract bleeding.

Keywords: Bioprosthesis; Heart valve prosthesis implantation; Transcatheter aortic valve replacement; Aortic valve stenosis; Colonic neoplasms

RESUMO – Paciente octagenária, admitida por insuficiência cardíaca secundária à estenose aórtica severa descompensada por fibrilação atrial de alta resposta ventricular. Compensada clinicamente, recebeu alta hospitalar em uso de anticoagulação oral com anticoagulante de ação direta para programação ambulatorial de implante de bioprótese aórtica transcater. Foi readmitida precocemente por sangramento digestivo baixo secundário à neoplasia de cólon estenosante localmente avançada. Após rediscussão com *Heart Team* e oncologia, optou-se por implante de bioprótese aórtica transcater, seguida de colectomia após 1 semana. Evoluiu clinicamente estável com alta hospitalar precoce em uso de anticoagulação oral com anticoagulante de ação direta. No segmento de 6 meses, manteve-se assintomática do ponto de vista cardiovascular e sem recorrência de sangramento digestivo baixo.

Descritores: Bioprótese; Implante de prótese de valva aórtica; Substituição da valva aórtica transcater; Estenose da valva aórtica; Neoplasias do colo

INTRODUCTION

With population aging, some diseases, such as degenerative aortic stenosis (AS) and cancer have an impact on quality of life and mortality. It is a challenge for the multidisciplinary team to treat patients diagnosed with severe AS and cancer. Symptomatic AS has a high mortality rate if a surgical intervention is not performed. Often, surgical aortic valve replacement is contraindicated, and more recently, a less invasive transcatheter treatment is an alternative to be considered for these patients.

The transcatheter aortic valve implantation (TAVI) procedure was performed for the first time in 2002, by Cribier et al.,¹ as an alternative option for patients at prohibitive risk for open surgery.^{1,2} The first robust evidence obtained with the PARTNER 1B study³ demonstrated that, in patients at prohibitive surgical risk, TAVI was superior to the clinical treatment, with a 1-year mortality of 30.7% versus 50.7% with drug treatment.

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Since then, studies on all risk profiles (PARTNER 1A, PARTNER 2 and PARTNER 3)⁴⁻⁶ have shown that TAVI and conventional surgical valve replacement are equivalent, and the choice between the types of therapeutic procedure should be shared, respecting the preference of the patient, with an understanding of the risks and the knowledge gaps (durability of the transcatheter prosthesis), and considering individual anatomical and clinical characteristics.

According to guideline recommendations,^{7,8} TAVI is recommended for patients with a life expectancy greater than 1 year. In the context of the associated oncological disease, the involvement of a specialist is essential to define the cancer staging and the estimated life expectancy.

Figure 1. Colonoscopy showing a vegetating lesion in the sigmoid colon.

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CASE REPORT

An 81-year-old female patient hospitalized for heart failure secondary to severe AS, decompensated by paroxysmal atrial fibrillation, with high ventricular response, and no hemodynamic instability. Clinical stabilization was successfully achieved with intravenous furosemide, and rhythm control with amiodarone. The transthoracic echocardiogram revealed a hypertrophic left ventricle, with preserved systolic function, aortic valve area of 0.9cm² and a maximum/medium transvalvular gradient of 70/41mmHg. A computed tomography angiography (CTA) performed during the same admission showed coronary arteries with no significant obstructive lesions. After clinical stabilization and oral anticoagulation, she was discharged from hospital, for a scheduled percutaneous treatment of AS, due to intermediate surgical risk (Society of Thoracic Surgeons – STS – risk score of 7.2% for mortality and 23.3% for morbidity or mortality).

She was readmitted after 15 days, due to moderate low gastrointestinal tract bleeding. Its investigation revealed a vegetating lesion in the sigmoid colon (Figure 1), obstructing 75% of intestinal lumen. The pathological examination confirmed a moderately differentiated adenocarcinoma, and a positron emission computed tomography scan revealed that it was a locally advanced tumor with no distant metastases (Figure 2).

Figure 2. Positron emission computed tomography scan showing absence of extraintestinal marker uptake by metastatic foci.

In a multidisciplinary team discussion, the cardiovascular risk was defined as high for the non-cardiac surgery due to severe symptomatic AS. The oncology team defined an early stage cancer (pT2pN0 – EC 1), with prospects for curative surgical treatment, with no indication for adjuvant chemotherapy, with an estimated 5-year survival of over 80%. The transcatheter aortic valve implantation was followed by tumor resection at the same hospital stay.

In preoperative exams, an aortic valve area of 4.55cm^2 was visualized on CTA (Figure 3), with a good distance between the coronaries and the valve plane (right coronary at a distance of 15.3mm, and left coronary at a distance of 18.1mm). In addition, the femoral arteries had parietal calcifications, without significant luminal reductions and with satisfactory diameters for TAVI via femoral approach (Figure 4).

Figure 3. Measurement of the aortic valve area of 4.55cm^2 .

Based on the robust evidence of using the Edwards SAPIEN 3 prosthesis, and the measurement of the aortic annulus in a three-dimensional CTA image, we chose to implant a 26-mm Edwards SAPIEN 3 prosthesis with an oversize of approximately 11%, and an insufflation of 22.5mL (0.5mL less than the nominal fill volume – underfilling).

A minimalist TAVI procedure was performed (under conscious sedation and local anesthesia), with central venous access via the right femoral vein (RFV) with a 6F introducer for the implantation of a 5F temporary transvenous pacemaker (TTVP), and as a route of medication administration, and with arterial access via right femoral artery (RFA) using a 7F introducer with a 0.018" (V18) guidewire positioned contralaterally to protect the left iliofemoral territory. The left femoral artery (LFA) was punctured with an 14F eSheath introducer for the insertion of the aortic prosthesis. The aortic valve was crossed with an AL1 catheter and a straight-tipped 0.035" teflon guide. A 0.035" Safari Small guidewire was positioned in the left ventricle. Aortic valvuloplasty was performed with a 23-mm balloon (with 19mL) under TTVP stimulation. Next, a 26-mm Edwards SAPIEN 3 bioprosthesis with 22.5mL was implanted (Figure 5). Follow-up angiography and echocardiography demonstrated the absence of aortic insufficiency. The TTVP was removed and, finally, LFA hemostasis was achieved using two ProGlide® devices, RFA hemostasis with Angio-Seal™, and RFV hemostasis with manual compression. The post-procedure echocardiography revealed preserved left ventricular function, absence of periprosthetic leak and maximum/medium transvalvular gradient of 10/4.5mmHg, with a 2.56cm^2 aortic valve area.

The patient was discharged from the intensive care unit within 36 hours, with only post-TAVI aspirin administration maintained during cancer surgery. After 7 days of

Figure 4. Computed tomography angiography with protocol for transcatheter implantation of aortic valve bioprosthesis. (A) Visualization of the iliofemoral territory with little tortuosity and parietal calcification. (B) Detail of the bifurcation, showing more pronounced calcification at the origin of the right common iliac artery. The left transfemoral route was chosen for the procedure.

TAVI, retroperitoneal lymphadenectomy and descending colon resection with primary anastomosis were performed. She was discharged after 72 hours on oral anticoagulation with a 30mg daily dose of edoxaban (due to paroxysmal atrial fibrillation, with an enlarged left atrium in a patient with valve prosthesis). The electrocardiogram at 20 days post-TAVI showed sinus rhythm, with a PR interval of 198ms, and a narrow QRS complex (Figure 6). After 6 months, the patient evolved asymptomatic from the cardiovascular point of view, with her usual bowel movements and no bleeding.

Figure 5. Final aortography after transcatheter implantation of a 26-mm Edwards SAPIEN 3 aortic valve. There was no central or periprosthetic aortic regurgitation.

Figure 6. Electrocardiogram on the 20th day after percutaneous implantation of aortic valve bioprosthesis. Sinus rhythm, normal PR interval of 198ms, and narrow QRS complex.

DISCUSSION

Despite recent evidence in lower-risk patients, national and international guidelines still recommend TAVI in higher-risk patients (class I at high risk and class IIa

at intermediate risk). Interestingly, classic surgical risk scores, such as STS, may not adequately classify these patients, and the clinical team should use frailty scale scores and the patient's overall assessment to decide on the valve therapeutic approach. With the expansion of TAVI, the oncological diagnosis in patients with AS can occur during the planning of TAVI by means of the computed tomography angiography, which is essential for planning the transcatheter procedure.

The TOP-AS study⁹ compared the treatment of severe AS using TAVI in patients with active cancer (222 patients) versus non-cancer patients (2,522 patients) and showed similar mortality rates in both groups in 30 days. In the long term (1 year), the mortality rate of the cancer group was higher (14.8% versus 9.4%; $p < 0.001$), and 75% of these deaths in the cancer group were due to a non-cardiovascular cause. Periprocedural complications (cerebrovascular events, hemorrhagic events, vascular complications, need for a pacemaker, or renal failure) were comparable between groups, as well as in-hospital and 30-day mortality rates. In patients who survived 1 year after TAVI (85%), one-third were in remission or cured of cancer. In terms of valve function and symptomatic improvement, the benefits were significant and similar in both groups. Approximately half of all cancer patients treated with TAVI were in New York Heart Association (NYHA) functional class I within 30 days, and the benefit persisted for 1 year. Severe untreated symptomatic AS, besides implying a poor prognosis, may have an impact on the choice of specific cancer treatment, and major surgeries, sometimes curative, may be cancelled or not performed, or the chemotherapy regimen may be changed, for fear of worsening cardiac function.

In the scenario of a patient with cancer and severe AS, it is difficult to predict the individual response of each patient to treatment procedures, such as cancer surgery and chemotherapy. In this context, the participation of the oncologist is essential to assess the cancer staging and probable response to the treatment. In addition to the evaluation of the Heart Team, the indication of a customized and safe surgical intervention for severe AS is possible.

In the case presented here, the patient was diagnosed with cancer while investigating a complication related to the use of oral anticoagulants. The identification of cancer brought up the reflection: to perform the surgical excision of a locally advanced cancer, with the possibility of cure, but assuming a high surgical risk due to severe AS, or perform TAVI first, accepting an increased risk of bleeding from the oncological disease? In view of the questioning and based on recent studies,^{10,11} which demonstrated the benefit of TAVI in patients in the early stages of cancer and with life expectancy >12 months, TAVI was performed followed by cancer surgery. Certainly, the treatment of severe AS minimizes the risk of a major cancer surgery. Therefore, this patient fits into the early stage cancer group that benefits from TAVI as much as patients without a diagnosis of cancer.

As to the management of the post-TAVI antithrombotic regimen, it was decided for an early start in 72 hours of oral anticoagulation with a direct thrombin inhibitor (edoxaban at a dose of 30mg per day), since the patient had a high thrombotic risk due to atrial fibrillation (CHADS₂=2, CHA₂DS₂VASc=4), enlarged left atrium and aortic valve bioprosthesis.

Even considering that the most recent evidence discussed here is registry data and should be considered as resources for raising hypotheses, it is clear that we should not exclude cancer patients from this AS treatment modality.

CONCLUSION

The multidisciplinary approach has the potential to benefit elderly patients with multiple comorbidities and multifactorial symptoms, improving survival rates and quality of life.

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None.

DECLARAÇÃO DE CONFLITOS DE INTERESSE

The authors declare there are no conflicts of interest.

CONTRIBUTION OF AUTHORS

Conception and design of the study: MSRS, CB; data collection: MSRS, SD, CB; data interpretation: MSRS, SD, CB; writing of the text: MSRS, SD, CB; approval of the final version to be published: MSRS, MMR, PB, CVES, CB.

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