Clinical outcomes in heart transplant recipients with coronary abnormalities in the donor graft

Resultados clínicos en pacientes receptores de trasplante cardiaco con anomalías coronarias del injerto

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To the Editor,

Congenital coronary abnormalities occur in approximately 1% of the general population. Around 20% of these abnormalities are symptomatic or can lead to severe outcomes, such as exercise-induced arrhythmias, syncope on exertion, cardiac arrest, or myocardial infarction.[1] Anatomical features associated with evidence of myocardial ischemia include an origin of the left coronary artery in the opposite sinus of Valsalva, an interarterial course of the affected artery, ostial stenosis, and a long intramural course.[2] The treatment of coronary abnormalities should be individualized and tailored to the specific risk of each patient.[3]

A coronary artery abnormality in the donor heart is a rarely detected occurrence in heart transplant (HT) recipients, and reports are limited to isolated cases without long-term follow-up.[4,5] The abnormality is usually diagnosed by postoperative coronary artery angiography.[6] It remains unknown if the presence of coronary abnormalities in the donor

heart can have a negative impact on the clinical course of HT recipients and, more specifically, if this situation increases the risk of graft vascular disease (GVD).

The aim of this study was to describe long-term clinical outcomes in HT recipients of a donor heart with a coronary abnormality. We performed an observational retrospective analysis of the consecutive series of patients aged ≥ 18 years who underwent HT at our center from 1 January 2000 to 15 December 2021. The local research ethics committee approved the research protocol, and patients gave written informed consent.

During the study period, 541 adult patients underwent HT at our center. Our clinical protocol does not stipulate routine coronary angiography before admission of donor organs. In addition, no coronary artery abnormalities were detected during surgical extraction because the abundance of epicardial fat usually obscures the segments close to the coronary arteries. HT recipients at our center are scheduled for invasive coronary angiography approximately 1 month after surgery to exclude donor coronary disease, followed by a repeat examination after 1 year to assess the presence of GVD and subsequent examinations every 5 years.

A coronary artery abnormality in the donor heart was detected in 7 HT recipients (1.3%). The baseline clinical characteristics and long-term clinical course of these patients are summarized in table 1. Median patient age at the time of HT was 54 years [interquartile range, 49-69 years], and 4 (57%) were men.

All coronary artery abnormalities were detected during the first year after the transplant procedure, and the median interval between HT and diagnosis was 3.5 months [1.1-5.2 months]. All patients were asymptomatic at the time of diagnosis. In all patients, the defect was an anomalous aortic origin of a coronary artery. In 3 patients (43%), the abnormal coronary artery had an interarterial course and was therefore classified as high-risk (patients 2, 4, and 6). Median follow-up after diagnosis was 6.0 years [3.8-20.2 years].

The group of patients with low-risk coronary abnormalities (patients 1, 3, 4, and 7) were not systematically tested for ischemia and received no specific therapeutic intervention. These patients had an excellent prognosis. No deaths were recorded in this subgroup during the follow-up period, which ranged from 5 to 20 years. Only 1 low-risk patient (patient 7) developed GVD.

In 2 of the 3 patients with a high-risk interarterial coronary course (patients 2 and 6), risk was stratified by means of stress echocardiography. In patient 2, the circumflex artery had an abnormal origin in the right coronary sinus of Valsalva. Stress echocardiography was negative for inducible ischemia. The patient died suddenly at home after 3.8 years of follow-up. The cause of death could not be determined; however, the patient had a poor clinical course after the HT surgery, with several episodes of acute cellular rejection and late development of symptomatic graft dysfunction characterized by restrictive ventricular filling.

In patient 6, the left and right coronary arteries both originated in the right coronary sinus of Valsalva, with each having an independent coronary ostium. The left coronary artery followed an interarterial course. Over 13 years of follow-up, the patient developed severe GVD with 90% stenosis in the left coronary trunk. Multiple stress echocardiography tests showed good functional capacity (> 10 metabolic equivalents) and mild inducible ischemia (< 2 segments) in the anterior descending artery territory. On the basis of these findings, the decision was taken to manage the patient conservatively. The patient has remained symptom free and with good functional capacity for more than 20 years since the HT surgery.

None of the 7 patients developed left ventricular systolic dysfunction. GVD was detected in 2 of the 7 patients, representing a total cumulative incidence of 29% in this cohort, similar to the rate in the general population of HT recipients.

In summary, this is the first long-term follow-up study of HT recipients of donor organs with coronary abnormalities.

This small study indicates that, in most cases, coronary abnormalities in the donor heart are benign, can be treated conservatively, and do not appear to negatively impact long-term clinical outcomes in HT recipients.

Our findings need to be confirmed in larger, prospective studies. In the absence of specific recommendations, the clinical treatment of coronary abnormalities in HT recipients requires a multidisciplinary and individualized approach.

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AUTHORS' CONTRIBUTIONS

P. Fernández de-Aspe: conceptualization, research, methodology, statistical analysis, project administration, supervision, writing (first draft), redrafting, editing and revision, validation. E. Barge-Caballero: conceptualization, research, methodology, project administration, resource management, supervision, redrafting, editing and revision, validation. G. Aldama-López: conceptualization research, methodology, project administration, supervision, redrafting, editing and revision, validation. L. Fernández-Arias: project administration, supervision, redrafting, editing and revision, validation. J. Manuel Vázquez-Rodríguez: methodology, project administration, supervision, redrafting, editing and revision, validation. M.G. Crespo-Leiro: conceptualization, research, methodology, project administration, resource management, supervision, redrafting, editing and revision, validation.

CONFLICTS OF INTEREST

None to declare.

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Table 1. Baseline characteristics and clinical outcomes in heart transplant recipients of a donor organ with a coronary abnormality

Patient	Age, y	Sex	Coronary abnormality	Coronary stenosis during follow-up	GVD (grade)	Duration of follow-up, y	LVEF, %	Stress echocardiography	NSTEACS	Death
1	69	Male	CxA originating in the RCA ostium (retroaortic course)	No obstructive coronary disease	0	20.2	82	Not done	No	No
2	70	Male	CxA originating in the right CSV (interarterial course)	No obstructive coronary disease	0	3.8	64	Negative for inducible ischemia	No	Sudden death at home
3	49	Female	RCA originating in the left CSV (prepulmonic course)	No obstructive coronary disease	0	6.0	60	Not done	No	No
4	53	Male	CxA originating in the RCA ostium (retroaortic course)	No obstructive coronary disease	0	5.4	70	Not done	No	No
5	54	Female	RCA originating in the left CSV (interarterial course)	No obstructive coronary disease	0	1.3	60	Not done	No	No
6	57	Male	LCA originating in the right CSV (interarterial course)	90% stenosis of the LCT	3	21.1	68	Mild inducible ischemia in the ADA territory (1 segment)	No	No

Table 1. Baseline characteristics and clinical outcomes in heart transplant recipients of a donor organ with a coronary abnormality

Patient	Age, y	Sex	Coronary abnormality	Coronary stenosis during follow-up	GVD (grade)	Duration of follow-up, y	LVEF, %	Stress echocardiography	NSTEACS	Death
7	48	Female	ADA originating in the RCA ostium (prepulmonic course)	100% stenosis of the OMB1 (donor coronary disease). 95% stenosis of the mid RCA 10 years after HT	2	13.4	75	Performed after observation of OMB1 Occlusion: Negative for inducible ischemia	NSTEACS 10 years after HT: 95% stenosis of the mid RCA (stent implanted in mid RCA)	No

ADA, anterior descending artery; CSV, coronary sinus of Valsalva; CxA, circumflex artery; GVD, graft vascular disease; HT, heart transplant; LCA, left coronary artery; LCT, left coronary trunk; LVEF, left ventricular ejection fraction; NSTEACS, non-ST-segment elevation acute coronary syndrome; OMB1, first obtuse marginal branch; RCA, right coronary artery.