

Left Internal Thoracic Artery Fistula to the Bronchial Artery: a Rare Cause of Coronary Flow Theft

Fístula da Artéria Torácica Interna Esquerda para a Artéria Brônquica: uma Causa Rara de Roubo de Fluxo Coronariano

Marcela Gomes de Souza¹, Alice Mirane Malta Carrijo¹, Vinicius Ferreira Aratani¹, Flávia Bittar Britto Arantes¹

¹School of Medicine, Federal University of Uberlândia, Uberlândia, MG, Brazil.

Introduction

The left internal thoracic artery (LITA) fistula to the pulmonary artery (PA) and/or its branches is a rare condition that was first described in 1947 by Burchell and Clagett¹ and can be acquired or congenital.² Its etiologies include, trauma, infection, neoplasms, and mainly myocardial revascularization surgery (MRS).^{2,3} The surgical manipulation of the intrathoracic vessels during MRS may predispose a patient to postoperative LITA fistulization to the PA, causing coronary flow leakage and myocardial ischemia. LITA should be considered an etiological diagnosis in cases of persistent angina after MRS.^{2,4} Its diagnosis requires coronary cineangiography,⁵⁻⁷ and its treatment options include conservative drug therapy, surgical ligation, or endovascular intervention.⁸

Case report

Our patient was a 75-year-old man with hypertension, dyslipidemia, and chronic obstructive pulmonary disease (COPD). He was a former smoker with a 60 pack-year smoking history.

In 2014, the patient developed unstable angina that required surgical intervention and MRS with LITA grafts to the anterior interventricular artery (AIA) and bypass to the right coronary artery (RCA), which was uneventful.

Five years later, he developed dyspnea on mild exertion, and a physical examination detected a nodule at the apex of the left lung. The patient then underwent a lobectomy and was diagnosed with lung adenocarcinoma with no need for complementary therapy. A dry cough and dyspnea developed eight months after surgical resection, and an examination identified a substernal goiter and heterogeneous thyroid. Thus, the patient underwent tumor resection in the mediastinum, pleurectomy via right laparoscopy, and thoracotomy with closed pleural drainage.

After two months, he presented with new complaints of dyspnea and chest pain on moderate and mild exertion. Pharmacological stress echocardiography showed transient

hypokinesia of the left ventricular anterior wall. Coronary computed tomography (CT) angiography showed an arterial fistula originating from the LITA following the lateral wall of the heart (Figure 1).

An angiographic study of the LITA confirmed the presence of a fistula to the left bronchial artery with hemodynamic repercussions due to blood flow deviation in the AIA (Video 1).

The patient underwent percutaneous embolization with Onyx polymer and the release of six Axium micro-coils (Medtronic) into the fistular tract via the left radial approach using a modified Seldinger technique.

LITA angiography was performed with an introducer and a 6F guide catheter guided by a 0.35/180 guidewire. A Marathon microcatheter (Medtronic) was navigated with a 0.010 Transend micro-guidewire® (Stryker) to the distal branch of the LITA, followed by polymer injection to occlude it distally. Subsequently, an Echelon 10 microcatheter (Medtronic) guided by a 0.014" guidewire was navigated to the proximal portion of the branch feeding the fistula for embolization, trapping, and micro-coil release. The blood flow was immediately restored from the LITA to the AIA, and the anastomosis was preserved (Video 2). The procedure was successfully performed, and the patient was discharged without complications, remaining asymptomatic in the early follow-up.

Discussion

The use of LITA as a conduit for MRS is widespread due to its higher patency rate than saphenous vein grafts.^{6,9} The occurrence of fistulas has become a relevant issue due to the number of MRS procedures performed in the modern era since the manipulation of intrathoracic vessels generates anatomical and inflammatory changes that can predispose patients to this condition.³

The incidence of LITA-PA fistulas after MRS is rare, 0.67–0.93%, with a mean of five years and an interval of presentation of two months to 13 years.^{4,10} People with pneumopathies and men are more susceptible to fistula formation.^{5,6,11,12}

Conditions that predispose patients to fistular tract formation include pleural and/or lung parenchyma lesions, incomplete ligation of the intercostal branches of the LITA, electrocautery use, and surgical site infection.^{5,6,8} Some studies suggest prophylaxis through careful LITA dissection in addition to covering it with a pericardial flap.^{5,6,11,12}

Patients may present with dyspnea, but angina is the most commonly reported symptom.⁶ From a pathophysiological perspective, there is a pressure difference between the vessels,

Keywords

Arteries; Case report; Coronary vessel anomalies; Coronary vessels; Diagnostic imaging; Fistula.

Mailing Address: Flávia Bittar Britto Arantes •

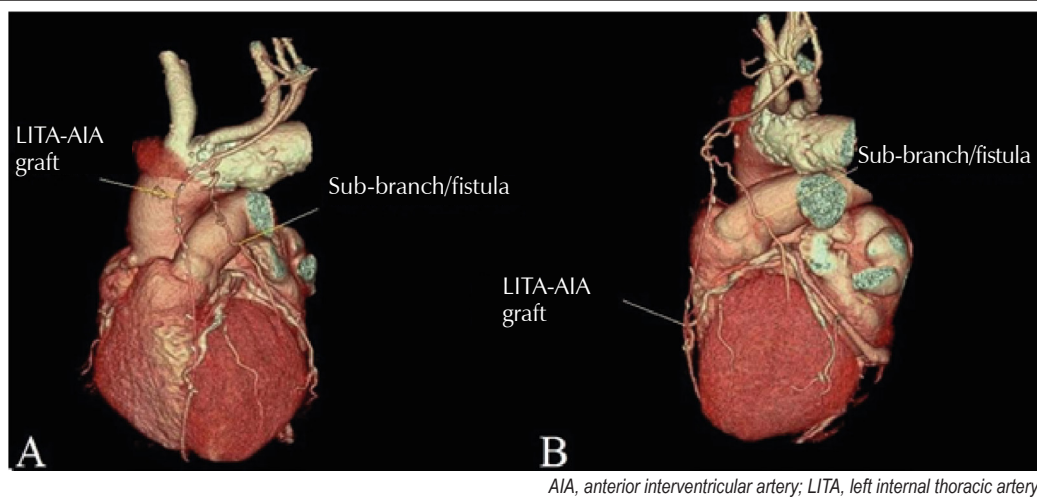
Avenida Pará, 1.720 – Umuarama. CEP: 38400-902 – Uberlândia, MG, Brazil.
E-mail: flaviabittar@hotmail.com

Manuscript received 6/4/2021; revised 20/4/2021; accepted 12/5/2021

DOI: 10.47593/2675-312X/20213403eabc303

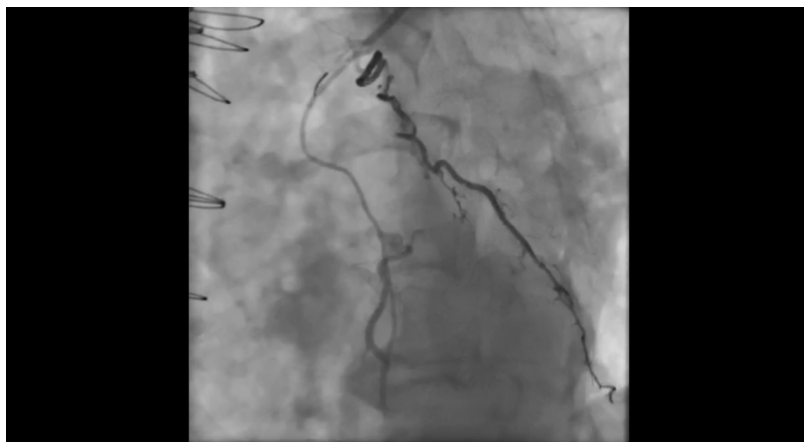


Case Report



AIA, anterior interventricular artery; LITA, left internal thoracic artery.

Figure 1 – Coronary computed tomography angiography showing a patent branch of the left internal thoracic artery toward the lateral wall of the left ventricle with distal tapering. (A) Anterior view. (B) Lateral view.



Video 1 – Coronary cineangiography showing the coronary flow theft.



Video 2 – Angiography of the left internal thoracic artery showing fistula occlusion by the Onyx polymer and flow restoration to the left internal thoracic artery.

with blood diversion from the LITA to the PA that decreases the flow from the arterial graft to the coronary artery. This results in the symptoms of myocardial ischemia, congestive heart failure, endarteritis with a continuous murmur, and malignant arrhythmia.³

Cardiac catheterization with selective angiography is considered the most appropriate and useful test for providing a differential diagnosis in cases of new coronary artery disease or graft occlusion in patients with a history of myocardial revascularization.⁵⁻⁷ Furthermore, CT angiography can delineate the course of the fistula and show its anatomical characteristics.¹³

Treatment options vary in the literature, with reports of native coronary bed angioplasty or the need for a new MRS.¹⁴ Endovascular therapy is a first-line alternative⁸ that is highly effective at occluding vessels and can be considered when fistula anatomy is feasible.⁵ Asymptomatic patients with small fistulas or those who are surgical candidates can be managed clinically. However, symptomatic patients with large-flow shunt fistulas or who develop angina, hemoptysis, or pulmonary hypertension should undergo invasive treatment to avoid complications.⁵

As the patient reported here was symptomatic and had a history of multiple chest approaches, endovascular therapy

was chosen for being minimally invasive and favorable due to the anatomy of the fistula, sparing the patient the risks of a new thoracotomy.

Although uncommon, the occurrence of LITA-PA fistula can be considered in cases of persistent angina after MRS due to the number of MRS procedures performed in the modern era and the preference for LITA as a graft. Symptoms are usually caused by coronary flow theft. Coronary cineangiography is the diagnostic method of choice and can aid in the choosing of the best management. With more advanced techniques, endovascular therapy has been well described as treatment, especially in symptomatic patients with a favorable anatomy.

Authors' Contributions

Research conception and design, data collection, data analysis and interpretation, and manuscript writing: MGS, AMMC, VFA, and FBBA; critical review of the manuscript for important intellectual content: FBBA.

Conflict of interest

The authors have declared that they have no conflict of interest.

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