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Acute myocardial infarction in rare case of dextrocardia and situs solitus - recognizing the acute ischemic syndrome in the midst of the COVID-19 pandemic

Infarto agudo do miocárdio em raro caso de dextrocardia e *situs solitus* – reconhecendo a síndrome isquêmica aguda em meio à pandemia por COVID-19

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ABSTRACT – The reduction of care for acute coronary syndrome during the COVID-19 pandemic is recognized. We describe a case of a patient with dextrocardia and *situs solitus*, a rare condition that occurs in adults in up to 1:900 thousand cases, admitted due to acute coronary syndrome in the context of paroxysmal atrial fibrillation. Some of the particularities of the congenital condition are described, such as epidemiology, associated structural abnormalities, and the strategy to perform the examination, as well as the discussion of anti-aggregation and anticoagulation therapies, given the concomitance with arrhythmia.

Keywords: Coronavirus infections; COVID-19; SARS-CoV-2; Myocardial infarction; Dextrocardia; Septal heart defects

RESUMO – É reconhecida a redução dos atendimentos à síndrome coronariana aguda durante a pandemia por COVID-19. Descrevemos um caso de paciente com dextrocardia e *situs solitus*, rara condição que ocorre em adultos em até 1:900 mil casos, admitido por síndrome coronariana aguda em contexto de fibrilação atrial paroxística. Descrevem-se algumas das particularidades da condição congênita, como epidemiologia, anormalidades estruturais associadas e a estratégia de realização do exame, bem como discussão de antiagregação e anticoagulação, dada a concomitância com a arritmia.

Descritores: Infecções por coronavírus; COVID-19; SARS-CoV-2; Infarto do miocárdio; Dextrocardia; Defeitos dos septos cardíacos

INTRODUCTION

Coronary artery disease (CAD) is one of the leading causes of death worldwide,¹ and its occurrence is related to population aging, prevalence of comorbidities, and genetic factors.² The acute presentation of coronary artery disease, acute myocardial infarction, and unstable angina, have important prognostic implications.³ In the current context of the pandemic caused by COVID-19, a reduction in acute coronary syndrome (ACS) care has been documented,⁴ with repercussions on overall mortality, percutaneous coronary intervention (PCI) results, and long-term outcomes. The evolution of diagnostic and therapeutic techniques, in turn, has allowed an increase in longevity and the documentation of diseases previously uncommon with aging, such as the association of congenital disorders with acquired conditions. Within this context, we describe a rare case of an elderly man with *situs solitus* and dextrocardia, a congenital heart disease of unusual occurrence, admitted in the course of ACS. This study was approved by the Research Ethics Committee of *Santa Casa de Misericórdia da Bahia*, protocol 4.362.104 and CAAE 39243520.4.0000.5520.

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CLINICAL CASE

A 65-year-old male patient, hypertensive, diagnosed as dextrocardia, family history of CAD, paroxysmal atrial fibrillation (AF), on rivaroxaban, candesartan/felodipine, bisoprolol, spironolactone, and amiodarone. He was admitted to a tertiary cardiology hospital with epigastric pain in the anterior region of right hemithorax associated with sweating, which initiated on June 11, 2020 at 11:30 am. He sought medical assistance and went to the emergency room 30 minutes after the onset of symptoms. For epidemiologi-

cal purposes, it is worth mentioning that the city of Salvador (BA) was then facing the peak of COVID-19 pandemic.

The electrocardiogram upon admission (Figure 1) showed sinus rhythm, with ST-segment elevation in V1 and AVR, and ST-segment depression in other leads. Upon examination, heart rate of 62 bpm, blood pressure of 133/80mmHg, with no other major findings.

The patient was referred to emergency coronary cineangiography (Cine), which showed dextroposition (*situs solitus*) and a severe proximal lesion of the left anterior descen-

Figure 1. 12-lead electrocardiogram.

Figure 2. Coronary cineangiography and percutaneous coronary intervention. (A) Dextroposition. (B/C) Severe proximal lesion of the left anterior descending artery. (D) Result of percutaneous coronary intervention with stent placement.

ding artery (Figure 2). Percutaneous coronary intervention was performed with the implantation of two drug-eluting stents. The echocardiogram showed an ejection fraction of 49% and slight apical and medium hypokinesia of the septal wall. A 12.79mcg/L troponin peak was recorded. With stable progression, the patient was discharged from hospital on the third day, on acetylsalicylic acid and clopidogrel; rivaroxaban was replaced by apixaban; other medications were maintained.

DISCUSSION

The patient described presented with a cardiac area in right hemithorax, with its apex rotated to the right. No associated congenital anomalies were identified. Cine was performed as an emergency procedure, due to the suspicion of high-risk ACS (electrocardiographic pattern with ST-segment elevation in aVR, with depression in multiple leads. In patients with suggestive symptoms, it should be conducted as equivalent to ACS with ST-segment elevation).³

The condition of the heart rotated to the right in the thorax is described as dextrocardia. The most frequent type of dextrocardia occurs in the situation described as *situs inversus*, in that the main lobe of the liver, the venous atrium, and the suprahepatic segment of the inferior vena cava are on the left side of the body.⁵ The incidence of dextrocardia associated with situs inversus in the general population is 1:10 thousand, while that associated with *situs solitus* is 1:30 thousand in live births, and only 1:900 thousand in the adult population.⁶

In *situs solitus*, a normal configuration of the viscera is observed, such as stomach on the left and liver on the right. Some authors have described the association of dextrocardia with *situs solitus* as dextroversion, but others reserve the term “dextroversion” for situations in which the rotation of the heart to the right is due to extracardiac causes, such as hypoplasia of the right lung, right pneumectomy, or diaphragmatic hernia.⁵

Dextroversion is the second most common type of dextrocardia. Its prevalence is approximately 1:30 thousand in the general population.^{5,7} The dextroversion process results from a failure in the final rotation of ventricles to the left during embryogenesis. In these cases, the right chambers continue to the right and are located dorsally to the left chambers. Dextroversion is often associated with other congenital cardiac anomalies, such as anomalous pulmonary vein drainage, single ventricle, tetralogy of Fallot, septal defects, pulmonary stenosis, coarctation of the aorta, and corrected transposition of the great arteries. Only 10% of cases of dextroversion do not present other associated congenital heart diseases, as in the case reported.^{5,7}

The risk of coronary atherosclerosis in dextrocardia is similar to that of the general population.^{8,9} Performing Cine and PCI in dextrocardia can pose some challenges. The double inversion technique proposed by Goel¹⁰ to normalize images as mirror images is a useful tool, especially in

cases of dextrocardia with *situs inversus*. The femoral approach, and later the right or left radial approach, proved to be adequate for performing the procedures.¹⁰ In the case reported, Cine and PCI were performed by the radial approach, since it is the preferred route of the organization, and it has been proven to reduce cardiovascular outcomes in the context of ACS.¹¹

Some studies in the literature aimed to answer the question of which would be the best antiplatelet and anticoagulant regimen in patients with ACS and AF, or AF patients who require a drug-eluting stent in stable CAD.¹²⁻¹⁴ There is a need to reduce thrombotic events, especially in the scenario of ACS; however the risk of hemorrhagic events cannot be neglected. In most patients with ACS and AF, double antiplatelet therapy is maintained in the hospital phase, and upon discharge, use of clopidogrel plus oral anticoagulant is maintained, ideally with direct action, for one year. After this period, the use of oral anticoagulant alone is suggested.¹⁴

In cases with a high risk of thrombotic events, with many stents implanted, in the context of ACS, the use of double antiplatelet therapy for 30 days, associated with oral anticoagulant is considered, and subsequently, clopidogrel and oral anticoagulant are maintained for up to one year.¹⁵ This last strategy was the proposal for the patient in question. Recently, a sub-analysis of the AUGUSTUS study was presented at the American College of Cardiology (ACC) 2020, which evaluated the risk/benefit ratio of antithrombotic therapy in AF and ACS patients, suggesting a shared, patient-focused evaluation to verify the time of use of acetylsalicylic acid in this scenario. The analysis identified that there is no benefit in extending the use of acetylsalicylic acid for more than 30 days.¹⁶

Cardiology medical societies around the world have reported a significant reduction in care for patients with ACS and other cardiovascular emergencies in the context of the COVID-19 pandemic. There has been an increase in out-of-hospital sudden death in publications, such as those from the Lombardy and New York groups.¹⁷ There has also been an increase in cases of patients seen with mechanical complications secondary to untreated infarctions in their initial phase.

ACS is a medical emergency that is the most important cause of death worldwide.¹ Structured care in appropriate care protocols, following the recommendations of medical societies and adapted to the realities of each location, with therapies that have been proven to reduce cardiovascular outcomes, is a fundamental part of modifying the prognosis of patients suffering from ACS.¹⁸

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DECLARATION OF CONFLICTS OF INTEREST

The authors declare there are no conflicts of interest.

CONTRIBUTION OF AUTHORS

Conception and design of the study: RPO and JPS; data collection: RPO, JPS, BDFAJ and LCSL; data interpretation: RPO, JPS and JCRB; text writing: RPO and JPS; approval of the final version to be published: RPO, JPS, BDFAJ, LCSL and JCRB.

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