

# Incidental Discovery of Anomalous Left Coronary Artery Arising from the Pulmonary Artery in a Coronavirus Disease-2019 Patient: A Blessing in Disguise

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## Abstract:

Anomalous origin of the left coronary artery from the pulmonary artery (ALCAPA) is a serious congenital malformation. Reports about asymptomatic, incidentally discovered ALCAPA in adults are scarce. We describe a patient with no known pre-existing cardiac condition admitted to our hospital with coronavirus disease 2019 (COVID-19) and was incidentally found to have ALCAPA. To the best of our knowledge, this is the first reported case of incidentally discovered ALCAPA in a COVID-19 patient and highlights the importance of appropriate investigation of the coronary status by Multidetector Cardiac Computed Tomographic Angiography (MDCCTA) in individuals with asymptomatic left ventricular dysfunction. The presentation of this case, discussion and literature review serves to iterate the necessity of appropriately investigating patients with asymptomatic LV dysfunction.

**Keywords:** Coronavirus Disease 2019, Incidental Discovery, Anomalous Left Coronary Artery Arising from The Pulmonary Artery

## 1. Introduction

**A**LCAPA is a serious congenital malformation wherein the LCA originates from the PA instead of the left coronary sinus. Reports about asymptomatic, incidentally discovered ALCAPA in adults are scarce in literature [1,2]. We describe a case of 34-year-old male, admitted with COVID-19, was found to have left ventricular dysfunction on cardiac ultrasound and ALCAPA on MD-CCTA.

## 2. Case Presentation

A 34-years-old, Asian male was referred to our hospital with COVID19 infection. Apart from mild flu on presentation, he denied having any cardiac

symptoms. Physical examination was unremarkable. Chest radiography showed subtle opacification in the right midzone. Blood investigations found slightly elevated in N-terminal pro-brain natriuretic peptide and serum Ferritin level. High-sensitivity troponin-T and C-reactive protein were normal. 12-lead electrocardiogram showed left ventricular hypertrophy and secondary repolarization abnormalities (Fig. 1). Cardiac ultrasound (GE Vivid I Ultrasound Machine) revealed diffusely hypokinetic left ventricular with ejection fraction of 40-45% and mild mitral regurgitation.

EKG-gated MD-CCTA (Siemens Definition Flash, Siemens Healthineers, Erlangen, Germany), discovered ALCAPA (Fig. 2) but normal origin of the RCA from the right aortic coronary sinus (Fig. 3). There was no flow limiting stenotic lesion. In the absence of cardiac symptoms and troponin rise, the

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authors attributed left ventricular dysfunction to ALCAPA rather than to COVID-19 related myocardial injury.

The patient was commenced on Perindopril 5 mg, bisoprolol 2.5 mg, rosuvastatin 20 mg and Acetylsalicylic acid 100 mg PO daily, in addition to hydroxychloroquine and azithromycin for COVID-19. He convalesced from the acute viral illness and was discharged from the hospital with a plan for surgical correction of his coronary anomaly.

### 3. Discussion

We describe a patient with no known pre-existing cardiac condition, admitted to our hospital with COVID-19 and was incidentally discovered to have ALCAPA. To the best of our knowledge, this is the first reported case of ALCAPA in an adult patient with COVID-19 infection.

Incidental discovery of ALCAPA in adults is extremely rare [1,2] It accounts for 0.25% to 0.5% of all congenital heart disease cases. Ninety percent of the patients present in the first year of life with signs and symptoms of heart failure or sudden cardiac death secondary to myocardial ischemia. Owing to sufficient blood supply through collaterals from RCA to LCA however, some of the patient survive to adulthood. These patients are either asymptomatic, as in our case, or present with signs and symptoms of myocardial ischemia, left ventricular dysfunction, mitral regurgitation, malignant arrhythmias or sudden cardiac death [3-5].

ALCAPA should be suspected if a young patient with no previous history of heart failure presents with dyspnea, chest pain or dysrhythmia. Our patient had none of these features and was incidentally found to have ALCAPA on MD-CCTA.

#### Abbreviations

ALCAPA	Anomalous left coronary artery arising from the pulmonary artery
COVID-19	Coronavirus Disease 19
MD-CCTA	Multidetector Cardiac Computed Tomographic Angiography
RCA	Right Coronary Artery
LCA	Left Coronary Artery
PA	Pulmonary Artery

2-D Echocardiography in ALCAPA may reveal anomalous origin of the LCA arising from the pulmonary artery with diastolic flow reversal on colour doppler from LCA towards the main pulmonary artery, mild left ventricular enlargement, dilatation of the RCA, abnormal flow-pattern in the ventricular septum as well as predominant systolic coronary flow. The last is a characteristic finding in ALCAPA

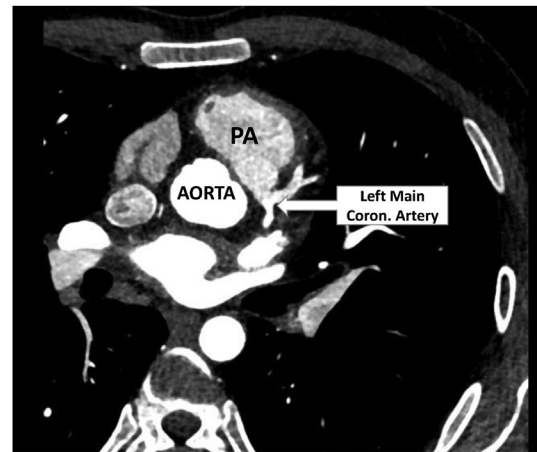


Fig. 2. Axial Coronary CT-angiography image showing an anomalous origin of the left main coronary artery from the pulmonary artery (PA).

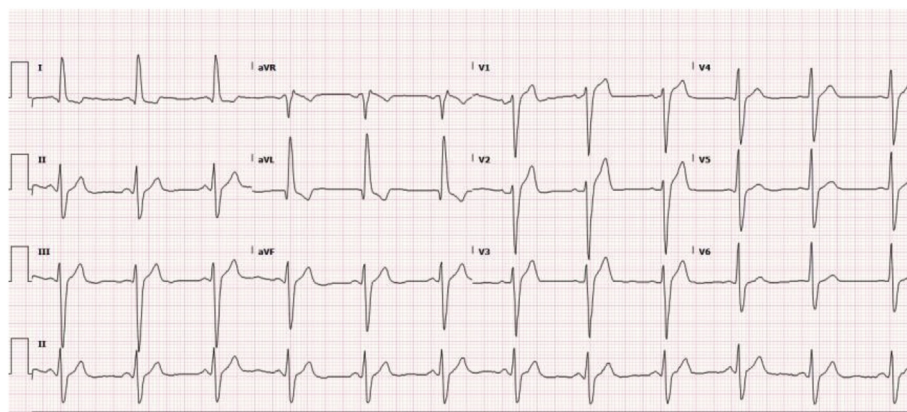


Fig. 1. 12-lead surface electrocardiogram depicting sinus rhythm, left ventricular hypertrophy with intraventricular conduction defect, left axis deviation and secondary repolarization abnormalities.

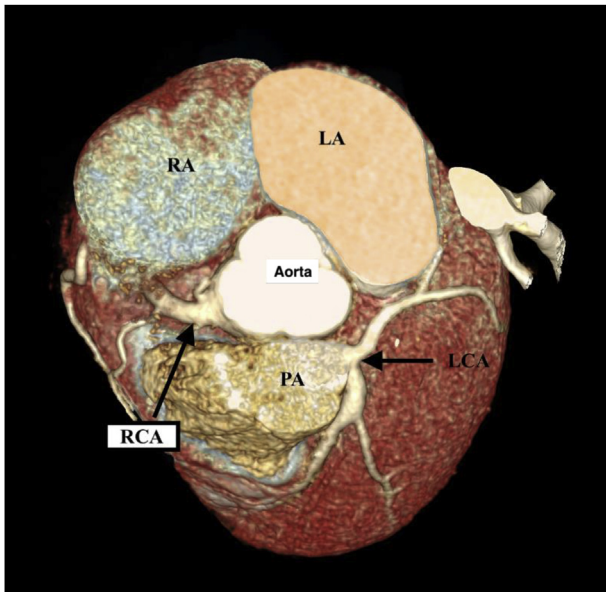


Fig. 3. 3-D rendering of CCTA depicting anomalous origin of LCA from PA. RCA has normal origin from right aortic cusp. Left Atrium (LA). Right Atrium (RA).

and can differentiate it from other coronary anomalies [6,7]. In our patient, due to COVID-19, a limited-view protocol of echocardiography was employed, and a detailed cardiac ultrasound will be performed prior to surgical correction of the anomaly.

Conventional coronary angiography has been diagnostic modality of choice for detecting ALCAPA. However, owing to its excellent spatial resolution and direct visualization of the anomaly, MD-CCTA is being more frequently employed for identification ALCAPA. Shorter examination time and non-invasive nature of MD-CCTA makes it more practical than conventional coronary angiography for the diagnosis of coronary anomalies in adults.

ALCAPA carries a poor prognosis without surgical repair. Surgical strategies like anomalous coronary ligation, aortic implantation, Takeuchi repair, coronary artery bypass grafting, or anastomosis to the subclavian artery are applied. Preferred approach is aortic implantation even in cases where the anomalous coronary artery originates leftward and laterally from the main pulmonary artery, where tunnelling may be a desirable option [8]. Transcatheter closure of an ALCAPA is a potentially safe and effective alternative treatment strategy in some patients [9]. Impaired left ventricular function usually normalizes in the long term. Isomatsu et al recommend that the simultaneous mitral annuloplasty should be performed at the time of operation

for patients who have significant mitral incompetence with anomalous origin of the left coronary artery [10].

#### 4. Limitations

Cardiac MRI and tests for parvovirus B19, human herpes virus, Epstein-Barr virus, enterovirus, cytomegalovirus, adenovirus, HIV, hepatitis C virus, autoimmune and infiltrative disorder were not done.

#### 5. Conclusion

To the best of our knowledge, this is the first reported case of incidentally discovered ALCAPA in a COVID-19 patient and highlights the importance of cardiac surveillance by MD-CCTA in young adults having COVID-19 and left ventricular dysfunction. Presentation of such cases may contribute to expanding our knowledge about otherwise undiagnosed but potentially fatal condition.

#### Author contribution

Conception and design of study: Masood Ayyub Ghori, Ahmed Rizwan. Literature review: Masood Ayyub Ghori, Ahmed Rizwan. Research investigation and analysis: Masood Ayyub Ghori, Ahmed Rizwan. Drafting of manuscript: Masood Ayyub Ghori. Revising and editing the manuscript critically for important intellectual contents: Ahmed Rizwan. Data preparation and presentation: Masood Ayyub Ghori, Ahmed Rizwan. Supervision of the research: Ahmed Rizwan.

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#### Disclosure of conflict of interests

The authors declare that there is no conflict of interests regarding the publication of this paper.

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#### References:

- [1] Preti A. Undiagnosed ALCAPA presentation at the preoperative anesthesia clinic. *Anesthesiol Case Rep* 2018;1(2):20–2. <https://www.pulsus.com/scholarly-articles/>

[undiagnosed-alcapa-presentation-at-the-preoperative-anesthesia-clinic.pdf](#).

- [2] Fierens C, Budts W, Deneff BA. 72 year old woman with ALCAPA. *Heart* 2000 Jan;83(1):E2. <https://doi.org/10.1136/heart.83.1.e2>.
- [3] Kristensen T, Kofoed KF, Helqvist S, et al. Anomalous origin of the left coronary artery from the pulmonary artery (ALCAPA) presenting with ventricular fibrillation in an adult: a case report. *J Cardiothorac Surg* 2008;3:33. <https://doi.org/10.1186/1749-8090-3-33>.
- [4] Nielsen HB, Perko M, Aldershvile J, Saunamäki K. Cardiac arrest during exercise: anomalous left coronary artery from the pulmonary trunk. *Scand Cardiovasc J* 1999;33(6):369–71. <https://doi.org/10.1080/14017439950141452>.
- [5] Murthy Avinash, Kim Grace Youngmi, Hussain Khawaja, Sullenberger Lance. Anomalous origin of the left coronary artery from pulmonary artery a late presentation—Case report and review of literature. *Journal of Cardiology Cases* 2014;9:22–5. <https://doi.org/10.1016/j.jccase.2013.09.001>.
- [6] Ghaderi F, Gholoobi A, Moeinipour A. Unique echocardiographic markers of anomalous origin of the left coronary artery from the pulmonary artery (ALCAPA) in the adult. *Echocardiography* 2014;31(1):E13–5. <https://doi.org/10.1111/echo.12378>.
- [7] Drinkovic Nikša, Margetic Eduard, Smalcelj Anton. Echocardiographic diagnosis of anomalous origin of the left coronary artery from the pulmonary artery. *European Journal of Echocardiography* 2008;9:309–10. <https://doi.org/10.1016/j.euje.2006.11.012>.
- [8] Phillip S, Naimo MD, Fricke Tyson A. MBBS, Yves d'Udekem. Surgical Intervention for Anomalous Origin of Left Coronary Artery from the Pulmonary Artery in Children: A Long-Term Follow-Up. *Ann Thorac Surg* 2016;101:1842–9. <https://doi.org/10.1016/j.athoracsur.2015.11.020>.
- [9] Collins N, Colman J, Benson L, Hansen M, Merchant N, Horlick E. Successful percutaneous treatment of anomalous left coronary artery from pulmonary artery. *Int J Cardiol* 2007 Nov 30;122(3):e29–31. <https://doi.org/10.1016/j.ijcard.2006.11.075>.
- [10] Isomatsu Y, Imai Y, Shin'oka T, Aoki M, Iwata Y. Surgical intervention for anomalous origin of the left coronary artery from the pulmonary artery: the Tokyo experience. *Thorac Cardiovasc Surg* 2001 Apr;121(4):792–7. <https://doi.org/10.1067/mtc.2001.112834>.