

Paroxysmal atrial fibrillation associated with a moderate form of COVID-19 in a middle-aged man with low cardiovascular risk factor: more still needs to be done in this topic.

Mazou Ngou Temgoua^{1,2*}, Sylvain Chanseume¹, Hilic Enver¹, Kane Karamoko¹, Joel Noutakdie Tochie³, Gislain Beyina¹, Lise Camus¹, Alexandra Chanseume¹, Mischie Alexandru¹, Khaled Benfreha¹, Nouhoun Diallo¹, Romain Eschalier⁴

1. Cardiology Unit, Center Hospital of Monluçon, France
2. Department of Internal Medicine and Specialities, Faculty of Medicine and Biomedical Sciences
3. Department of Anaesthesiology and Critical Care Medicine, Faculty of Medicine and Biomedical Sciences
4. Department of Cardiology, Clermont-Ferrand University Hospital, Clermont-Ferrand, France

***Corresponding author:** Mazou Ngou Temgoua, MD, MPH, Heart Rhythm Disorders and Cardiac Stimulation, Clermont-Ferrand University, France, neurotemgoua@yahoo.fr.

Abstract

Background : Cardiac arrhythmia is a major complication of COVID-19. This occurs often in patients with severe COVID-19 with pre-existing cardiovascular diseases. We report an unusual case of paroxysmal atrial fibrillation in an adult male with low cardiovascular risk factor who presented with a moderate form of COVID-19.

Case presentation : A 50 year-old patient with uneventful past history, was admitted to the emergency room of the hospital center of Montluçon for irregular palpitations and dyspnoea on physical exertion both of 24 hours duration. Clinical evaluation revealed a non ill-looking patient with mild respiratory distress. A resting electrocardiogram found an atrial fibrillation with rapid ventricular beat response. Biological tests revealed positive COVID-19 RT-PCR, a mild hypoxemia ($PO_2=65$ mmhg) and a mild inflammatory syndrome (CRP= 34.7mg/l, range : 0-5mg/l and IL-6=30.9 ng/l ; range : 0-7 ng/l). The patient was treated with supplementary oxygen through nasal prongs at 3liters per min, dexamethasone 6mg /24h intravenously (IV), rivaroxaban 20mg/24h per os and verapamil 120mg/24h orally. Day 2 after admission was marked by a sinus regular rhythm, which motivated the introduction of Fleicainide 100mg/24h for a normo-rhythm maintenance therapy. After 2 weeks of hospitalization the patient return at home with normal clinical and biological parameters.

Conclusion : This atypical case of paroxysmal atrial fibrillation during a non severe form of COVID-19 first alerts clinician to enhance follow-up of all COVID-19 for the earlier detection of rhythm disorders. Another particular lesson of this case is that more is still to be done for understanding all the cardiovascular implications of the COVID-19 infection.

Keywords: atrial fibrillation, COVID-19, middle-aged patient, low cardiovascular risk factor

Key Clinical Message : Strict monitoring of heart rhythm in patient with COVID-19 even non severe case is very important to prevent fatal outcome.

Introduction

Coronavirus disease 2019 (COVID-19) is a worldwide health crisis responsible of a high cardiovascular burden (1). Amongst the cardiovascular disease induced by SARS-COV2, the viral pathogen of COVID-19, cardiac arrhythmia is one of the leading cause of mortality (2). Wang and colleagues in a retrospective cohort of 138 patients found that cardiac arrhythmia occurs in 16.7% of all COVID-19 patients and reached 44% in patient admitted in intensive care unit (3). Some hypotheses have been postulated to explain the pathophysiology of arrhythmia during COVID-19; these includes the role of hypoxemia, the induced cytokine storm and possible direct injury of conductive tissues by the virus (4). Ventricular arrhythmia is generally more taken in consideration because of its most lethal effect (5) ; In Wuhan, Guo et al found an incidence of 6% of severe ventricular arrhythmia in COVID-19 patients (6). Supraventricular arrhythmia and particularly atrial fibrillation (AF) are the most common arrhythmias associated with COVID-19 and is potentially responsible for hemodynamic instability and thromboembolic events (4). Accounting for 16.5 - 27.5% of the total number of patients according to Colon and colleagues (7). The concomitant occurrence of paroxysmal AF and COVID-19 is generally observed in elderly patients with prior cardiac abnormalities and/or severe inflammatory response(8). In this case, the virus and related complications appear like a trigger for the rhythm disorder(8). Although the scenario of paroxysmal AF in COVID-19 in patient without major cardiovascular comorbidities is rare. We describe the case of paroxysmal atrial fibrillation in a relatively young patient with low cardiovascular risk factors.

Case presentation

A 50 year-old male engineer was admitted in the emergency room of the hospital center of Montluçon for irregular palpitations and dyspnoea on physical exertion which lasted 24 hours prior to his current presentation. One week ago, he developed anorexia, asthenia, and myalgia. His past medical history was unremarkable apart from asthma for which he on taken salbutamol spray, budesonide plus formoterol 400/12 mcg twice daily during crisis. He was non-smoker, non-alcoholic. He moderately physically exercised. Clinical evaluation revealed a non ill-looking patient with mild respiratory distress (oxygen saturation level = 87%), he was afebrile with a blood pressure of 128/85 mmHg and a grade I obesity (a body mass index of 31.57 kg/m²). A resting electrocardiogram found an atrial fibrillation with rapid ventricular beat response (Figure 1). Biological tests revealed a positive RT-PCR COVID-19 test, a normal full blood count with : leucocytes of 6100/mm³, Hemoglobin level at 17g/dl and platelet count at 172000/mm³, a mild hypoxemia (PO₂=-65mmHg), elevated NT proBNP at 838 pg/ml (normal range : 0 – 125 pg/ml), slightly elevated D-dimeres at 585 mcg/l (normal value < 500 mcg/l) and a mild inflammatory syndrome (CRP= 34.7mg/l, normal range : 0-5mg/l and IL-6=30.9 ng/l ; normal range : 0-7 ng/l). Transthoracic echocardiography was normal with a preserved ejection fraction of 60%. Chest X-ray was unremarkable (Figure 3). The patient received an initial treatment consisting of supplementary oxygen through nasal prongs at 3 litres per min, intravenous dexamethasone 6mg /24h for 10 days, rivaroxaban 20mg/24h per os and verapamil 120mg/24h per os. On day 2 after admission, the patient was on sinus regular rhythm with a heart rate at 65 bpm (Figure 2). We, therefore, added

Flecainide 100mg/24h to the aforementioned treatment for rhythm maintenance therapy. After 2 weeks of hospitalization the patient returned home with normal clinical and biological parameters.

Discussion

Coronavirus disease (COVID-19) is now considered as a multi-systemic infectious disease having a great potential to cause severe cardiovascular complications (9). Little is known about occurrence of AF during COVID-19 infection. Based on available literature, among COVID-19 patients, AF was detected in 19% to 21% of all cases (10,11). The rate of new onset of AF varies between 3.6% and 6.7% according to some clinical studies (7,12). This AF occurs mainly in patients with cardiovascular risk factors and severe respiratory distress (7,12). The Danish nationwide registry found that new-onset AF decreased by 47% during the first three weeks of the national lockdown compared with the same period of previous year (12). This finding, re-inforces the hypothesis of direct relationship between AF and COVID-19. The pathophysiology of COVID-19 related AF is not well understood and hypothesized mechanisms include a reduction in angiotensin-converting enzyme 2 (ACE2) receptor availability, the inflammatory cytokine storm, the direct viral endothelial damage, electrolytes and acid-base balance abnormalities in the acute phase of severe illness and increased adrenergic response to the infection (13).

New onset of AF in COVID-19 with low cardiovascular disease is very rare. Taha and colleagues reported a case of a male of 51 year with no significant past history presented with palpitations, dyspnea on physical exertion, and fatigue. The paraclinical workup of this patient was unremarkable except for a left ventricular hypertrophy that oriented the authors to the possibility of a chronic cardiovascular condition (13). Seecheran et al reported a second case of a 46-year-old Caribbean-Black male with no relevant past history, clinically this patient had grade 1 hypertension without cardiac involvement and mild respiratory distress syndrome with rapid AF resolved by electric cardioversion (13). These cases have three particularity, first, the incidence seems to be more high in male gender, secondly, the patients have mild to moderate COVID-19 and thirdly, low cardiovascular risk factor for all the cases. SARS-COV2 could be a great arrhythmogenic trigger probably with a male gender correlation. Hence, more studies are warranted to affirm this hypothesis.

Conclusion

Relationship between AF and COVID-19 is still not clear for the scientific community, this case in a middle-aged male patient with low cardiovascular and non-severe COVID-19 should alert the scientific community for future research in this topic.

Acknowledgments : We acknowledge the patient who have accepted to participate in this study, and also all the administrative staff of hospital center of Montluçon.

Abbreviations

bpm : beat per min

BNP : Brain natriuretic peptide

CRP : C reactive protein

IL : Interleukin

PCR : Polymerase chain reaction

SARS COV2 : Severe acute respiratory syndrome-coronavirus 2

WBC : White Blood Cell

Diclosures

Approval of the research protocol: Formal ethical approval from the University Research Ethics Board was not required for the completion of this study.

Informed consent : Written informed consent for publication of this case report was obtained from the patient.

Registry and registration no. of the study: N/A.

Animal studies: N/A.

Conflict of interest: None

Funding: None

Author Contribution :

Management of the case : All the authors

Manuscript writing : MNT

Critical revision : JNT

Supervision : SC, RE

References

1. WHO. Strengthening the health system response to COVID-19 – Recommendations for the WHO European Region: policy brief, 1 April 2020. 1 avr 2020 [cité 15 mai 2020]; Disponible sur: <http://www.euro.who.int/en/health-topics/health-emergencies/coronavirus-covid-19/novel-coronavirus-2019-ncov-technical-guidance-OLD/coronavirus-disease-covid-19-outbreak-technical-guidance-europe-OLD/strengthening-the-health-system-response-to-covid-19/strengthening-the-health-system-response-to-covid-19-policy-brief/strengthening-the-health-system-response-to-covid-19-recommendations-for-the-who-european-region-policy-brief,-1-april-2020>
2. ESC. ESC Guidance for the Diagnosis and Management of CV Disease during the COVID-19 Pandemic. 10 juin 2020 [cité 20 juill 2020]; Disponible sur:

<https://www.escardio.org/Education/COVID-19-and-Cardiology/ESC-COVID-19-Guidance>

3. Wang D, Hu B, Hu C, Zhu F, Liu X, Zhang J, et al. Clinical Characteristics of 138 Hospitalized Patients With 2019 Novel Coronavirus–Infected Pneumonia in Wuhan, China. *JAMA*. 17 mars 2020;323(11):1061.
4. Babapoor-Farrokhran S, Rasekhi RT, Gill D, Babapoor S, Amanullah A. Arrhythmia in COVID-19. *Sn Compr Clin Med*. 14 août 2020;1-6.
5. ACC. Ventricular Arrhythmia Risk Due to Hydroxychloroquine-Azithromycin Treatment For COVID-19. 29 mars 2020 [cité 20 avr 2020]; Disponible sur: <https://www.acc.org/latest-in-cardiology/articles/2020/03/27/14/00/ventricular-arrhythmia-risk-due-to-hydroxychloroquine-azithromycin-treatment-for-covid-19>
6. Guo T, Fan Y, Chen M, Wu X, Zhang L, He T, et al. Cardiovascular Implications of Fatal Outcomes of Patients With Coronavirus Disease 2019 (COVID-19). *JAMA Cardiol*. 1 juill 2020;5(7):811.
7. Colon CM, Barrios JG, Chiles JW, McElwee SK, Russell DW, Maddox WR, et al. Atrial Arrhythmias in COVID-19 Patients. *JACC Clin Electrophysiol*. sept 2020;6(9):1189-90.
8. Gawalko M, Kapłan-Cieślicka A, Hohl M, Dobrev D, Linz D. COVID-19 associated atrial fibrillation: Incidence, putative mechanisms and potential clinical implications. *IJC Heart Vasc*. 1 oct 2020;30:100631.
9. Temgoua MN, Endomba FT, Nkeck JR, Kenfack GU, Tochie JN, Essouma M. Coronavirus Disease 2019 (COVID-19) as a Multi-Systemic Disease and its Impact in Low- and Middle-Income Countries (LMICs). *SN Compr Clin Med*. 1 sept 2020;2(9):1377-87.
10. Inciardi RM, Adamo M, Lupi L, Cani DS, Di Pasquale M, Tomasoni D, et al. Characteristics and outcomes of patients hospitalized for COVID-19 and cardiac disease in Northern Italy. *Eur Heart J*. 14 mai 2020;41(19):1821-9.
11. Gopinathannair R, Merchant FM, Lakkireddy DR, Etheridge SP, Feigofsky S, Han JK, et al. COVID-19 and cardiac arrhythmias: a global perspective on arrhythmia characteristics and management strategies. *J Interv Card Electrophysiol*. 3 juin 2020;1-8.
12. Holt A, Gislason GH, Schou M, Zareini B, Biering-Sørensen T, Phelps M, et al. New-onset atrial fibrillation: incidence, characteristics, and related events following a national COVID-19 lockdown of 5.6 million people. *Eur Heart J*. 21 août 2020;41(32):3072-9.
13. Seecheran R, Narayansingh R, Giddings S, Rampaul M, Furlonge K, Abdool K, et al. Atrial Arrhythmias in a Patient Presenting With Coronavirus Disease-2019 (COVID-19) Infection: J Investig Med High Impact Case Rep [Internet]. 5 mai 2020 [cité 18 nov 2020]; Disponible sur: <https://journals.sagepub.com/doi/10.1177/2324709620925571>

List of figures

Figure 1 : Atrial fibrillation with a ventricular response at 93bpm

Figure 2 : Normal sinus rhythm at day 2 after admission

Figure 3 : Low transparency of the left basal lung