

# Ischemic stroke in a patient with giant fusiform aneurysm of dolichoectatic basilar artery and Covid-19 infection

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## ABSTRACT:

Coronavirus disease (Covid-19) can manifest with numerous neurological disorders. We present a case of stroke in a patient with acute intraluminal thrombus in giant basilar tip fusiform aneurysm. A 71-year-old woman with past medical history of arterial hypertension and dilated cardiomyopathy was hospitalized in intensive care unit (ICU) because of decreased consciousness (GCS 6) and a right-sided hemiplegia which occurred twelve hours before admission. Five days earlier she was tested positive for Covid-19. ECG revealed new-onset atrial fibrillation (AF). She was intubated and mechanically ventilated. Brain CT and CT angiography of the head and neck vessels revealed dolichoectatic BA with giant fusiform aneurysm of the tip of BA. BA lumen was partially filled with hyperdense, acute thrombus. Hypodensity of superior cerebellar artery (SCA) irrigation was consistent with acute ischemic stroke. She was treated with low molecular weight heparin, acetylsalicylic acid and corticosteroid therapy. During hospitalization her respiratory function deteriorated, and she died. To our knowledge this is the first case of stroke caused by acute thrombus in a giant tip of the BA aneurysm in patient with Covid-19 infection. It is important to increase prehospital stroke awareness since stroke in patients with Covid-19 is related to worse outcomes, and in appropriate time window can be treated with acute recanalization techniques.

**KEYWORDS:** stroke, Covid-19, dolichoectasia, basilar artery, fusiform aneurysm

## SAŽETAK:

ISHEMIJSKI MOŽDANI UDAR U PACIJENTA S VELIKOM FUSIFORMNOM ANEURIZMOM DOLIHOEKTATIČNE BAZILARNE ARTERIJE I COVID-19 INFEKCIJE

Koronavirusna bolest (COVID-19) može se manifestirati brojnim neurološkim poremećajima.

Prikazujemo slučaj moždanog udara u bolesnika s akutnim intraluminalnim trombom u fusiformnoj aneurizmi divovskog bazilarnog vrha. Žena u dobi od 71 godine s anamnezom arterijske hipertenzije i dilatacijske kardiomiopatije hospitalizirana je na jedinici intenzivnog liječenja (JIL) zbog smanjene svijesti (GCS 6) i hemiplegije na desnoj strani koja se pojavila dvanaest sati prije prijema. Pet dana ranije bila je pozitivna na Covid-19. EKG je otkrio novonastalu fibrilaciju atrijske (AF). Intubirana je i mehanički ventilirana. CT i CT angiografija žila glave i vrata otkrila je dolichoektatični BA s divovskom fusiformnom aneurizmom vrha BA. Lumen BA je djelomično ispunjen hiperdensnim, akutnim trombom. Hipodenzitet irigacije superiorne cerebelarne arterije (SCA) bio je u skladu s akutnim ishemijskim moždanim udarom. Liječena je heparinom niske molekularne težine, acetilsalicilnom kiselinom i terapijom kortikosteroidima. Tijekom hospitalizacije njezina se respiratorna funkcija pogoršala, te je

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umrla. Prema našim saznanjima, ovo je prvi slučaj moždanog udara uzrokovanog akutnim trombotom u divovskom vrhu aneurizme BA u bolesnika s infekcijom Covid-19. Važno je povećati svijest o prehospitalnom moždanom udaru jer je moždani udar u bolesnika s Covid-19 povezan s lošijim ishodima, te se u odgovarajućem vremenskom roku može liječiti tehnikama akutne rekanalizacije.

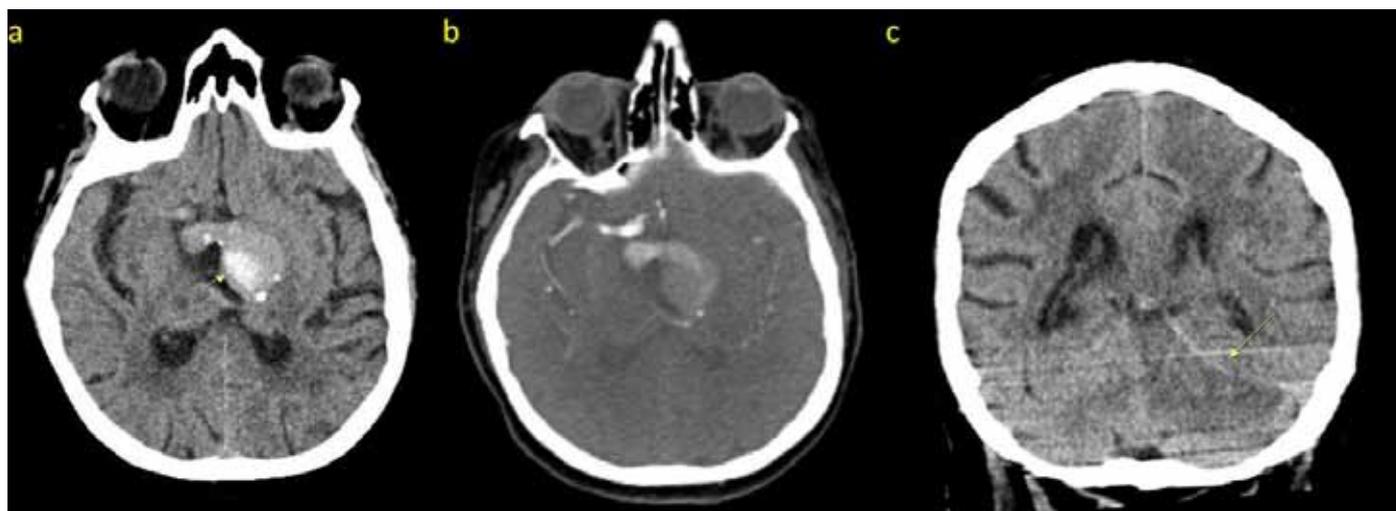
**KLJUČNE RIJEČI:** moždani udar, COVID 19, dolichoektazija, bazilarna arterija, fuziformna aneurizma

Coronavirus disease (Covid-19), caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) can have numerous neurological manifestations [1]. We present a case of stroke in a patient with acute intraluminal thrombus in a giant basilar tip fusiform aneurysm.

A 71-year-old woman with past medical history of arterial hypertension and dilated cardiomyopathy was hospitalized in intensive care unit (ICU) because of decreased consciousness (GCS 6) and a right-sided hemiplegia which occurred twelve hours before admission. Five days earlier she had symptoms of generalized weakness and fever (37.6°C), and tested positive for Covid-19.

On admission National Institutes of Health Stroke Scale (NIHSS) was 20. ECG revealed atrial fibrillation (AF). She was intubated and mechanically ventilated. Chest x-ray revealed basal right pulmonary infiltrate. Laboratory findings revealed WBC count of  $8.8 \times 10^9/L$ , lymphocyte count of  $0.36 \times 10^9/L$ ,

CRP level of 37.6 mg/L. D-dimer level was  $>4.40$  mg/L FEU, fibrinogen level was 5.3 g/L, aspartate transaminase (AST) level was 235 U/L, lactate dehydrogenase (LDH) level was 410 U/L. Brain CT and CT angiography of the head and neck were performed. They revealed dolichoectatic BA with a giant fusiform aneurysm (dimensions 30x20x15 mm) of the tip of BA. BA lumen was partially filled with hyperdense, acute thrombus. Hypodensity of superior cerebellar artery (SCA) irrigation was consistent with acute ischemic stroke (Fig.1). Additional findings were saccular aneurysms of middle and distal segment of anterior inferior cerebellar artery (AICA) (diameter 4 mm and 4.5 mm), as well as a saccular microaneurysm of right anterior cerebral artery (ACA). Interventional neuroradiologist and neurosurgeon did not indicate endovascular or neurosurgical treatment. She received enoxaparin sodium 40 mg and acetylsalicylic acid (ASA) 300 mg. Corticosteroid therapy with dexamethasone was also initiated. On the third day of hospitalization a control brain CT scan was



*Figure 1. Non-enhanced CT in the axial plane (a) showing dolichoectasia of the basilar artery with fusiform aneurysmatic dilatation of the basilar tip containing a hyperdense thrombus (arrow), with CTA (b) showing diminished contrast opacification of the basilar artery lumen with no opacification of the thrombus, and a coronal reformatted non-enhanced CT slice (c) displaying hypodensity of the left superior cerebellar artery territory consistent with acute ischemia (arrow).*

performed, which demonstrated acute ischemic lesion in left half of mesencephalon, tectum, as well as more marked left cerebellar ischemic lesion in the territory of left SCA. There was also a marked progression of hyperdense (thrombotic) content in the lumen of the BA aneurysm. On the 5th day of hospitalization the patient started receiving enoxaparin 40 mg twice a day and ASA 100 mg, with enoxaparin dosage increase the following day (80 mg twice a day) and discontinuation of ASA.

On the 6th day of hospitalization ECG showed atrial flutter, she received nebivolol and amiodarone for heart rate and rhythm control. Also, an increase of inflammatory parameters was observed, WBC count was  $21.43 \times 10^9/L$ , neutrophil count was  $19.96 \times 10^9/L$ , lymphocyte count was  $0.70 \times 10^9/L$ , CRP was 170 mg/L, *Acinetobacter Baumannii* was isolated from urine cultures, and she was started on targeted antibiotic therapy.

On the same day her clinical condition deteriorated, and she suffered cardiac arrest. Cardiopulmonary resuscitation was performed, but it was unsuccessful and the patient died.

## DISCUSSION

Our patient suffered severe stroke after being diagnosed with Covid-19 infection. Stroke has been shown to be one of neurological manifestations of Covid-19, and has been associated with unfavorable outcomes [1].

There are several mechanisms that contribute to stroke development, and increased stroke severity in Covid-19 patients such as hypercoagulability, impaired immune response with systemic inflammation, inflammatory cytokine storm, direct cytotoxic effect caused by binding of SARS-CoV-2 spike glycoprotein on

angiotensin converting enzyme-2 (ACE-2) receptor leading to dysregulation in Renin Angiotensin System (RAS) [2].

The patient had elevated levels of D-dimer and fibrinogen which reflect a prothrombotic state. She developed new onset AF. It is suggested that acute SARS-CoV-2 infection may increase the susceptibility to AF in patients with previous risk factors for AF development. Furthermore, a study of cardiovascular events showed that new onset AF during Covid-19 infection is also an indicator of poor prognosis [3, 4].

Our patient did not arrive to hospital in therapeutic window for thrombolysis and mechanical thrombectomy. She was treated with prophylactic, followed by therapeutic doses of low molecular weight heparin (LMWH). As Covid-19 infection is a procoagulant state, there are several ongoing studies evaluating effectiveness of full-dose anticoagulation in Covid-19 patients [5]. Regarding patients with Covid-19 and stroke the optimal treatment regimen with anticoagulants is still not known [1]. Studies have shown that most strokes in patients with Covid-19 infection are caused by occlusion of large brain-supplying arteries [2]. To our knowledge this is the first case of stroke caused by acute thrombus in a giant tip of the BA aneurysm in patient with Covid-19 infection. During the Covid-19 pandemic, the number of hospital admissions of patients with mild stroke has decreased, most likely due to fear of Covid-19 infection and social distancing measures [1]. It is important to increase prehospital stroke awareness since stroke in patients with Covid-19 is related to worse outcomes, and in appropriate time window can be treated with acute recanalization techniques.

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