

## Cavernous Sinus Thrombosis After Coronavirus Infection in A Patient with Type 2 Diabetes Mellitus- Case report

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Submitted: 29 June 2021; Accepted: 08 July 2021; Published: 15 July 2021

**Citation:** Khaydarova Feruza Alimovna, Alieva Anna Valerevna, Kamalov Telman Tulaganovich, Talenova Vasila Abdukarimovna. (2021). Cavernous Sinus Thrombosis After Coronavirus Infection in A Patient with Type 2 Diabetes Mellitus- Case report. Archives of Infect Diseases & Therapy, 5(2), 49-51.

### Abstract

**Background.** Thrombotic complications after COVID-19 are described in literature in early period after acute phase of infection. **Case presentation.** This article presents a clinical case of a patient with type 2 diabetes mellitus with cavernous sinus thrombosis and maxillary osteomyelitis 4 months after COVID-19 infection. **Conclusion.** Prevention of thrombosis after COVID-19 is the cornerstone, the prevention period may need to be extended.

**Keywords:** COVID-19, Cavernous Sinus Thrombosis, Type 2 Diabetes Mellitus, Case Report

### Background

The cavernous sinus is the dural venous sinus located lateral to the sella turcica, between the two layers of the dura mater, in the middle cranial fossa. The IIIrd, IVth and VIth cranial nerves pass inside the cavernous sinus; ophthalmic and maxillary parts of the Vth cranial nerve and the internal carotid artery with the surrounding sympathetic plexus. Cavernous sinus thrombosis was first described by Bright in 1831 as a complication of epidural and subdural contamination [1].

Before the COVID-19 pandemic, cavernous sinus thrombosis was rare. Mortality from cavernous sinus thrombosis was 100% before the antibiotic era and was usually caused by sepsis or an infection of the central nervous system [2]. Cavernous sinus thrombosis may result from an infection of the paranasal sinuses or any of the anatomical structures of the head drained by the cavernous sinus, including the midface, orbit, and oral cavity [3]. About 7% of septic cavernous sinus thrombosis is of dental origin [4]. Despite the anticoagulant therapy in patients with COVID-19, there is a high risk of thrombus formation, most often thromboembolism of the pulmonary artery and its branches occurs [5]. For our knowledge, there are limited data on cavernous sinus thrombosis in patients with diabetes after COVID-19. Here we provide the case of patient with type 2 diabetes mellitus with cavernous sinus thrombosis and maxillary osteomyelitis 4 months after COVID-19 infection.

### Case presentation

A 41-year-old man was admitted to the clinic in January 2021 with complaints on painful infiltration of the left gluteal region, numbness of the lower extremities, headaches, increased blood pressure, shortness of breath, general weakness and was admitted to the department of purulent diabetes complications. From the anamnesis upon admission: diabetes mellitus was diagnosed 12 years before. From the onset of the disease, he took oral hypoglycemic drugs (metformin). 4 months before admission to the clinic during the acute period of COVID-19, he was transferred to insulin therapy, at the time of admission, patient takes Lantus 8 U in the evening, Novorapid 4 U 3 times before main meals. The glycemic variations within 10.0-12.0 mmol/L. 4 months before the visit, the patient was admitted to the COVID center due to the development of symptoms of coronavirus infection and confirmed tests for COVID-19. 2 weeks after admission to the COVID center, the patient developed anuria, nephrolithiasis was diagnosed, and therefore a nephrostomy tube was installed. A month after the COVID infection, complaints of chills, cold extremities, subfebrile fever, purulent nasal discharge, and headaches appeared. The patient was diagnosed with cavernous sinus thrombosis, and the resection of the middle turbinate on the left and the middle third of the nasal septum was performed.

The patient was admitted to the department of purulent diabetes complications because of the development of post-injection ab

cess of gluteus for surgical treatment. Patient has family history of diabetes (in mother).

**Table 1: Laboratory data**

Index	Result	Reference range
Total blood count:		
Hemoglobin	75 g/L	130-160 g/L
Hematocrit	23.9%	40-48%
Thrombocytes	366 109/L	180-320 109/L
Leucocytes	11.3 109/L	4.0-9.0 109/L
stab	3%	1-5%
segmented	78%	47-72%
eosinophils	1%	1-6%
monocytes	5%	3-11%
lymphocytes	13%	19-39%
ESR	73 mm/h	0-10 mm/h
General urine analysis:		
Protein	0.165 g/L	abs
Leucocytes	5-10/1	2-4/1
Salts	Uric acid	abs
Blood chemistry:		
ALT	23 U/L	4-40 U/L
AST	20 U/L	8-35 U/L
Total protein	67.9 g/L	65-85 g/L
Albumin	34.0 g/L	35-55 g/L
Total bilirubin	11.6 µmol/L	< 20.5 µmol/L
Potassium	4.6 mmol/L	3.5-5.4 mmol/L
Calcium	1.94 mmol/L	2.1-2.6 mmol/L
Creatinine	92 µmol/L	62-115 µmol/L
CRP	(eGFR 89 mL/min/1.73m <sup>2</sup> )	
Serum iron	103.3 U	0-6 U
	4.4 mmol/L	10.6-28.3 mmol/L
Coagulogram:		
Fibrinogen	6.05 g/L	2-4 g/L
PTI	75.5%	80-100%
APTT	27.1 sec	20-32 sec
Thrombine time	17.8 sec	15-30 sec
INR	1.13%	
HbA1c.	8.0%	aim: 7.0%
Vitamin D3	13.0 ng/mL	30-100 ng/mL
Ferritin	1855 ng/mL	30-400.0 ng/mL
Interleukin 6	54.0 pg/mL	1.5-7.0 pg/mL

MSCT of the eye orbits revealed left-sided sinusitis (chronic sinusitis), osteomyelitis of the left maxillary sinus and areas of destruction in the palatal plate. The patient underwent the operation "Opening of the post-injection abscess of the left gluteus". The postoperative course was smooth. The patient received treatment: combined antibacterial therapy, low molecular heparin. Patient was discharged with improvement for further treatment by a maxillofacial surgeon for osteomyelitis of the upper jaw. The treatment was carried out conservatively - antibacterial therapy was continued with a positive result.

## Discussion and Conclusions

In December 2020, Khasha A. et al. from Morocco described a case of cavernous sinus thrombosis in a patient in the acute period of COVID-19, accompanied by high levels of D-dimer and leukopenia. The patient was prescribed intravenous heparin, and subsequently the patient was transferred to acenocoumarl [6].

American authors from Boston, Massachusetts describe 3 cases of cerebral venous sinus thrombosis in patients with COVID-19 [7]. A 68-year-old woman with thrombosis of the main venous structures of the brain that occurred within 10 days after the diagnosis of COVID-19. The patient received intravenous heparin, then enoxaparin, then dabigatran. 79-year-old woman with a transverse sinus thrombosis clinic on the 3rd day of hospitalization for COVID-19. She received low molecular weight heparin and was discharged on enoxaparin. And a 25-year-old woman with Evans' syndrome and idiopathic thrombocytopenic purpura who developed transverse sinus thrombosis 4 months after COVID-19 infection. None of the patients reported having diabetes mellitus. The dynamics on the background of treatment was positive. The same authors in their work give a review of 14 patients with thrombosis of the venous sinuses of the brain after COVID-19 with a time of thrombosis in 4 days to 2 weeks from the onset of the disease and a mortality rate of 36.4%.

Current recommendations suggest continuing the prevention of thrombus formation for 45 days after discharge of patients with COVID-19 under the control of coagulation factors, and for patients with suspected PE - up to 3 months, regardless of laboratory parameters [5]. We believe that for patients with type 2 diabetes, especially those who do not reach the target glycemic values, an approach is to be the same as for the patients with suspected pulmonary embolism, i.e. at least 3 months of antithrombotic therapy after diagnosis of COVID-19.

In the case we described, thrombosis occurred a month after discharge from the COVID center, which confirms the need for long-term prevention of thrombus formation. In the literature, there are theoretical premises linking thrombus formation in the pulmonary artery system with localized intravascular coagulopathy due to severe inflammation in the alveoli [5]. Perhaps, in the case described above, the presence of chronic sinusitis on the side of the lesion played a role in the occurrence of thrombosis of the cavernous sinus. Limitaion of the study: we have no data on coagulogram in dynamics starting from the onset of COVID-19 through the period until the recovery. Also we have no data on exact reason for osteomyelitis.

## Conclusion

In this patient thrombosis of the cavernous sinus developed as the consequence of coronavirus infection likely due to the existing chronic focus of infection (chronic sinusitis).

After a COVID-19 infection, the onset of an intolerable headache, vision changes, impaired motor function of the eyes, and even more bulging of the eyeball can be alarming signs of the development of cavernous sinus thrombosis, which may require not only intensive heparin therapy, but also surgical intervention. After the operation, strict follow-up and, if necessary, targeted antibiotic therapy is needed because of the risk of osteomyelitis.

Prevention of thrombosis after COVID-19 is the cornerstone, the prevention period may need to be extended.

### Abbreviations

ESR – erythrocytes sedimentation rate  
ALT – alanine amino transpherase  
AST – asparagine amino transpherase  
CRP – C-reactive protein  
PTI – prothrombin index  
APTT – associated partial thromboplastin time  
INR – international normalized rate  
HbA1c – glycated hemoglobin A1c  
MSCT – multispiral computed tomography

### Declarations

- Ethics approval and consent to participate. This case is approved by the ethics committee of the Republican Specialized Scientific and Practical Medical Center of Endocrinology.
- Consent for publication – the written consent is obtained from the patient.
- Availability of data and material – data are available on demand.
- Competing interests – N/A.
- Funding – none.
- Authors' contributions: FK – organization, data interpretation, AA – organization, data interpretation, writing, TK – data collection, data interpretation, VT – data collection, data interpretation, writing.
- All authors have read and approved the manuscript

- Acknowledgements: authors express their gratitude to the team of doctors who treated the patient.

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