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The unusual history of stroke due to coagulopathy caused by SARS-CoV-2 infection in a 14-year-old boy with two heart tumors

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A healthy 14-year-old boy felt unwell while swimming. Soon, he experienced nystagmus. The next day, when he was at the emergency department, he was admitted to the infectious ward since he tested positive in a SARS-CoV-2 antigen test. On admission, abnormal eye movements were observed, double vision when looking to the left, and discrete asymmetry of the pupils otherwise without features of focal central nervous system damage.

The head computed tomography (CT) scan showed normal cerebral structures, while the brain magnetic resonance imaging (MRI) revealed abnormal intensity in the medial part of the left thalamus corresponding to the acute phase of ischemia (Figure 1A).

The diagnosis of ischemic stroke due to COVID-19-associated coagulopathy was established, and acetylsalicylic acid (ASA) was administered. Assessment of stroke risk factors revealed the homozygosity for the methylenetetrahydrofolate reductase 677C>T mutation, while Leiden mutation was not found.

The antiphospholipid syndrome was excluded and other results (homocysteine, protein C, S, D-dimer, troponin levels) were normal.

The control brain MRI after 9 days showed the resolution of ischemia. The patient was discharged in overall good condition, and ASA treatment was maintained. Five weeks later, after a negative SARS-CoV-2 test, he was readmitted for cardiology consultation. Echocardiography revealed two movable echogenic structures: in the left ventricle (LV) apex, approximately 2.5×1.5 cm and in the left atrium (LA) 2×3 cm (Figure 1B), along with hypokinesis of the apical region with normal ejection fraction = 70% calculated using the Simpson method. For this reason, a cardiac MRI was performed, which confirmed the presence of two large structures in the LV and LA as well as post-infarct foci in the 17th apex segment (Figure 1C). A coronary computed tomography angiogram showed no coronary stenosis (thrombus), including the distal left anterior descending coronary artery (Figure 1E), and visualized 2 nonenhancing structures in the LV and LA.

The most likely diagnosis after imaging was double LV and LA thrombus formation during SARS-CoV-2 infection. Therefore, ASA was discontinued and nadroprine 2×1 mg/kg daily was introduced.

After 8 days of intensive treatment, the thrombus did not diminish and there was a high risk that mobile clots could lead to recurrent stroke

After consultation with several specialists to determine the treatment strategy, we decided to remove the clots during the cardiac surgery (Figure 1F).

The result of the histopathology examination was unexpected (Figure 1G–H).

It turned out that the masses removed from the heart were double myxomas with clots accumulated on the surface, which were most likely formed during the SARS-CoV-2 infection. This is a rare case because among children, myxoma is an uncommon heart tumor, while dual localization is a unique diagnosis [1–3]. Multiple and recurrent myxomas were rarely described as features of Carney complex. Although our patient did not exhibit Carney complex symptoms, regular echocardiography follow-up was ordered to prevent myxoma recurrence and potential embolism [4]. Thrombus formation on the surface of cardiac tumors and its complications is a new medical phenomenon during the COVID-19 pandemic [5].

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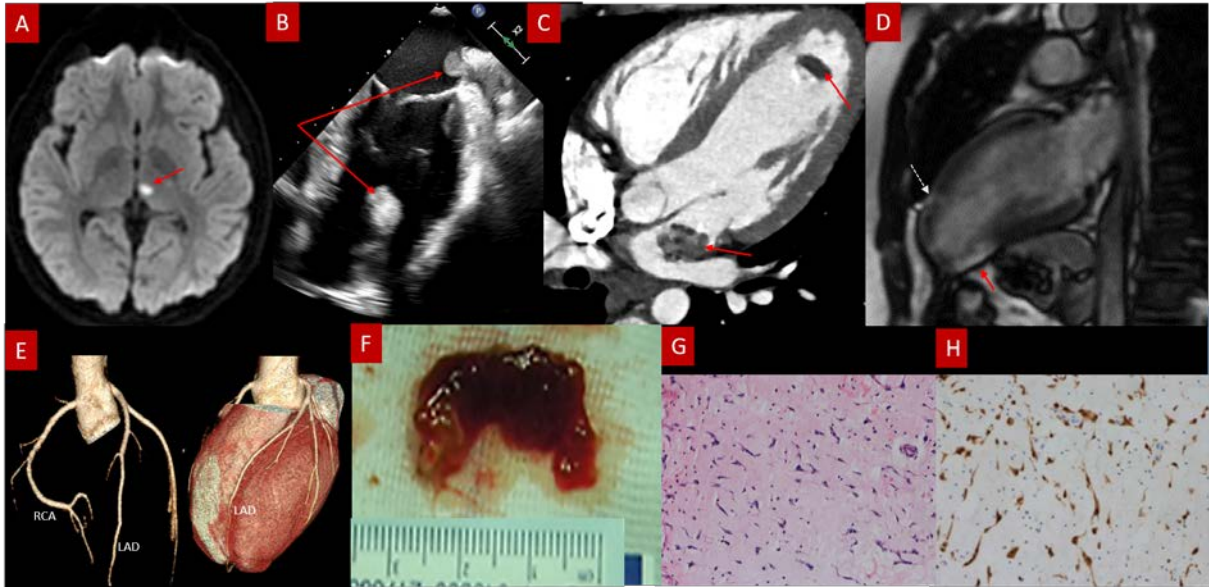


Figure 1. **A.** Brain MRI scan: axial DWI scan shows the focal region of a restricted diffusion — acute ischemic lesion (arrow) in the left posterior thalamus. **B.** 2DE image. Two large echogenic structures in the LV and LA (arrows). **C.** Cardiac CT, axial view: hypodense soft tissue mass in LV apex and in LA (arrows) — suspicion of double thrombi in CT. **D.** Cardiac MRI, LV 2-chamber view, LGE image: focus of late gadolinium enhancement in apical segment of LV wall (red arrow); small focus of LGE visible also in apical segment of anterior LV wall (white arrow). **E.** Coronary CTA. 3D reconstruction showing normal coronary arteries. **F.** anatomical specimen, 2.9×2.1 cm from the LV apex. **G.** Myxoma. The mass was composed of stellate and spindle cells embedded within a myxoid stroma (hematoxylin & eosin stain, magnification $\times 100$). **H.** Immunohistochemical staining for calretinin. A markedly positive immunohistochemical reaction in tumor cells. Lymphocytes without calretinin expression (magnification $\times 100$).

Abbreviations: 2DE, two-dimensional echocardiographic; CT, computed tomography; CTA, computed tomography angiogram; DWI, diffusion weighted; LA, left atrium; LGE, late gadolinium enhancement; LV, left ventricle; MRI, magnetic resonance imaging