Ischaemic stroke as a presenting feature of ChAdOx1 nCoV-19 vaccine-induced immune thrombotic thrombocytopenia

A syndrome of vaccine-induced immune thrombotic thrombocytopenia (VITT) has recently been reported following the ChAdOx1 nCoV-19 (Oxford–Astra Zeneca) recombinant adenoviral vector vaccine encoding the spike glycoprotein of SARS-CoV-2.1–4 Previously described patients developed thrombosis, mainly affecting cerebral venous sinuses, with thrombocytopenia and antibodies to platelet factor 4 (PF4), but the characteristics of VITT with arterial thrombosis have not previously been described. Here, we report three patients with VITT who presented with ischaemic stroke.

Patient 1, a 35-year-old Asian woman, developed episodic right temporal and periorbital headache 6 days after receiving the ChAdOx1 nCoV-19 vaccine. Five days later, she awoke with left face, arm and leg weakness, right gaze preference and drowsiness. Non-contrast CT and CT angiography (CTA) revealed occlusion of the right middle cerebral artery (MCA) distal M1 segment with extensive ischaemia and haemorrhagic transformation (figure 1A–C). Subsequent imaging revealed right portal vein thrombosis. The platelet count was 64 x 10⁹/L (reference range 150–400 x 10⁹/L); D-dimer was raised at 11 220 µg/L (reference range 0–550); and the Asserachrom HPIA IgG assay for anti-PF4 antibodies was positive (76.1%). The patient underwent urgent decompressive hemicraniectomy (figure 1D). The platelet count increased after intravenous immune globulin and plasmapheresis. She received anticoagulation with intermediate dose fondaparinux. Fourteen days after presentation, her consciousness level suddenly dropped; CT head showed extensive haemorrhagic transformation of the left MCA infarct with mass effect and herniation of the brain through the decompressive hemicraniectomy. Brainstem death was subsequently confirmed.

Patient 2, a 37-year-old White female, presented 12 days after receiving the ChAdOx1 nCoV-19 vaccine with diffuse headache, left visual field loss, confusion and left arm weakness. CTA showed occlusion of both internal carotid arteries (figure 1E) and left transverse sinus thrombosis (figure 1F); diffusion-weighted MRI showed bilateral acute infarcts in a borderzone distribution (figure 1G,H). Subsequent imaging confirmed pulmonary embolism and thromboses of the...
left transverse and sigmoid sinuses, left jugular, right hepatic and both iliac veins. The platelet count was 9 x 10^9/L; D-dimer was raised at 34 000 μg/L; and the anti-PF4 antibody assay was positive (99.7%). The platelet count increased following treatment with intravenous fondaparinux and improved clinically.

Patient 3, a 43-year-old Asian male, presented 21 days after the ChAdOx1 nCoV-19 vaccine with dysphasia. CT and magnetic resonance (MR) showed an acute left frontal and insular infarct corresponding to the anterior cortical territory of the left MCA, with a small volume of haemorrhagic transformation within the territory. MR and CT venography showed no evidence of cerebral venous sinus thrombosis. The platelet count was 48 x 10^9/L; D-dimer was raised at 24 000 μg/L; and the anti-PF4 antibody assay was positive. He was treated with platelet transfusion, intravenous immune globulin and fondaparinux and improved clinically.

Our observations suggest that, in addition to venous thrombosis, the neurological spectrum of VITT can include arterial occlusion. Young patients presenting with ischaemic stroke after receiving the ChAdOx1 nCoV-19 vaccine should urgently be evaluated for VITT with laboratory tests (including platelet count, D-dimers, fibrinogen and anti-PF4 antibodies) and assessment for co-existing venous thromboses; they should be managed by a multidisciplinary team (haematology, neurology, stroke, neurosurgery and neuroradiology) for rapid access to treatments including intravenous immune globulin, methylprednisolone, plasma- pheresis and non-heparin anticoagulants, for example fondaparinux, argatroban, or direct oral anticoagulants. Endovascular therapy or decompressive hemicraniectomy may also be indicated in carefully selected patients. 3 5

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