## AZD-1222/tozinameran

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### Neurological complications post COVID-19 vaccination: 18 case reports

In a retrospective study conducted at Saudi German Hospitals in Jeddah, Saudi Arabia, between March 2021 to September 2021, 18 patients (9 man and 9 women) aged 26–69 years, were described, who developed neurological complications like cerebral venous thrombosis, intracranial haemorrhage, ischaemic cerebrovascular accident, seizures, vestibular neuritis, right optic neuritis, bilateral optic neuritis, transient ischaemic attack, encephalopathy, Guillain-Barre syndrome (GBS) or Miller Fisher Syndrome following administration of AZD-1222 or tozinameran COVID-19 vaccination [*dosages not stated; not all outcomes stated*].

In a total of 18 patients, 10 patients received the AZD-1222 [Oxford-AstraZeneca Vaxzevria COVID-19 vaccine], and the remaining 8 patients received the tozinameran [Pfizer-BioNTech Comirnaty COVID-19 vaccine]. Subsequently, three women (Case 1, 2 and 3) presented with neurological complications including severe cerebral venous thrombosis (CVT) following first dose of AZD-1222 vaccine. Of the three women with severe cerebral venous thrombosis, two died of an intracerebral haemorrhage with herniation after re-bleeding. Their initial complaint was headache, which was followed by clinical deterioration of GCS. Laboratory results revealed thrombocytopenia and elevated prothrombin time in all three women. Overall, they had the highest D-dimers readings among our total cohort of 18 patients. One woman developed bilateral optic neuritis (Case 10) and one man developed right unilateral optic neuritis (Case 9) after the first dose of AZD-1222 vaccine by 14 and 19 days, respectively. Both presented with decreased visual acuity and eye pain. Both recovered completely after less than 10 days of admission. Eight patients presented with neurological complication of ischaemic cerebrovascular accident. Four patients developed ischaemic cerebrovascular accident following AZD-1222 vaccine (Case 4, 5, 6, and 7) while four patients developed ischaemic cerebrovascular accident following tozinameran vaccine (Case 11, 12, 13, and 14). One elder patient (Case 4) presented with a seizure, low blood pressure, aphasia, and dysphagia, in addition to motor, sensory, and visual affection at 10 days after receiving the first dose of the AZD-1222 vaccine. He had multiple comorbidities and spent the longest duration in the intensive care unit (ICU), and his MRI showed a right middle cerebral infarction. One man (Case 5) presented with a seizure, ataxia, dysarthria, and motor and sensory affection at 7 days after receiving the first dose of the AZD-1222 vaccine. He had highly elevated triglyceride, total cholesterol, and LDL. One ischaemic stroke patient (Case 6) following AZD-1222 vaccine showed a right lacunar thalamic stroke on MRI. He had presented at 2 days after receiving the vaccine with ataxia and vertigo. He was diagnosed as a case of vestibular neuritis. Another case (Case 7) of of ischaemic cerebrovascular accident after AZD-1222 vaccine showed pontine infarction on MRI. He presented 4 days after receiving the vaccine with dysarthria and motor, sensory, and visual affection. Of the four patients with ischaemic cerebrovascular accident following tozinameran vaccine, one man (Case 11) presented with sensory affection in addition to ataxia, vertigo, aphasia, dysphagia, dysarthria, and a GCS score of 9 after receiving the first dose of tozinameran vaccine by 12 days. On presentation, his blood sugar was 458, and his HbA1c was 10.3. He was also hypertensive, presenting with a blood pressure of 458/210mm Hg. Additionally, his lipid profile showed high triglyceride, cholesterol, and LDL levels. He was admitted to the ICU for 15 days and his MRI brain showed a large left cerebral infarction. MRA showed left posterior inferior cerebellar artery occlusion. One man (Case 12) presented after receiving the second dose of the tozinameran vaccine by 23 days with motor and sensory affection in addition to dysphagia and dysarthria. He had dyslipidaemia, and on admission, his triglyceride level was 187 mg/dl, and his total cholesterol was 285 mg/dl, while his LDL was 169 mg/dl. MRI and cerebral angiography revealed right middle cerebral artery infarction. One woman (Case 13) who received the second dose of tozinameran vaccine, and then 7 days later, she presented with motor, sensory, and visual affection in addition to aphasia, dysphagia, and dysarthria. She was admitted to the ICU for 18 days, where her MRI and MRA showed left middle cerebellar artery occlusion. One woman ( Case 14) who received the first dose of the tozinameran vaccine and presented 6 days later with motor and sensory affection, in addition to aphasia and dysphagia. Her brain imaging revealed a left middle cerebellar artery occlusion. One woman (Case 15 ) had a transient ischaemic attack after the first dose of tozinameran [Pfizer-BioNTech] vaccine by 8 days. She had an episode of aphasia and dysarthria. Two patients developed neurological complication in the form of seizure (Case 8 and Case 16). A woman (Case 8) presented with an isolated first-time seizure following the first dose of AZD-1222 [Vaxzevria] vaccine within 25 days. Her GCS on presentation was 10, and she was admitted to the ICU. Her MRI and CT brain were normal. She spent a total of 4 days of admission. Additionally, two of the patients who had an ischaemic stroke also presented with first-time seizure. An elderly woman (Case 16) presented with motor, sensory, and visual affection in addition to seizures, vertigo, dysphagia, and dysarthria after receiving the second dose of tozinameran [Pfizer-BioNTech] vaccine by 16 days. She was admitted to the ICU for 8 days. She was a known case of hypertension, diabetes, and epilepsy, and she had been seizure free for years on valproic acid [Depakene]. She had also developed encephalopathy. A man was diagnosed with GBS (Case 17). He presented with muscular weakness 4 days after receiving the second dose of the tozinameran [Pfizer-BioNTech] vaccine. Similarly, another man (Case 18) presented initially with dysphagia and dysarthria 9 days after the first dose of the tozinameran [Pfizer-BioNTech] vaccine, and then he was diagnosed with a GBS variant: Miller Fisher syndrome (MFS). Both did not have any previous comorbidities and were admitted for a total of 7 days, during which they received IV immune-globulin. The number of days between receiving the vaccine and presenting with various neurological complications ranged between 4 and 25 days, while the average days of hospital admission was 8 days.

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