

Cerebral Venous Sinus Thrombosis (CVST) and ST Elevated Myocardial Infarction (STEMI) post COVID-19 vaccination

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Area of Interest: Cardiovascular system Neuroradiology

brain Case Type: Clinical Cases

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Patient: 52 years, male

Clinical History:

A 52-year-old man presented with episodic chest pain and headaches that had been ongoing for 5 weeks post-ChAdOx1nCoV-19 (Astra Zeneca) Vaccine. These symptoms began 2 days after vaccination. Patient described having been infected with COVID-19 the previous year and had a past medical history of gout.

Imaging Findings:

ECG showed an inferior STEMI with troponin peaking at 1231. Bloods on admission; D-Dimer 225, platelets 194, CRP 7, clotting screen NAD, PF4 antibody negative. PCR for COVID-19 negative. Coronary Angiography revealed large thrombus in the Right Coronary Artery (RCA) (Figure 1); aspiration attempted but unsuccessful, patient received a tirofiban infusion. ECHO showed Ejection Fraction (EF) of 55% with Bicuspid type 1 Aortic Valve.

Given the presentation and findings on angiography, a CT venous Sinus was requested. This showed filling defects in the transverse and sagittal sinuses (Figures 2 & 3). MRI head was then performed which showed evidence of acute lacunar infarctions and signal alterations in the right transverse and sigmoid sinuses in keeping with CVST (Figures 4 & 5).

Patient was stable on discharge after having been an in-patient for a week. Patient sent home with 6 months anticoagulation and outpatient follow up from Haematology, Cardiology and Stroke.

Discussion:

Post-COVID-19 vaccination thrombosis has been noted in the literature with several COVID-19 vaccines, including ChAdOx1nCoV-19 (Astra Zeneca) [1]-[3]. We present a case of not only CVST but also arterial thrombosis occurring in the RCA leading to a STEMI in a patient negative for PF4 antibodies.

Symptoms of CVST will typically involve headache [4] and/or focal neurological presentations [5]. Initial investigations for these patients should include a coagulation screen, D-Dimer and PF4 Antibodies [6]. Imaging should include Head CT venogram along with MRI angiography to identify location of sinus venous thrombosis [6]. Guidance suggests starting anticoagulation treatment for these patients as a soon as the benefits of treatment outweigh any risk of bleeding [6]. Previous studies indicate the incidence of CVST post AZ vaccine to be around 2.5 per million vaccinated people [7].

For presentations of chest pain with ECG changes involving the ST segment, the local standard investigative pathway should be followed to rule out MI. Smadja et al. [8] noted differences between the rates of venous thrombosis to arterial thrombosis between different COVID-19 vaccines. For the Astra Zeneca vaccine, it was found to be more evenly shared (52.2% vs 48.2 % respectively) however, with mRNA vaccines there was found to be an imbalance towards arterial thrombotic events (31.8% vs 67.9% for Pfizer and 24.6% vs 77.6% for Moderna) [8]. Clinicians should be aware of the increased venous thrombosis risk when assessing patients who are in the AZ vaccine group.

Diagnosis of cerebral venous sinus thrombus (CVST) can be made on Head CT venogram (CTV) and MRI Head venogram (MRV) [4]. Direct or indirect (via ischaemic or vascular changes e.g., filling defects) visualisation of the clot are the key findings in elucidating a diagnosis [9]. Confirmation of RCA thrombus was made via direct visualisation on coronary angiography as would be typical in such presentations.

Patients' symptoms had resolved and was stable on discharge. He began 6 months anticoagulation treatment. He was given follow-up outpatient appointments with Haematology, Cardiology and Stroke as well repeat CTV and MRV scans before these appointments.

CVST post-COVID-19 vaccine has been discussed at length in the literature; clinicians should be aware that not only is the risk of venous thrombosis increased in the Astra Zeneca patient group, but arterial thrombosis events can also occur concurrently, leading to the presentation described in this case study.

Differential Diagnosis List: RCA Thrombus and Cerebral Venous Sinus Thrombosis post COVID-19 Vaccine, Cavernous Sinus Syndromes , Head Injury/ intra-cranial haemorrhage , 6th cranial nerve palsies, PE , Angina , Pericarditis

Final Diagnosis: RCA Thrombus and Cerebral Venous Sinus Thrombosis post COVID-19 Vaccine

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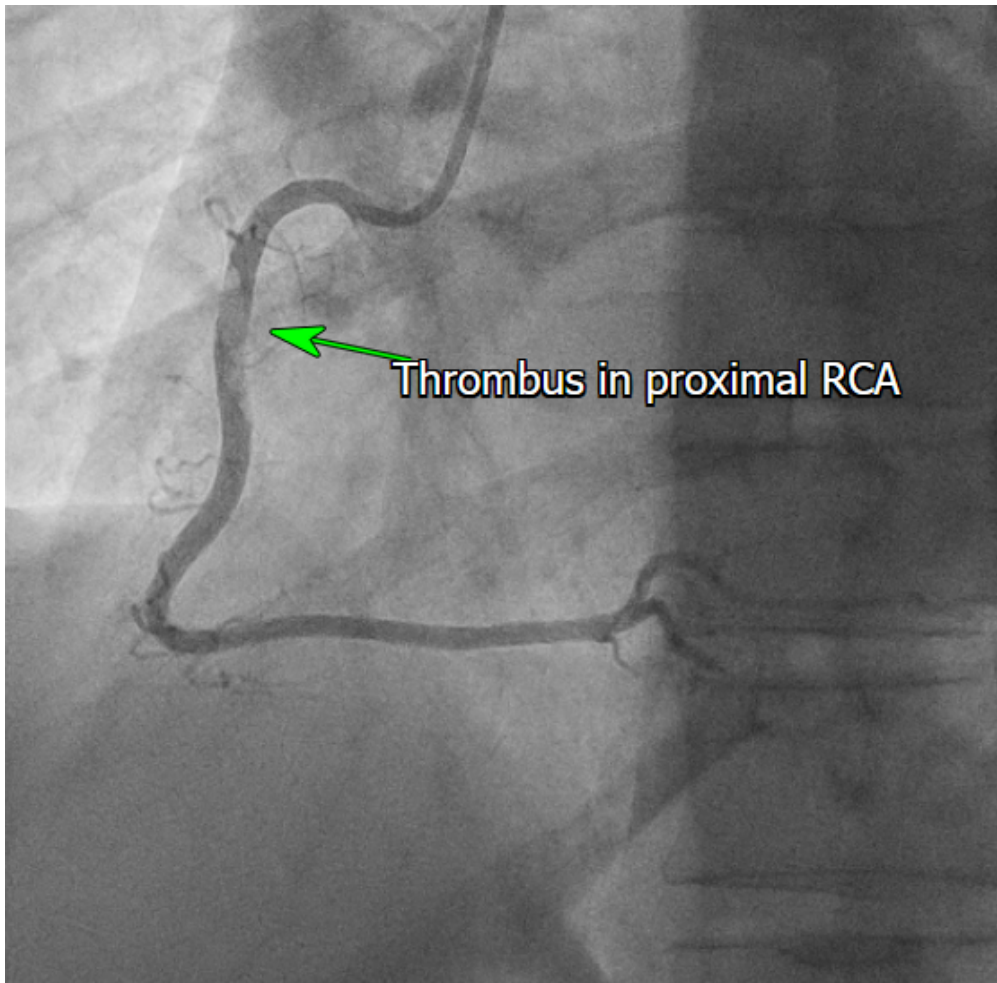
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Figure 1

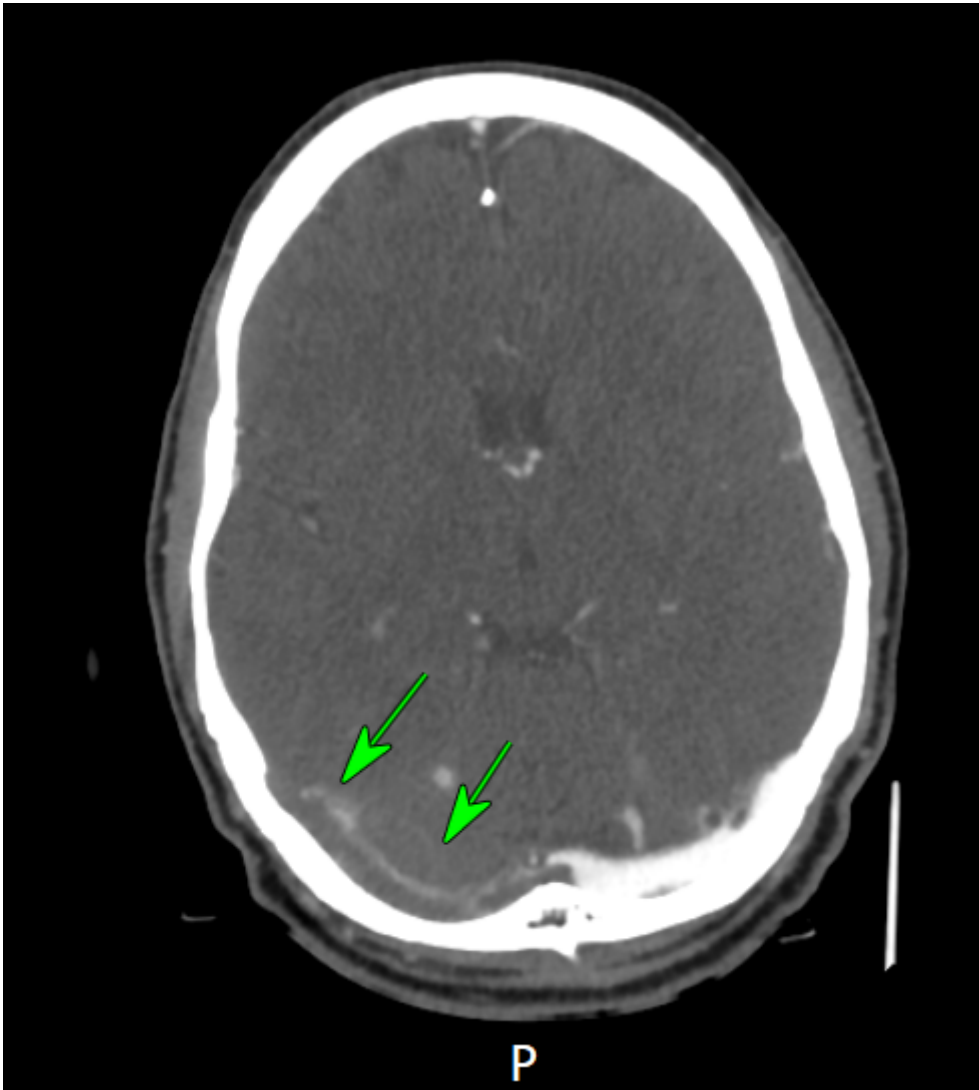
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Description: Angiogram showing Thrombus in proximal RCA **Origin:** Basildon & Thurrock Hospital, United Kingdom

Figure 2

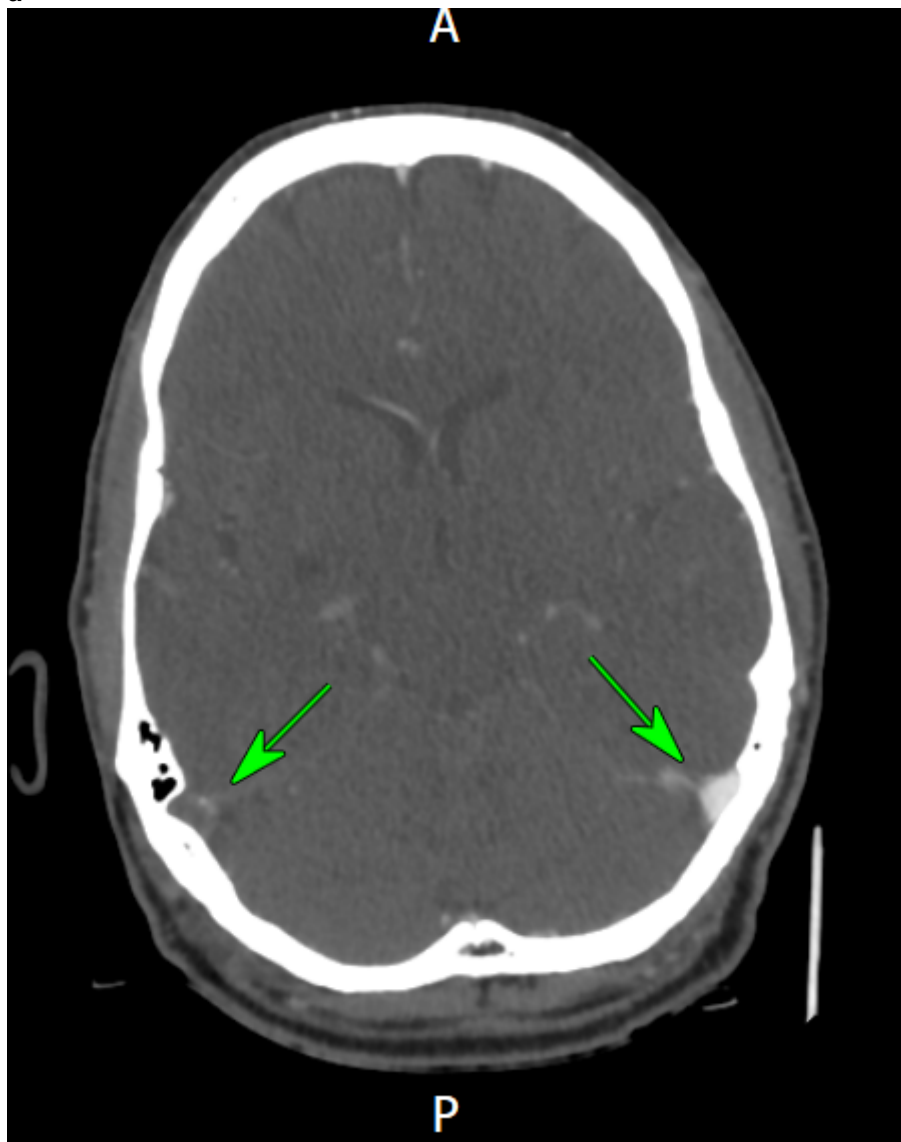
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Description: CT Venogram showing filling defect in right transverse sinus **Origin:** Basildon & Thurrock Hospital, United Kingdom

Figure 3

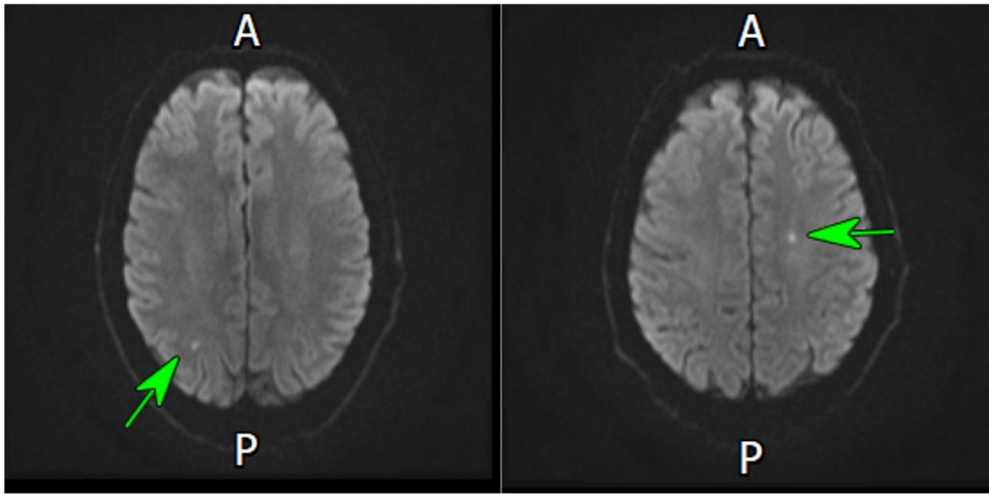
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Description: CT Venogram showing empty delta sign suggestive of venous sinus thrombosis **Origin:** Basildon & Thurrock Hospital, United Kingdom

Figure 4

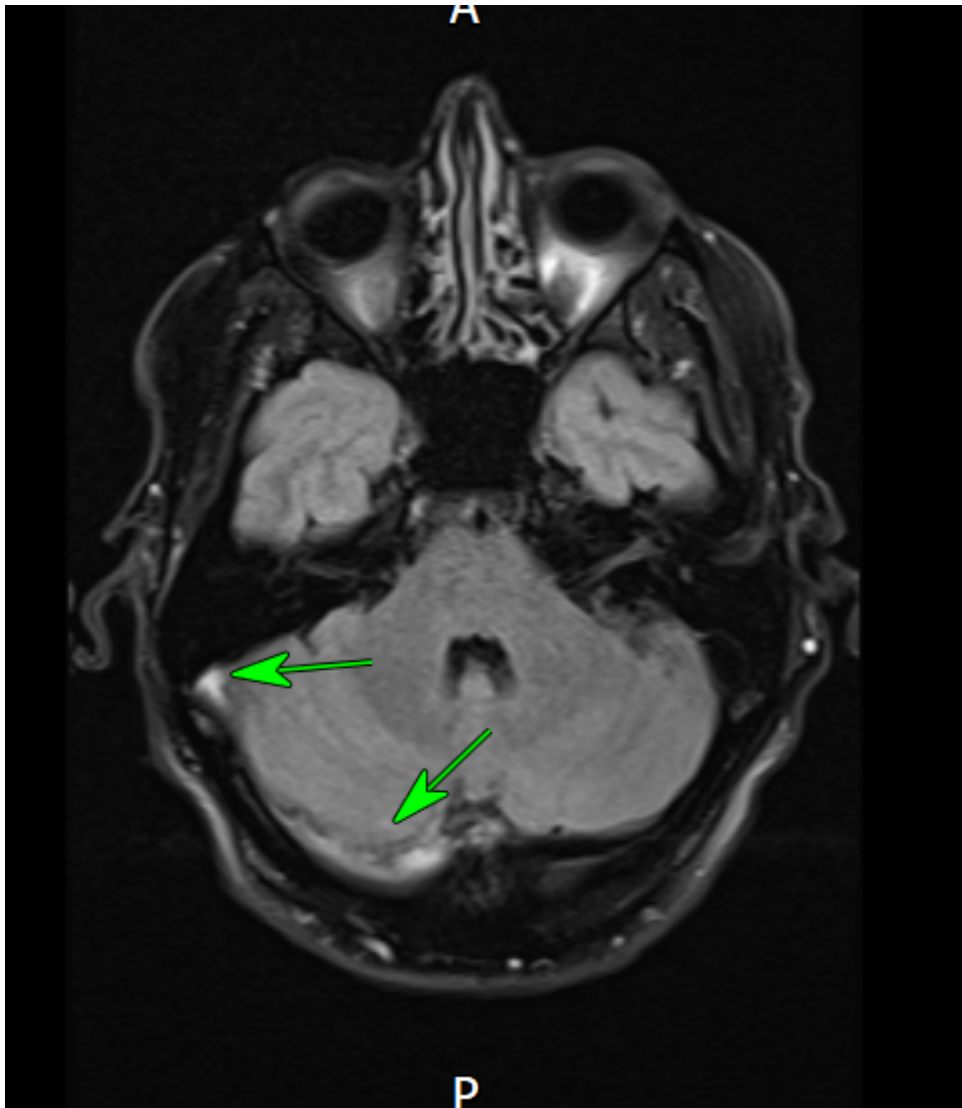
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Description: A couple of small acute lacunar infarcts showing restricted diffusion in bilateral centrum semiovale **Origin:** Basildon & Thurrock Hospital, United Kingdom

Figure 5

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Description: Flow void in right transverse and sigmoid sinuses on axial FLAIR sequence in keeping with dural venous sinus thrombosis **Origin:** Basildon & Thurrock Hospital, United Kingdom