Management of cerebral venous sinus thrombosis following Covid-19 vaccination
A neurosurgical guide

This guidance should be read in conjunction with the latest guidance on 'Blood Clotting following COVID-19 Vaccination' at:
www.gov.uk/government/collections/covid-19-vaccination-and- blood-clotting

Background

There are increasing reports of a rare adverse event of thrombosis and thrombocytopaenia following the first dose of the AstraZeneca nCoV-19 vaccine[1], a syndrome labelled as VITT (vaccine-induced thrombotic thrombocytopaenia) [2]. An increasing trend with decreasing age has been noted, and a number of cases have also been reported following the Johnson & Johnson vaccine which also uses an adenovirus vector. Such cases typically present with thrombotic events predominantly affecting the cerebral venous sinuses, as well as pulmonary embolism and arterial ischaemia [3][4]. CVST is a rare condition affecting 5 per million annually accounting for 1% of all strokes [5].

The spectrum of severity and presentation of VITT is not yet known. A number of cases with intracerebral haemorrhage secondary to cerebral venous sinus thrombosis (CVST) have also been reported in the absence of thrombocytopaenia, and it is unclear whether these are a less severe form of VITT.

Features of the syndrome include:

- Presentation within 5-30 days post vaccination
- Thrombocytopaenia with platelets <150x10^9/L
- Elevated D-dimer (probable cases 2000-4000µg/L; likely cases >4000µg/L)
- Antibodies to platelet factor 4 (PF4)

Principles of management include:

- Early treatment with ivIg
- Avoiding platelet transfusion unless surgical intervention required
- Anticoagulation with non-heparin based agents if fibrinogen is >1.5 g/L and platelets >30 x10^9/L

Neurosurgical considerations

Intracerebral haematoma (ICH) is a common pathology accounting for approximately 10% of neurosurgical referrals. ICH secondary to extensive CVST is rare, but should be considered as a diagnostic possibility in the context of recent Covid-19 vaccination, particularly in the absence of other known risk factors.

Additional information for referrals with ICH

- Recent history of Covid-19 vaccination, including date of immunisation and brand
- Alternative risk factors for ICH e.g. hypertension
- Platelet count, coagulation profile, fibrinogen and D-dimer

Consideration of CTV in addition to existing diagnostic protocols

- All patients with an ICH and 1 or more features of VITT within 30 days of Covid-19 vaccination

Suspected cases or vaccination status unclear

- Lobar or multi-focal ICH with or without associated infarction crossing typical arterial boundaries
- Symptoms suggestive of CVST
    - Diffuse and/or progressive headache
    - Visual disturbance
    - Pulsatile tinnitus
- Alternative cause of ICH less likely
    - Age <60 years
    - No history of coagulopathy or hypertension

Management of suspected VITT-related CVST

- Requires multidisciplinary care with joint input from haematology, neurology and neurosurgery

- Consider transfer to neuroscience centre if:
  - Evidence of CVST with associated ICH or mass effect
  - Extensive venous thrombosis involving dominant side or bilateral occlusion
  - Deteriorating conscious level (GCS<15) or other clinical features of concern

- Primary treatment is with intravenous immunoglobulin and/or alternative interventions to neutralise the auto-antibodies (e.g. steroids or plasma exchange). Platelet transfusion for correction of thrombocytopaenia should be avoided unless required for surgical intervention.

- If neurosurgical procedure indicated (e.g. intracranial pressure monitoring, external ventricular drain, haematoma evacuation, or decompressive craniectomy) and thrombocytopenia needs to be corrected, then platelet transfusion may be given if primary treatment has been instituted.

- For significant CVST consider mechanical thrombectomy to restore venous outflow

- The benefit of surgery, particularly decompressive craniectomy, for refractory raised intracranial pressure secondary to CVST remains uncertain and should be decided on a case by case basis.

Reporting

- National Expert Haematology MDT panel / PHE
  https://snapsurvey.phe.org.uk/snapwebhost/s.asp?k=161706705032
- MHRA (Yellow card system)
  https://coronavirus-yellowcard.mhra.gov.uk

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Alexis Joannides
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References

[1] Public Health England, 'Blood Clotting following COVID-19 Vaccination: Information for Health Professionals', p. 7, Apr. 2021.

[2] N. H. Schultz *et al.*, 'Thrombosis and Thrombocytopenia after ChAdOx1 nCoV-19 Vaccination', *n engl j med*, p. 7, 2021.

[3] Expert Haematology Panel, 'Guidance produced from the Expert Haematology Panel (EHP) focussed on Covid-19 Vaccine induced Thrombosis and Thrombocytopenia (VITT)', Apr. 2021.

[4] Neuro Anaesthesia and Critical Care Society, 'Intensive Care guidance for the management of vaccine- associated thrombocytopenia and thrombosis (VATT)'. Apr. 09, 2021.

[5] G. Saposnik *et al.*, 'Diagnosis and management of cerebral venous thrombosis: a statement for healthcare professionals from the American Heart Association/American Stroke Association', *Stroke*, vol. 42, no. 4, pp. 1158–1192, Apr. 2011, doi: 10.1161/STR.0b013e31820a8364.