Under Pressure: A Case of Acute Compartment Syndrome/VITT after the Covid-19 Vaccine

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Background

- Vaccines have proven essential in managing the global health crisis caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2).
- Following widespread vaccination efforts, cases of unusual thrombosis and thrombocytopenia after the receipt of JNJ-78436735 (Johnson & Johnson) vaccine have been reported in the literature

Case Presentation

A 33 year old Caucasian male with no significant past medical history presented to the ED with progressively worsening calf pain over 24 hours. Review of systems was negative for recent illness, chest pain, palpitations, shortness of breath, hemoptysis, recent trauma, surgery, travel, prolonged immobilization, history of malignancy, or previous Covid infection. He also denied any personal or family history of thrombosis. He denied chronic medications at home. Social history was otherwise remarkable for a remote history of tobacco and marijuana use but none within the last 12 months. Patient had no significant risk factors for thrombosis with the exception of receiving his first dose of the JNJ-78436735 vaccine approximately 10 days prior to presentation.

Physical exam revealed pain out of proportion, paresthesias, mottling of the medial calf and poikilothermia of the distal right leg. Pulses 1+ in the dorsalis pedis and posterior tibial arteries. Stat CTA of the abdomen with runoff was obtained revealing diffuse occlusion of the right popliteal artery and complete occlusion of the right posterior tibial artery.

Treatment was initiated with heparin drip and patient required thrombectomy of the popliteal, anterior tibial and posterior tibial arteries in addition to fasciotomies of the medial and lateral compartments of the right leg for restoration of blood flow.

Further work up revealed severe thrombocytopenia with essential morphology, aPTT, PT and INR were prolonged and PF4 antibodies returned positive at >4.001 (normal </= 0.399).

Based on these results, the patient was diagnosed with vaccine induced immune thrombotic thrombocytopenia (VITT). He was treated with methylprednisone and IVIG with resolution of his thrombocytopenia. He was continued on rivaroxaban for long-term anticoagulation.

Discussion

VITT is a new syndrome identified in individuals who received certain adenoviral-vectored vaccines against SARS-CoV-2 infections. Risk factors of this extremely rare but life-threatening complication are not well understood, however, two vaccines, namely the ChAdOx1-s (AstraZenica) and the JNJ-78436735 (Johnson & Johnson) vaccine have been implicated.

This case specifically focuses on the JNJ-78436735 vaccine. Per case reports, the condition usually manifests within 30 days after the first vaccination and most patients present with thrombosis. Various locations have been reported with cerebral vein thrombosis being the most common. Other reported presentations include embolic stroke, splanchnic vein thrombosis, pulmonary embolism, lower extremity DVT and acute limb ischemia.

VITT was recently coined to describe this relatively new phenomenon which mimics heparin-induced thrombocytopenia (HIT) in many aspects without requiring prior heparin exposure. Individuals affected by both HIT and VITT have positive antibodies against platelet factor 4 (PF4). Since VITT's constellation of clinical and laboratory features mimics HIT, an adapted 4Ts score can be used in clinical settings to determine likelihood. The low incidence of VITT makes the validation of positive predictive value exceedingly challenging. Notably, the patient discussed above had an adapted score of 8 indicating high probability.

A positive PF4 antibody test (enzyme-linked immunosorbent assay [ELISA] or function test) is currently gold standard for confirmation however VITT remains a diagnosis of exclusion and other causes of thrombocytopenia and thrombosis should be thoroughly investigated and excluded.

Treatment remains uncertain however the mainstay for VITT management includes therapeutic dose anticoagulation and IVIG. It may be prudent to avoid unfractionated or low-molecular weight heparin if HIT is on the differential. In refractory disease and critical bleeding, plasma exchange and platelet transfusions can be considered respectively. Continued monitoring after discharge is encouraged as thrombocytopenia reflects ongoing antibody-induced platelet activation. Increasing fibrinogen levels and decreasing anti-PF4 antibodies and d-dimer levels can be utilized to reflect the efficacy of therapy.

VITT Adapted 4Ts Score

Parameter	Point(s)
Thrombocytopenia	
Platelet count 10,000 – 99,000/microL	2
Platelet count <10,000/microL or 100,000 to 149,000/microL	1
Platelet count ≥150,000/microL	0
Thrombosis	
Definite thrombosis or D-dimer >10 mg/L (>10,000 ng/mL)	2
Suspected (not documented) thrombosis or D-dimer 2.00 to 9.99 mg/L (2000 to 9990 ng/mL)	1
No thrombosis and D-dimer <2 mg/L (<2000 ng/mL)	0
Other causes of thrombosis or thrombocytopenia	
None apparent	2
Possible	1
Definite	0

- Interpretation
  - 0-3 points – low probability
  - 4-5 points – intermediate probability
  - 6-8 points – high probability

Conclusion

The following case highlights the potentially life-threatening complication of arterial thrombosis associated with the JNJ-78436735 vaccine triggering acute compartment syndrome - a surgical emergency. Recognition of this syndrome is critical to the institution of appropriate therapy and prevention of ischemic necrosis of an extremity.

References

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