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Concomitant Peripheral and Pulmonary Arterial Thromboembolism 35 Days After SARS-CoV-2 mRNA Vaccine

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What is known on this subject?

Although several European countries reported cases of thromboembolism accompanied by thrombocytopenia following ChAdOx1 (Oxford-AstraZeneca) vaccine, such an association was rarely reported after vaccination with BNT162b2 (Pfizer–BioNTech).

What this study adds?

We present the case of an otherwise healthy patient who developed concomitant acute limb ischemia and extensive pulmonary embolism following the first dose of BNT162b2 vaccine.

ABSTRACT

Although thromboembolism after ChAdOx1 vaccine has been extensively reported, this association was rarely reported after vaccination with BNT162b2. We present the case of an otherwise healthy patient who developed concomitant acute limb ischemia and extensive pulmonary embolism (PE) 35 days after the first dose of BNT162b2 vaccine. Fogarty balloon thrombectomy was performed using open femoral artery exposure, and limb perfusion was restored. Reperfusion strategies were not used for treating PE due to low risk on prognostic assessment. The patient made an uneventful recovery, and she was discharged home on postoperative day 5 on warfarin, and remains symptom-free in a 3-month follow-up. Even though thromboembolic events following BNT162b2 are very rare, concomitant venous and arterial thromboembolism may occur in patients as late as 35 days after vaccination. However, the risk of thromboembolism following BNT162b2 vaccination appears significantly lower compared with severe acute respiratory syndrome-coronavirus-2 infection itself.

Keywords: BNT162b2, coronavirus 2019, vaccination

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Introduction

It has been well established that coronavirus disease-2019 (COVID-19), the multi-systemic disease caused by severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2), is associated with venous and arterial thromboembolic events across multiple organ systems (1). SARS-CoV-2 vaccines reduce the rate of thromboembolism as they prevent symptomatic and severe disease (2). Although several European countries reported cases of thromboembolism accompanied by thrombocytopenia following ChAdOx1 (Oxford-AstraZeneca) vaccine, such an association was rarely reported after vaccination with BNT162b2 (Pfizer-BioNTech) (2,3,4). We present the case of an otherwise healthy patient who developed concomitant acute limb ischemia

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(ALI) and extensive pulmonary embolism (PE) following the first dose of BNT162b2 vaccine.

Case Report

A 62-year-old woman presented with dyspnea and a cold, painful left lower limb. Her medical past was insignificant except for a right total knee replacement that occurred 2 months ago. The patient had recovered from surgery and was already mobile. She had received the first dose of BNT162b2 mRNA vaccine 35 days before presentation. On physical examination, she was slightly tachypneic with normal blood pressure and heart rate. The electrocardiogram showed a sinus rhythm. Heart and lung sounds were normal. Her left lower extremity was cyanotic and cold with absent popliteal and pedal pulses, minimal sensory loss, and normal motor function. Doppler signals distal to the left femoral pulse were inaudible. Laboratory tests revealed normoxia, hypocapnia, a D-dimer level of 5.61 µg/mL (normal range <0.5 µg/mL), and a platelet count of 171,000 per µL. Computed tomography angiography of the lower extremities and pulmonary arterial system demonstrated thrombotic occlusion of the left external iliac artery (Figure 1) and bilateral PE (Figure 2). There were not any signs of right ventricular overload or dysfunction, intracardiac thrombi, or any septal defects on the transthoracic echocardiographic examination. Venous duplex ultrasound of the extremities was negative for deep vein thrombosis. A COVID-19 polymerase chain reaction test was also negative. The patient was immediately anticoagulated using unfractionated heparin, and transferred to the operating room for the surgical treatment of ALI. Fogarty balloon thrombectomy was performed using open femoral artery exposure, and limb perfusion was restored. Reperfusion strategies were not used for treating PE due to low risk on prognostic assessment. Genetic thrombophilia testing did not demonstrate an increased risk of thromboembolism. Lupus anticoagulant and anti-cardiolipin antibodies were negative. The patient made an uneventful recovery, and she was discharged home on postoperative day 5 on warfarin, and remains symptom-free in a 3-month follow-up.

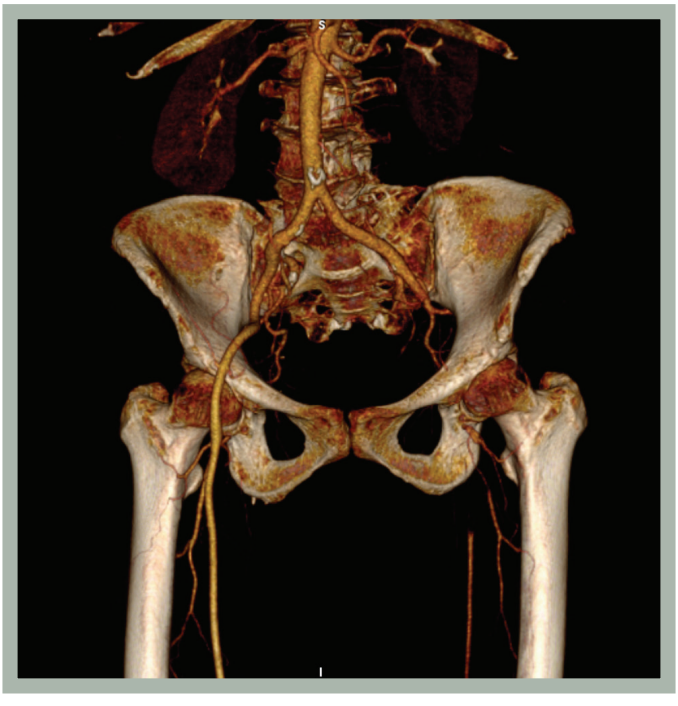

Figure 1. Three dimensional reconstruction of contrast enhanced computed tomography scan demonstrating left external iliac artery thrombosis

Discussion

The current report describes the occurrence of concomitant pulmonary and peripheral arterial thromboembolism following immunization with the BNT162b2 vaccine. There is no direct evidence that thromboembolic events observed in this particular patient were caused by vaccination; however, we failed to demonstrate any other causes of arterial and venous thromboembolism, such as a proximal source or genetic predisposition.

Thromboembolism after ChAdOx1 has been extensively reported, yet such association was rarely reported after BNT162b2 (2,3,4). A recent self-controlled case series study by Hippisley-Cox et al. (5) analyzed over 29 million people in England who received the first doses of ChAdOx1 or BNT162b2 mRNA vaccines and approximately 2 million people with a positive COVID-19 test. The outcomes were hospital admission or death associated with thrombocytopenia or

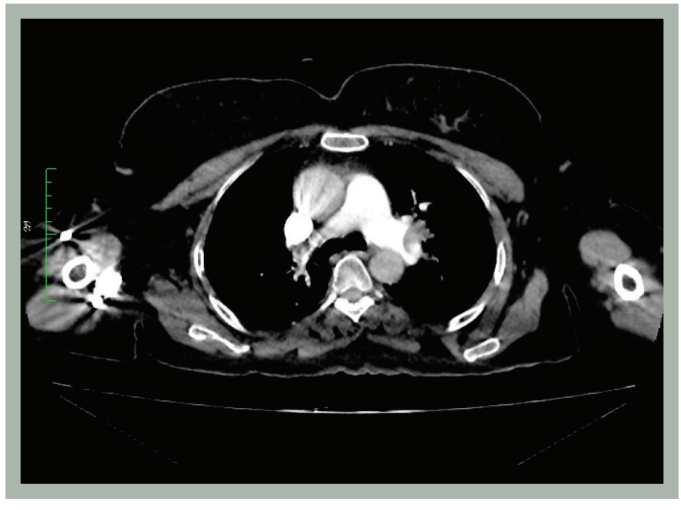

Figure 2. Contrast enhanced computed tomography scan demonstrating left main pulmonary artery thromboembolism

thromboembolism within 28 days of vaccination or COVID-19 infection. The authors reported that vaccination with ChAdOx1 was associated with increased risks of thrombocytopenia, venous thromboembolism, and rare arterial thromboembolic events. They also reported that vaccination with BNT162b2 increased the risk of arterial thromboembolism, and both vaccines increased the likelihood of cerebral venous sinus thrombosis. However, they also reported that all of the above-mentioned complications were more commonly observed and more prolonged after SARS-CoV-2 infection in the same population (5). Therefore, it can be interpreted that SARS-CoV-2 vaccination protects against thromboembolism during the COVID-19 pandemic.

Another study by Sessa et al. (6) included women ≤50 years of age and concluded that mRNA vaccines did not show disproportional reporting of thromboembolic events compared to hormonal contraception. Moreover, others reported that the risk of thromboembolism was not increased 14 days (7), 21 days (8), and 42 days (9) following immunization with BNT162b2. Considering the accumulating evidence, the European Medical Agency has stated that the benefits of vaccination against SARS-CoV-2 continue to outweigh the risk of side effects (10).

Even though thromboembolic events following BNT162b2 are very rare, concomitant venous and arterial thromboembolism may occur in patients as late as 35 days after vaccination. However, the risk of thromboembolism following BNT162b2 vaccination appears significantly lower compared with SARS-CoV-2 infection itself.

Take home messages

• Thromboembolic events may be rarely be observed following BNT162b2 vaccination.

• The risk of thromboembolism following BNT162b2 vaccination appears significantly lower compared with SARS-CoV-2 infection itself.

Ethics

Informed Consent: Informed consent has been obtained from the patient for publication of the case report and accompanying images.

Peer-review: Internally peer-reviewed.

Authorship Contributions

Surgical and Medical Practices: A.C.T., A.E., N.K., M.Y., Concept: A.C.T., A.E., N.K., M.Y., Design: A.C.T., A.E., N.K., M.Y., Data Collection or Processing: A.C.T., A.E., N.K., M.Y., Analysis or Interpretation: A.C.T., A.E., N.K., M.Y., Literature Search: A.C.T., A.E., N.K., M.Y., Writing: A.C.T., A.E., N.K., M.Y.

Conflict of Interest: No conflict of interest was declared by the authors.

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REFERENCES

1. Malas MB, Naazie IN, Elsayed N, Mathlouthi A, Marmor R, Clary B. Thromboembolism risk of COVID-19 is high and associated with a higher risk of mortality: a systematic review and meta-analysis. EClinicalMedicine 2020;29:100639.
2. Konstantinides SV. Thrombotic complications of vaccination against SARS-CoV-2: what pharmacovigilance reports tell us - and what they don't. Eur Respir J 2021;58:2101111.
3. Smadja DM, Yue QY, Chocron R, Sanchez O, Lillo-Le Louet A. Vaccination against COVID-19: insight from arterial and venous thrombosis occurrence using data from VigiBase. Eur Respir J 2021;58:2100956.
4. Schultz NH, Sørvoll IH, Michelsen AE, et al. Thrombosis and thrombocytopenia after ChAdOx1 nCoV-19 Vaccination. N Engl J Med 2021;384:2124-2130.
5. Hippisley-Cox J, Patone M, Mei XW, et al. Risk of thrombocytopenia and thromboembolism after COVID-19 vaccination and SARS-CoV-2 positive testing: self-controlled case series study. BMJ 2021;374:n1931.
6. Sessa M, Kragholm K, Hviid A, Andersen M. Thromboembolic events in younger women exposed to Pfizer-BioNTech or Moderna COVID-19 vaccines. Expert Opin Drug Saf 2021;20:1451-1453.
7. Jabagi MJ, Botton J, Bertrand M, et al. Myocardial infarction, stroke, and pulmonary embolism after BNT162b2 mRNA COVID-19 vaccine in people aged 75 years or older. JAMA 2022;327:80-82.
8. Klein NP, Lewis N, Goddard K, et al. Surveillance for adverse events after COVID-19 mRNA vaccination. JAMA 2021;326:1390-1399.
9. Barda N, Dagan N, Ben-Shlomo Y, et al. Safety of the BNT162b2 mRNA COVID-19 vaccine in a nationwide setting. N Engl J Med 2021;385:1078-1090.
10. Franchini M, Liumbruno GM, Pezzo M. COVID-19 vaccine-associated immune thrombosis and thrombocytopenia (VITT): Diagnostic and therapeutic recommendations for a new syndrome. Eur J Haematol 2021;107:173-180.