

# An upper limb deep vein thrombosis (DVT) after receiving inactivated virus COVID-19 vaccine (Sinopharm vaccine): a case report

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## Abstract

Chinese COVID-19 vaccine named BBIBP-CorV (Sinopharm vaccine) is an inactivated whole virus vaccine to prevent COVID-19 disease. Previous studies concluded that inactivated COVID-19 vaccines do not increase the risk of thrombosis. In this report, we present the first upper limb DVT case after receiving this kind of vaccine.

## Title page

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**Ethics:** This study was performed according to the principles outlined by the World Medical Association's Declaration of Helsinki on experimentation involving human subjects, as revised in 2000, and has been approved by the ethics committee of the Tabriz University of Medical Sciences with the approval number of IR.TBZMED.REC.1401.159 on the date of 2022/05/11.

**Consent statement:** The patient was informed regarding the publishing of this case report and written informed consent was obtained from the patient to publish this report. Consent has been signed and collected in accordance with the journal's patient consent policy.

**Abstract:** Chinese COVID-19 vaccine named BBIBP-CorV (Sinopharm vaccine) is an inactivated whole virus vaccine to prevent COVID-19 disease. Previous studies concluded that inactivated COVID-19 vaccines do not increase the risk of thrombosis. In this report, we present the first upper limb DVT case after receiving this kind of vaccine.

**Keywords:** COVID-19, COVID-19 Vaccines, Sinopharm BIBP COVID-19 vaccine, Deep Vein Thrombosis

#### **Abbreviations:**

DVT: Deep Vein Thrombosis

WHO: World Health Organization

CT: Computerized Tomography

VITT: Vaccine-Induced Immune Thrombotic Thrombocytopenia

CVT: Cerebral Venous Thrombosis

PTE: Pulmonary Thromboembolism

SVT: Splanchnic Vein Thrombosis

**Introduction:** Upper limb deep vein thrombosis (DVT) is a rare condition, which occurs as a result of thrombosis in the axillary, subclavian or brachiocephalic veins. According to previous studies, it occurs spontaneously in 20% of patients and develops secondary to some risk factors in 80% of them.<sup>1-3</sup> These risk factors are related to Virchow’s triad; venous flow stasis, venous wall injury, and hypercoagulability.<sup>3</sup> Although upper limb DVT seems to be benign, it has considerable morbidity and mortality rate and leads to serious problems such as pulmonary embolism, loss of vascular access, superior vena cava syndrome, and post-thrombotic syndrome. So, we have to take it more seriously.<sup>1-3</sup>

COVID-19 disease is a multisystem infectious disease and affects several organs and systems including respiratory, cardiovascular, gastrointestinal, neurologic, coagulation, and immune system.<sup>4</sup> Although certain management and treatment against COVID-19 have not been released yet, several vaccines are used around the world to control and prevent this pandemic disease.<sup>5</sup> Chinese COVID-19 vaccine named BBIBP-CorV (Sinopharm vaccine) is an inactivated whole virus vaccine that was the fifth authorized vaccine by World Health Organization (WHO) for emergency use in May 2021 and has a 79% efficacy rate.<sup>6,7</sup> This vaccine requires two doses with an interval of 21 to 28 days. It is authorized by several countries and used widely in the Asian population.<sup>5-7</sup>

It has mild side effects including dizziness, fatigue, headache, nausea, vomiting, fever, and injection site reactions.<sup>6</sup> A cohort study by Liu et al.<sup>8</sup> in 2021 concluded that inactivated COVID-19 vaccines do not increase the risk of thrombosis. In this report, we present a 23-year-old man who came to the emergency department with the chief complaint of severe pain, generalized inflammation, and swelling of the right upper limb after getting his second dose of the Sinopharm vaccine.

**Case Presentation:** A 23-year-old right-hand-dominant man came to the emergency department with the chief complaint of severe pain, generalized inflammation, and swelling of the right upper limb. He stated that this pain started within 24 hours after receiving his second dose of the Sinopharm COVID-19 vaccine to the right deltoid muscle about a month before referring to the hospital. By the time, he noticed progressive inflammation and swelling in his right arm; and a week before referring, the pain and swelling started to intensify in a way that he couldn’t tolerate. So, he self-referred to the emergency department.

He was an employee, and he did not do manual labor. He didn’t have any past medical history or any history of COVID-19 disease. He didn’t use any medication, didn’t mention any specific familial medical history, and didn’t have a recent history of surgery or trauma. He was a 2-pack-years smoker.

At First, physical examinations were performed in the emergency department, and the most important finding was the difference in the size of two limbs by 4 centimeter in the mid-arm (The right upper limb was larger). He had generalized swelling, erythema, pitting edema, and tenderness in his right arm. The pulse of the right radial artery was weak (+1). He didn’t have any lymphadenopathy on general examination.

His initial lab tests were normal and there were no significant findings. Color-doppler ultrasonography of the right upper limb was requested and the radiologist’s statement was as follows: The distal half of the axillary vein and the entire length of the subclavian vein are dilated and incompressible. Echogenic thrombosis is seen within them (Diagnosis: Right Upper Limb Deep Vein Thrombosis). Computerized tomography (CT) angiography of the chest was negative for pulmonary embolism, and there was no evidence of mass and lymphadenopathy.

According to the diagnosis (right upper limb DVT), he was admitted to the general ward, and treatment was started. Rivaroxaban was prescribed for 6 days in the hospital, and after 6 days of hospitalization, his symptoms of right upper limb swelling and pain relatively improved. He was discharged on Rivaroxaban 15 mg twice a day for 21 days, and then 20 mg daily for 3 months.

During hospitalization, several lab tests were requested to investigate the cause and etiology of the DVT. The thrombophilia tests were negative including factor V Leiden, protein C, protein S, and antiphospholipid antibodies.

He was followed up for 6 months, he was not re-admitted after discharging and didn’t have any new com-

plaints. Mild swelling and pain continued for 3 months and then improved. Due to the fact that he was right-handed, his life and job were affected.

**Discussion:** COVID-19 disease causes thrombotic complications such as venous thromboembolism.<sup>4</sup> A meta-analysis study by Tan et al.<sup>9</sup> in 2021 was performed on 102 studies involving 64503 patients. In this study, the frequency rate of COVID-19-related venous thromboembolism events was 14.7% to 17.6%, and the frequency of COVID-19-related arterial thrombotic events was about 3.9%.<sup>9</sup> These events were more common among critically ill patients who were admitted to the intensive care unit.<sup>10</sup>

Previous studies concluded that some of the COVID-19 vaccines increase the risks of thrombosis and coagulopathy.<sup>10</sup> In late February 2021, a number of thrombotic events named vaccine-induced immune thrombotic thrombocytopenia (VITT) were reported in relation to adenoviral vector-based vaccines such as ChAdOx1-S/nCoV-19 (AstraZeneca vaccine) and Ad26.COV2.S (Johnson & Johnson/Janssen vaccine). These events were associated with thrombocytopenia and occurred in various sites such as cerebral venous thrombosis (CVT), deep vein thrombosis (DVT), pulmonary thromboembolism (PTE), and splanchnic vein thrombosis (SVT). A significant mortality rate was reported.<sup>10,11</sup>

A cohort study by Liu et al.<sup>8</sup> in 2021 was designed and performed to investigate whether inactivated virus COVID-19 vaccines such as the Sinopharm vaccine induces thrombosis or not. In this study, 406 healthcare workers who had received two doses, 21 days apart, were included and it was concluded that inactivated whole virus vaccines do not increase the risk of thrombosis.<sup>8</sup>

A study by Hameed et al.<sup>12</sup> in 2022 discussed four cases of cerebral venous thrombosis after receiving inactivated COVID-19 vaccines (Sinopharm and Sinovac vaccine) and to our knowledge, there are two case reports of VITT associated with the Sinopharm vaccine.<sup>13,14</sup>

Although upper limb DVT itself is a rare condition and represents about 11% of all DVTs in the general population,<sup>2</sup> a study by Chen et al.<sup>3</sup> in 2018 predicted that the prevalence of this condition will increase. Because of dangerous complications of Upper limb DVT such as pulmonary embolism, early diagnosis and treatment are important.<sup>3</sup>

To our knowledge, there are some case reports of acute upper limb deep vein thrombosis after getting mRNA Covid-19 vaccines including mRNA-1273 (Moderna vaccine) and BNT162b2 (Pfizer-BioNTech vaccine) vaccines.<sup>15-18</sup> In comparison between our report and other case reports, the results are relatively similar as follows:

In all cases, there were negative results of thrombophilia workups. In all cases, there was no evidence of thrombocytopenia, so they were in contrast to adenoviral vector COVID-19 vaccines such as ChAdOx1-S/nCoV-19 (AstraZeneca vaccine) and Ad26.COV2.S (Johnson & Johnson/Janssen vaccine), and should not be listed in the group of vaccine-induced immune thrombotic thrombocytopenia (VITT).

In conclusion, according to the imaging findings, laboratory and thrombophilia tests, and previous studies our case can be introduced as the first upper limb DVT case after receiving inactivated whole virus COVID-19 vaccine.

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#### **Author Contributions:**

Ali Riazi: Conception and design of the report - Patient management and Follow-up

Masood Faghieh Dinevari: Conception and design of the report - Supervision

Samaneh Abbasian: Drafting the manuscript - Revising the article

Amirreza Jabbaripour Sarmadian: Data collection - Drafting the manuscript

All authors have read and approved the final manuscript.

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