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A CASE OF AUTOIMMUNE COMPLICATIONS FOLLOWING COVID-19 VACCINATION WITH SINOVAC-CORONAVAC (CHINA)

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Abstract

During the COVID-19 pandemic, vaccination in the Republic of Kazakhstan utilized the vaccine SinoVac-CoronaVac (China), which contains a chemically inactivated form of the SARS-CoV-2 virus and an adjuvant to stimulate immunity. A retrospective analysis was conducted on the medical history and observation of a patient, T., born in 1989, who developed overlap syndrome, rheumatoid arthritis, and systemic lupus erythematosus (SLE) after receiving the SinoVac-CoronaVac vaccine.

Blood analysis revealed leukopenia (2.8 × 10^9), thrombocytopenia (104 units/μL), hypochromic anemia (hemoglobin 87 g/L), increased ESR, elevated rheumatoid factor (13.9), increased CRP (70.4), and elevated anti-streptolysin O (218 IU/mL). Antibodies to nuclear antigens (ANA) were also detected (32 units). The patient was treated with hormones, non-steroidal anti-inflammatory drugs, and rituximab.

This case suggests that COVID-19 vaccination with the SinoVac-CoronaVac vaccine activated the immune system and acted as a trigger for the development of autoimmune overlap syndrome. Recognizing the possibility of autoimmune complications enables better patient monitoring and care post-vaccination.

Keywords: *SinoVac-CoronaVac (China), vaccination, COVID-19, overlap syndrome, systemic lupus erythematosus, rheumatoid arthritis.*

Резюме

СЛУЧАЙ АУТОИММУННЫХ ОСЛОЖНЕНИЙ ПОСЛЕ ВАКЦИНАЦИИ ОТ COVID-19 ПРЕПАРАТОМ SINOVAC-CORONAVAC (КИТАЙ)

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Во время пандемии COVID-19 в Республике Казахстан для вакцинации использовалась вакцина SinoVac-CoronaVac (Китай), содержащая химически инактивированную форму вируса SARS-CoV-2 и адъювант для стимуляции иммунитета. Был проведен ретроспективный анализ истории болезни и наблюдения пациента Т., 1989 года рождения, у которого после вакцинации препаратом SinoVac-CoronaVac развился оверлап-синдром, ревматоидный артрит и системная красная волчанка (СКВ).

Анализ крови выявил лейкопению (2,8 × 10^9), тромбоцитопению (104 ед/мкл), гипохромную анемию (гемоглобин 87 г/л), повышенную СОЭ, увеличенный ревматоидный фактор (13,9), повышенный уровень С-реактивного белка (70,4) и повышенный антистрептолизин О (218 МЕ/мл). Также были обнаружены антитела к ядерным антигенам (ANA) (32 единицы). Пациенту проводилось лечение гормонами, нестероидными противовоспалительными препаратами и ритуксимабом.

Этот случай позволяет предположить, что вакцинация препаратом SinoVac-CoronaVac активировала иммунную систему и стала триггером развития аутоиммунного оверлап-синдрома. Анализ данного клинического случая подчеркивает возможные побочные эффекты после вакцинации против COVID-19. Понимание этих рисков имеет ключевое значение для улучшения мониторинга и ухода за пациентами после вакцинации.

Ключевые слова: *SinoVac-CoronaVac (Китай), вакцинация, COVID-19, оверлап-синдром, системная красная волчанка, ревматоидный артрит.*

Түйіндеме

SINOVAC-CORONAVAC (ҚЫТАЙ) ПРЕПАРАТЫМЕН COVID-19 ВАКЦИНАЦИЯСЫНАН КЕЙІНГІ АУТОИММУНДЫ АСҚЫНУЛАР ЖАҒДАЙЫ

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Пандемия кезінде Қазақстан Республикасында вакцинация үшін SARS-CoV-2 вирусының химиялық инактивацияланған SinoVac-CoronaVac (Қытай) вакцинасы қолданылды. 1989 жылы туған Т. есімді науқастың медициналық тарихы мен бақылауының ретроспективті талдауы жүргізілді. Вакцинациядан кейін пациентте оверлап-синдром, ревматоидты артрит және жүйелі қызыл жегі (ЖҚЖ) дамыды.

Қан талдауы лейкопенияны (2,8 × 10^9), тромбоцитопенияны (104 бірлік/мкл), гипохромды анемияны (гемоглобин 87 г/л), жоғары ЭТЖ, артқан ревматоидты факторды (13,9), С-реактивті ақуыздың деңгейінің көтерілуін (70,4) және антистрептолизин О-ның жоғарылауын (218 ХБ/мл) көрсетті. Сондай-ақ ядролық антигендерге қарсы антиденелер (ANA) (32 бірлік) анықталды. Науқас гормондармен, стероидты емес қабынуға қарсы препараттармен және ритуксимабпен емделді.

Бұл жағдай SinoVac-CoronaVac препаратымен вакцинация иммундық жүйені белсендіріп, аутоиммундық оверлап-синдромның дамуына триггер болғанын болжауға мүмкіндік береді. Бұл клиникалық жағдайды талдау COVID-19-ға қарсы вакцинациядан кейінгі ықтимал жанама әсерлерге назар аударады. Бұл тәуекелдерді түсіну вакцинациядан кейінгі пациенттерді бақылау мен күтімді жақсарту үшін маңызды.

Түйінді сөздер*: SinoVac-CoronaVac (Қытай), вакцинация, COVID-19, оверлап-синдром, жүйелі қызыл жегі, ревматоидты артрит.*

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Introduction

On February 1, 2021, mass vaccination against COVID-19 began in the Republic of Kazakhstan [1]. Vaccination serves as protection against infectious agents through antibody production [2]. During the COVID-19 pandemic, Kazakhstan utilized several vaccines: the combined vector vaccine Sputnik V (Russia), inactivated vaccines SinoVac-CoronaVac (China), Sinopharm, QazVac (Kazakhstan), and the RNA-based Pfizer/BioNTech (USA) vaccine [1].

The Pfizer–BioNTech COVID-19 is an mRNA-based COVID-19 vaccine developed by the German biotechnology company BioNTech [9].

SinoVac-CoronaVac, developed by Sinovac Biotech, is an inactivated COVID-19 vaccine containing chemically inactivated SARS-CoV-2 grown on Vero cells. These vaccines include aluminum hydroxide or similar adjuvants. The immune response targets the SARS-CoV-2 spike protein, along with matrix, envelope, and nucleoproteins [2,3].

A phase III clinical trial for evaluating efficacy and safety of the inactivated vaccine produced by Sinovac was started in 2024. The study will be double-blind placebo-controlled trial. Interim preliminary efficacy analysis can be triggered by reaching the target number of 61 cases [4]. Clinical trials on the effectiveness of the SinoVac-CoronaVac vaccine were conducted in Chile and Turkey [5,6].

Case description

In November 2021, a 32-year-old woman presented to her general practitioner with symptoms including joint pain, morning stiffness, dry eyes, dry mouth, weight loss, facial hyperpigmentation, and elevated blood pressure. Symptoms began two weeks after the second dose of the SinoVac-CoronaVac vaccine. A rheumatologist diagnosed her with rheumatoid arthritis.

Medical History

- Pregnancy complications in 2009 and in 2010, including eclampsia and cesarean sections, with blood transfusion. The children did not survive.
- Diagnosed with arterial hypertension in 2009, managed with angiotensin-converting enzyme inhibitor.

Examination and Findings

In February 2022, the patient was hospitalized in a rheumatology ward for further diagnostic clarification. Her general condition was moderate, with active positioning. Height was 153 cm, weight 40 kg, and BMI 17.1, indicating underweight.

Her body temperature was 36.6°C. She displayed facial skin erythema over the cheeks and nose, forming the characteristic "lupus butterfly." Peripheral lymph nodes were not enlarged. Examination of the hands revealed symmetrical involvement of the hand joints, deformities, and inflammation in the proximal interphalangeal joints with wrist joint swelling. A positive cross-compression test was noted.

Laboratory Results:

- Complete blood count: leukopenia at 2.8×10^9, thrombocytopenia at 104 units/μL, hemoglobin decreased to 87 g/L, ESR elevated to 52 mm/h (indicating an autoimmune process).
- Biochemical analysis: within normal limits, with total protein 65 g/L, urea 3.66 mmol/L, creatinine 88 mmol/L, glucose 4.4 mmol/L, ALT 10 U, AST 16 U, bilirubin 11.9, cholesterol 5.9 mmol/L.
- Coagulogram: increased PTI (135) and fibrinogen (4.9 g/L), indicating hypercoagulation; other parameters were normal (APTT 23.9, INR 0.85, PT 10.2 sec).
- Rheumatoid factor: at the upper limit of normal (13.9 U/mL), suggesting rheumatoid arthritis or systemic lupus erythematosus.
- ANA levels were significantly elevated (32 units), indicating an autoimmune process, common in rheumatoid arthritis.
- Anti-MPOS ANCA PR3 and MPO were negative, ruling out vasculitis.
- Lupus anticoagulant increased to 43.5 sec, a marker of antiphospholipid syndrome and thrombosis, often seen in systemic lupus erythematosus.
- CRP was markedly elevated (70.4 mg/L), indicating inflammation and autoimmune activity.
- Elevated anti-streptolysin O (218 IU/mL), suggesting recent streptococcal infection.
- Urinalysis revealed proteinuria (0.323 g/L) and hematuria, with daily proteinuria (211 mg/day) indicating renal involvement.
- Ferritin was elevated to 577 μg/L, a marker of autoimmune processes.

- Imaging and Other Tests:
- X-rays showed arthritis.
- MSCT of the chest revealed pneumonia, pleurisy, pneumofibrosis, and pericarditis.

Diagnosis and Treatment

The patient was diagnosed with: M35.1 Other overlap syndromes. M32.8 Other forms of systemic lupus erythematosus, subacute course, Grade 2 activity with skin and vascular involvement (hyperpigmentation and cheilitis), joints (polyarthritis, FC 2), kidneys, lupus nephritis, muscles (myalgia), trophic disorders (hair loss), Sjogren's syndrome (xerostomia, xerophthalmia), heart (carditis), hematologic syndrome (autoimmune anemia, thrombocytopenia, leukopenia), constitutional syndrome (weight loss), immunopositivity for ANA, lupus anticoagulant, and anti-DNA antibodies. Rheumatoid arthritis, polyarthritis, seronegative variant, advanced stage, DAS-28 >5.1, X-ray Grade 2, FC 2.

Treatment included corticosteroids, non-steroidal anti-inflammatory drugs, and rituximab. The patient passed away in 2023.

Discussion

This case describes the development of an overlap syndrome, rheumatoid arthritis, and systemic lupus erythematosus (SLE) in a patient vaccinated with the inactivated SinoVac-CoronaVac COVID-19 vaccine. The examination findings indicate autoimmune involvement triggered post-vaccination. It is hypothesized that antibodies generated in response to the vaccine might have cross-reacted with the patient's own cells, initiating an autoimmune overlap syndrome.

Globally, cases of autoimmune complications, such as thrombocytopenia, acquired hemophilia, anterior uveitis have been reported following the administration of the Pfizer BNT162b2 mRNA COVID-19 vaccine, which encodes a mutant form of the SARS-CoV-2 spike protein [6,10,11].

In 2021*, Eleanor R.* King and colleagues [6] reported a case of thrombocytopenia in a 39-year-old woman after receiving the Pfizer vaccine complications following Moderna and Pfizer-BioNTech vaccinations, such as hemophilia, uveitis, and Bell's palsy, have been documented.

In 2022 Chantal Lemoine et al. reported a case of SLE in a previously healthy 68-year-old woman who developed myalgia and was found positive for ANA and dsDNA antibodies following vaccination with Pfizer-BioNTech (BNT162b2) [7].

A meta-analysis of 45006 cases made by *Meijiao Wang et al.* (2024) found no significant link between vaccination Covid-19 and SLE but identified an association between hepatitis B vaccination and SLE onset [8] .

In the described case, COVID-19 vaccination acted as a trigger for an autoimmune complication, with symptoms appearing two weeks post-vaccination, possibly due to molecular mimicry, as suggested by *Wraith D.C. and colleagues* (2021) in *The Lancet [14].*

This hypothesis proposes that the vaccine antigen closely resembles endogenous antigens, leading to an autoimmune response against the body's own cells.

Another proposed mechanism involves T-cell activation without antigen recognition [12]; however, the full mechanism by which vaccines may provoke autoimmune responses remains unclear.

Conclusion

COVID-19 vaccination with SinoVac-CoronaVac likely triggered autoimmune complications in this case. Autoimmune reactions are rare and influenced by factors such as genetic predisposition, comorbidities, and prior infections. Despite isolated complications, COVID-19 vaccination significantly mitigated severe outcomes during the pandemic.

This clinical case analysis highlights potential side effects following COVID-19 vaccination. Understanding these risks is crucial for managing adverse reactions in individuals with pre-existing autoimmune disorders. Recognizing the possibility of autoimmune complications enables better patient monitoring and care post-vaccination.

Conflict of Interest. *We declare no conflict of interest.*

Author Contributions

Concept development, manuscript writing, and scientific interpretation of results – Nurgaliyeva Bayan Kadirovna;

Literature search and analysis – All authors;

Patient management – Akzhalova Yulia;

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