Case Report

Immune complex-mediated glomerulonephritis post COVID-19 vaccination in a patient with concomitant Brucellosis

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ABSTRACT

COVID-19 vaccinations have been an important step in controlling the COVID-19 pandemic. Despite the fact they were generally safe and effective, a few case reports of renal disorders have been published following COVID vaccines. We report a 29-year-old man with history of Chronic Kidney Disease who presented to our center with flank pain after receiving AstraZeneca COVID vaccine. He also had history of raw milk ingestion. His initial investigations showed high creatinine with high level of proteinuria. A renal biopsy was consistent with immune complex-mediated glomerulonephritis on top of renal fibrosis. His brucella serology also showed high titer. He was started on treatment for Brucellosis and planned for follow-up afterwards for further therapy. To the best of our knowledge, this is the first reported case of concomitant Brucellosis and post COVID vaccine glomerulonephritis.

Keywords: brucellosis, glomerulonephritis, COVID-19 vaccines, renal insufficiency, chronic, ChAdOx1 nCoV-19

Since Coronavirus disease-19 (COVID-19) was declared a pandemic in 2019, several efforts have been made to control its spread worldwide, including the development of vaccines.

The vaccines developed for COVID 19 are generally safe and effective; however, there have been cases of post vaccine nephropathy. Cases of minimal change disease after administration of messenger ribonucleic acid vaccines were reported.\(^1,2\) Cases of pauci-immune glomerulonephritis with positive Anti-Neutrophil Cytoplasmic Antibodies (ANCA) were also reported.\(^3,4\) Although temporal association does not always indicate causation, a first-presentation of Class V lupus nephritis was reported in a patient who was previously healthy post AstraZeneca vaccine administration.\(^5\) Membranous and IgA nephropathy have been also reported post vaccination.\(^6,7\) However, renal injuries following vaccinations were also reported with previous vaccines.\(^8\)

Brucellosis is considered the most common zoonotic disease and rarely causes renal manifestations, which can carry a poor prognosis.\(^9,10\)

Here, we report a patient who developed immune complex-mediated glomerulonephritis after receiving the AstraZeneca COVID 19 vaccine with a concomitant Brucellosis.

Case Report. A 29-year-old male presented to our hospital on the 12th of April 2021, with a history of abdominal and loin pain for 5 days, 2 days after receiving the AstraZeneca vaccine for COVID-19. His symptoms included vomiting, diarrhea, and decreased oral intake. He had no history of fever, skin rash, joint pain, photosensitivity, or drug use. The patient had a history of recurrent urinary tract infections, which resulted in long-term impairment of kidney function.
However, no medical report or baseline kidney function were available.

**Clinical findings.** Physical examination revealed no pain or distress; his Glasgow coma scale score was 15/15. His blood pressure was 130/70 mmHg, heart rate was 91 beats per minute, respiratory rate was 12 breaths per minute, oxygen saturation was 99% on room air, and temperature was 37°C. There was no pallor, jaundice, lymphadenopathy, oral ulcers, or arthritis. Chest examination revealed normal vesicular breathing bilaterally. Heart sounds were normal. Abdominal examination revealed mild bilateral flank tenderness; however, no organomegaly was observed. Lower limb examination was unremarkable.

**Diagnostic assessment.** The laboratories results upon admission can be found in Table 1. Therefore, the patient was admitted with the impression of acute kidney injury. Further laboratory tests after admission are in Table 2.

**Radiological studies showed.** Abdominal computed tomography without contrast showed small non-obstructing right renal stones, bilateral renal cortical scarring, mild splenomegaly and hiatus, and left inguinal hernias (Figure 1). A 99mTc dimercapto-succinic acid (DMSA) scan showed a relative renal function of 28% on the right side and 70% on the left side. The patient was examined by the nephrology team, and their impression was acute kidney injury and a renal biopsy was planned. At the same time, the patient revealed a history of raw milk ingestion, and his Brucella serology came back positive (1:2560). Renal biopsy showed segmental scarring. Strong staining was observed for immunoglobulin M, kappa and lambda light chains, and complement component 1q, confirming immune complex-mediated glomerulonephritis, with segmental scarring. Interstitial fibrosis tubular atrophy of 40% was observed.

**Therapeutic intervention.** The patient was diagnosed with chronic kidney disease with acute glomerulonephritis and started on doxycycline, ciprofloxacin, and ceftriaxone to treat brucellosis.

**Follow-up and outcome.** The patient continued to have stable level of serum creatinine with no further deterioration. The decision for immune suppression was delayed till after completing the antibiotics for brucellosis.

**Table 1 - Initial laboratory results.**

| Test name                     | Result                  |
|-------------------------------|-------------------------|
| White blood cells             | 3.4 x10^9/L ↓           |
| Hemoglobin                    | 123 g/L ↓               |
| Platelets                     | 121 x10^9/L ↓           |
| International normalized ratio| 1.0                    |
| Lymphocytes                   | 0.83 x10^9/L ↓          |
| Neutrophils                   | 1.66 x10^9/L ↓          |
| Bilirubin                     | 19 micromol/L           |
| Alanine transaminase          | 51 ↑                    |
| Alkaline phosphatase          | 73 units/L ↑            |
| Aspartate aminotransferase    | 52 units/L ↑            |
| Albumin                       | 33 g/L ↓                |
| Gamma-glutamyl transferase    | 85 units/L ↑            |
| Urea                          | 12.7 mmol/L ↑           |
| Creatinine                    | 284 micromol/L ↑        |
| Potassium                     | 4 mmol/L                |
| Sodium                        | 129 mmol/L ↓            |
| Chloride                      | 98 mmol/L               |

**Table 2 - Laboratory after admission.**

| Test name                     | Result                  |
|-------------------------------|-------------------------|
| Amylase                       | 133 unit/L ↑            |
| Haptoglobin                   | 0.06 g/L ↓              |
| Creatine kinase               | 256 unit/L ↑            |
| Ferritin                      | 1182 ng/mL ↑            |
| Lactate dehydrogenase         | 538 unit/L ↑            |
| D-dimer                       | 8759 ng/mL ↑            |
| Procalcitonin                 | 1.32 micg/L ↑           |
| C-Reactive proteins           | 87 mg/L ↑               |
| Anti-nuclear antibodies       | Negative                |
| Complement C3                 | 1.68 g/L ↑              |
| Complement C4                 | 0.46 g/L ↑              |
| Parathyroid hormone           | 117 pg/mL ↑             |
| Hepatitis B surface antigen   | Negative                |
| Hepatitis C serology          | Negative                |
| Human immunodeficiency virus  | Negative                |
| Urine micro-albumin           | 3145 mg/L ↑             |
| Micro-albumin/creatinine urine ratio | 532 mg/mmol   |
| Urine creatinine              | 5.91 mmol/L             |
| 24-hour urine protein         | 6.12 g/day ↑            |

**Discussion.** The present case was truly challenging. First, he had a chronic kidney disease. He was also infected with Brucella and received a vaccine, both of which rarely lead to glomerulonephritis. This raised the questions whether having multiple concomitant risk factors further increases the risk of vaccine-induced glomerulonephritis and whether chronic kidney disease increases the risk of developing glomerulonephritis. Although it is difficult to determine the exact causative factor, more attention should be paid to such cases.

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The patient presented with a history of abdominal pain for five days, 2 days after getting Covid vaccine(AstraZeneca). His symptoms were associated with vomiting, diarrhea and decreased oral intake.

| Dates       | Relevant past medical history and interventions                                                                 |
|-------------|------------------------------------------------------------------------------------------------------------------|
| 12th April  | The patient was admitted for work up of renal impairment and cytopenia. Pre-admission labs (WBC 3.4 x10^9/L, Hgb 123 g/L, Plt 121 x10^9/L, Urea 12.7 mmol/L, Creat 284 micromol/L) | 
| 12th April  | Abdominal CT without contrast showed small non-obstructing right renal stones, bilateral renal cortical scarring, mild splenomegaly and hiatus, and left inguinal hernias |
| 13th April  | Assessed by nephrology team and planned for biopsy |
| 21st April  | Renal biopsy showed segmental scarring. Strong staining was observed for IgM, kappa and lambda light chains, and C1q, confirming immune complex-mediated glomerulonephritis, with segmental scarring. Interstitial fibrosis tubular atrophy of 40% was observed. |
| 22th April  | Patient was discharged with clinic follow up with Nephrology and Infectious disease clinics |
| 23rd April  | Infectious disease clinic |
| 24th April  | To complete the course of antibiotics |
| 8th November | Nephrology clinic |

WBC: white blood cell, Hgb: hemoglobin, Plt: platelet, Creat: creatinine, ImG: immunoglobulin M, C1q: complement component 1q

**Figure 1** - Computed tomography scan of the abdomen shows bilateral renal atrophy and splenomegaly (blue arrows).
To the best of our knowledge, this is the first case for Glomerulonephritis post Covid vaccine with concomitant Brucellosis.

In conclusion, a small risk of post vaccination glomerulonephritis exist. Coexistence of brucellosis might increase the risk. More attention should be made to at-risk population.

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