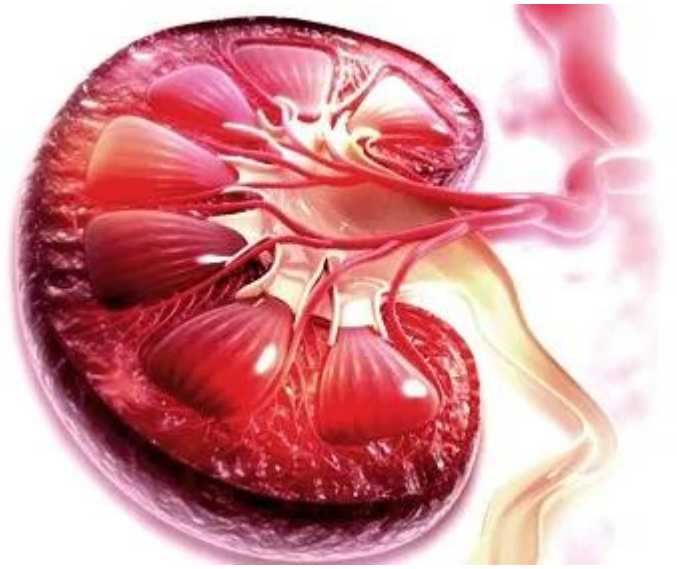
BNT162b2 (Pfizer- BioNTech) and mRNA 1273 (Moderna) vaccines were the first approved messenger RNA (mRNA)-based vaccines. Among many adverse events linked to the COVID-19 mRNA vaccination, the most common new-onset or relapsing vaccine-associated glomerular diseases are minimal change disease (MCD), antineutrophil cytoplasmic autoantibody (ANCA)-associated vasculitis, ANCA-negative vasculitis, anti-glomerular basement membrane (GBM) nephritis, idiopathic membranous nephropathy, immunoglobulin (Ig)G4-related disease, and immunoglobulin A nephropathy (IgAN). In this case series, the Japanese authors reported 30 patients with newly diagnosed or relapsing glomerular diseases after COVID-19 mRNA vaccination.



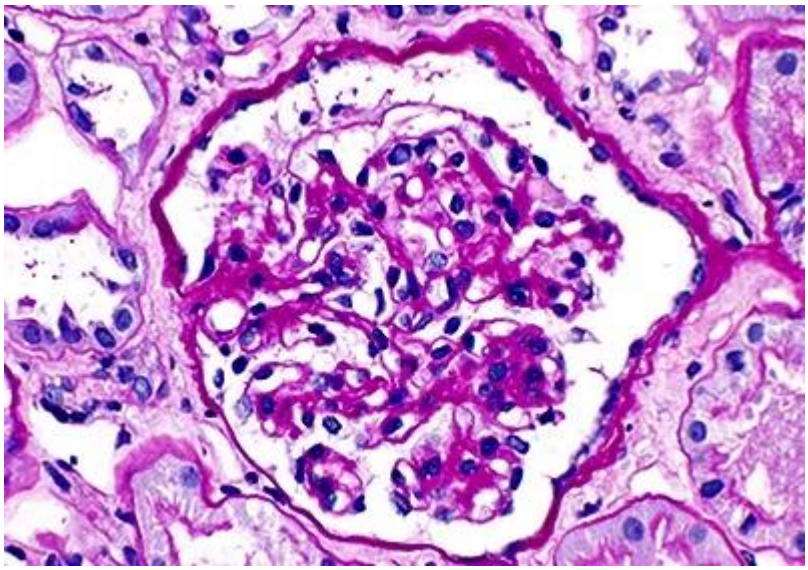
About the study

The study included patients aged 18 years or older with hematuria or proteinuria following COVID-19 mRNA vaccination. Data on demographic characteristics, medical history, medications, and detailed information about hematuria after vaccination were collected from their clinical records. The type and number of vaccinations, onset of symptoms, and medical history were self-reported by each patient. Patients with urinary stones, urinary tract cancer, urinary tract infections, women in menstrual periods, pregnant women, and patients who could not consent to a renal biopsy were excluded.

Laboratory data were obtained during the initial hospital visit and at the time of renal biopsy. Microscopic hematuria with dysmorphic red blood cells on microscopy is specific for glomerular damage. Relapse of glomerulonephritis was defined as worsening of hematuria

and/or increased proteinuria.

A renal biopsy was performed for a definitive diagnosis. Glomerular diseases were diagnosed with light microscopy (LM), immunofluorescence microscopy (IF), and electron microscopy (EM). Immunoglobulin A nephropathy (IgAN) was diagnosed by a dominant or co-dominant IgA mesangial deposit using IF. Cases with no LM and IF histological abnormalities in the glomeruli were diagnosed as minimal change disease (MCD)



IgA nephropathy (IgAN)

Results

The study presented 30 patients who developed glomerular diseases after COVID-19 mRNA vaccination, with a median age of 42.5 years (ranging from 24 to 66 years). Most patients were women (63%). 73% of patients received BioNTech Pfizer vaccines, and 27% received mRNA-1273 Moderna vaccines. After the first vaccination, glomerular diseases occurred in 12% of patients (3 people), after the second vaccination in 73% (19 patients), and after the third vaccination in 15% (4 patients).

87% of patients (26/30) were diagnosed with a new-onset glomerular disease and underwent a renal biopsy. IgAN was the most common diagnosis (77% of patients, 20/26). Two patients were diagnosed with nephrotic syndrome, one patient with proliferative glomerulonephritis with monoclonal Ig deposits (PGNMID), one patient with TAFRO syndrome, and two patients with anti-glomerular basement membrane (GBM) disease. Proliferative glomerulonephritis with monoclonal immunoglobulin deposits (PGNMID) is a spectrum of monoclonal

gammopathy characterized by glomerular deposits of monotypic IgG, with a single heavy chain subclass (most commonly IgG3) and light chain restriction (usually κ). TAFRO syndrome is characterized by thrombocytopenia, anasarca (edema, pleural effusion, and ascites), fever, reticulin fibrosis/renal dysfunction, and organomegaly.

As 26/30 patients were diagnosed with a new-onset glomerular disease, the remaining four patients (13%) experienced a relapse of previously diagnosed IgAN. One patient relapsed after the first vaccination, and three patients relapsed after the second vaccination. None of the IgAN patients who relapsed after COVID-19 mRNA vaccination was in clinical remission. All four IgAN patients who relapsed after vaccination were in the clinical stage of non-remission before vaccination.

Almost all patients with newly diagnosed IgAN after vaccination required steroid treatment. In contrast, none of the IgAN patients who relapsed after vaccination required additional immune therapy to recover to their baseline proteinuria before vaccination. Patients with PGNMID and TAFRO syndrome were also treated with steroids and had complete remission. A patient with anti-GBM disease was treated with steroids, cyclophosphamide, and plasma exchange, but since no treatment was effective, hemodialysis was initiated.

Conclusion

This study reported a case series of 30 newly diagnosed or relapsed glomerular diseases after COVID-19 mRNA vaccination. The most common glomerular disease after COVID-19 mRNA vaccination was IgAN. The absolute risk of glomerular disease increased after the second or third vaccination. Although rare, relatively severe diseases, such as PGNMID, TAFRO syndrome, and anti-GBM nephritis, occurred after vaccination. The short-term outcomes appear to be favorable, but, some patients developed serious deterioration of renal function.

The authors emphasized that, to their knowledge, they are the first to report the occurrence of PGNMID and TAFRO syndromes after COVID-19 vaccination. They concluded that further studies are needed to elucidate the underlying biological mechanisms and the potential causal relationship between newly diagnosed or relapsed glomerular diseases and COVID-19 mRNA vaccination.

Journal Reference

Umezawa Y, Suzuki H, Hirose H, et al. A Series of Glomerular Diseases That Developed After COVID-19 Vaccination. Cureus 17 (3): e81085. March 24, 2025.

https://www.cureus.com/articles/335753-a-series-of-glomerular-diseases-that-developed-after-covid-19-vaccination