

LETTER TO THE EDITOR

## Minimal change disease with thrombotic microangiopathy following the Pfizer-BioNTech COVID-19 vaccine

Fumika Tanaka<sup>1</sup>, Kan Katayama<sup>1</sup>, Kensuke Joh<sup>2</sup>, Kayo Tsujimoto<sup>1</sup>, Masahiro Yamawaki<sup>1</sup>, Ryosuke Saiki<sup>1</sup>, Tairo Kurita<sup>1</sup>, Tomohiro Murata<sup>1</sup> and Kaoru Dohi<sup>1</sup>

<sup>1</sup>Department of Cardiology and Nephrology, Mie University Graduate School of Medicine, Tsu, Japan and  
<sup>2</sup>Department of Pathology, Jikei University School of Medicine, Tokyo, Japan

Correspondence to: Kan Katayama; E-mail: [katayamk@clin.medic.mie-u.ac.jp](mailto:katayamk@clin.medic.mie-u.ac.jp)

There have been reports of minimal change disease (MCD) following the Pfizer-BioNTech coronavirus disease 2019 (COVID-19) vaccine [1–5]. Here we report a case of MCD with mesangiolytic after Pfizer-BioNTech vaccination (BNT162b2).

A 69-year-old Japanese woman received the first injection of the BNT162b2 COVID-19 vaccine 39 days before a kidney biopsy. While she had been taking amlodipine for hypertension and rosuvastatin for hyperlipidaemia, she had never demonstrated kidney dysfunction. Although she noticed bilateral mild leg oedema 7 days after the first vaccination, she received the second injection 18 days before the kidney biopsy. The next day she had a fever of 37.5°C and took a tablet of loxoprofen, which relieved her symptom. Her bilateral leg oedema subsequently worsened and her body weight increased 4 kg from her usual weight. She visited a local doctor 9 days prior to our encounter and her serum albumin was 1.4 g/dL. Nephrotic syndrome was suspected and a tablet of azosemide 30 mg was prescribed. However, her oedema did not improve and she was referred to our hospital for further evaluation.

Her height, body weight and blood pressure were 155 cm, 57.5 kg and 120/80 mmHg, respectively. A physical examination revealed bilateral pitting oedema in her lower legs. The urinary protein:creatinine ratio, serum albumin and serum creatinine were 8.08 g/gCr, 1.5 g/dL and 0.65 mg/dL, respectively. The selectivity index was low at 0.15. Complements and immunoglobulin G (IgG), IgA and IgM were within normal ranges. Anti-nuclear

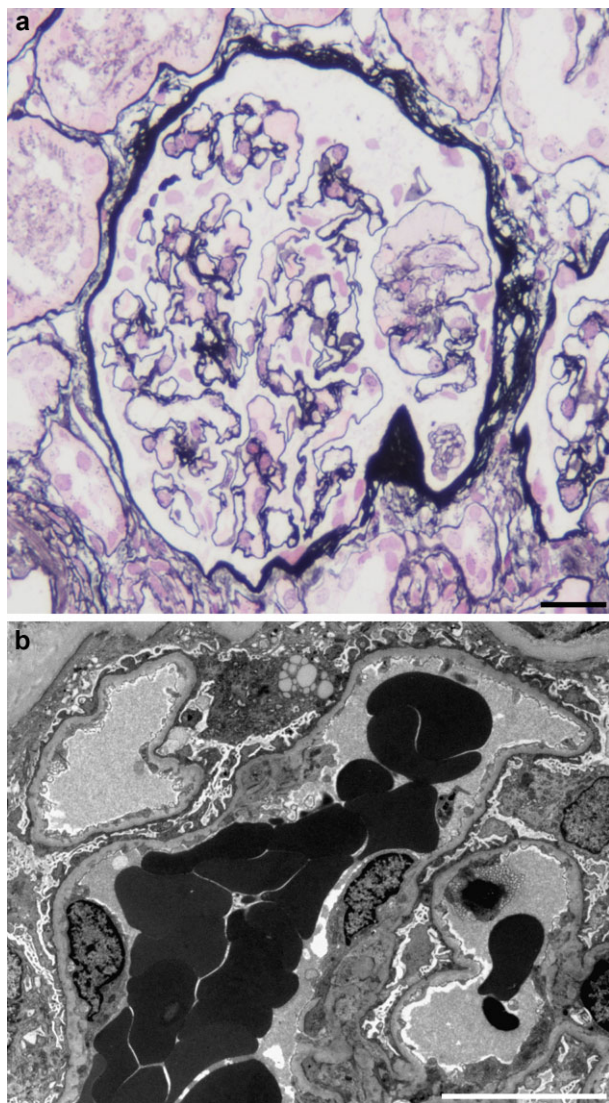
antibody, anti-double-stranded DNA antibody, anti-neutrophil cytoplasmic antibody and cryoglobulin values were negative. There was no monoclonal peak on immunoelectrophoresis in serum and urine tests. Polymerase chain reaction for severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) was negative. SARS-CoV-2 IgG was 3846.2 AU/mL.

The kidney biopsy contained 34 glomeruli, 5 of which were global sclerotic. Periodic acid–silver methenamine stain showed focal segmental mesangiolytic in two glomeruli, a characteristic feature of thrombotic microangiopathy (TMA) (Figure 1a). Tubulointerstitial fibrosis was mild at 10% and some foam cells were observed in the tubulointerstitial area. An immunofluorescence study showed weak segmental deposition of IgM, likely corresponding to an exudative lesion. An electron microscopic study revealed diffuse effacement of the podocyte foot processes together with a rouleau formation located in the merged capillary lumen (Figure 1b). She was diagnosed with MCD with mesangiolytic. Oral prednisone at 30 mg/day was initiated, which led to complete remission within 1 month.

Thus far, nine cases of MCD after COVID-19 vaccination have been reported, including five involving Pfizer-BioNTech BNT162b2, two involving Oxford University and AstraZeneca ChAdOx1 nCoV-19, one involving Moderna mRNA-1273 and one involving Johnson & Johnson Ad26.COV.2 (Supplementary data Table S1). One case developed MCD after the second vaccination, as in the present case [5]. Another showed the mesangial

Received: 8.11.2021; Editorial decision: 17.11.2021

© The Author(s) 2021. Published by Oxford University Press on behalf of the ERA. This is an Open Access article distributed under the terms of the Creative Commons Attribution-NonCommercial License (<https://creativecommons.org/licenses/by-nc/4.0/>), which permits non-commercial re-use, distribution, and reproduction in any medium, provided the original work is properly cited. For commercial re-use, please contact [journals.permissions@oup.com](mailto:journals.permissions@oup.com)



**FIGURE 1:** (a) Periodic acid–silver methenamine stain showed segmental ballooning of capillaries in the glomerulus. Bar = 20  $\mu\text{m}$ . (b) An electron microscopic study showed a rouleau formation in the merged capillaries and diffuse effacement of the podocyte foot processes. Bar = 10  $\mu\text{m}$ .

proliferative variant of MCD [6]. The present case showed MCD with mesangiolytic changes due to a rouleaux formation in the capillary. Mesangiolytic changes can be caused by severe endothelial injury, resulting in segmental ballooning of capillaries [7]. Although the relationship between MCD and TMA is unknown, there was a case report of renal TMA with MCD after COVID-19 vaccination and infection [8]. Therefore a careful follow-up of patients with MCD after COVID-19 vaccination should be considered.

## SUPPLEMENTARY DATA

Supplementary data are available at [ckj](#) online.

## CONFLICT OF INTEREST STATEMENT

The authors declare no competing interests in association with the present study. The results presented in this article have not been published previously in whole or part.

## REFERENCES

1. Weijers J, Alvarez C, Hermans MMH. Post-vaccinal minimal change disease. *Kidney Int* 2021; 100: 459–461
2. Lebedev L, Sapojnikov M, Wechsler A et al. Minimal change disease following the Pfizer-BioNTech COVID-19 vaccine. *Am J Kidney Dis* 2021; 78: 142–145
3. D'Agati VD, Kudose S, Bombardieri AS et al. Minimal change disease and acute kidney injury following the Pfizer-BioNTech COVID-19 vaccine. *Kidney Int* 2021; 100: 461–463
4. Maas RJ, Gianotten S, van der Meijden WAG. An additional case of minimal change disease following the Pfizer-BioNTech COVID-19 vaccine. *Am J Kidney Dis* 2021; 78: 312
5. Salem F, Rein JL, Yu SM et al. Report of three cases of minimal change disease following the second dose of mRNA SARS-CoV-2 COVID-19 vaccine. *Kidney Int Rep* 2021; 6: 2523–2524
6. Anupama YJ, Patel RGN, Vankalakunti M. Nephrotic syndrome following ChAdOx1 nCoV-19 vaccine against SARS-CoV-2. *Kidney Int Rep* 2021; 6: 2248
7. Morita T, Churg J. Mesangiolytic changes. *Kidney Int* 1983; 24: 1–9
8. De Fabritiis M, Angelini ML, Fabbri B et al. Renal thrombotic microangiopathy in concurrent COVID-19 vaccination and infection. *Pathogens* 2021; 10: 1045