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Letter to the Editor

Rule out appropriately all differentials before attributing severe rhabdomyolysis to SARS-CoV-2 vaccination

We read with interest the article by Kamura *et al.* about a 57-year-old, previously healthy male patient, who presented with leg pain 2 weeks after the first dose of the Moderna vaccine (Kamura *et al.*, 2022). Four weeks after the vaccination, he was diagnosed with rhabdomyolysis upon the clinical presentation (muscle pain), elevated creatine-kinase (maximal value 74,804 U/l [n, 60-287 U/l]), and the muscle magnetic resonance imaging (MRI) (Kamura *et al.*, 2022). During the following course, the patient additionally developed multiorgan infarctions and, finally, died despite intensive diagnostic and therapeutic approaches (Kamura *et al.*, 2022). The study is interesting but raises concerns that should be discussed.

The main shortcoming of the study is that an acute SARS-CoV-2 infection had not been ruled out by polymerase chain reaction. Although SARS-CoV-2 infections can be complicated by rhabdomyolysis (Lamzouri *et al.* 2021), it is crucial to rule out an acute SARS-CoV-2 infection in the index patient. Other causes of rhabdomyolysis that were not appropriately ruled out are hereditary neuromuscular disorder, seizures, food (mushrooms, coturnism), histiocytosis, insect bite, electrical shock, trauma, intoxication, or illicit drugs (Stanely *et al.*, 2022).

To document myositis as the cause of rhabdomyolysis on muscle MRI, it is crucial to administer gadolinium. However, only a T2-image without contrast medium was presented (Kamura *et al.*, 2022). Therefore, we should be informed about the results of muscle MRI with contrast medium.

Because infarction can be also embolic and because endocarditis or myocarditis have been reported as a complication of SARS-CoV-2 vaccinations (Aikawa *et al.*, 2022; Tiwari *et al.*, 2022), it is essential to know whether endocarditis and myocarditis were appropriately ruled out by echocardiography or even right ventricular myocardial biopsy or by cardiac MRI with contrast medium. In addition, we should be informed if ever during hospitalization or before hospitalization, atrial fibrillation had been recorded.

The D-dimer was elevated (Kamura *et al.*, 2022); therefore, we should be informed if this was attributed to an ongoing infectious disease or due to vein occlusions. Particularly, we should know whether venous sinus thrombosis, portal vein thrombosis, pulmonary embolism, mesenteric vein thrombosis, or thrombosis of the jugular veins had been appropriately ruled out.

Muscle biopsy of the quadriceps muscle revealed slight rhabdomyolysis, which was not seen on muscle MRI. Which is the reason for this discrepancy?

Overall, the interesting study has some limitations and inconsistencies that call the results and their interpretation into question. Addressing these limitations could further strengthen and re-

inforce the statement of the study. Rhabdomyolysis requires extensive workup to uncover the underlying cause and to prevent recurrence.

Conflicts of interest

The authors have no competing interests to declare.

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Ethical approval

The work has been approved by the institutional review board.

Availability of data

All data are available from the corresponding author.

Author contributions

JF: design, literature search, discussion, first draft, critical comments, and final approval; FS: literature search, discussion, critical comments, and final approval.

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Abbreviations: MRI, magnetic resonance imaging.

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