RHABDOMYOLYSIS AND ACUTE KIDNEY INJURY AS LEADING COVID-19 PRESENTATION IN AN ADOLESCENT

Nathalie Tram, MD, Benedetta Chiodini, MD, PhD,* Isabel Montesinos, MD, PhD,† Alfredo Vicinanza, MD,‡ Xavier Beretta-Piccoli, MD,‡ Natacha Gubbelmans, MD,§ Milena Demey, MD,§ Nathalie Genis, MD,§ Anne Tilmanne, MD, PhD,¶ Pierre R. Smeesters, MD,¶‖**†† and Khalid Ismaili, MD, PhD**

Abstract: Severe acute respiratory syndrome coronavirus 2, the virus responsible of the current COVID-19 pandemic, has limited impact in the pediatric population. Children are often asymptomatic or present mild flu-like symptoms. We report the case of a COVID-19-infected adolescent presenting severe rhabdomyolysis and acute kidney injury without any fever or respiratory symptoms.

Key Words: COVID-19, SARS-CoV-2, rhabdomyolysis, pediatrics, acute kidney injury

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From the *Department of Pediatric Nephrology, Hôpital Universitaire des Enfants Reine Fabiola (HUDERF), Université Libre de Bruxelles (ULB), Brussels, Belgium, †Laboratoire Hospitalier Universitaire de Bruxelles (LHUB-ULB), Université Libre de Bruxelles (ULB), Brussels, Belgium, ‡Pediatric Intensive Care Unit, Hôpital Universitaire des Enfants Reine Fabiola (HUDERF), Université Libre de Bruxelles (ULB), Brussels, Belgium, §Department of Pediatrics, Hôpital Universitaire des Enfants Reine Fabiola (HUDERF), Université Libre de Bruxelles (ULB), Brussels, Belgium, ¶Infectious Diseases Unit, Hôpital Universitaire des Enfants Reine Fabiola (HUDERF), Université Libre de Bruxelles (ULB), Brussels, Belgium, ‖Molecular Bacteriology Laboratory, Université libre de Bruxelles (ULB), Brussels, Belgium, **Tropical Diseases Research Group, Murdoch Children's Research Institute, Melbourne, Victoria, Australia, ††Department of Paediatrics, University of Melbourne, Melbourne, Victoria, Australia.

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Consent: The parents of the patient gave their consent to the publication of the report.

Address for correspondence: Nathalie Tram, MD, Department of Pediatric Nephrology, Hôpital Universitaire des Enfants Reine Fabiola, Avenue J. J. Crocq 15, 1020 Brussels, Belgium. E-mail: nathalie.tram@huderf.be.

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The ongoing COVID-19 pandemic has reached most countries in the world. This infection caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), a member of the Coronaviridae family, is highly contagious with significant human-to-human transmission. Infected patients show different manifestations from asymptomatic cases to severe acute respiratory distress syndrome with a high mortality rate, mainly in elder adults with comorbidities.[1,2] Pediatric cases account for around 1%–5% of infected patients.[3] Clinical symptoms in young patients seem to be less severe with mostly flu-like symptoms.[3,4] While myalgia is a well-known symptom of COVID-19 disease, rhabdomyolysis is exceptional[5,6] and has, to our best knowledge, not yet been described in the pediatric population.

CASE REPORT

A 15-year-old boy with uneventful medical history was admitted to the pediatric intensive care unit of our tertiary hospital with severe rhabdomyolysis and renal failure. He had been in lockdown since the 13th of March and had no contact with known ill people. The clinical history started on the 23th of March when he developed an intense proximal muscle pain without history of trauma or physical exercise. On day 3, he went to the emergency room, his physical examination was normal, and the laboratory analyses were unremarkable (Table 1). He was discharged with supportive care (paracetamol). At home, he presented abdominal pain over 2 days, associated with vomiting and mild diarrhea. On day 6, he developed tea-colored urines, polyuria, polydipsia, and general fatigue. He did never exhibit fever or respiratory symptoms. No alcohol or drug consumption was reported. On day 10, he was admitted to pediatric intensive care unit. Vital parameters were within normal ranges (SpO_2: 98%, respiratory rate: 19/min, heart rate: 110/min, t°: 35.8°C, blood pressure: 120/69 mm Hg). Laboratory analyses showed severe renal failure, mild hypocalcemia, mild hepatic cytolysis, C-reactive protein elevation, and severe rhabdomyolysis (Table 1). At admission, SARS-CoV-2 rapid antigenic test (COVID-19 Ag Respi-Strip®; Coris BioConcept, Gembloux, Belgium) on nasopharyngeal specimen resulted positive, and extended polymerase chain reaction panel for respiratory diseases (FilmArray® Respiratory Panel 2 plus; BioMérieux, Craponne, France), testing adenovirus, endemic coronavirus (OC43, NL63, HKU1, 229E), influenza A (H1, H1-pdm2009, H3), influenza B, human metapneumovirus, parainfluenza 1–4, rhino/enterovirus, respiratory syncytial virus, *Chlamydophila pneumoniae* and *Mycoplasma pneumoniae* to, resulted negative. The possibility of other concomitant viral infections such as cytomegalovirus, Epstein-Barr virus, herpes simplex virus, human immunodeficiency virus, varicella zoster, and hantavirus was unlikely due to negative single point serology. Chest radiogram and cardiac ultrasound were normal. No amphetamine, cocaine, benzodiazepines, or opiates were found in urine testing. There were no reasons to suspect a connective tissue disease or metabolic inherited disorder. During hospitalization, the patient showed a favorable clinical evolution and received only supportive care (sodium bicarbonate and aggressive hydration). Muscle pain disappeared with a steady decrease of serum creatinine kinase and a rapid recovery of renal function. He was discharged 9 days after entry. When last seen on day 29, his clinical condition and serum creatinine level returned to normal. A specific SARS-CoV-2 serology has been performed on day 10 and day 29 with 2 different test kits: Liaison® SARS-CoV-2 IgG; DiaSorin, Saluggia, Italy and Novalisa® SARS-CoV-2 [COVID-19] IgG, IgM, IgA; NovaTec Immundiagnostica GmbH, Dietzenbach, Germany. On day 10, SARS-CoV-2 serology was negative for all class immunoglobulins, while on day 29, SARS-CoV-2 IgG titers were positive for both tests (Table 1).

DISCUSSION

Rhabdomyolysis, a potential life-threatening condition, results from important skeletal muscle injury leading to the release of massive amount of creatine-kinase and myoglobin.[7,8] Myoglobin is harmful for the kidneys and leads to renal failure by direct tubular toxicity.[7,8] Several factors can lead to rhabdomyolysis, mainly muscle traumatism or sustained exertion, toxics such as drugs, alcohol, or medications, metabolic and infectious diseases.[7,8] In the pediatric population, most cases are secondary to viral myositis (mainly influenza A and B, cytomegalovirus, Epstein-Barr virus) or inherited metabolic disorders.[7,8] In our patient, a viral cause has been suspected due to the acute onset myalgia and gastrointestinal symptoms. In children, COVID-19 infection can be asymptomatic or typically shows fever and mild respiratory symptoms (sore throat, cough, or shortness of breath).[3,4] However, new warnings have arisen concerning possible SARS-CoV-2–associated severe systemic inflammatory disease in pediatric population.[9] Although our patient did not show the classical symptoms of this disease, we

TABLE 1. Laboratory Features

Laboratory Values	March 26, 2020 (Day 3)	April 2, 2020 (Day 10)	April 5, 2020 (Day 13)	April 9, 2020 (Day 17)	April 11, 2020 (Day 19)	April 21, 2020 (Day 29)	Normal Range
Urea (mg/dL)	28	290	239	89	68	24	15–43
Creatinine (mg/dL)	1.01	8.91	5.98	2.13	1.63	0.87	0.7–1.2
Calcium (mmol/L)	2.18	2.08	2.29	2.47	2.48	2.47	2.10–2.55
ASAT (UI/L)	319	201	62	22	20	22	<32
ALAT (UI/L)	42	118	78	35	22	35	<18
CRP (mg/L)	28.6	60.9	23.5	36.1	39.9	1.6	<5
Creatine-kinase (UI/L)	ND	21,876	2000	428	409	165	39–308
Myoglobin (μg/L)	ND	855	150	80	ND	ND	<72
Liaison® SARS-CoV-2 IgG (UA/mL)		0				17	<12
Novalisa® SARS-CoV-2							
IgG		8.5				30	<9 (ratio)
IgA		2.3				7.4	<9 (ratio)
IgM		1.7				2.3	<9 (ratio)

ALAT, alanine transaminase; ASAT, aspartate transaminase; CRP, C-reactive protein; ND, not done; SARS-CoV-2, severe acute respiratory syndrome coronavirus.

promptly tested for COVID-19 with the rapid antigen and serologic tests.

The positive result of the SARS-CoV-2 rapid antigenic test in addition to the significant rise in serum IgG levels 1 month after the disease onset, suggest that SARS-CoV-2 may well have been responsible of the rhabdomyolysis, in particular as testing for other viruses was negative.

Two cases of COVID-19–associated rhabdomyolysis have been so far described in adult patients.[5,6] Unlike our case, both adults presented severe respiratory symptoms and fever. The mechanism of the muscle cell damage remains unknown but similar to other viruses, direct viral, or toxin-induced injury could be involved.[10]

Our patient was affected by rhabdomyolysis, an unusual COVID-19 clinical manifestation, without fever or respiratory symptoms. This case illustrates that COVID-19–associated rhabdomyolysis should be suspected in all age patients with acute onset myalgia.

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FOLLOW-UP STUDY OF LONG-TIME POSITIVE RT-PCR IN STOOL SPECIMENS FROM ASYMPTOMATIC CHILDREN INFECTED WITH SARS-COV-2

Jun Xie, MD,†‡ Xiaoru Long, MD,§†‡ Chongsong Ren, MBBS,¶ Ronghui He, MMed,¶ Xiaofeng Yan, MBBS,‖ Weiguo Li, MMEd,*†‡ Zhengxiu Luo, MD,*†‡ Qiu Li, MD,†‡ Hongmei Xu, MD,§†‡ and Enmei Liu, MD, PhD*†‡*

Abstract: In the current study, we report on 4 children with confirmed SARS-CoV-2 infection, of which 3 of them were asymptomatic. These patients had both pharyngeal swabs and anal swabs testing during hospital or after discharge. All the 4 children showed long-time positive viral RNA in the stool specimens after pharyngeal swabs turned negative during the follow-up stage, especially in the asymptomatic children. The positive RNA in stool specimens of asymptomatic children last for more than 54 days after admission or 30 days after discharge.

Key Words: SARS-CoV-2, reverse transcription-polymerase chain reaction, children, asymptomatic, stool specimens

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From the *Department of Respiratory Medicine, †National Clinical Research Center for Child Health and Disorders, Ministry of Education Key Laboratory of Child Development and Disorders, China International Science and Technology Cooperation Base of Child Development and Critical Disorders, and §Department of Infection, Children's Hospital of Chongqing Medical University, Chongqing, China; ‡Chongqing Key Laboratory of Pediatrics, Chongqing, China; ¶Nanchong Central Hospital, Sichuan, China; and ‖Chongqing Public Health Medical Center, Chongqing, China.

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J.X. and X.L. contributed equally to this article.

This case series was approved by the Children's Hospital of Chongqing Medical University (2020-002). Given the urgency of policy and clinical decision-making for COVID-19 and the difficulty of confirming information for most patients, informed consent was exempted from all patients after discussion and approval of the above institution.

Address for correspondence: Enmei Liu, MD, PhD, National Clinical Research Center for Child Health and Disorders, Children's Hospital of Chongqing Medical University, Chongqing, China. E-mail: emliu186@126.com or Hongmei Xu, MD, National Clinical Research Center for Child Health and Disorders, Children's Hospital of Chongqing Medical University, Chongqing, China. E-mail: xuhongm0095@sina.com.