

The importance of SARS-CoV-2 testing in pediatric population

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ABSTRACT

Pediatric population associates multiple peculiarities in terms of SARS-CoV-2 regarding the differences of symptoms in comparison to adults, but also the higher incidence of asymptomatic cases.

The aim of these case reports is to underline the importance of SARS-CoV-2 testing in pediatric patients. The first case describes the case of a 2-year and nine-month-old child admitted to the Pediatrics Clinic I Targu Mures for involuntary ingestion of toxic substance. The clinical exam pointed out a mild hyperemia of pharynx and small lymph nodes under the mandibula, on the side area of the neck and above the clavicle; and the laboratory tests pointed out leukocytosis, thrombocytosis and one of the liver transaminases above the normal limit. In spite of the presentation concerns, the patient was tested for SARS-CoV-2 infection, with positive result. The evolution was favorable during the admission. The second case describes a 3-year and 8-month-old male patient brought in the emergency department with the suspicion of foreign body aspiration, but the bronchoscopy revealed only purulent secretion in the trachea and bronchia. The RT-PCR test for SARS-CoV-2 infection was negative on the admission day, but due to the slowly favorable evolution, the patient was retested on the 5th day of admission, with positive result.

The testing of pediatric patients independently of the symptoms and the clinical setting might carry a higher importance in limiting the viral transmission.

Keywords: SARS-CoV-2 infection, test, child

INTRODUCTION

The human coronaviruses were described for the first time in the 60' to be responsible for acute upper airways infection in children, and until 2003 there were reported 5 types, including those associated with significant morbidity and mortality [1]. An acute respiratory pathology caused by a new type of coronavirus [COVID-19] identified for the first time in a small area from China spread quickly on the entire globe at the beginning of 2020, being officially declared by the World Health Organization (WHO) on 30th of January 2020 as the COVID-19 epidemics [2]. The increased transmission of the new coronavirus along with the high rate of travel-

ling favored the extremely fast spread of the disease, consequently declared by WHO as COVID-19 pandemics on 11th of March 2020 [3]. Nevertheless, the real number of cases is considered to be much higher than reported if we take into account the increased number of asymptomatic patients, those with mild forms who did not require medical care and who were not tested. To these cases, we might add the increased rate of false-negative results based on antigen detection from nose, throat and saliva samples, but also the ability of the virus to cause atypical forms of disease with non-respiratory manifestations [4].

In order to adhere to the cells, SARS-CoV-2 virus used the angiotensin converting enzyme receptor

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(ACE-2), which is known to have an increased expression in type 1 and 2 alveolar cells playing an extremely important role in both the severity and the transmission of this condition. Nevertheless, ACE-2 receptors used as ligands for the intracellular penetration of the virus are present also in the gastrointestinal tract, in the heart, liver and kidneys. In addition, in the gastrointestinal tract the highest abundance of these receptors is in the small bowel with a tendency to decrease in the colon [5].

Similar to other types of Coronavirus described in the past, the infection with the actual SARS-CoV-2 virus affects predominantly the respiratory tract, the most common symptoms being fever, dry cough, dyspnea, fatigability, generalized myalgia, and anosmia and taste disorders. We must mention that initially the gastrointestinal symptoms such as abdominal discomfort, nausea, vomiting or diarrhea were recognized to be a part of the clinical manifestations, and later they were acknowledged as single symptoms in certain cases [4]. The transmission of this virus is realized through Flugge droplets or aerosols, which enter in direct contact with mucosa, or indirectly through contaminated hands. Although the virus was also detected in the saliva, feces or seminal fluid of the infected patients, other transmission pathways were not recognized officially despite they are highly probable [6].

Albeit initially it predominated the wrong conception that the pediatric population is less susceptible to this infection, the pandemics spread led to the increase of the cases in this age group and even to the occurrence of severe cases [7]. In pediatric population, the digestive symptoms such as anorexia, nausea, vomiting, diarrhea and abdominal pain can be present even during the onset of the disease or they can occur during the evolution [5]. Thus, in this age group, the diagnosis is burdened by the significant number of asymptomatic cases, the lack of fever in many cases and the child's susceptibility for other pathogens [8].

The aim of these case reports is to underline the importance of testing in pediatric patients independently of the symptoms and clinical situation.

Case 1

We report the case of 2-year and nine-month-old female child without significant personal history, brought in the Emergency Department for an involuntary ingestion of a substance for industrial cleaning, followed by a spasm of the upper limbs which lasted for approximately 30 seconds. According to the mother, the patient presented watery rhinorrhea a couple of days before the admission for which the mother administered symptomatic treatment. The clinical exam pointed out mild hyperemia of the pharynx and multiple mildly enlarged lymph

nodes in the area below the mandibula, on both sides of the neck and above the clavícula, mobile and without any pain associated. The laboratory tests revealed leukocytosis (28290/ μ L), thrombocytosis (619000/ μ L), and one of the transaminases mildly increased (GOT 46 U/L). Based on all the above-mentioned facts, the patient was admitted in the Pediatric Clinic 1 for follow-up and specialty treatment.

During the admission, the patient presented a favorable evolution after the ingestion excepting for several episodes of fever that disappear after the administration of antipyretics. Taking into account the presence of fever, we performed a RT-PCR test for SARS-CoV-2, in both patient and mother, with positive result for the patient. Due to the relatively good general status of our patient, she was discharged with isolation recommendation and the continuation of symptomatic treatment if needed.

Caz 2

We report the case of a 3-year and 8-month-old male patient with a history of foreign body aspiration, who was brought by the caregivers in the Emergency Department due to a possible foreign body aspiration (tangerine) followed by sudden dyspnea. The clinical exam pointed out mildly hyperemic pharynx, respiratory stridor, signs of respiratory distress and decreased vesicular murmur on the left side associated with sibilant rales. Thus, we performed an ENT consult, which decided to perform a bronchoscopy for the suspicion of trachea-bronchial foreign body. The bronchoscopy did not detect any foreign body, but it revealed purulent secretions especially in the left lung for which the patient is admitted to the Pediatrics Clinic 1 Targu Mures with negative RT-PCR test for SARS-CoV-2 infection performed on the day of admission.

The laboratory tests performed after the admission showed mild microcytic anemia, and the chest radiography described a pneumonia and increased pulmonary hilum as well an accentuated pulmonary interstitial space on both lungs.

As a result of the treatment with antibiotics, corticosteroids and symptomatic treatment, the patient evolution was slowly favorable, and we repeated the RT-PCR SARS-CoV-2 test on the 5th day of admission which was positive, and the patient was transferred in the Pediatric Clinic 2 Targu Mures.

Discussions

According to the clinical studies performed on pediatric patients the most common symptom of SARS-CoV-2 infection are cough, hyperemic pharynx and fever [9], and those that develop symptoms represent only one third of the positive patients [10]. Thus, 2/3 of the positive patients will not develop symptoms or these might be neglected by the

caregivers. Although the infection with SARS-CoV-2 virus was initially described as an acute respiratory pathology, many studies report the onset of this infection with gastrointestinal symptoms, followed later by the respiratory ones, fact that might trick the parents and even the physicians. In addition, another challenge might be represented by the difficulty to differentiate the symptoms to those caused by other viruses, the adverse events caused by certain drugs used in the treatment, and also the reactivity of the gastrointestinal tract to fever [7].

Nevertheless the cases in which the RT-PCR test for SARS-CoV-2 detection based on nasal or pharyngeal samples is negative, but the patients present suggestive respiratory symptoms as in the second case described above raise numerous concerns, among which the entrance pathway of the virus. A possibility would be the infection through fecal-oral transmission with the replication of the virus in the gastrointestinal tract, which through the presence ACE-2 receptors would make it possible [11] and with further hematogenous spread and lung impairment. The isolation of the virus from the patients' feces during both the acute stage of the disease and the convalescence, but also the common gastrointestinal symptoms brought into discussion the possibility of the fecal-oral or fecal-respiratory transmission of the virus with replication within the gastrointestinal tract [12,13]. Moreover, several studies reported that patients with pathognomonic 'ground glass' opacities on lung computed tomography had negative RT-PCR tests from the nasal and pharyngeal samples, but positive feces result [14]. Another cause for these negative results might be the early stage of SARS-CoV-2 infection when the test was performed. The improper sample collection must not be neglected in a child, the degrees of training in medical staff, and also the technique they apply.

The most important challenge for medical staff remains the testing in asymptomatic or oligosymptomatic cases during the referral with other health problems, especially since several studies report that the number of asymptomatic children is considerably higher when compared to adults, the number of their contacts in higher due to kindergarten or school, and the physical contact in children is more difficult to be limited [15]. Therefore, in order to ad-

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mit a patient in a pediatrics department, it is needed to take a decision regarding the testing and isolation for preventing a supplementary exposure for other patients with different conditions, as well as for medical staff. Thus, not testing the cases that require admission for monitoring a non-infectious pathology, as in the first case we described, who did not present any epidemiologic suspicion might lead to nosocomial infections with major consequences on vital risk patients or with chronic pathologies, on medical staff and on the compartment activity.

Considering the multitude of studies which report cases in which the virus is identified only in the feces [13], the implementation of such kind of tests especially in pediatric patients would be extremely useful for both patients with digestive symptoms, and for explaining the infection pattern in those with respiratory symptoms like in the second case we described, with negative RT-PCR test from the nasal and pharyngeal sample. Testing in pediatric population should be a major national and international concern based on the increased number of asymptomatic cases in this age group, the mild forms of disease, the cases with atypic onset that mimic other pathologies, the persistently increasing infectiveness of new types of SARS-CoV-2, the possibility of fecal-oral contamination associated with the children return in the school environment, and the difficulties to enable a strict respecting of protection and hygiene measures. This phenomenon might lead to an absolute increase of the number of severe cases and to the overwhelming of the severe cases and of the healthcare system [5,14].

CONCLUSIONS

SARS-CoV-2 infection in children represents a real diagnostic and therapeutic challenge for the medical community, with unknown long-term implications. Although the case definition recommends clearly how to select the children that should be tested before admission, the experience of the 2 cases presented above questions the efficiency of these prevention measures for the spreading in the hospital environment. Thus, in pediatric population a widening of the suggestive symptoms and the clinical situations that impose the SARS-CoV-2 infection would be extremely useful.

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