


CASE REPORT

Pediatric COVID-19 case with regard to the family infection chain and the psychosocial context

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Abstract

The role of children in households, spreading SARS-CoV-2, may differ from measles or influenza, and therefore, these diseases are not directly comparable to COVID-19. The psychosocial aspect of infection and quarantine for families and children suggests that fear of social stigmatization can lead to not disclosing the infection.

KEYWORDS

case report, corona, COVID-19, infection chain, pediatrics, quarantine, SARS-CoV-2, stigmatization

1 | BACKGROUND

The biological father of an 11-year-old girl infects his daughter, who returns to her biological mother's family before the father's diagnosis. The daughter endures a 1-day, mild illness. However, despite close physical contact prior to and during the girl's illness, her mother, stepfather, and 1-year-old half-brother were not infected.

In Germany, the first SARS-CoV-2 infection was confirmed on January 28, 2020. A recent study showed that less than 1% of cases occurred in children under 10 years of age.¹ It appears that children are as likely to be infected as adults, but the course of infection is more likely to be asymptomatic or mild.² We report on one of the first infected children in Germany with 8-week follow-up to the index infection and discuss biological and psychosocial aspects.

2 | METHODS

"Melina" an 11-year-old girl infected with SARS-CoV-2 was prospectively followed up by her family doctor, and interviews were conducted by a researcher physician. Family members were also semi-qualitatively interviewed, including clinical manifestations, epidemiological characteristics, and laboratory tests. Naso-oro-pharyngeal swab tests were used to detect SARS-CoV-2 via real-time PCR Cobas, Roche Company. In addition to the COVID-19 pathogen (SARS-CoV-2), this test detects SARS-CoV-1 and other sarbecoviruses. No cross-reactivity with common respiratory coronaviruses (CoV-NL63, 229E, HKU, OC43, or MERS-CoV) was found. Melina drew a picture of herself in the corona situation. Six weeks after Melina's positive initial testing, her pediatrician carried out serum antibody tests in the family using the Acro 2019-nCoV IgG/IgM Rapid Test. IgG relative sensitivity was

100% (95% confidence interval (CI): 86.0%-100%); relative specificity, 98.0% (95% CI: 89.4%-99.9%); IgM relative sensitivity, 85.0% (95% CI: 62.1%-96.8%); and relative specificity, 96.0% (95% CI: 86.3%-99.5%).

3 | CASE PRESENTATION WITH REGARD TO THE CORONA INFECTION

After a business trip within Germany from February 19 to 21, 2020, where he had a conference and meals with an Italian man who later was tested positive for COVID-19, Melina's biological father developed first mild symptoms (fatigue) on February 23. Melina, whose parents live separately, visited her father from February 22 and returned to her mother in the evening of February 24, on which Melina's father developed significant fatigue, fever, headache, aching limbs, and cough.

On February 25, the father was informed of the Italian's positive test and, due to his symptoms, was referred to a university hospital on February 26 where he was also tested for SARS-CoV-2. Three other attendees of the meeting were also positive. After the positive result was communicated on February 27, Melina's father remained in quarantine at the university hospital until March 4.

Melina developed her first symptoms on March 1: dizziness with a slight headache. She quickly developed an elevated body temperature of 38.1°C and was given a 400 mg ibuprofen tablet by her mother. By the next morning, Melina had no more symptoms. The mother reported: "It came as if by magic and disappeared just as quickly." The following symptoms from our COVID-19 symptom list were denied: cough, rhinitis, irritability, fatigue, tearfulness, abdominal pain, vomiting, diarrhea, sore throat, aching limbs, disorders of the sense of smell or taste, loss of appetite, sensitivity to light, pressure on the chest, and scratching of the throat.

On March 2, Melina, her half-brother, her mother, and her stepfather were also tested. On the same day, Melina's mother had diarrhea and a febrile feeling at a temperature of 37.6°C. On March 3, the family received the results that Melina was tested positive for SARS-CoV-2, but her mother, brother, and stepfather were negative. On March 4, Melina returned to her father, who was allowed to leave the hospital. Melina was tested negative for SARS-CoV-2 on March 6 and 9, the day Melina returned to her mother's family (Figure 1).

From March 3, Melina and her mother's family remained in quarantine for 2 weeks without further symptoms. Antibody tests on April 13 on Melina, her mother, her stepfather, and half-brother showed IgG-positive results only for Melina (Figures 2 and 3).

4 | MELINA'S MEDICAL HISTORY

Melina was born in November 2009 after an uncomplicated pregnancy. She was an uncomplicated baby, was breastfed, and was in day care from the age of 1. She is fully vaccinated according to the German vaccination commission (STIKO). As a small child, she had frequent middle ear infections. Surgical operations, accidents, or allergies are denied. In connection with flu-like infections, she occasionally had a fever of up to 39.8°C. Since starting school, Melina has migraine attacks about 4 times per year with aura, vomiting, and severe headaches. The mother sees a connection to both distress and eustress. The migraine is treated with ibuprofen, and Melina usually returns to school on the next day.

5 | CURRENT FAMILY SITUATION

Melina's 42-year-old mother and 41-year-old father separated when she was 4 years old. Two years ago, her mother

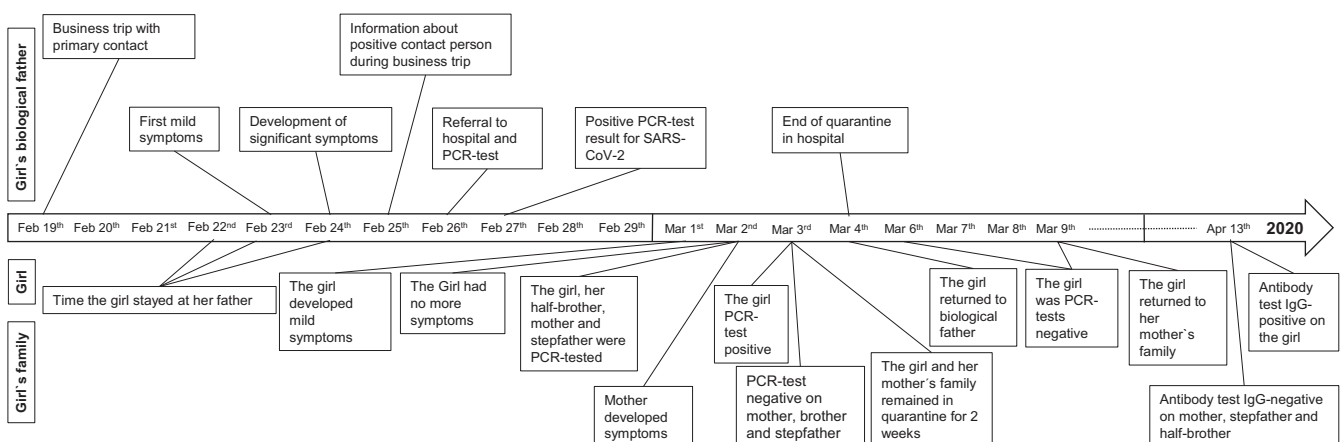


FIGURE 1 Time line of case report

Immunological Tests:

02/26/2020 Biological father SARS-CoV-2 PCR: positive

03/02/2020 Melina SARS-CoV-2 PCR*: positive

03/03/2020 Mother SARS-CoV-2 PCR*: negative

03/06/2020 Melina SARS-CoV-2 PCR*: negative

03/09/2020 Melina SARS-CoV-2 PCR*: negative

04/13/2020 Follow-up serum antibody rapid Test** in serum by the pediatrician:
Melina's half-brother, mother and stepfather: IgM and IgG negative.
Melina IgM negative, IgG positive

Other: Blood group: mother is 0 Rhesus positive; not known for other family members

Tests: *RT-PCR cobas SARS-CoV-2
**Acro 2019-nCoV IgG/IgM, Rapid Test

FIGURE 2 Immunological tests

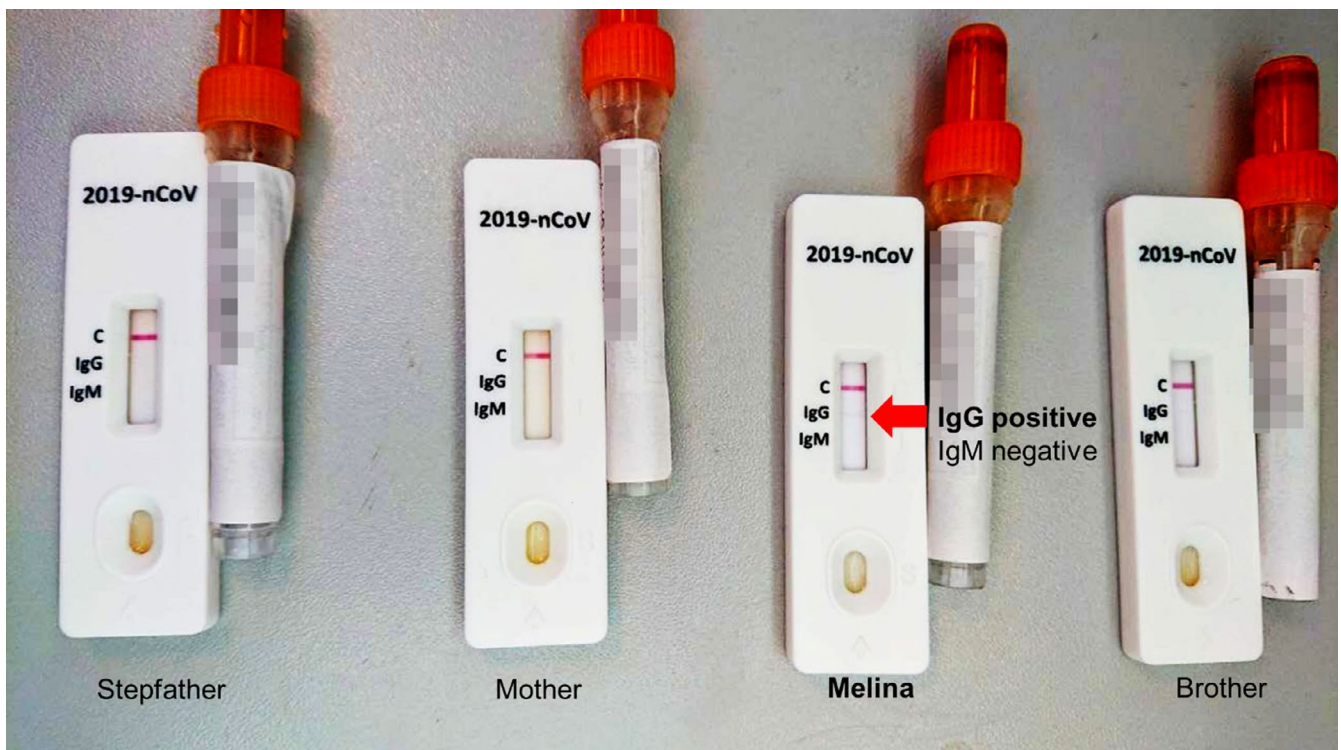


FIGURE 3 Antibody test for SARS-CoV-2 antibodies at 6-week follow-up: (from left to right) Melina's stepfather, her mother, Melina, and her brother. Melina: IgM-negative, IgG-positive; all others: IgM- and IgG-negative

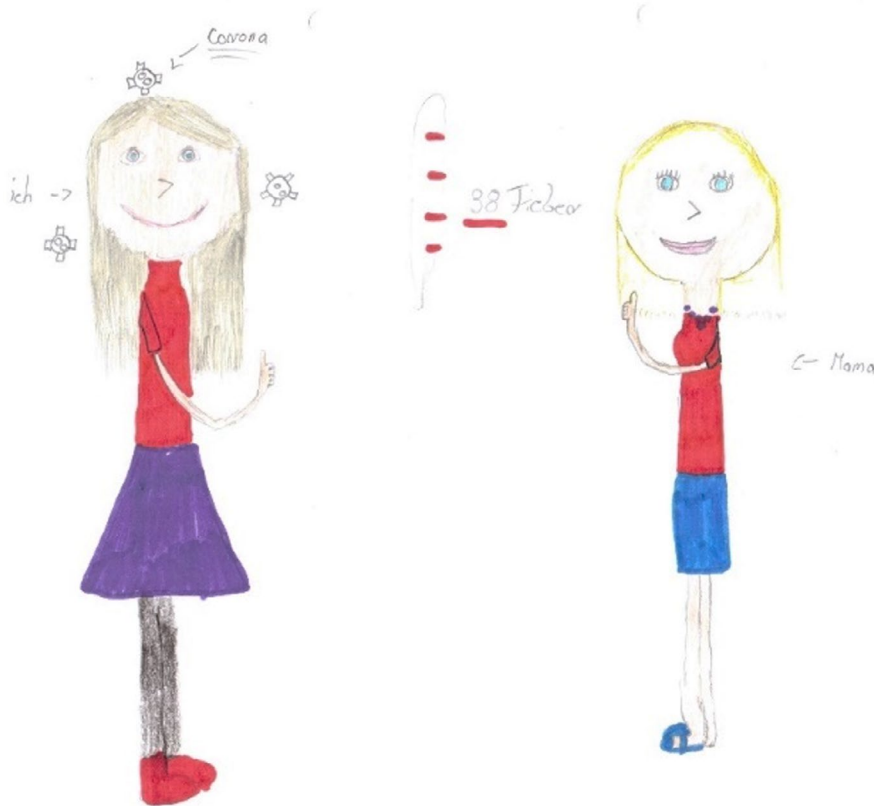


FIGURE 4 Melina's drawing shows the distance she had to keep to her mother during the corona quarantine. The thumbs up shows that she did not find the illness so bad

married Melina's 39-year-old stepfather. Melina's mother and stepfather are in friendly contact with Melina's biological father, who lives 6 kilometers away. Melina sees him weekly in flexible arrangement, stays overnight with him in her own room, and likes to be there. The patchwork family lives in an apartment; Melina has her own room there. German high school graduation is their highest educational level. None of the adults not smoke, and they drink alcohol only occasionally. No particular health, family, or work pressures are mentioned. Melina attends the 5th grade of a grammar school, is an eager student, and does sports every week. The mother describes Melina as very likable, positive, and sensitive, and says she often has to stand back because of her little half-brother. The mother compensates for this by spending a lot of time with her in the evening. The family has no pets.

6 | TIME OF QUARANTINE

The mother describes the quarantine as a "terrible" experience. After Melina's positive test result, that is, the day after her symptoms, the recommended personal distance inside the family was adhered to. Melina ate in her room with her mother as company at a distance, and different bathrooms were used. "We cuddle a lot," said the mother, "especially in the evening, which did not happen for the 2.5 days until she

went to her daddy. This put a lot of strain on Melina and she kept saying that she would like to hug or cuddle us. That was the worst part of the whole thing for her, not the illness itself." Despite this difficult experience, Melina drew quite positive picture in retrospect on April 13 (Figure 4). The family did not leave the house for 2 weeks and ordered food online. For fear that Melina could be avoided, the infection was not communicated to the school, nor with friends or neighbors.

7 | DISCUSSION

Although Melina was quickly infected by her separated living father, the infection did not spread in Melina's main household, despite very close physical contact even at the time of the acute illness when a large amount of virus exchange must be assumed.³ So, it might be possible that COVID-19 does not spread in families easily from children to adults despite they had close contacts. Melina also did not infect her 1-year-old half-brother, even though babies do get infected with COVID-19.² Data differ on whether children are less susceptible to SARS-CoV-2 infection.^{1,4} There are an increasing number of articles that examine household contacts and infection rates, and the transmissibility of the causative pathogen remains unclear.⁵ Our case fits with the findings of a low within-household secondary infection rate.⁶ Because of a broad spectrum of symptoms,

spreading, and incubation time in the context of COVID-19, it is difficult to generalize. But given that the statistics are often based on unclear cases, it may be useful to have some well-researched case reports that precisely tell how things were in a particular case. This report and many others do suggest that children spread the disease less than adults and less than in the case of measles and influenza.³ The psychosocial aspect of infection and quarantine for families and children is one of the unique aspects of this case report. Although many children are doing very well during the pandemic, the literature suggests that children who are quarantined are more likely to develop mental health problems.⁷ This case also suggests that fear of social stigmatization can lead to not disclosing the infection to acquaintances or institutions.

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CONFLICT OF INTEREST

None declared.

AUTHOR CONTRIBUTIONS

Dr med. SS, CS, MSc. HK, Dr phil. KB, and Prof. Dr med. DM: conceptualized and designed the case report, drafted the initial manuscript, and critically reviewed and revised the manuscript. All authors: approved the final manuscript as submitted and agree to be accountable for all aspects of the work.

ETHICAL APPROVAL

All names in this case report have been changed by the authors. "Melina," her mother, her father, and her stepfather

have read the manuscript and approved its publication. An ethical approval was not required for this retrospective case report and therefore not requested.

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