

COVID-19 Can Cause Severe Intussusception in Infants

Case Report and Literature Review

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Abstract: COVID-19 may cause intussusception in infants. We report on a case of severe ileo-colic intussusception in an infant with COVID-19 who required an ileo-colic resection. A literature review revealed 9 other cases with COVID-19 and intussusception. In this article, we will discuss the management and treatment of the first reported case of intussusception associated with COVID-19 in Italy.

Key Words: intussusception, COVID-19, pediatric surgery, infants

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Intussusception is an acquired and acute condition in which a bowel segment (intussusceptum) is invaginated into an adjacent distal segment (intussusciptens). While it may occur at any age, the highest incidence appears to be in infants between 4 and 9 months,¹ and it is the most common cause of intestinal obstruction in this age group.²

Spontaneous reduction may occur, but lymphatic and venous obstruction may also develop as a result of edema of the bowel wall, causing arterial insufficiency with intestinal ischemia and necrosis. Any tract of the mesenteric intestine can be involved: ileocolic (85%), ileoileocolic (10%), appendicocolic, cecocolic or colocolic (2.5%), and jejunojejunal and ileoileal (2.5%). An intussusception can have a lead point, drawing the proximal bowel into the distal intestinal tract by peristaltic activity. The most common lead point is a Meckel diverticulum followed by polyps, duplication cysts, and appendix. Hemangiomas, carcinoid tumors, hamartomas from Peutz-Jeghers syndrome, and lipomas are, however, rare.

Primary or idiopathic intussusception, without a lead point, is the most frequent form (>80% of cases), especially in infants, and it is related to hypertrophied Peyer patches on the luminal surface of the distal small bowel.³ This problem can occur in the context of an upper respiratory tract infection or an episode of gastroenteritis, on account of the hypertrophied lymphoid tissue. Recently, it has also been associated with COVID-19.⁴

CASE REPORT

A 7-month-old male patient, with normal vaginal delivery after a full-term pregnancy (39⁺² weeks) and without a relevant

medical history, was brought to our pediatric emergency department because of 12 hours of abdominal pain, inappetence, diarrhea and vomiting (4 episodes), accompanied by sleepiness. He had been in contact with his grandmother who had been positive for COVID-19 10 days previously. The COVID-19 PCR test for the baby and his mother was reported to have been positive. He was afebrile, and his heart rate was 95 beats per minute, with an oxygen saturation of 100%. On physical examination, he appeared pale, ill, moderately dehydrated and lethargic. Laboratory tests revealed a normal blood count and D-dimer level of 27,891 ng/mL. Two hours later, he produced a stool mixed with blood and mucus. Urgent ultrasounds showed ileocolic intussusception through alternating rings of low and high echogenicity, representing the bowel wall and mesenteric fat in the transverse plane, and the “pseudokidney” sign on the longitudinal section. A contrast enema confirmed the diagnosis. The nonoperative procedure was unsuccessful; therefore, a laparotomic approach was necessary. Through a transverse right supraumbilical incision, the ileo-colic intussusceptum was identified and manipulated back to its normal position, but with difficulty. We found an ischemic portion of the intestine, which required ileocolic resection (3 cm of terminal ileus, cecum with appendix and 20 cm of ascending colon) and anastomosis.

The child was monitored for 48 hours in intensive care. After 5 days, he was gradually fed with adequate tolerance and severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2) RNA was identified in his stool specimen.

Throughout the hospital course, he developed no complications and was discharged on the 15th day of his hospital stay when the COVID-19 test was negative. At 1-month follow-up, the patient was well.

DISCUSSION

As the onset of the COVID-19 pandemic is caused by SARS-CoV-2, attention is focused on adults with respiratory manifestations. Children are less affected than adults, specifically infants who tend to have an asymptomatic or mild presentation.⁵ The gastrointestinal symptoms of COVID-19 in children are more frequent and usually limited to abdominal pain, diarrhea and vomiting.⁶ Involvement of the gastrointestinal tract is related to the angiotensin II converting enzyme used by this virus to enter cells, not only in the lung tissue but also in the gastrointestinal tract, especially in enterocytes of the small intestine and colon.⁷ This is supported by a study that found that 8 of 10 COVID-19 positive children had positive rectal swabs, even after the disappearance of the virus from the upper respiratory tract.⁸ Intestinal infections, as with respiratory infections, can lead to inflammation through the production of cytokines and the release of chemokines.

The association between COVID-19 and intussusception may be related to mesenteric lymphadenopathy and hypertrophy of Peyer patches, evoking a local reactive mesenteric adenitis which causes an alteration in peristaltic intestinal movement or acts as a lead point for the intussusceptum.

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TABLE 1. Case Reports of Recent Literature Review

Author, Country	Gender, Age (Months)	Respiratory Symptoms	Symptoms	Treatment	Outcome
Makrinioti et al, London, United Kingdom ⁹ Case 1	F, 10	2 weeks before	Bilious vomiting, currant jelly stool	Pneumatic reduction Surgical intervention	Recovered
Makrinioti et al, Wuhan, China, ⁹ Case 2	F, 10	No	Currant jelly stool, vomiting	Pneumatic reduction Surgical intervention	Deceased
Athamnah et al, Jordan, United States ¹⁰	M, 2.5	No	Vomiting	Pneumatic reduction	Recovered
Moazzam et al, Pakistan ¹¹	M, 4	1 week before	Abdominal pain, currant jelly stool, drawing legs to abdomen	Pneumatic reduction	Recovered
Martínez-Castaño et al, Spain ¹²	M, 6	No	Abdominal cramps currant jelly stool vomiting	Hydrostatic reduction	Recovered
Mercado et al, Saltillo, Mexico, ¹³ case 1	M, 8	No	Feverish feeling, vomiting	Surgical reduction	Recovered
Mercado et al, Saltillo, Mexico, ¹³ case 2	F, 7	1 week before	Intermittent crying, 2 currant jelly stools	Surgical reduction	Recovered
Rajalakshmi et al, Chennai, India ¹⁴	M, 8	No	6–7 episodes of vomiting, 2 episodes of blood-stained stools	Pneumatic reduction	Recovered
Bazuaye-Ekwuyas et al, Galveston, United States ¹⁵	M, 9	4 days before	Vomiting, abdominal pain, decreased oral intake, blood-streaked stool	Hydrostatic reduction	Recovered

To date, the presentation of COVID-19 as intussusception has been reported in 9 cases. Our patient is the first Italian case report and the only severe intussusception requiring an ileo-colic resection. To confirm a direct relationship between COVID-19 and intussusception, we wished to pursue RNA research on the resected intestinal tissue, but it was not possible with our available tests, so we looked for the presence of the virus in the stool specimen.

Nine infants with intussusception and laboratory-confirmed SARS-CoV-2 infection were described in the literature from January 2020 to February 2021 (Table 1).^{9–15} They were more or less the same age, predominantly male, and had initial intussusception symptoms; 4 of them also had respiratory symptoms.

Reduction without a surgical procedure was attempted in 5 of them, 3 had pneumatic reductions and 2 had hydrostatic reductions, guided by ultrasound or fluoroscopy. Another 4 patients required interventions, but none of them required ileo-colic resection because of invagination.

In conclusion, we report the first case of severe COVID-19-associated intussusception in a healthy infant. As knowledge of this virus is still evolving, we cannot define the nature of this association, but it is certainly important to know that intussusception can be an unconventional manifestation of COVID-19. It is even more important to suspect intussusception when a COVID-19 patient presents with abdominal pain, vomiting, constipation or blood in the stool. In these cases, timely diagnosis is crucial for adequate treatment and a good prognosis.

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