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Intussusception and SARS-CoV-2 infection

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ABSTRACT

We present 2 cases in the same city, of coexistence of intussusception and SARS-CoV-2 infection. The first in an 8 month old male in August 2020 and the second in a 7 month old female in October 2020; both resolved by surgical technique. Although it is known that some intussusception cases can present concomitantly with viral infections, the fact that they appear in the same context as COVID-19 has only been reported as of late; these 2 new cases are added to the 6 reported so far. In the future, it will be analyzed whether this coexistence is the result of an association between the 2 diseases.

1. Introduction

Intussusception or intestinal invagination occurs when a segment of the intestine (*the intussusceptum*) is telescopically introduced into an adjacent segment (*intussusciptiens*) [1]. It is the most common cause of intestinal obstruction in infants [2]. Surgical reduction is performed urgently in order to avoid the development of ischemia, necrosis, perforation and peritonitis. More than 80% of cases correspond to ileocolic intussusception. Most are idiopathic, caused by lymphoid hyperplasia which acts as an invaginating point in the small intestine; the remaining 6% are explained by lesions such as: Meckel's diverticulum, Henocho-Schönlein purpura, intestinal duplication cyst, polyp or lymphoma [1]; in other series it has been reported that up to 30% have a history of previous viral infection [3].

Some enteric infections have been related to intussusception, possibly due to the proliferation of lymphoid tissue in response to the microorganism, some examples are: *Yersinia enterocolitica*, *Staphylococcus aureus*, *Clostridium difficile*, *Salmonella typhimurium* and *Escherichia coli* O157: H7; and viruses such as adenovirus, cytomegalovirus, Epstein-Barr virus, herpes virus 6 [4], rotavirus, poliovirus, enterovirus, parechovirus, and norovirus [3].

2. Case 1

An 8 month old male patient, treated at the City Children's Hospital, in August 2020, presenting with a feverish feeling starting 2 days prior to admission and managed with Acetaminophen, 8 non-biliary episodes of vomiting the day before, and no respiratory symptoms. At the

hospital, he had 2 stools with currant jelly appearance. No significant pathological history. Feeding: breast milk and formula, and solid diet started 2 months prior.

On examination: Well-nourished, irritable, pale, without respiratory distress, his abdomen was soft and not distended, normal peristalsis, grimace upon palpation, no presence of masses, and capillary refill of 4 seconds. Rectal examination: stool with mucus and blood. Due to the pandemic situation, and the presence of fever, an RT-PCR test for SARS-CoV-2 was obtained with a positive result.

Laboratory tests including complete blood count within normal limits, Globular Sedimentation Rate: 17mm/hour, Protein C Reactive 18.6 mg/L and normal coagulation tests. An ultrasound was obtained confirming intussusception. Surgical reduction with manual reduction was performed; ileo-colic invaginated portion without tension. There were no complications during the procedure.

During recovery, he presented normocytic normochromic anemia with a decrease in hemoglobin to 7.5 g/dL from 12.0 g/dL at admission, normal ferritin and D-Dimer at 7650 ng/ml. He received prophylactic anticoagulation with enoxaparin. General diet was resumed on the 3rd postoperative day due to secondary ileus, with adequate tolerance and finally he discharged on the 12th day of hospital stay.

3. Case 2

A 7 month old female infant, consulted at The University Hospital, presenting with Intermittent crying of over 36 hours, associated with 2 stools with currant jelly appearance. Upon admission, a fever of 38 °C and non-biliary vomiting. Relevant background: Initiation of solid diet 1

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Table 1
Reported cases of intussusception and SARS-CoV-2 infection worldwide in 2020.

	Cai et al. Wuhan, China [10].	Rajalakshmi et al. Chennai, India [6].	Moazzam et al. Karachi, Pakistan (3)	Martínez-Castano et al. España [11].	Makrinioti et al. Londres UK [5]	Bazuaye-Ekwuyasi et al. Galveston, USA [7].	Mercado et al. Saltillo, México Caso 1	Mercado et al. Saltillo, México Caso 2
Age	10 months	8 months	4 months	6 months	10 months	9 months	8 months	7 months
Gender	Female	Male	Male	Male	Female	Male	Male	Female
Respiratory symptoms	No	No	1 week before	No	2 weeks before	4 days before	No	1 week before
Symptom evolution	Initially intussusceptions symptoms, then SARS-CoV-2 positive test	Initially intussusceptions symptoms, then SARS-CoV-2 positive test	Initially intussusceptions symptoms, then SARS-CoV-2 positive test	Initially intussusceptions symptoms, then SARS-CoV-2 positive test	Not specified	Initially SARS-CoV-2 positive test, then intussusceptions symptoms	Initially SARS-CoV-2 positive test, then intussusceptions symptoms	Initially intussusceptions symptoms, then SARS-CoV-2 positive test
Fever	Detected upon arrival at the hospital	2 days before	No	No	No	1 day before	2 days before	Detected upon arrival at the hospital
Initial labs	Not relevant	Anemia	Anemia	Anemia leukocytosis	Not relevant	Anemia Lymphopenia, proteinuria, Hydrostatic enema	Not relevant	Not relevant
Treatment	Air enema	Air Enema	Air enema	Hydrostatic enema	Failed air enema, Surgical reduction + Ladd procedure.	Hydrostatic enema	Surgical reduction	Surgical reduction
Type of intussusception	Not specified	Ileocolic	Ileocolic	Ileocecal	Not specified	Ileocolic	Ileocolic	Ileocolic
Outcome	Death	Recovered	Recovered	Recovered	Recovered	Recovered	Recovered	Recovered
Remarks	MODS, Seizures, Shock	None	None	None	Previous bilateral conjunctivitis. Associated malrotation in surgical findings	None	Anemia and elevated D-dimer after surgery	None

month prior and rhinopharyngitis 1 week before.

On examination: eutrophic, irritable, fever: 38.1 °C, tachycardia 130 BPM. Normal lung auscultation, abdomen with mild distension, decreased peristalsis, painful on deep palpation in mesogastrium, perception of a firm and painful mass between right hypochondrium and mesogastrium. Capillary refill of <2 seconds. Rectal examination revealed mucus and blood.

Laboratories: normal blood count, normal coagulation tests. Simple abdominal X-ray with loop dilation, air-fluid levels and absence of distal gas. Intussusception was diagnosed and surgical treatment was decided: Rockey-Davis incision for manual reduction of tight ileo-colic segment. Procedure without complications.

The recovery was favorable, restarting enteral feeding at 8 hours post-op with adequate tolerance and patient was discharged after 36 hours of hospitalization. Due to the hospital protocol against COVID 19 and the presence of fever, an RT-PCR test for SARS-CoV-2 was performed with a positive result. Completed isolation at home and the outpatient follow-up by consultation finding a healthy patient a month after surgery.

4. Discussion

Since declaration of a COVID-19 pandemic caused by SARS-CoV-2 virus in March 2020, the priority targets for case identification have focused on adults with respiratory manifestations. Testing rates in the pediatric population are much lower compared to adults and elderly people globally. This situation can generate an underestimation of pediatric cases [3].

COVID-19 in children, specifically infants, has an asymptomatic or mild presentation. Gastrointestinal symptoms have been more frequent in pediatric age compared to adults, and include nausea, vomiting, diarrhea, and abdominal pain [2]. To date, available studies show that approximately 10% of pediatric patients present these symptoms and they have been associated with greater severity of the disease [5].

SARS-CoV-2 binds to Angiotensin II Converting Enzyme to enter cells of lung tissue and gastrointestinal tract, especially the small intestine and colon [6]. This protein, identified in immunohistochemical studies in enterocytes, acts as a co-receptor for the absorption of nutrients, for example amino acids from food [5]. The pathophysiology of the infection involves production of cytokines and release of chemokines responsible for acute intestinal inflammation. The presence of viral nucleocapsid has been demonstrated in rectal swab samples, even after clearance of the virus in the upper respiratory tract, which corroborates with intestinal compromise [6].

Although the pathogenesis of intussusception related to the SARS-CoV-2 is not fully understood, it can be inferred that it involves alteration in peristaltic intestinal movement that allows intussusception [7]. Diagnostic imaging studies have identified data of ileocolitis and mesenteric lymphadenitis in adult tomography [8]; in pediatrics, there are 2 studies that report thickening of the wall of the small intestine and colon [9], which may be consistent with local inflammation.

Analyzing the clinical and surgical characteristics of the cases (Table 1), we found that the age of presentation, the affected segment and the predominance in males were maintained, like most cases of intussusception. Half of the cases presented respiratory symptoms between 1 and 2 weeks before the appearance of the intussusception diagnosis. 3 of 8 patients remained afebrile throughout the evolution. Half of cases were associated with anemia in the initial laboratories. As is known, the management of choice for intussusception is pneumatic or hydrostatic reduction guided by ultrasound or fluoroscopy; however, in the 2 cases that we present, the resolution was surgical due to the lack of 24-h service of this equipment.

The mortality rate in intussusception is reported to be less than 1% [7]; it's striking that in this group of cases, 1 of 8 has died, this patient was the first reported and was associated with Multisystemic Inflammatory Syndrome caused by COVID-19.

5. Conclusion

With the contribution of more cases of both diseases, future research will attempt to understand if intussusception is part of the gastrointestinal symptoms of SARS-CoV-2 infection or if it is an associated complication. In our city, which serves a population of 936,107 people (2016, National Institute of Statistics and Geography - of Mexico) we identified 2 cases in children in less than 1 month, so infection by this new coronavirus should be considered from now on in patients presenting with intussusception during pandemic time.

Patient consent

Consent to publish the case reports was not obtained. This report does not contain any personal information that could lead to the identification of the patients.

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Authorship

All authors attest that they meet the current ICMJE criteria for Authorship.

Declaration of competing interest

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