

Appendicular Syndrome: Another Manifestation of SARS-COV-2 Infection

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1. Introduction

First reported in Wuhan, China, in December 2019, Coronavirus disease 2019 (COVID-19) is a contagious disease caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), the disease has since spread worldwide, and has now become an international pandemic. [1] Most people infected with the virus will typically present respiratory tract symptoms and fever, However, a significant proportion of patients presented initially with gastrointestinal symptoms have also been reported [2] [3]. Pediatric patients with COVID-19 may experience milder illness with atypical clinical manifestations [4].

2. Case Presentation

A 12-year old previously healthy girl, presented to emergency department with a history of two days of abdominal pain, vomiting, and watery diarrhea for two days associated with fever but the temperature has not been recorded. She had no significant surgical nor medical history, and there was no similar symptoms among her family members.

She was febrile 39°C, tachycardic with a heart rate 120 beats per minute, a respiratory rate 18 breath per minute, her blood pressure 108/75 mmHg, and had a peripheral oxygen saturation of 100% on ambient air. On abdominal examination, there was no distention but she had a diffuse abdominal tenderness, worse in the right iliac fossa with guarding and positive rebound. The rest of the exam was normal including lung and heart exam.

Her blood investigations revealed raised inflammatory markers, elevated C-reactive protein (CRP) 244 mg/l (normal <20 mg/l), significant leukocytosis 20400/ μ l (reference range 4000-10000/ μ l), neutrophilia 17300/ μ l (reference range 1500-7500/ μ l), minimal lymphopenia 1400/ μ l (reference range 1500-6000/ μ l), Ferritin 318 ng/mL (normal range 4 -204ng/mL), Erythrocyte sedimentation rate (ESR) 81mm (normal range 3-13 mm), Procalcitonin 0.76ng/ml (normal range <0.5 ng/ml), fibrinogen 8.6g/L (normal range 2 - 4 g/L), D-dimer 4.24 μ g /ml (normal range <0.5 μ g/ml).

With the presumed diagnosis of appendicitis, she was started on ceftriaxone, metronidazole and gentamycine.

Because the patient endorsed recent exposure to a cousin who had tested positive for COVID-19, 20days prior, we did an initial rapid test that returned negative, but her COVID-19 polymerase chain reaction (PCR) returned positive.

On pelvic ultrasound the appendix could not be visualized, the presence of sub-centimetric mesenteric lymph nodes at the level of the right iliac fossa, with infiltration of the mesenteric fat (*Figure1*), associated with an anechogenic peritoneal effusion in the inter loop and at the level of the vesico-uterine pouch (*Figure 2*).



Figure 1: Infiltration of the mesenteric fat.



Figure 2: Peritoneal effusion in the loop

An abdominopelvic and thoracic CT scan were requested; the pelvic level revealed an inflamed appendix and agglutination of the small intestine loop on the right para-

umbilical side confirming the ultrasound images (*Figure 3 and 4*). This location of the appendix in the pelvic region, justifies why it couldn't be seen on the ultrasound.

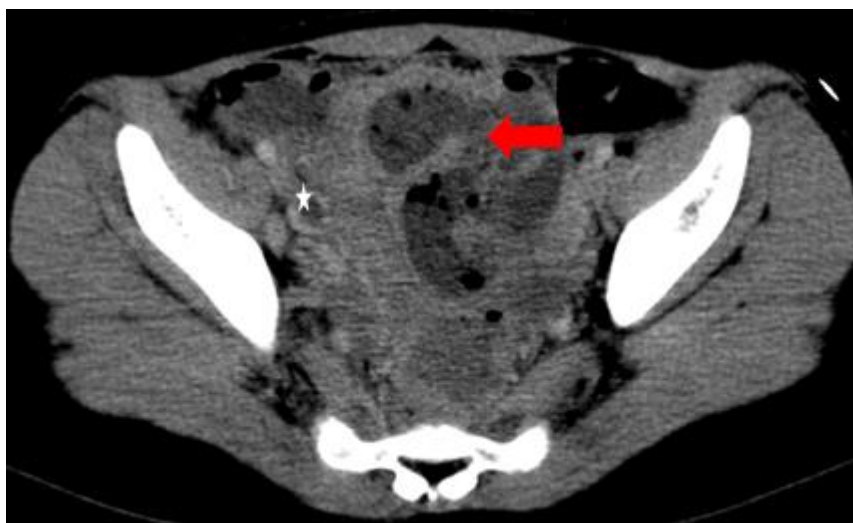


Figure 3: Appendix with thickened walls (Star). Agglutinated small bowel loops with mesenteric fat stranding (Arrow).

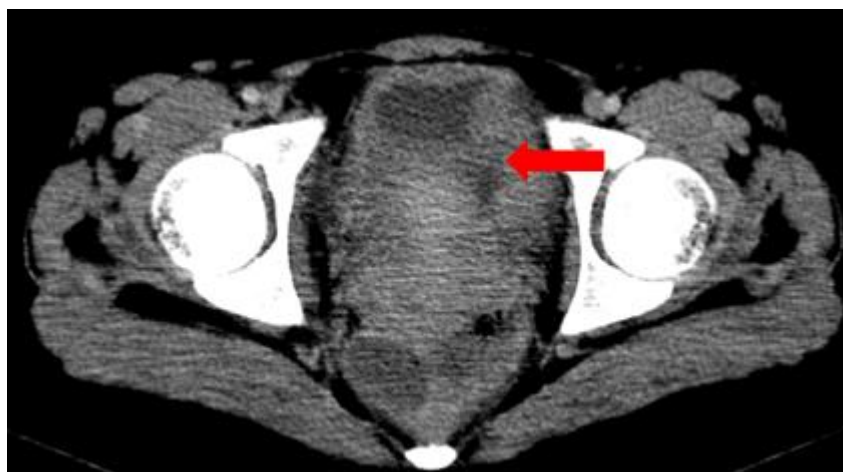


Figure 4: Peritoneal fluid in the vesico-uterine space.

The thoracic CT was normal, with no lung bases infiltration or ground-glass opacities (*Figure 5*).



Figure 5: Normal chest CT scan.

The patient was kept on antibiotics and fluids. After two days of hospitalization, the girl became afebrile and no

longer vomited, the diarrhea and abdominal pain disappeared after four days of hospitalization. She did not receive any specific COVID-19 treatment; COVID-19 IgG anti-body was positive one week after.

3. Discussion

Compared to adult, children have been presenting milder clinical manifestation of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), in addition to fever, gastrointestinal (GI) symptoms such as anorexia, nausea, vomiting, abdominal pain, GI bleeding and diarrhea have been reported, a study reviewing GI features of COVID-19 showed that, 10% of the children had only GI symptoms instead of respiratory symptoms, which was higher than 3% of adults [5], even though the majority of patients have described mild GI symptoms, others presented clinical features resembling an acute surgical abdomen.

Number of studies have shown cases of COVID-19 presented with symptoms mimicking acute appendicitis, in

USA an adolescent girl presented with similar symptoms to our patient, she also had neutrophilia, lymphopenia in her blood test results and an inflammatory biological syndrome, however her abdominal and thoracic CTs can were normal [1], another case of an adult patient was reported in Qatar, the woman showed gastrointestinal symptoms and tenderness at the right iliac fossa, in addition to lymphopenia [6]. Moreover, eight children with COVID-19 presenting at a single center in the United Kingdom with symptoms of atypical appendicitis, with a combination of symptoms including fever, abdominal pain, diarrhea, and emesis, raised blood inflammatory markers, as well as our patient findings on ultrasound were in line with lymphadenopathy and presence of inflammatory fat throughout the mesentery, with thickening of the terminal ileum [7].

K. Malbul et al. case report, besides fever and diarrhea this patient had similar clinical and biological features to our case as well as radiological similarities, in the pelvic ultrasound the appendix could not be visualized, but radiological signs of inflammation in the right lower abdominal quadrant were confirmed, which led to an open appendectomy [8]. In addition other cases were published in the Journal of Pediatric Surgery of four children with associated SARS-CoV-2 infection and acute appendicitis [9]. In both these studies the diagnosis of acute appendicitis associated to COVID-19 was confirmed intra-operatively and by pathological examination.

Although, the exact mechanism of SARS-CoV-2 to be responsible of digestive symptoms still needs to be explored, some hypothesis were given to discuss the implications of the association of the virus and the manifestation of gastrointestinal symptoms and acute abdominal pain.

A study by Hoffmann et al [10] affirmed that host cell entry of SARS-CoV-2 depends on receptor of angiotensin-converting enzyme 2 (ACE2), which is expressed on the lungs (type II alveolar cells) and also present in most other tissues, including gastrointestinal tract, the nasal and oral mucosa, vasculature, kidney, heart, pancreas, and brain [11].

Two researches made in China [12] [13] concluded that ACE2 protein, is abundantly expressed in the glandular cells of gastric, duodenal, rectal epithelia, and highly expressed in proximal and distal enterocytes of the small intestine, supporting the entry of SARS-CoV-2 into the host cells, thus, the virus RNA is detected in these tissues, which stipulate that the virus infects the gastrointestinal glandular epithelial cells, explaining the presence of 2019-nCoV RNA in the stool samples, and may suggest a possible fecal-oral mode of transmission [12]. Additionally, prolonged viral presence is observed in the gastrointestinal tract of COVID-19 patients, despite the absence or the recovery from respiratory symptoms, in fact RT-PCR-positive rectal swabs, remained detectable even after nasopharyngeal swabs turned negative [14].

In a case report, a second supposition made by K. Suwanwongse suggest that the mucosal injury induced by SARS-Cov-2 leads to hyper-immunity and over-inflammatory responses causing hypercoagulability and ischemia and be responsible for acute abdominal pain [1].

However, studies in the past have suggested a relationship between viral infection and appendicitis, by many mechanisms, whether it is by lymphoid hyperplasia, lymph node enlargement or mucosal ulcerations as result of subsequent bacterial infection [15].

4. Conclusion

In summary, with the current pandemic involving SARS-CoV-2, it is important to draw clinician's attention to atypical presentations of COVID-19 including acute surgical abdomen symptoms. As in this case report symptoms of pseudoappendicitis may occur as the only manifestation of the virus, making it important to have abdominal imaging confirmation and to perform SARS-Cov-2 PCR in all children with acute abdominal pain to avoid excessive surgical interventions, as well as an early and adequate diagnosis and management for these patients.

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