BRITISH JOURNAL OF HOSPITAL MEDICINE

CASE REPORT

Multisystem inflammatory syndrome in children presenting with symptoms of acute appendicitis

Rekha Khaund Borkotoky[1]

Geetanjali Sahariah Khound[1]

Paul A Heaton[2]

Siba P Paul[1,2]

Author details can be found at the end of this article

Correspondence to:
Siba P Paul;
siba@doctors.org.uk

How to cite this article:
Khaund Borkotoky R, Sahariah Khound G, Heaton PA, Paul SP. Multisystem inflammatory syndrome in children presenting with symptoms of acute appendicitis. Br J Hosp Med. 2022. https://doi.org/10.12968/hmed.2021.0093

Introduction

Multisystem inflammatory syndrome in children is characterised by persistent fever, laboratory markers of inflammation, signs and symptoms of organ dysfunction, temporal relation to COVID-19 infection or exposure, and lack of an alternative diagnosis (Ahmed et al, 2020). Multisystem inflammatory syndrome in children typically presents 3–4 weeks after COVID-19 infection; many affected children have positive antibodies to severe acute respiratory syndrome–related coronavirus 2 (SARS-CoV-2) but negative COVID-

Case report

A previously healthy 8.5-year-old girl presented with fever, abdominal pain, diarrhoea and vomiting over 4 days. Two weeks earlier her sibling had developed a febrile illness with cough. At initial assessment, the patient appeared unwell; her temperature was 40°C, heart rate 130/min, respiratory rate 29 breaths/min and blood pressure of 110/60 mmHg. On examination her abdomen was distended, with guarding and rebound tenderness; she was admitted with a provisional diagnosis of acute appendicitis. Throat and nasopharyngeal swabs for COVID-19 polymerase chain reaction were negative. Investigations including COVID-19 serology were sent; relevant results are shown in Table 1. She was kept nil by mouth and started on intravenous fluids and antibiotics.

Abdominal ultrasound showed oedema of the ascending colon and hepatic flexure, suggestive of colitis. An abdominal computed tomography scan revealed wall thickening at the lower pole of the caecum and the ileocaecal junction; the appendix could not be delineated but there was free fluid in the pelvis, suggestive of peritonitis (Figures 1a–c). Laparoscopic appendectomy, adhesiolysis and peritoneal lavage were performed the next day. Histopathology showed erythrocytes, lymphocytes and a few neutrophils in the lumen of the appendix, with a few neutrophils also visible in the mucosa and wall of the appendix. Subserosal and muscular layers showed groups of lymphocytes with few plasma cells and eosinophils; the histopathological conclusion was that she had mild acute appendicitis.

Two hours postoperatively she developed tachycardia and hypotension. Fluid boluses were given, and inotropes started. Repeat blood culture was sent, and antibiotics given for suspected septicaemia. Bedside abdominal ultrasonography showed no collection.

Her condition worsened on day 4 with persistent pyrexia, hypotension, tachycardia, oxygen saturation of 86% on 10 litres of oxygen, hepatomegaly and crepitations on chest auscultation; chest X-ray showed bilateral infiltrates. Echocardiography showed poor cardiac function, global hypokinesia, left ventricular ejection fraction of 40% and moderate mitral regurgitation, suggestive of myocarditis. She was electively intubated and ventilated; intravenous fluids, antibiotics, inotropes, low molecular weight heparin and paracetamol infusion were administered, and electrolyte derangement was corrected.

She remained haemodynamically unstable on maximum inotropic support for several days. On day 8, the anti-SARS-CoV-2 report showed a high IgG antibody titre with normal IgM titre. Intravenous immunoglobulin 2 g/kg was given, and intravenous methylprednisolone 30 mg/kg/day for 3 days, then tapering doses of oral prednisolone for a further 2 weeks. Enoxaparin was given subcutaneously for 10 days, then changed to aspirin for 6 weeks. There was gradual improvement from day 10 and she was extubated on day 12. Feeds were gradually introduced, oxygen weaned; she was discharged on day 19 and was well at follow up 4 weeks later.

Multisystem inflammatory syndrome in children was diagnosed on day 8 on the basis of positive anti-SARS-CoV-2 IgG antibodies on admission, persistent pyrexia, multisystem involvement (cardiac, respiratory, gastrointestinal, haematological) and raised levels of inflammatory markers.

19 polymerase chain reaction at the time of diagnosis. A significant proportion of children meeting the diagnostic criteria for paediatric inflammatory multisystem syndrome temporally associated with SARS-CoV-2 had associated gastrointestinal symptoms, all of which may also be the presenting features of appendicitis (Whittaker et al, 2020). This article reports the likely gastrointestinal manifestation of multisystem inflammatory syndrome in a child from north-eastern India, presenting with suspected appendicitis.

Discussion

Preoperative radiology indicated an inflammatory process extending beyond the appendix. The histology of the appendix showed only features of early inflammatory appendicitis, and the postoperative course was highly unusual for appendicectomy. It is uncertain whether this patient had both acute appendicitis and multisystem inflammatory syndrome in children, or whether all clinical features were solely the result of multisystem inflammatory syndrome in children. This case illustrates the need for clinicians to consider that gastrointestinal features may occur with multisystem inflammatory syndrome in children, and that this may contribute to the differential diagnosis of an unexpected serious postoperative clinical deterioration.

A study of 58 hospitalised children (median age 9 years) meeting the criteria for paediatric inflammatory multisystem syndrome temporally associated with SARS-CoV-2 reported that a significant proportion of children had associated gastrointestinal symptoms, all of which

Table 1. Laboratory results during admission

Measure (normal range)	Day 1	Day 3	Day 4	Day 5	Day 6	Day 9	Day 12	Day 14	Day 16	Day 18
Neutrophils (1.5–8.2 x 10^9/litre)	14.8	22.7	58.7	–	30.1	9.0	12.9	–	7.3	–
Lymphocytes (1.0–4.0x 10^9/litre)	0.6	0.7	4.0	–	1.6	1.2	0.3	–	0.9	–
Prothrombin time (10–13 seconds)	–	19.4	–	–	23.4	–	12.7	–	–	–
International normalised ratio (normal = 1)	–	1.62	–	–	1.86	–	0.86	–	–	–
D-dimer (<500 ng/ml)	–	–	9874	–	–	1060	527	787	607	–
Procalcitonin (<0.1 ng/ml)	–	38.2	–	>100	–	>100	14.4	–	2.86	–
Interleukin 6 (0–7 pg/ml)	–	–	509	–	–	–	–	12.1	7.2	–
High sensitivity troponin I (<19 ng/litre)	–	–	114	–	–	–	243	206	–	–
N-terminal pro B-type natriuretic peptide (<62 pg/ml)	–	–	>35000	–	–	–	6273	–	–	–
Ferritin (12–327 ng/ml)	–	–	–	–	–	1455	1944	–	1136	–
Creatine kinase myocardial band (5–25 U/litre)	–	–	54	–	20	–	–	–	–	–
SARS-CoV-2 IgM	Neg	–	–	Neg	–	–	–	–	–	–
SARS-CoV–2 IgG (<1 IU/ml)	83.25	–	–	–	–	–	–	–	–	–

SARS-CoV-2 = severe acute respiratory syndrome–related coronavirus 2

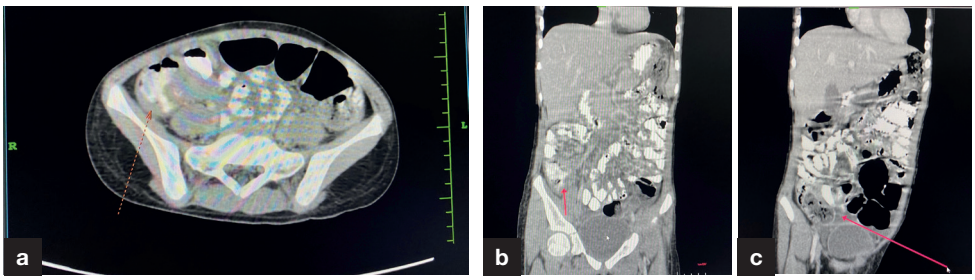

Figure 1. Computed tomography images (a = transverse section, b = coronal section, c = sagittal section) showing thickening at the lower pole of caecum and ileocaecal junction (arrows).

could also be the presenting features in appendicitis: vomiting (26/58; 45%), abdominal pain (31/58; 53%) and diarrhoea (30/58; 52%) (Whittaker et al, 2020).

A case report from the USA described a 9-year-old girl with gastrointestinal manifestations of multisystem inflammatory syndrome in children mimicking acute appendicitis; histopathological findings of the resected appendix and a segment of small bowel in that case were not suggestive of acute appendicitis (Jackson et al, 2020). In another case from Italy of a 7-year-old boy presenting with multisystem inflammatory syndrome in children and symptoms initially mimicking appendicitis, the patient recovered without the need for surgery, but developed inflammatory vasculitis and heart failure, with pericardial effusion (Guanà et al, 2020). Both cases needed admission to intensive care and other supportive measures, as in this case. A case series from a tertiary centre in the UK reported eight children with COVID-19 presenting with features of atypical appendicitis, before rapid deterioration occurred requiring hospitalisation, three of whom required intensive care support. All children had radiological imaging showing terminal ileitis, and no surgical intervention was required (Tullie et al, 2020).

A South African series reported four children (aged 5–12 years) with multisystem inflammatory syndrome in children and coexisting features of appendicitis; two had perforated, and needed ventilator support; two children had cardiac involvement including dilated coronary arteries and mild left ventricular systolic function, three had conjunctivitis and skin rash (Lishman et al, 2020). These cases and the current case highlight the difficulties in distinguishing multisystem inflammatory syndrome in children and acute appendicitis, and highlight the need for multidisciplinary assessment and care. Abdominal imaging with ultrasound may be helpful in children with COVID-19 when investigating possible appendicitis (Tullie et al, 2020).

Author details

[1]Department of Pediatrics, Apollo Hospitals (Unit: International Hospital), Guwahati, India

[2]Department of Paediatrics, Yeovil District Hospital, Yeovil, UK

Acknowledgements

The authors would like to thank Dr Puja Banerjee Barua, Dr Barnali Das, and Dr Amrit Lal Saha, consultant paediatricians, for their valuable contribution towards managing the patient.

References

Ahmed M, Advani S, Moreira A et al. Multisystem inflammatory syndrome in children: a systematic review. EClinicMed. 2020;26:100527. https://doi.org/10.1016/j.eclinm.2020.100527

Guanà R, Pagliara C, Delmonaco AG et al. Multisystem inflammatory syndrome in SARS-CoV-2 infection mimicking acute appendicitis in children. Pediatr Neonatol. 2020;S1875-9572(20):30147–30149. https://doi.org/10.1016/j.pedneo.2020.09.007

Jackson RJ, Chavarria HD, Hacking SM. A case of multisystem inflammatory syndrome in children mimicking acute appendicitis in a COVID-19 pandemic area. Cureus. 2020;12(9):e10722. https://doi.org/10.7759/cureus.10722

Learning points

- Multisystem inflammatory syndrome in children can present with fever, inflammation and multiorgan dysfunction.
- Multisystem inflammatory syndrome in children can present with gastrointestinal manifestations mimicking the symptoms of appendicitis.
- Conservative non-surgical management should be considered where multisystem inflammatory syndrome in children mimics appendicitis.
- Ultrasound scan of the abdomen may help identify inflammation beyond the appendix, which is usually not associated with acute appendicitis.
- Computed tomography is better at showing a non-inflamed appendix and should be considered where there is doubt about the pathology following an ultrasound scan.

Lishman J, Kohler C, de Vos C et al. Acute appendicitis in multisystem inflammatory syndrome in children with COVID-19. Pediatr Infect Dis J. 2020;39(12):e472–e473. https://doi.org/10.1097/INF.0000000000002900

Tullie L, Ford K, Bisharat M et al. Gastrointestinal features in children with COVID-19: an observation of varied presentation in eight children. Lancet Child Adolesc Health. 2020;4(7):e19–e20. https://doi.org/10.1016/S2352-4642(20)30165-6

Whittaker E, Bamford A, Kenny J et al. Clinical characteristics of 58 children with a pediatric inflammatory multisystem syndrome temporally associated with SARS-CoV-2. JAMA. 2020;324(3):259–269. https://doi.org/10.1001/jama.2020.10369