



COVID-19 and the paediatric acute abdomen—the emerging dilemma of PIMS-TS

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Paediatric multisystem inflammatory syndrome temporally associated with COVID-19 (PIMS-TS), also referred to as multisystem inflammatory syndrome in children (MIS-C), is a newly recognized and rare complication of COVID-19 infection in children. The annual incidence is as yet unknown; however, a UK-wide national surveillance study identified 216 cases in a 15-week interval in 2020.¹ Patients may present with features such as persistent fever, biochemical markers of inflammation, and evidence of multi-organ dysfunction. Similarities with other syndromes including Kawasaki disease, toxic shock syndrome, and macrophage activation syndrome have been identified.² One of the commonest presenting features is that of the 'acute abdomen', mimicking a number of gastrointestinal pathologies. This poses a diagnostic challenge for paediatricians, surgeons, and other members of the multidisciplinary team (MDT). [Figure 1](#) illustrates the key messages highlighted by this article.

While a number of case reports describe PIMS-TS mimicking clinical features of acute appendicitis, there are only a small number of high-quality studies on the relationship between PIMS-TS and intra-abdominal pathology. In a retrospective cohort study of 685 children with either acute COVID-19 and

MIS-C across primary and secondary care in Italy, severe gastrointestinal manifestations were a common feature of MIS-C, presenting in 49.2 per cent of patients.³ This compared with just 5.3 per cent of children presenting with acute COVID-19 infection. In a systematic review evaluating 385 cases of MIS-C, gastrointestinal symptoms were a feature of a patient's presentation in 60.5 per cent of cases.⁴ Although many of these patients were eventually diagnosed with a non-surgical pathology such as mesenteric adenitis or terminal ileitis, 48.6 per cent who presented with an 'acute abdomen' underwent a laparotomy, 51.4 per cent of which were negative. A surgical pathology such as acute appendicitis or obstructive ileus were confirmed in 23.6 per cent of cases, suggesting that relying on clinical findings alone might be insufficient while we better understand this emerging disease process.

Treatment for PIMS-TS includes immunomodulation in the form of intravenous immunoglobulins, immunotherapy, and methylprednisolone. In guidelines published in the *Lancet* and endorsed by the Royal College of Paediatrics and Child Health (RCPCH), Harwood *et al.* advised the commencement of broad-spectrum antibiotics, and aspirin for patients with a

Key messages:

- Paediatric multisystem inflammatory syndrome temporally associated with COVID-19 (PIMS-TS) is a rare but serious complication of COVID-19 in children
- 60.5 per cent of patients present with gastrointestinal symptoms and can mimic a number of surgical presentations
- Management of patients requires a high index of suspicion and close working with members of the multidisciplinary team
- Preventative strategies to reduce the sequelae of PIMS-TS including vaccinations are an important consideration for clinicians and policy makers

Fig. 1 Key messages about PIMS-TS

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Kawasaki-type phenotype.² Further general purpose guidelines for the recognition and management of patients presenting with PIMS-TS have also been published by the RCPCH.⁵ Given the risks of concurrent steroid and immunotherapy with surgical intervention, confirmation of the diagnosis before considering surgery is crucial. The commencement of broad-spectrum antibiotics is an appropriate initial treatment to cover many of the differential diagnoses while further diagnostic tests are performed.

In a retrospective analysis on 120 children with confirmed PIMS-TS, abdominal ultrasound identified abnormal findings in 84 per cent of patients.⁶ In 64 per cent ascites was demonstrated, 16 per cent had mesenteric inflammation, and 14 per cent were found to have bowel wall thickening. This suggests that abdominal ultrasound conducted by expert paediatric ultrasonographers is an appropriate first-line imaging modality. If the diagnosis remains uncertain, further confirmatory imaging with either abdominal CT or MRI may be required, following discussion with the wider MDT.

In addition to the diagnostic dilemma and treatment strategies of PIMS-TS it is important to consider preventative strategies. In a US study across 20 states in 12–18-year-olds, two doses of the Pfizer-BioNTech BNT162b2 mRNA vaccination reduced the risk of developing MIS-C, and 95 per cent of patients hospitalized with MIS-C were unvaccinated.⁷ No fully vaccinated individuals required high-level respiratory or cardiovascular support.

Given the clinical dilemma that PIMS-TS presents to teams involved in the care of paediatric patients, a low index of suspicion must be maintained by all members of the MDT for patients presenting with a variety of symptoms, including those that mimic surgical pathologies. To avoid the harm caused by both unnecessary surgical procedures and delaying the initiation of immunomodulating therapy, a multidisciplinary approach must be taken, with regular re-assessment, and the use of radiological imaging as appropriate. Finally, as evidence emerges from the USA to suggest that double vaccinations in adolescents reduces the risk of developing this serious COVID-19 complication, these data should be considered internationally when planning public health strategies for vaccination programmes in paediatric populations.

Disclosure. The authors declare no conflict of interest.

Data availability

All data presented is referenced within the article and freely accessible to interested parties.

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