Royal Australasian College of Surgeons

Post COVID-19 multi-system inflammatory (MIS) syndrome masquerading as the acute surgical abdomen

A 32 year old woman presented with a 2 day history of right sided abdominal pain, diaphoresis, and fevers. Her comorbidities included obesity and a history of intrahepatic cholestasis in pregnancy. She had contracted COVID-19 2 months earlier. Abdominal examination revealed localized peritonism in the right iliac fossa. The patient had raised inflammatory markers (WCC 10.2 and CRP 132 mg/L) but normal LFTs, lipase, electrolytes, renal function, and b-HCG levels. CT scan (Fig. 1) revealed extensive lymphadenopathy with associated fat stranding. The appendix appeared normal (Fig. 2).

The patient proved to be a diagnostic dilemma. She was reviewed by several surgical consultants over the next 5 days and discussed and reviewed by several teams including: colorectal surgery, haematology, Infectious diseases, and general medicine. IV antibiotics were administered. The right sided abdominal pain and fevers persisted. Pan-culture and tumour markers (colorectal and haematological) returned negative. Testing for HIV, TB, EBV, and CMV also returned negative. Inflammatory markers continued to rise and a mild cholestatic derangement in LFTs developed (ALP 162 U/L, GGT 60 U/L, and Bilirubin 27 micromol/L). On day 5 the patient underwent preparation for lower GI endoscopy to assess for intraluminal aetiology. The following day the patient developed episodes of sinus tachycardia and hypotension that were refractory to fluid resuscitation. That patient was transferred to ICU and commenced on vasopressors. The plan for endoscopy was abandoned. Repeat CT showed peri-portal edema and gallbladder wall thickening. On examination the patient was Murphy's sign positive. A follow up biliary ultrasound was equivocal for cholecystitis. Diagnostic laparoscopy with a plan for node biopsy or cholecystectomy (depending on intraoperative findings) was considered, but at this point there was a marked rise in cardiac troponin (7800 ng/mL) and a follow up TTE revealed moderate to severe global systolic dysfunction. After further surgical review the right upper quadrant pain was thought likely related to heart failure and hepatic congestion.

The patient was reviewed again by the medical team and the impression was post-COVID multi-system inflammatory syndrome (MIS) with myocardial involvement. IVIG and Methylprednisolone infusions were commenced and the patient was transferred under

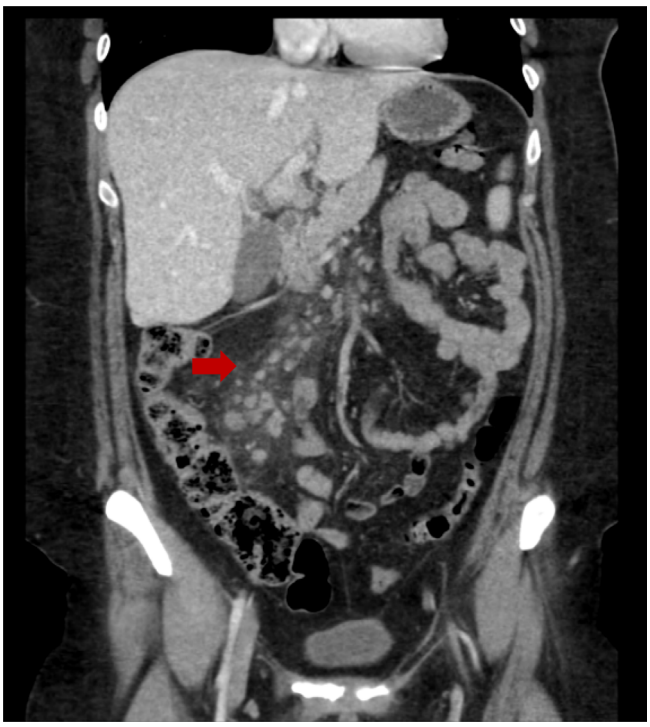

Fig. 1. Coronal view of CT scan demonstrating lymphadenopathy and associated fat stranding (red arrow).

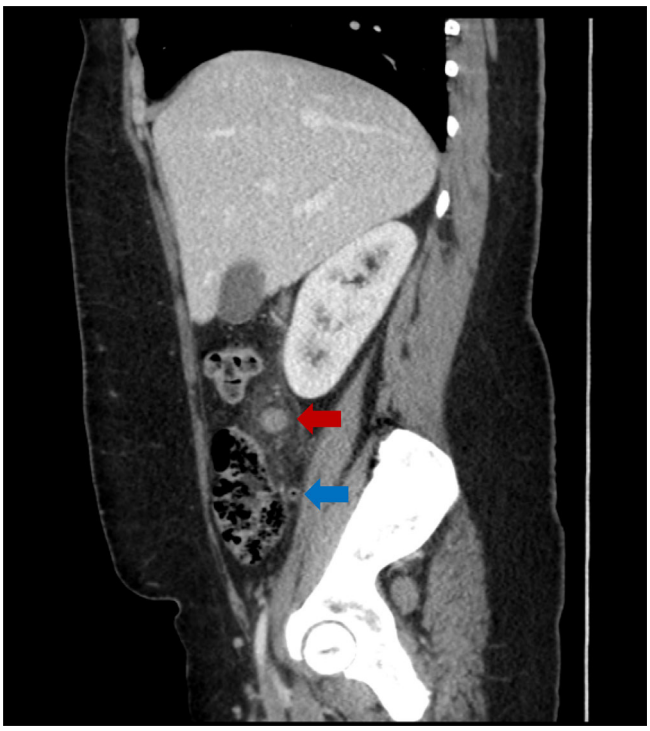

Fig. 2. Sagittal view of CT scan demonstrating an enlarged lymph node (red arrow) and normal appendix (blue arrow).

the care of Infectious diseases. The patient had a good response to IVIG and corticosteroid therapy. Vasopressor support was weaned and the patient was discharged from ICU on day 9. The patient continued to improve clinically with oral prednisolone. Cardiac troponin, LFTs, and CRP normalized. The patient was discharged on day 17 pain free.

MIS following COVID-19 infection is a well described syndrome in children (MIS-C). Only recently has it been discovered in adults (MIS-A). One of the first case reports published in the Lancet described a Kawasaki-like illness in an adult with a concurrent COVID-19 illness.[1] Although the exact incidence is unknown, it is thought to be rarer than MIS-C. In a recent systematic review at the end of 2021, only 221 cases of MIS-A globally were included for analysis.[2]

Like the syndrome described in children the presenting clinical features can vary, but the most frequent include: fever, gastrointestinal (pain, nausea, emesis, diarrhoea), and mucocutaneous inflammation (conjunctivitis and mucositis).[2] Patients can progress to multi-organ failure including heart failure requiring vasopressor support. A recent systematic review revealed that MIS-A patients have a 7% mortality risk and more than half will require ICU admission.[2] Interestingly our patient had lymphadenopathy and hepatomegaly which are uncommon clinical features.[3]

The pathophysiology of MIS is only partly understood. It shares similarities with Kawasaki disease, macrophage activation syndrome (MAS), and cytokine release syndrome.[2] It occurs in both patients who test positive for active COVID-19 infection, but also those who have had the illness previously (positive antibody serology). However most cases occur several weeks after COVID-19 infection. Importantly, by definition the patient must have an absence of severe respiratory symptoms.[4] It is thought to be due to a dysregulated immune response to the virus. Potential mechanisms include: reduced levels of neutralizing antibodies and autoreactive antibodies that promote inflammation.[4] Similarly the mechanisms of myocardial injury are not understood, but coronary artery abnormalities may develop.[3]

Further research into MIS-A is needed. Although rare, this potentially fatal syndrome should be considered in the surgical patient who has recently contracted COVID-19. As most patients present with fever and gastrointestinal symptoms, they may be misdiagnosed as an acute surgical abdomen. However, unusual imaging findings and a poor response to anti-microbial therapy should prompt clinicians to suspect a non-surgical aetiology. This should also prompt urgent referral to a physician and evaluation for cardiac dysfunction.

Author contributions

Ali Baker: Conceptualization; writing – original draft; writing – review and editing. **Russel Krawitz:** Conceptualization; writing – original draft; writing – review and editing.

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doi: 10.1111/ans.17935