

## Atraumatic splenic rupture due to covid-19 infection

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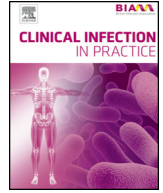
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## Case reports and series

## Atraumatic splenic rupture due to covid-19 infection

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## ABSTRACT

**Background:** Covid-19 is a novel disease caused by the severe acute respiratory coronavirus (SARS-CoV2). We discuss a gentleman who presented with an atraumatic rupture of the spleen secondary to this infection.

**Brief summary of presentation:** A 57-year-old service engineer was brought into the emergency department after having collapsed at home. RT-PCR was positive for covid-19 infection. CT scan showed evidence of haemoperitoneum and splenic rupture. He underwent splenic artery embolisation and required ventilatory and circulatory support on ITU. He made a full recovery and was discharged home 3 weeks later.

**Discussion and relevance:** Atraumatic splenic rupture is a rare, potentially fatal condition which has been described as a complication of haematological and non-haematological malignancies, inflammatory disorders and infections. There is emerging evidence to suggest that covid-19 has a direct destructive impact on the spleen, causing lymphoid follicle attrition and nodular atrophy in addition to microvascular thrombosis and necrosis. This is the first report of atraumatic splenic rupture secondary to covid-19 infection, to our knowledge.

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## An unusual presentation of covid-19 infection

## Background

Covid-19 is a novel disease caused by the severe acute respiratory coronavirus (SARS-CoV2), which has been declared a pandemic by the World Health Organisation (WHO) on the 11th of March 2020 [1]. An ongoing observational study of inpatients in the UK has revealed that individuals with covid-19 present mainly with either respiratory, enteric or systemic symptoms [2]. We discuss a middle-aged gentleman who had an unusual presentation of covid-19 infection.

## Case discussion

A 57-year-old service engineer was brought in by ambulance having collapsed at home. He was feeling unwell for 10 days prior to admission with a dry cough, diarrhoea and reduced appetite. There was no history of trauma. He was a smoker with a 44 pack year history.

At arrival in the accident and emergency department, he looked pale and clammy. He was alert but confused and complained of abdominal

pain. He was short of breath at rest, with a respiratory rate of 28 per minute. On examination, there was no rash or lymphadenopathy. There were fine crackles heard in both lung bases. Abdominal examination confirmed a tender, rigid abdomen. His blood pressure at admission was 86/56, heart rate was 126 bpm, saturation 98% on 60% oxygen, and the temperature was 37.2. ECG showed tachycardia but no ischemic changes. Urine dipstick was normal.

Past medical history included moderate obstructive sleep apnoea, chronic lower back pain following L4/L5 discectomy, chronic bronchitis, excision of left lower lobe of the lung following trauma 20 years previously and radical prostatectomy for cancer (10 years ago). He was generally fit and well.

There was no recent travel history of note. He denied any high risk sexual or social behaviours. He did not have any personal or family history of leukaemia, lymphoma, autoimmune diseases or coagulopathies.

Results of blood tests at presentation are shown in Table 1. Blood gas analysis showed evidence of metabolic acidosis (see Table 1).

An emergency CT scan of the chest and abdomen was carried out which showed fluid in both subdiaphragmatic spaces, paracolic gutters and pelvis suggestive of a haemoperitoneum. The spleen was normal sized, heterogenous in texture, with evidence of extracapsular rupture. The chest images showed peripheral ground glass consolidation in bases of both lungs, consistent with covid-19 infection (Figs. 1 and 2).

The other imaged abdomino-pelvic viscera were reported as normal with no significant lymphadenopathy in the imaged areas.

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**Table 1**  
Summary of investigations.

Test	Result	Normal
Haemoglobin	78 g/L	130–180
WBC	$3.7 \times 10^9/L$	4.0–11.0
Platelet	$149 \times 10^9/L$	150–450
Lymphocyte	$0.8 \times 10^9/L$	1.5–4.0
Sodium	125 mmol/L	133–146
Potassium	4.4 mmol/L	3.5–5.3
Urea	20.2 mmol/L	2.5–7.8
Creatinine	374 $\mu\text{mol/L}$	59–104
Estimated GFR	15	
CRP	368.1 mg/L	0–5
INR	1.1	0.8–1.2
Blood gas analysis (venous)		
pH	7.27	7.35 to 7.45
Lactate	6.7 mmol/L	0.6 to 2.5
Base excess	–5.2 mmol/L	–2 to 3
Anion gap	23.5 mmol/L	10 to 20
Bicarbonate	18.9 mmol/L	22 to 26
Serological tests		
RT PCR for covid-19	Positive	
ANA	Negative	
Serology (IgM/IgG) for EBV, CMV	Negative	
HIV screen	Negative	
Toxoplasma screen	Negative	
Syphilis screen	Negative	
Hep B serology	Negative	
Hep C serology	Negative	
Blood cultures	Positive for coagulase negative staphylococci (likely contaminant)	

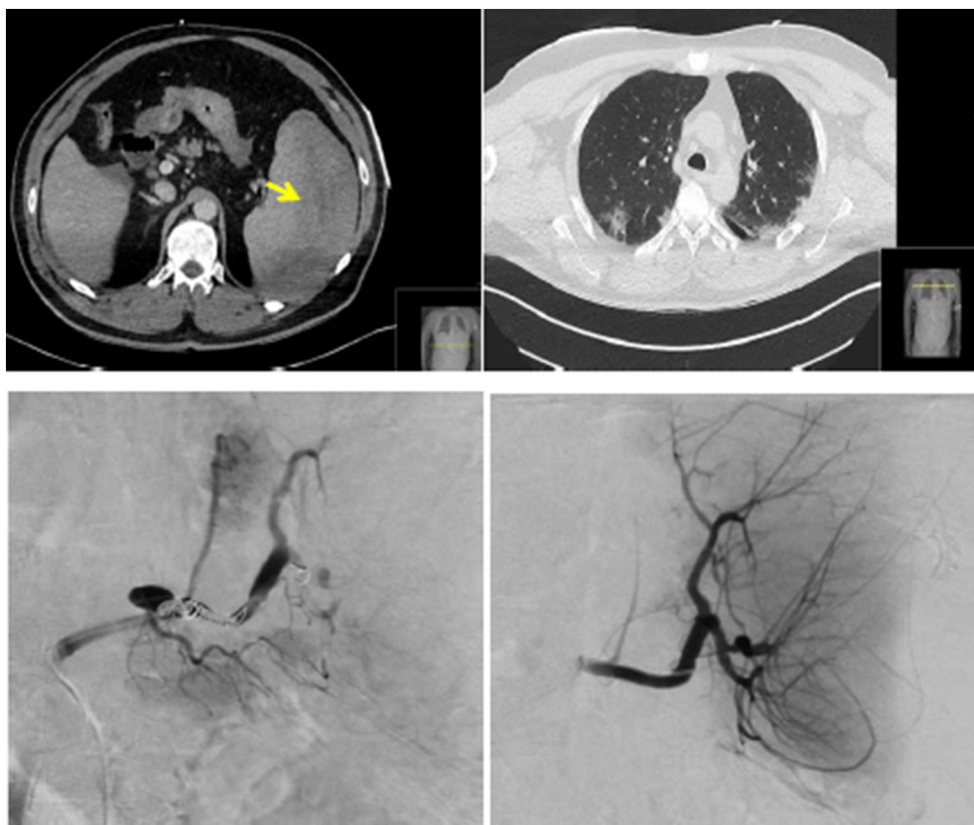
He was started on vigorous fluid resuscitation and was transferred to critical care for ventilatory and circulatory support. He was transfused with packed red cells, FFP and given IV Tranexamic acid. He underwent a splenic artery embolisation procedure to stop the haemorrhage, following which he stabilised. He deteriorated in ITU whilst on high flow oxygen and was, therefore, ventilated on Day 2 of admission. Renal replacement therapy was not needed and Inotropic support continued until Day 7. On day 8, a tracheostomy was performed because of agitation and failed sedation hold. He was weaned off the ventilator on Day 13. On Day 14, he developed urosepsis and *Klebsiella* spp was isolated from urine. This was treated with IV co-amoxiclav for 7 days.

He steadily improved in hospital after this with a complete resolution of acute kidney injury and was discharged home on Day 24.

### Discussion

Atraumatic splenic rupture is a rare, potentially fatal condition which has been described as a complication of haematological and non-haematological malignancies, inflammatory disorders and infections [4]. Viral infections implicated include EBV, HIV, CMV and Dengue. The condition carries a high mortality rate and therefore, an early diagnosis is necessary for good outcomes. Splenectomy is commonly performed, although spleen preserving procedures such as arterial embolisation are considered to avoid unnecessary surgery where appropriate [5].

There is emerging evidence to suggest that covid-19 has a direct impact on the spleen and lymph nodes inducing severe tissue damage including lymphoid follicle depletion, splenic nodule atrophy, histiocytic



Starting from top left and moving clockwise—Fig. 1 – Demonstrating large subcapsular splenic haematoma (yellow arrow head); Fig. 2 – Peripheral ground glass appearances with lower lobe predominant mix of bronchocentric and peripheral consolidation in keeping with 'probable COVID-19' [3]; Fig. 3 – Contrast showing arterial blush in branches of splenic artery; Fig. 4 – Post successful splenic artery embolisation with 2 coils.

hyperplasia and lymphocyte reduction [6]. In addition, covid-19 is reported to induce microvascular thrombosis and necrosis affecting the spleen [7]. Just as with our patient, peak organ involvement in covid-19 occurs around day 10 [8]. Although we are unable to provide direct histological evidence, the trajectory of illness and lack of any other underlying pathology are highly suggestive of splenic rupture in this case being secondary to covid-19 infection.

#### Author agreement

The authors declare that this manuscript is original, has not been published before and is not currently being considered for publication elsewhere.

The authors know of no conflicts of interest associated with this publication, and there has been no significant financial support for this work that could have influenced its outcome. The corresponding author confirm that the manuscript has been read and approved for submission by all the named authors.

#### References

1. Organization WH. WHO virtual press conference on COVID-19; 2020.
2. Docherty AB, Harrison EM, Green CA, Hardwick H, Pius R, Norman L, et al. Features of 16,749 hospitalised UK patients with COVID-19 using the ISARIC WHO Clinical Characterisation Protocol. *MedRxiv*. 2020. <https://doi.org/10.1101/2020.04.23.20076042> preprint.
3. British Society of Thoracic Imaging (BSTI). Available: [https://www.bsti.org.uk/media/resources/files/BSTI\\_COVID-19\\_Radiology\\_Guidance\\_version\\_2\\_16.03.20.pdf](https://www.bsti.org.uk/media/resources/files/BSTI_COVID-19_Radiology_Guidance_version_2_16.03.20.pdf). [Accessed 5 December 2020].
4. Renzulli P, Hostettler A, Schoepfer A, Gloor B, Candinas D. Systematic review of atraumatic splenic rupture. *Br J Surg*. 2009;96(10):1114–21.
5. Liu PP, Lee WC, Cheng YF, Hsieh PM, Hsieh YM, Tan BL, et al. Use of splenic artery embolization as an adjunct to nonsurgical management of blunt splenic injury. *J Trauma Acute Care Surg*. 2004;56(4):768–73.
6. Feng Z, Diao B, Wang R, Wang G, Wang C, Tan Y, et al. The novel severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) directly decimates human spleens and lymph nodes. *medRxiv*. 2020. <https://doi.org/10.1101/2020.03.27.20045427>.
7. Oudkerk M, Büller HR, Kuijpers D, van Es N, Oudkerk SF, McLoud TC, et al. Diagnosis, prevention, and treatment of thromboembolic complications in COVID-19: report of the National Institute for Public Health of the Netherlands. *Radiology*. 2020:201629.
8. Pan F, Ye T, Sun P, Gui S, Liang B, Li L, et al. Time course of lung changes on chest CT during recovery from 2019 novel coronavirus (COVID-19) pneumonia. *Radiology*. 2020:200370.