

# Myocarditis in Crohn's disease: a case report

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## Background

Mobile valvular masses are often considered pathognomonic for infective endocarditis. We present a case of a young patient with mobile valvular masses in the context of myocarditis likely secondary to active ileal Crohn's disease. Cardiac magnetic resonance (CMR) imaging was crucial in diagnosing and monitoring our patient.

## Case summary

A 27-year-old woman presented with pleuritic chest pain, dyspnoea, and a 3-day history of fevers. She also reported a 2-month history of intermittent visual loss in her right eye. She had a history of histologically proven ileal Crohn's disease, diagnosed 5 months prior. She was haemodynamically unstable on presentation. Abnormalities on a transthoracic echocardiogram necessitated a transoesophageal echocardiogram. After blood cultures were sent, the patient was commenced on empirical treatment for infective endocarditis with gentamicin and flucloxacillin. Eight days after her initial presentation, all blood cultures remained negative and she was changed to empirical treatment for culture negative endocarditis with ceftriaxone and vancomycin, according to local protocol. Despite 8 days of treatment for infective endocarditis she remained febrile. A CMR was organized on Day 9 and this showed myocarditis, which changed the treatment paradigm. She responded swiftly to steroids and anti-coagulation.

## Discussion

In this case, echo-dense valvular lesions are not pathognomonic for infective endocarditis and a careful diagnostic process involving multi-modality imaging, including CMR, occurred to arrive at a diagnosis of myocarditis likely secondary to Crohn's disease.

## Keywords

Myocarditis • Cardiac magnetic resonance imaging • Crohn's disease • Case report

## Learning points

- While valvular lesions support the diagnosis of endocarditis, in the absence a response to antibiotics or positive blood cultures and with involvement of the myocardium other causes should be considered.
- Myocarditis is a rare extra-intestinal manifestation of Crohn's disease.
- Cardiac MRI is an excellent, non-invasive alternative to endomyocardial biopsy to diagnose myocarditis, treat and monitor response to treatment.

## Introduction

An echogenic valvular mass in association with fever is often considered synonymous with infective endocarditis. Other differential diagnoses include thrombus, Lambli's excrescences, cardiac tumours, and metastases. Certain echocardiographic features of a valvular mass are more supportive of infective endocarditis. These are outlined in the Duke Criteria and include a pendulum-like mass on a valve or supporting structure, in the path of a regurgitant jet.<sup>1</sup>

Causes of myocarditis include viruses such as human herpes virus 6 and parvovirus B19, bacteria, parasites and fungi, drugs and

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allergies, autoimmune-associated, and specific entities such as giant cell myocarditis and amyloid-associated myocarditis.<sup>2</sup> The gold standard in diagnosis is endomyocardial biopsy with immunohistochemistry staining.<sup>2</sup> Acute myocarditis may resolve spontaneously, be treated successfully or evolve into a dilated cardiomyopathy.<sup>2</sup>

Crohn's is a chronic inflammatory disease which may affect any region of the gastrointestinal tract but typically the terminal ileum and/or colon. Endoscopy findings include ulcerations and segments of inflammation. Extra-intestinal manifestations of Crohn's disease are common and may precede the bowel diagnosis. Myocarditis is an extremely rare extra-intestinal manifestation of Crohn's disease, with only a few case reports in the literature. In a recent retrospective cohort of hospitalized patients diagnosed with acute myocarditis 0.9% had coexistent inflammatory bowel disease, such as Crohn's.<sup>3</sup> Myocarditis may occur independently of bowel disease activity and result in serious complications such as cardiac failure, malignant arrhythmias, and death. Relapses can occur even when the bowel disease is quiescent.

We report on a young patient with fevers and mobile masses on the mitral valve. She was initially treated as infective endocarditis then a careful diagnostic process resulted in a diagnosis of pancarditis likely secondary to Crohn's disease.

## Timeline

## Case presentation

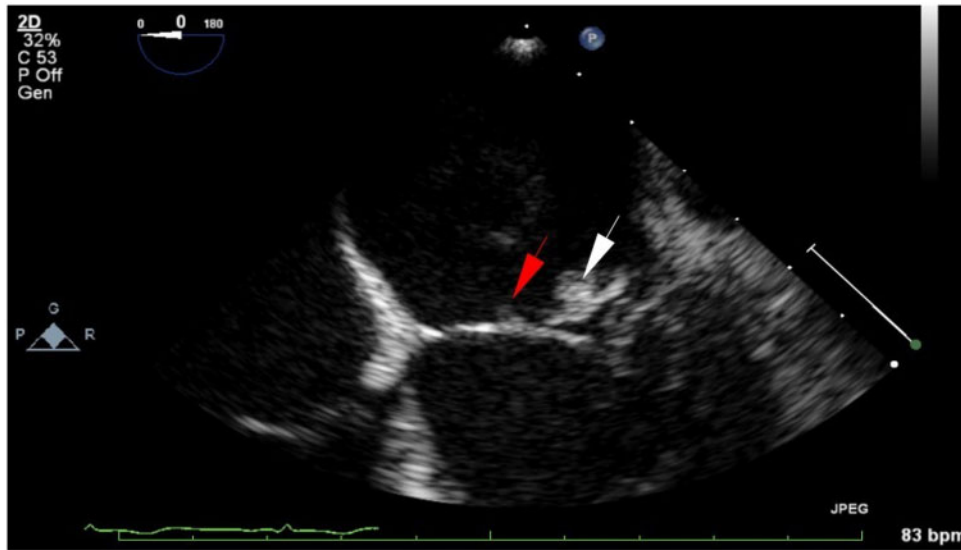
A 27-year-old woman presented to a regional hospital with acute central, pleuritic chest pain, dyspnoea, and a 3-day history of fevers. She reported a 2-month history of intermittent visual loss in her right eye, suspicious for amaurosis fugax. She had a history of histologically proven ileal Crohn's disease diagnosed 5 months prior to her presentation and had a previous splenectomy for sterile splenic abscesses and an appendectomy. She did not take any medications at the time of presentation and was an active smoker.

The patient was unstable with a heart rate of 110 b.p.m. and a blood pressure of 80/50 mmHg. She was febrile to 39°C. There were no peripheral signs of infective endocarditis. Her heart sounds were dual with no murmurs, there was no evidence of heart failure and her chest was clear to auscultation. On examination of visual acuity, this was normal (6/6) in both eyes, and there were no emboli on fundoscopic examination.

This was a young patient who was unwell with chest pain, fever, and visual loss. Following the history and examination our differential diagnoses were broad and included infection, inflammation, and autoimmunity.

A 12-lead electrocardiogram (ECG) demonstrated sinus rhythm with T-wave inversion inferiorly. There were no arrhythmias on cardiac monitoring. A chest X-ray was unremarkable. Blood tests were consistent with inflammation/infection. There was an elevated white

Time	Events
5 years prior to presentation	Febrile illness and abdominal symptoms Exploratory laparoscopy and biopsy revealing necrotic lymph nodes but no granulomas
2 years prior to presentation	Fevers and sterile splenic abscesses Splenectomy performed
5 months prior to presentation	Colonoscopy showing features of ileal Crohn's disease, confirmed on biopsy
Day 0	Acute admission to regional hospital with fevers, pleuritic chest pain, and dyspnoea Empirical treatment for infective endocarditis commenced
Day 2	Transferred to metropolitan hospital
Day 4	Blood cultures remained negative Antibiotics changed to empirical treatment for culture negative endocarditis
Day 7	Transoesophageal echocardiogram showing mobile masses on the mitral valve and thickening of the myocardium
Day 9	Cardiac magnetic resonance (CMR) imaging showed a thickened and oedematous basal-mid inferior and posterior wall with diffuse late gadolinium enhancement and overlying left ventricular thrombus Commenced prednisolone
Day 16	Magnetic resonance enterography performed
Day 17	Antibiotics ceased
Day 26	Discharged from hospital
4 months after presentation	Weaned steroids
6 months after presentation	Six-month follow-up CMR showed a thinned basal infero-lateral left ventricular wall with hypokinesia and resolution of myocardial oedema, consistent with previous myocarditis
7 months after presentation	Myocarditic relapse
1 year after presentation	1-year follow-up CMR showed laminated thrombus over a thinned area of scar from myocarditis, persevered overall function and no active myocarditis



**Figure 1** Transoesophageal echocardiogram. Four-chamber close-up of the mitral valve showing the large mobile echodensity above the posterior mitral valve leaflet attached just above the base of the posterior leaflet (white arrow) and the mobile echodensity on the anterior mitral valve leaflet (red arrow).

blood cell count of  $21.0 \times 10^9/L$  (normal range  $4.0\text{--}11.0 \times 10^9/L$ ) and a C-reactive protein of  $115 \text{ mg/L}$  ( $<10.0 \text{ mg/L}$ ). A full blood count showed a microcytic anaemia with a haemoglobin of  $106 \text{ g/L}$  ( $115\text{--}165 \text{ g/L}$ ) and a mean cell volume of  $75 \text{ fL}$  ( $76\text{--}96 \text{ fL}$ ) and thrombocythaemia with a platelet count of  $572 \times 10^9/L$  ( $150\text{--}400 \times 10^9/L$ ). There was an elevated troponin of  $900 \text{ ng/L}$  ( $0\text{--}20 \text{ ng/L}$ ). The renal function was normal with an eGFR of  $>90 \text{ mL/mn}/1.73 \text{ m}^2$  ( $>60 \text{ mL/mn}/1.73 \text{ m}^2$ ).

A transthoracic echocardiogram (Supplementary material online, Video S1) was performed due to the chest pain, ECG changes, and elevated troponin and this showed an ejection fraction of  $>50\%$  with an echodense, markedly thickened, and hypokinetic basal inferolateral wall. A mobile mass was seen on the atrial side of the posterior leaflet of the mitral valve, with mild mitral regurgitation. There was no pericardial effusion.

Blood cultures were taken prior to the commencement of antibiotics and empirical treatment for infective endocarditis was commenced with flucloxacillin, vancomycin, and gentamicin. On Day 7, we performed a transoesophageal echocardiogram (Figure 1) and echodensities were seen on the posterior and anterior mitral valve leaflets. The ascending aorta and proximal arch appeared normal.

Blood cultures were negative after 8 days and empirical treatment for culture negative endocarditis was commenced (ceftriaxone, flucloxacillin, high dose vancomycin). The patient had persistent fevers but no arrhythmias.

We performed a cardiac magnetic resonance (CMR) study (Figure 2) on Day 9, due to the patient having persistent fevers, wall thickening on echocardiogram, and an elevated troponin. This revealed a thickened and oedematous basal-mid inferior and posterior wall with diffuse late gadolinium enhancement and overlying left ventricular thrombus. The mobile masses were seen on the mitral valve

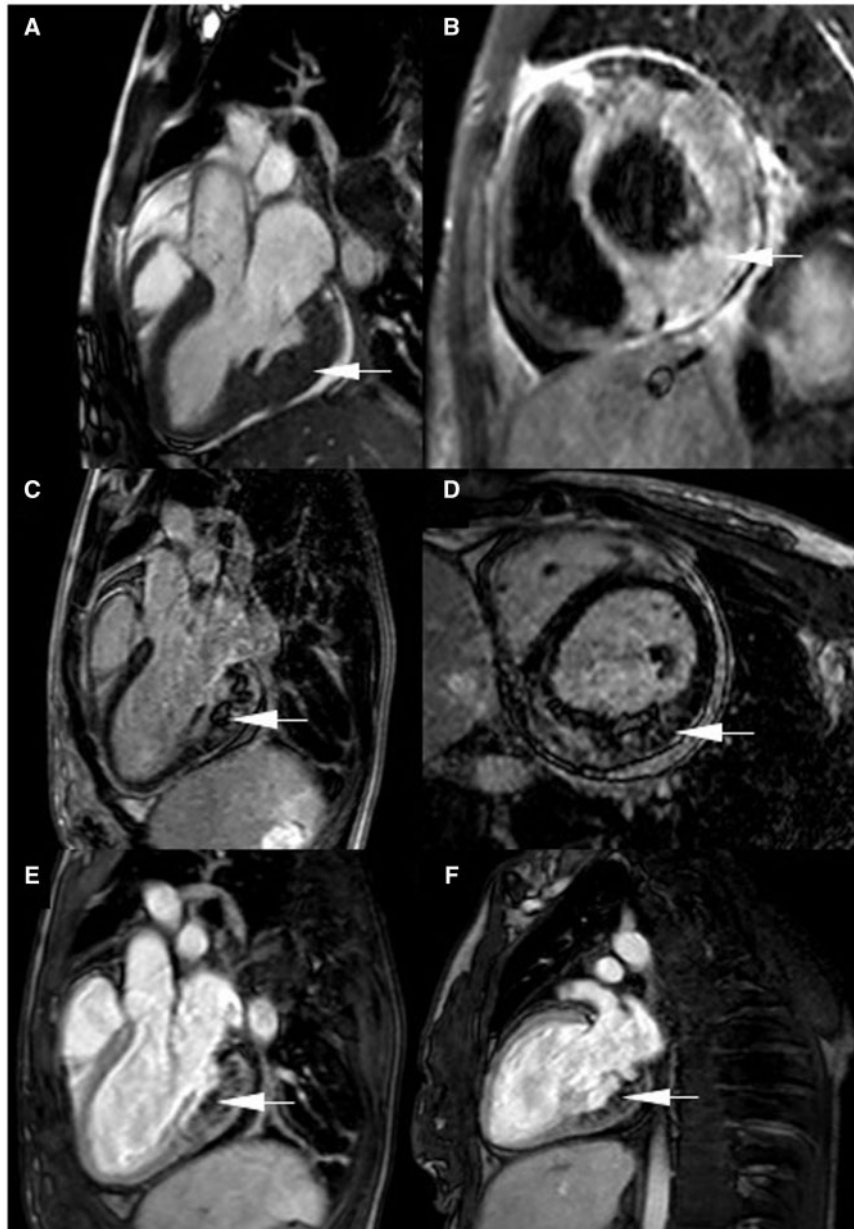
leaflets, correlating with the echocardiogram findings. Transmural inflammation (pancarditis) was present with clinical evidence of pericarditis and imaging evidence of myocarditis and endocarditis on CMR.

Further imaging was performed including a computed tomography coronary angiogram on Day 10, which revealed normal coronary arteries and normal calibre and appearance of the thoracic aorta and proximal great vessels. A nuclear medicine gallium scan showed no abnormal tracer uptake in the aorta or major vessels to suggest vasculitis. Magnetic resonance enterography was performed on Day 16, to assess for active Crohn's disease and showed fat stranding, wall thickening, and enhancement of the terminal ileal wall.

A lack of response to broad-spectrum antibiotics, multiple negative blood cultures, and the persistent appearance of a thickened ventricular wall suggested a myocardial inflammatory process was more likely than infection. Inflammatory myocarditis was considered in association with active ileal Crohn's disease. Valvular lesions (marantic endocarditis) can be seen in severe cases of myocarditis and are associated with microvascular obstruction, stasis, and thrombus formation. The regional wall motion abnormalities are likely secondary to the myocarditis.

The management paradigm was changed and prednisolone  $20 \text{ mg}$  three times per day was commenced with a plan to taper, as well as enoxaparin  $60 \text{ mg}$  twice a day with a plan for warfarin therapy. The patient defervesced and symptomatically improved, supporting the diagnosis of inflammatory myocarditis. She developed a pericardial rub and colchicine was commenced. Azathioprine  $25 \text{ mg}$  daily was added as a steroid sparing agent and aspirin  $100 \text{ mg}$  daily was added for ongoing amaurosis fugax.

A CMR was performed at the 6-month follow-up (Figure 3) and this showed a thinned basal infero-lateral left ventricular wall with

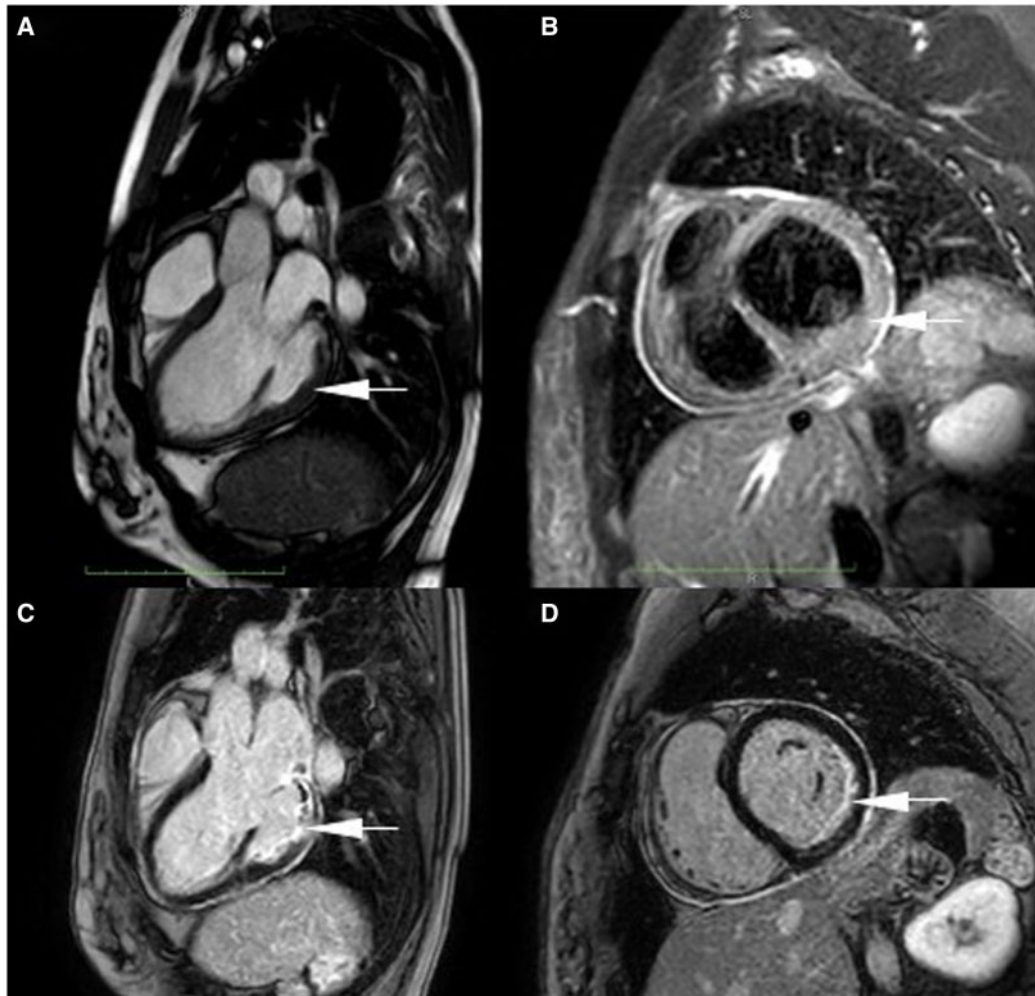


**Figure 2** Acute cardiac magnetic resonance imaging. (A) Sensitivity Encoding left ventricular outflow tract view. Extending from the base of the posterior mitral leaflet there is thickening of the basal-mid inferior and posterior wall (arrow), maximum wall thickness 18 mm at the inferior wall vs. 8 mm at septum, and associated dyskinesia within these segments ([Supplementary material online, Video S2](#)). (B) Short Tau Inversion Recovery black blood short axis view. There is diffuse increased myocardial signal intensity of all basal segments consistent with active myocardial oedema (arrow). (C) Phase Sense Inversion Recovery late gadolinium enhancement left ventricular outflow tract view. Demonstrating mid wall myocardial enhancement (arrow). (D) Late gadolinium short axis view. Diffuse late enhancement corresponding to the thickened, hypokinetic inferior wall (arrow). (E and F) Early gadolinium enhancement left ventricular outflow tract view and two-chamber views. Left ventricular thrombus overlying the basal inferior and inferolateral wall is extending from the base of the posterior mitral leaflet to the basal inferior left ventricular wall.

hypokinesis and resolution of myocardial oedema, consistent with previous myocarditis.

Since discharge our patient has had one myocarditic relapse presenting as shoulder and chest tightness with an elevated troponin (109 ng/L) 7 months after presentation. Repeat transthoracic echocardiogram showed no pericardial effusion

and a thinned basal infero-lateral wall. Prednisolone was weaned by 5 months post-discharge and azathioprine 175 mg and colchicine were continued. Bacterial serologies for brucella, Q fever, bartonella, yersinia, and streptococcus A were negative. Thrombophilia and autoimmune screens were also negative.



**Figure 3** Six-month follow-up cardiac magnetic resonance imaging. (A) Sensitivity Encoding left ventricular outflow tract view. The basal infero-lateral left ventricular wall is now thinned (arrow) with ongoing hypokinesis. (B) T2 Short Tau Inversion Recovery black blood short axis view. Resolution of myocardial oedema (arrow). (C and D) Late gadolinium enhancement (left ventricular outflow tract and short axis view, respectively). Showing sub-endocardial enhancement in the basal lateral and infero-lateral wall, consistent with previous myocarditis with resultant increased interstitial space, with improvement compared with the previous scan (arrows).

At the most recent cardiology follow-up our patient was well and pain free. She had a further CMR 1 year after presentation, which showed laminated thrombus over a thinned area of scar from myocarditis, preserved overall function and no active myocarditis. Despite being advised against pregnancy she has had her second successful pregnancy. She is maintained on anticoagulation and immunosuppression.

## Discussion

This case represents a diagnostic dilemma of a young patient with chest pain, dyspnoea, fevers, a troponin rise, and mobile valvular masses. A provisional diagnosis of infective endocarditis was made. There was convincing evidence of a systemic inflammatory disorder and the most likely diagnosis was pancarditis associated with ileal Crohn's disease, given the temporal relation.

Our patient presented with chest pain and a troponin rise and did not undergo coronary imaging until Day 10 after her presentation. The rationale for this related to her symptomatology and the findings seen on echocardiography of a thickened, hypokinetic, basal infero-lateral wall which did not fit with coronary artery ischaemia as the cause for her presentation as well as her overall preserved left ventricular ejection fraction which made a cardiogenic cause for her hypotension unlikely.

Marantic endocarditis or non-bacterial thrombotic endocarditis of the mitral valve has been reported in a patient with Crohn's disease.<sup>4</sup> It has been described more often as a complication of antiphospholipid syndrome, systemic lupus erythematosus, and malignancy.<sup>5</sup> Strokes and other embolic complications are the most common presentation of marantic endocarditis.<sup>5</sup> The pathophysiology is not well understood and the management often involves treating the underlying condition and anticoagulation.<sup>5</sup>

Cardiac magnetic resonance is a sensitive, non-invasive investigation for myocarditis.<sup>3,6–8</sup> The positive troponin and oedema on black blood T2-weighted Short Tau Inversion Recovery and late gadolinium enhancement confirmed the diagnosis of acute myocarditis in our patient. Cardiac magnetic resonance has been validated in monitoring myocarditis recovery. Oedema by T2-weighted imaging normalizes during recovery, with no difference to controls after 6 months.<sup>9,10</sup>

## Conclusions

We present one of only a few cases of myocarditis in Crohn's disease reported in the literature. Our case educates clinicians on the existence of this rare condition. The presentation of our case demonstrates the importance of considering diagnoses other than infective endocarditis in patients with valvular lesions who fail to respond to antibiotic treatment, have negative blood cultures and/or have myocardial involvement. A multidisciplinary approach was taken to management and involvement of gastroenterology, immunology, and infectious diseases specialists was helpful. The case also highlights the utility of CMR in diagnosing and monitoring myocarditis.

## Lead author biography



Dr Lucy McGrath-Cadell BAppSc (Physiotherapy) (Hons1), MBBS, MPH, graduated from The University of Sydney in 2013. She is currently undertaking Cardiology Advanced Training through the Royal Australasian College of Physicians at St Vincent's Hospital, Sydney, Australia. Alongside her clinical training she works with a team at The Victor Chang Cardiac Research Institute, Sydney researching the clinical phenotype, pathophysiology

and genetics of spontaneous coronary artery dissection (SCAD). She has co-authored several papers on SCAD including in *Open Heart*, *Circ Cardiovasc Interv.* and *J Am Coll Cardiol.* and has collaborated with UK, French and US research groups. Upon completion of her

cardiology training at the end of 2020 she plans to undertake a PhD and a clinical Fellowship. Her career goal is to work in a procedural area of clinical cardiology and maintain continued involvement in translational research.

## Supplementary material

Supplementary material is available at *European Heart Journal - Case Reports* online.

**Slide sets:** A fully edited slide set detailing this case and suitable for local presentation is available online as [Supplementary data](#).

**Consent:** The authors confirm that written consent for submission and publication of this case report including image(s) and associated text has been obtained from the patient in line with COPE guidance.

**Conflict of interest:** none declared.

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