

## Editorial

# Spontaneous ventricular thrombosis in patients with inflammatory bowel disease

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**Abstract** Inflammatory bowel disease is closely associated with an increased risk for thrombotic events. Thrombosis mostly occurs in the extremities, lungs, and liver; but it can also occur in the ventricles of the heart. The primary goal of this article is to increase awareness of the risk for ventricular thrombosis in this patient population among healthcare professionals and, thus, appropriate prompt use of thromboprophylaxis therapy for these patients during acute flare-ups. Early diagnosis and intervention are critical for ventricular thrombosis to prevent systemic embolisation of the thrombus. Concisely, inflammatory bowel disease predisposes to the development of thrombi. A low threshold for the use of imaging studies to detect such thrombi is warranted.

**Keywords:** Ventricular thrombosis; inflammatory bowel disease; ulcerative colitis; Crohn's disease

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**R**ISK FACTORS FOR THROMBOGENESIS HAVE BEEN described traditionally by the so-called “Virchow’s triad” consisting of stasis, endothelial damage, and hypercoagulability.<sup>1,2</sup> Intracardiac thrombogenesis is seen most frequently following acute anterior myocardial infarction and dilated cardiomyopathy; moreover, intracardiac thrombi may also develop in the presence of hypercoagulable states such pregnancy, malignancy, protein-C and protein-S deficiency, infectious diseases including septic shock, and inflammatory conditions including ulcerative colitis, Behçet’s disease, and as an adverse effect to medications.<sup>1,3–8</sup>

Thrombosis is a well-known complication of inflammatory bowel diseases, including Crohn’s disease and ulcerative colitis. The overall incidence of thrombotic events in patients with inflammatory bowel disease is estimated to be 1–8%, which is approximately threefold greater than that of the general population.<sup>9,10</sup> Thrombosis most commonly occurs in the lower extremities, lungs, brain, and liver.<sup>9</sup> More than half of the

thrombotic events occur during an exacerbation of inflammatory bowel disease.<sup>11</sup> In parallel with this, the risk for thrombosis correlates with the disease activity of inflammatory bowel disease.<sup>12</sup> Cases of spontaneous ventricular thrombosis also have been reported in patients with inflammatory bowel disease in the age range of 28–42 years.<sup>11–16</sup> In all cases, the patients were asymptomatic, and ventricular thrombosis was detected as an incidental finding during an acute flare-up of inflammatory bowel disease. Except for one instance of right ventricular thrombosis, all other cases of ventricular thrombosis developed in the left ventricle. The patients were immediately treated with either a combination of ventricular thrombectomy and anticoagulation or with anticoagulation alone to prevent systemic embolisation of the thrombus. Early detection and intervention are critical for ventricular thrombosis as the rate of systemic embolisation is about 2–3%.<sup>17</sup>

The mechanism underlying thrombotic events in an acute exacerbation of inflammatory bowel disease is speculated to be cytokine production in the setting of chronic and systemic inflammation. Cytokine production initiates a cascade leading to a hypercoagulable state, massive platelet aggregation, and impaired fibrinolysis.<sup>9,18</sup> About 24% of patients do

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not receive appropriate thromboprophylaxis during acute flare-ups of inflammatory bowel disease.<sup>19</sup> A key factor contributing to the underutilisation of thromboprophylaxis is the lack of awareness of healthcare providers on the thrombotic risk associated with inflammatory bowel disease.<sup>20</sup> Another factor speculated to play a central role in the low rate of thromboprophylaxis utilisation in patients with inflammatory bowel disease is the misperception that patients with inflammatory bowel disease are more likely to develop bleeding as an adverse effect of the anticoagulant; however, the rate of bleeding was reported to be similar for patients with inflammatory bowel disease and for the general population.<sup>20</sup> It is our hope that this article increases awareness of the increased risk for thrombosis in this patient population and, thus, prompts clinicians to consider the use of thromboprophylaxis therapy in these patients during acute flare-ups.

In the light of the high thrombotic risk associated with this particular population, and its asymptomatic presentation, it would be advisable to have a low threshold for screening patients with an acute exacerbation of inflammatory bowel disease for possible ventricular thrombosis before discharge, especially if other risk factors are present. Among patients with inflammatory bowel disease additional risk factors for developing thrombi include obesity, dehydration, and malnutrition.<sup>9</sup> Diagnosis of ventricular thrombosis is typically made using imaging modalities including cardiovascular MRI, transesophageal echocardiography, transthoracic echocardiography, coronary angiography, and CT of the chest. Of these modalities, contrast-enhanced cardiovascular MRI is the current gold standard for diagnosing ventricular thrombus.<sup>21,22</sup> Cardiovascular MRI is a non-invasive method of forming detailed images of structures, perfusion, and blood flow of the heart using magnetic fields and radio waves.<sup>23</sup> Late gadolinium enhancement using contrast-enhanced cardiovascular MRI has a sensitivity of 88% and specificity of 99% when detecting ventricular thrombus, making it the most accurate of all modalities.<sup>21,22</sup> Transesophageal echocardiography is moderately invasive as a specialised piezoelectric transducer probe in the oesophagus emits ultrasound waves to visualise the most posterior structures of the heart; however, both transesophageal echocardiography and transthoracic echocardiography have the potential to miss the diagnosis because of limited resolution.<sup>23,24</sup> Transthoracic echocardiography is a non-invasive method of obtaining two-dimensional or digitally generated three-dimensional images of the heart with a sensitivity of 40% for ventricular thrombus.<sup>22,25</sup> Utilisation of three-dimensional echocardiography is thought to improve the diagnostic accuracy of

detecting ventricular thrombus versus the two-dimensional approach; however, this is an area that necessitates further research. Further, the incorporation of ultrasound contrast with transthoracic echocardiography has been shown to improve its sensitivity from 24–33% to 23–61% and specificity from 94–95% to 96–99% compared with non-contrast transthoracic echocardiography.<sup>25,26</sup> Although cardiovascular MRI is known to be better at detecting ventricular thrombus than is transthoracic echocardiography, cardiovascular MRI is unavailable at times and is expensive. Transthoracic echocardiography with contrast ultrasound may be a cost-effective alternative that is comparable to cardiovascular MRI in terms of sensitivity and specificity.<sup>21,27</sup> Coronary angiography involves the anatomic insertion of a catheter into the chambers and vessels of the heart while visualising structures via X-ray or CT, which can allow for distinction of different cardiomyopathies by the quantification of coronary artery stenosis and detect thrombi via detection of apical ballooning and filling defects.<sup>28</sup> Chest CT is another non-invasive diagnostic tool that combines a computer and X-ray technology to produce two-dimensional and digital three-dimensional images to assist in diagnosis.<sup>29</sup> Chest CT, however, has been reported to allow ventricular thrombus to often go undetected.<sup>30,31</sup>

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## Conflicts of Interest

None.

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