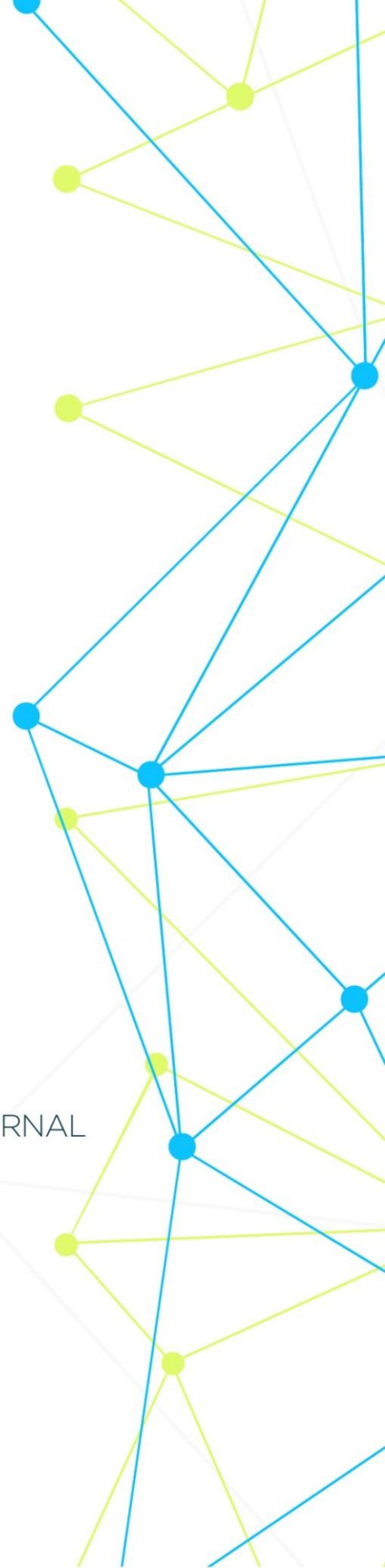




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ISOLATED OVARIAN THROMBOSIS UNDER CORONAVIRUS INFECTION

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Abstract: COVID-19 (coronavirus disease-19) is associated with an increased risk for thrombosis due to endothelial dysfunction and hyper-activation of the immune system induced by the virus. Most cases of venous thromboembolism associated with COVID-19 are either pulmonary emboli or deep vein thromboses. Ovarian vein thrombosis is a rare condition most commonly seen in the post-partum period. This report describes a case of COVID-19-associated ovarian vein thrombosis in a nonpregnant woman with no evidence of underlying inherited coagulopathy.

Keywords: COVID-19, VTE, coronavirus, JAK2 V617.

Most patients infected with coronavirus disease-19 (COVID-19) experience pulmonary complications, the most severe form of which is acute respiratory distress syndrome [1]. However, there is increasing recognition of thrombotic complications associated with the virus. COVID-19 induces a hyperinflammatory state that causes elevated levels of acute phase reagents and leads to abnormal activation of the immune system, which ultimately contributes to the hypercoagulability associated with COVID-19. [2] Venous thromboembolism (VTE) occurs in 23% of cases. patients with COVID-19 in the intensive care unit, and also occurs in other hospitalized patients. This report describes a case of ovarian vein thrombosis associated with COVID-19.

Clinical case

A 44-year-old woman with hypertension, asthma, hypothyroidism, obesity (body mass index 44 kg/m²) and uterine fibroids after hysterectomy presented to the emergency department with dyspnea, cough, and fever with chills, vomiting, and diarrhea for 5 days, and he was diagnosed with COVID-19 infection. She had hypoxia, was hospitalized and received enoxaparin and dexamethasone. She also had methicillin-susceptible *Staphylococcus aureus* bacteremia and started intravenous cefazolin.

She was weaned off supplemental oxygen and discharged home 7 days later.

Five days after discharge, she developed severe right-sided throbbing abdominal pain. Computed tomography (CT) of the abdomen and pelvis showed a right-sided partial TU. Doppler ultrasound of the ovaries showed normal blood flow. She was a non-smoker and had no history of thromboembolism even during seven previous pregnancies. Antiphospholipid antibody testing with lupus anticoagulant, protein C, protein S, and antithrombin III levels were normal. Tests for factor V Leiden and prothrombin gene mutation were negative. Testing for JAK2 V617 mutation, JAK2 exon 12 mutation, and flow cytometry for paroxysmal nocturnal hemoglobinuria also showed no significant changes. The patient's unprovoked

isolated gonadal vein thrombosis was presumed to result from coagulopathy associated with COVID-19.

DISCUSSION

Ovarian thrombosis (OT) is a rare condition that, in addition to the postpartum period, is associated with a number of systemic conditions, including malignancy, pelvic inflammatory disease and inflammatory bowel disease, and with abdominal or pelvic surgery.^{3,4} Most patients with OT presents with pelvic pain, fever, right-sided abdominal pain, or flank pain. Due to the rarity of OT and its nonspecific clinical presentation, a high index of suspicion helps in making the diagnosis. Patients with OT usually have an underlying prothrombotic state. [5] COVID-19 is a known risk factor for thrombosis. Coagulopathy associated with COVID-19 is associated with endothelial dysfunction and hyperactivation of the immune system caused by the virus. To date, two cases of OT associated with COVID-19 have been reported. Mohammadi et al. reported the case of a 26-year-old woman at 8 weeks pregnant who had a COVID-19 infection and presented with increasing abdominal pain, nausea, and vomiting. She had evidence of a right OT on magnetic resonance imaging. Since pregnancy is the most common risk factor for OT, pregnancy may have been the precipitating factor in this patient. In their case description, the authors did not mention initiation of anticoagulant therapy, nor did they comment on follow-up. [7] Veyseh M. reported a 54-year-old postmenopausal woman with no significant history of COVID-19. an infection that is manifested by the sudden onset of acute pain in the abdomen. The D-dimer level was markedly elevated, >3800 ng/mL, and the patient underwent CT scan, which revealed a left OT. A chest CT angiogram revealed a stable pulmonary embolism. Extensive examination including lupus anticoagulant, protein C, protein S, and antithrombin III was normal. The patient's morbidity and pulmonary embolism were determined to be secondary to COVID-19 infection. She started on enoxaparin 1 mg/kg and eventually switched to apixaban within 3 months. The thrombus resolved after 1 month of follow-up. [8]

Although the treatments used to treat OT vary across the VTE treatment spectrum, there are no universally accepted guidelines for patient management. [9] Reports of spontaneous resolution of OT also cast doubt on the need for anticoagulant therapy in these patients. [10] The risk of pulmonary embolism and recurrent VTE in patients with OT is poorly defined. Since there are no clear guidelines as to which OT patients should receive anticoagulants, our patient was not initiated on this matter. At follow-up at 3 months, she noted a significant reduction in abdominal pain, which was thought to be due to the continued resolution of the clot.

Most cases of venous thrombosis in patients with COVID-19 are pulmonary embolisms. [11] The current case is unique in that the patient was not in critical condition and had thrombosis in an unusual location with no other sites of thrombosis. There were no clear triggers for OT, and her thrombophilia testing was unremarkable. This case raises attention to the clinical possibility of unusual thrombotic sites in patients with COVID-19 infection. A high alertness index, early diagnosis and timely initiation of therapeutic measures contribute to overall recovery and prevent serious complications.

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