Large tricuspid valve thrombus complicating COVID-19 pneumonia

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Abstract

Background: Hemostatic disturbances with coronavirus disease 2019 (COVID-19) can predispose to tricuspid and right heart thrombi in very rare instances. **Aim:** We describe a 29-year-old female patient without previous cause of thrombosis who developed large tricuspid valve thrombus (TVT) and moderate-to-severe tricuspid regurgitation (TR) during the course of COVID-19 infection. **Materials and methods:** Persistant fever and tachycardia with thrombocytopenia and high D-dimer increased the index of suspicion. The diagnosis was made by bedside transthoracic echocardiography (TTE) and cardiac magnetic resonance (CMR). Surgery was performed for thrombectomy and tricuspid valve replacement with a tissue valve. **Discussion and conclusion:** Detection of TVT in COVID-19 patients on the basis of high index of suspicion, bedside TTE and non-invasive CMR helps early surgical treatment and subsequent reduction of mortality and hospital stay.

1. INTRODUCTION

More than two years after the appearance of coronavirus disease 2019 (COVID-19), the relevant research is still ongoing. COVID-19 can lead to hemostatic disorders and thrombotic diseases due to exaggerated inflammatory process, decreased tissue oxygenation, and endothelial dysfunction [1].

Intracardiac thrombi, including tricuspid valve thrombus (TVT), are very rare life-threatening complications of COVID-19 which indicate high index of suspicion to provide early proper management [2, 3]. Herein, we report a surgically treated patient with TVT associated with moderate-to-severe tricuspid regurgitation (TR) during the course of COVID-19 pneumonia.

2. CASE REPORT

A 29-year-old female patient presented with a 5-day history of fever, palpitations, and dyspnea. There was no history of chronic illness, trauma, surgery, or intravenous drug abuse. The patient had positive polymerase chain reaction (PCR) test for COVID-19 followed by home treatment and partial clinical improvement before re-occurence of fever and shortness of breath.

On admission, she had fever (temperature of 38°C), siuus tachycardia, tachypnea, normal blood pressure, and oxygen saturation of 94% in room air. The laboratory investigations (Table 1) revealed total leucocytic count of 12000/µL (lymphocyte count: 15%) and C-reactive protein (CRP) of 67.4 mg/L, with positive PCR test.

2.1 Diagnostic workup

During the hospital stay, the patient underwent diagnostic and therapeutic workup as appropriate (Figure 1). High-resolution computed tomography (HRCT) revealed multiple peripheral patchy ground glass opacities at both lung fields associated with pneumonic consolidation (Figure 2). The patient received the standard treatment of COVID-19 pneumonia with no need for mechanical ventilation.

Persistant fever and tachycardia with elevated D-dimer and thrombocytopenia indicated bedside transthoracic echocardiography (TTE) which revealed large mobile tricuspid valve mass, mostly thrombus, measuring

33 x 17 mm and protruding into right atrium (RA) and right ventricle (RV), with moderate-to-severe TR and moderate pulmonary hypertension. Furthermore, cardiac magnetic resonance (CMR) showed TVT of 28 x 21 x 11mm oscillating into the right ventricle with preserved ventricular function (Figure 3). Blood culture showed no growth.

2.2 Treatment

To avoid thromboembolism, the patient underwent cardiac surgery through median sternotomy. Intraoperatively, a mass attached to the septal leaflet was identified with no other masses in RA and RV (Figure 4). Beating heart removal of the mass followed by tricuspid valve replacement with tissue valve #31. Tissue culture showed no growth.

2.3 Outcome

The postoperative course was uneventful except for delirium and agitation on the 3rd postoperative day that improved on the medical treatment with the absence of any lesion on brain MR study. The patient discharged home 17 days after surgery with negative PCR test, and she continued on a regimen of antibiotic therapy and oral anticoagulants. On follow-up visits, chest X-ray, TTE, and laboratory investigations were normal with improved general condition.

3. DISCUSSION

Thromboembolic complications are reported in 27% of COVID-19 patients [1] with challenging diagnosis due to similarity of its clinical manifestations and laboratory findings with the usual features of COVID-19 infection. Thus, high index of clinical suspicion is recommended in addition to emergency pulmonary angiography or echocardiography in supected patients [4]. Our report describes a rare case of large TVT in COVID-19 female patient during the third wave of the pandmic. One previous report described a large thrombus-in-transit through the tricuspid valve into the RV in adult male [2], and another report described a large TVT extended to the RA and RV and attached to the tip of central venous catheter in a child [3].

Our patient had unremarkable risk factors for thrombosis prior to COVID-19 infection. The clinical, laboratory, and imaging workups to distinguish thrombotic disease from COVID-19 infection are challenging due to: 1) similar presentation of dyspnea, chest pain, tachypnea, and tachycardia in patients with thrombosis or COVID-19; 2) routine use of prophylactic anticoagulants in all COVID-19 patients; 3) usual elevation of D-dimer and pro-inflammatory markers in both conditions; and 4) limited mobility of COVID-19 patients which may delay the proper imaging study to identify thrombotic diseases.

In our case, TVT was initialy detected on bedside TTE; however, TTE could not differentiate thrombus from vegetation thus CMR was performed for further evaluation. CMR has the ability to detrmine the acuity of a thrombus and to differentiate it from cardiac tumors or other true cardiac lesions [5]. Moreover, CMR has a specific role in COVID-19 patients to determine cardiovascular complications because of its high accuracy in evaluation of myocardial structure, function, tissue characterisation, and perfusion [6].

The decision for surgery in our case aimed to avoid subsequent complications of a large mobile thrombus ($>$ 2 cm) associated with moderate-to-severe TR. The treatment of TVT includes medical therapy with anticoagulants or fibrinolytics, surgery, and percutaneous directed retrieval. Each modality has its benefits and risks [7]. Therefore, the treatment should be decided on indvidual basis depending on size and dynamics of the thrombus, surgical fittness, ventricular function, and hemodynamic stability [3, 8].

4. CONCLUSION

COVID-19 is a predisposing factor of thromboembolic events. A bedside TTE and CMR help accurate assessment of clinically suspected TVT. Early surgical removal is efficient.

ABBREVIATIONS

CMR: Cardiac magnetic resonance; COVID-19: coronavirus disease 2019; HRCT: High-resolution computed

tomography; PCR: Polymerase chain reaction; RA: Right atrium; RV: Right ventricle; TR: Tricuspid regurgitation; TTE: Transthoracic echocardiography; TVT: Tricuspid valve thrombus

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Table (1): Laboratory hematologic results during hospital stay of the patient and at the first postoperative follow-up visit

Test	Reference range	At admission (26/1/2022)	Before surgery (8/2/2022)	After surgery (15/2/2022)	At discharge (26/2/2022)	At follow-up (13/3/2022)
Total leucocytic count (x 10^3)	4-11	12	14.27	10.6	6.8	6.5
Red blood cell (x 10^6)	4-5.5	3.95	4.2	4.2	4.15	4.35
Hemoglobin (g/dl)	12-16	10	11.65	11.1	10.7	11.8
Hematocrite (%)	36-46	31.9	36.5	33.6	32.6	35.7
Platelet count (x 10^3)	150-400	175	144	231	275	272
Lymphocyte (%)	25-45	15	19	30	26	35
Neutrophil (%)	45-75	80	78	60	65	55
CRP (mg/L)	<6	67.4	24	12	6	4

Test	Reference range	At admission (26/1/2022)	Before surgery (8/2/2022)	After surgery (15/2/2022)	At discharge (26/2/2022)	At follow-up (13/3/2022)
D-dimer (mg/L)	0.19-0.52	1.40	2.30	0.68	0.50	0.46

CRP: C-reactive protein

Figure 1: Timline of in-hospital diagnostic and therapeutic workup. TTE:Transthoracic echocariography, CMR: Cardiac magnetic resonance, TV: Tricuspid valve. MR: magntic reonance. PCR: Polymrae chain reaction.

Figure 2: Computed tomography of the chest shows consolidation and peripheral ground glass lung opacitis (arrow).

Figure 3: Cardiac magnetic resonance shows tricuspid valve thrombus (white arrows).

Figure 4: Intraoperative view of tricuspid valv thrombus attached to septal leaflet (white arrow).