Clinical Case Report

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Chronic disseminated intravascular coagulation induced by left atrial thrombus in a patient with giant "normal" heart

A case report

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Abstract

Introduction: We herein describe a patient with chronic disseminated intravascular coagulation (DIC) induced by a giant thrombus in the left atrium.

A 63-year-old woman was admitted to our hospital for evaluation of extensive mucocutaneous hemorrhage, especially at the sites of venipuncture, on May 21, 2015. Considering her long history of rheumatic heart disease and atrial fibrillation and her mitral valve replacement performed several years previously, we strongly suspected that the bleeding was closely related to postoperative over-anticoagulation of warfarin. After careful investigation, we found that her coagulopathy was induced by the chronic DIC, which was in turn secondary to a left atrial giant thrombus. This is a rarely reported cause of chronic DIC. Cardiac computed tomography and echocardiography showed apparent biatrial enlargement; the morphology and function of the ventricles were unaffected. After anticoagulant therapy, the bleeding tendency and coagulation index were significantly improved.

Conclusion: A left atrial thrombus should be considered as a differential diagnosis of chronic DIC, especially in patients with predisposing heart conditions. Because treatment of the underlying cause is paramount in the management of chronic DIC, this case is of great clinical value.

Abbreviations: AF = atrial fibrillation, DIC = disseminated intravascular coagulation, HF = heart failure, INR = international normalized ratio, RHD = rheumatic heart disease.

Keywords: atrial thrombus, chronic disseminated intravascular coagulation, rheumatic heart disease

1. Introduction

Chronic disseminated intravascular coagulation (DIC) is commonly seen in patients with malignancies, arterial aneurysms, complications of pregnancy, and giant hemangiomata.[1–5] Several cases of consumption coagulopathy induced by a left atrial thrombus have been reported, but none met the criteria for DIC.[6,7] To the best of our knowledge, this is the first reported case in which chronic DIC was induced by a left atrial giant thrombus.

2. Case

This study was approved by the Institutional Review Board of Peking Union Medical College Hospital. Informed consent was obtained from the patient for publication of this case report.

A 63-year-old woman was admitted to our hospital for evaluation of extensive mucocutaneous hemorrhage that had been present for several months. She had a history of progressive breathlessness and lower extremity edema since 1982 but had received no medical treatment. She began to experience marked limitation of physical activity in 1993, and symptoms of heart failure (HF) such as dyspnea and fatigue developed with a lower-than-ordinary activity level; she had no symptoms at rest. She received treatment (unspecified type) at a local hospital, but her symptoms were not relieved. In 2007, she was referred to a tertiary hospital. Electrocardiography indicated atrial fibrillation (AF). Echocardiography showed severe mitral stenosis and mild mitral regurgitation, moderate-to-severe tricuspid regurgitation, a giant left atrium with a thrombus, severe pulmonary artery hypertension, and a thickened interventricular septum. Rheumatic heart disease (RHD) was highly suspected, and HF (New York Heart Association Class III) was diagnosed. Then she underwent mitral valve replacement and thrombectomy. The postoperative pathological diagnosis was consistent with RHD. After the procedure, her symptoms and signs of HF markedly

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QQS and RT have contributed equally to the article.

Contributors: QQS, RT, XZ, and SYZ treated the patient; XG, JZL, ZT, and XWY collected the data. All authors contributed to the report.

The authors have no conflicts of interest to disclose.

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improved (New York Heart Association Class I). She continued to undergo anticoagulation and control of her ventricular rate after discharge. However, her international normalized ratio (INR) was not regularly monitored, and she adjusted her medication dose without her doctor's advice. She gradually developed severe petechiae on her extremities and eventually presented to another hospital. Considering her long history of RHD and AF and the performance of mitral valve replacement several years previously, the physicians suspected that her severe petechiation was due to postoperative over-anticoagulation with warfarin; they therefore reduced the warfarin dose. However, her bleeding condition unexpectedly deteriorated. She was referred to our hospital on May 21, 2015. Her medical history was not significant with the exception of a >10-year history of hypertension (maximum blood pressure of 160/100 mmHg). Upon admission, she had a body temperature of 36.7°C, heart rate of 78 bpm, respiratory rate of 19 bpm, and blood pressure of 105/50 mmHg. Physical examination revealed scattered petechiae on her extremities (Fig. 1A, C, D, and F). Auscultation revealed a grade III/VI systolic murmur due to a mechanical prosthetic valve in the left parasternal area.

Laboratory tests showed mild thrombocytopenia (platelet count, 72×10^9/L). Coagulation testing showed that her prothrombin time was mildly prolonged (18.3 seconds), D-dimer and fibrin degradation product concentrations were both obviously elevated (37.94 mg/L and 167.5 μg/mL, respectively), and plasma fibrinogen concentration was slightly decreased (0.89 g/L). Her INR was 1.13. Biochemical test results were not clinically significant with the exception of a serum creatinine concentration of 158 μmol/L. Her N-terminal pro-B-type natriuretic peptide and B-type natriuretic peptide concentrations were 951 pg/mL and 46 ng/L, respectively. Echocardiography showed biatrial enlargement (left, 144 × 120 mm and right, 41 × 107 mm), moderate tricuspid regurgitation, mild pulmonary artery hypertension, a suspected left atrial thrombus (28.9 × 67.1 mm), and a left ventricular ejection fraction of 68% (Fig. 2). Abdominal and vascular ultrasonography showed no significant abnormities. Computed tomography showed significant biatrial enlargement, a giant thrombus in the left atrium, and hepatic cirrhosis (Fig. 3). Warfarin was prescribed at 3 mg/d, and anticoagulation therapy with enoxaparin was coadministered at 6000 U/d after ruling out the presence of a deep hematoma and active hemorrhage. She also received fresh frozen plasma and fibrinogen infusions as supportive measures. We closely monitored her coagulation indices (Table 1). Both her mucocutaneous hemorrhage and laboratory indices gradually improved (Fig. 1B and E).

During hospitalization, the etiology of the patient's DIC was thoroughly investigated. She exhibited no fever, chills, or signs of infection during admission. A blood culture, urine culture, human immunodeficiency virus test, and hepatitis virus test were all negative. Neither arthralgia nor typical skin manifestation of connective tissue disease was noted. Abdominal ultrasound revealed no hepatic abnormality or cholestasis. Both an antinuclear antibody test and rapid plasma reagin test showed negative results. Because a direct Coombs' test, indirect Coombs' test, cold hemagglutinin test, and haptoglobin test were all negative, autoimmune hemolysis was unlikely. The patient had no history of malignancy. All imaging examinations failed to demonstrate any signs of malignancy. Her carcinoembryonic

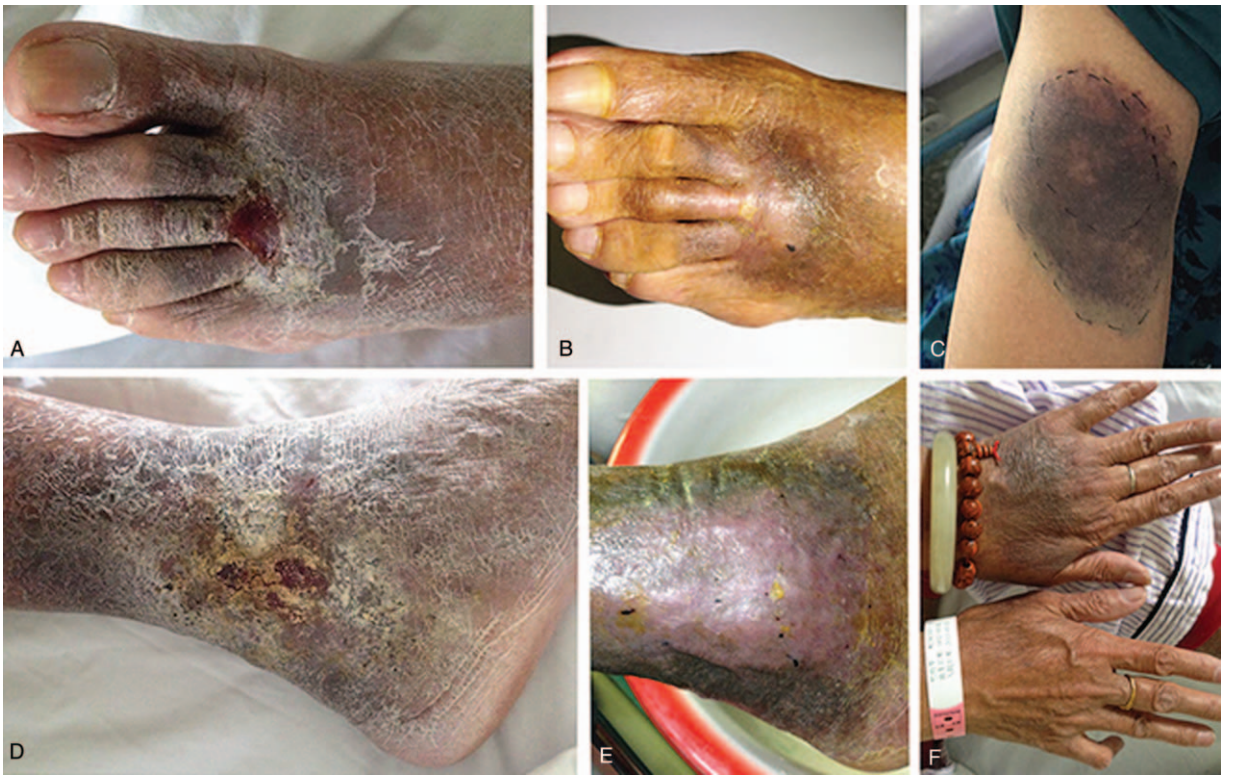

Figure 1. Extensive mucocutaneous hemorrhage upon admission. (A) Hemorrhage on the dorsum of the left foot on admission. (B) Hemorrhage on the dorsum of the left foot after treatment. (C) Hemorrhage on the left arm on admission. (D) Hemorrhage on the left ankle on admission. (E) Hemorrhage on the left ankle after treatment. (F) Hemorrhage on the dorsum of the left hand.

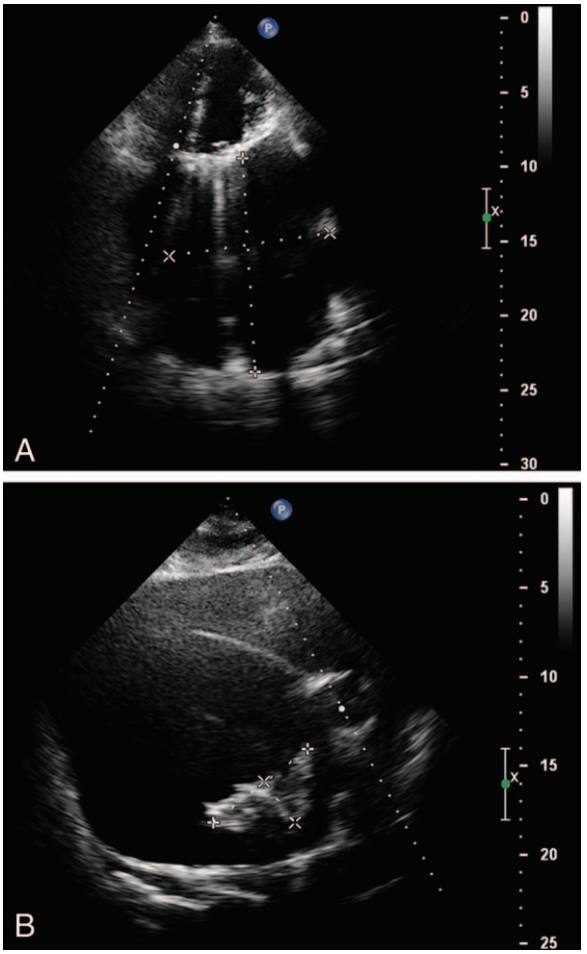

Figure 2. Echocardiography findings upon admission. (A) Giant left atrium (144 × 120 mm). (B) Giant thrombus within left atrium (28.9 × 67.1 mm).

antigen concentration was within normal limits, and a blood smear showed no blood cell abnormalities. According to established diagnostic criteria,[8] the patient was diagnosed with chronic DIC. Because the long-existing thrombus continuously consumed coagulation factors and platelets, eventually leading to the activation of intravascular coagulation, we considered that the left atrial thrombus was the underlying condition responsible for her chronic DIC. We believe that another important factor, stasis cirrhosis, significantly contributed to the development of DIC in this case. Because most procoagulant and anticoagulant factors are synthesized in the liver, hepatic impairment predisposes to depletion of these factors. A second thrombectomy to eliminate the stimulus of ongoing coagulation and thrombosis would have been radical management of the DIC for our patient. However, considering the complexities of this case and risks of reoperation, our patient decided not to undergo cardiac surgery but to instead continue with anticoagulant therapy comprising low-molecular-weight heparin and warfarin with a goal INR of 2.5. After discharge on June 19, 2015, the patient underwent regular follow-up with ongoing warfarin therapy and showed no recurrence of DIC.

3. Discussion

Thrombosis is always reported to be a consequence, but rarely a cause, of DIC. We encountered a patient with chronic DIC secondary to a left atrial thrombus. Thus, an atrial thrombus should be considered as a differential diagnosis in patients with underlying chronic DIC, especially patients with predisposing heart conditions. Cases of acute DIC in patients with congestive HF and left ventricular thrombi have been previously reported.[9,10] However, these cases differ from ours in terms of the location of the thrombus, the predisposing heart conditions, and especially the cause-and-effect relationship between the DIC and heart thrombus. Thus, we believe that

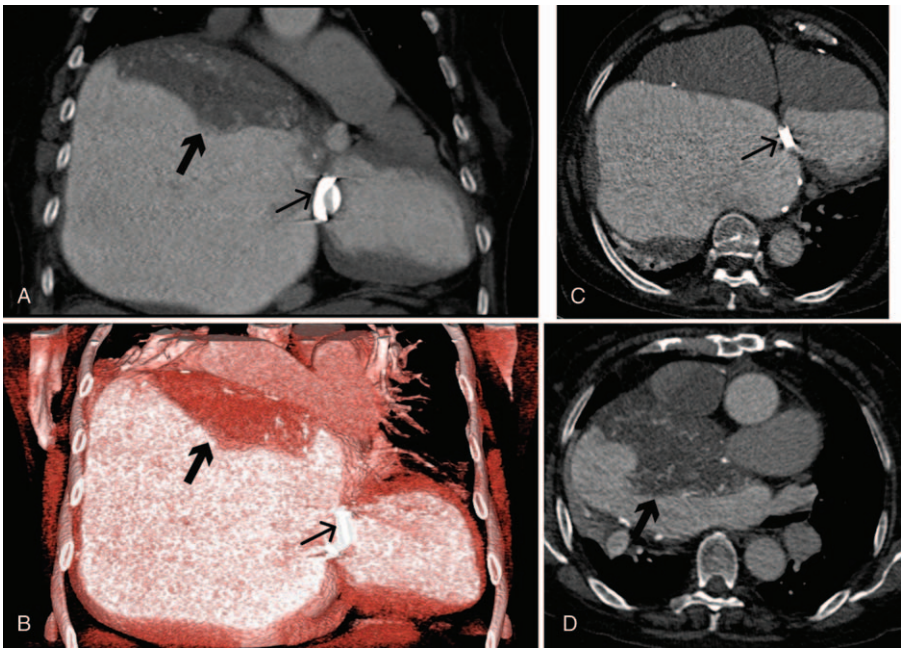

Figure 3. Cardiac computed tomography findings during hospital stay. (A) Cortical reconstruction and (B) volume rendering technique showed the maximum diameter of the giant heart. The fine arrow indicates the replaced metal mitral valve; the bold arrow indicates the giant thrombus in the left atrium. (C) This picture shows the giant heart of our patient. The fine arrow indicates the replaced metal mitral valve. (D) This picture shows the giant thrombus in the left atrium (bold arrow).

Table 1

Coagulation tests during hospital stay.

	Reference range	21 May	23 May	24 May	25 May	27 May	29 May	31 May	03 June	05 June	08 June	10 June	29 June
Hemoglobin	110–150 × 10^9/L	118	118	118	116	121	125	118	113	111	113	108	118
Platelets	100–350 × 10^9/L	72	73	79	83	82	102	95	106	102	91	93	72
PT	10.4–12.6 s	12.4	11.4	11.9	12.3	10.7	12.0	13.3	15.5	19.9	26.0	31.6	28.3
INR	0.86–1.14	1.13	1.04	1.08	1.03	0.97	1.07	1.21	1.41	1.81	2.36	2.72	2.43
APTT	22.7–31.8 s	34.0	33.0	33.0	34.4	32.1	33.2	37.2				51.6	44.9
Fibrinogen	1.80–3.50 g/L	0.89	1.28	1.39	1.81	1.99	2.41	2.27				2.07	1.47
D-Dimers	0–0.55 mg/L	37.94	21.56	18.63	19.40	16.86	17.95	16.77				18.07	18.30
FDP	0–5.0 μg/mL	167.5			88.1		61.0					76.8	84.0

APTT = activated partial thromboplastin time, FDP = fibrin degradation products, INR = international normalized ratio, PT = prothrombin time.

this is the first reported case in which chronic DIC was induced by a left atrial giant thrombus.

Because treatment of the underlying cause is paramount in the management of chronic DIC, our case is of great clinical value. A second thrombectomy to remove the intra-atrial thrombus was the main priority for this patient. Surgical thrombectomy, thrombolytic agents, and anticoagulation with heparin are also reasonable treatment options.[11] Considering the bleeding diathesis and critical condition of the patient in this case, however, removal of the intra-atrial thrombus would have been extremely risky, and the patient refused the operation. Thus, anticoagulant therapy with low-molecular-weight heparin and warfarin was the treatment of choice in this patient.

The other highlight of this case is the giant "normal" heart, indicating that the patient's cardiac morphology and systolic function were not parallel. Imaging examinations showed biatrial enlargement, but the morphology of her ventricles remained unaffected. During hospitalization, she showed no significant limitations of her physical activity or development of HF symptoms, her N-terminal pro-B-type natriuretic peptide and B-type natriuretic peptide concentrations were not obviously elevated, and her left ventricular ejection fraction was almost normal. The coexistence of AF and long-term RHD may partly explain this uncommon phenomenon.

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