Case Report

Management of Perioperative Anticoagulation in a Patient with Antiphospholipid Antibody Syndrome Undergoing Cardiac Surgery: A Case Report

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ABSTRACT

Patients with Antiphospholipid syndrome (APLS) are at high risk for both bleeding and thrombotic complications during cardiac surgery involving cardiopulmonary bypass (CPB). In this case we present a patient with APLS and Immune Thrombocytopenic Purpura who successfully underwent aortic valve replacement (AVR) with CPB despite recent craniotomy for subdural hematoma evacuation. Anticoagulation for CPB was monitored by targeting an Activated Clotting Time (ACT) that was 2× the upper limit of normal. A multidisciplinary approach was essential in ensuring a safe and successful operation.

Keywords: Antifibrinolytics, antiphospholipid syndrome, cardiopulmonary bypass, immune thrombocytopenic purpura, Libman-Sacks endocarditis

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INTRODUCTION

APLS is an autoimmune condition characterized by recurrent thrombosis and the presence of antiphospholipid antibodies. Libman-Sacks endocarditis (LSE) is a well-known complication of APLS, most often affecting left-sided heart valves with a predilection for the mitral leaflets. Valvular dysfunction can range from asymptomatic to severe, necessitating valve replacement. We present a case of a patient with APLS, immune thrombocytopenic purpura (ITP), and congenital May-Hegglin anomaly who required emergent craniotomy for a spontaneous subdural hematoma (SDH) while anticoagulated. Following the craniotomy, she then underwent a surgical AVR due to recurrent embolic strokes. This case highlights the unique perioperative challenges particularly in coagulation management for APLS patients undergoing CPB. HIPAA authorization for publication and use of radiographic and transesophageal echocardiographic (TEE) images were obtained from the patient.

CASE

Preoperative

A 30-year-old woman with a history of thrombocytopenia secondary to ITP and May-Hegglin anomaly (on eltrombopag and prednisone with platelet count >100,000/μL), bicuspid aortic valve (AV), and known anti-phospholipid antibodies initially presented to our institution in acute decompensated heart failure. TEE showed kissing thrombi on the AV leaflets [Figure 1a] causing severe stenosis (valve area

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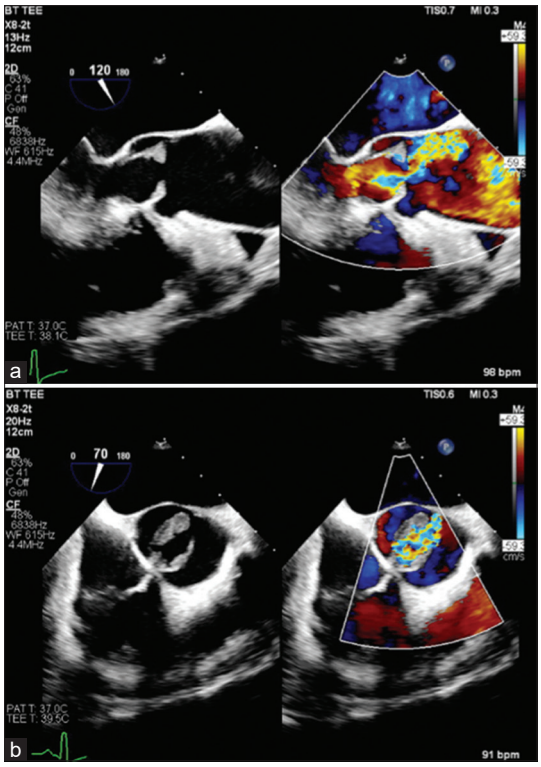

Figure 1: (a) TEE mid esophageal long axis view showed significant clot burden on aortic valve leaflets with turbulent flow during systole. (b) TEE mid esophageal short axis view showed bicuspid aortic valve with severe aortic stenosis (valve area 0.99 cm^2)

0.99 cm^2, peak velocity 3.7 m/s) [Figure 1b]. Given the presence of lupus anticoagulant, anti-cardiolipin and beta glycoprotein IgG with AV thrombus, patient met criteria for APLS with LSE. She was initiated on enoxaparin with bridge to Coumadin. Two weeks later, she presented again with headache and right hand paresthesias. Computed tomography showed an acute left frontoparietal subdural hematoma and hematoma at left parietal convexity with 5 mm midline shift [Figure 2]. She was taken for emergent left decompressive craniotomy and further anticoagulation was held. Following surgery, she developed expressive aphasia with imaging revealing scattered intracerebral infarcts. Given suspected cardioembolic phenomenon, the decision was made to pursue a high-risk surgical AVR. Notably, our institution does not have the capability for transcatheter AV replacement. Due to ITP and May-Hegglin anomaly, she underwent preoperative intravenous immunoglobulin and platelet infusions leading to a rise of platelets from 68,000 to 133,000/μL.

Intraoperative

The patient underwent surgical AVR ten days post craniotomy. Following sternotomy, 500 U/kg of heparin was administered prior to aortic cannulation. The patient's baseline ACT was elevated at 183 s, and target

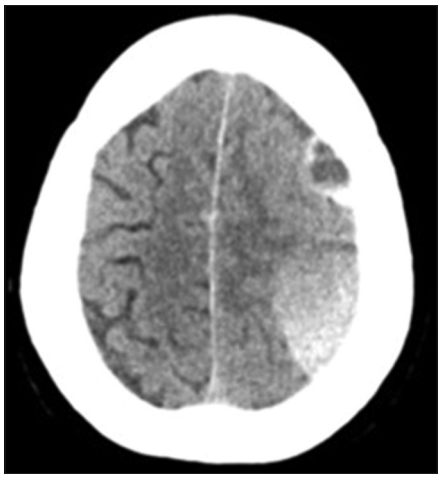

Figure 2: Computed tomography of the head showed an acute left frontoparietal subdural hematoma and hematoma at left parietal convexity with 5 mm midline shift. This occurred in the setting of anticoagulation with enoxaparin bridged to warfarin for the aortic valve thrombus

ACT for CPB was chosen at 800-960 s or 2× the upper limit of normal given her propensity for thrombosis. No antifibrinolytic agent was administered. CPB was initiated and a bioprosthetic valve was placed without difficulty. No fibrinous strands or thrombus formation in the circuit was noted by the perfusionist. Following separation from CPB, low dose protamine was administered with both ACT and Thromboelastography™ (TEG) demonstrating the coagulation profile returning to baseline. The patient did not have major bleeding intraoperatively, requiring two units of packed red blood cells and one unit of platelets. TEE showed a well-seated bioprosthetic valve without leak and improved ejection fraction. Postoperatively, she required minimum vasopressor support and was extubated 12 hours later uneventfully.

DISCUSSION

APLS is an autoimmune disease defined by the serologic presence of antibodies to phospholipids, along with evidence of venous and/or arterial thrombus formation.[1] It can be a primary disorder or a secondary disorder in association with another disease, most commonly systemic lupus erythematosus or rheumatoid disease. Further, ITP may develop in 23-34% of patients with APLS.[2]

APLS can cause valvular abnormalities in up to one third of patients, presenting as leaflet thickening most commonly involving the mitral and/or aortic valves.[1] In addition, nonbacterial thrombotic endocarditis (i.e. LSE) is a well-known complication of APLS. The pathogenesis involves the formation of a fibrin-platelet thrombus on an altered valve leading to fibrosis and distortion of valve

architecture. The literature is sparse as far as treatment guidelines for LSE. In most patients, valvular involvement is of minor hemodynamic consequence and does not cause significant heart disease. However, patients with severe valvulopathy, embolic phenomenon, or heart failure may require surgical replacement.[1] Mainstay treatment for LSE includes immunomodulation and anticoagulation (with vitamin K antagonists being the most studied). Resolution of vegetation is possible with anticoagulation. Steroids have also been documented to be effective by reducing inflammation but can theoretically worsen fibrosis and valvular disease.[1]

Cardiac surgery and APLS

Valve surgery in patients with APLS is associated with high morbidity and mortality given the risk of both hemorrhagic and thrombotic complications. Surgery itself increases the risk of thrombosis in patients with APLS due to the perioperative withdrawal of anticoagulation as well as a surgery induced hypercoagulable state. Bleeding complications can occur due to excessive anticoagulation, CPB induced inflammation, and comorbid thrombocytopenia.[3] In a retrospective analysis of 33 patients, APLS patients undergoing valve surgery experienced a mortality and morbidity of 12.5% and 43% respectively from major bleeding or thrombosis (including venous thrombosis, strokes, and valvular thrombosis).[3] It is recommended that periods without anticoagulation be minimized in the immediate postoperative setting, however there are no guidelines regarding when to restart anticoagulation.[3,4] Mechanical prophylaxis with intermittent venous compression should also be employed.[4]

Cardiopulmonary bypass and APLS

Anticoagulation for CPB is typically achieved with systemic heparinization. Monitoring its adequacy is performed by measuring ACT, which is a phospholipid dependent test. Antiphospholipid antibodies present in APLS patients can bind to the phospholipid reagents and produce falsely elevated baseline ACTs, as seen in our patient.[5] Such false elevations can lead to under-dosing of anticoagulation for CPB, especially in light of their hypercoagulable physiology. Suggested strategies for dosing heparin include targeting 2× the upper limit of normal for ACT, formulating personalized ACT titration curves by targeting a specific blood heparin concentration, or directly measuring anti-factor Xa levels. However, there are no prospective studies investigating these approaches. The latter two strategies are challenging as levels take time to result.[5,6] Our patient was particularly difficult to manage given her concurrent ITP and May-Hegglin anomaly, which confounded her overall coagulation status. There are no documented cases in the literature of patients with these three conditions undergoing CPB. With input from hematology, our formalized approach included targeting 2× the upper limit of normal for ACT during CPB and using TEG-guided reversal of heparin.

Antifibrinolytics and APLS

In cardiac surgery, antifibrinolytics have been shown to reduce hemostatic activation, bleeding, allogeneic blood transfusions, and are "strongly recommended" in the latest clinical practice guidelines. Nevertheless, there is potential to cause thrombotic complications, though the risk of thrombosis is not felt to be clinically significant in most patients.[7] However, there are limited data on the use of antifibrinolytics in patients with APLS. Given these patients' propensity toward clotting, it may be wise to avoid them. In a case series of five APLS patients receiving aprotinin, four died of thromboembolic complications.[8] However, safe use of both aminocaproic acid and tranexamic acid has been documented in case reports of APLS patients undergoing CPB.[9,10]

In this case we presented a challenging patient with APLS who underwent cardiac surgery despite comorbid ITP and recent craniotomy. Her anticoagulation management, especially in the setting CPB, was fraught with challenging decisions. A multidisciplinary approach was vital to ensuring the success of the operation.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Conflicts of interest

There are no conflicts of interest.

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