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# Use of Plasma Exchange in a Case of Disseminated Intravascular Coagulation in a Patient with Antiphospholipid Syndrome

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## Abstract

We describe a case of a 38-year-old patient with systemic lupus erythematosus and anti-phospholipid syndrome who underwent total abdominal hysterectomy and then developed a vaginal vault abscess which lead to sepsis. She was treated as possible sepsis with disseminated intravascular coagulation and there was also a possibility of her suffering from catastrophic anti-phospholipid syndrome which was the line of management in this case.

## Case Presentation

A 38-year-old lady who had a background history of SLE with anti-phospholipid syndrome presented with heavy menstrual bleeding which did not settle with medical management. She had a history of pulmonary embolism in 2012 her ANA had been positive; DsDNA, beta microglobulin, anticardiolipin were also positive and Ro/La was also positive. In 2016 she was diagnosed of having deep vein thrombosis. Her medical history was complicated by avascular necrosis of the left hip joint which was due to steroids for this decompression of the left hip joint had been done. In 2015 she also contracted TB of the spine.

She had a significant gynecological history she had attained menarche at the age of 13 years and had regular menstrual cycles. In 2018 she had started suffering from prolonged menstrual cycles for which levonorgestrel had been inserted. She had per vaginal bleeding for 10 days along with clots during her menstrual cycle and had been recently admitted for anemia with a hemoglobin of 5.9 g/dl for which 4 units of red blood cells was transfused. Ultrasound scan done shows a bulky uterus with an anterior fundal fibroid and a posterior fundal fibroid and a pedunculated cervical fibroid. Due to the history of per vaginal bleeding which caused anemia and being refractory to medical management total abdominal hysterectomy was decided.

The patient was admitted to the ICU in preparation for the operation. Her warfarin had been stopped about 8 days back and she was bridged with enoxaparin. Total abdominal hysterectomy was done the INR was 1.08 about 300 ml of blood was lost during surgery. Post surgery the patient was mobilized and pain free she was commenced on enoxaparin and warfarin and transferred to the ward.

In the ward the patient developed fever on day 4 and surgical site pain. Patient was on ciprofloxacin and teicoplanin was added after the fever failed to subside. Ultrasound scan was done which showed fluid collection under the surgical scar suggestive of seroma formation. Patients' antibiotics ciprofloxacin, metronidazole and teicoplanin were continued for the management of vaginal vault hematoma with or without abscess. Her antibiotics were changed with the addition of gentamicin and clarithromycin with the omission of ciprofloxacin as the CRP continued to climb from 50 to 109.

A vaginal swab that had been sent revealed *Staphylococcus aureus*. Patient also developed shortness of breath during the ward stay and since there was a probable DVT risk CTPA and echo were done. The latter was normal with good LV/RV systolic function. There was a thin rim of pericardial effusion. There was no dilated RA/RV. Along with the CTPA, CECT abdomen was done. There was no evidence of pulmonary embolism however pulmonary hypertension was noted. There was a vaginal vault abscess about 3 cm × 6 cm × 3 cm collection with gas formation. There was generalized iliac and inguinal lymphadenopathy. A decision was made to evacuate the abscess. The INR was 6 warfarin had been omitted and FFP was given for correction with the view of doing

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a source control under general anesthesia and for central venous catheter insertion. However, the abscess was manually evacuated at the bedside with minimal sedation in the form of fentanyl being given for pain relief this was done on two occasions and ultrasound scan was repeated after each attempt. Initial scan showed complete drainage and a cavity of 3 cm × 5 cm which was collapsed.

With the FFP correction which was about 1800 ml the patient developed features of fluid overload.

Bedside echo showed a reduction in the ejection fraction to 45% with the IVC being full and B lines being noticed in the lungs. IV furosemide boluses were given, and the patient was started on a furosemide infusion. Ivabradine was started due to the tachycardia and there was severe reduction in heart rate after it was initiated. The patient was significantly tachypneic and non-invasive ventilation was also started. The patient's antibiotics had been changed meanwhile to imipenem, levofloxacin and metronidazole was continued. The patient became hypotensive, and noradrenaline was started and hydrocortisone 50 mg 6 h was started as the vasopressor requirement went up.

The patient also had a one episode of generalized Tonic-Clonic seizure which subsided with midazolam. CT scan done to rule out an abscess and intracranial hemorrhage was normal.

It was noticed with the elevation of CRP a thrombocytopenia was noted and blood picture showed features of fragmented cells, no evidence of severe sepsis or toxic changes and since aPTT elevated and PT were elevated. Catastrophic APLS and DIC were considered. ROTEM done did not show excess bleeding risk.

The patient was seen by the rheumatology team and since catastrophic APLS was also considered PLEX was decided and Vas Cath was inserted under FFP cover. One cycle of plasma exchange was done with FFP and the patients hemodynamic requirements remained stable during the procedure. 2D echo was done which showed 30% to 35% ejection fracture with apical segment hypokinesia likely Takotsubo cardiomyopathy.

A blood gas done showed a lactate of 7 which increased to 15 despite patient's hemodynamics being stable on noradrenaline and oxygenation being stable on non-invasive ventilation. A decision was taken to electively intubate the patient due to the increased work off breathing and rising lactate levels.

The patient however succumbed to the disease after having a cardiac arrest.

## Discussion

In Systemic Lupus Erythematous (SLE) infection are common and a remain as a source mortality. Infections are same as the general population and usually include both gram positive and gram-negative organisms. When treated with immunosuppressive agents' patients are susceptible to infections. Severe flares, active renal disease are other factors that make SLE patients susceptible to infection. In certain SLE patients' genetic factors such as complement deficiencies, mannose-binding lectin, Fc gamma III, Granulocyte Macrophage Colony-Stimulating Factor [GM-CSF], osteopontin may predispose them to infections. C reactive protein and adhesion molecules help distinguish between disease flare and infection. Molecular mimicry by microbial agents may cause induction of SLE [1].

Not only infection but SLE flare also presents with fever and physicians are faced with dilemma of differentiating between the two which is important.

Our patient had Anti-Phospholipid Syndrome (APS) along with SLE. Anti-Phospholipid Syndrome (APS) is an autoimmune disease that has venous and/or arterial thrombosis and pregnancy morbidity is due to the presence of pathogenic autoantibodies known as anti-Phospholipid antibodies (aPL). Management of patients with SLE and APS/aPL vascular risk factors should be risk stratified. Low dose aspirin and hydroxychloroquine are used as primary prophylaxis. Low molecular weight heparin is used in high-risk cases such as surgery, prolonged immobilization and puerperium [2].

Catastrophic Anti-Phospholipid Syndrome (CAPS) as a presentation usually constitutes about one half of the cases of APS and about one third of the cases are triggered by infection which could have been the case in our patient [3]. The diagnostic criteria for CAPS include involvement of three or more organs, systems, or tissues. With the development of manifestations of the disease simultaneously or in less than one week duration, evidence by histopathology of small vessel occlusion in at least one organ or tissue. and laboratory investigations of the presence of anti-phospholipid antibodies (*i.e.*, lupus anticoagulant and/or anti-cardiolipin antibodies) [4]. Our patient did not really fulfill the criteria of CAPS since we were unable to perform anticardiolipin antibodies and there was no evidence of thrombotic manifestations in different organ systems however there was a blood picture showed evidence of microangiopathic hemolytic anemia CAPS was considered.

In CAPS there is usually a high serum ferritin concentration compared to patients with classic APS which contributes to the cytokine storm leading to multi-organ dysfunction. CAPS is usually a life-threatening syndrome which warrants ICU admission. The main causes of death are cerebral, cardiac complications and infections. Usually, a high recovery rate is established with the use of anticoagulants, corticosteroids and plasma exchange followed by the combination of the three and or inclusive of IV IG. Plasma exchange independently on its own is independently associated with a decrease in mortality probably through the removal of circulating anti-phospholipid antibodies and the removal of pro-inflammatory mediators' removal of serum ferritin, TNF-α, IL-1, IL-6, and IL-18. According to the international guideline consensus initiation of plasma exchange is recommended especially in the presence of schistocytes in blood picture.

The place of immunosuppressant therapy in APS has not been clearly defined. Cyclophosphamide has shown some benefit in SLE flare and rituximab as well. Eculizumab has been reported to be used in refractory cases of CAPS [3].

Monitoring of laboratory parameters such increased aPL titers, troponin, serum creatinine, and decreased platelet count can contribute to evaluation of a patient and help in making a clinical decision on the mode of treatment [3]. Anti-phospholipid syndrome on its own is associated with increased morbidity and mortality. As an independent risk factor for premature death antiphospholipid antibodies have been identified [5].

Infections associated with DIC is one of the most common triggers of catastrophic antiphospholipid syndrome. Molecular mimicry following infection is supposed the proposed mechanism

for causing CAPS following infection.

Distinguishing between catastrophic antiphospholipid syndrome and other conditions that lead to multiple organ thrombosis is difficult. A few major causes of organ thromboses should also be considered.

Disseminated Intravascular Coagulation (DIC) is one of these. DIC is usually considered a secondary thrombotic microangiopathy because it is usually associated with an underlying event such as sepsis, cancer, trauma or another insult. DIC as observed by investigators is caused by excessive, systemic release of tissue factor causing pathological consumption and release of coagulation proteins and platelet factors [6]. Tissue factor is expressed in numerous tissues plays a pivotal role in the initiation and propagation of the coagulation cascade. Local tissue injury or inflammation causes the release of tissue factor into the bloodstream and factor VIIa complexes with enhancing its procoagulant property. The tissue factor- factor VIIa complex causes activation of factors IX and X, leading to thrombin generation and eventually fibrin clot formation. Although local clot formation during a focal infection lends a theoretical survival benefit to the host by immobilizing bacteria and limiting their spread. However, the violent systemic injury and inflammation, excessive release of tissue factor can cause detrimental hyper activation of the coagulation system resulting in disseminated microvascular thrombosis and the consumption and depletion of coagulation proteins leading to increased bleeding. T The level of anti-fibrinolytic Plasminogen Activator Inhibitor type-1 (PAI-1) is elevated, and the levels of anticoagulants antithrombin III and protein C are diminished which aggravates the pro-thrombotic state [7]. DIC is associated with elevated fibrin degradation products, low fibrinogen levels, or elevated D-dimer concentrations. In acute DIC the prothrombin time and activated partial thromboplastin time is prolonged unlike in catastrophic antiphospholipid syndrome [8]. In our patient the APTT and PT were prolonged favoring DIC.

Thrombotic microangiopathies is also another differential as they are systemic syndromes in which small vessel platelet microthrombi form in various vascular beds, leading to life threatening manifestations such as thrombocytopenia, Microangiopathic Hemolytic Anemia (MAHA), and organ injury. Unexplained thrombocytopenia and organ involvement also occur in thrombotic microangiopathies like catastrophic APLS. Thrombotic microangiopathies however do not cause large vessel thrombosis but are associated with laboratory abnormalities related to their underlying pathophysiology [6].

Thrombotic microangiopathy, DIC and APS may coexist in the same patient or may overlap making the diagnosis difficult [9]. Since we weren't certain of the diagnosis as there were elements of sepsis causing DIC or the slight possibility of CAPS. Plasma exchange was performed as using steroids might aggravate the underlying sepsis. In DIC, plasma exchange is thought to benefit by removing tissue factors, PAI-1 and replenish antithrombin III, protein C and S and tissue plasminogen activator inhibitor. Plasma exchange in short attempts to bring the patient's plasma from its dysregulated pro-thrombotic and antifibrinolytic states back to the normal milieu [7].

This patient disease process was also complicated by stress induced cardiomyopathy which was found by the apical ballooning that was seen in the echo elevated troponin and rising lactate. There are usually two entities to consider when it comes to cardiovascular involvement in sepsis, sepsis induced myocardial dysfunction and stress induced cardiomyopathy. The former is a reversible myocardial depression caused by sepsis that has left ventricular dilation, depressed Ejection Fraction (EF), and seven to 10 days of a recovery period. The condition is still poorly understood although endotoxins, inflammatory cytokines and nitric oxide are related to its pathology. The incidence is reported from between 16% to 65% with a mortality rate of 40% to 70%. The latter stress induced cardiomyopathy also known as Takotsubo cardiomyopathy, is due to a dysfunction of the left ventricular apex presenting as either hypokinesia, akinesia, or dyskinesia of the mid-segments maybe, with or without apical involvement. Its etiology is usually elevated catecholamine release, and emotional or physical stress or acute medical conditions usually precede most cases. The natural courses of both these entities are quite similar and most patients usually recover in a few days. However, stress induced cardiomyopathy in sepsis is associated with a higher mortality. Because the pathogenesis of these two-disease process is different the treatment approach is rather different. Inotropic agents such as dobutamine have been thought to alleviate sepsis induced myocardial dysfunction. In stress induced cardiomyopathy supportive care is usually the treatment strategy. The hypotension due to the mid ventricular obstruction which is the result of systolic anterior motion of the anterior mitral leaflet and the juxtaposition of the septum to the chordal apparatus is better treated with beta blockers and phenylephrine. There is also concern that excessive catecholamine use due to inotropic agents in sepsis might be detrimental but sometimes inotropes might be required for left ventricular dysfunction. Elevated levels of troponin and lactate are usually risk factors of stress induced cardiomyopathy both of which were noticed in this patient especially the lactate which was refractory to inotropes or fluid management.

## Lessons Learnt

One must be extremely vigilant while treating patients with SLE and APLS as they are prone to high morbidity and mortality. Catastrophic anti-phospholipid syndrome is always a possibility in these patients and treatment is often complicated when sepsis leading to disseminated intravascular coagulation is also a differential diagnosis. Plasma exchange is always a mode of management in these patients.

## References

1. Shoenfeld Y, Zandman-Goddard G, Stojanovich L, Cutolo M, Amital H, Levy Y, et al. The mosaic of autoimmunity: hormonal and environmental factors involved in autoimmune diseases--2008. Isr Med Assoc J. 2008;10(1):8-12.
2. Pons-Estel GJ, Andreoli L, Scanzi F, Cervera R, Tincani A. The antiphospholipid syndrome in patients with systemic lupus erythematosus. J Autoimmun. 2017;76:10-20.
3. Titeca-Beauport D, Salle V, Kontar L, Maizel J, Choukroun G. Plasma exchange in the management of catastrophic antiphospholipid syndrome. Case Rep Crit Care. 2016;2016.
4. Farkas J. Catastrophic Antiphospholipid Syndrome (CAPS). 2020 July 10.
5. Drenkard C, Villa AR, Alarcon-Segovia D, Perez-Vazquez ME. Influence of the antiphospholipid syndrome in the survival of patients with systemic lupus erythematosus. J Rheumatol. 1994;21(6):1067-72.
6. Espinosa G, Santos E, Cervera R, Piette JC, de la Red G, Gil V, et al. Adrenal involvement in the antiphospholipid syndrome: Clinical and immunologic characteristics of 86 patients. Medicine. 2003;82(2):106-18.
7. Nguyen TC, Han YY. Plasma exchange therapy for thrombotic microangiopathies. Organogenesis. 2011;7(1):28-31.

8. Ortel TL, Erkan D, Kitchens CS. How I treat catastrophic thrombotic syndromes. Blood. 2015;126(11):1285-93.

9. Asherson RA, Pierangeli SS, Cervera R. Is there a microangiopathic antiphospholipid syndrome? Ann Rheum Dis. 2007;66(4):429-32.