Anatomy Physiology & Biochemistry
International Journal
ISSN: 2476-1400

Juniper Publishers
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Mini Review
Volume 7 Issue 2 - November 2023
DOI: 10.19080/APBIJ.2023.07.555706

Anatomy Physiol Biochem Int J

A Mini Review on Antiphospholipid Syndrome: Pathogenesis and Complications

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Submission: October 19, 2023; **Published:** November 16, 2023

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Abstract

Antiphospholipid syndrome (APLA) is a multisystemic autoimmune disorder. This disorder affects women in the age of 30 to 40. It is associated with the following infections, drugs and Autoimmune diseases and it is antibody mediated thereby autoantibodies reacting against phospholipid associated proteins such as plasma coagulation proteins and membrane proteins on endothelial cells, monocytes, and platelets. Laboratory tests such as ELISA, Lupus anticoagulants test etc. can detect this syndrome. Risk factors in this disorder are development of blood clots, high blood pressure, obesity etc. Common treatments available are intravenous blood thinners, warfarin, low dose aspirin etc. Future research should highlight the complications of this disease and a multidimensional approach is required.

Keywords: Antibodies; Antiphosholipid Syndrome; Autoimmune Disease; Warfarin

Abbreviations: APLA: Antiphospholipid syndrome; HIT: Heparin Induced Thrombocytopenia; CMV: Cytomegalovirus; tPA: Tissue type plasminogen activator; APS: Antiphospholipid Syndrome; SLE: Systemic Lupus Erythematosus

Introduction

Auto antibody mediated acquired thrombophilia and intermittent arterial or venous thrombosis [1]. It is a disorder of the coagulation system that involves disproportionate activation of the clotting cascade and consistent thrombus formations. Very common cause is point mutations in factor V gene and prothrombin gene (prothrombin G 2210A variant) and acquired thrombophilic results in Antiphospholipild syndrome and heparin induced thrombocytopenia (HIT). High levels of IgM antibodies against viruses amd parasite such as Rubella, toxoplasma gondii, cytomegalovirus (CMV), hepatitis C virus and Demonstration of cross reactivity between proteins of tetanus toxoid which is produced by a gram positive bacteria. Although it's an inherited immune disorder but however the infection by a gram-positive bacteria induces the occurrence of Anti phospholipid syndrome [2].

Pathogenesis of the Syndrome

It is caused by one or more combinations of pathogens, and it causes Arterial or venous thrombosis ad pregnancy related complications and the presence of elevated titers of antiphospholipid syndrome antibodies such as lupus anticoagulant, anticardiolipin and anti-beta 2 glycoprotein [3]. Initiating event Majorly bacterial infection, oxidative stress, physical stress (surgery or trauma) Binding of anti phospholipids to disrupted endothelial cells causes intravascular coagulation thrombus formations and complement Activation. Lupus Anticoagulant interacts with phospholipids on platelet membrane and increases the adhesion, aggregation of platelets and it is prothrombotic. Anticardiolipid antibodies interacts with Anionic phospholipids and found in the inner mitochondrial membrane Anti beta2 glycoprotein I antibodies also known as apolipoprotein H and it binds to cardiolipin and phospholipids thereby acting as a opsonin for complement system activation. It is associated with the following infections, drugs and Autoimmune diseases and it is antibody mediated thereby autoantibodies reacting against phospholipid associated proteins such as plasma coagulation proteins and membrane proteins on endothelial cells, monocytes, and platelets [4] (Figure 1).

Complications of Aps

Pregnancy Related Complications

Repeated miscarriages and severe preeclampsia followed by a intrauterine growth restrictions which causes preterm delivery [5].

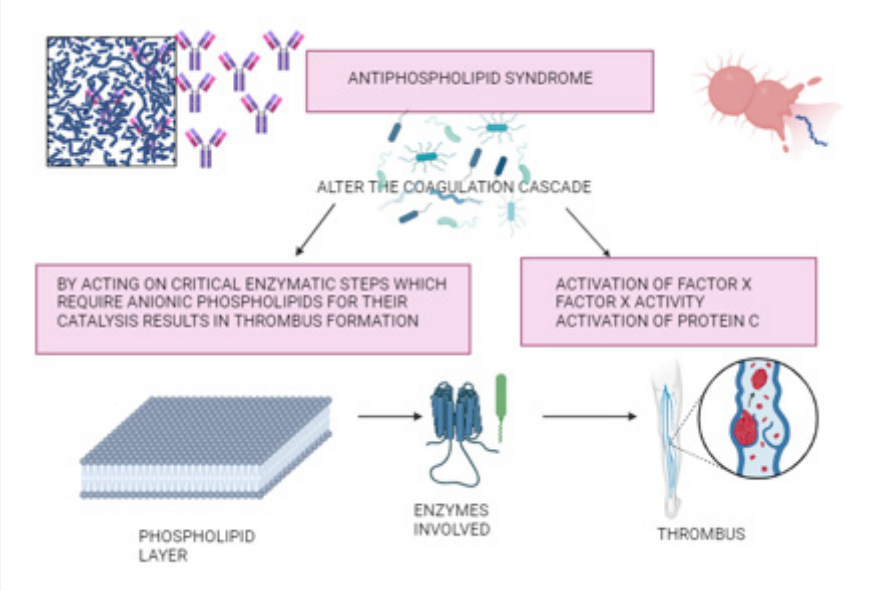

Figure 1: Mechanism of pathogenesis [3].

Fetal Loss

Tissue type plasminogen activator (tPA) is a protein that facilitates the breakdown of blood clots. It acts as an enzyme to convert plasminogen into its active form plasmin and it is the major enzyme responsible for clot breakdown. The nature of enzyme is a serine protease found on endothelial cells lining the blood vessels. Human tPA is encoded by the PLAT gene and has a molecular weight of ~70 kDa in the single chain form. The activity of tpA is necessary for trophoblastic invasion. Specific changes in the utero placental arteries during pregnancy which ensure adequate blood flow to the fetus. Therefore antibody mediated inhibition of tpA activity inhibits trophoblastic invasion [2]. Pregnancy morbidity is one of the main complication caused by auto antibodies generated due to infection caused by gram positive bacteria's protein such as tetanus toxoid and antibodies naturally act as a modulator that can remodel the cascades [6].

Antiphospholipid Syndrome (APS) is a complex autoimmune disorder distinguished by the presence of antiphospholipid antibodies in the blood, that leads to collection of clinical manifestations. There are two main types of APS: Primary Antiphospholipid Syndrome: Primary APS refers to cases where antiphospholipid antibodies are present, and clinical manifestations of the syndrome occur in isolation unescorted by the presence of another autoimmune disorder. Patients with primary APS may have various symptoms, including thrombosis (clot formation), recurrent pregnancy loss, skin conditions, and neurological complications. primary APS affects both men and women, although it is more commonly seen in women. Increased expression of type I interferon (IFN) regulated genes is noticed in blood and tissue cells from patients with systemic lupus erythematosus (SLE) and other rheumatic disorders. The studies on relation between type1 interferon and aps pathogeneicity is one of the primary future implications [7].

Secondary Antiphospholipid Syndrome

Secondary APS occurs in individuals who have antiphospholipid antibodies in conjunction with another autoimmune disorder, most commonly systemic lupus erythematosus (SLE). When APS is secondary to another autoimmune disease, it may be referred to as "secondary APS associated with SLE" or another specific autoimmune condition. Patients with secondary APS often exhibit a broader spectrum of clinical symptoms and complications, due to the clinical symptoms and adverse conditions caused by array of infections or the coupled disease in association with other autoimmune disorder [8]. It's important to note that while primary and secondary APS are the two main categories, the clinical presentation of APS can vary widely from one individual to another. The syndrome can manifest as venous or arterial thrombosis, recurrent miscarriages, skin issues, and neurological problems. The severity of APS can also differ among patients, and treatment approaches are personally tailored to the specific symptoms and risks faced by each individual. Early diagnosis, appropriate management, and regular monitoring are crucial for improving the quality of life for those affected by APS (Figure 2).

How to cite this article: Abira R, Soumya V M, Asha K. A Mini Review on Antiphospholipid Syndrome: Pathogenesis and Complications. Anatomy Physiol Biochem Int J: 2023; 7(2): 555706. DOI: 10.19080/APBIJ.2023.07.555706

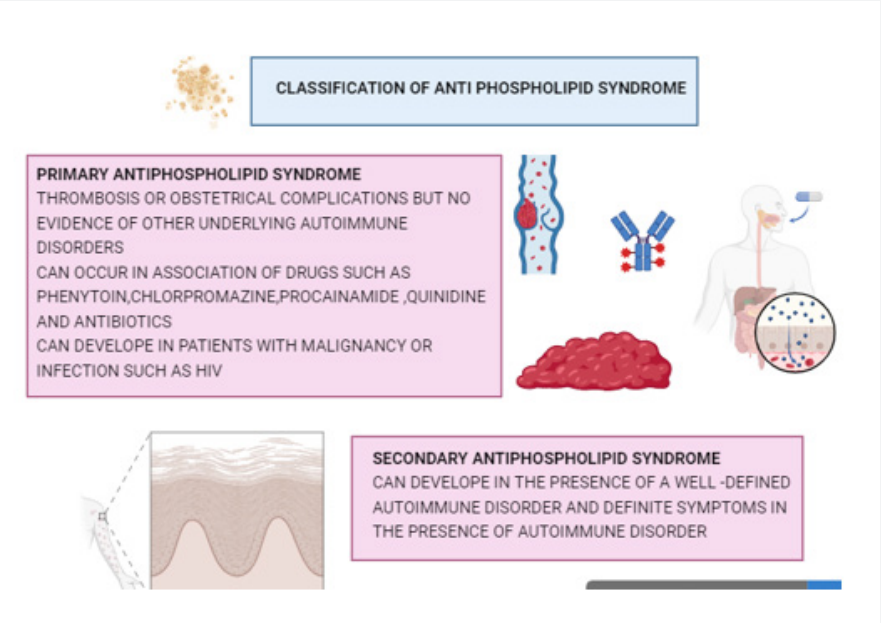

Figure 2: Overview of primary and secondary antiphospholipid syndrome [1].

RARE Catastrophic Antiphospholipid Syndrome

Rare and aggressive and leads to rapid multi organ failure due to ubiquitous small vassel thrombosis and high rate of mortality. There are no diagnostic criteria for APS [9]. If a person has signs and symptoms that suggest they have APS, laboratory tests are ordered to determine the presence of antiphospholipid antibody (aPL). A confirmatory diagnosis requires positive results from at least two such blood tests, with three or more months apart because many symptoms of APS, including miscarriages, are considered as more common conditions, many patients go undiagnosed for years. In addition to this, people with APS sometimes receive a false positive test result for syphilis, a sexually transmitted disease. On the other hand, there is also a problem with overdiagnosis: Some people are incorrectly diagnosed with APS, relying totally on a single positive test for (aPL), which can occur frequently in healthy people.

Conclusion

Antiphospholipid syndrome is a disease dependent on various factors and hence its management requires multidisciplinary approach and involvement of numerous specialists. This review highlights the pathogenesis of the syndrome and types of antiphosholipid syndrome such as primary and secondary types. Incorrect diagnosis of the disease makes it even worser for the patients. Perioperative complications are also common in this syndrome. In future, personalized treatment with emphasis on the specific symptoms for the syndrome will help to avoid confusion and further complications of the disease. Pharmaceutical interventions are also required based on multifunctional aspects of antiphospholipid syndrome.

References

1. Sammaritano LR (2020) Antiphospholipid Syndrome. Best Practice & Research Clinical Rheumatology 34(1): 101463.
2. Dabit JY, Almada MOV, Ramos SV, García AD (2021) Epidemiology of antiphospholipid syndrome in the general population. Current Rheumatology Reports 23(12): 85.
3. Rosina S, Chighizola CB, Ravelli A, Cimaz R (2021) Pediatric antiphospholipid syndrome: From pathogenesis to clinical management. Current Rheumatology Reports 23(2): 10.
4. Ruffatti A, Calligaro A, Lacognata CS, D'Odorico A, Colpo A, et al. (2020) Insights into the pathogenesis of catastrophic antiphospholipid syndrome. A case report of relapsing catastrophic antiphospholipid syndrome and review of the literature on ischemic colitis. Clinical Rheumatology 39(4): 1347-1355.
5. Chatterjee S, Pauling JD (2021) Anti-phospholipid syndrome leading to digital ischaemia and rare organ complications in systemic sclerosis and related disorders. Clinical Rheumatology 40(6): 2457-2465.
6. Li X, Shopit A, Wang J (2021) Biochemical and clinical predictors in pregnant women with antiphospholipid syndrome and systemic lupus erythematosus: Comprehensive update. Archives of Gynecology and Obstetrics 304(5): 1153-1160.
7. Palli E, Kravvariti E, Tektonidou MG (2019) Type I interferon signature in primary antiphospholipid syndrome: Clinical and laboratory associations. Frontiers in Immunology 10: 487.
8. Álvarez CAN, Molina GH, Bermejo PB, Legoff VZ, Ramírez DFH, et al. (2019) Prevalence and associations of anti-phosphatidylserine/prothrombin antibodies with clinical phenotypes in patients with primary antiphospholipid syndrome: aPS/PT antibodies in primary antiphospholipid syndrome. Thrombosis Research 174: 141-147.

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9. Benjume BL, Pintó IR, Amigo MC, Erkan D, Shoenfeld Y, et al. (2022) Eculizumab use in catastrophic antiphospholipid syndrome (CAPS): Descriptive analysis from the "CAPS Registry". Autoimmunity Reviews 21(4): 103055.

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