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Cardiovascular Manifestations of Systemic Lupus Erythematosus: An Overview

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ABSTRACT

Systemic Lupus Erythematosus(SLE) is a multisystem autoimmune disease with variable presentations. A proposed mechanism for the etiology of SLE involves the development of autoantibodies that result from a defect in apoptosis. The specific defect involves the "find-me" (adenosine triphosphate [ATP]/uridine triphosphate [UTP]) or "eat-me" (phosphatidylserine) signals activated upon release of red cell nuclei. In the absence of apoptosis, the nuclei break down, causing inflammation and contributing to the development of autoimmunity. Many signs and symptoms of SLE are caused by either circulating immune complexes or direct effects of antibodies on cells. A genetic predisposition for SLE exists, and the concordance rate in monozygotic twins is between 25% and 70%. If a mother has SLE, her daughter's risk of developing the disease is 1:40, and her son's risk is 1:250. The course of SLE consists of intermittent remissions punctuated by disease flares, and organ damage often progresses over time. Pericarditis is the most frequent cardiac manifestation; it can be documented by ECG, auscultation of a friction rub, or evidence of pericardial effusion. It usually responds to anti-inflammatory therapy and infrequently leads to tamponade. More serious cardiac manifestations are myocarditis and fibrinous endocarditis of Libman-Sacks. The endocardial involvement can lead to valvular insufficiencies, most commonly of the mitral or aortic valves, or embolic events. It has not been proven that glucocorticoid or other immunosuppressive therapies improve lupus myocarditis or endocarditis. Still, it is usual practice to administer a trial of high-dose steroids and appropriate supportive treatment for heart failure, arrhythmia, or embolic events. As discussed above, patients with SLE are at increased risk for myocardial infarction, usually due to accelerated atherosclerosis, which probably results from immune attack, chronic inflammation, and chronic oxidative damage to arteries.

Keywords: Systemic Lupus Erythematosus (SLE); multisystem autoimmune disease; Cardiovascular Manifestations

INTRODUCTION

Systemic Lupus Erythematosus (SLE) is an autoimmune condition with deleterious effects; as such, it is increasingly recognized as an important risk factor for cardiovascular disease. In this condition, autoreactive antibodies attack multiple organs in the body, not sparing the cardiovascular system. It has the propensity to cause various cardiovascular diseases like; premature coronary artery disease, accelerated atherosclerosis and several other cardiac manifestations, which eventually result in an increased morbidity and mortality rate in the older and the younger generation.

These events raise an urgent need for developing specific guidelines in identifying these cardiovascular manifestations of Systemic Lupus Erythematosus. In addition, SLE related cardiovascular diseases are important clinical problems that shed light on how the immune system reacts to premature decline in the functionality of the heart.

A combination of traditional and non-traditional risk factors including dyslipidemia, inflammation, antiphospholipid antibodies are closely related to cardiovascular diseases in Systemic lupus Erythematosus.

COMPLICATIONS

ACUTE PERICARDITIS

Acute pericarditis is the most common cardiac manifestation of systemic lupus erythematosus [1,2] with a frequency of about 25% who mainly present with chest pain [3] and about 50% are asymptomatic [1]. Research has revealed that MIR1279 and TRAF3IP2 gene polymorphism is associated with the development of pericarditis in patients with SLE and thus contributes to an increased genetic risk for this complication [4,5]. There is also a gender susceptibility risk amongst males for pericarditis and other serositis seen in lupus patients [6,7]. Other risk factors implicated in the development of acute pericarditis include African-Americans, hemolytic anaemia, and anti-Sm antibodies [8,9]. Young age at onset has also been associated with a higher incidence of pericardial inflammation compared to an adult-onset disease [10].

CONDUCTION ABNORMALITIES

The different types of arrhythmia that can occur as a result of SLE include sinus tachycardia, sinus bradycardia, prolonged QT intervals, atrial fibrillation, or atrioventricular (AV) nodal blocks, and aetiological factors for these include accelerated atherosclerosis, vasculitis, or autoantibodies-induced myocarditis [11]. Sinus tachycardia might be the only SLE manifestation involving the conduction system, and it usually resolves following treatment with steroids [12].

In neonates, neonatal lupus occurs due to transplacental migration of maternal immunoglobulin (IgG) autoantibodies to SSA and SSB autoantigens [13]. These autoantibodies are directly implicated in the subsequent clinical presentation of heart blocks which may vary from asymptomatic first-degree blocks to life-threatening complete heart blocks [12]. Neonatal lupus is responsible for most cases of congenital heart blocks; however, rhythm abnormalities can be detected as early as 14-24 weeks by fetal kinetocardiogram and echocardiogram [14]. On a positive note, there is a high rate of spontaneous recovery from sinus rhythm in those with transient first-degree congenital heart block.

HEART FAILURE

As a multi-systemic and autoimmune disease with diverse cardiovascular effects, SLE may push the heart towards failure. Retrospective cohort studies have shown that patients with SLE have a higher chance of developing heart failure than the general population. In comparison to the general population, the prognosis is also worse [15].

Cardiac complications are present in at least 50% of SLE patients. Factors that may drive these patients toward heart failure include genetic predisposition, iatrogenic factors and chronic inflammation [16]. Inflammatory markers have been shown to increase T lymphocyte recruitment and endothelial dysfunction; they are also linked to low HDL levels and accelerated atherosclerosis. Immunosuppressants used in the management of SLE may also contribute to the poor cardiovascular risk profile [17]. Traditional risk factors like hypertension cannot be overlooked, as they are associated with early-onset heart failure in young patients with SLE. Management can be medical or surgical, depending on the severity of symptoms [18].

ENDOCARDITIS

Endocarditis is one of the possible cardiovascular complications in patients with SLE. It could be caused by an infection (infective endocarditis) or inflammation linked to the disease activity (Non-bacterial thrombotic endocarditis [NBTE]) Libman-Sacks endocarditis, which is a type of NBTE, is a rare disease found chiefly post-mortem, with a prevalence between 0.9 and 1.6 per cent [19]. Owing to the presence of Libman-Sacks lesions (composed up of fibrin deposits, platelets, with mononuclear cell infiltrates), SLE patients have an increased frequency of valvular abnormalities, which generally raises their risk of developing infective endocarditis in addition to NBTE [20]

Infective endocarditis (IE) can result from infection during dental and surgical procedures, from the use of intravascular catheters, hyperalimentation lines, cardiac devices, dialysis shunts, as well as intravenous drug use [21]. Streptococci and Staphylococci account for approximately 80 per cent of all IE cases. Enterococci is the third leading cause. Gram-native and fungal microorganisms are rare in IE infections [21]

Clinically, IE and NBTE have similar signs and symptoms. The diagnostic approach would involve a thorough history, examination and laboratory tests for markers of inflammation (e.g. Rheumatoid factor and antinuclear antibodies) [21]. Notably, Duke's criteria are employed in diagnosis of IE [21].

The management approach is interdisciplinary, which includes prevention and management from dentists, cardiologists, rheumatologists and primary care physicians [19].

CORONARY ARTERY DISEASE/ACCELERATED ATHEROSCLEROSIS

Systemic lupus erythematosus as an autoimmune aetiology predominantly affects young people. In most cases, the clinical characteristics of most patients with SLE who have coronary artery disease are their young age [22]. Some studies have shown that severe atherosclerosis resulting in acute coronary syndrome has been noted, especially in patients with risk factors like hypertension and hyperlipidemia and prolonged clinical course of corticosteroids [23]. The excess risks seen in autoimmune disease mostly can be attributed to systemic inflammation, and seeing atherosclerosis as an inflammatory disease, the association becomes stronger [23]. One critical event in the development of atherosclerosis is endothelial dysfunction. A prolonged raised level of inflammatory mediators may cause inflammation that eventually contributes to endothelial damage, thus an important mechanism in the development of atherosclerosis [23]. Inflammatory markers and C-reactive protein have an important role in atherogenesis, specifically in the formation of unstable plaques. CRP also has proatherogenic properties that can activate the complement system, secretion of endothelin 1 and interleukin 6 (IL-6), upregulating adhesion molecules (ICAM-1, VCAM1, selectins), mediating macrophages uptake of LDL and stimulating monocyte production of tissue factors. therefore, increased level of CRP predicts coronary events in healthy individuals and patients with stable and non-stable angina [23].

CONCLUSION

The cardiovascular complications of SLE are extensive, as shown above, ranging from cardiac arrhythmias to accelerated atherosclerosis. The presence of these manifestations worsens the prognosis. The need for holistic management of SLE patients and monitoring for these risk factors using the latest technological advancements is therefore emphasised.

REFERENCES

[1] Doria, A., Iaccarino, L., Sarzi-Puttini, P., Atzeni, F., Turriel, M., & Petri, M. (2005). Cardiac involvement in systemic lupus erythematosus. Lupus, 14(9), 683–686.https://doi.org/10.1191/0961203305lu2200oa

[2] Cojocaru, M., Cojocaru, I. M., Silosi, I., & Vrabie, C. D. (2011). Manifestations of systemic lupus erythematosus. Maedica, 6(4), 330–336.

[3] Kreps, A., Paltoo, K., & McFarlane, I. (2018). Cardiac Manifestations in Systemic Lupus Erythematosus: A Case Report and Review of the Literature. American journal of medical case reports, 6(9), 180–183. https://doi.org/10.12691/ajmcr-6-9-3

[4] Ciccacci, C., Perricone, C., Politi, C., Rufini, S., Ceccarelli, F., Cipriano, E., Alessandri, C., Latini, A., Valesini, G., Novelli, G., Conti, F., & Borgiani, P. (2017). A polymorphism upstream MIR1279 gene is associated with pericarditis development in Systemic Lupus Erythematosus and contributes to definition of a genetic risk profile for this complication. Lupus, 26(8), 841–848. https://doi.org/10.1177/0961203316679528

[5] Perricone, C., Ciccacci, C., Ceccarelli, F. et al. TRAF3IP2 gene and systemic lupus erythematosus: association with disease susceptibility and pericarditis development. Immunogenetics 65, 703–709 (2013). https://doi.org/10.1007/s00251-013-0717-6

[6] Ramírez Sepúlveda, J. I., Bolin, K., Mofors, J., Leonard, D., Svenungsson, E., Jönsen, A., Bengtsson, C., DISSECT consortium, Nordmark, G., Rantapää Dahlqvist, S., Bengtsson, A. A., Rönnblom, L., Sjöwall, C., Gunnarsson, I., & Wahren-Herlenius, M. (2019). Sex differences in clinical presentation of systemic lupus erythematosus. Biology of sex differences, 10(1), 60. https://doi.org/10.1186/s13293-019-0274-2

[7] Gimeno-Torres, L., Carrión-Barberà, I., Durán, X., Villegas, E., Monfort, J., & Salman-Monte, T. C. (2021). Prevalence and risk factors for serositis in patients with systemic lupus erythematosus: A case-control study. Lupus, 30(13), 2095–2101. https://doi.org/10.1177/09612033211049305

[8] Dein, E., Douglas, H., Petri, M., Law, G., & Timlin, H. (2019). Pericarditis in Lupus. Cureus, 11(3), e4166. https://doi.org/10.7759/cureus.4166

[9] Ryu, S., Fu, W., & Petri, M. A. (2017). Associates and predictors of pleurisy or pericarditis in SLE. Lupus science & medicine, 4(1), e000221. https://doi.org/10.1136/lupus-2017-000221

[10] Chang, J. C., Xiao, R., Mercer-Rosa, L., Knight, A. M., & Weiss, P. F. (2018). Child-onset systemic lupus erythematosus is associated with a higher incidence of myopericardial manifestations compared to adult-onset disease. Lupus, 27(13), 2146–2154. https://doi.org/10.1177/0961203318804889

[11] Butt, S., Kiran, S., Qadir, N., Menghani, D., & Tanzeem, H. (2020). Cardiac Conduction Defects in Systemic Lupus Erythematosus. Cureus, 12(10), e10882. https://doi.org/10.7759/cureus.10882

[12] Nield, L. E., Silverman, E. D., Taylor, G. P., Smallhorn, J. F., Mullen, J. B., Silverman, N. H., Finley, J. P., Law, Y. M., Human, D. G., Seaward, P. G., Hamilton, R. M., & Hornberger, L. K. (2002). Maternal anti-Ro and anti-La antibody-associated endocardial fibroelastosis. Circulation, 105(7), 843–848. https://doi.org/10.1161/hc0702.1y 04182

[13] Capone, C., Buyon, J. P., Friedman, D. M., & Frishman, W. H. (2012). Cardiac manifestations of neonatal lupus: a review of autoantibody-associated congenital heart block and its impact in an adult population. Cardiology in review, 20(2), 72–76. https://doi.org/10.1097/CRD.0b013e31823c808b

[14] 14)Rein, A. J., O'Donnell, C., Geva, T., Nir, A., Perles, Z., Hashimoto, I., Li, X. K., & Sahn, D. J. (2002). Use of tissue velocity imaging in the diagnosis of fetal cardiac arrhythmias. Circulation, 106(14), 1827–1833. https://doi.org/10.1161/01.cir.0000031571.92807.cc

[15] Kim, C. H., Al-Kindi, S. G., Jandali, B., Askari, A. D., Zacharias, M., & Oliveira, G. H. (2017). Incidence and risk of heart failure in systemic lupus erythematosus. Heart (British Cardiac Society), 103(3), 227–233. https://doi.org/10.1136/heartjnl-2016-309561

[16] Kreps, A., Paltoo, K., & McFarlane, I. (2018). Cardiac Manifestations in Systemic Lupus Erythematosus: A Case Report and Review of the Literature. American journal of medical case reports, 6(9), 180–183. https://doi.org/10.12691/ajmcr-6-9-3

[17] Chang, J. C., Xiao, R., Knight, A. M., Kimmel, S. E., Mercer-Rosa, L. M., & Weiss, P. F. (2020). A population-based study of risk factors for heart failure in pediatric and adult-onset systemic lupus erythematosus. Seminars in arthritis and rheumatism, 50(4), 527–533. https://doi.org/10.1016/j.semarthrit.2020.03.019

[18] Dhakal, B. P., Kim, C. H., Al-Kindi, S. G., & Oliveira, G. H. (2018). Heart failure in systemic lupus erythematosus. Trends in cardiovascular medicine, 28(3), 187–197. https://doi.org/10.1016/j.tcm.2017.08.01

[19] Tayem, M. G., Shahin, L., Shook, J., & Kesselman, M. M. (2022). A Review of Cardiac Manifestations in Patients with Systemic Lupus Erythematosus and Antiphospholipid Syndrome with Focus on Endocarditis. Cureus, 14(1), e21698. https://doi.org/10.7759/cureus.21698

[20] Hojnik, M., George, J., Ziporen, L., & Shoenfeld, Y. (1996). Heart valve involvement (Libman-Sacks endocarditis) in the antiphospholipid syndrome. Circulation, 93(8), 1579–1587. https://doi.org/10.1161/01.cir.93.8.1579

[21] Ibrahim AM, Siddique MS: Libman sacks endocarditis. StatPearls Publishing, Treasure Island, FL; 2021.

[22] Cardiovascular manifestations of systemic lupus erythematosus: Current perspective https://www.sciencedirect.com/science/article/abs/pii/0033062085900039

[23] Mendall, M. A., Strachan, D. P., Butland, B. K., Ballam, L., Morris, J., Sweetnam, P. M., & Elwood, P. C. (2000). C-reactive protein: relation to total mortality, cardiovascular mortality and cardiovascular risk factors in men. European heart journal, 21(19), 1584–1590. https://doi.org/10.1053/euhj.1999.1982