THE EUROPEAN SOCIETY OF MEDICINE
Medical Research Archives, Volume 13 Issue 9

REVIEW ARTICLE

Spondyloarthritis and the Heart: From Pathogenesis to Clinical Management

Prof. Adawi Mohammad[1], M.D, M.H.A, **Dr. Awni Yousef**[2], M.D, M.H.A

[1] Laniado MC, Ariel University, General health services
[2] General health services, Bar Ilan University

OPEN ACCESS

PUBLISHED
30 September 2025

CITATION
Mohammad, A., and Yousef, A., 2025. Spondyloarthritis and the Heart: From Pathogenesis to Clinical Management. Medical Research Archives, [online] 13(9). https://doi.org/10.18103/mra.v13i9.6854

DOI
https://doi.org/10.18103/mra.v13i9.6854

ISSN
2375-1924

ABSTRACT

Spondylarthritis (SpA), especially ankylosing spondylitis (AS), is linked to a significantly higher risk of cardiovascular disease and death. This review summarizes current understanding of the complex connection between SpA and heart health. Chronic systemic inflammation, a key feature of SpA, promotes cardiovascular problems through shared mechanisms involving atherosclerosis, endothelial dysfunction, and immune-mediated vascular damage. Major heart issues include cardiomyopathy, conduction abnormalities, aortitis, and valvular diseases, which are more common in male patients with long-term disease (>15 years). Immunopathogenesis plays a crucial role in involving immune cells (e.g., macrophages, T lymphocytes) and inflammatory mediators, leading to both joint and vascular problems. Extracellular vesicles and microRNAs are emerging as new factors involved in vascular comorbidity. While traditional cardiovascular risk factors are relevant, the ongoing inflammatory burden is a crucial independent trigger. Active management of cardiovascular risk, including careful monitoring and control of inflammation (possibly through biologic therapies such as TNFα antagonists), is essential. However, more research is needed to determine whether specific anti-inflammatory treatments can improve long-term cardiovascular outcomes. Customized screening approaches and integrated management are vital for reducing cardiovascular risk in patients with SpA.

Keywords: Spondyloarthritis; Cardiovascular Disease; Inflammation; Immunopathogenesis; Risk Management

Introduction

The connection between spondyloarthritis (SpA) and cardiovascular health has attracted increasing attention in recent years, emphasizing a complex interplay between inflammatory processes and various heart-related complications. Current research is revealing a growing understanding of the connection between these two major health issues, highlighting the importance of meticulous cardiovascular monitoring, assessment, and effective management in patients with SpA. As research progresses, it becomes increasingly clear that healthcare providers must remain vigilant to the heightened risk of cardiovascular problems in these patients and implement targeted preventive measures [1]. To highlight the prevalence of heart abnormalities in patients with ankylosing spondylitis, the study lists complications such as cardiomyopathy, aortitis, and conduction disorders. Through echocardiographic and electrocardiographic assessments, it emphasizes the importance of detecting myocardial dysfunction and valvular disease, especially in men diagnosed more than 15 years ago. Their findings suggest the need for regular cardiac checkups, as structural changes such as hypertrophy and myocardial fibrosis may increase the risk of arrhythmias [2]. Furthermore, the researchers explored the complex immunopathogenesis of spondylarthritis, revealing a multi-layered involvement of immune cells that drive disease progression. They proposed that inflammation in the bone marrow might be an initial trigger, with macrophages and T lymphocytes playing key roles across different tissues. This understanding of the inflammatory environment in spondylarthritis deepens knowledge of how chronic inflammation could increase cardiovascular risk. The inflammatory pathways observed in spondylarthritis resemble those in atherosclerosis, reinforcing the close links between these conditions and the importance of targeting inflammation in both [3].

The relationship between chronic inflammation and cardiovascular disease has been further clarified by researchers who discussed the higher rates of cardiovascular illness and death associated with various chronic inflammatory rheumatic diseases. Their comprehensive analysis indicated that traditional risk factors alone do not fully account for the cardiovascular risks, which are heavily influenced by ongoing inflammation and immune imbalance [4]. Notably, they suggested that better control of rheumatic disease activity may decrease the cardiovascular risks associated with these conditions, highlighting the potential of new biologic therapies to significantly improve cardiovascular outcomes. This area offers promising opportunities for further research and clinical development, as understanding these links could lead to more effective treatments [5]. They also examined mechanisms behind vascular comorbidities in autoimmune diseases, introducing factors such as extracellular vesicles and microRNAs. Their review highlighted the combined effects of various contributors to cardiovascular issues, although they acknowledged a lack of comprehensive studies covering all these factors in patients with inflammatory joint disease. This gap highlights the need for additional research to elucidate the intricate nature of cardiovascular risks in SpA.[6] Finally, earlier findings were summarized to reaffirm the increased cardiovascular and cerebrovascular mortality among patients with ankylosing spondylitis. They pointed out the high prevalence of subclinical atherosclerosis and common cardiovascular risk factors in this group, drawing parallels to other inflammatory diseases like rheumatoid arthritis. Their work emphasized the urgent need for effective cardiovascular risk management tailored specifically for people with spondyloarthritis [7].

Literature Review

The article titled "Ankylosing spondylitis and heart abnormalities: do cardiac conduction disorders, valve regurgitation, and diastolic dysfunction occur more often in male patients with diagnosed ankylosing spondylitis for over 15 years than in the normal population?" by Brunner et al. gives a detailed overview of significant cardiovascular complications linked to ankylosing spondylitis (AS), an important subgroup within spondyloarthritis. The authors carefully gather evidence from clinical, echocardiographic, and histopathological studies to show how common and specific cardiac involvement is in patients with long-standing AS. They explore how these issues are more frequent in men diagnosed with AS for over 15 years compared to the general population, providing valuable insights for clinical management [2]. A major strength of this article is its thorough review of various cardiac problems, including cardiomyopathy, aortitis, valvular abnormalities, and conduction issues. The authors emphasize that these complications are not coincidental; rather, they are significantly more prevalent in patients with longer disease duration, especially in males with more than 15 years since diagnosis. Additionally, the discussion on left ventricular dysfunction and aortitis aligns well with the broader understanding that systemic inflammation affects cardiovascular pathology in spondyloarthritis. This highlights the importance of early detection and ongoing cardiovascular assessment, emphasizing clinical relevance and the need for vigilant monitoring [8]. The article also discusses QT dispersion as a key predictor of arrhythmic events, adding an important electrophysiological perspective to patient care. This insight supports the idea that comprehensive electrophysiological monitoring may be critical in risk assessment, particularly given the increased rates of conduction abnormalities and arrhythmias reported. Moreover, the mention of hypertrophic non-obstructive cardiomyopathy and other myocardial dysfunctions broadens the scope of cardiac issues clinicians should consider when working with this patient group. Addressing these factors is crucial for improving outcomes and ensuring effective management strategies [9]. However, while the review consolidates existing evidence well, it would benefit from a more complete and critical evaluation of methodological limitations in the cited studies, such as sample sizes and potential selection biases that could affect the validity of the findings. Additionally, the focus mainly on male patients, although justified by current epidemiological trends, may limit the applicability of the findings to females, who might present differently. The discussion on clinical management is also somewhat limited, lacking detailed recommendations for screening protocols or therapies, which are necessary to translate these findings into practical clinical use.[10] The article "Progress in

spondylarthritis. Immunopathogenesis of spondyloarthritis: which cells drive disease?" by Melis and Elewaut provides a comprehensive overview of the complex cellular mechanisms underlying spondyloarthritis (SpA). The authors highlight the multifaceted involvement of organs in SpA, emphasizing inflammation in areas such as the colon, ileum, synovial tissue, and entheses, all of which contribute to disease progression. A key insight is the identification of bone marrow inflammation as an early event, involving mononuclear cells such as CD4+ and CD8+ T lymphocytes, suggesting that these adaptive immune responses are central to disease initiation. This understanding of cellular dynamics helps explain how SpA develops and progresses, influencing treatment and management [3;11]. The discussion on immune cell infiltrates stresses the heterogeneity seen in immune responses. Macrophages expressing CD163 are dominant in the synovium and entheses, playing a key role in local inflammation and tissue remodeling. The authors describe gut inflammation in detail, characterized by acute infiltration of polymorphonuclear cells alongside chronic macrophages and lymphocytes. This infiltration includes increased dendritic cells and T cells, even in the absence of obvious inflammation, indicating complex interactions between innate and adaptive immunity that may predispose or sustain SpA [12]. The article emphasizes the extensive formation of new blood vessels in affected tissues, which facilitates the infiltration of immune cells and the maintenance of inflammation. This vascular response may be a primary factor contributing to the persistent inflammation in SpA. The authors also distinguish SpA from other rheumatic diseases, such as rheumatoid arthritis, by highlighting its unique pattern of bone destruction and remodeling. Recognizing these differences is crucial for developing effective treatments. While the article offers valuable insights into the cellular drivers of SpA, it would be improved by including more recent findings on molecular pathways and genetic factors that influence immune cell behavior. These areas are essential for deepening our understanding of the disease mechanisms. Nonetheless, the article effectively highlights the roles of immune cells such as T lymphocytes and macrophages, providing a foundation for targeted therapies aimed at improving patient outcomes and guiding future research [14].

The article titled "Targeting Inflammation to Prevent Cardiovascular Disease in Chronic Rheumatic Diseases: Myth or Reality?" by Elena Bartoloni et al. 5 provides a thorough review of the relationship between chronic inflammatory rheumatic diseases and cardiovascular risk, highlighting the role of inflammation in the development of atherosclerosis. The authors compile evidence showing that patients with conditions such as rheumatoid arthritis, psoriatic arthritis, and ankylosing spondylitis face an increased risk of cardiovascular events and death, which is partly due to traditional risk factors but driven mainly by the underlying inflammation in these diseases [15]. This article provides valuable insights into the crucial connection between systemic inflammation and atherosclerosis. The authors clearly explain how chronic inflammation leads to endothelial dysfunction and promotes early atherosclerotic changes. In doing so, they identify a common inflammatory pathway that worsens cardiovascular risk among patients with rheumatic diseases. This perspective supports the broader understanding that immune system imbalance, coupled with ongoing inflammation, plays a key role in the progression of rheumatic diseases and the damage caused by atherosclerosis. The connection between these health issues emphasizes the importance of targeting inflammation in clinical management for at-risk patients. [16;17] The review also critically examines the potential of biologic therapies, especially TNFα antagonists, to reduce cardiovascular risk by controlling systemic inflammation. Evidence suggests these treatments may improve surrogate markers, such as endothelial function and arterial stiffness, and possibly decrease adverse cardiovascular events. However, the authors wisely point out the limitations and inconsistent findings in current research regarding the definitive effect of these therapies on atherosclerosis progression and long-term cardiovascular outcomes. This cautious view highlights the need for more comprehensive and rigorous clinical studies to establish causality and thoroughly evaluate therapeutic benefits [18]. Notably, the article discusses the complex relationship between controlling inflammation and reducing cardiovascular risk, stressing that while theoretically beneficial, the actual clinical advantages are still uncertain. The authors suggest that managing rheumatic disease activity through targeted anti-inflammatory treatments could be an effective way to lower cardiovascular morbidity. Still, they also recognize the multifactorial nature of atherosclerosis, which involves both immune-related and traditional risk factors [19].

The article "Mechanisms of vascular comorbidity in autoimmune diseases" by Nagy, Németh, and Buzás offers a comprehensive overview of the complex nature of cardiovascular comorbidities associated with autoimmune conditions. The authors emphasize that these comorbidities do not result from a single factor but arise from an intricate interaction of multiple mechanisms, including immune-driven inflammation, metabolic disturbances, and cellular communication pathways. A significant contribution of this review is its focus on the roles of extracellular vesicles and microRNAs (miRNAs) as mediators of cell-to-cell communication that influence vascular health in autoimmune diseases [20]. Notably, the article emphasizes the importance of understanding these molecular and cellular mechanisms in developing targeted therapies. The section on extracellular vesicles highlights their capacity to transfer bioactive molecules, impacting inflammatory responses and contributing to vascular damage. Similarly, miRNAs are identified as key regulators of gene expression, playing essential roles in endothelial function and the development of atherosclerosis. Although the review effectively summarizes current knowledge, it also acknowledges gaps in understanding, particularly the need for further research into how these communication systems specifically impact patients with inflammatory joint diseases, such as spondyloarthritis [21]. From a clinical perspective, this review stresses the importance of a multidisciplinary approach that combines molecular insights with cardiovascular risk assessment and management for patients with autoimmune diseases. Understanding these mechanisms could enable the development of new biomarkers for early detection and personalized treatment options. However, the article

notes that much of the existing evidence remains at the experimental level, and translating these findings into clinical practice continues to be a significant challenge. [22]

The article "Comorbidity management in spondyloarthritis" by López-Medina and Molto[7] provides a comprehensive overview of the increased cardiovascular risk associated with spondyloarthritis, particularly ankylosing spondylitis, psoriatic arthritis, and undifferentiated spondyloarthritis. The authors emphasize that patients with ankylosing spondylitis face higher cardiovascular and cerebrovascular mortality rates, linked to a high prevalence of subclinical atherosclerosis even in the absence of overt cardiovascular disease. This underscores the importance of early detection and proactive management of cardiovascular risk factors in this population [23]. Notably, the article consolidates evidence indicating that the risk of major cardiovascular events is increased not only in ankylosing spondylitis but also in related conditions, such as psoriatic arthritis and psoriasis, highlighting a standard underlying connection between systemic inflammation and vascular disease. The authors also note that the incidence and prevalence of traditional risk factors—such as hypertension, dyslipidemia, and metabolic syndrome—are significantly higher among patients with rheumatoid arthritis, psoriasis, and psoriatic arthritis, emphasizing the need for integrated cardiovascular risk assessment and management strategies within rheumatology care [24]. While the article effectively synthesizes epidemiological data, it could be improved with a more detailed discussion of the mechanisms driving increased cardiovascular risk in spondyloarthritis, such as chronic systemic inflammation, endothelial dysfunction, and immune-mediated vascular injury. Additionally, exploring how specific anti-inflammatory treatments influence cardiovascular outcomes would be valuable, as current evidence suggests that controlling systemic inflammation may help reduce some of this risk.

Overall, López-Medina and Molto convincingly argue for the significance of comprehensive cardiovascular risk management in patients with spondyloarthritis. Their review highlights the importance of routine screening for cardiovascular risk factors and the adoption of tailored interventions to reduce morbidity and mortality in this vulnerable population. Future research should aim to clarify how targeted anti-inflammatory therapies influence cardiovascular outcomes, which could help guide more effective integrated treatment strategies [25].

Conclusion

The literature on the relationship between spondyloarthritis (SpA) and cardiovascular health reveals a complex connection characterized by shared inflammatory pathways and significant clinical implications. Studies consistently demonstrate that patients with ankylosing spondylitis (AS), a common type of SpA, have a higher rate of cardiovascular issues, including cardiomyopathy, conduction problems, and aortitis 2. This underscores the importance of cardiovascular monitoring in this patient group, particularly in those with long-standing disease, as structural changes like hypertrophy and myocardial fibrosis can raise the risk of arrhythmic events. [26]

The immunopathogenesis of SpA, as discussed by Melis and Elewaut (2021), emphasizes the role of immune cells in disease development and suggests that chronic inflammation may elevate cardiovascular risk. The authors describe how bone marrow inflammation, along with the involvement of macrophages and T lymphocytes, can contribute to the maintenance of systemic inflammation, a condition known to impact cardiovascular health. This is consistent with findings from Bartoloni et al. (2021), who emphasize that the inflammatory processes associated with chronic rheumatic diseases significantly increase cardiovascular morbidity and mortality, regardless of traditional risk factors.

Nagy, Németh, and Buzás (2021) further elucidate the mechanisms of vascular comorbidities in autoimmune diseases by introducing new factors, such as extracellular vesicles and microRNAs, that promote intercellular communication. Their insights into how these factors influence vascular health provide a deeper understanding of the complex relationship between inflammation and cardiovascular disease in SpA. This perspective is crucial because it opens possibilities for targeted treatment strategies to reduce cardiovascular risks.

López-Medina and Molto (2021) compile evidence showing that patients with SpA, especially AS, have higher rates of cardiovascular and cerebrovascular death, often related to subclinical atherosclerosis. They advocate for comprehensive cardiovascular risk management plans tailored to this group, emphasizing the need for routine screening and proactive treatment to address the increased risks caused by systemic inflammation and traditional cardiovascular risk factors. [28]

The extensive body of literature highlights the complex relationship between spondyloarthritis (SpA) and cardiovascular health. Numerous studies suggest that chronic inflammation in SpA significantly increases cardiovascular risk, underscoring the importance of understanding this connection. This situation calls for vigilant cardiovascular monitoring and proactive management strategies specifically tailored for patients with SpA. A primary focus should be on effectively controlling inflammatory activity to enhance overall health outcomes and well-being for these individuals. Future research should continue to focus on exploring the biological mechanisms underlying this link and identifying potential treatments that can better manage cardiovascular risks in this vulnerable group. Such advancements are crucial for enhancing patient care and improving long-term outcomes.

References:

1. Toussirot E. The Risk of cardiovascular diseases in Axial Spondyloarthritis: Current insights. Front Med. 2021; 8:782150.
2. Brunner F, Kunz A, Weber U, Kissling R. Ankylosing spondylitis and heart abnormalities: do cardiac conduction disorders, valve regurgitation, and diastolic dysfunction occur more often in male patients with diagnosed ankylosing spondylitis for over 15 years than in the normal population? J Rheumatol. 2006;33(1):186-192.
3. Melis L, Elewaut D. Progress in spondylarthritis. Immunopathogenesis of spondyloarthritis: which cells drive disease? Arthritis Res Ther. 2009;11(5):233.
4. Hintenberger R, Affenzeller B, Vladychuk V, et al. Cardiovascular Risk in axial spondyloarthritis—a systematic review. Clin Rheumatol. 2023;42(7):1739-1753.
5. Bartoloni E, Alunno A, Valentini V, Luccioli F, et al. Targeting inflammation to prevent cardiovascular disease in chronic rheumatic diseases: myth or reality? Front Cardiovasc Med. 2018; 5:177.
6. Nagy G, Németh N, Buzás EI. Mechanisms of vascular comorbidity in autoimmune diseases.Curr Opin Rheumatol. 2019;31(1):26-33.
7. López-Medina C, Molto A. Comorbidity management in spondyloarthritis. Ther Adv Musculoskelet Dis. 2020; 12:17.
8. Saeed S, Tadic M, Larsen TH, Grassi G, Mancia G. Coronavirus disease 2019 and cardiovascular complications: focused clinical review. J Hypertens. 2021;39(7):1282-1292.
9. Chávez-González E, Rodríguez-Jiménez AE, et al. Ventricular arrhythmias are associated with increased QT interval and QRS dispersion in patients with ST-elevation myocardial infarction. Rev Port Cardiol. 2022;41(9):739-747.
10. Marzo-Ortega H, Navarro-Compán V, Akar S, et al. The impact of gender and sex on diagnosis, treatment outcomes, and health-related quality of life in patients with axial spondyloarthritis. Clin Rheumatol. 2022;41(11):3513-3523.
11. Ivanova M, Zimba O, Dimitrov I, Angelov AK. Axial Spondyloarthritis: An Overview of the Disease. Rheumatol Int. 2024;44(6):987-1004.
12. Ren Y, Zhang S, Weeks J, Moreno JR, et al. Reduced angiogenesis and delayed endochondral ossification in CD163−/− mice highlight a role of M2 macrophages during bone fracture repair. J Orthop Res. 2023;41(9):1904-1915.
13. Coletto LA, Rizzo C, Guggino G, Caporali R. The role of neutrophils in spondyloarthritis: a journey across the spectrum of disease manifestations. Int. J. Mol. Sci. 2023; 24(4): 4108.
14. Rosine N, Fogel O, Koturan S, Rogge L, et al. T cells in the pathogenesis of axial spondyloarthritis. Joint Bone Spine. 2023;90(3):105523.
15. van Onna, M., & Boonen, A. Challenges in the management of older patients with inflammatory rheumatic diseases. Nat Rev Rheumatol. 2022;18(6): 326-334.
16. Gusev E, Sarapultsev A. Atherosclerosis and inflammation: insights from the theory of general pathological processes. Int. J. Mol. Sci. 2023; 24(9): 7910.
17. Henein MY, Vancheri S, Longo G, Vancheri F. The role of inflammation in cardiovascular disease. Int. J. Mol. Sci. 2022; 23(21): 12906.
18. Wallach JD, Yoon S, Doernberg H, Glick LR, et al. Associations between surrogate markers and clinical outcomes for nononcologic chronic disease treatments. JAMA. 2024;331(15):1290-1300.
19. Avouac J, Fogel O, Hecquet S, Daien C, et al. Recommendations for assessing the risk of cardiovascular disease and venous thromboembolism before the initiation of targeted therapies for chronic inflammatory rheumatic diseases. Joint Bone Spine. 2023;90(3):105523.
20. Porsch F, Binder CJ. Autoimmune diseases and atherosclerotic cardiovascular disease. Nat Rev Cardiol. 2024;21(2):85-102.
21. Buffolo F, Monticone S, Camussi G, Aikawa E. Role of extracellular vesicles in the pathogenesis of vascular damage. Hypertension. 2022;79(5):863-873. .
22. Conrad N, Verbeke G, Molenberghs G, Goetschalckx L, et al. Autoimmune diseases and cardiovascular risk: a population-based study on 19 autoimmune diseases and 12 cardiovascular diseases in 22 million individuals in the UK. Lancet. 2022;400(10354):733-743.
23. Bhattad PB, Kulkarni M, Patel PD, Roumia M, et al. Cardiovascular morbidity in ankylosing spondylitis: a focus on inflammatory cardiac disease. Cureus. 2022;14(7): e27287.
24. Kao CM, Wang JS, Ho WL, Ko TM, et al. Factors associated with the risk of major adverse cardiovascular events in patients with ankylosing spondylitis: a nationwide, population-based case-control study. Int J Environ Res Public Health. 2022;19(7):4098.
25. Bodur H. Cardiovascular comorbidities in spondyloarthritis. Clin Rheumatol. 2023;42(2):311-319.
26. Baniaamam M, Heslinga SC, Boekel L, et al. The prevalence of cardiac diseases in a contemporary large cohort of Dutch elderly ankylosing spondylitis patients—the Cardas study. J Clin Med. 2021;10(21):5069.
27. Grieco GE, Fignani D, Formichi C, Nigi L, et al. Extracellular vesicles in immune system regulation and type 1 diabetes: cell-to-cell communication mediators, disease biomarkers, and promising therapeutic tools. Front Immunol. 2021; 12:682948.
28. Kim JH, Choi IA. Cardiovascular morbidity and mortality in patients with spondyloarthritis: a meta-analysis. Int J Rheum Dis. 2021;24(4):477-486.