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Review Article

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Investigating the Considerations and Outcomes Following Coronary Artery Bypass Grafting in Patients with Rheumatoid Arthritis: A Narrative Review Study

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Abstract

Rheumatoid arthritis (RA) is a chronic systemic autoimmune inflammatory disease strongly associated with premature atherosclerosis and an increased risk of cardiovascular diseases (CVDs). Consequently, there is growing clinical concern regarding perioperative and postoperative outcomes in patients with RA undergoing major cardiac surgery. To synthesize the available evidence, a literature search was conducted in PubMed, Scopus, and Google Scholar using the following search terms: “rheumatoid arthritis and coronary artery bypass grafting” and “rheumatoid arthritis and valve surgery”. The initial search identified 28 relevant records. After rigorous screening of titles, abstracts, and full texts, we selected seven articles that met all predefined eligibility criteria for detailed qualitative synthesis. The reviewed evidence suggests that patients with RA undergoing cardiac surgery may face an increased risk of adverse outcomes, including in-hospital mortality, postoperative myocardial infarction (MI), impaired sternal wound healing, and infection. Crucially, these surgical risks are profoundly exacerbated by preoperative high-dose and prolonged corticosteroid regimens, which impair tissue repair and vascular integrity. Preoperative assessment of disease activity, comorbidities, and complexity can guide medication plans, balancing infection and healing risks with inflammation control. Further prospective studies are needed to refine risk-estimation models and therapeutic protocols. In conclusion, careful postoperative hemodynamic monitoring, multidisciplinary collaboration, and appropriate perioperative management of immunomodulatory medications may help reduce surgical complications and improve outcomes in patients with RA undergoing cardiac surgery.

Key words: Coronary Artery Bypass, Coronary Artery Disease, Grafting, Rheumatoid Arthritis

Introduction

Patients with rheumatoid arthritis (RA) are at increased risk of coronary artery disease (CAD), and cardiovascular diseases (CVDs) are a leading cause of premature mortality in this population (1). Conventional risk factors—such as age, sex, and hypertension—contribute heavily to CAD pathogenesis. Hypertension, in particular, imposes severe hemodynamic stress and accelerates target-organ damage. In addition to these traditional risk factors, patients with RA may exhibit distinct pathophysiological features, including diffuse CAD,

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coronary microvascular dysfunction, and persistent systemic inflammation.

Although early-stage rheumatoid inflammation primarily targets synovial joints, systemic manifestations frequently involve extra-articular organ systems. Furthermore, cardiovascular diseases tend to manifest approximately a decade earlier in patients with RA than in the general population. This temporal pattern suggests that RA itself may act as an independent risk factor for CVD, similar to diabetes mellitus and hypertension (2–5). Despite accumulating evidence regarding heightened cardiovascular risk in RA, the precise pathophysiological relationship between RA and CAD, as well as the extent to which RA independently drives cardiovascular risk beyond conventional metrics, remains insufficiently clarified. Moreover, contemporary data detailing the clinical characteristics and cardiovascular risk profiles of RA patients across diverse populations are sparse. Therefore, this study was conducted to further elucidate the association between rheumatoid arthritis and cardiovascular risk factors, with a specific focus on coronary artery disease.

Methods

Study Design

This study was conducted as a narrative literature review. A non-systematic but structured literature search was performed to identify relevant studies evaluating clinical outcomes, complications, and prognosis following coronary artery bypass grafting (CABG) in patients with rheumatoid arthritis (RA). The methodology was designed to provide a comprehensive clinical overview rather than a quantitative meta-analysis.

Search Strategy

The literature search was conducted across the following electronic databases: PubMed/MEDLINE, Scopus, and Google Scholar. Articles published between January 2012 and 2025 were considered. Only studies published in English were included. The search strategy combined Medical Subject Headings (MeSH) terms and free-text keywords related to rheumatoid arthritis and cardiac surgery, using combinations of:
"rheumatoid arthritis," "coronary artery bypass grafting," "CABG," "cardiac surgery complications," and "outcomes."

Study Selection and Inclusion Criteria

Studies were selected based on their relevance to the clinical management and surgical outcomes of patients with rheumatoid arthritis undergoing CABG. The inclusion criteria comprised original research articles, observational studies (cohort and case-control), and clinical reviews published between 2012 and 2025 that specifically evaluated postoperative complications, clinical outcomes, or prognosis following CABG in RA cohorts.

Exclusion Criteria

Studies focusing on non-rheumatoid arthritis populations, non-cardiac procedures, review articles lacking specific surgical data, case reports, conference abstracts, duplicate publications, non-English studies, and investigations failing to specifically report CABG outcomes in RA cohorts were excluded. Given the narrative nature of this review, no formal computerized screening protocol or dual-reviewer blinding process was applied.

Risk of Bias Assessment

Formal risk of bias assessment tools (such as the Newcastle-Ottawa Scale or Cochrane tools) were not systematically applied because this review was intended as a narrative and qualitative overview rather than a formal systematic review or meta-analysis. Instead, study quality, design limitations, and clinical relevance were considered descriptively when synthesizing and interpreting the available evidence.

Data Extraction and Synthesis

Key information from the included studies—such as author, publication year, study design, patient population, sample size, and main outcomes (including mortality, myocardial infarction, sternal wound complications, and re-interventions)—was qualitatively extracted. Findings were synthesized narratively and organized thematically to provide a comprehensive summary of surgical considerations and prognostic factors in patients with rheumatoid arthritis undergoing CABG.

Results

Table 1 summarizes the findings of the included studies regarding postoperative complications and risk factors in patients with RA undergoing cardiac surgery. The included literature comprised cross-sectional, case-control, and cohort studies evaluating

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perioperative and postoperative risk factors. Overall, the reviewed studies suggested that patients with RA may have an increased risk of postoperative mortality and myocardial infarction (MI) compared with surgical patients without RA. Additionally, RA patients exhibited a higher incidence of cardiac surgical re-intervention. Cumulative corticosteroid dose and duration of corticosteroid therapy were identified as potential factors associated with surgical outcomes in this population. Comparative analyses further revealed that while RA patients face heightened vulnerability to heart failure, stroke, and reoperation, this heightened risk possesses distinct inflammatory mechanisms differing from those observed in diabetic populations (Table 1).

Table 1. Results of studies on risk factors, postoperative outcomes, and complications in patients with rheumatoid arthritis

Author	Title	Study Design	Results
Markus Malmberg et al. (2021)(1)	Long-term outcomes after coronary artery bypass surgery in patients with rheumatoid arthritis	Clinical trial	- Patients with RA are at higher postoperative mortality after CABG compared to other patients; - Increased risk of MI in the postoperative period.
Antti Palomäki et al. (2021)(2)	Patients with rheumatoid arthritis have impaired long-term outcomes after myocardial infarction: A nationwide case-control registry study	Nationwide case-control registry study	- Higher risk of repeat CABG; - RA duration and corticosteroid use were significantly associated with mortality; - RA is independently associated with a worse prognosis following MI.
Jorge D. (2022)(3)	Cardiology co-management of rheumatoid arthritis patients with coronary artery disease as an intervention reduces hospitalization rates and adverse event occurrence	Retrospective study	Lack of cardiology follow-up is associated with increased hospitalizations, incidence of MI, heart failure, and stroke, and potentially an increase in overall and cardiovascular mortality.
Brian B Løgstrup (2021)(4)	Cardiovascular risk and mortality in rheumatoid arthritis compared with diabetes mellitus and the general population	Retrospective study	This study indicates that RA is associated with an increased risk of heart failure, MI, stroke, and coronary revascularization, although the level of risk is not as high as that observed in patients with diabetes mellitus.
Aguayo et al., 2020(5)	Rheumatoid arthritis heightens mortality risk after CABG, study finds	Retrospective study	- National registry data revealed that in-hospital mortality following CABG among patients with autoimmune connective tissue diseases, predominantly rheumatoid arthritis (58%), was comparable to non-affected controls (1.98% vs. 2.04%); - Furthermore, after risk adjustment, these patients demonstrated non-inferior perioperative outcomes and even lower rates of in-hospital cardiovascular, neurologic, and infectious complications.

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Stulak JM. (2012)(6)	Mitral valve repair is durable in patients with rheumatoid arthritis	- The pathology of the mitral valve leaflets in RA patients with severe mitral regurgitation is similar to that in non-RA patients with mitral valve disease; - Long-term survival following mitral valve repair in RA patients is comparable to that of RA patients without mitral valve disease, and the durability of mitral valve repair in these patients is highly favorable.
Nishant Johri (2023)(7)	Association of cardiovascular risks in rheumatoid arthritis patients: Management, treatment and future perspectives	- Emphasizing the dedicated, goal-oriented disease management approach (Treat-to-Target), it is recommended to reduce the dosage of glucocorticoids and meticulously assess the use of medications that may increase the risk of CVD in RA patients.

Abbreviations: RA, Rheumatoid arthritis; CABG, Coronary artery bypass grafting; MI, Myocardial infarction; CVD, Cardiovascular disease.

Discussion

The primary objective of this narrative review was to summarize postoperative outcomes, complications, and prognostic factors in patients with rheumatoid arthritis (RA) undergoing cardiac surgery, particularly coronary artery bypass grafting (CABG) and valvular procedures. From the literature search, 7 primary studies were synthesized.

In a landmark cohort investigation by Malmberg et al. (2021) (1) comprising 378 RA patients and 7,560 non-RA controls undergoing CABG, individuals with RA demonstrated a significantly heightened risk of myocardial infarction during long-term follow-up. The authors identified preoperative corticosteroid use as an independent predictor of postoperative mortality, whereas cardiovascular medication use after surgery was comparable between the cohorts. Furthermore, prolonged disease duration was independently correlated with increased post-CABG mortality after adjusting for confounding variables.

Similarly, Palomäki et al. (2021) (2) reported an increased risk of incident myocardial infarction over a 7-year follow-up period among patients with RA. They concluded that long-standing RA and glucocorticoid therapy substantially increase mortality, whereas methotrexate administration appears to exert a mitigating, protective effect against myocardial infarction. Excess post-MI mortality was shown to extend across broader systemic autoimmune conditions, such as systemic lupus erythematosus. Variations in short-term post-MI outcomes were attributed to differing degrees of revascularization and acute coronary syndrome (ACS) phenotypes, where heightened ACS severity—driven by inflammation-dependent pathways such as impaired collateral vessel formation and plaque destabilization—culminated in worse clinical trajectories.

Regarding valvular interventions, Stulak et al. (2012) (6) evaluated clinical manifestations and outcomes in RA patients presenting with severe mitral regurgitation. Their findings indicated that macroscopic mitral leaflet morphology in RA patients did not differ significantly from non-RA surgical cohorts (with most cases resembling typical degenerative disease). Long-term (5-year) survival in RA patients following mitral valve surgery was comparable to RA controls without valvular disease; however, RA patients undergoing mitral valve surgery experienced significntly reduced survival compared to non-RA surgical cohorts undergoing the same procedure.

Beyond localized autoimmune pathways, systemic metabolic dysregulations and altered lipid profiles significantly aggravate cardiovascular vulnerability in chronic disease states (8). Moreover, evidence from extensive population-based aging cohorts underscores that advanced age and cumulative comorbidity burdens are decisive determinants of adverse cardiovascular and clinical outcomes (9).

Cardiopulmonary bypass (CPB) initiates a profound systemic inflammatory response driven by multiple interdependent triggers: transition from pulsatile to continuous flow, hypothermic cardioplegia, surgical tissue trauma, endotoxemia, ischemia-reperfusion injury, oxidative stress, hypothermia, and foreign surface contact activation. These overlapping pathways can lead to substantial immune dysregulation. In patients with RA, who

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already have chronic systemic inflammation, the immune responses triggered by CPB may be further amplified. Mitigating these risks requires tailored perioperative strategies, including biocompatible surface coatings, miniaturized circuits, hemofiltration, and stringent preoperative suppression of systemic disease activity through optimized immunomodulatory scheduling (10-14).

This study has certain limitations. First, the synthesized evidence exhibits heterogeneity in study designs, sample sizes, and procedural classifications. Second, the observational nature of the included studies limits definitive causal attribution. Third, aggregate reporting precluded individual patient-level subset analyses.

Conclusion

The available evidence suggests that patients with RA may experience less favorable outcomes following cardiac surgery than patients without RA, including increased postoperative mortality, stroke risk, and the need for reoperation. Therefore, long-term follow-up, appropriate management of immunomodulatory medications, and careful postoperative monitoring may help reduce potential complications in this patient population.

Ethics Approval and Consent to Participate

Not applicable.

Consent for Publication

Not applicable.

Data Availability Statement

The data analyzed in this study are available from the corresponding author upon reasonable request.

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Author's Contributions

AR and MJYD conceptualized and designed the study. SEHZ developed the methodology and guided the clinical and perfusion methodology. SK, MG, and M.B. contributed to data collection and analysis. AR and FSE prepared the manuscript. All authors critically reviewed and revised the manuscript, approved the final version of the manuscript, and agreed to be accountable for all aspects of the work.

Conflict of Interest

The authors declare no conflicts of interest.

Declaration of Generative Artificial Intelligence (AI) in Scientific Writing

The researcher did not use artificial intelligence to generate content at any stage of this study. Grammarly software was used to check the text grammar and spelling.

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