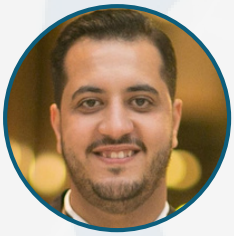

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Hypertension and Atrial Fibrillation: Bridging the Gap Between Mechanisms, Risk, and Therapy

Abstract

Background and objectives

Atrial fibrillation (AF), the most prevalent sustained arrhythmia, poses a significant public health challenge due to its links with stroke, heart failure, and mortality. Hypertension, a primary modifiable cardiovascular risk factor, is a well-established risk factor for AF that facilitates structural and electrical changes in the atria, including dilation, fibrosis, and pressure overload.

Material and Methods

we conducted a literature search regarding the shared mechanisms, risks and treatments of hypertension and atrial fibrillation. Results: The renin–angiotensin–aldosterone system plays a pivotal role in this remodelling and inflammation, increasing AF susceptibility. Uncontrolled hypertension complicates AF management, diminishing the effectiveness of mainstay treatments, including antiarrhythmic drugs, catheter ablation, and cardioversion. Effective blood pressure management, particularly with therapies targeting the renin– angiotensin–aldosterone system (RAAS), can lower the risk of new-onset AF and reduce the incidence of recurrent AF, enhancing the success of rhythm control strategies. These antihypertensive therapies mitigate myocardial hypertrophy and fibrosis and attenuate both atrial pressure strain and the inflammatory response, mitigating the substrates for AF.

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Conclusion

This review highlights the urgent need for integrated strategies that combine BP control, AF screening, and lifestyle modifications to minimise the burden of AF and its complications. Future research should investigate the specific mechanisms of cellular-level interactions associated with a hypertensive predisposition to AF, including systematic inflammation and the role of genetics, the impact of blood pressure variations on AF risk, and individualised treatment strategies specifically targeting the shared mechanisms, simultaneously propagating hypertension and AF.

Keywords: atrial fibrillation; hypertension; mechanism; review

Biography

Currently a Cardiology Research Fellow at the University of Leicester and an Honorary Cardiology Fellow at Glenfield NHS Hospital. Started his career as a Cardio-thoracic ICU resident at Ain Shams University Hospitals, Egypt. Joined the NHS Workforce in 2018 and completed his Internal Medicine Training in 2022. Worked as a Cardiology Registrar in Mid Yorkshire NHS Hospitals and Calderdale & Huddersfield NHS Hospitals between 2022 and 2024.

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