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His-bundle pacing and left bundle branch pacing in patients with heart failure

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ADMINISTRATIVE INFORMATION

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Conflicts of interest - None declared.

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Amendments - This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 11 October 2024 and was last updated on 11 October 2024.

INTRODUCTION

Review question / Objective This study aims to evaluate the efficacy and safety of HBP and LBBP in patients with heart failure and conduction disturbances, comparing these techniques to conventional pacing.

Rationale In recent years, cardiac electrotherapy has focused on more physiological pacing techniques. Modern electrotherapy methods include HBP, left bundle branch pacing (LBBP), pacing in the area of the left bundle branch (LBBAP), and modifications of previously used pacing systems, such as His-Optimized Cardiac Resynchronization Therapy (HOT-CRT) and LBBAP-Optimized CRT (LOT-CRT). Continued research into modern methods and the technology of physiological conduction system pacing, taking into account benefits and side effects, is essential for the development of cardiac electrotherapy.

Condition being studied Heart failure is a chronic medical condition in which the heart is unable to pump enough blood to meet the body's needs. This condition affects millions of people worldwide and is associated with high morbidity and increased healthcare costs. Heart failure is characterized by a variety of symptoms, including dyspnea, fatigue, peripheral edema, and reduced exercise tolerance. As the disease progresses, patients often experience arrhythmias, which further complicate treatment and worsen quality of life. His-bundle pacing and left bundle branch pacing are modern electrotherapeutic techniques aimed at improving the synchronization of heart contractions and restoring a more physiological heart rhythm. These methods may be beneficial in treating patients with heart failure, as they enhance cardiac contractility and reduce clinical symptoms. Investigating the efficacy and safety of HBP and LBBP in this patient group is crucial to understanding their potential therapeutic benefits and incorporating them into clinical practice. Analyzing these techniques can contribute to

better management of heart failure and improved health outcomes for patients.

METHODS

Search strategy We used the PubMed database to review the literature. We searched the database twice. The first search was for literature on His bundle pacing in patients with heart failure. For this, we used the advanced search: „(his pacing) AND (heart failure)". We applied filters: Full text, Clinical Study, Clinical Trial, Clinical Trial Protocol, Clinical Trial, Phase I, Clinical Trial, Phase II, Clinical Trial, Phase III, Clinical Trial, Phase IV, Controlled Clinical Trial, Meta-Analysis, Multicenter Study, Observational Study, Randomized Controlled Trial, in the last 10 years. The search results showed 84 publications.
The second search was for literature on left bundle branch pacing in patients with heart failure. For this, we used the advanced search: „(left bundle branch) AND (heart failure)". Filters used: Full text, Clinical Study, Clinical Trial, Clinical Trial Protocol, Clinical Trial, Phase I, Clinical Trial, Phase II, Clinical Trial, Phase III, Clinical Trial, Phase IV, Controlled Clinical Trial, Meta-Analysis, Multicenter Study, Observational Study, Randomized Controlled Trial, in the last 10 years. The search results showed 137 publications.
The third search was for literature on modifications using bundle-branch or left bundle branch pacing in patients with heart failure: HOT-CRT and LOT-CRT. For this, we used the advanced search: „((HOT-CRT) OR (LOT-CRT)) AND (heart failure)". Filters used: Full text, Clinical Study, Clinical Trial, Clinical Trial Protocol, Clinical Trial, Phase I, Clinical Trial, Phase II, Clinical Trial, Phase III, Clinical Trial, Phase IV, Con-trolled Clinical Trial, Meta-Analysis, Multicenter Study, Observational Study, Randomized Controlled Trial, in the last 10 years. The search results showed 4 publications.
In this systematic review, scientific articles published as of July 30. 2024, and covering the last 10 years were used.

Participant or population The systematic review focuses on patients with heart failure and indications for electrotherapy, including those with narrow QRS complexes and persistent atrial fibrillation (AF) requiring single-chamber implantable cardioverter-defibrillators (ICD), narrow QRS complexes requiring dual-chamber ICD, narrow QRS complexes with atrioventricular (AV) conduction disturbances requiring cardiac resynchronization therapy (CRT), wide QRS complexes and persistent AF indicated for CRT, wide QRS complexes with sinus rhythm indicated for CRT, sick sinus syndrome, AV conduction disturbances and/or intraventricular conduction disturbances requiring pacing, and conventional indications for pacing that require an expanded pacing system.

Intervention Without an intervention group.

Comparator In the systematic review, modern electrotherapy methods are compared, including His-bundle pacing (HBP), left bundle branch pacing (LBBP), pacing in the area of the left bundle branch (LBBAP), and modifications of previously used pacing systems, such as His-Optimized Cardiac Resynchronization Therapy (HOT-CRT) and LBBAP-Optimized CRT (LOT-CRT).

Study designs to be included We selected the studies using the following criteria: Full text, Clinical Study, Clinical Trial, Clinical Trial Protocol, Clinical Trial, Phase I, Clinical Trial, Phase II, Clinical Trial, Phase III, Clinical Trial, Phase IV, Controlled Clinical Trial, Meta-Analysis, Multicenter Study, Observational Study, Randomized Controlled Trial, in the last 10 years.

Eligibility criteria No additional criteria.

Information sources The PubMed database was searched, primarily considering works published in the last 10 years.

Main outcome(s) In the systematic review focusing on His-bundle pacing (HBP) and left bundle branch pacing (LBBP) in patients with heart failure, the main outcomesinclude: improvement in heart failure compared to standard right ventricular apex pacing, which does not provide benefits and has suboptimal left ventricular pacing effects; improvement in left ventricular function; reduction in QRS duration; improvement in mitral inflow; lower incidence of atrial fibrillation and other complications induced by standard pacing; and reduction in mortality among patients meeting the criteria for pacing.

Additional outcome(s) No additional results.

Data management The data were manually searched independently by two researchers, and the data were collected into an encrypted spreadsheet on a local drive.

Quality assessment / Risk of bias analysis Data selection was performed by two independent researchers. The collected results were presented in the form of a table.

Strategy of data synthesis The data were presented in the form of a systematic review, which included subsections describing specific indications for modern cardiac electrotherapy methods in groups of patients with various comorbid cardiological conditions.

Subgroup analysis No subgroup analysis was performed.

Sensitivity analysis The assessment of the reliability of the collected data was conducted continuously during their analysis.

Language restriction No language restrictions were applied to the searches.

Country(ies) involved Poland.

Other relevant information Without additional information.

Keywords His -bundle pacing, left bundle branch pacing, heart failure, QRS duration, stimulation threshold, cardiac resynchronization therapy, biventricular pacing.

Dissemination plans We intend to present the collected information in the form of a systematic review in open access to facilitate researchers' access to the latest knowledge.

Contributions of each author

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