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Clinical Utility of Three-dimensional Speckle Tracking Images in the Detection of Left Ventricular Myocardial Contractile Function in Patients with Diabetes Mellitus: A Systematic Review and Meta-Analysis

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ADMINISTRATIVE INFORMATION

Support - N/A.

Review Stage at time of this submission - Completed but not published.

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 23 June 2023 and was last updated on 23 June 2023.

INTRODUCTION

Review question / Objective 3D-STI is of good value in the evaluation of primary or secondary left ventricular systolic dysfunction. However, However, the 3D-STI assessing viability of left ventricular myocardial contractile function in patients with DM remain unknown and further studies are required. The purpose of this study was to explore the value of 3D-STI in evaluating early left ventricular systolic dysfunction in patients with diabetes mellitus by systematic meta-analysis.

Condition being studied Diabetes mellitus (DM) is a common and frequently occurring disease in the world. Some studies have indicated that DM can increase the incidence of coronary heart disease, hypertension, and other diseases, and can aggravate the extent of coronary artery disease. Therefore, early detection of left ventricular systolic function impairment in patients with DM, timely intervention is particularly important. 3D-STI is of good value in the evaluation of primary or secondary left ventricular systolic dysfunction. However, However, the 3D-STI assessing viability of left ventricular myocardial contractile function in patients with DM remain unknown and further studies are required. The purpose of this study was to explore the value of 3D-STI in evaluating early left ventricular systolic dysfunction in patients with diabetes mellitus by systematic meta-analysis.

METHODS

Search strategy (1) "Three-dimensional speckle tracking" or "3D-speckle tracking" or "3D-STI" or "Speckle tracking echocardiography" or "STE" and (2) "Diabetes mellitus" or "DM" and (3) "left ventricular" or"LV".

Participant or population (1) Randomized controlled trial (RCT) and cohort study; (2) Studies comparing left ventricular myocardial contractile function parameters in DM patients and healthy controls; (3) The participants had no history of cardiovascular diseases such as coronary heart disease, hypertension, severe valvular heart disease, and hepatic and renal insufficiency; (4) Ultrasonic diagnostic technology was 3D-STI; (5) At least one interesting result is reported, including global longitudinal strain (GLS), global circumferential strain (GCS), global radial strain (GRS), global area strain(GAS).

Intervention N/A.

Comparator N/A.

Study designs to be included (1) Randomized controlled trial (RCT) and cohort study; (2) Studies comparing left ventricular myocardial contractile function parameters in DM patients and healthy controls; (3) The participants had no history of cardiovascular diseases such as coronary heart disease, hypertension, severe valvular heart disease, and hepatic and renal insufficiency; (4) Ultrasonic diagnostic technology was 3D-STI; (5) At least one interesting result is reported, including global longitudinal strain (GLS), global circumferential strain (GCS), global radial strain (GRS), global area strain (GAS).

Eligibility criteria Duplicated data and articles that did not offer original report of interest, such as case reports, conference documents, reviews, fundamental research, and non-relevant articles were excluded.

Information sources PubMed, Embase, Scopus databases, Cochrane library.

Main outcome(s) 3D-STI could accurately evaluate the early global systolic dysfunction of left ventricle in patients with type 2 diabetes mellitus. The evaluation of left ventricular strain in patients with DM by 3D-STI could detect the impairment of left ventricular systolic function in patients with DM in the early stage, and GLS and GAS might be regarded as sensitive indexes to evaluate the left ventricular function in patients with DM.

Quality assessment / Risk of bias analysis Quality of the involved articles was evaluated using the New-Ottawa Scale (NOS). The quality of the literature was evaluated from three aspects: the selection of the study population, the comparability of the case group and the control group, and the evaluation of the results. According to the quality of the study, the score was 0-9.

Strategy of data synthesis The quality of the selected study was evaluated independently by two researchers, and the disagreement was resolved through negotiation.

Subgroup analysis The DM group was divided into two subgroups according to without or with microvascular complications.

Sensitivity analysis Sensitivity analysis was carried out to investigate the stability of the findings. None of the studies demonstrated a significant effect on pooled value, suggesting that the included studies had goodstability.

Country(ies) involved China.

Keywords systematic review; meta-analysis; diabetes mellitus; left ventricular myocardial contractile function; three-dimensional speckle tracking technique.diabetes mellitus; left ventricle; three-dimensional echocardiography; speckle tracking.

Contributions of each author

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