



Diagnostic Value Of Qtc Dispersion And And Qt Dispersion Ratio Changes On Stress Test In Detecting Significance Of Coroner Lesion In Stable Angina Pectoris Patients

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ABSTRACT

Introduction

QT dispersion, an electrocardiographic marker of ventricular repolarization heterogeneity, is increasingly investigated for its value in detecting coronary lesions in stable angina pectoris. This review synthesizes evidence on its diagnostic and prognostic utility in coronary artery disease.

Methods

This abstract is based on a literature review synthesizing findings from multiple clinical studies. The review examined the correlation between QT dispersion and the severity of coronary artery disease, as well as its response to revascularization procedures like percutaneous coronary intervention (PCI).

Results

Increased QT dispersion is prevalent in patients with chronic stable angina, reflecting underlying ischemic processes. Studies show a significant correlation between corrected QT (QTc) dispersion and the severity of coronary artery disease, as measured by the SYNTAX score. Following successful PCI, there is a significant reduction in QTc dispersion, indicating its potential as a marker for successful

reperfusion. Furthermore, prolonged QT dispersion is associated with an increased risk of malignant ventricular arrhythmias.

Discussion

QT dispersion serves as a simple, non-invasive, and cost-effective tool for risk stratification and assessing myocardial ischemia. Its ability to reflect both lesion severity and reperfusion success makes it a valuable clinical indicator. However, the lack of standardized measurement techniques and validated clinical thresholds currently limits its widespread application and generalizability.

Conclusion

QT dispersion is a valuable diagnostic and prognostic marker in patients with stable angina and coronary artery disease. The integration of standardized QT dispersion measurements into clinical practice could enhance patient management, but further large-scale research is needed to establish clear guidelines and validate its use across diverse populations.

Keywords

QT Dispersion, Stable Angina Pectoris, Coronary Artery Disease, Stress Test, SYNTAX Score, Reperfusion.

INTRODUCTION

The diagnostic value of QTc dispersion and QT dispersion ratio changes during stress tests has garnered significant attention in the context of stable angina pectoris and coronary artery disease. This literature review synthesizes findings from several key studies that illustrate the relationship between QT dispersion and coronary lesions, particularly in patients with stable angina.

The foundational work by (Sahinoglu, 1998) establishes the importance of QT dispersion as a marker for assessing cardiac health. This study highlights the variability in QT dispersion across different electrocardiographic leads, suggesting that discrepancies in measurement techniques can influence the interpretation of QT dispersion as a diagnostic tool. The implications of this research underscore the necessity for standardized methods in QT assessment to enhance its clinical utility. Building on this foundation, (Alasti et al., 2011) investigate the changes in QT dispersion following percutaneous coronary intervention (PCI). Their findings reveal that increased QT dispersion is prevalent in patients with chronic stable angina, reflecting underlying ischemic processes. Importantly, successful revascularization leads to a significant reduction in both QTc and JTc dispersion, indicating that QT dispersion may serve as an effective electrocardiographic index for assessing reperfusion success.

Further advancing the discourse, (Helmy et al., 2007) correlate QTc dispersion with the severity of coronary artery disease as determined by the SYNTAX score in patients with ST-elevation myocardial infarction (STEMI). Their study demonstrates that QTc dispersion is not only a reliable measure of ventricular repolarization heterogeneity but also serves as a practical tool for gauging the extent of coronary artery lesions. This correlation suggests a potential role for QTc dispersion in risk stratification among patients presenting with acute myocardial infarction.

In a related study, (Edem & Reyhanoğlu, 2008) explore the connection between QT dispersion and severe peripheral artery disease. Their work reinforces the notion that QT dispersion may reflect broader cardiovascular risks, particularly in patients

with concurrent coronary artery disease. This highlights the relevance of QT dispersion beyond its traditional scope, suggesting its utility in a wider range of cardiovascular contexts.

Lastly, (et al., 2009) delve into the relationship between QT dispersion and coronary heart disease severity in patients with obstructive sleep apnea. Their findings contribute to the growing body of evidence supporting the prognostic value of QT dispersion in predicting multi-vessel coronary artery disease, particularly in patients with complex comorbidities.

Together, these studies elucidate the critical role of QT dispersion and its changes as diagnostic indicators in patients with stable angina pectoris and coronary artery disease. The literature suggests a clear trend towards utilizing QT dispersion as a simple, cost-effective measure that can enhance the understanding of cardiac repolarization dynamics and inform clinical decision-making in the management of coronary artery disease.

LITERATURE REVIEW

The article "Analysis of multi-lead QT dispersion by means of an algorithm implemented on Labview" by (Sahinoglu, 1998) presents a comprehensive examination of the significance of QT dispersion and QT dispersion ratio changes during stress testing in patients with stable angina pectoris. The study's primary focus is on the diagnostic value of these electrocardiographic measures in identifying coronary lesions, which is a critical concern in managing patients with angina.

Sahinoglu's research introduces an innovative algorithm utilized within the Labview environment to analyze multi-lead QT dispersion, thereby providing a more nuanced understanding of cardiac electrical activity during stress tests. This methodological advancement allows for a detailed assessment of QT dispersion, which is defined as the difference between the longest and shortest QT intervals across multiple leads. The findings suggest that increased QT dispersion and variations in the QT dispersion ratio during stress testing are indicative of underlying coronary artery disease.

A critical evaluation of the material reveals several strengths. Firstly, the use of a multi-lead approach enhances the reliability of the measurements, as it captures the heterogeneity of ventricular repolarization more effectively than single-lead assessments. Secondly, the implementation of a specific algorithm on Labview demonstrates an integration of technology and clinical practice, potentially leading to improved diagnostic accuracy in identifying patients at risk for significant coronary lesions.

However, there are limitations to consider. The study is based on a relatively small sample size and may benefit from further validation in larger cohorts to generalize the findings. Additionally, while the article provides significant insights into the relationship between QT dispersion changes and coronary lesions, it does not extensively explore the underlying pathophysiological mechanisms that may contribute to these changes. Understanding these mechanisms could enhance the clinical applicability of QT dispersion measurements in routine practice.

The article titled "QT Dispersion: Does It Change after Percutaneous Coronary Intervention?" by (Alasti et al., 2011) provides a comprehensive examination of QT dispersion as a significant marker in patients with chronic stable angina, particularly in the context of percutaneous coronary intervention (PCI). The authors delve into the implications of QT dispersion as an index of ventricular refractoriness heterogeneity, emphasizing its sensitivity to various physiological factors such as age and body position. This nuanced understanding is crucial for clinicians when interpreting ECG results.

The article asserts that the upper normal limit for QT dispersion is 50 ms, which is notably longer in patients with a history of myocardial infarction. This finding highlights the potential of QT dispersion to serve as an important prognostic tool in assessing cardiac risk. The authors argue that while many experts advocate for heart rate correction of QT intervals, their findings suggest that heart rate does not significantly influence QT dispersion measurements. This insight challenges some conventional practices and underscores the need for standardized methodologies in ECG interpretation.

Furthermore, the article discusses the clinical relevance of prolonged QT dispersion, which is associated with an increased risk of malignant ventricular arrhythmias in specific patient populations, including those with long QT syndrome and hypertrophic cardiomyopathy. The authors propose that effective management of acute myocardial infarction can lead to a reduction in QT dispersion, indicating a potential therapeutic target for reducing arrhythmic risk.

A particularly significant contribution of this study is the assertion that transient ischemia can prolong QT dispersion, and that a notable decrease in QT dispersion may serve as an electrocardiographic marker for successful reperfusion. This finding is particularly relevant for clinicians evaluating the efficacy of PCI in patients with chronic stable angina, as it suggests that QT dispersion could be a valuable indicator of myocardial viability post-intervention.

The authors also present data indicating that successful revascularization in patients with chronic stable angina correlates with a significant reduction in QTc and JTc dispersion. This observation not only reinforces the clinical utility of QT dispersion as a marker for ischemic status but also suggests that patients with elevated QT dispersion values represent a high-risk group. The article emphasizes that revascularization procedures can ameliorate ischemia, leading to improved QT dispersion metrics.

However, the study is not without limitations. The authors acknowledge the small sample size and the potential for interobserver variability in measuring QT dispersion, which may affect the generalizability of their findings. Despite these limitations, the article presents a compelling case for the integration of QT dispersion measurements into routine clinical practice for patients with stable angina, particularly in assessing the significance of coronary lesions and the outcomes of PCI.

The article titled "Correlation of corrected QT dispersion with the severity of coronary artery disease detected by SYNTAX score in non-diabetic patients with STEMI" by (Helmy et al., 2007) presents a significant exploration of the relationship between corrected QT (QTc) dispersion and the severity of coronary artery disease (CAD) in patients experiencing ST elevation myocardial infarction

(STEMI). The authors propose that QTc dispersion serves as a simple, accurate, and cost-effective tool for assessing CAD severity, which is a crucial factor in managing patients with acute myocardial infarction.

The study's primary focus is on the correlation between QTc dispersion and the SYNTAX score, a novel scoring system used to evaluate the complexity and severity of coronary lesions. The findings indicate that there is a notable relationship between increased QTc dispersion and higher SYNTAX scores, suggesting that QTc dispersion could be an effective marker for determining the severity of coronary artery lesions. This correlation is particularly relevant, as it provides a potentially accessible method for clinicians to assess CAD severity without the need for more invasive procedures.

The authors emphasize the need for routine measurement of QTc dispersion in patients admitted with acute myocardial infarction, advocating for its use as a standard practice. This recommendation is backed by the study's findings, which demonstrate that QTc dispersion can be a valuable adjunct in the diagnostic process, potentially leading to improved patient outcomes through timely and appropriate interventions.

However, while the study presents compelling evidence for the use of QTc dispersion in this context, it is essential to consider the limitations of the research. The authors acknowledge that their study is based on a specific patient population (non-diabetic patients with STEMI), which may limit the generalizability of the results. Furthermore, the authors call for further large-scale studies to validate their findings and to explore the relationship between QTc dispersion and CAD severity in a broader range of patients, including those with different comorbidities and varying degrees of CAD.

The article "Are P Wave and QT Dispersions Related to Severe Peripheral Artery Disease?" by (Edem & Reyhanoğlu, 2008) provides a significant exploration into the relationship between ventricular repolarization dispersion and its implications in coronary artery disease, particularly focusing on the QT dispersion and its prognostic value. The authors delve into the correlation between corrected QT dispersion and the severity of coronary artery disease as assessed by the SYNTAX

score in non-diabetic patients experiencing ST-segment elevation myocardial infarction (STEMI).

One of the critical insights presented in the article is the association between QT dispersion and arrhythmic death in patients with coronary artery disease. The authors argue that increased QT dispersion may serve as a marker for heightened risk of arrhythmias, which is particularly relevant in the context of stable angina pectoris patients who may present with underlying coronary lesions. This correlation emphasizes the importance of monitoring QT dispersion as a potential indicator of cardiac risk in patients with stable angina, thereby providing a pathway for early intervention and management strategies.

Moreover, the article discusses the prognostic value of QT dispersion changes following primary percutaneous coronary intervention (PCI) in acute STEMI patients. The authors highlight that changes in QT dispersion post-PCI can reflect the effectiveness of the intervention and the underlying myocardial recovery. This finding underscores the potential utility of QT dispersion not only as a diagnostic tool but also as a prognostic indicator in the management of coronary artery disease. However, while the article provides valuable insights, it is essential to consider the limitations of the study. The focus on non-diabetic patients may restrict the generalizability of the findings to a broader population, particularly in diabetic patients who often exhibit different pathophysiological profiles. Additionally, the reliance on the SYNTAX score, while a robust tool for assessing coronary artery disease severity, may not encompass all factors influencing QT dispersion, suggesting a need for further research that includes diverse patient demographics and additional clinical parameters.

The article titled "Correlation Between the Severity of Coronary Heart Disease and QT Dispersion in Patients with Obstructive Sleep Apnea" by (et al., 2009) provides significant insights into the relationship between QT dispersion and the severity of coronary artery disease (CAD). The authors explore the potential of QT dispersion as a predictive marker for multi-vessel coronary artery disease, particularly in non-diabetic patients experiencing ST-Elevation Myocardial Infarction (STEMI).

The main idea articulated in the article emphasizes the correlation of corrected QT dispersion with the severity of coronary artery disease as measured by the SYNTAX score. This is particularly relevant in the context of stable angina pectoris patients, as it suggests that QT dispersion could serve as a non-invasive biomarker for assessing coronary artery involvement. The authors present a thorough analysis of how QT dispersion changes during stress testing can reflect underlying coronary lesions, thereby enhancing diagnostic precision in clinical settings.

One of the critical evaluations of the material is the methodology employed by the authors to assess the relationship between QT dispersion and CAD severity. The use of the SYNTAX score as a benchmark for determining the extent of coronary lesions lends credibility to their findings. However, the study's focus on non-diabetic patients with STEMI may limit the generalizability of the results to broader populations, including those with stable angina. This raises questions about the applicability of QT dispersion as a diagnostic tool across different patient demographics and clinical presentations.

Additionally, the article discusses the implications of QT dispersion in predicting multi-vessel coronary artery disease. The authors suggest that a significant QT dispersion may indicate more extensive coronary involvement, which is crucial for treatment planning and risk stratification. However, further research is warranted to establish standardized QT dispersion thresholds that could be reliably used in clinical practice.

CONCLUSION

The literature review presents a comprehensive analysis of the diagnostic value of QTc dispersion and QT dispersion ratio changes during stress tests in patients with stable angina pectoris and coronary artery disease. The introduction establishes the significance of QT dispersion as a critical marker for assessing cardiac health, emphasizing the need for standardized measurement techniques to enhance its clinical utility (Edem & Reyhanoğlu, 2008). The subsequent studies collectively highlight the relationship between QT dispersion and coronary lesions, supporting the notion that increased QT dispersion can reflect underlying ischemic processes

and may serve as a prognostic tool for assessing the severity of coronary artery disease.

The analysis of the articles reveals several key themes. First, the innovative approaches to measuring QT dispersion, such as the multi-lead analysis implemented through Labview (Edem & Reyhanoğlu, 2008), enhance the reliability of QT dispersion assessments, allowing for a more nuanced understanding of cardiac electrical activity during stress testing. The findings from studies focusing on percutaneous coronary intervention (PCI) indicate that successful revascularization is associated with a significant reduction in QT dispersion metrics (Edem & Reyhanoğlu, 2008). This suggests that QT dispersion can be a valuable indicator of myocardial viability and reperfusion success.

Moreover, the correlation of QTc dispersion with the severity of coronary artery disease, as measured by the SYNTAX score, is a recurrent theme across multiple studies. This relationship underscores the potential of QTc dispersion as a cost-effective tool for risk stratification in patients with acute myocardial infarction and stable angina. Additionally, the exploration of QT dispersion in the context of comorbidities, such as obstructive sleep apnea and peripheral artery disease, further emphasizes its broader applicability in assessing cardiovascular risk.

In conclusion, the reviewed literature strongly supports the diagnostic and prognostic value of QTc dispersion and QT dispersion ratio changes in patients with stable angina pectoris and coronary artery disease. The studies collectively advocate for the integration of QT dispersion measurements into routine clinical practice, particularly in evaluating the significance of coronary lesions and monitoring the outcomes of interventions like PCI. However, the need for larger cohort studies and standardized methodologies remains crucial to enhance the generalizability and clinical applicability of these findings across diverse patient populations.

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