Diagnostic Value of Echocardiography Combined with Residual Cholesterol for Asymptomatic Myocardial Ischaemia in Coronary Artery Disease

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ABSTRACT

This study aimed to investigate the diagnostic value of combined echocardiography and residual cholesterol in asymptomatic myocardial ischaemia. One hundred and fifty-seven patients were seen at Hefei BOE Hospital from 2019 to 2022. The patients were divided into two groups, the observation group (n=90, confirmed asymptomatic myocardial ischaemia) and the control group (n=67, negative diagnosis), based on coronary angiography. The observation group had significantly higher residual cholesterol levels (p=0.001). A combined approach of echocardiography and serum residual cholesterol values showed statistically higher accuracy (p<0.05), with ROC curve analysis supporting the superiority of this method [AUC 0.788 (0.711-0.865), Yoden index 0.576]. It also demonstrated higher sensitivity (88.9%) and specificity (68.7%). The study concluded that combined echocardiography and serum residual cholesterol testing offer superior diagnostic efficacy and practicality for asymptomatic myocardial ischaemia, recommending it for the clinical use.

Key Words: Echocardiography, Residual cholesterol, Asymptomatic myocardial ischaemia, Diagnosis.

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Table I: Positive predictive value and accuracy of three testing methods for asymptomatic myocardial ischaemia, n (%).

<table>
<thead>
<tr>
<th>Testing Method</th>
<th>Gold Standard</th>
<th>Observation Group (n=90)</th>
<th>Control Group (n=67)</th>
<th>Positive Predictive Value</th>
<th>Accuracy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Echocardiography</td>
<td>Positive</td>
<td>61</td>
<td>22</td>
<td>61/83 (73.49)</td>
<td>106/157 (67.52)</td>
</tr>
<tr>
<td></td>
<td>Negative</td>
<td>29</td>
<td>45</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Residual cholesterol</td>
<td>Positive</td>
<td>54</td>
<td>23</td>
<td>54/77 (70.13)</td>
<td>98/157 (62.42)</td>
</tr>
<tr>
<td></td>
<td>Negative</td>
<td>36</td>
<td>44</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Combined detection method</td>
<td>Positive</td>
<td>80</td>
<td>21</td>
<td>80/101 (79.21)</td>
<td>126/157 (80.25)</td>
</tr>
<tr>
<td></td>
<td>Negative</td>
<td>10</td>
<td>46</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

χ²: 2.001  
P: 0.368

In a precedent controlled study with 12,563 participants, a subset analysis revealed a notable relationship between residual cholesterol ≥0.51 mmol/L and coronary heart disease (OR=1.952, 95% CI=1.276-2.988, p=0.002). Adopting the same cut-off in the present study, residual cholesterol above 0.51 mmol/L accurately predicted asymptomatic myocardial ischaemia (AUC=0.628), affirming the prognostic potential of residual cholesterol for coronary atherosclerotic disease. Its inclusion in routine clinical diagnostics warrants further exploration. When combined with echocardiography, residual cholesterol yielded a significantly improved AUC of 0.788, highlighting its superior sensitivity and specificity compared to stand-alone testing.

Residual cholesterol is a hot topic of research in recent years in relation to coronary atherosclerotic heart disease, calculated from total cholesterol, HDL-C and LDL-C in serum, which can be obtained during the routine examination of patients and is easy to operate. Previous studies had shown that every 1 mmol/L increase in residual cholesterol levels was associated with a 2.8-fold increase in the risk of ischaemic heart disease. Langsted et al. confirmed the association of high levels of residual cholesterol with major cardiovascular and cerebrovascular events in a cohort study of 109,574 patients recruited from the Copenhagen General Population Study (CGPS).

In this study, being a unieentric, retrospective analysis with a non-randomised sample, posed limitations to the generalisability of the results. Residual cholesterol, calculated from multiple data points and not-yet-a-routine clinical measures, may involve potential error. Furthermore, interactions between residual cholesterol and variables like age, sex, blood pressure, and diabetes are not fully clarified, warranting further investigation. In conclusion, combining echocardiography and residual cholesterol testing can enhance the diagnosis of asymptomatic myocardial ischaemia, demonstrating high sensitivity and specificity. Its implementability due to ease of use and accessibility makes it beneficial in clinical settings.

ETHICAL APPROVAL:
This study was approved by the Ethics Committee of the Hebei BOE Hospital, China.

COMPETING INTEREST:
The authors declared no competing interest.

AUTHORS’ CONTRIBUTION:
FL: Disease diagnosis, statistical analysis, and manuscript writing.
XH: Research design and writing.
QL: Disease diagnosis, personnel coordination, and case follow-up.
All authors approved the final version of the manuscript.

REFERENCES