Carotid Intima Media Thickness in the Prediction of ST Elevation Myocardial Infarction

Ashish Kabra MD
Lehigh Valley Health Network, Ashish_N.Kabra@lvhn.org

Justin D. Roberts DO
Lehigh Valley Health Network

Nitin Verma MD
Lehigh Valley Health Network, Nitin.Verma@lvhn.org

Lori Neri MSN
Lehigh Valley Health Network, Lori.Neri@lvhn.org

Martin E. Matsumura MD
Lehigh Valley Health Network, Martin_E.Matsumura@lvhn.org

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Carotid Intima Media Thickness in the Prediction of ST Elevation Myocardial Infarction

Ashish Kabra MD, Justin Roberts DO, Nitin Verma MD, Lori Neri MSN and Martin Matsumura MD
Lehigh Valley Health Network, Allentown, Pennsylvania

Background:
Patients who present with ST elevation myocardial infarction (STEMI) typically have fewer traditional risk factors versus patients with other forms of acute coronary syndrome (ACS). Measurement of Carotid Intima Media Thickness by B mode ultrasonography has been deemed a non-invasive, sensitive and reproducible technique for identifying and quantifying subclinical vascular risk and cardiovascular disease, according to the most recent guidelines produced by the American Society of Echocardiography.

We examined the utility of carotid intima media thickness assessment (CIMT) on refining the ability of the Framingham Risk Score (FRS) to predict patients at risk of a first STEMI.

Purpose and Hypothesis:
Using a vascular age algorithm to re-define the Framingham Risk score will lead to better assessment of cardiovascular risk in patients destined to suffer STEMI as their first cardiac event.

Methods:
- Pro-retrospective study design
- All first time STEMI patients without presence of CAD equivalent
- Demographic data and CIMT measurement within 30 days of STEMI
- Calculation of ‘vascular age’ based on addition of CIMT measurement to ‘chronological age’ by use of the well validated atherosclerosis in communities database
- Student’s t-test statistical analysis for acquired variables

Table 1. To show Mean Values and Standard Deviation for Baseline Demographic and Acquired Data

<table>
<thead>
<tr>
<th></th>
<th>Mean (n=26)</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chronological Age</td>
<td>52.85</td>
<td>12.63</td>
</tr>
<tr>
<td>% Male</td>
<td>66.94</td>
<td>0.90</td>
</tr>
<tr>
<td>% HTN</td>
<td>29.23</td>
<td>0.06</td>
</tr>
<tr>
<td>% Smoker</td>
<td>68.66</td>
<td>0.00</td>
</tr>
<tr>
<td>Total cholesterol mg/dl</td>
<td>197.06</td>
<td>78.75</td>
</tr>
<tr>
<td>LDL-C, mg/dl</td>
<td>125.77</td>
<td>54.39</td>
</tr>
<tr>
<td>HDL-C, mg/dl</td>
<td>41.3</td>
<td>19.27</td>
</tr>
<tr>
<td>SBP resting</td>
<td>116.37</td>
<td>18.79</td>
</tr>
<tr>
<td>DBP resting</td>
<td>88.56</td>
<td>11.52</td>
</tr>
<tr>
<td>TC mg/dl</td>
<td>190.23</td>
<td>140.70</td>
</tr>
<tr>
<td>CIMT (mm)</td>
<td>0.86</td>
<td>0.22</td>
</tr>
<tr>
<td>Vascular Age</td>
<td>78.51</td>
<td>14.13</td>
</tr>
<tr>
<td>Chronological FRS</td>
<td>12.11</td>
<td>4.06</td>
</tr>
<tr>
<td>Chronological 10 yr risk</td>
<td>16.19</td>
<td>8.02</td>
</tr>
<tr>
<td>Vascular FRS</td>
<td>18.85</td>
<td>5.07</td>
</tr>
<tr>
<td>Vascular 10 yr risk</td>
<td>17.23</td>
<td>11.06</td>
</tr>
</tbody>
</table>

Results:
- Total patients recruited n=30, 4 with incomplete datasets resulting in final number n=26
- The mean CIMT-adjusted “vascular age” was significantly higher than the mean chronological age for the cohort as a whole (52.89yrs vs. 79.5yrs, p<0.001)
- CIMT-adjustment of FRS led to a significant increase in 10yr risk assessment for the cohort as a whole (10.1% vs. 17.2%, p=0.015)
- When calculated using chronologic age, 2/26 patients (7.7%) had high risk FRS 10yr event rates (defined as event rate >20%) compared to 11/26 patients (42.3%) when calculated using CIMT-adjusted age (p=0.018)

Conclusion:
- The use of CIMT to calculate FRS using a CIMT-adjusted ‘vascular age’ in a STEMI population led to significant improvement in our ability to define high risk for CAD among this patient population.
- Given that STEMI patients usually represent a younger population with fewer traditional risk factors vs. other ACS patients, this data suggests that CIMT may be helpful in identifying and modifying risk factors and behaviors of patients who are at risk of STEMI.

References:
2. Comparison of Assessment of Coronary Calcium versus Carotid Intima Media Thickness for determination of patients at risk of STEMI. A comparison of Assessment of Coronary Calcium versus Carotid Intima Media Thickness for determination of patients at risk of STEMI.

Figure 1. Bar Graph Showing Change in FRS % Risk by Addition of Vascular Age Derived from CIMT

Figure 2. Overall Change in FRS Strata Using Vascular Age