THE INCIDENCE AND CONSEQUENT RELEVANCE OF UNPLANNED INVASIVE CORONARY ANGIOGRAPHY FOLLOWING CORONARY BYPASS GRAFTING

To the Editor:

Based on data from the Virginia Cardiac Services Quality Initiative, Norman and colleagues performed a critical study into the outcomes of patients undergoing unplanned coronary angiography (CAG) following coronary artery bypass grafting (CABG). Nevertheless, its important findings may benefit from some additional nuance and contextualization.

The Virginia Cardiac Services Quality Initiative database comprises >10,000 patients undergoing CABG between 2018 and 2021 and, therefore, seems highly powered to evaluate clinically meaningful differences. However, only 41 patients (0.4%) underwent unplanned postoperative CAG. Acute coronary syndrome was the predominant indication for CAG (43.9%), followed by cardiac arrest (22.0%). Of note, the study did not specify the definition of (periprocedural) acute coronary syndrome. The authors conclude that unplanned CAG is not cheap, nor benign, but does not appear to be associated with increased operative mortality or failure to rescue. Rightfully, the authors state that the results may be susceptible to a type II error in the “Limitations” section, given the small sample size of patients with unplanned CAG.

Despite the large dataset of >10,000 patients with CABG, the incidence of unplanned CAG in the study by Norman and colleagues (0.4%) is in sharp contrast with previous reports of European (ranging between 2.2% and 3.4%) and US experiences (4.4%, data from the US National Inpatient Sample). Of note, these studies did relate unplanned CAG to significantly increased morbidity, mortality, and costs. Table 1 presents the incidence, outcomes, and relation between unplanned CAG and mortality in these studies. Please also note the similar mortality rate and near-identical point estimate in terms of odds ratio in the studies by Norman and colleagues and Alqahtani and colleagues.

The incidence of unplanned CAG is determined by indication. Consequently, the indication to perform CAG is often subjective, depending on the thoughts of the treating physicians and interventional cardiologist. Although the presence of periprocedural myocardial infarction (PMI) may be a more accurate reflection of the actual incidence of postoperative ischemia—as not all patients with PMI will undergo CAG—this diagnostic entity struggles with its own inherent limitations, relating to the definition of PMI. Still, the question remains how many patients in Norman and colleagues’ dataset had postoperative ischemia and did not undergo CAG. Moreover, these patients would then have been included in the “control group” (confounding by indication), which may be one of the underlying causes of the absence of a statistically significant difference in postoperative mortality and failure to rescue. Finally, the 2-fold increase in postoperative mortality in patients who received CAG, with a point estimate of odds ratio 2.17, seems clinically meaningful. Therefore, the absence of statistical significance may be a direct consequence of the small sample size, which is in turn affected by a CAG incidence that is not in line with previously mentioned reports. As such, we fully agree that unplanned CAG is not cheap nor benign but would add that it is most likely related to increased postoperative morbidity and mortality, when applying more accurate indication criteria.

Samuel Heuts, MD, PhD
Pieter A. Vriesendorp, MD, PhD

aDepartment of Cardiothoracic Surgery Maastricht University Medical Center Maastricht, The Netherlands

bCardiovascular Research Institute Maastricht (CARIM)
Maastricht University Maastricht, The Netherlands

cDepartment of Cardiology Maastricht University Medical Center Maastricht, The Netherlands

Table 1. Incidence and outcomes of patients with CABG undergoing unplanned CAG in the current study and previous reports

<table>
<thead>
<tr>
<th>Study</th>
<th>Year</th>
<th>Number of patients with CABG</th>
<th>Number of unplanned CAG</th>
<th>Mortality CAG patients (%)</th>
<th>Odds ratio, 95% CI*</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Norman and colleagues</td>
<td>2023</td>
<td>10,597</td>
<td>41 (0.4%)</td>
<td>4.9%</td>
<td>2.16 (0.52-9.03)</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Omran and colleagues</td>
<td>2022</td>
<td>4684</td>
<td>161 (3.4%)</td>
<td>NR</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>Rupprecht and colleagues</td>
<td>2019</td>
<td>4825</td>
<td>108 (2.2%)</td>
<td>8.3%</td>
<td>NA†</td>
<td>NA</td>
</tr>
<tr>
<td>Alqahtani and colleagues</td>
<td>2019</td>
<td>554,987</td>
<td>24,503 (4.4%)</td>
<td>5.1%</td>
<td>1.94 (1.83-2.06)</td>
<td>&lt;.001</td>
</tr>
</tbody>
</table>

CABG: Coronary artery bypass grafting; CAG: coronary angiography; CI: confidence interval; NR: not reported; NA: not available. *Authors’ own calculation based on the available data from the studies. The odds ratio represents the unadjusted difference in mortality between patients who received CABG undergoing unplanned CAG versus patients who received CABG not undergoing CAG. †Outcomes of patients without unplanned CAG not reported.
Letter to the Editor

Conflict of Interest Statement
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References


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