Predicting bleeding risk after coronary surgery: Let’s focus on modifiable risk factors and simple, practical decision making

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It is well known that bleeding increases morbidity and mortality. In recent years several risk scores for bleeding prediction have been developed in different areas of cardiovascular diseases (1–4). Most scores have been related to the administration of some form of antithrombotic drugs, when a fine assessment between thrombotic and bleeding risk should be made, and so try to avoid (or correct) risk factors that would lead to and excessive bleeding and thus improve survival (5).

Bleeding after cardiac surgery is known to be associated with poor outcome, and increased morbidity and mortality (6, 7) due to the need for blood transfusion, hypoperfusion-related injuries to critical organs and the need for re-exploration (8). In this context, cardiac surgery, especially coronary artery bypass grafting (CABG) confers a huge challenge, as patients are treated with various antithrombotic drugs, which are known to increase perioperative risk. Hence identification of patients at high risk of bleeding would be of great importance in order to optimise management.

In this issue of Thrombosis and Haemostasis, Biancari et al. (9) propose a new bleeding risk score specific for CABG. The WILL-BLEED score now adds to other bleeding risk scores for coronary interventions (3, 10, 11) or cardiac surgery (12–14). Variables included in WILL-BLEED scores are resumed in Table 1. Not to mention numerous other bleeding risk scores for those acute medical ill, VTE etc (15).

WILL-BLEED score exhibit a good predictive ability for estimating severe bleeding (area under the curve [AUC] 0.721) respect to the other bleeding scores included in the study (all AUC =0.6). It includes few variables all easily available in clinical practice: antithrombotic therapy, gender, acute coronary syndrome, anaemia, renal impairment and critical preoperative state. In comparison with other risk scores (see Table 1), in the WILL-BLEED score age and weight are missed, especially as they were common variables in preoperative scores (16). Also, it identifies quite good patients at high risk for bleeding (score >6) whereas there seem not be substantial differences for scores under 5. It could be criticised that there is no external validation provided, as the population was divided after electronic random sampling into a derivation cohort and a validation cohort. However, the need of an external validation has recently been questioned, as validation studies are only valid for the data source they are performed on (17).

The use and misuse of bleeding risk scores has recently been discussed (4, 18, 19). Many risk factors for bleeding are also risks for thromboembolism, as it is known that thrombotic and bleeding risks track each other. Given that many bleeding risk factors are reversible, the focus should be on ‘flagging up’ high-risk patients for more careful review and follow up, as well as drawing attention to reversible bleeding risk factors. Unfortunately, most of the risk factors included in the WILL-BLEED cannot be modified, and the authors focus on the surgical technique, continuous hemostatic evaluation with point of care systems and the use of procoagulants as well.

Table 1: The WILL-BLEED score in comparison with ACTION, CRUSADE, Paworth, TRACK and TRUST scores. Shared variables have been noted.

<table>
<thead>
<tr>
<th>Variables</th>
<th>WILL-BLEED Score</th>
<th>Variables shared with scores that have been compared with WILL-BLEED score</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACTION</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CRUSADE</td>
<td></td>
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<td>Paworth</td>
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<td>TRACK</td>
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<tr>
<td>TRUST</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LMWH/ unfractionated heparin</td>
<td>1</td>
<td>/**</td>
</tr>
<tr>
<td>Potent antiplatelet drugs pause &lt;5 days</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Females</td>
<td>2</td>
<td>/  /  /</td>
</tr>
<tr>
<td>Acute coronary syndrome</td>
<td>2</td>
<td>/  /  ***  ***</td>
</tr>
<tr>
<td>Anaemia</td>
<td>3</td>
<td>/  /  /</td>
</tr>
<tr>
<td>eGFR &lt;45 ml/min/1.73m²</td>
<td>3</td>
<td>/  /</td>
</tr>
<tr>
<td>Critical preoperative state</td>
<td>5</td>
<td>**  **</td>
</tr>
<tr>
<td>* Warfarin user. **Defined as low systolic pressure, high heart rate and heart failure. *** Defined as non elective surgery.</td>
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as blood transfusion and blood cell salvage (9).

The highest WILL-BLEED score fell on critical preoperative state (5 points) and secondly, an acute coronary presentation, being both situations usually related. An urgent need for intervention might also be associated with less than five days of antiplatelet drugs withdrawal and the administration of parenteral anticoagulants, as well as anaemia and renal impairment. On this point, meticulous surgery and the administration of procoagulants under a strict monitoring using point-of-care tests could be recommended (20), or delaying the surgery treating the critical vessel with PCI (21).

Patients with atrial fibrillation (AF) presenting with acute coronary syndrome and/or undergoing percutaneous coronary intervention require balancing of the risk of stroke and thromboembolism against the risk of recurrent cardiac ischaemia and/or stent thrombosis, and serious bleeding. Radial access is recommended to avoid procedural bleeding and the shortest maintenance of triple therapy should be used (2). In the setting of CABG, however, several modifications could be made for optimising antithrombotic therapy. First, the use of ticagrelor offers advantages, as three days is sufficient cessation and is associated with less bleeding (22). Using fondaparinux instead of low-molecular-weight heparin also reduces bleeding risk (23), whereas the use of unfractionated heparin confers greatest risk (24).

A good clinical score should balance simplicity, practicality, and predictive utility for use in everyday clinical practice (4). Bleeding risk scores should be applied appropriately and not misused. The continued preoccupation with trying to improve prediction of ‘high risk’ patients with ever more complex scores (and often multiple biomarkers) with only marginal improvement in predictive performance, at the cost of simplicity and practicability, would seem counter intuitive for everyday clinical management. Modifiable risk factors should be corrected when feasible and if not, close clinical follow-up, careful review and meticulous management is needed as part of the holistic management (sometimes called ‘integrated care’) of such patients (Figure 1).

Figure 1: Proposed algorithm for management of bleeding risk factor in patients candidate for coronary artery bypass grafting (CABG).

Conflicts of interest
None declared.

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