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LETTER TO THE EDITOR

4Ts Score and EuroSCORE in cardiac surgery

Anna Vittoria Mattioli[1] · Antonio Manenti[1] · Alberto Farinetti[1]

Dear Sir,

We have read with great interest the paper "Initial and long term impact of a multi-disciplinary task force in the diagnosis and management of Heparin-Induced thrombocytopenia" by Lim et al. [1] and we found their conclusion of importance with a view to clinical prevention.

The authors underline how diagnosis and management of HIT has been changed after a retrospective audit on patients who underwent at least one laboratory testing for HIT.

The audit demonstrated a high frequency of PF4-ELISA testing (n = 54, 66%) in patients that had low 4T scores. Also, a very low percentage of PF4-ELISA-positive cases were confirmed to be SRA positive. If the 4T scoring criteria were initially used prior to PF4-ELISA testing, 54 (65.8%) PF4-ELISAs and 24 (55.8%) SRAs would not have been performed, resulting in a cost savings of $11,850 [2].

On the basis of these data, Authors evaluated the initial and long-term impact and challenges of these institution-wide changes in the diagnosis and management of HIT in the inpatient setting at an academic medical center. They concluded that, despite their efforts, the number of PF4-ELISA testing was already higher than other academic medical centers of similar size [1]. In order to reduce test and to decrease costs they plan to create an electronic order set for 4T score for ELISA-PF4 testing.

With reference to the findings reported in the paper, we would like to make the following contribution to the discussion. We refer the results of our retrospective analysis in post-cardiac surgery patients about the incremental value of 4Ts Score and EuroSCORE for prediction of heparin-induced thrombocytopenia.

The analysis was performed in a group of patients treated with unfractionated heparin undergoing cardiac surgery. Anti-PF4/heparin antibodies were tested in all patients using a commercial immunoassay (Asserachrom H PF4 ELISA kits) [3–5]. Of the 600 patients investigated, 131 (21.8%) were found to have anti-PF4/heparin antibodies in the post-operative period (5–7 days from surgery). All patients had the EuroSCORE [6] value and the 4Ts Score [7] evaluated before surgery As expected the 4Ts Score identify as high probability patients that developed antibodies and we found 22 thrombotic events (16.79%). Within the group of patients that tested negative to anti-PF4/heparin antibodies, the incidence of thrombotic complications was lower (5%) ($p > 0.01$).

A 4T Score > 3 identified medium and high risk and predicted an increased risk of thrombosis in patients independently of the EuroSCORE value and add information for stratification. In these patients the ELIZA test is suggested in order to identify the presence of antibodies. This group had a greater prevalence of antibodies and a greater prevalence of thrombotic complications at 30 days.

A low EuroSCORE value was associated with an exceedingly low hard-event rate (0.4% year) that increases significantly as a function of the 4T's score results. The 4Ts Score yielded incremental value for the prediction of hard events (X 56–88, $p < 0.001$) and significantly stratified patients. In patients with intermediate to high likelihood of complications as predicted by EuroSCORE the 4Ts Score significantly increased the prediction of events.

Our results suggested that cardiac surgery patients are at high risk for coagulation adverse effects, among which the generation of anti-PF4/heparin antibodies. This usually causes a late post-operative thrombocytopenia, and, when persisting, thrombotic complications at different levels [8–10].

The evaluation of the risk of patients had to include the 4Ts Score and the EuroSCORE in order to identify patients more likely to developed anti-PF4/heparin antibodies and

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thrombotic complications. These patients need a more careful follow-up and the ELISA test for anti-PF4/heparin antibodies could help in the management of post-operative anticoagulant therapy. On the other side patients with low risk could avoid PF4/ELISA test. We support the hypothesis by Lim et al. that a HIT task force can reduce the number of inappropriate HIT testing with significant cost savings.

Compliance with ethical standards

Conflict of interest Anna Vittoria Mattioli, Antonio Manenti and Alberto Farinetti declare that they have no conflict of interest.

Ethical approval All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Informed consent Informed consent was obtained from all individual participants included in the study.

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