New insights about quantitative platelet disorders in the cardiac surgery and mechanical circulatory support settings

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Chapter 2:
The occurrence of thrombocytopenia and the current knowledge about platelet function during ECMO in adult patients are often undervalued. This systematic review and meta-analysis, including 7,190 patients [6,698 veno-arterial (V-A) ECMO, and 477 veno-venous (V-V) ECMO] is the only evidence-based analysis on this topic. The study showed that thrombocytopenia and platelet dysfunction are common in ECMO patients, regardless the type of ECMO mode. Moreover, platelet dysfunction plays a role in the process. Blood product transfusions and bleeding events are common complications.

Chapter 3:
In this chapter we present a single-centre trial with the aim to analyze whether the use of a specific sutureless bioprosthesis is linked to postoperative thrombocytopenia. Platelet count decreased both in the sutureless and the rapid deployment valves groups. However, the sutureless group had a lower platelet count from day 3 to discharge. The sutureless valve was an independent predictor of postoperative thrombocytopenia.

Chapter 4:
Thrombocytopenia has been shown to occur soon after surgical biological aortic valve replacement (AVR), and recently reported also after transcatheter valve implantation (TAVI). This systematic review and meta-analysis include 2,163 patients. Perioperative platelet reduction ranged from 35% to 55% in stented-AVR, from 60% to 77% in stentless-AVR, from 53% to 60% in RDV, and from to 21% to 72% in TAVI. Apparently, balloon-expandable valves are more frequently associated to thrombocytopenia. Thrombocytopenia-related major adverse events were mainly reported in TAVI patients, whereas clinically meaningless in surgical patients.

Chapter 5:
This multicentre randomized prospective study investigates the occurrence and the clinical impact of platelet count reduction in patients receiving the sutureless bioprosthesis compared to those receiving standard sutured stented bioprosthetic aortic valve. The sutureless group showed a higher platelet reduction than the control group (46% vs 32%).
The phenomenon was transient in both groups, with a slow recovery of the platelet count by hospital discharge. No differences were observed between groups regarding need of transfusions, blood loss, major bleeding and stroke events.

Chapter 6

This retrospective, multicenter, observational trial comes from the PORTRAIT registry (Post-Operative Thrombocytopenia After Bio-prosthesis Implantation). Its aim was to evaluate the occurrence of peri-operative thrombocytopenia and to analyse the eventual clinical impact of the phenomenon in the surgical patients receiving a stented, rapid deployment (RDV), or stentless bioprostheses. Aortic valve replacement with a bioprosthesis is associated with significant but transient platelet count decrease. RDV patients more likely experience a significative platelet count reduction and related clinical adverse events. A platelet count decrease is associated to ischemic strokes, regardless the bioprosthesis type.

Chapter 7:

This trial derives from the PORTRAIT registry as like as the previous study in Chapter 6. Platelet count reduction is a not fully understood phenomenon occurring after trans-catheter aortic valve implantation (TAVI). Literature reported that patients receiving balloon-expandable valves (BEV) experienced a higher platelet count reduction than self-expandable valves (SEV) patients. The study, enrolling 1.122 TAVI patients aimed to investigate the occurrence and the clinical impact of platelet count decrease after TAVI. BEV and SEV were propensity score-matched in a 1:1 ratio. TAVI is associated with a significant but transient platelet count decrease, regardless of the type of implanted valve. TAVI patients who experience thrombocytopenia are exposed to high complications (i.e., blood product transfusions, long intensive care unit and in-hospital length of stay) and in-hospital mortality rates.

Chapter 8:

This chapter is a letter to the Editor referring to the manuscript by Griffin and colleagues about thrombocytopenia after cardiopulmonary bypass, whose conclusions are that postoperative thrombocytopenia is independently associated with postoperative mortality, acute kidney injury, infection, stroke, and prolonged intensive care unit and hospital length
of stay. However, the authors did not analyse patients undergoing valve surgery who received a biological prosthesis that can be associated with a risk for thrombocytopenia.