Procedure-Specific Bleeding Phenotypes: A Propensity-Matched Comparative Analysis of Postoperative Blood Loss and Transfusion in CABG versus AVR

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Abstract

Objectives: Postoperative bleeding remains a major cause of morbidity, transfusion exposure, and prolonged intensive-care stay after cardiac-surgery. Despite advances in perfusion and anaesthesia, current blood-management protocols often apply uniform transfusion thresholds across operations with distinct haemostatic profiles. Recognising these differences is essential for developing tailored, evidence-based strategies.

Methods: This single-centre retrospective study included adults undergoing elective, isolated on-pump CABG (n = 1,331) and AVR (n = 472) between 2021–2024 at Cork University Hospital. All patients received pre-operative aspirin monotherapy, ensuring antiplatelet uniformity. Data were extracted from integrated ICCA and PATS databases. The primary endpoint was 24-h chest-drain output; secondary endpoints were RBC transfusion ⩽ 48-h and significant bleeding (UDPB ⩾ 2: drain > 801 mL or ⩾ 2 RBC units). Continuous and categorical variables were compared using Mann-Whitney U and χ^2/Fisher tests. Propensity-score matching (1:1 nearest-neighbour, caliper 0.2 SD) adjusted for demographic, operative, and risk variables.

Results: Median [IQR] 24-h drain loss was 710 [550–900] mL after CABG versus 580 [440–800] mL after AVR (p <0.001). RBC transfusion occurred in 39.2% vs 33.2% (p = 0.022). Significant bleeding affected 34.1% vs 29.9% (p = 0.03). After propensity matching, CABG retained higher drain loss and transfusion burden at 12-and 24-hour intervals, confirming the procedure-specific bleeding difference.

Conclusions: CABG patients exhibited higher postoperative blood loss and transfusion needs than AVR, reflecting distinct bleeding phenotypes independent of baseline risk. Tailoring transfusion thresholds to procedure-specific bleeding profiles may substantially improve haemostatic control, reduce transfusion exposure, and enhance efficiency in cardiac-surgery.