Transfusion Algorithms for the Bleeding Cardiac Surgical Patient

1. Learn a practical, clinically relevant transfusion algorithm for use in the bleeding cardiac surgical patient
2. Understand the rationale behind the algorithm
3. Understand the proven benefits of using a transfusion algorithm in cardiac surgery

Point of care hemostasis monitoring has evolved such that measures of coagulation factor function and platelet activity can be obtained on whole blood in a matter of minutes. This development of rapid turn-around, user-friendly laboratory testing has enabled the early detection of hemostasis problems and appropriate treatment. Transfusion algorithms using these point-of-care testing techniques have enabled the rapid acquisition of hemostasis information and thus a reduction in and a more rational blood transfusion strategy for the bleeding patient.

Transfusion algorithms are best designed to look for the expected defect. In cardiac surgical hemorrhage, this defect would be platelet function. The most expected defects should be tested for early, and other defects tested either later, or simultaneously. In this way, ordering of blood products can be rational and not wasteful. Transfusion algorithms using thromboelastography (TEG®) have been well-studied and have demonstrated reductions in transfusions and chest tube drainage in complex cardiopulmonary bypass (CPB) cases. The use of the maximal amplitude (MA) as a marker of platelet function is the measure of platelet function that guides transfusion decision. Royston and Kier have used the TEG MA and other TEG values to stratify a quantitative approach to transfusion. They direct transfusion of small volumes for small defects in the test result, and larger volumes for more major coagulation test abnormalities.

Other platelet function tests have been used in transfusion algorithms in clopidogrel-treated patients and have allowed reduced transfusion volumes. One of these tests is the Platelet Function Analyzer-100® used by Chen and colleagues to reduce FFP and platelet transfusion. The ROTEM® thrombelastographic monitor is another monitor...
that has been used more extensively in Europe but is now approved for use in the United States. ROTEM-guided transfusion therapy has allowed for the early intervention with non-allogeneic blood products to reduce FFP and platelet transfusions. The use of certain assays such as the FibTEM and the ExTEM are specific tests of fibrinogen and extrinsic coagulation respectively. Through early intervention with recombinant fibrinogen, the transfusion of allogeneic blood products can be minimized. Similarly, the use of prothrombin complex concentrates in response to a prolonged clotting time (ExTEM, InTEM) can supplant the transfusion of FFP and dramatically and has resulted in a reduced number of allogeneic transfusions.

In summary, the use of transfusion algorithms changes clinician behavior. Practitioners are forced to think rationally about hemostasis abnormalities and to wait a 10-15 minute interval for point-of-care test results to return. With more accurate information about the hemostatic system, a more practical approach to the specific hemostasis problem can be employed, and transfusion volumes are ultimately reduced.

References:


