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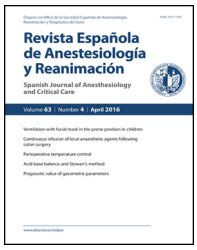

ORIGINAL ARTICLE

Thromboelastometry as guidance for blood management in patients undergoing cardiac surgery☆

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KEYWORDS
Thromboelastometry;
Cardiac surgery;
Blood products management;
Point-of-care testing

Abstract
Objective: Thromboelastometry is a viscoelastometric method for haemostasis testing in a whole blood sample. The aim of this study was to assess the results of using thromboelastometry as guidance for blood management in cardiac surgery, postoperative adverse events and ICU stay.
Material and method: Analytical and comparative non-randomised quasi-experimental prospective study with a retrospective control group. The inclusion criteria for the 80 patients were: patients undergoing cardiac surgery who had had prior cardiac surgery, endocarditis surgery or aortic arch surgery. Thirty-one patients were treated following routine transfusion practice during surgery (group A). The other 49 patients were treated with thromboelastometrically guided transfusion algorithms (group B).

The main objective was blood products transfused, and postoperative adverse events and ICU stay were the secondary objectives.
Results: Statistical analysis showed lower transfusion rates of fresh-frozen plasma in group B compared to group A ($p < 0.001$), as well as red blood cell transfusion during surgery with an average transfusion rate of 3.9 units in group A in comparison to 2.67 units in group B ($p = 0.125$). Moreover, fibrinogen infusion was increased in group B compared to group A ($p = 0.019$). In addition, a lower rate of respiratory adverse events was found in group B ($p = 0.019$). There was a significant decrease in ICU stays over 7 days in group B compared to group A ($p = 0.031$).

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Conclusions: Using thromboelastometry guidance for blood management led to a meaningful reduction of fresh frozen plasma transfusion during surgery. This probably resulted in a reduction in respiratory adverse events after surgery and length of ICU stay in our patients.

PALABRAS CLAVE
Tromboelastometría;
Cirugía cardiaca;
Transfusión de hemoderivados;
Test a pie de cama

Tromboelastometría como guía de administración de hemoderivados en cirugía cardiaca

Resumen
Objetivo: La tromboelastometría evalúa la coagulación analizando la viscoelasticidad de una muestra de sangre. Nuestro objetivo principal fue evaluar los resultados de su uso como guía de administración de hemoderivados en cirugía cardiaca y, secundariamente, las complicaciones postoperatorias y el tiempo de hospitalización en UCI.
Material y método: Estudio analítico, de intervención, cuasiexperimental, comparativo, no aleatorizado, prospectivo, con un grupo control retrospectivo. Se incluyeron 80 pacientes reintervenidos de cualquier cirugía cardiaca, o cirugías por endocarditis o del arco aórtico. En 31 pacientes los hemoderivados intraoperatorios se administraron según pautas clínicas tradicionales (grupo A). Los 49 pacientes restantes recibieron hemoderivados siguiendo algoritmos basados en el análisis tromboelastométrico (grupo B). El objetivo principal fue la administración de hemoderivados y los objetivos secundarios fueron: estancia en UCI y complicaciones postoperatorias.
Resultados: Hubo una importante disminución en la administración de plasma fresco congelado en el grupo B respecto al A ($p < 0{,}001$), así como una disminución en la transfusión intraoperatoria de sangre: 3,9 concentrados de hematíes de media por paciente en el grupo A frente a 2,67 en el grupo B ($p = 0{,}125$). Se incrementó la administración de fibrinógeno, con una $p < 0{,}019$. Se encontró una menor tasa de complicaciones respiratorias ($p = 0{,}019$) en el grupo B y una reducción significativa de las estancias mayores de 7 días en el grupo B respecto al A ($p = 0{,}031$).
Conclusiones: La tromboelastometría condujo a una importante disminución en la utilización de plasma fresco congelado, contribuyendo muy probablemente al descenso en la incidencia de complicaciones respiratorias y en la menor estancia en UCI.

Introduction

Cardiac surgery is one the costliest procedures in terms of blood products. Transfusion rates vary, depending on the experience of the hospital, the professionals involved, and the type of surgery. In contrast to other interventions, no global consensus on the management of intraoperative bleeding in cardiac surgery has yet been reached.[1]

In the case of cardiopulmonary bypass patients, a number of circumstances can aggravate the risk of coagulation abnormalities and microvascular bleeding[2]: advanced age, preoperative administration of antiplatelet drugs and anticoagulants, the use of a cardiopulmonary bypass (CPB) pump, severe hypothermia, anticoagulation with high doses of heparin, platelet activation and subsequent dysfunction, haemodilution and fibrinolysis. The CPB induces a systemic inflammatory response with activation of both the coagulation and fibrinolytic systems, followed by coagulopathy caused by factor consumption and transiently reduced platelet count and function.[3] This is considered one of the major causes of increased morbidity and mortality in patients undergoing cardiac surgery.[4]

Recent studies have shown that haemostasis and prognosis are improved when algorithm-based transfusion protocols are used instead of strategies based on the individual decisions of treating physicians.[5–7] Based on this premise, the use of point-of-care coagulation tests is gaining ground over traditional laboratory tests.[8,9] The latter, though useful, are time consuming, and in the case of an intraoperative haemorrhage, immediate results are usually needed in order to take the most appropriate therapeutic decision. Tests such as thromboelastometry are proving useful as a guide for blood transfusion, since they provide a comprehensive, dynamic picture of coagulation parameters by analysing the viscoelasticity of a small sample of whole blood. They can provide information on clot initiation, formation, stability, solidity and dissolution kinetics,[10] and give a picture of the patient's haemostatic status within 2–3 min, thus reducing the need for blood transfusion and optimising haemostasis.[11–13]