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SCIENTIFIC ARTICLE

Postoperative excessive blood loss after cardiac surgery can be predicted with International Society on Thrombosis and Hemostasis scoring system

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KEYWORDS
Cardiac surgery;
Coagulation;
Disseminated intravascular coagulopathy;
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Transfusion

Abstract
Background and objective: Prediction of postoperative excessive blood loss is useful for management of Intensive Care Unit after cardiac surgery. The aim of present study was to examine the effectiveness of International Society on Thrombosis and Hemostasis scoring system in patients with cardiac surgery.
Method: After obtaining approval from the institutional review board, the medical records of patients undergoing elective cardiac surgery using Cardio-Pulmonary Bypass between March 2010 and February 2014 were retrospectively reviewed. International Society on Thrombosis and Hemostasis score was calculated in intensive care unit and patients were divided with overt disseminated intravascular coagulation group and non-overt disseminated intravascular coagulation group. To evaluate correlation with estimated blood loss, student *t*-test and correlation analyses were used.
Results: Among 384 patients with cardiac surgery, 70 patients with overt disseminated intravascular coagulation group ($n = 20$) or non-overt disseminated intravascular coagulation group ($n = 50$) were enrolled. Mean disseminated intravascular coagulation scores at intensive care unit admission was 5.35 ± 0.59 (overt disseminated intravascular coagulation group) and 2.66 ± 1.29 (non-overt disseminated intravascular coagulation group) and overt disseminated intravascular coagulation was induced in 29% (20/70). Overt disseminated intravascular coagulation group had much more EBL for 24 h ($p = 0.006$) and maintained longer time of intubation time ($p = 0.005$).

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Conclusion: In spite of limitation of retrospective design, management using International Society on Thrombosis and Hemostasis score in patients after cardiac surgery seems to be helpful for prediction of the post- cardio-pulmonary bypass excessive blood loss and prolonged tracheal intubation duration.

PALAVRAS-CHAVE
Cirurgia cardíaca;
Coagulação;
Coagulação intravascular disseminada;
Morbidade;
Transfusão

A perda sanguínea excessiva no pós-operatório de cirurgia cardíaca pode ser prevista com o sistema de classificação da Sociedade Internacional de Trombose e Hemostasia (ISTH)

Resumo
Justificativa e objetivo: A previsão de perda sanguínea excessiva no pós-operatório é útil para o manejo em Unidade de Terapia Intensiva (UTI) após cirurgia cardíaca. O objetivo do presente estudo foi examinar a eficácia do sistema de classificação da Sociedade Internacional de Trombose e Hemostasia (ISTH) em pacientes submetidos à cirurgia cardíaca.
Método: Após obter a aprovação do Conselho de Revisão institucional, os prontuários de pacientes submetidos à cirurgia cardíaca eletiva usando Circulação Extracorpórea (CEC) entre março de 2010 e fevereiro de 2014 foram retrospectivamente revisados. O escore ISTH foi calculado na UTI, e os pacientes foram divididos em dois grupos: grupo com Coagulação Intravascular Disseminada (CID) manifesta e grupo com CID não-manifesta. Para avaliar a correlação com a Perda Estimada de Sangue (PES), o teste *t* de Student e as análises de correlação foram utilizados.
Resultados: Dentre os 384 pacientes submetidos à cirurgia cardíaca, 70 pacientes com CID manifesta (n = 20) ou CID não manifesta (n = 50) foram incluídos. As médias dos escores CID na admissão na UTI foram 5,35 ± 0,59 (Grupo CID manifesta) e 2,66 ± 1,29 (Grupo CID não manifesta) e induzida CID manifesta em 29% (20/70). O grupo CID manifesta apresentou PES superior durante 24 horas ($p = 0,006$) e um tempo maior de intubação ($p = 0,005$).
Conclusão: Apesar da limitação do desenho retrospectivo, o uso do escore ISTH para o manejo de pacientes após cirurgia cardíaca parece ser útil para prever a perda sanguínea excessiva pós-CEC e o prolongamento da intubação traqueal.

Introduction

Excessive perioperative bleeding continues to complicate cardiac surgery with Cardio-Pulmonary Bypass (CPB) in spite of improvements in extracorporeal oxygenation and surgical techniques. Patients after cardiac surgery with CPB has various causes of bleeding.[1,2] Defective surgical hemostasis and acquired transient platelet dysfunction mainly cause bleeding in patient with CPB. After starting CPB, hemodilution causes platelet counts to decrease to approximately 50% of preoperative levels rapidly and even is the progressive loss of platelet function and prolonged PT and PTT and low fibrinogen levels are also attributable to dilution coagulopathy. Drug induced causes also attributed the perioperative bleeding[3] and unknown mechanisms contribute to decrease in platelet counts and platelet dysfunction during CPB.[4] In addition, the balance of pro-coagulation and anticoagulation is profoundly disturbed in Cardio-Pulmonary Bypass (CPB) patients. Both extensive contact between blood and non-endothelial surfaces of the bypass circuit and the release and reinfusion of tissue factor lead to increased thrombin generation during CPB.[5–7] These results cause fibrin formation, fibrinolysis, and platelet activation, despite full heparinization.[5,8] Thus, during CPB, it thought that hyper-fibrinolysis is a secondary phenomenon induced by the activation of coagulation factors. Activation of factor XII and thrombin have been demonstrated to induce the release of tissue-type plasminogen activator from endothelium. Therefore, it attenuates the effects of both thrombin and plasmin to maintain coagulation homeostasis during CPB, as unrestricted thrombin and plasmin activation ultimately lead to consumption of coagulation factors and platelets (i.e. a disseminated intravascular coagulation state during CPB).[7,8] Therefore, variable reasons are contributed in the patients undergoing unpredicted excessive blood loss.

The prediction of postoperative excessive blood loss after cardiac surgery with CPB has been hampered by lack of a specific diagnostic test. No single clinical sign or laboratory test has been found to possess sufficient diagnostic accuracy for confirming or rejecting the diagnosis of postoperative excessive blood loss.[9]

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