Journal of Clinical Anesthesia 44 (2018) 23–31

Contents lists available at ScienceDirect

Journal of Clinical Anesthesia

The effect of tranexamic acid to reduce blood loss and transfusion on off-pump coronary artery bypass surgery: A systematic review and cumulative meta-analysis

Zhao Dai, M.M, Haichen Chu, MD, Shiduan Wang, MD, Yongxin Liang, MD *

Department of Anesthesiology, The Affiliated Hospital of Qingdao University, 16 Jiangsu Road, Qingdao 276000, China

ARTICLE INFO

Article history:
Received 12 August 2017
Received in revised form 10 October 2017
Accepted 14 October 2017

Keywords:
Coronary artery bypass grafting (CABG)
Off pump
Fibrinolytic therapy
Tranexamic acid

ABSTRACT

Study Objective: To assess the safety and efficacy of tranexamic acid (TA) on off-pump coronary artery bypass (OPCAB) surgery.
Design: Meta-analysis.
Setting: Operating room, OPCAB surgery, all surgeries were elective measurements. Searching the following data sources respectively: PubMed/MEDLINE, the Cochrane Library, EMBASE and reference lists of identified articles, we performed a meta-analysis of postoperative 24 h blood loss, postoperative allogeneic transfusion, re-operation for massive bleeding, postoperative mortality, and postoperative thrombotic complications.
Main results: Using electronic databases, we selected 15 randomized control trials (RCTs), carried out between 2003 and 2016, with a total of 1250 patients for our review. TA significantly reduced the postoperative 24 h blood loss (mean difference −213.32 ml, 95% confidence intervals, −247.20 ml to −179.43 ml; $P < 0.0001$). And, TA also significantly reduced the risk of packed red blood cell (PRBCs) transfusion (risk ratio 0.62; 95% confidence intervals 0.51 to 0.76; $P < 0.0001$) and fresh frozen plasma (FFP) transfusion (0.65; 0.52 to 0.81; $P < 0.001$). There were no statistical significance on platelet transfusion (risk difference −0.00, 95% confidence interval −0.02 to 0.02; $P = 0.73$) and re-operation (0.00, −0.02 to 0.02; $P = 1.00$). No association was found between TA and morbility (risk difference −0.00, 95% confidence interval −0.02 to 0.02; $P = 0.99$) and thrombotic complications (−0.01, −0.01 to 0.02; $P = 0.70$).
Conclusions: TA reduced the probability of receiving a PRBCs and FFP transfusion during OPCAB surgery. And no association with postoperative death and thrombotic events was found. However, further trials with an appropriate sample size are required to confirm TA safety in OPCAB surgery.

Contents

* Corresponding author.
E-mail address: liangzi66@hotmail.com (Y. Liang).

https://doi.org/10.1016/j.jclinane.2017.10.004
0952-8180/

1. Introduction

Post-operative hemorrhage is considered as one of the major concerns in cardiovascular surgery [1]. And excessive postoperative bleeding after cardiac surgery increases transfusion requirements, which is associated with postoperative infections and ischemic events [2]. Since fibrinolysis can contribute to bleeding after cardiac surgery, the administration of antifibrinolytics appears to be a suitable approach to reducing postoperative bleeding in the patient presenting for on-pump CABG surgery. Results from previous trials have shown that TA reduces blood loss and transfusion in cardiopulmonary bypass surgery [3–5].

Since the early 1990s, CABG surgery performed off-pump has become an established alternative surgical technique [6]. OPCAB surgery can be performed with low risk of postoperative bleeding and blood transfusion [7]. Additionally, a greater level of activation of fibrinogen associated with OPCAB surgery compared with on-pump CABG might result in a higher incidence of adverse thrombotic events [8]. Therefore, TA may be less effective for off-pump surgery, and its safety profile may be different. The aim of this study was to provide a meta-analysis including 15 randomized controlled trails [4,9–22] to examine the efficacy and safety of TA in OPCAB surgery.

2. Materials and methods

According to the criteria of the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) statement, we

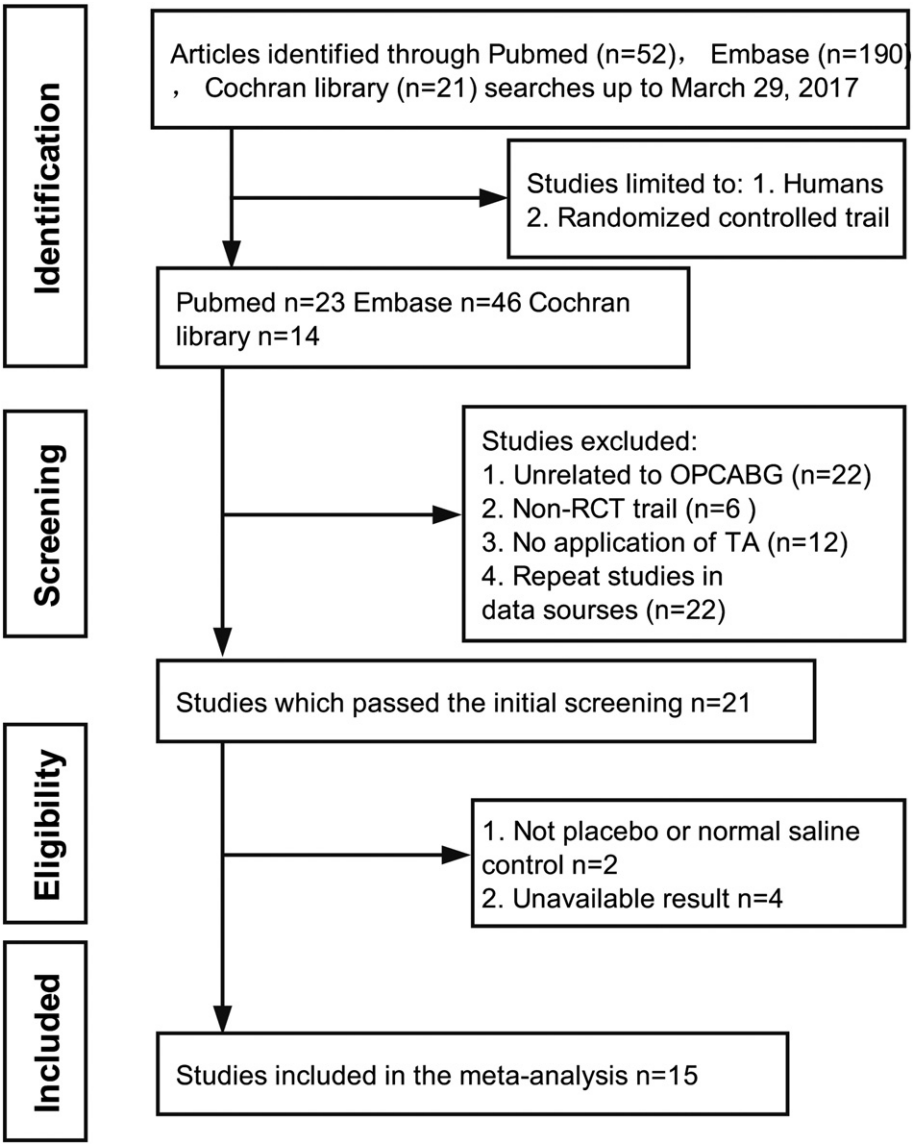

Fig. 1. A detailed breakdown of the search strategy used in identifying the 15 randomized controlled trials that were used within the review and meta-analysis.