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PROPHYLACTIC USE OF TRANEXAMIC ACID IN OFF PUMP CORONARY ARTERY BYPASS SURGERY: RETROSPECTIVE ANALYSIS

Anaesthesiology

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ABSTRACT

BACKGROUND: Off pump coronary artery bypass surgery is often associated with significant blood loss and allogenic blood transfusion and use of antifibrinolytic agent like tranexamic acid has a potential in mitigating these side effects.

METHODS: Forty two patients who underwent elective OPCAB surgery were analyzed retrospectively. All patients after standard narcotic induction received bolus intravenous dose of tranexamic acid 10 mg/kg before skin incision. Data was analyzed for 24-hour postoperative chest tube drainage, blood products transfusion, morbidity and mortality.

RESULTS: Mean intraoperative blood loss was 450 + 91.73 ml and 24 hours drainage was 450 + 91.73 ml. PRBC transfusion was required in 9.5% patients. There were no thrombotic complications, stroke, renal failure and mortality.

CONCLUSION: Prophylactic tranexamic acid is a safe strategy during OPCAB to reduce peri-operative blood loss.

KEYWORDS

INTRODUCTION:

Coronary artery bypass graft surgery results in bleeding and coagulopathy in the perioperative period. Literature suggests that OPCAB surgery also causes activation of the fibrinolytic pathway due to surgical trauma, use of heparin and protamine.[1]

Even though OPCAB is associated with less intraoperative blood loss than on pump CABG; incidence of allogenic blood transfusions is still high (approximately 30%) in OPCAB surgery.[2–4]

Methods to reduce these also prevents various risks and side effects associated with blood transfusion.[5,6]

Tranexamic acid being a synthetic antifibrinolytic drug is a promising pharmacologic agent in this regard. It has been shown to reduce blood loss and transfusion requirements in cardiac surgery.[7–9]

Although its results in OPCAB are inconsistent and controversial, it appears to be effective in reducing postoperative bleeding. [10,11] This retrospective study is aimed to add evidence to the existing literature on this aspect.

METHODS:

Forty two patients who underwent elective OPCAB surgery in between January 2018 to July 2018 were analyzed. All patients had stopped their aspirin and clopidogrel 5 days before surgery. Patients with combined valvular and bypass surgery, redo cardiac surgery, history of stroke, renal dysfunction (creatinine > 1.5 mg/dl), bleeding disorder were excluded. All patients received premedication with oral alprazolam 0.5 mg in the morning of surgery as anxiolytic. After standard narcotic induction with fentanyl 5-10 mcg/kg, titrated doses of etomidate, midazolam 0.1 mg/kg and vecuronium 0.1mg/kg; tranexamic acid 10 mg/kg IV bolus was administered before skin incision. Surgical technique included left internal mammary artery to LAD and saphenous vein grafts to OM and RCA. Titrated dose of Heparin upto 2 mg /kg was given to maintain ACT 300-350 seconds which was neutralized by protamine. Packed RBC transfusion was given to maintain Hb > 8 gm%. Fresh frozen plasma (FFP) was transfused in case of diffuse bleeding with INR > 1.5. Platelets were transfused to keep > 100000/mm^3. Surgical re-exploration criteria included chest tube drainage > 400 mL/h in the first 2 postoperative hours or >200 mL/h for 4 consecutive hours.

Primary parameters of the study included intraoperative blood loss and total chest tube drainage at 24 hours. Other outcomes included need for transfusion and any complications like renal failure, stroke, acute myocardial infarction and mortality.

RESULTS:

Total 42 patients were assessed in the study. 31 male and 11 female patients were analyzed with respect to the baseline demographic data and surgical characteristics. (Table 1) Mean left ventricular ejection fraction was 50.9 ± 9.58 %. Mean intra-operative blood loss was 450 ± 91.73 ml. Total postoperative chest drainage was 450 ± 91.73 ml. Four patients (9.5%) required packed RBC transfusion while 5 (11.9%) needed FFP transfusion. Two patients required platelets transfusion. No significant complications were encountered. There was no mortality and acute myocardial infarction following surgery. We did not encounter any peri-operative stroke and renal failure requiring dialysis. Four patients (9.5%) required intra-aortic balloon pump (IABP) during surgery while none were converted on cardio pulmonary bypass support. No patient was taken up for re-exploration. Mean ICU and hospital stay was 3.05 ± 0.58 and 7.12 ± 0.99 days respectively.

TABLE 1. Characteristics and outcomes of patients

Parameter	Study group
Age (yrs)	61.57 ± 10.13
Sex	Male 31 Female 11
Weight (kg)	64.02 ± 12.78
Height (cms)	162.1 ± 9.16
Diabetes	30/42
Hypertension	34/42
Ejection fraction (%)	50.9 ± 9.57
Number of grafts	3.02 ± 0.71
Total intraoperative blood loss (ml)	450 ± 91.13
Chest tube drainage (ml)	307.14 ± 95.36
PRBC transfusion	4/42
FFP transfusion	5/42
Platelets transfusion	2/42
IABP requirement	4/42
Surgery duration (min)	186.67 ± 21.71
ICU stay (days)	3.05 ± 0.58
Hospital stay (days)	7.12 ± 0.99
Mortality	0

DISCUSSION:

Present retrospective analysis was done to find out an impact of intra-operative use of tranexamic acid during OPCAB. Our protocol included single pre-incision bolus intravenous dose of tranexamic acid without further continuous infusion. However, our findings are in accordance with the other studies which concluded significant reduction in bleeding after OPCAB surgery.[11,12]

OPCAB surgery is associated with reduced blood loss as compared with on-pump CABG. [13] Hence, it is thought that tranexamic acid may

not be required in such cases. However, activation of the fibrinolytic pathway still occur during off-pump procedures because of surgical trauma,pericardiotomy, graft harvesting, manipulation of the heart, and exposure to heparin and protamine.[1] One study reported no difference in the mean 24-hour chest tube drainage between off-pump and on-pump coronary bypass surgery.[2] Incidence of allogenic blood transfusion in OPCAB surgery was still 28.4% as demonstrated in one study.[3]

The results of the present study demonstrate that TA reduces 24-hour blood loss and the risk of exposure to allogenic blood transfusion in OPCAB surgery. There was no evidence that TA increases the risk of postoperative mortality and thrombotic complications.

Tranexamic acid by decreasing fibrinolysis has a significant impact over reduction in peri-operative blood loss and transfusion practices. [4,12] Few studies, however, did not observe a statistically significant difference in the need for allogenic transfusions due to their small sample size. [11,12] Authors however, are of the opinion that the sound surgical technique of coronary anastomosis and manipulation of the heart without causing major hemodynamic instability also plays role in peri-operative blood loss in OPCAB surgery.

This study supports findings of reduction in PRBCs transfusion in OPCAB surgery. It has been found useful even in reducing FFP transfusion in dual antiplatelet-treated anemic patients.[14]

Tranexamic acid has been correlated with the major incidence of thrombotic incidences after coronary bypass surgery in the past. [15,16] However, recent meta analysis did not found any association between tranexamic acid and thrombotic events after OPCAB surgery.[4] Recent ATACAS trial suggested no evidence of higher risk of death or thrombotic complications with the use of TA coronary artery surgery.[17]

Limitations of the study include its retrospective nature apart from the fact that no control group as compared. We also excluded redo surgical cases, renal failure and hepatic insufficiency patients which would have greatly validated these results.

CONCLUSION:

Tranexamic acid appears to be safe and effective in controlling postoperative bleeding in OPCAB surgery.

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