Does Intraoperative Autologous Blood Transfusion in Coronary Artery Bypass Grafting Surgery Reduce the Incidence of Postoperative Mediastinal Bleeding?

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Abstract

Objective- Mediastinal bleeding and blood transfusion have been an important accompaniment of open heart surgery. Increasing attempts are being made to minimize blood loss and blood transfusion in cardiac surgery. We investigated the effect of intraoperative autologous donation (IAD) on need for homologous transfusion post-coronary artery bypass graft surgery (CABG).

Methods- 202 adult patients scheduled for elective CABG operation were randomly assigned to IAD (n=101) or control groups (n=101). We obtained 500ml fresh whole blood from the IAD patients while the patients were prepared for anesthesia in the operating room. This amount of blood was replaced with Ringer's solution. After completion of the operation and neutralization of heparin, this blood was re-infused to the patients. The amount of bleeding and infused blood products were measured and compared in both groups.

Results- The present study demonstrated that IAD did not significantly reduce post-operative mediastinal bleeding, although it had a positive effect on reducing homologous transfusion.

Conclusions- It seems that IAD can reduce homologous blood transfusion (although not significantly), but for prevention of bleeding some simple points such as mild hypothermia instead of moderate hypothermia, reduced heparin dose with newer tubing systems and oxygenators and precise hemostasis are more prominent ***(Iranian Heart Journal 2009; 10 (4):37-39).***

Key words: autologous transfusion ■ coronary artery bypass graft

Nearly 20% of blood transfusions in the United States are associated with cardiac surgery[1]. 68% of patients undergoing primary elective coronary artery bypass graft (CABG) surgery received homologus blood transfusion[2]. Because of cost concerns, adequacy of blood supply and fear of transmission of HIV and other infections, increasing attempts including intraoperative autologus donation (IAD), non-blood prime, return of all residual cardiopulmonary bypass (CPB) circuit blood, intraoperative salvage, use of the lowest safe level of anemia during CPB as well as in the postoperative period and reinfusion of shed mediastinal blood are being made to minimize blood transfusion in surgical procedures[3]. The purpose of our study was to evaluate the impact of IAD on postoperative mediastinal bleeding and hence the need for transfusion.

Methods

Patients referred for elective first-time isolated CABG at Golestan hospital, Ahvaz, Iran, between September 2006 and December

Received May 21, 2009; Accepted for publication Jan. 4, 2010

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2007 were candidates for inclusion in this study. Patients with a hemoglobin (Hb) level of less than 12g/dl were excluded.

Patients were randomly allocated according to the day of operation. We operated the patients on Saturday, Monday and Wednesday. At first Saturday we obtained 500ml fresh whole blood from the patient while preparing for anesthesia in the operating room. This volume was replaced by Ringer's solution (acute normovolemic hemodilution). On the next Monday, no whole blood was obtained but was on the next Wednesday.

The obtained blood was reinfused to the patient just after CPB discontinuation and heparin neutralization. This policy was continued until 202 cases were gathered in the two groups; 101 patients who received autologus blood and 101 cases who did not.

The preoperative factors are summarized in Table I. As expected, women are more anemic and thus are less suitable for IAD.

Table I. Comparison of preoperative characteristics in the two groups

	IAD group (n = 101)	Control group (n = 101)	P value
Age (years)	55 ± 4.3	57.8 ± 9.5	0.07
Male sex (no.)	79 (78.2%)	42 (41.6%)	0.0001
Diabetes	34 (33.7%)	39 (38.6%)	0.46
COPD	45 (44.6%)	33 (32.6%)	0.08
No of grafted vessels / patient	3.3 ± 0.73	3.1 ± 0.70	0.06
Additive Euroscore	2.2 ± 1.30	2.5 ± 1.20	0.07
Logistic Euroscore	2.3 ± 1.54	2.3 ± 1.10	0.72

Preoperatively, blood coagulation tests including prothrombin time, partial thromboplastin time, clotting time, bleeding time and platelet count in addition to Hb level were tested. All were in normal ranges in both groups.

Surgical procedure

Under full hemodynamic monitoring and after premedication with midazolam 0.45mg/kg and fentanyl 7µg/kg in the operating room, the patients were anesthetized with sodium thiopental 3.5mg/kg, followed by atracurium 0.5mg/kg to facilitate endotracheal intubation.

CABG was performed with a roller pump (Stöckert S3, Munich, Germany) and membrane oxygenators. Mild hypothermia (33° C) without local ice was used. We did not use a cell saving device. After completing the distal and proximal anastomoses, the aortic cross-clamp was removed. Left internal thoracic artery in addition to saphenous vein grafts were used for all cases in both groups.

Results

The amount of bleeding from one hour up to 48 hours after operation was measured and compared in the two groups (Table II).

Table II. Comparison of postoperative bleeding between the two groups

Amount of bleeding from 1-48 hr Postoperatively	IAD group (n = 101)	Control group (n = 101)	P value
Up to 599 ml (mild)	32	54	0.002
600-1199ml (mild to moderate)	59	33	0.0001
1200- 1799ml (moderate to severe)	8	11	0.47
More than 1800ml (severe)	2	3	0.65

Mild to moderate bleeding was significantly more in the IAD group. The amount of blood or blood products needed to be infused postoperatively is summarized in Table III.

Table III. Amount of blood and / or blood products infused postoperatively

Product	IAD group (n = 101)	Control group (n = 101)	P value
Whole blood (ml/pts)	16600/32	32150/42	0.14
Packed Red cell (ml/pts)	7250/22	14700/37	0.02
Fresh Frozen Plasma (ml/pts)	12550/17	7800/15	0.70
Platelets (ml/pts)	700/2	750/1	0.62

ml, milliliter; pts, patients

It seems that in spite of more mild to moderate mediastinal bleeding, the need for homologous blood transfusion in the IAD group is less.

Conclusion

It seems that IAD can reduce homologous blood transfusion requirement (although not significantly), but for prevention of bleeding some simple points such as mild hypothermia instead of moderate hypothermia; reduced heparin dose with newer tubing systems and oxygenators and precise hemostasis are more prominent.

Acknowledgement

We would like to thank Khadijeh Mottaghi, surgical database manager at the Golestan hospital; Seyed Mahmoud Latifi, statistician at the Faculty of Health and Alireza Gachkooban for their help in preparing this study.

Conflict of Interest

No conflicts of interest have been claimed by the authors.

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