

Correlation between type of blood group and post operative bleeding in coronary artery bypass graft surgery

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Abstract

Aims. Various and controversial reports are present about correlation of different diseases and their complications with type of blood group. This study was done for assessing correlation between type of blood group and post operative bleeding in coronary artery bypass graft surgery.

Methods. In this retrospective study, amount of bleeding was measured in 228 non-emergency patients in first 24 hours after coronary artery bypass graft surgery, and its correlation with type of blood group and other parameters was evaluated.

Results. Maximum bleeding rate was observed in AB blood group with mean of 1672 ml. and minimum bleeding rate was observed in O blood group with mean of 1365 ml. Statistical test of variance analysis didn't confirm meaningful correlation between type of blood group and amount of post operative bleeding. Also there was no meaningful correlation between variables of number of grafts, reoperation due to massive bleeding, pumping time and duration of operation with type of blood group.

Conclusion. Although results were not significant, due to clinical importance, it is concluded that patients with AB blood group, especially Rh⁻, had more bleeding after CABG surgery than other blood groups.

Keywords: Blood Group, Bleeding, Coronary Artery Bypass Graft Surgery

Introduction

There are various and contradictory reports about correlation between diseases and types of blood group [1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11]. The correlation between O blood group and digestive ulcers has been addressed in medical sources from many years ago [12, 13], however, the same studies have rejected the clinical relationship between helicobacter infection and the types of blood group [10,14].

Malaria prevalence is lower in AB blood group [15]. The chance of myasthenia in Rh⁻ individuals is three times more than Rh⁺ individuals [16]. The probability of cardiac vessels disease is more in AB blood group, especially Rh⁻, and less for O blood group [17, 18]. On the one hand, in a study done with aim of determining the risk factors and the correlation between blood groups and myocardial infarction, it is reported that considering blood groups of Hamadan province of Iran, the most affected individuals are of A, then AB,O and B blood group, respectively [19]. Lewis blood group is correlated with diabetes, hypercholesterolemia and cardiac vessels diseases [20] and the probability of hyperparathyroidism in O blood group is more than the other groups [21].

Lung function is weaker in A and B blood groups and as a result the probability of pulmonary infection disease and chronic obstructive pulmonary disease or

COPD is more in mentioned groups. Min Su, et al. (2001) reported that the relationship between larynx cancer and men with B blood group is significant (meaningful) [23]. Finally, Green et al. in their study on 1714 samples, examining the relationship between blood groups and coagulating factors, reported that amount of VIII factor and VonWillebrand factor is lower in O blood group and as a result the probability of coagulation problem is more in this group. On the other hand, in white men of AB, A, B and Lewis blood group coagulation problem have been high due to lack of these factors [24], and as a result the probability of vessel's thrombosis is high in this groups [25]. Therefore, this study was designed to examine the relationship between amount of post operative bleeding in coronary artery bypass graft surgery with the type of blood group.

Methods

In the retrospective study, records of 228 patients who underwent Coronary Artery Graft surgery in 1383 were examined. Sampling conditions were:

- The main surgeon of surgical team was the same for all patients.
- Surgical emergency cases were excluded from sampling.

c) Anti-coagulating medicines such as Aspirin, Dipyridamol etc. were stopped before surgery. Then, the amount of bleeding was recorded per hour after patients' admission to ICU for 24 hours. Also, the amount of blood consumption and related products, duration of surgery, duration of cardio-pulmonary pumping and the graft number were recorded. Data was analyzed using SPSS 11.5 Software, ANOVA (variance analysis) and Chi square statistical tests.

Results

Based on the results of the study, the average age of patients were 51±19 years, with the age range of 31 to 82 years. 198 patients were male (86.8%) and 30 patients were female (13.2%). Diagram 1 shows the frequency distribution of patients' blood group present in this study with the frequency of Iran's normal population blood group and those of Tehran. The prevalence of coronary artery Graft surgery shows increase in this study in A blood group with the rate of 37.7% for 30.25% Iran's normal population and 31.51% Tehran's normal population, and AB blood group with the rate of 10.1% for 7.7% Iran's normal population and 7.62% Tehran's normal population. Diagram 2 shows the comparison of blood group's frequency in patients of current study with patients who experienced myocardial infarction in 1993.

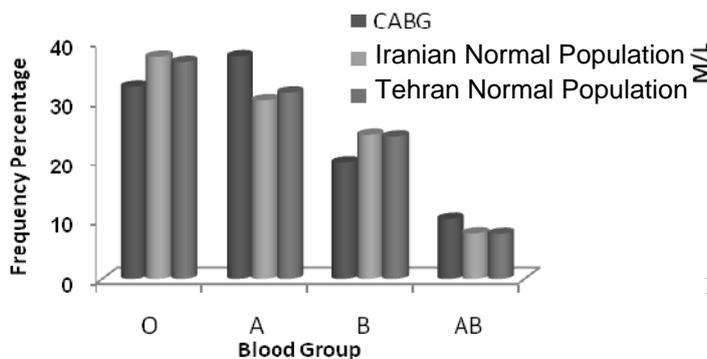


Diagram 1- Comparing the frequency of blood groups in Iran and Tehran normal population

3-4 blood vessels were grafted in 82% of patients in current study. 12 (5.3%) of the total number of 228, needed reoperation. In mentioned individuals, the average volume of bleeding was 1567ml. till their return to operating room (with range of 750-3230ml). The average time of cardio-pulmonary pumping was 85 min and the average time of surgery from the starting point until entering ICU was 5 hours.

Diagram 2- Comparing the frequency of blood groups in CABG patients in 1383 and heart attacked patients in 1372

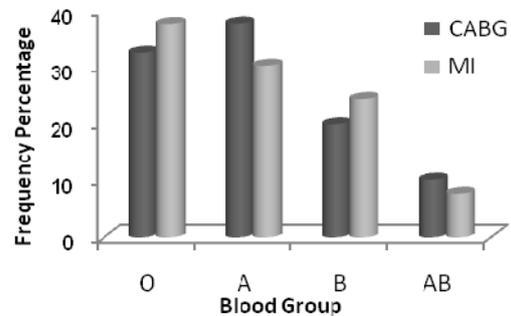


Diagram 3 compares the bleeding mean by ml in various types of blood groups. The bleeding mean at 24 hours after surgery was 1672 ml in AB blood group, 1492 ml in B blood group and 1365 ml in O blood group. According to the results of the statistical analysis, there were not any significant relationship among the amount of bleeding, cardio-pulmonary pump time, duration of surgery, and blood group type. Also, the minimum amount of post operative bleeding in O⁻ blood group (540 ml) and the maximum amount of bleeding in AB⁻ blood group (892.5 ml) were observed.

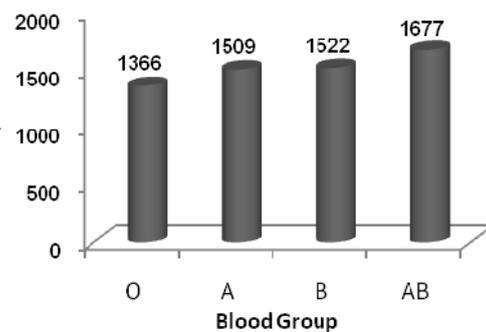


Diagram 3- Comparison of the amount of bleeding in blood groups in first 24 hours after CABG

Discussion

Farhoud et al., (1992) in their study in Tehran reported the average age of heart attacked patients 57.7±12.4 and sex distribution of 78.6% male and 21.4% female. This issue implies a shift in average age of ischemic heart disease and sex distribution in Iran [26]. The distribution of major blood groups in geographical areas differs regarding ethnic and racial differences. The results of the studies in Iran shows that the frequency of O blood group in 1380 was

37.62% between donors' population, 30.25 % for A blood group, 24.36% for B blood group, and 5.77% for AB blood group, of which 89.92% were Rh⁺ and 10.08%, Rh⁻, which implies an increase of 1.3% in the frequency of O and B blood group and decrease in A blood group comparing to conducted studies in 1361 [27], and corresponds with the results of this study. These changes likely arise from factors such as changes in border divisions of provinces, immigration from deprived provinces to big cities and the immigration caused by imposed war [27, 28]. It seems that distribution of population of these patients is changed with regard to the concentration of the majority of cardiac surgery centers in Tehran.

One of the life threatening risks after surgery is hypovolemic shock followed by bleeding. The method of surgery, examining the coagulating time and the other coagulating elements and also timely stopping of anti-coagulating medicine can be some of actions taken in order to reduce the bleeding risk. On the one hand, the risks of blood transfusion and blood products such as infectious diseases, allergic reactions etc, are the matters of concern. Therefore, the careful examination of patients before surgery and anticipating the necessary efforts are essential for preventing probable risks. Contradictory reports are presented in spite of various researches done on relationship between some diseases and blood group type and the amount of coagulating factors.

Green et al. [24] and Oretavik [29] reported that in O blood group, the amount of Von Willebrand factor is lower than the other groups. But in the present study, contrary to the above study, the amount of bleeding in O blood group patients was lower than the other groups, although the statistical test did not confirm their significant relationship. On the other hand, regarding the lesser frequency of AB blood group, especially Rh⁻, and the more bleeding rate of this group in the present study, more measures and plans should be anticipated for this group.

Conclusion

Finally, although results were not significant, due to the clinical importance, it is concluded from the present study, that patients with AB blood group, especially Rh⁻, had more bleeding after CABG surgery than the other blood groups, on the other hand, since 10.1% of studied patients had AB blood group and

considering the difficulty of preparing AB blood group, especially with Rh⁻ for Blood Transfusion Organization and medical centers. Special measures and efforts, such as earlier stopping of anti coagulating medicine, accuracy and care in the technique of surgery and avoiding emergency operations should be taken before operation, to minimize the complications and problems.

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