The Effect of Anemia on Mortality in Patients with Acute Coronary Syndromes

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ABSTRACT

Objective: Anemia is an important and independent risk factor for the occurrence of adverse cardiovascular events in patients with acute coronary syndrome (ACS). Anemia has the potential of increasing myocardial ischemia in acute myocardial infarction(MI) and other coronary syndromes. This study aims to compare the patients with acute coronary syndrome with anemia with those without anemia in terms of the mortality during hospitalization.

Material and Method: The patients with acute coronary syndrome presented to emergency service were enrolled to study. The haemograms were taken in fasting condition in the first morning following the admission.

Patients were divided in two groups as the patients with ACS with and without anemia. The patients were monitorized during the period of hospitalization (mean 7 days) and their mortality rate within this period were investigated. For evaluations, SPSS 10.0 package program for Windows software was used.

Results: 570 patients were included to the study. 416 of the patients were male and 154 of patients were female. Total mortality rate was significantly higher in women than in men (p<0.05). The mean hemoglobine level was significantly lower in women (p<0,05). The mortality was significantly higher in the patients with anemia than those without anemia (p<0.05), and was significantly higher in the patients of >70 years old than those of <70 years old (p<0.001).

Conclusion: In this study, we found significantly higher mortality rate in the patients with acute coronary syndrome with anemia. Thus anemia can be a prognostic factor in short term mortality in ACS.

Key Words: Anemia, mortality, acute coronary syndrome. *Nobel Med 2011; 7(3): 78-81*

ANEMİNİN AKUT KORONER SENDROMLARDA MORTALİTE ÜZERİNE ETKİSİ

ÖZET

Amaç: Anemi, akut koroner sendromlu (AKS) hastalarda istenmeyen kardiovasküler olayların ortaya çıkmasında önemli ve bağımsız bir risk faktörüdür. Aneminin akut miyokard infarktüsü (MI) ve diğer koroner sendromlarda myokardiyal iskemiyi artırma potansiyeli vardır. Bu çalışmanın amacı, akut koroner sendromlu hastalardan anemisi olanların hospitalizasyon dönemindeki mortalitesinin anemisi olmayan hastalarla kıyaslanmasıdır.

Materyal ve Metod: Çalışmaya Koroner Yoğun Bakım ünitesine alınan akut koroner sendromlu hastalar alındı. Hemogramları, yatışı takiben ilk sabah hastalar aç iken alındı. Anemisi olan ve olmayan AKS'li hastalar olarak iki gruba ayrıldı. Hastalar hospitalizasyon süresince (ortalama 7 gün) takip edildi ve bu süre içindeki mortaliteleri araştırıldı. İstatistiksel değerlendirmeler SPSS 10.0 paket programıyla yapıldı.

Bulgular: Çalışmaya 416'sı erkek, 154'ü kadın toplam 570 hasta dahil edildi. Toplam mortalite kadınlarda erkeklere göre anlamlı derecede daha yüksek saptandı (p<0,05). Anemik olgularda ölüm oranı anemik olmayan olgulara göre anlamlı derecede daha yüksekti (p<0,05). 70 yaş üstü olgularda ölüm oranı 70 yaş altı olgulara göre yüksek bulundu (p<0,001).

Sonuç: Bu çalışmada, anemisi olan AKS'li hastalarda hastane içi mortalitenin anemik olmayan hastalara göre anlamlı derecede yüksek olduğu saptandı. Bu nedenle aneminin kısa dönem mortalitede etkili olan prognostik bir faktör olduğu düşünüldü.

Anahtar Kelimeler: Anemi, mortalite, akut koroner sendrom. **Nobel Med 2011; 7(3): 78-81**

INTRODUCTION

Deaths due to cardiovascular disease are still the most frequent cause of death in North America and Europe. Anemia is an important and independent risk factor in development of adverse cardiovascular in the patients with acute coronary syndromes. It has a potential to increase myocardial ischemia in acute myocardial infarction (MI) and other coronary syndromes. It exhibits its action either by reducing oxygen content of the blood supply to the myocardium or by causing need of higher cardiac output by increasing myocardial oxygen demand to maintain adequate systemic oxygen distribution.[1] Higher hemoglobin concentrations prevent ischemia in cases of significant coronary arterial stenosis in animal models.[2,3] In human studies, anemia has been shown to be an independent risk factor for adverse cardiovascular effects in the patients with cardiac failure and previous percutaneous transluminal coronary angioplasty (PTCA).[4-7] A few studies have examined anemia especially in the patients with acute coronary syndromes (ACS) so far. The aim of present study was to compare mortality rate of acute coronary syndromes patients with anemia during hospitalization period with those without anemia.

MATERIAL and METHOD

The present study included the patients with acute coronary syndrome admitted to our coronary intensive care unit of between January 2006 and January 2007. These patients were evaluated for mortality during the hospitalization period of average 7 days, of the acute phase of acute coronary syndrome. Fasting blood samples for whole blood counts were taken morning of the day after admission. For each patient age, gender, diagnosis, hemoglobin levels and clinical course during the acute phase (in the first 7 days) were recorded. For the patients with acute coronary syndromes admitted to the coronary intensive care unit, hemoglobin levels were determined. Hemoglobin levels less than 12 g/dL in women and less than 13.5 g/dL in men were considered as anemia. The patients in two groups were followed during their hospitalization period (averagely 7 days) and their mortality rates during this period were examined. Statistical software SPSS version 10.0 was used for comparison of data. Student's t test and chi-square test were used for the comparisons. P values less than 0.05 were considered as significant.

All patients gave their informed consent to participate in our study. Our study was approved by the local ethical committee.

RESULTS

The present study included 570 patients. Of them, 416 were men and 154 women. 14 deaths in 416 male patients and 19 deaths in 154 female patients occured. 20.5% (n=117) of the patients were younger than 50 years old, 54.9% (n=313) between 50 and 69 years old, 24.6% (n=140) were elder than 70 years old. Mortality rate was found to be 3.4% in male patients and 12.3% in female patients. The difference was→
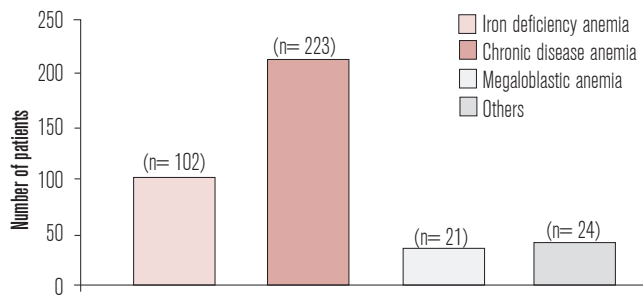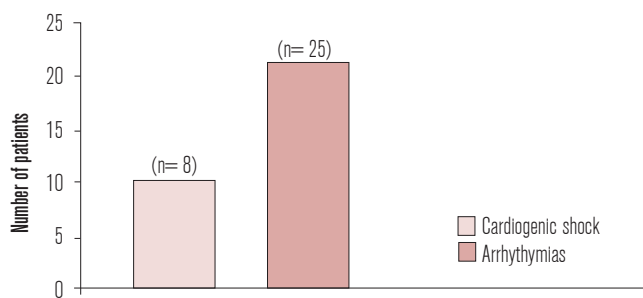
Figure 1. Types of anemia in patients.

Figure 2. The causes of in hospital mortality in patients

Table 1: Clinical and demographic characteristics of patients			
	Patients who survived	**Patients who died**	**p**
Age	59.34±12.14	66.94±11.46	<0.001
Hemoglobin	13.48±2.01	12.27 ±2.33	<0.001
Total cholesterol (mg/dl)	192.1±44.97	195±43.8	NS
Triglycerides (mg/dl)	167.29±102.16	165±100.5	NS
Low densitiy cholesterol (mg/dl)	123.43±38.56	100.55±18.93	<0.05
High densitiy cholesterol (mg/dl)	40.11±10.69	38.05±10.09	NS
Smoking (%)	47	51	NS
Body mass index (kg/m²)	27.61± 5.47	26.09±3.09	NS
NS: Non-statistical			

Table 2: The type of acute coronary syndromes and mortality.		
The type of ACS	**Patients who survived (n)**	**Patients who died (n)**
MI with ST elevation	431	28
Non-ST elevation MI	41	2
Unstable angina pectoris	65	3

found to be statistically significant (p<0.05). Table 1 shows some clinical and demographic characteristics of the patients.

377 of the patients included in the study had anemia whereas 193 did not. Twenty six deaths occurred in the patients with anemia whereas 7 deaths occurred in those without anemia. Mortality rate was found to be significantly higher in the patients with anemia than in those without anemia (p<0.05). Mean age of the patients who died was significantly higher (p<0.001) than patients

surviving. Mean hemoglobin level of the patients who died was significantly lower (p<0.001) than patients surviving. Mean hemoglobine level of the women was significantly lower than men (p<0.05). The types of anemia in patients were shown in Figure 1. There was no difference in hospital mortality according to type of anemia. The causes of in hospital mortality in patients with ACS were shown in Figure 2. There was no difference about the causes of mortality between patients with and without anemia. Table 2 shows the types of ACS in the patients.

• Mortality rate in women (12.3%) was significantly higher than in men (3.4%) and mean hemoglobin level of women was significantly lower than those in men (p< 0.05).
• Mortality rate in the patients with anemia (8.8%) was significantly higher than in those without anemia (4.2%) (p< 0.05).
• Mortality rate in the patients ≥ 70 years old (12.1%) was significantly higher than younger patients (3.7%) (p< 0.05)

Statistical software SPSS version 10.0 was used for comparison of data. Student's t test and chi-square test were used for the comparisons. P values less than 0.05 were considered as significant.

DISCUSSION

Anemia is an important and independent risk factor in the development of adverse cardiovascular event in the patients with acute coronary syndromes.[1] Due to the fact that anemia effects negatively on cardiovascular system with decreasing tissue oxigenation.[8] Also anemia is accepted as an independent prognostic factor in heart failure.[9]

In a study by Al Falluji et al., no significant effect of anemia was found on 1 year follow-up of the patients with acute myocardial infarction.[10] Lipsic et al. found in their study of 1769 patients that lower hemoglobin levels did not significantly increase 30-day mortality.[11] Sjauw et al. carried out a similar study on 264 patients and found similar results. In the study by Sjauw et al., each increase of 1 mmol/L (1.61 g/dl) in hemoglobin level reduced 30-day mortality rate by 21%.[12]

Sabatine et al. demonstrated in their study of 39922 patients that anemia was a significant and independent risk factor in development of adverse cardiovascular events in the patients with acute coronary syndromes.[13] Shu et al. determined that anemia was an independent risk factor only for long-term mortality following acute myocardial infarction in the patients with or without diabetes. They reported →

that lower hemoglobin levels did not have an effect on short-term mortality.[14]

Dauerman et al. found increased mortality risk in the patients with acute myocardial infarction with anemia in their prospective cohort study of 5378 patients.[15] Nikolsky et al. reported that anemia was an independent risk factor when they evaluated 1-year mortality and in-hospital deaths in their study of 2027 patients with acute myocardial infarction undergoing percutaneous coronary intervention (PCI).[16] A retrospective study by Langston et al. gave similar results.[17]

In a literature review, 9 studies conducted on large patient populations were found in which whether hemoglobin or hematocrit values was a prognostic factor was evaluated in the patients with acute coronary syndrome. Of these studies, all but one by Al Falluji et al. found that lower hemoglobin or hematocrit values were related to mortality. Five studies determined that lower hemoglobin and hematocrit levels were associated with increase in short-term mortality. Patients with acute myocardial infarction were included in 4 of them[10,11,15,16] whereas one study included all patients with ACS.[12] We found significantly higher mortality rate in the patients with acute coronary syndrome with

anemia. In our study the mortality rate in women was found to be higher. It must be noted that hemoglobin levels were lower in women than in men. Because of this it was thought that anemia can be a prognostic factor in short term mortality in ACS. In our study the main cause reason of mortality was cardiogenic shock. Anemia has potential to increase myocardial ischemia in acute MI and other coronary syndromes. It exhibits its action either by reducing oxygen content of the blood supply to the myocardium or by causing need of higher cardiac output by increasing myocardial oxygen demand to maintain adequate systemic oxygen distribution. On the other hand, polycythemia causes thrombus formation and reduced oxygenation of ischemic myocardium by leading to hyperviscosity. However, what ideal hemoglobin level should be hasn't been determined so far. Further studies are needed to show whether correcting lower hemoglobin levels reduces mortality. Transfusion is still controversial in the patients with acute coronary syndrome with anemia. In the present study, although we showed that in-hospital mortality rate in anemic patients with ACS was higher than non-anemic patients with ACS. We think that anemia can be a prognostic factor in the patients with acute coronary syndrome, this should be confirmed by randomized and controlled studies with higher numbers of patients.

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