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ORGINAL ARTICLE

Association Between Intraventricular Conduction Disorders and Intrahospital Prognosis in Patients with Acute Coronary Syndrome

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ABSTRACT

Background: Acute coronary syndrome (ACS) is one of the most common heart diseases. Interventricular conduction disorders are complications of acute myocardial infarctions and have different types, such as left and right bundle branch blocks and left anterior and posterior hemiblocks. The prognosis of this disease can affect therapeutic methods, duration of hospitalization, and timely intervention decisions. Therefore, in this study, we evaluated the relationship between interventricular conduction disorders and the prognosis of patients with ACS. **Methods:** Using the convenience sampling method, this analytical case-control study was conducted on 140 patients with ACS (61 patients in the case group and 79 patients in the control group) who were treated from March to August 2013. The underlying variables of the risk factors for ACS were evaluated, along with prognostic evaluation factors, in two groups: a case group (patients with interventricular conduction disorders) and a control group (patients without interventricular conduction disorders). Data were analyzed with SPSS v. 17 software using the chi-squared test, the analysis of variance test, Student's t-test, and Fisher's exact test. **Results:** The mean age of patients was 64.1 ± 5.8 years in the case group and 62.9 ± 8.8 years in the control group. No significant relationship was observed between ACS risk factors, such as hyperlipidemia, diabetes, hypertension, previous myocardial infarction, and smoking, and the prognosis of patients with ACS. The mean ejection fraction was 39.7 in the case group and 45.1 in the control group, so a significant relationship existed between the two groups ($P<0.05$). In addition, systolic heart failure was more common in the case group than in the control group. **Conclusion:** We found that the presence of auscultation (rales sound) and shortness of breath on the first day of hospital admission in the case group was significantly different from the control group ($P<0.05$). Furthermore, the ejection fraction in the case group was lower than in the control group, and the frequency of mitral regurgitation in the case group was higher than in the control group. These factors can effectively predict the prognosis of patients with ACS. Finally, we found that interventricular conduction disorders weakened the prognosis of patients with ACS.

INTRODUCTION

Acute coronary syndrome (ACS) includes the clinical syndromes of unstable angina, non-ST segment elevation myocardial infarction (NSTEMI), and ST-segment elevation myocardial infarction (STEMI) (1). In the United States, approximately 1.3 million patients with NSTEMI or unexpected angina and 300,000 STEMI patients annually are admitted to hospitals (2). In Iran, ACS as the first cause of death leads to the death of approximately 110,000 people per year (3). Myocardial infarction has a mortality of 25%-30% and is the most common cause of death in most societies. It is associated with important complications such as heart failure, mitral valve regurgitation, ventricular septal defect, interventricular conduction disorders, and arrhythmia (4). Cardiac blocks and conduction disorders are often associated with conduction system dysfunctions that accompany large myocardial necrosis (2). Interventricular conduction disorders are among the complications of an acute myocardial infarction and have different types, such as left and right bundle branch blocks and left anterior and posterior hemiblocks (2). One study showed that right bundle branch blocks and left hemiblocks could be considered independent criteria for

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mortality in patients with coronary artery disease (5). However, another study reported conflicting results and showed that left hemiblocks do not increase the risk of death or complete atrioventricular block, but that complete bundle branch blocks do greatly reduce the survival rate (6).

As reported in many studies, right bundle branch blocks are more common in elderly patients and patients with anterior myocardial infarctions. In addition, right bundle branch blocks significantly increase the mortality rate (7-10). A recent study showed that arrhythmias and conduction disorders are more common in people with ACS and impaired renal function, and that this weakened their prognosis (11). The prognosis of this disease can affect therapeutic methods, duration of hospitalization, and timely intervention decisions.

Since no similar study has been conducted in Iran, we investigated the relationship between interventricular conduction disorders and prognosis in patients with ACS.

MATERIALS AND METHODS

Using the convenience sampling method, this analytical case-control study was conducted on 140 patients with ACS (61 patients in the case group and 79 patients in the control group) who were treated from March to August 2013. Patients were included in the study if they were diagnosed with ACS. Exclusion criteria were as follows: history of coronary artery bypass grafting, presence of a pacemaker, history of stroke, presence of an artificial valve, consumption of tricyclic antidepressants and phenothiazines, hypercalcemia, hospitalization more than 4 days, and age under 40 and over 80 years. The underlying variables of the risk factors for ACS were evaluated along with the prognostic evaluation factors in two groups: a case group (patients with interventricular conduction disorders) and a control group (patients without interventricular conduction disorders). Data were analyzed with SPSS v. 17 software using the chi-squared test, the analysis of variance test, Student's t-test, and Fisher's exact test.

RESULTS

We examined 140 patients with an early diagnosis of ACS who were eligible according to the inclusion and exclusion criteria: 61 (43.6%) patients were in the case group (with interventricular conduction disorders) and 79 (56.4%) patients were in the control group (without interventricular conduction disorders). In the studied groups, the mean patient age was 63.45 ± 7.65 years (range, 46-78 years). Patients in the two groups were of approximately the same age (P=0.38). In terms of the frequency distribution of sex in the two groups, 80 (57.1%) were men and 60 (42.9%) were women. The two groups were also the same in terms of sex distribution (P=0.094). Since smoking is a risk factor for ACS, duration of smoking was evaluated in the two groups. The mean duration of smoking was 1.2 ± 5.9 years in the case group and 1.9 ± 6.2 years in the control group. The difference between the two groups was not significant (P=0.918). In terms of the frequency distribution of heart failure between the two groups, 36 (59%) and 28 (35.4%) patients had systolic heart failure in the case and the control group, respectively; this difference was significant (P=0.001). Systolic heart failure was significantly more common in the case group than in the control group. Table 1 shows the different symptoms and risk factors for ACS in the two groups.

In this study, the case group consisted of patients with ACS, which has various types of interventricular conduction disorders. In examining the frequency distribution of different types of interventricular conduction disorders, we found that the highest frequency was related to a left anterior hemiblock (18, 29.5%). The frequency of a right bundle branch block was 16 (26.2%); the frequency of a left bundle branch block was 15 (6.26%); and the frequency of a left posterior hemiblock was 11 (18%). Table 2 shows the frequency distribution of clinical findings on admission days in the two groups.

In the distribution of negative cases and the various positive cases, C-reactive protein levels did not differ significantly between the two groups (P=0.291). The frequency distribution of echocardiographic findings in the two groups is shown in Table 3.

Finally, laboratory findings showed no significant differences in the two groups (Table 4).

DISCUSSION

According to studies of patients with acute myocardial infarctions, the presence of interventricular conduction disorders, such as left and right bundle branch blocks and left anterior and posterior hemiblocks, weakens the prognosis and increases the risk of death (12). In our study, we found that interventricular conduction disorders also weaken the prognosis of patients with ACS.

Many studies, such as one by Fazzini et al., have examined the effect of interventricular conduction disorder on the prognosis of patients with acute myocardial infarctions (13). They concluded that right bundle branch blocks do not increase the risk of death in acute myocardial infarction patients, whereas left bundle branch blocks and right bundle branch blocks, with a left posterior hemiblock, can increase the risk of death in these patients (13). However, Wong et al. concluded that the 30-day mortality rate of patients with acute myocardial infarction in cases of right bundle branch block is higher than the mortality rate of patients without a block (9). Cortigiani et al. stated that a right bundle branch block and a left hemiblock are independent criteria for the mortality of patients with suspected coronary artery disease, and that the presence of these blocks weakens the prognosis of these patients (5). Moloudi et al. conducted a similar study of patients with left bundle branch blocks. They found a relationship between increasing the duration of QRS complex and reducing the amount of ejection fraction; in particular, the ejection fraction decreased sharply in the case of QRS>140 ms in the left bundle branch block (14).

In our study, we found a significant difference in the mean reduction of ejection fraction in the case group with different types of interventricular conduction disorders compared to the control group, which had no interventricular conduction disorders. We also found that the frequency of auscultation and shortness of breath on the first day of hospital admission was more common in the case group (patients with interventricular conduction disorders) than in the control group (pa-

Table 1. Frequency distribution of different symptoms and risk factors for ACS in two groups

History of disease	Status	Case (n=61)	Control (n=79)	P
		Number (percentage)	Number (percentage)	
ACS symptoms	U.A	28 (45.9)	45 (57.0)	0.424
	STEMI	22 (36.1)	22 (27.8)	
	NSTEMI	11 (18.0)	12 (15.2)	
Blood pressure	Positive	41 (67.2)	45 (57.0)	0.217
	Negative	20 (32.8)	34 (43.0)	
Diabetes	Positive	16 (62.2)	23 (29.1)	0.706
	Negative	45 (37.8)	56 (70.9)	
Hyperlipidemia	Positive	24 (39.3)	25 (31.6)	0.344
	Negative	37 (60.7)	54 (68.4)	
History of MI	Positive	7 (11.5)	14 (17.7)	0.305
	Negative	54 (88.5)	65 (82.3)	
Smoking	Positive	9 (14.8)	8 (10.1)	0.406
	Negative	52 (85.2)	71 (89.9)	

ACS: Acute Coronary Syndrome, MI, myocardial infarction; U.A, unstable angina; STEMI, ST-segment elevation myocardial infarction; NSTEMI, non-ST segment elevation myocardial infarction

Table 2. Frequency distribution of clinical findings in hospital admission days in the case and control groups

Clinical findings	Admission days	Case (n=61)	Control (n=79)	P
		Number (percentage)	Number (percentage)	
Chest pain	First day	61 (100)	78 (98.7)	1.000
	Second day	52 (85.2)	67 (84.8)	0.943
	Third day	14 (23.0)	15 (19.0)	0.566
	Fourth day	5 (8.2)	3 (3.8)	0.295
Shortness of breath	First day	19 (31.1)	6 (7.6)	<0.001
	Second day	7 (11.5)	4 (5.1)	0.210
Auscultation	First day	8 (13.1)	3 (3.8)	0.042
	Second day	2 (3.3)	4 (3.8)	1.000

*: The third and fourth days were evaluated for the presence of shortness of breath and auscultation, which were not seen in either of the two groups

Table 3. Frequency distribution of echocardiographic findings in the case and control groups

Echocardiographic findings	Results	Case (n=61)	Control (n=79)	P
		Number (percentage)	Number (percentage)	
Mitral regurgitation	No	28 (54.9)	56 (70.8)	0.014
	Mild	18 (29.5)	16 (20.3)	
	Moderate	14 (23.0)	7 (8.9)	
	Severe	1 (1.6)	0	
Tricuspid failure	No	46 (75.4)	74 (93.6)	<0.05
	Mild	7 (11.5)	1 (1.3)	
	Moderate	8 (13.1)	3 (3.8)	
	Severe	0	1 (1.3)	
Pericardial effusion	No	60 (98.4)	70 (88.6)	0.083
	Mild	1 (1.6)	8 (10.1)	
	Moderate	0	1 (1.3)	

tients without interventricular conduction disorders). To date, no studies have investigated the relationship between interventricular conduction disorders and the clinical findings of patients with ACS. Mitral regurgitation, as one of the complications of myocardial infarction, is an effective parameter in determining the prognosis of these patients. In our study, the

Table 4. Mean laboratory findings in the case and control groups

Laboratory findings	Mean±SD		P
	Case (n=61)	Control (n=79)	
CPK	621.78±965.71	763.46±1206.37	0.454
CPK-MB	82.29±110.08	82.37±149.57	0.997
Troponin	10.16±11.49	8.76±12.16	0.491

CPK, Creatine phosphokinase

frequency of mitral regurgitation in patients with ACS was higher in the case of interventricular conduction disorders.

Limitation

In this study if we choose more patients we could have a better results.

CONCLUSION

In this study, we examined the factors affecting the prognosis of patients with ACS in two groups. Considering the importance of these factors, including reduction of ejection fraction and increased frequency of systolic and mitral regurgitation, as well as auscultation and shortness of breath on the first day of hospital admission, we found that the presence of interventricular conduction disorders weakens the prognosis of patients with ACS. We recommend that the relationship between different types of interventricular conduction disorders and the prognosis of patient with ACS be compared and recognized. Future studies are needed to determine the association between duration of the QRS complex and the reduction of ejection fraction in patients with ACS.

AUTHOR CONTRIBUTION

The corresponding author appreciates all authors of this article.

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