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

Mehdi Latif1*, Mohammad Salehi2, Nazanin Janfada1, Leila Foroutan4, Mohammad Moein Ashrafi5

1Assistant Professor of Cardiology, Yazd Branch, Islamic Azad University, Yazd, Iran
2Assistant Professor of Internal Medicine, Yazd Branch, Islamic Azad University, Yazd, Iran
3General Practitioner, Yazd Branch, Islamic Azad University, Yazd, Iran
4Anesthesiology Resident, Shahid Sadoughi University of Medical Sciences, Yazd, Iran
5Medical Student, Yazd Branch of Azad University, Faculty of Medicine, Yazd, Iran

*Corresponding Author: Mehdi Latif, E-mail: Drlatif_clinic@yahoo.com

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...
Intraventricular Conduction Disorders and ACS

failure in the case and the control group, respectively; this
groups, 36 (59%) and 28 (35.4%) patients had systolic heart
the frequency distribution of heart failure between the two
groups was not significant (P=0.918). In terms of
ration of smoking was 1.2 ± 5.9 years in the case group and
of smoking was evaluated in the two groups. The mean du
(P=0.094). Since smoking is a risk factor for ACS, duration
was also the same in terms of sex distribution
was significant (P=0.291). 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 signifi-
cantly 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 differ-
ces in the two groups (Table 4).

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. Pa-
tients 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 tri-
cyclic 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 anal-
ysis 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 int-
erventricular conduction disorders) and 79 (56.4%) patients
were in the control group (without interventricular conduc-
tion 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 du-
ration 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 posi-
tive cases, C-reactive protein levels did not differ signifi-
cantly 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 differ-
ces in the two groups (Table 4).

DISCUSSION

According to studies of patients with acute myocardial in-
farctions, the presence of interventricular conduction disor-
ders, 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 prog-
nosis 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, where-
as 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 infarc-
tion 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 sus-
pected 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 du-
ration 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 interven-
tricular conduction disorders) than in the control group (pa-
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 1. Frequency distribution of different symptoms and risk factors for ACS in two groups

<table>
<thead>
<tr>
<th>History of disease</th>
<th>Status</th>
<th>Case (n=61) Number (percentage)</th>
<th>Control (n=79) Number (percentage)</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACS symptoms</td>
<td>U.A</td>
<td>28 (45.9)</td>
<td>45 (57.0)</td>
<td>0.424</td>
</tr>
<tr>
<td></td>
<td>STEMI</td>
<td>22 (36.1)</td>
<td>22 (27.8)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>NSTEMI</td>
<td>11 (18.0)</td>
<td>12 (15.2)</td>
<td></td>
</tr>
<tr>
<td>Blood pressure</td>
<td>Positive</td>
<td>41 (67.2)</td>
<td>45 (57.0)</td>
<td>0.217</td>
</tr>
<tr>
<td></td>
<td>Negative</td>
<td>20 (32.8)</td>
<td>34 (43.0)</td>
<td></td>
</tr>
<tr>
<td>Diabetes</td>
<td>Positive</td>
<td>16 (26.2)</td>
<td>23 (29.1)</td>
<td>0.706</td>
</tr>
<tr>
<td></td>
<td>Negative</td>
<td>45 (70.9)</td>
<td>56 (70.9)</td>
<td></td>
</tr>
<tr>
<td>Hyperlipidemia</td>
<td>Positive</td>
<td>24 (39.3)</td>
<td>25 (31.6)</td>
<td>0.344</td>
</tr>
<tr>
<td></td>
<td>Negative</td>
<td>37 (60.7)</td>
<td>54 (68.4)</td>
<td></td>
</tr>
<tr>
<td>History of MI</td>
<td>Positive</td>
<td>7 (11.5)</td>
<td>14 (17.7)</td>
<td>0.305</td>
</tr>
<tr>
<td></td>
<td>Negative</td>
<td>54 (88.5)</td>
<td>65 (82.3)</td>
<td></td>
</tr>
<tr>
<td>Smoking</td>
<td>Positive</td>
<td>9 (14.8)</td>
<td>8 (10.1)</td>
<td>0.406</td>
</tr>
<tr>
<td></td>
<td>Negative</td>
<td>52 (85.2)</td>
<td>71 (89.9)</td>
<td></td>
</tr>
</tbody>
</table>

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

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

*: 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

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

**REFERENCES**