Prognostic significance of complete atrioventricular block in acute right ventricular infarction

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Abstract

This study evaluates the morbidity and mortality, during hospitalization of 50 patients with acute right ventricular myocardial infarction who were admitted to coronary care unit of Mosul teaching hospital from 1996 – 1998. The patients were evaluated clinically, electrocardiographically, and by two dimensional echocardiography for the diagnosis of right ventricular infarction. The patients were followed up by continuous ECG monitoring for at least three days to detect rhythm and conduction disturbances. The patients were divided into three groups depending on presence or absence of complete heart block;

Group I; 15 patients with complete heart block.

Group II; 35 patients without complete heart block.

In this study patients in group I had significantly higher mortality rate than group II, 40% versus 11% ($p < 0.05$). A third group (20) patients with inferior myocardial infarction and complete heart block without right ventricular infarction were evaluated, and the mortality rate was the same as in group II ($p > 0.5$).

Introduction

Right ventricular infarction (RVI) was recognized pathologically from many yearsand has only recently been defined as distinct clinical and pathophysiologic entity.(1,2) It is frequent concomitant of acute inferior MI. various non-invasive techniques were used for diagnosis of RVI as clinical, electrocardiography, and two dimensional echocardiography.(4,5,6)

It has been shown that the incidence of complete atrioventricular block is two to four times higher in patients with IMI as compared to patients with anterior myocardial infarction.(7,8) The occurrence of atriovntricular block is usually explained by the fact that the blood supply to AV node depends 90% of patients on the right coronary artery,(9,10) a higher degree of AV block has been reported in patients with RVI up to 48% versus 9 to 17% in patients with inferior MI without RV involvement.(11,12) The mortality rate of hospitalized patients with acute myocardial infarction has decreased from 35% - 40% to 18% - 24% as a result of coronary care unit. Among patients who experience complete heart block the mortality rate is twice of the overall mortality rate for acute MI.(13,14)Most of these patients have in addition to complete heart block the complications of congestive heart failure; cardiogenic shock and cardiac arrest.(15)

Patients and methods

This study included 50 patients with acute RVI; 40 males and 10 females, aged 42 -70 years, who were admitted to the coronary care unit during the years 1996 to 1998.The diagnosis of myocardial infarction was established by history, clinical examination, ECG, enzymes and 2 dimension echocardiography. All the patients were assessed for the bedside features of RVI, including arterial

hypotension i.e systolic pressure < 90 mmHg, elevation of JVP more than 2 cm above manubrium sterni, fourth heart sound, clear lung bases and hepatomegaly. The patient was regarded having RVI if two or more of these signs were found.

Standard 12 leads ECG was taken within 24 hours from the onset of symptoms with supplementary V4R lead at right 5th intercostals space at midclavicular line. All the patients were followed up by continuous ECG monitoring for at least 3 days to detect rhythm and conduction defects. All patients had inferior MI ; new Q wave, ST elevation and T changes in leads II, III, aVF. V4R was done for detection of at least 0.05 mV ST elevation, or Qr, Qs pattern.

Three days after admission of the patient 2DE using an 80 degree – wide angle phased array sector scanner, ausonic V – 5340 with 2.5 MHz transducer was recorded with the patient in left lateral decubitus or supine position to detect wall motion abnormalities of right ventricle; hypokinetic, akinetic or dilated right ventricle. Blood sample was taken from the patient to measure AST daily for three successive days.

Complete heart block was diagnosed when no P wave propagated to the ventricles, and ventricular rate was less than 60 BPM.(16)During the period of this study temporary pacemaker (VVI type) was inserted for two patients in group I and one patient in group II.

Statistical analysis was tested by student test and test of proportion.

Results

Out of 50 patients with RVI 15 (30%) developed complete atrioventricular block while 35 (70%) did not. The patients showed, as in table 1 two or more of the clinical features of RVI. Thirty patients had arterial hypotension, they were treated by intravenous fluid 500 - 1000 cc of glucose - water which regained the blood pressure to an acceptable limit. Elevated jugular venous pressure (JVP) was seen in 35 patients, hepatomegaly in 20 patients and complete heart block in15 patients (for two of them temporary pace maker was implemented, when the administration of atropine was not efficacious). Maximum AST was 70U/L + 43 in group I, 35 u/l + 28 in group II, 32 U/L +19 in group III. Table 2 demonstrates details of ECG finding in patients with RVI, ST segment elevationin lead V4R more than 0.05 mV was seen in 20 patients, more than 0.1 mV in10 patients, QR and QS pattern in 20 patients in the same lead. Table 3 shows the details of 2 dimensional echo. findings : thirty patients showed mild hypokinesia ofRV will, Fifteen patients showed severe hypokinesia of RV wall, all of them had complete atrioventricular block, five patient showed dilatation of RV wall. Table 4 demonstrates the causes of death in the three groups.

In group I; 4 patients developed cardiogenic shock, 2 patients developed cardiac arrest, while in group II, 2 patients developed cardiac arrest and 2 patients developed cardiogenic shock.

The mortality rate was higher in group I (40%) than in group II (11%), $p < 0.05$, while it was the same in group II and III.

Discussion

Prognostic significance of complete AV block in the setting of inferior MI is not clear. In previous studies the mortality rate for patients with inferior MI and high degree AV block varied from 14% to 45% and most authors reported mortality rate between 22 – 28%.(17-20). The exact mechanism of this prognostic influence of iv block is not completely explained. Many authors have found that patients with AV block have higher

incidences of congestive heart failure and highest SGOT; they concluded that these patients had greater amount of myocardial necrosis, with higher incidence of complications.(21)

The review of brady-arrhythmias occurring in the setting of acute MI noted that AV block was highly influenced by the relation of conduction system with coronary circulation and amount of myocardial necrosis.(16,17,20)In general occlusion of posterior circulation usually involve right coronary artery and occasionally the left circumflex branch, which lead to inferior MI and AV block. In contrast occlusion of anterior descending artery lead to conduction disturbance involving bundle of His and bundle branch system.(19) Other studies showed that mortality rate was higher in complete heart block associated with anterior MI than that associate with inferior MI, but in presence of RVI the mortality rate rises up to 40%.(11,19,20)Significantly higher value of AST with severe hypokinesia of right ventricle and high mortality rate indicate that those patients had greater amount of myocardial necrosis and higher mortality could be a consequence of large infarct size.

In this study, the patients were divided into two groups depending on presence of complete heart block, it was found that patients with RVI and complete AV block had maximal SGOT, higher incidence of left ventricular failure and higher mortality rate.

Patients with inferior MI and heart block, but without right ventricular involvement had no significant increase in mortality rate. Patients with right ventricular infarction and complete heart block had significantly higher value of SGOT and higher mortality rate (40%). This mean that complete heart block is poor prognostic sign in acute MI as reported by other authors.(21)

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Table 1: finding in patients with RVI

Clinical features	Number of patients (%)
Arterial hypertension	30 (60%)
Elevated JVP*	35 (70%)
Hepatomegaly	20 (40%)
Heart block	15 (30%)
Biochemical data AST mean ± 2SD Group I: 70 U/L ± 43 Group II: 35 U/L ± 28 Group III: 32 U/L ± 19	 15 (30%) 35 (70%) 20 (40%)

*Jagular venous pressure.

Table 2: Electrocardiographic finding:

Morphology of V4R	Number of patients
ST elevation > 0.05 mV	20 (40%) (%)
ST elevation > 0.1 mV	10 (20%)
QR	10 (20%)
QS	10 (20%)

Table 3: Two dimensional echo. Finding:

Echo. finding	Number of patients (%)
Mild hypokinesia of RV wall	30 (60%)
Mild hypokinesia of RV wall	15 (30%)
Dilatation of RV wall	5 (10%)

Table 4: Causes of death in all groups:

Cause of death	Group I	Group II	Group III
Cardiogenic shock	4	2	0
Cardiac arrest	2	2	2
Mortality rate	40%	11%	10%

أهمية التكهن بالاحصار الكامل في احتشاء عضلة البطين الايمن الحاد

أجريت هذه الدراسة على خمسين مريضا ادخلوا وحدة انعاش القلب في مستشفى الموصل التعليمي للفترة من 1996 الى 1998 نتيجة اصابتهم باحتشاء عضلة البطين الايمن الحاد بالاعتماد على الاعراض السريرية وتخطيط كهربائية القلب و فحص الفلبالايكو ثنائي البعد. تم مراقبة تخطيط كهربائية القلب لمدة ثلاثة ايام متتالية لمراقبة حالات الاحصار. تم تقسيم المرضى الى مجموعتين, المجموعة الاولى ضمت 15 مريضا ظهر لديهم احصار كامل و المجموعة الثانية ضمت 35 مريضا لم يظهر لديهم احصار.

أثبتت هذه الدراسة زيادة نسبة الوفيات في المجموعة الاولى مما يدل على ان الاحصار الكامل مع احتشاء عضلة البطين الايمن الحاد ذو دلالة سلبية على زيادة نسبة الوفيات لدى المرضى المصابين باحتشاء عضلة القلب.