CIRCADIAN VARIATION IN THE ONSET OF ACUTE PULMONARY EDEMA IN DIABETIC AND NON-DIABETIC PATIENTS

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This study was designed to see whether there is a circadian variation in the frequency of acute pulmonary edema in diabetic and non-diabetic patients with ischemic heart disease. Total 150 patients (80 diabetics, 70 non-diabetic) of both sexes age range between 34-72 years with the diagnosis of acute pulmonary edema were included in this study. Out of 80 diabetics, 28 had associated hypertension, white 16 patients from non-diabetic group were hypertensive. It was found that there was significant circadian variation in the onset of acute pulmonary> edema in non-diabetic patients but diabetic patients did not exhibit a circadian variation in the onset of acute pulmonary edema.

INTRODUCTION

Some cardiovascular events such as acute myocardial infarction and sudden death show a circadian variation in onset with peak incidence in the early hours of the morning to noon[1]. Acute cardiogenic pulmonary edema is the most dramatic symptom of left heart failure. It differs from orthopnea and paroxysmal nocturnal dyspnoea in the more rapid and extreme development of pulmonary capillary hypertension.

It is a terrifying experience for the patient and often the bystander as well. There are the cardiac and non-cardiac causes of pulmonary edema, the underlying mechanisms are common to majority of the cases[2,1].

The two most common forms of pulmonary edema are those initiated by an imbalance of starling forces and those initiated by disruption of one or more components of alveolar capillary membranes', less often lymphatic insufficiency can be involved as a predisposing, if not, initiating factor in the genesis of edema. Although the initiating or primary mechanism may be clearly identifiable, multiple factors come into play during the development of pulmonary edema[6].

The aim of this study was whether there is a circadian variation in the frequency of acute pulmonary edema in diabetic and non-diabetic patients with ischemic heart disease.

PATIENTS AND METHODS

One hundred and fifty consecutive patients admitted to cardiology/CCU of Nishtar Hospital, Multan with a diagnosis of acute pulmonary edema (APE) were entered in this study. The diagnosis of APE was made on the basis of acute severe dyspnoea, fine lung crepitation's and radiological evidence of pulmonary vascular congestion. The onset of APE was defined as the time of onset of acute severe dysponea. Patients were classified as diabetic on the basis of previous diagnosis made according to WHO criteria namely a fasting plasma glucose concentration of >7.8 mmol/L or a 2-hour plasma glucose concentration of >1 1.1 mmol/L in the oral glucose tolerance test. Again hypertension was defined according to WHO criteria[8]. Patients were followed with serial electrocardiograms and creatinine-kinase estimations. A diagnosis of AMI was made on the basis of CPK (MB) level of >50 1U/L and of diagnostic electrographic changes of more than 2 mm ST-segment elevation, with typical evolutionary changes and presence of new' pathological Q-waves.
In the case of multiple admissions during the study period the first admission was taken as the index admission for the purpose of calculating the mortality. Circadian patterns were noted on all admissions.
Patients with blood glucose level of >7.8 mmol/L in the absence of known diabetes mellitus were excluded. Patients having history of airways disease were also not included in the study.

RESULTS

There were 150 patients admitted with APE during the study period. Out of 80 diabetic patients 50 were male and 30 females. There were 1 10 hospital admissions of 80 patients, 28 patients in diabetic group were also hypertensive, 24 patients from diabetic group were only taking diabetic medications at the time of admission, 20 were on nitrates and aspirin, 10 on nitrates with calcium antagonists and 8 were on B-blockers, 14 on ACE inhibitor. Record was not available for 4 patients. Out of 70 patients from non-diabetic group 48 were male and 22 were female. All were known patients of coronary artery disease and taking antianginal therapy, 10 patients suffered recent acute myocardial infarction (raised CPK-MB more than 50 u/1) leading to pulmonary edema. The average stay in the hospital was one week. 18 patients from diabetic group and 12 from non-diabetic group died in the hospital.

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DISCUSSION

The proportion of patients who had an underlying recent AMI was almost similar in the diabetic and non-diabetic group but inspite of similar proportion with AMI the in hospital mortality was significantly greater in diabetic group of patients. The explanation for the increased mortality in diabetic patients is unclear. It could be due to more extensive atherosclerotic disease in coronary arteries. There was significant circadian variation in the onset of APE in non-diabetic patients. This has been previously described only in one study[9].

However, the later study was retrospective one and there was sufficient data for inclusion in only 103 of the 179 patients and we feel this is serious limitation of this study. In our study the peak incidence of APE in the non-diabetic group was in the first and last quarters. The nocturnal peak of APE could be related to the redistribution of blood or to a circadian variation in left ventricular function secondary to diurnal changes in the sympathetic activity as reported by some authors[10]. Unlike AMI which reveals peak incidence in the early hour of the morning APE shows progressive increase from the first to the fourth quarter of the day this could be accounted for the evening peak of APE (18.00 to 24.00 hours). One would expect a time lapse of number of hours after AMI before its haemodynamic effects become fully manifested. Diabetic patients did not exhibit a circadian variation in the onset of APE as revealed by the study or in the frequency of underlying AMI[11]. It has been previously shown that there is loss of circadian rhythm in the onset of AMI in diabetics" but pattern of onset of APE on the basis of loss of circadian rhythm of sympathetic activity in diabetic[1']. In conclusion there is circadian variation in the onset of APE in nondiabetic. This is probably related both to the circadian rhythm of AMI in general population and the nocturnal redistribution of blood volume and depressed left ventricular function.

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