

# Management of Severe Hyperglycemia with Associated Pulmonary Oedema, Due to Coronary Disease

By

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## Introduction:

Diabetes Mellitus, a leading public health problem has a profound effect on Cardiovascular system and majority of the mortality and morbidity from diabetes is related to Cardiovascular dysfunction. In the Framingham study<sup>1</sup> diabetes had 4—5 fold increased risk of CCF. It has also been noticed that patients with acute myocardial infarction and poor control of diabetes resulting in hyperglycemia with or without D.K.A. before hospital admission exhibit a significant higher mortality<sup>2</sup>. The management of such patients is challenging due to their precarious metabolic status and the precision required in adjusting their insulin dose, as reduction of hyperglycemia may be disastrous.

## Material & Methods:

We present here a study of 11 consecutive diabetic patients treated in medical unit III in the past two months, who were admitted from emergency room in pulmonary edema (LVF) with or without acute myocardial infarction and were severely hyperglycemic (blood sugar  $>400$  mg%) at the time of admission. Patients were managed on the low dose insulin therapy

regime for hyperglycemia on the pattern of the protocol of the American Diabetic Association. (Table I).

Hourly blood sugar was determined by Dextrometer which was counterchecked by our laboratory.

## Results:

From the result of the study which is presented in tabulated form (Table II), the following observations can be made.

- a) **Age:-** The age range was from 44-68 years with a mean of 54 years.  
Female patients were of younger age with a mean of 50 years in contrast to the male mean age of 59.4 years.
- b) **Sex:-** There was a preponderance of female over male 6:5.
- c) **Cause of LVF:-** Only 3 out of 11 patients (27.2%) presented with left ventricular failure resulting from acute myocardial infarction. The rest 72.8% were cases of chronic congestive failure where the cause was ischaemic heart disease or old infarction.

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Table I

**Protocol for the Management of Diabetic Patient (with CCF) in the Ward.**

1. Urgent urine sugar & acetone, urgent blood glucose and electrolytes and urea; CBC; XRC; ECG; Blood cultures if indicated; blood gases.
2. On confirmation of hyperglycemia of 350 mg% give 0.4U of Plain Insulin/kg body weight (half as I/V push and half as I/M in deltoid area).
3. Determine plasma glucose hourly; and electrolytes every 3 hrs.  
If plasma glucose does not fall by 10% in the first hour, repeat initial priming dose of insulin.
4. After satisfactory glucose decrement, give 10 U plain insulin/hr as I/M intermittent injection (if adequate peripheral perfusion) or I/V 5 U/half hrly (if inadequate peripheral perfusion) until plasma glucose reaches 200 mg/dl.
5. If initial potassium is  $< 3.5$  m Eq/L potassium supplements should be provided at the rate of 40 m Eq/h with initial insulin therapy.
6. No bicarbonate is given for  $\text{Ph} > 7.15$ . For  $\text{Ph} < 7.15$  but  $> 7.0$  give 44 mEq of  $\text{NaHCO}_3$ . For  $\text{Ph} < 7.0$  give 88 mEq of  $\text{NaHCO}_3$ .
7. Ancillary measures. O<sub>2</sub> therapy for  $\text{Po}_2 < 80$  mmHg. Dopamine for hypotension and antibiotic therapy.
8. Avoid using Normal Saline use D<sub>5</sub>INS and cover the dextrose in it with insulin.

The three patients who presented with acute myocardial infarction did not complain of chest pain, typical of the silent infarcts present in diabetics.

**d) Blood Sugar:-**

The range of initial blood sugar of patients included in this study varied between 420-960 mg% with a mean of 641.1 mg%. The dose of Insulin required did not depend on the initial blood sugar level. Time taken for the control of hyperglycemia (to 200 mg%) also varied, the average being 8.1. hrs.

**e) Factors affecting the ultimate outcome:-**

i) **Sex:-** Females took longer time for stabilization of blood sugar than males.

ii) **Underlying Cause of LVF:-** Patients with acute myocardial infarction in general do not respond well. In fact 2 of our 3 patients who presented with acute myocardial infarction died as a result of severe pump failure and anuria. If the cause of CCF is other than acute myocardial infarction, patients generally responded well to the low dose insulin therapy.

**iii) Diabetic State:-**

In our series of 11 patients, none of the patients developed hypoglycemia, 2 died for reasons other than diabetes. The time taken for blood sugar to reach the base (200 mg%) was not proportional to the initial blood sugar level. It was also noticed that the amount of Insulin required to control hyperglycemia was different. As such it was not the initial sugar level which governed the prognosis.

Table II

S.No.	Name	Age/Sex	Diagnosis	Blood Sugar	Time taken to Reach 200 mg%	Assoc. Disease	Total Insulin Req
1.	M.A.	65/M	AMI/CCF	688	5 Hrs.	—	80 U
2.	N.B.	55/F	IHD/CCF	430	6 Hrs.	Rh.Arth.	100 U
3.	Mrs. J.	44/F	IHD/CCF	420	5 Hrs.	—	70 H
4.	K.M.	65/M	IHD/CCF	600	13 Hrs.	—	240 U
5.	Mrs. T.	47/F	IHD/LVF	488	14 Hrs.	—	170 U
6.	A.R.	45/M	IHD/CCF	820	12 Hrs.	—	150
7.	D.H.	50/M	IHD/CCF	550	4 Hrs.	Hypertension.	70 U
8.	Mrs. A.B.	45/F	IHD/CCF (Acute M.I.)	960	10 Hrs.	—	130 U
9.	A.R.	68/M	IHD/CCF (Acute M.I.)	770	5 Hrs. (pt expired)	—	80 U (Last Blood Sugar 295 mg%)
10.	Mrs. I.B.	55/F	IHD/CCF	572	4 Hrs.	—	60 U
11.	Mrs. M.	55/M	IHD/CCF	760	12 Hrs.	—	150 U

**Abbreviations:** IHD = Ischemic Heart Disease; CCF = Conjestive Heart Failure;  
LVF = Left Ventricular Failure; MI = Myocardial Infarction.

## References:

1. Kannel W.B., Hjorland M., Cortelli W.P.; Role of Diabetes in congestive Heart failure. The Framingham study.
2. Harrower A.D.B, Clarke R.F; Experience of coronary care in Diabetes. Brit. Med. J., 1:126, 1976.

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