Diabetes Mellitus in Patients with Benign Prostatic Hyperplasia

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Summary: Of 51 patients submitted to operation for benign prostatic hyperplasia three (5.9%) were known diabetics and two others had undergone surgery for peptic ulcer. Of the remaining patients half (23 out of 46) were found to be diabetic; 40% (20 patients) had a history of previous cardiac infarction or electrocardiograph evidence of myocardial ischaemia.

It is suggested that these findings add further support to the hypothesis that benign prostatic hyperplasia is one manifestation of a relative increase of oestrogen secretion with advancing age.

Introduction

An association between benign prostatic hyperplasia, raised blood pressure, and diabetes mellitus has been reported in a retrospective study (Bourke and Griffin, 1966). It was suggested that these findings could be accounted for by an increase in oestrogens relative to androgens with advancing age. Only overt cases of diabetes mellitus were included and many undiagnosed diabetics may have been overlooked (College of General Practitioners, 1962; Harkness, 1962; Butterfield 1964).

A prospective study has therefore been undertaken to determine the incidence of diabetes mellitus in patients submitted to surgery for benign prostatic hyperplasia during the period 1 July 1965 to 30 June 1966.

Definitions

The recommendations of the W.H.O. Expert Committee on Diabetes Mellitus (1965) have been used throughout this study in interpreting the results of the 50-g. oral glucose tolerance test.

(1) *Normal or Latent Diabetic Levels of Blood Sugar.*—Two-hour venous true blood sugar of less than 110 mg./100 ml. of blood would indicate normal carbohydrate tolerance.

(2) *Diabetic Levels of Blood Sugar (Chemical Diabetes Mellitus).*—Two-hour venous true blood sugar levels which have reached or exceeded 130 mg./100 ml. of blood.

(3) *The Borderline State.*—Many people are in the borderline state between 110 and 129 mg./100 ml. for venous blood.

(4) *Clinical or Symptomatic Diabetes Mellitus.*—Persons with known diabetes mellitus who are under treatment.

Method

Fifty-four patients submitted to abdominal or transurethral prostatectomy at the London Hospital between 1 July 1965 and 30 June 1966 and without evidence of neoplasia were studied. Three patients were excluded because of their general condition or at the request of the surgeon.

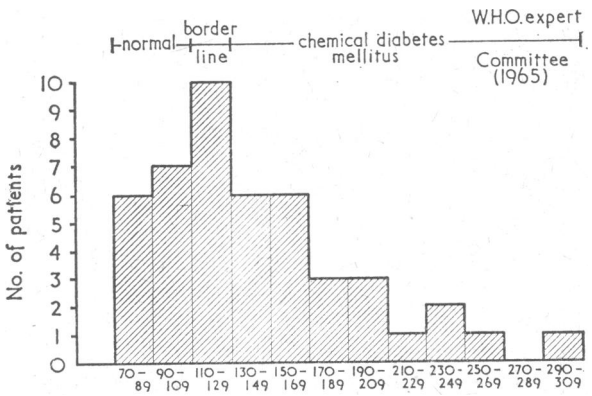
The age of the patients and the presence or absence of preoperative glycosuria (Clinistix) were recorded. A previous history of diabetes mellitus, peptic ulcer surgery, and ischaemic heart disease was sought. The findings of any preoperative E.C.G. were also recorded. The preoperative blood pressure was recorded and the precautions previously noted were again taken (Bourke and Griffin, 1966).

After the patient's recovery from surgery and when ambulant and eating a normal ward diet, a 50-g. oral glucose tolerance test was undertaken. All tests were made in the morning after a 12-hour overnight fast and between the seventh and twelfth postoperative days. Venous blood samples were collected immediately before the ingestion of glucose, and 30 and 120 minutes later. Blood glucose levels in the venous samples were estimated by the ferricyanide reduction method, a Technicon AutoAnalyzer being used. Urine samples were also collected at the same time as blood samples and tested qualitatively for glucose (Clinistix).

Results

Fifty-one patients were admitted to this study; three of them (5.9%) were previously known diabetics, and of these one had previously undergone operation for peptic ulcer. Two further patients had a past history of partial gastrectomy for peptic ulcer—one showing a lag storage curve and the other a diabetic curve (120-minute venous blood sugar: 160 mg./100 ml.).

The remaining 46 patients, who were neither known diabetics nor had undergone previous gastric operation, were studied. Three of them (6.5%) had glycosuria while fasting and 14 (30.4%) showed glycosuria after the glucose load. Twenty-three (50%) showed a venous blood sugar in excess of 130 mg./100 ml. two hours after a 50-g. oral glucose load and were frankly diabetic according to the W.H.O. Expert Committee on Diabetes Mellitus (1965) criteria (see Chart).



Distribution of two-hour venous blood glucose levels in mg./100 ml. for the 46 patients studied.

The Table shows an association between a previous history of cardiac infarction, E.C.G. evidence of ischaemia, raised blood pressure, and abnormal glucose tolerance. Eight patients (16.3%) had a past history of cardiac infarction and a further 12 (24.4%) had E.C.G. evidence of coronary ischaemia.

Discussion

Of 51 patients with benign prostatic hyperplasia three (5.9%) were known diabetics, and on glucose tolerance testing 23

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Previous Cardiac Infarction, E.C.G. Evidence of Ischaemia, and Raised Blood Pressure in 49 Patients Classified by Blood Glucose Levels According to the Criteria of the W.H.O. Expert Committee on Diabetes Mellitus (1965)

Two-hour Venous Blood	No. of Patients	Previous Cardiac Infarct	E.C.G. Evidence of Ischaemia	Diastolic B.P. Over 110 mm.Hg	Systolic B.P. Over 200 mm.Hg
< 110 mg./100 ml. ..	13	2	0	3	2
110 mg./100 ml. to 129 mg./100 ml. ..	10	0	1	0	0
> 130 mg./100 ml. ..	23	6	8	5	4
Known diabetics ..	3	0	3	2	1

further chemical diabetics were detected. Thus 50% of patients submitted to operation for benign prostatic hyperplasia were diabetic. This high incidence of diabetes mellitus and a previous history of cardiac infarction or E.C.G. evidence of ischaemia (40.7% of patients) may reflect the already demonstrated association between latent diabetes and ischaemic heart disease (Butterfield, 1964).

Patients with benign prostatic hyperplasia appear to have a high incidence of diabetes mellitus. A similar finding was noted on a previous retrospective study and it was suggested this could be accounted for by the known effect of oestrogens (Bourke and Griffin, 1966). Marmorston *et al.* (1965) reported that the oestrogen/androgen ratio in 24-hour urine collections for men with benign prostatic hyperplasia was increased compared with normal controls. These findings give further support to the hypothesis that benign prostatic hyperplasia is one manifestation of a relative increase of oestrogens with advancing age (Teilum, 1950 ; Scott, 1953).

It is possible that the high incidence of diabetes found in this study might in part be due to the stress of operation ; and glucose tolerance testing between the seventh and twelfth post-operative days when the patient was ambulant and eating a normal ward diet may have been insufficient precaution. Reduction of glucose tolerance with increasing age may also be a factor (Streeten *et al.*, 1965 ; W.H.O. Expert Committee on Diabetes Mellitus, 1965 ; Butterfield, 1966). Further work is being undertaken to study these points.

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Medical Memoranda

Pneumomediastinum and Diabetic Hyperpnoea

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Pneumomediastinum is a not uncommon complication of respiratory disease. The mechanism and the many causes of this air leakage were comprehensively discussed by Macklin and Macklin (1944) and by Bierman (1967). We have found only one previous account of pneumomediastinum in association with diabetic hyperpnoea (Hamman, 1937) in a 16-year-old boy who probably had a bronchopneumonia. In the following case we believe that the diabetic hyperpnoea may have caused or contributed to the pneumomediastinum in the absence of any definite evidence of pulmonary infection.

Case Report

A boy was admitted to hospital on his seventh birthday after two weeks of excessive thirst, polyuria, and weight loss, and 24 hours of persistent vomiting ; his weight was 52 lb. (23.6 kg.). His maternal grandmother was diabetic. He was conscious though considerably dehydrated ; the urine contained much sugar and acetone, and the blood glucose was 800 mg./100 ml. Serum electrolytes were: sodium 140, potassium 6, chloride 101 mEq/l., and serum urea 62 mg./100 ml. ; *p*H was not estimated owing to a mechanical failure. The diabetic ketosis responded rapidly to intravenous insulin and sodium bicarbonate solution followed by multiple electrolyte solutions, and he gained 5 lb. (2.3 kg.) in weight in 18 hours.

On admission there was marked acetonpnoea and deep acidotic breathing at 48/minute with a slight expiratory grunt and an occasional dry cough. Two hours later it was noted that the heart sounds were distant, that cardiac dullness was absent, and that subcutaneous emphysema was appearing above the right clavicle. The cardiac rate was 160/minute, the blood pressure 100/60 mm. Hg, the pulse showed slight paradoxical decrease during expiration, and an electrocardiogram was normal. Portable radiographs showed a moderate amount of air between sternum and heart on the lateral projection and on the anteroposterior projection streaks of air outlining the upper heart, great vessels, and descending aorta, as well as air bubbles above both clavicles. There were no clinical or radiological signs of pneumonia, and, apart from an admission temperature of 99.8° F. (37.7° C.), he remained afebrile. Some hours later the subcutaneous emphysema had spread up the neck, and inspiratory crunching sounds were heard on auscultation across the lower anterior chest at the level of diaphragmatic attachment. There was little respiratory distress, but he was nursed in an oxygen tent for the next 12 hours, and thereafter his general condition improved greatly though the subcutaneous emphysema took some days to disappear.

Forty hours after admission some cardiac dullness reappeared, and Hamman's (1937) sign of crunching sounds synchronous with systole was heard in the precordium for the first time. On the seventh day all abnormal signs had disappeared apart from slight inspiratory crunching in the left lower chest ; a radiograph showed complete absorption of the ectopic air and slight peribronchial shadowing in the right lower zone. The initial throat culture grew haemolytic streptococci, and 500,000 units of penicillin were given intramuscularly twice daily for 10 days. The haemoglobin on the second day was 12.3 g./100 ml., and the leucocytes numbered 11,400/cu. mm., with 91% neutrophils.

Comment

The great majority if not all examples of interstitial pulmonary emphysema leading to pneumomediastinum are in association with increased alveolar pressure. Macklin and Macklin (1944) and Bierman (1967) suggest that when alveoli