binucleated erythroblasts were present. The possibility therefore exists that there may be a specific haematological disorder characterized by marrow mastocytosis with abnormal erythroblasts which may lead to aplastic anaemia without having necessarily systemic mast cell involvement.

Summary

A case is presented in which pancytopenia was associated with marrow mastocytosis and abnormal erythroid precursors. At post-mortem tuberculosis of the serous cavities was found. The possible significance of these findings is discussed.

Acknowledgments

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Phaeochromocytoma as a cause of gastro-intestinal distension

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Too often the diagnosis of phaeochromocytoma is missed, because the possibility has not even been considered. This is largely due to its diverse clinical presentations. While paroxysmal hypertension with vasomotor instability, or sustained hypertension, may suggest the diagnosis, less familiar features may distort the picture. Those recorded include paroxysmal hypotension (Gjol, Dybkaer & Funder, 1957; Richmond, Frazer & Millar, 1961; Hamrin, 1962; Leather *et al.,* 1962), a typical hyperthyroidism (Davies, 1952), glycosuria, or even diabetes mellitus (Freedman *et al.,* 1958) and urinary retention (Barnet *et al.,* 1950; Baird & Cohen, 1954). There is a well-documented association with thyroid carcinoma (Williams, 1965) and with neurofibromatosis (Glushien, Mansuy & Littman, 1953). Phaeochromocytoma may cause sudden death from pulmonary oedema (Harrison & Seward, 1954) and from cardiac arrhythmia (Durant & Soloff, 1962).

We report here a patient with bilateral phaeochromocytomata, presenting with gross abdominal distension and simulating acute intestinal obstruction. Although distension of the abdomen has been recorded in case reports of phaeochromocytoma, a direct connection between the two has not previously been stressed.

Case report

In August 1965, a 26-year-old housewife was admitted to Hope Hospital with a diagnosis of acute intestinal obstruction. She gave an 8-day history of progressive abdominal distension and colicky pains. There had been absolute constipation for 6 days, and persistent vomiting for 3 days. She gave a lifelong history of constipation, but there had been no previous episode of abdominal distension. Other complaints were exertional dyspnoea for 2 weeks, spontaneous bruising of her legs for a week, and thirst with polyuria for 3 days.

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In 1960 and 1961 she had had normal pregnancies. Blood pressure recordings during her antenatal care varied between 110/70 and 130/70 mmHg. In June 1962, she was seen because of backache of 2 years' duration, and throbbing headaches associated with nausea, vomiting and occasional sweating. She also mentioned 'nervous attacks' accompanied by a feeling of panic, these having started 17 months before. On examination her BP was 160/90, and no organic cause for these attacks was found. Two weeks later, she was admitted to Hope Hospital following a self-administered overdosage of glutethimide (Doriden) tablets, recovering fully. On this occasion her blood pressure, monitored hourly for 24 hr, was normal. Following psychiatric examination, she was transferred to a mental hospital for further treatment of her depression, but she discharged herself 7 days later.

From that time until October 1964, she was seen on several occasions in the psychiatric out-patient clinic, because of depression. There was one admission to hospital in February 1963 with an incomplete abortion.

In October 1964, she was admitted to the medical wards as a case of diabetic precoma, complaining of thirst, sweating and vomiting over the previous week. Glycosuria had been discovered at her home. The BP was 160/110, heart rate 108/min, regular. Glycosuria was not confirmed in hospital, and the blood sugar was found to be normal on three occasions. The thyroid was diffusely enlarged, and this, with her sweating, tachycardia, nervousness, finger tremor and hyperdynamic circulation, suggested thyrotoxicosis. ^{131}I uptake at 2 hr was 23%, within normal range.

In May 1965, she was again seen with the same complaints, and on this occasion the clinical picture was strongly suggestive of thyrotoxicosis. Partial thyroidectomy was performed 6 weeks later; the pre-operative BP being 150/110. There was little post-operative improvement, and her tachycardia with sweating persisted. Thyroid histology showed a classical 'Hürthle cell tumour', with no evidence of malignancy.

Examination of the patient on her final admission to Hope Hospital in August 1965 revealed a grossly distended tympanitic abdomen without visible peristalsis (Fig. 1). There was no detectable ascites, and faint bowel sounds could be heard. The rectum was loaded. Heart rate 132/min, regular. BP 220/160. There was clinical evidence of left ventricular hypertrophy and moderate bilateral ankle oedema. Fundoscopy showed bilateral papilloedema, with numerous fresh exudates and haemorrhages. There were areas of recent bruising of the legs and arms, and the skin of the lower limbs and lower abdomen showed a typical livido reticularis. Urine on ward testing contained ¼% sugar (Clinitest) and a moderate amount of albumen.

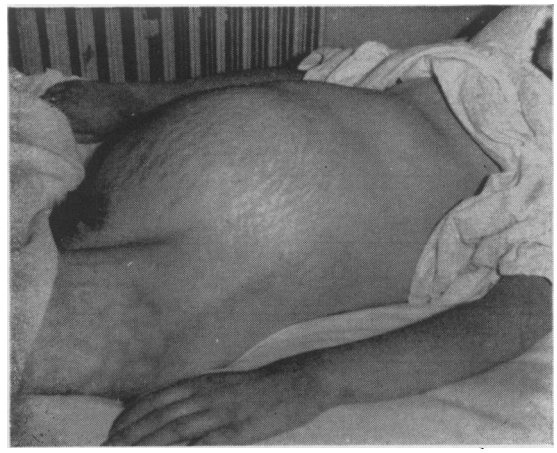

FIG. 1. Gross abdominal distension in a patient with phaeochromocytoma.

Investigations. Haemoglobin 60%, white cell count 17,000/mm^3, blood film—a haemorrhagic picture with polychromatic cells, late normoblasts and a reticulocytosis of 5·2%; blood sugar 285 mg/100 ml; LE cells not found; blood urea 50 mg/100 ml. Serum sodium, 141 mEq/l; potassium, 3·3 mEq/l; chlorides, 87 mEq/l; total serum proteins 8 g/100 ml (albumen, 5·8 g; globulin, 2·2 g); urinary catecholamines—markedly increased excretion. Electrocardiogram showed sinus tachycardia with left ventricular hypertrophy and strain. Chest X-ray was normal.

Two days after admission, a phentolamine (Rogitine) test was performed (Fig. 2). After 5 mg phentolamine had been given intravenously, blood pressure recordings were taken at 3-sec intervals for 3 min and at 60-sec intervals for a further

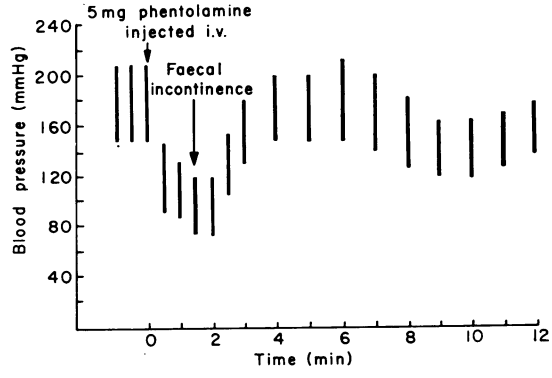

FIG. 2. Phentolamine test.

9 min. The basal reading was 210/150, and in 90 sec the BP had fallen to 120/70. At this time, she had profuse faecal incontinence. This was her first bowel action for 8 days, in spite of suppositories at home and repeated enemata in hospital.

The diagnosis of phaeochromocytoma having been confirmed, it was decided to operate within 48 hr. Pre-operative treatment was commenced with phenoxybenzamine 60 mg in 500 ml 5% dextrose, given intravenously each 24 hr, and pronethalol 0·1 g, 8-hourly, by mouth. On this regime the blood pressure settled within 2 hr, and remained stable at 120/70. Fifteen hours after treatment had been started, the patient collapsed suddenly, and, in spite of emergency measures, died within 10 min.

Necropsy showed that there had been a large retroperitoneal haemorrhage from the left adrenal gland, which had ruptured. The remainder of the gland weighed 440 g. The right adrenal gland was greatly enlarged, weighing 1440 g (Fig. 3). Both glands were fleshy and haemorrhagic. The kidneys were displaced downwards, but appeared otherwise to be normal. The brain showed moderate cerebral oedema. The upper alimentary tract contained altered blood, and the colon showed gross dilatation. There was moderate left ventricular hypertrophy and pulmonary oedema.

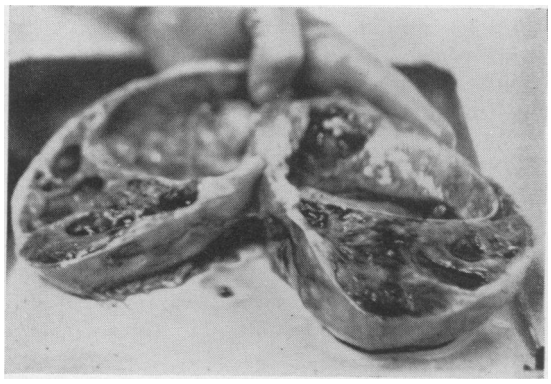

FIG. 3. Right adrenal gland.

Histology. The abdominal tumours were typical phaeochromocytomata, with a moderately strong chromaffin reaction. Section of the lung showed moderate pulmonary oedema and patchy polymorphonuclear infiltration. There was no evidence of metastases. The heart showed slight left ventricular hypertrophy; sections of the liver and kidneys were normal and the colon was normal, showing no signs of Hirschprung's disease.

Further investigations were performed on the tumours after necropsy, with the following results:

Tumour, left:
Adrenalin 1·2 mg/g tissue
Noradrenalin 1·5 mg/g tissue
Fluid from right tumour:
Adrenalin 2700 mg/l
Noradrenalin 480 mg/l

These are average levels for phaeochromocytomata, but the unusual size of the tumours makes this a much larger quantity of adrenalin and noradrenalin than is normally encountered.

There was also a greatly increased urinary excretion of inactivated material, the normetadrenalin level on two samples being 136 mg and 230 mg/g creatinine, and the vanillyl mandelic acid (V.M.A.) level being 380 and 1000 mg/g creatinine, respectively. These results are considerably in excess of those found in most phaeochromocytomata, but again may be accounted for by the unusual size of the tumours.

Discussion

In reported cases of phaeochromocytoma, simulated abdominal emergencies have not been uncommon. Gilliland & Daniel (1951) reported a 29-year-old man whose vomiting and severe abdominal pain was due to haemorrhage into the tumour. One of the patients reported by Leather *et al.* (1962) had suffered repeated attacks of abdominal pain and vomiting, simulating cholecystitis. Cholecystectomy was performed prior to the diagnosis of phaeochromocytoma being made, and the tumour was later removed with symptomatic relief.

Abdominal distension has been recorded infrequently, and when it has occurred, its significance has not been stressed. Cole (1950) described a patient, one of whose main complaints was progressive abdominal distension. Laparotomy was performed because of possible general peritonitis with paralytic ileus, or subacute obstruction. The whole bowel was distended enormously with gas. No evidence of peritonitis was found, nor was there any mechanical obstruction. Later, on further laparotomy, a tumour was removed from the site of the left adrenal gland, subsequently proving to be a typical phaeochromocytoma. The cause of the abdominal distension was not discussed. In a patient described by Jelliffe (1952), substernal and epigastric pain was followed by generalized, extreme abdominal tenderness and gaseous distension. The clinical diagnoses were coronary thrombosis and mesenteric infarction. This was not confirmed at necropsy, when a phaeochromocytoma of the left adrenal gland was found.

In our patient, the biochemical data obtained from post-mortem tumour and urine examination may provide two diametrically opposed theories

as to the absence of hypertension and gastro-intestinal distension in her previous history. Either she was secreting adrenalin into the tumour and no release was taking place, or she was capable of inactivating vast amounts of adrenalin. Presumably, in her final admission, there was a breakdown of whichever compensatory mechanism had existed previously. This resulted in an increased circulating adrenalin causing hypertension and, we believe, the gastro-intestinal distension. The latter effect may be explained by the action of adrenalin on the smooth muscle of the bowel. This causes relaxation of the musculature of the gastro-intestinal tract, and contraction of the pyloric and ileo-caecal sphincters. The frequency and amplitude of peristaltic waves are decreased (Goodman & Gilman, 1960). We would further suggest that the dramatic faecal incontinence which occurred 90 sec after the injection of phentolamine substantiates this theory, the adrenergic blocking agent partially inhibiting the adrenalin-induced intestinal relaxation.

This case provides two further interesting features. Firstly, haemorrhage into a phaeochromocytoma is a rare event in itself. Huston & Stewart (1965) cited only four such cases in the literature in addition to their own. There is little doubt that rupture of the tumour was secondary to haemorrhage, and this resulted in liberation of vast quantities of stored adrenalin into the circulation. Such a release would cause uncontrollable hypertension leading to death.

Secondly, although the association of bilateral phaeochromocytoma with thyroid carcinoma is well documented, we can find no relationship with 'Hürthle Cell tumour' of the thyroid. However, Willis (1953) and Winston Evans (1956) are both of the opinion that the 'Hürthle Cell tumour' is not a separate entity, but merely a variation of thyroid adenoma and thus, possibly, a pre-malignant condition.

Summary

A patient with bilateral phaeochromocytomata presented with severe abdominal distension, simulating acute intestinal obstruction. It is suggested that this feature may occur as part of the syndrome of phaeochromocytoma, and a possible mechanism is discussed.

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