dose to avoid hypoglycaemic reactions. This is important because three quarters of our patients breast fed and two thirds continued to do so for at least six weeks. A similar proportion breast fed for six weeks in another study,³ and we believe that breast feeding should no longer be considered difficult for diabetics.

The control of blood glucose concentrations in the breast feeding women was good despite the reduced insulin dose and an increased carbohydrate intake by more than half of them. The average postnatal blood glucose concentration in those who bottle fed was higher than that in the breast feeding patients despite smaller dose reductions and an increased carbohydrate intake in only one. The reduced insulin requirements in the breast feeding women were unlikely to be due to the reduced responsiveness of growth hormone to insulin post partum as growth hormone concentrations do not depend on the method of feeding.⁴ Caesarean section may lead to a temporary fall in insulin requirements,⁵ but this was not the case in our study. We attribute the difference in insulin requirements to breast feeding; the carbohydrate supplements were unlikely to replace the lactose in milk.

Whichelow and Doddridge did not report insulin doses immediately post partum but found similar doses in breast feeding and bottle feeding women six weeks after delivery.³ Their patients increased their carbohydrate intake by 50 g while breast feeding, a supplement that was probably greater than that of our group. We advise that women who intend to breast feed should reduce their insulin by one quarter of their prepregnancy dose. They should also supplement their carbohydrate intake but may still require a reduction of insulin until after the postnatal visit. Those who bottle feed can resume the dose they took early in pregnancy.

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Phaeochromocytoma with associated somatostatin production

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Phaeochromocytomas secrete large quantities of catecholamines into the circulation, and sustained hypertension is usually present at diagnosis. The tumour may also produce other neurotransmitters that have systemic effects such as vasoactive intestinal peptide, neurotensin, and neuropeptide Y. We report on a patient with a phaeochromocytoma in whom biochemical confirmation of the diagnosis was delayed because resting concentrations of catecholamines were normal, possibly because of the associated production of somatostatin by the tumour.

Case report

A 40 year old general practitioner developed a sudden severe occipital headache while out jogging. It lasted four hours and was associated with anxiety, palpitations, tremor, nausea, and vomiting. Over the next three weeks he had up to three similar episodes a day and noticed pallor during them. His blood pressure during an episode was 160/90 mm Hg compared with 120/80 mm Hg between episodes.

He diagnosed a phaeochromocytoma but repeated estimations of urinary vanillylmandelic acid excretion over 24 hours were normal apart from one of 58 $\mu\text{mol}/24\text{ h}$ (normal range 12-44) on the day of a severe episode. Abdominal computed tomography showed a small nodule in the right adrenal gland but scanning with radiolabelled *m*-iodobenzyl guanidine failed to confirm that it contained chromaffin tissue. Because of the conflicting biochemical and radiological results he was referred for provocation testing. The results of a physical examination were normal, his blood pressure was 140/90 mm Hg, and he showed no signs of sustained hypertension. He had had postprandial regurgitation for one year and so a profile of gut hormones was requested.

His basal catecholamine concentrations were within the normal range for radioenzymatic assay (noradrenaline 1.46 nmol/l, range 1.18-4.72; adrenaline 136 pmol/l

In situ hybridisation of synthetic 36 base oligonucleotide complementary to somatostatin messenger RNA radio labelled with ³⁵S-deoxycytidine triphosphate. Fixed sections of phaeochromocytoma were incubated for one hour at 37°C with 50 μl probe (18 μM), 50% formamide, 0.3M sodium chloride, 0.03M sodium citrate, Denhardt's solution, salmon sperm DNA 0.25 mg/ml, 5% dextran sulphate, and 14mM 2-mercaptoethanol. Washed sections were dipped in Ilford nuclear emulsion and developed after 10 days. Dense collections of silver grains over cytoplasm of cells identifies those that contain somatostatin messenger RNA

range 110-440.¹ Provocation testing with glucagon 1 mg intravenously produced no change in plasma noradrenaline concentration and the expected physiological increase in plasma adrenaline concentration. Selective venous sampling was undertaken, and catecholamine concentrations were normal at all 22 sites sampled. Plasma obtained during acute episodes did, however, contain raised catecholamine concentrations (mean values: noradrenaline 13.30 nmol/l, adrenaline 1965 pmol/l), and further scanning with radiolabelled *m*-iodobenzylguanidine with digital subtraction of the hepatic image showed uptake of label in the right adrenal gland.

The profile of gut hormones showed an increased plasma concentration of somatostatin of 147 pmol/l (normal < 100) but normal concentrations of gastrin (15 pmol/l), glucagon (11 pmol/l), neurotensin (28 pmol/l), and vasoactive intestinal peptide (4 pmol/l).

At operation a phaeochromocytoma measuring 1.5 cm was removed from the right adrenal gland. *In situ* hybridisation of sections of the tumour showed cells with positive binding for an oligonucleotide complementary to somatostatin messenger RNA (figure). No such binding was detected in sections from an unrelated

phaeochromocytoma or from normal human adrenal tissue. To show whether the tumour was producing physiologically active somatostatin the growth hormone response to an intravenous infusion of growth hormone releasing hormone (100 µg) was studied.² Before operation plasma growth hormone concentration increased by only 7.6 mU/l compared with a normal increase of 54.0 mU/l postoperatively.

Comment

Plasma catecholamine concentrations are characteristically considerably raised in patients with phaeochromocytomas, and biochemical detection of a tumour by measuring the 24 hour urinary excretion of vanillyl-mandelic acid relies on the high excretion of the breakdown products of catecholamine metabolism. Our patient had consistently normal plasma concentrations of catecholamines at rest and after stimulation, and increased concentrations were found only during episodes.

The production of immunoreactive somatostatin within phaeochromocytomas has been described,³ but the production of somatostatin messenger RNA and the probable secretion of functional somatostatin have not been reported. Somatostatin inhibits the release of many hormones and neurotransmitters and suppres-

sion of the growth hormone response to growth hormone releasing hormone typically occurs. Our patient showed a blunted response, which returned to normal after his tumour had been removed; his gastrointestinal symptoms also improved after operation. The tumour was probably secreting somatostatin, but whether this was responsible for our patient's normal resting catecholamine concentrations is not known.

We thank Dr J Clark for supplying the growth hormone releasing factor and Dr P Raggatt for the growth hormone assay. The profile of gut hormones was performed by the staff of Professor S R Bloom's laboratory at the Royal Postgraduate Medical School, Hammersmith.

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x Ray film obtained during
barium swallow, showing
dilated oesophagus with food
debris above impacted bolus

Disimpaction of swallowed bolus

P I Ignotus, A Grundy

Impaction of foreign bodies in the oesophagus, particularly large pieces of meat (the steakhouse syndrome), is not uncommon.¹ Once the foreign body is impacted the likelihood of spontaneous passage is small, as mucosal oedema grips it more tightly.

Case report

A 30 year old man was referred from the casualty department for an urgent barium swallow examination. He had a three day history of dysphagia and the feeling of something stuck retrosternally after he had eaten a large piece of steak. He was otherwise well.

The barium swallow showed a large impacted bolus in the distal oesophagus with proximal dilatation and food debris above it (figure). The obstruction did not clear with further mouthfuls of barium. He was given 20 mg hyoscine butylbromide intravenously followed by 25 effervescent tablets (Baritop, an agent used in double contrast studies) and several glasses of water. The symptoms were immediately relieved, and a barium swallow after a few minutes showed that the obstruction had cleared. A little irregularity of the oesophageal wall was attributed to oedema. He failed to attend for follow up.

Comment

Several methods have been suggested to relieve impacted foreign bodies. Removal with a Foley catheter may be possible but carries the risk of mucosal damage.² Proteolytic enzymes, such as chymopapain, may digest a meat bolus but may also lead to mucosal damage, mediastinitis, perforation, or death.^{3,4} Endoscopic removal requires specialised equipment and sedation or anaesthesia and carries risks, and the

patient may need to be admitted to hospital. Several radiological approaches have been tried. The weight of a column of barium is sometimes enough to dislodge a bolus.³ Intravenous glucagon may relax the lower oesophageal sphincter and allow passage of a bolus but was successful in only three out of six patients.⁵ A high success rate has been reported for a combination of barium and carbonated drinks, and a cocktail of tartaric acid and sodium bicarbonate was successful in all eight patients reported on by Mohammed and Hegedus.³ No important complications have been reported, though there is a theoretical risk of aspiration of the agents or oesophageal contents.

The mechanism of action is probably twofold. Gas distends the oesophagus above the impacted bolus and helps to propel it downwards. This distension leads to relaxation of the lower oesophageal sphincter, which is further helped by giving a smooth muscle relaxant.

Oesophageal lesions are an important predisposing factor to obstruction with a bolus and have been reported in 16 out of 28 cases.³ Re-evaluating patients after a short interval when mucosal oedema will have resolved is important.

The radiological techniques of disimpaction are simple, quick, safe, and effective. We suggest the following sequence for dealing with obstruction. Mouthfuls of barium should be tried first; if this is unsuccessful hyoscine and an effervescent agent should be given. If neither of these techniques is successful endoscopy should be performed.

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