intestine is normal with no evidence of malabsorption." Three-day faecal fat excretion and xylose absorption test were normal.

Although the serum B_{12} level was not available at the time, the evidence from blood, marrow, and barium meal examinations suggested vitamin B_{12} deficiency due to pernicious anaemia, and treatment was started with hydroxocobalamin 1 mg intramuscularly daily for four days, and then weekly. There was no haematological response, and the haemoglobin fell further to 34%. The patient was then admitted to the Luton and Dunstable Hospital (under Dr B P Harrold), where folic acid was added to her treatment, again with no response in the peripheral blood or marrow. A blood transfusion brought her haemoglobin up to 10.8 g/dl, but a subsequent marrow aspiration confirmed the previous findings of a megaloblastic picture, with a few ring sideroblasts, insufficient to justify a diagnosis of sideroblastic anaemia. At the suggestion of the haematologist (Dr J R B Williams) a therapeutic trial of pyridoxine was begun with a dose of 50 mg twice a day. Seven days later the marrow had reverted to normal and the patient was discharged on pyridoxine alone. In the following weeks her haemoglobin gradually returned to normal levels. After the diagnosis had been established the serum B_{12} level, in a sample of blood taken at the start of the investigation and before the administration of hydroxocobalamin, was reported as normal at 360 ng/l. A Schilling test was also normal.

Comment

Administration of combined oestrogen-progestogen oral contraceptive agents (OCA) can lead to a disturbance of tryptophan and vitamin B_6 metabolism owing to the oestrogen component causing induction of tryptophan oxygenase in the liver. This causes increased metabolism of tryptophan and hence an increased need for the necessary coenzyme pyridoxal phosphate.¹ Boots *et al*² report that a tenfold or greater increase in vitamin B_6 requirements is necessary to compensate for this effect. Rose *et al*³ reported that a subclinical vitamin B_6 deficiency may result, and Adams *et al*⁴ reported that a form of depression found in OCA users responds to pyridoxine administration. Brown *et al*⁵ concluded that a small subgroup of women may exist who are particularly vulnerable to vitamin B_6 deficiency when taking OCA, but I can find no previous reports of megaloblastic anaemia associated with OCA usage in a patient with no other apparent cause and responding to vitamin B_6 administration. I suggest that the above patient represents such a case.

¹ Leklam, J E, *et al*, *American Journal of Clinical Nutrition*, 1975, **28**, 146.

² Boots, L, *et al*, *American Journal of Clinical Nutrition*, 1975, **28**, 354.

³ Rose, D P, *et al*, *American Journal of Clinical Nutrition*, 1973, **26**, 48.

⁴ Adams, P W, *et al*, *Lancet*, 1973, **1**, 897.

⁵ Brown, R R, *et al*, *American Journal of Clinical Nutrition*, 1975, **28**, 10.

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Prolactin concentrations during anaesthesia

Because of the difficulty in detecting prolactin receptors in breast-tumour specimens obtained at operation, we postulated that the stress of the procedure might lead to raised serum prolactin levels with blocking of available receptor sites. We therefore studied the changes in serum prolactin concentrations during anaesthesia.

Patients, methods, and results

Nine men and ten women undergoing general surgery and nine women having a lump in the breast removed were studied. Patients receiving medication known to affect serum prolactin concentrations (such as chlorpromazine) were excluded. Venous samples were obtained before induction of anaesthesia and at about 15-minute intervals during the operation. The number of samples obtained depended on the length of the operation. Premedication was with atropine and papaveretum. Anaesthesia was induced in most cases with thiopentone and suxamethonium and maintained with N_2O/O_2 and halothane.

Radioimmunoassay of human prolactin used materials supplied by NIH and human standard supplied by Dr H Friesen (code 72/11/23). Radio-

immunoassay of human growth hormone used materials supplied by the MRC and as standard WHO First IRP 66/217.

Serum prolactin and GH concentrations are shown in the figure. The difference between resting levels in the three groups is not significant but the peroperative levels are statistically significantly different from each other and from the resting levels ($P < 0.025$ Mann-Whitney U Test). Prolactin concentrations rose within 15 minutes and remained high for up to one hour, by which time most operations in this series were completed. The readings shown in the figure are from samples taken between 15 and 30 minutes after induction. The removal of a lump in the breast was for a benign lesion in five cases and for a malignant tumour in four. The mean peroperative level for the benign group was $71 \pm 8.4 \mu\text{g/l}$ (standard error of the mean) and for the malignant group $124 \pm 13.5 \mu\text{g/l}$.

Effect of general anaesthesia on serum growth hormone and prolactin concentrations.

Discussion

There is little published data on prolactin concentrations during anaesthesia in man. One study shows a significant rise in both men and women, with a greater rise in women.¹ We have found a significant rise in all groups studied but of special interest is the finding of much higher concentrations in women undergoing surgery for a lump in the breast. The women with malignant lumps seem to have the highest concentrations, but the numbers are too small to draw definite conclusions. Abnormalities in basal prolactin concentrations have been reported in some women with benign and malignant breast lumps.²⁻⁴ A small difference in peak prolactin response to TRH has been claimed in advanced breast cancer compared with earlier stages and with normal people.⁵

Whether these differences are due to inherent differences in prolactin secretion or to greater stress in women with breast lumps is not clear. The failure of growth hormone concentrations to rise significantly is against the latter explanation.

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¹ Noel, G L, *et al*, *Journal of Clinical Endocrinology and Metabolism*, 1972, **35**, 840.

² Kwa, H G, *et al*, *Lancet*, 1974, **1**, 433.

³ Franks, S, *et al*, *British Medical Journal*, 1974, **4**, 320.

⁴ Cole, E N, *et al*, *Journal of Endocrinology*, 1976, **69**, 49P.

⁵ Mittra, I, Hayward, J L, and McNeilly, A S, *Lancet*, 1974, **1**, 889.

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