a virus type of gastroenteritis. In two cases the symptoms were present for one day only while the other patients suffered for two or more days. Most of the patients developed symptoms after taking seven to 10 tablets in that particular cycle but in two cases more than 12 tablets had been taken and in one case only three tablets had been taken.

Discussion

Study of the oral contraceptives in common use shows that the leaflet which accompanies each packet of tablets warns the patient of the risk of omitting tablets and the action to be taken if this happens. In only 30% of preparations does the leaflet explain that if diarrhoea or vomiting occurs the contraceptive effect may be lost and pregnancy result: Anovlar-21, Minovlar, Eugynon 30, Minovlar ED, Gynovlar -21 Ovrnette, and Minilyn.

Furthermore, in the *Handbook of Contraceptive Practice*,⁴ published by the Department of Health and Social Security, no mention is made of diarrhoea or vomiting in relation to failure of oral contraceptives. In our eight cases of pregnancy four patients were using preparations which did specifically mention the risks of gastrointestinal upsets, which must mean that they either did not read or did not understand the information given. Warnings of possible side effects and of causes of failure of the preparation are much better given verbally by the prescriber, and the risk of diarrhoea or vomiting should be emphasized.

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Department of Gynaecology, Bristol Royal Infirmary, Bristol BS2 8HW

A. HOWARD JOHN, F.R.C.S., F.R.C.O.G., Consultant Obstetrician and Gynaecologist

A. JAMES JONES, M.B., M.R.C.O.G., Registrar in Obstetrics and Gynaecology

Cerebral Oedema in Diabetic Ketoacidosis

Raised intracranial pressure during the treatment of diabetic ketoacidosis is uncommon but can produce or prolong unconsciousness.^{1,2} Treatment—with parenteral urea, mannitol, glucocorticoids, or dexamethasone—has generally been unsuccessful.¹ We describe a diabetic patient who developed cerebral oedema during the treatment of hyperglycaemic ketoacidosis but who recovered after dexamethasone.

Case Report

A 40-year-old man maintained on isophane insulin for 14 years was admitted after 48 hours of vomiting and progressive drowsiness. For four years he had moderate renal impairment (serum creatinine 725 $\mu\text{mol/l}$ (8.2 mg/100 ml)), hypertension, and advanced retinitis proliferans. On admission he was deeply unconscious, hyperventilating, and dehydrated. There were no focal neurological signs, and vitreous haemorrhages obscured the optic discs. Biochemical investigation confirmed severe hyperglycaemia, severe acidosis, and ketonuria (see fig.).

He was treated with hourly intramuscular insulin in low doses³ and intravenous saline 0.9%. Over three hours 500 ml of 4.2% sodium bicarbonate was given. After 14 hours blood glucose had fallen to 19 mmol/l (344 mg/100 ml), and he was no longer acidotic. He remained unconscious though responsive to pain. At 30 hours his level of consciousness was unchanged though biochemical values were normal. Sterile cerebrospinal fluid (C.S.F.) was obtained under pressure of 400 mm H₂O and it contained $0.045 \times 10^9/\text{l}$ lymphocytes (glucose 2.6 mmol/l (46 mg/100 ml)). Dexamethasone was given in an initial dose of 10 mg intramuscularly, then four mg six-hourly. Within six hours he regained consciousness and though drowsy could answer questions lucidly. C.S.F. pressure five days later was 180 mm H₂O. Despite recovery from this acute episode his renal function subsequently deteriorated, and he died four weeks later from uraemia, pulmonary

Effect of treatment on blood glucose, serum potassium, and blood pH, with related level of consciousness (grades 0-4).

Conversion: SI to Traditional Units—Glucose: 1 mmol/l $\approx$ 18 mg/100 ml.

oedema, and bronchopneumonia. At necropsy there was no evidence of intracerebral disease.

Discussion

Cerebral oedema has been reported only in young diabetics free of major complications who did not seem dangerously ill and who lost consciousness only after treatment of the ketoacidosis was started.^{1,2} The development of cerebral oedema may be caused by a rapid fall in blood glucose with improvement in the metabolic acidosis.³ During treatment C.S.F. glucose and osmolality are higher and fall more rapidly than those in the blood,⁴ and this may produce a shift of water from blood to subarachnoid space and brain because of an osmotic gradient.^{2,4} In our patient the fall in blood glucose averaged $2.8 \text{ mmol l}^{-1} \text{ h}^{-1}$ ($50 \text{ mg } 100 \text{ ml}^{-1} \text{ h}^{-1}$), which is much less than the fall of $5.0 \text{ mmol l}^{-1} \text{ h}^{-1}$ ($90 \text{ mg } 100 \text{ ml}^{-1} \text{ h}^{-1}$) reported by others.³ Serum osmolality fell from 351 mmol/kg to 318 mmol/kg during the first 14 hours. In ketoacidosis the depression of consciousness parallels the hyperglycaemia and the hyperosmolality rather than the degree of acidosis,⁵ but a profound lowering of C.S.F. pH resulting from changes in acid-base balance between blood and C.S.F. may contribute.⁴⁻⁵

The initial high C.S.F. pressure and the rapid response to dexamethasone suggest that cerebral oedema contributed significantly to the delayed return of consciousness in our patient. Spontaneous recovery is exceptional,² and active treatment has generally been unsuccessful¹ though parenteral methylprednisolone has been used successfully in non-ketotic hyperglycaemic coma. Success of treatment may be related to the duration of cerebral oedema before treatment begins.

In an unconscious diabetic patient it may be difficult to decide when to perform a lumbar puncture. Severe retinopathy in our patient made exclusion of papilloedema impossible, and a further diagnostic problem arose from the presence of white cells in the C.S.F. This has been noted in cerebral oedema without infection after ketoacidosis¹ and is presumably an epiphenomenon. Failure to recover consciousness after biochemical improvement in diabetic ketoacidosis must promote suspicion of cerebral oedema, in which early use of dexamethasone may be beneficial.

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Division of Medicine, Ninewells Hospital, Dundee DD2 1UB

B. M. FRIER, M.B., M.R.C.P., Medical Registrar

J. B. McCONNELL, M.B., M.R.C.P., Medical Registrar