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SHORT REPORTS

Rhythmic raiding of refrigerator related to rapid eye movement sleep

We report on a patient who three to five times each night got out of bed and went to the adjacent kitchen to eat and drink, and correlate these episodes of eating with periods of rapid eye movement sleep.

Case report

A man aged 37 in a managerial job was concerned about the fact that he raided his refrigerator to eat and drink three to five times each night, about every one and a half hours.

When aged 1 he had received operations for epispadias, and his ureters had been implanted into the bowel. He first married at 23 years, but when the marriage broke down soon after his weight fell to 55 kg. During the next few years he had an active sex life, and his nocturnal eating began. He remarried at 29 years to a woman with a keen interest in cooking. His wife was unperturbed by his nocturnal activities and generally slept through them. If she spoke as he got out of bed he would only mutter back, and she did not think that he was properly awake as often in the morning he would not remember having got up during the night. After each episode of eating he would rapidly fall back to sleep. Sometimes he would switch on the kitchen light, and sometimes he would behave oddly—for example, he had once found himself drinking sunflower oil. Asked why he did not simply restrain himself and stay in bed, he said that it was "a sort of impulsion." When he and his wife went to France each summer for a month they would place food and drink beside his bed every night.

During the past 12 years he had regularly taken cycloserine to prevent urinary tract infections. He had also been told to drink plentifully. His nocturnal behaviour did not seem to have the characteristics of sleepwalking, but as sleepwalking can be provoked by drugs acting on the central nervous system the cycloserine treatment was suspected. Treatment with trimethoprim instead of cycloserine had no effect on his nocturnal behaviour. Generally, he was healthy, but his blood urea was 9.6 mmol/l (85 mg/100 ml) and he had mild renal scarring. His height was 172 cm, and his weight improved steadily when he started to live with his second wife, becoming stable at about 70 kg for the past several years. There was no history of abnormal daytime eating habits or any unusual concern for his body size. His hobbies were mainly sedentary.

He spent six nights in the sleep laboratory and would put beside his bed two bottles of soft drink, a pork pie, several packets of potato crisps, and biscuits. He fell asleep quickly and slept on average for 439 minutes with a normal distribution of sleep stages, including 25% rapid eye movement (paradoxical) sleep. There were 31 episodes of eating, counting closely grouped eating episodes as one; 28 of these occurred just before, in the middle of, or just after a period of rapid eye movement sleep (figure). An electroencephalogram confirmed brief wakefulness as each eating and drinking episode began, and a video tape showed him unscrewing and screwing up bottle tops. While chewing, however, he would be falling asleep and would pass into stage 2 sleep within a few seconds and rapid eye movement sleep within half a minute.

Episodes of eating and drinking in relation to rapid eye movement sleep during the night (measured in the sleep laboratory). Hatched areas are periods of rapid eye movement sleep; lines are episodes of eating.

The patient and his wife agreed that when they next went on holiday they would not have any food by the bedside. On return he claimed to have had only soft drinks during the night. His nocturnal eating returned, however, and at follow up at one year he was again raiding the refrigerator every hour and a half during the night. He now dismissed it cheerfully, saying that it did not affect him adversely.

Comment

In their early description of periods of rapid eye movement in the sleep of babies on demand feeding, Aserinsky and Kleitman reported that demands for food were related in time to rapid eye movement sleep.¹ In adults there is a 100 minute rhythm in waking behaviour, as is the case with periods of rapid eye movement during sleep, and, in an unstructured environment, waking adults tend to eat and drink spontaneously every 100 minutes.^{2,3}

In conclusion, our patient exhibited a normal propensity for rhythmic eating and drinking but was unusual in not suppressing this at night as most adults do.

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Cyanosis attributable to right to left shunt in the carcinoid syndrome

Cyanosis is commonly observed in the carcinoid syndrome and thought usually to be due to haemostasis in dilated capillaries.¹ We present a case in which central cyanosis appeared to be secondary to a pronounced right to left shunt.

Case report

A 69 year old woman presented with weight loss, diarrhoea, ankle swelling, and exertional dyspnoea of six months' duration. She had previously been fit, was a non-smoker, and was not taking any drugs. On examination she was thin, centrally cyanosed (but not clubbed), and breathless on minimal exertion. She had sinus tachycardia (100 beats/min), a soft ejection systolic murmur at the upper left sternal edge, and moderate ankle oedema. Jugulovenous pressure was not raised. There were no signs of chronic liver disease, and the liver was not palpable. A firm mass the size of a golfball was felt in the right iliac fossa.

The blood count showed polycythaemia: haemoglobin concentration 171 g/l (normal female range 115-165), packed cell volume 0.548 (0.38-0.47). White cell and platelet counts were normal. Urea and electrolyte concentrations and results of liver function tests were normal except for a low albumin concentration of 33 g/l (35-50) and alkaline phosphatase of 300 IU/l (<160). Analysis of arterial blood while the patient was breathing room air (table) showed pronounced hypoxia and hypocapnia. Urinary excretion of 5 hydroxyindole acetic acid was 740 μ mol (140 mg)/24 h (<109 μ mol (21 mg)/24 h).

Arterial blood gas tensions with varying concentrations of inspired oxygen

	Air (two readings)		50% Oxygen	100% Oxygen
Oxygen tension (kPa)	6.9	6.4	7.1	10.9
Carbon dioxide tension (kPa)	3.5	3.8	4.3	4.1
Bicarbonate (mmol/l)	16	18	20	20
pH	7.40	7.41	7.41	7.43

Conversion: SI to traditional units—Oxygen and carbon dioxide: 1 kPa=7.5 mm Hg. Bicarbonate: 1 mmol/l=1 mEq/l.

A chest x ray film showed hyperinflated lungs, a normal sized heart, and no evidence of pulmonary metastases. A barium enema showed a constant filling defect in the caecum; an isotopic liver scan showed irregular uptake, suggesting metastatic deposits; an isotopic lung scan failed to show any appreciable emboli; and an electrocardiogram was unremarkable. Right heart catheter studies showed a normal mean right atrial pressure of 6 mm Hg and no appreciable gradient across the pulmonary valve (right ventricle 20/3 mm Hg; pulmonary artery 18/4 mm Hg). The pulmonary capillary wedge pressure was 10 mm Hg. Lung function tests showed a total lung capacity of 123% of the predicted value; the forced vital capacity and forced expiratory volume in one second were normal. The carbon monoxide transfer factor, corrected for the polycythaemia, was normal.

The respiratory and cardiovascular findings did not account for the pronounced cyanosis, suggesting the presence of a right to left shunt. High concentrations of inspired oxygen were administered (table). With 100% oxygen the oxygen tension was still abnormally low at 10.9 kPa (82 mm Hg), consistent with a shunt of about 30-40%.² This diagnosis was confirmed by isotopic scanning, in which microspheres of diameter 20-40 μ m labelled with technetium-99m were infused intravenously.³ Normally, all such microspheres are filtered out by the lungs, but in this patient the counts over head and abdomen (which receive about 13% and 43% of the total cardiac output respectively) were 43 000 and 130 000 while the lung fields gave 736 000, giving an estimated shunt of 30%.

Comment

This patient had a carcinoid syndrome associated with a primary tumour, which probably arose from the distal ileum, and hepatic metastases. It was complicated by pronounced cyanosis and dyspnoea with secondary polycythaemia. Blood gas and scanning data indicated a right to left shunt as the principal cardiorespiratory abnormality. Acquired right to left shunts have been associated with pulmonary metastatic deposits from thyroid carcinoma,⁵ but macroscopic secondaries were not visible in this patient's chest radiograph. More probably the shunt was due to microscopic fistulas, comparable with those seen in hepatic cirrhosis.³ A high pulmonary artery pressure might have been expected in the presence of an increased concentration of serotonin, a pulmonary vasoconstrictor, from which the increased urinary 5-hydroxyindole acetic acid presumably derived.¹ The normal value observed may have been due to the opposing action of a vasodilator such as bradykinin or to the presumed shunt.¹

Various drugs are useful in treating some manifestations of the carcinoid syndrome, but this patient declined such treatment.

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Sensitive urine tests and human chorionic gonadotrophin secreted during ectopic pregnancy

The detection of human chorionic gonadotrophin (hCG) secreted by trophoblastic tissue is important in the diagnosis of gynaecological emergencies and acute abdominal pain in women.^{1,2} Various immunoassays using fluorescence, enzymes, and radioactive isotopes have been developed for measurement of hCG in blood. These are highly sensitive but not suitable for use in wards or outpatient departments, where a 24 hour service is required. Thus relatively simple assays without the need for centrifugation or sophisticated equipment are required.³ The advent of monoclonal antibodies and enzyme linked immunoassays with colour endpoint detection has led to the development of urine tests for pregnancy that are sensitive and specific. Despite the widespread availability of these tests few data are available on their suitability for detecting hCG secreted during ectopic pregnancies.

Patients, methods, and results

Sixty patients presenting with clinical signs and symptoms suggestive of chronic or subacute ectopic pregnancy were included in the study. Patients with obvious ruptured ectopic pregnancies were excluded. Paired preoperative serum and urine specimens were submitted to the laboratory for qualitative radioimmunoassay of hCG using a commercial kit (Amersham International, United Kingdom; sensitivity 25 IU/l; second international standard preparation). Ultrasonography was performed in all patients, followed by laparoscopy or laparotomy when indicated. An ectopic pregnancy was shown in 32 patients, a complicated intrauterine pregnancy in 10 (incomplete abortion, septic abortion, molar pregnancy), and no evidence of pregnancy in 18 (pelvic inflammatory disease, ruptured ovarian cyst, etc).

Serum hCG was measured by quantitative radioimmunoassay (Amersham International; sensitivity 4 U/l; second international standard) and a qualitative tube enzyme immunoassay (Model, Monoclonal Antibodies, United Kingdom; sensitivity 25 U/l). Urine hCG was assessed by quantitative radioimmunoassay, an enzyme linked immunosorbent assay (Model, Monoclonal Antibodies; sensitivity 50 U/l), and dipstick testing (Pregnostick, Monoclonal Antibodies; sensitivity 175 U/l). The dipstick test was made more sensitive by changing the reagent volume as recommended by the manufacturer (50 U/l). Units for hCG in the enzyme tests were based on the first international reference preparation; experience in our laboratory suggests that values obtained with the second international reference preparation are two to three times lower than those obtained with the first.

In the 32 patients with ectopic pregnancy all methods for detecting hCG in serum and urine correctly identified the hormone (table). No false negative results were obtained. In the 10 patients with other complications of pregnancy all serum and urine tests gave positive results except for the unmodified dipstick test, which gave a negative result for one urine sample (hCG value 78 U/l). Serum from the 18 patients who were not pregnant was negative for hCG when assessed by quantitative and qualitative radioimmunoassay, but two serum samples gave a positive result on enzyme immunoassay and one urine sample gave a positive result in the modified dipstick test.

Summary of results obtained with different tests for human chorionic gonadotrophin (hCG) in serum and urine

	Serum		Urine		
	Rapid radio-immunoassay (>25 U/l)	Tube ELISA (>25 U/l)	Standard dipstick test (>175 U/l)	Sensitive dipstick test (>50 U/l)	Tube ELISA (>50 U/l)
Ectopic pregnancy:					
Positive	32/32	32/32	32/32	32/32	32/32
Negative	0/32	0/32	0/32	0/32	0/32
Other pregnancy states:					
Positive	10/10	10/10	9/10	10/10	10/10
Negative	0/10	0/10	1/10	0/10	0/10
Non-pregnant women:					
Positive	0/18	2/18	0/18	1/18	0/18
Negative	18/18	16/18	18/18	17/18	18/18
Sensitivity (%)	100	100	97.6	100	100
Specificity (%)	100	89	100	94.4	100
Predictive value of positive result (%)	100	95	100	97.6	100
Predictive value of negative result (%)	100	100	94.4	100	100

ELISA = Enzyme linked immunosorbent assay.

Sensitivity = Proportion of patients who are pregnant with a positive result on testing for hCG.

Specificity = Proportion of patients who are not pregnant with a negative result on testing for hCG.

Predictive value = Proportion of patients whose test result is appropriate to their condition.