the typical findings of Guillain-Barre syndrome or its variants, such as slowing of peripheral nerve conduction or conduction block. Critical illness polyneuropathy or a disease of the neuromuscular junction were not excluded by these investigations. Electromyographic sampling of muscle, however, did not reveal the features of denervation, which would be expected for all of the potential neuropathic causes of weakness, including critical illness polyneuropathy. Repetitive nerve stimulation likewise did not show the decremental response typical of prolonged neuromuscular blockade or myasthenia gravis. Instead, electromyography demonstrated small, brief polyphasic motor unit potentials, with good recruitment and a complete interference pattern, in keeping with a myopathic process. Muscle biopsy of the left quadriceps confirmed a myopathic process demonstrating features such as diffuse myofibre degeneration. Electron microscopy of the same specimen also showed loss of thick filaments as has been described in critical illness myopathy.³ By a process of exclusion, critical illness myopathy was therefore felt to be the cause of this woman's weakness.

QUESTION 3

Recovery in any critically ill patient who develops new muscle weakness is ultimately dependent on the prognosis of the primary illness which necessitated admission to the intensive care unit. If the patient survives this illness, however, it is the cause of the weakness that will

determine how much return of power that will occur. Critical illness myopathy is increasingly being recognised as a cause of new weakness in critically ill patients. This condition, first described in 1977 by MacFarlane and Rosenthal,⁴ typically results in difficulty weaning from the ventilator and is associated with diffuse weakness of a varying degree, without or without ophthalmoplegia or facial weakness, attenuation of reflexes, subtle or no sensory disturbance, and preservation of higher functions.⁵ Usually, in addition to being critically ill, patients who develop this condition have had a febrile illness, or have been septicaemic, and have received high doses of corticosteroids and/or neuromuscular blocking agents. In contrast to other causes of weakness in this setting, such as critical illness polyneuropathy which often occurs in the absence of neuromuscular blocking agents or steroid administration, the outlook for recovery has generally been reported as being good.⁵ As recovery is spontaneous the need for specific therapies, such as plasmapheresis or human immunoglobulin for Guillain-Barre syndrome which are more often associated with complications in these patients, is also unnecessary.

Final diagnosis

Critical illness myopathy.

Keywords: critical illness myopathy; muscle weakness

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A woman with amenorrhoea

A Ogunko, K Oboubie, J S Davies, A Rees

A 26-year-old woman was referred by her general practitioner with primary amenorrhoea. She denied galactorrhoea or headaches. She had undergone ligation of a patent ductus arteriosus at 2 years of age and was noted in childhood to have a partial hearing defect in her right ear. On examination she was a phenotypically normal female with a BMI of 23.2 kg/m². She had Tanner stage II breast and pubic hair development. Investigations revealed a normal full blood count, urea and electrolytes, with a glucose of 5 mmol/l, prolactin of 100 mU/l (normal < 400 mU/l). Hypogonadotrophic hypogonadism was confirmed with a low plasma oestradiol of 108 pmol/l (normal > 130), luteinising hormone (LH) < 0.5 U/l and follicle-stimulating hormone (FSH) < 0.5 U/l. She had impaired responses to LHRH stimulation of LH < 0.5 U/l and FSH 0.6 U/l. Dynamic testing of pituitary function revealed a normal growth hormone, cortisol and prolactin response to insulin-induced hypoglycaemia. Thyroid function tests, pituitary magnetic resonance imaging, and karyotype were normal.

Questions

- 1 What other clinical test would be useful?
- 2 What is the diagnosis?

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Answers

QUESTION 1

Test her sense of smell. This patient had an absent sense of smell to standard testing with coffee, lemon juice and varying concentrations of propionic acid.

QUESTION 2

Kallmann's syndrome.

Discussion

In this case, the association of hypogonadotrophic hypogonadism, deafness and anosmia confirms the diagnosis of Kallmann's syndrome. Kallmann's syndrome is the commonest cause of isolated gonadotropin deficiency¹ with a predominantly male predisposition. It can occur in a familial setting, though the majority of cases are sporadic.

Although the exact cause of Kallmann's syndrome remains to be identified, it is believed that there is a failure of migration of the LHRH neurones to the median eminence of the hypothalamus.² According to Rimoin and Schimke,³ Kallmann's syndrome represents a complex spectrum of developmental anomalies which include midline cleavages of the embryonic forebrain, aplasia of the olfactory bulb and tract with midline dysplasia of the face causing abnormalities like cleft lip, cleft palate, congenital deafness and colour blindness. Other developmental abnormalities reported in association with Kallmann's syndrome include gut malrotation, renal agenesis and congenital heart defects.¹

In 1960 Gauthier⁴ for the first time reported a case of a young woman with olfactogenital dysplasia (Kallmann's syndrome) who had died of an Ebstein anomaly. Since then there have been seven other case reports of Kallmann's syndrome in association with other cardiac abnormalities, these include right aortic arch, 2:1 atrioventricular block and Wenckebach phenomenon, atrial septal defect, and a complex case of transposition of the great vessels which required heart transplantation.¹

Kallmann's syndrome is genetically heterogeneous and may be inherited in an autosomal dominant or recessive pattern. In some forms

Clinical features of Kallmann's syndrome

- anosmia
- deafness
- hypogonadotrophic hypogonadism
- cleft lip and cleft palate
- rarely, congenital heart defects, renal agenesis

of inheritance there is a defect in the KALIG-1 gene.² It is speculated that this gene may have a direct effect on axonal outgrowth and is required for the normal migration of the embryonic cells that develop within the olfactory bulb and the hypothalamic nuclei that subsequently secrete gonadotropin-releasing hormone.² The KALIG-1 gene may also be involved in the recognition mechanisms which occur between LHRH nuclei and olfactory nuclei, as well as in the modulation of migrating cardiac cells during embryonic development, which may account for the association of certain types of congenital heart defects with Kallmann's syndrome.² This is supported by the demonstration of aorticopulmonary septal defects following the removal of areas within the occipital neural crest, the area from which the presumptive cardiac cells originate in chick embryos.⁵

To our knowledge there have been no reports of Kallmann's syndrome in association with patent ductus arteriosus. The significance of this and other cardiac defects in association with Kallmann's syndrome is unclear as it may represent a purely chance occurrence. However, it may also reflect a true association between Kallmann's syndrome and congenital heart defects, due to the putative mechanism outlined previously.

Final diagnosis

Kallmann's syndrome.

Keywords: patent ductus arteriosus; Kallmann's syndrome; heart defects

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Acute epigastric pain and recurrent vomiting in an elderly man

P Cherian, J Khoury, M A Albornoz

A 76-year-old previously asymptomatic man presented to the emergency room with a 4-hour history of severe epigastric pain. This was accompanied by vomiting of food contents followed by repeated dry heaves. Examination was remarkable for tenderness in the epigastrium with no abdominal rigidity and normal bowel sounds. A nasogastric tube could not be inserted despite repeated attempts. The medical history was significant for a motor vehicle accident 2 years prior to admission that resulted in fracture of the left humerus, three left-sided rib fractures, and a splenic laceration that did not require surgery. An upright X-ray of the abdomen (figure 1) followed by computed tomography (CT) scan (figure 2) of the abdomen were performed.

Figure 1 Upright X-ray of the abdomen

Figure 2 Abdominal CT scan

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Questions

- 1 What is the unusual finding in figure 1?
- 2 What are the CT scan findings in figure 2?
- 3 What test would confirm the diagnosis?