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Failure to diagnose: diabetic ketoacidosis

A recent coronial inquest examined the death of a patient, 17 years of age, from fulminant diabetic ketoacidosis.¹ The patient's presentation with diabetic ketoacidosis was the first manifestation of the onset of type 1 diabetes. This article examines the Coroner's findings and recommendations.

Keywords: diabetes mellitus, medico-legal/jurisprudence



Case study

The patient, 17 years of age, presented to a general practitioner at 8.45 am on 27 February 2007 with a 1 day history of feeling unwell. She had not attended the practice before. The GP obtained a history of vomiting, increased frequency of bowel motions, crampy abdominal pain, headaches and night sweats. There was no history of increased urinary frequency. On examination, the patient was afebrile and she did not look unwell. There was no neck stiffness and her mucous membranes were moist. Her abdomen was soft, with no tenderness. The GP made a provisional diagnosis of gastroenteritis, or food poisoning from the take-away food she had eaten 2 nights earlier. He administered an intramuscular injection of maxolon and gave her a prescription for stemetil tablets, with a view to controlling the vomiting and preventing dehydration. An appointment was made for the patient to be reviewed the next day.

However, the patient returned to see the GP at about 3.15 pm later that day. She was carrying a plastic bucket. She told the GP that she had not been able to keep anything down, including the tablets she had been prescribed. The GP recorded a history of two vomits and passing urine twice that morning, with

the urine being light in colour and of a reasonable volume. On examination, the GP thought the patient was <5% dehydrated, with normal skin turgor. Abdominal examination was unremarkable. The GP told the patient that if she felt unwell overnight, she should go to hospital. He administered a second injection of maxolon and provided a prescription for gastrolyte to assist with her hydration.

At about 10.00 pm that night, the patient's mother rang a GP after hours service and requested a home visit. The deputising service GP arrived about 1 hour later. He obtained a history of vomiting for more than 24 hours. The patient's mother gave a past medical history that her daughter had been diagnosed with C4 lipoatrophic panniculitis, an extremely rare autoimmune disease, which involved her lower limbs. On examination, the patient's pulse rate was 121 bpm and her blood pressure was 127/93. The GP noted an increased respiratory rate which was recorded as 'raspy breathing' and which he thought was related to her vomiting. He agreed with the earlier GP's diagnosis of gastroenteritis and administered another maxolon injection. He recommended that the patient go to hospital if there was no improvement within an hour.

At 7.45 am on 28 February 2007, the patient's mother tried to wake her but she was unrousable. An ambulance was called and the patient was transported to the local emergency department (ED). Investigations revealed the presence of diabetic ketoacidosis. Despite intensive resuscitation, the patient died about 5 hours after her arrival at hospital.

The patient's death was reported to the Coroner. A coronial inquest was held in early 2009. At the inquest, evidence was heard from an endocrinologist. He opined that the postmortem findings of focal hemorrhage and fat necrosis within the bowel mesentery suggested that the C4 lipotrophic panniculitis was again active and this may have contributed to the patient's vomiting. The endocrinologist confirmed that the patient's presentations to the general practitioner were unusual in that the lack of the usual symptoms of polydipsia, polyuria and weight loss made the diagnosis of diabetic ketoacidosis difficult. He stated that the sudden onset of repeated vomiting and rapid development of severe metabolic acidosis leading to the patient's death within 3 days indicated an unusually fulminant type 1 diabetes. He also noted that diabetic ketoacidosis was a well recognised but rare cause of vomiting.

The Coroner made the following recommendations:

1. The findings be sent to The Royal Australian College of General Practitioners in an effort to elevate general practice awareness of the differential diagnosis of sudden onset diabetic ketoacidosis in young people
2. In view of the reportedly rising incidence of diabetes in young people, GPs not overlook the fact that the ability pass urine may mask developing dehydration due to the onset of diabetic ketoacidosis and the use of a urine dipstick may be a useful tool in diagnosis
3. General practitioners explain the unpredictability of emergency department admission times as a necessary factor in prioritisation of medical care while explaining the benefits of access to specialist support in undiagnosed illness
4. General practitioners consider that when a patient has suffered an autoimmune condition in the past it may indicate a propensity to other autoimmune conditions.

Discussion

A study of patients diagnosed with diabetes before 20 years of age found the prevalence of diabetic ketoacidosis at the time of initial diagnosis of diabetes was 25.5%.² The

prevalence decreased with age from 37.3% in children aged 0–4 years to 14.7% in those aged 15–19 years. Patients with diabetic ketoacidosis were more likely to be hospitalised.

It has been estimated that 1.6% of presentations in general practice involve nausea and/or vomiting.³ Vomiting was more often presented by children aged less than 15 years (3.1%) and decreased steadily with age to 0.4% in those aged 65 years or more. Gastroenteritis was the most likely diagnosis (37%), while 10% of the presentations remained undiagnosed.

The common causes of acute nausea and vomiting in adults include:

- gastroenteritis
- nongastrointestinal infection (eg. urinary tract infections)
- medications.⁴

'Not to be missed' conditions causing nausea and vomiting include:

- surgical causes
- pancreatitis
- cholecystitis
- appendicitis
- small bowel obstruction
- diabetic ketoacidosis
- Addisonian crisis
- raised intracranial pressure
- hepatitis
- ingestion of irritants/allergens.

Risk management strategies

This case is a timely reminder that the onset of diabetes in one-quarter of young patients is heralded by diabetic ketoacidosis. Patients with diabetic ketoacidosis usually present with polyuria, polydipsia, polyphagia, weakness and Kussmaul's respirations; nausea and vomiting are present in 50–80% of patients, and abdominal pain is present in about 30%.⁵

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