CASE REPORT

Diabetic ketoacidosis: an unusual presentation of acromegaly

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SUMMARY

Secondary diabetes mellitus is known to occur in acromegaly due to insulin resistance caused by growth hormone excess. However, diabetes in acromegaly usually does not lead to ketosis. We describe an unusual case of a patient that presented with diabetic ketoacidosis in the emergency room with thirst, polyuria and dyspnoea. The patient was subsequently diagnosed with a growth hormone-secreting pituitary macroadenoma as the underlying pathology; after initial stabilisation with insulin and fluids, the patient was successfully treated with trans-sphenoidal surgery.

BACKGROUND

Diabetic ketoacidosis is commonly seen in patients with type 1 diabetes and can often be the presenting clinical picture. Rarely, however, diabetic ketoacidosis has been described as a complication of acromegaly. A patient may not recognise the insidious progression of features of excess growth hormone in a patient with pituitary adenoma. We present a case of a middle-aged man with acromegaly who presented for the first time with diabetic ketoacidosis.

CASE PRESENTATION

A 45-year-old man presented to the emergency room with a 1-month history of thirst and polyuria. Moreover, on the day of admission, he reported nausea, vomiting with shortness of breath and abdominal pain. A clinical examination revealed textbook features of acromegaly including prognathism with macroglossia (figure 1), greasy skin, obviously enlarged hands and feet (figure 2) and a characteristic broad and swollen nose. On direct questioning, the patient admitted that he had continuous moderate intensity headache since the past year, localised to bilateral frontal region. Headache was not associated with nausea, vomiting or vertigo. On direct questioning, he agreed to have noticed increasing dimensions of hands and feet with progressive hoarseness of voice for the past 1 year. This was also confirmed with his family. The patient was dehydrated, his pulse rate was 100 min regular, blood pressure was 110/80 mm Hg, was obviously tachypnoeic with a respiratory rate of 30 min and noted to be deep and laboured, identified as Kussmaul's breathing. Moreover, a sweet fruity odour was identified on his breath.

Nothing relevant to his presentation was found in his medical, family or social history.

Figure 1 Facial features suggestive of acromegaly.

Figure 2 Enlarged and knobby hands of patient.

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INVESTIGATIONS

On investigation, it revealed a random blood sugar of 434 mg/dL and on urine analysis he had marked ketonuria. Arterial blood gas analysis was suggestive of a metabolic acidosis. The haemogram and biochemistry profiles were normal. The patient was admitted and the initial management of diabetic ketoacidosis was begun.

Further investigations revealed insulin-like growth factor-1 levels that were markedly raised 1031 ng/ml (101–287). Other pituitary hormonal studies were carried out and found to be normal. An MRI of the brain identified a pituitary macroadenoma (14×16 mm) extending into the sphenoid sinus (figure 3). An automated evaluation of the visual fields by perimetry was normal. Increased heel pad thickness was demonstrated on roentogram (figure 4).

TREATMENT

Initial treatment included fluid supplementation, intravenous regular insulin and potassium supplementation, with regular blood sugar, urine ketones and vital charting. The insulin requirement was more than 200 units of regular insulin a day. In light of the diagnosis of acromegaly, injectable octreotide 100 µg 8 hourly and tablet bromocriptine were added as well. After correcting dehydration and hyperglycaemia, trans-sphenoidal surgery was carried out 2 weeks after the initial presentation for definitive management.

OUTCOME AND FOLLOW-UP

Following surgery, insulin could be withdrawn and the patient on follow-up showed controlled blood glucose levels on oral hypoglycaemic agents.

DISCUSSION

Acromegaly has an estimated prevalence of around 60 per million and an annual incidence of 3–4 per million.¹ The insidious onset of its symptoms as well as failure to recognise clinical clues, like a change in glove or shoe size and characteristic facial features both by the patient and the clinician, contributes to a delay in the diagnosis. An increased awareness would help pick it up early and thus allow a timely administration of therapeutic measures including surgery, radiotherapy and/or drug therapy.

Figure 3 MRI suggestive of pituitary mass.

Figure 4 X-ray suggestive of increased heel pad thickness, a classical sign of acromegaly.

Acromegals are known to have impaired glucose tolerance and 19–56% of them develop frank diabetes mellitus.² However, diabetes whenever presented in acromegals is usually neither severe nor symptomatic. Some of the patients who have diabetes and are symptomatic will require antidiabetic treatment. Most of them will be controlled on oral hypoglycaemic agents, but around 25% of the patients will require insulin.³ Insulin when required may be required in large doses.

The mechanisms for the development of diabetes mellitus in acromegaly include an excess of growth hormone, which counteracts the action of insulin, and an increase in IGF-I levels, which increases insulin resistance.⁴ Diabetic ketoacidosis is an uncommon presentation for acromegaly^{5–7} and is mentioned infrequently in the literature. A case reported by Lakhotia *et al* from the subcontinent was similar in presentation and investigations and it also reported an unusually high insulin dose was required for control of ketosis.⁶ Another case reported from China describes a similar presentation, and surgical correction of the pituitary macroadenoma not only normalised GH levels but also permitted the omission of oral hypoglycaemic medications. Diabetic ketosis classically requires absolute deficiency of insulin and a relative excess of glucagon. It is assumed that in the presence of high levels of counter regulatory hormones even a normal level of insulin is inadequate to the level of hyperglycaemia leading to diabetic ketosis.

In our case, the physical examination was the first clue to the underlying cause of his apparent ketotic state. We feel that it highlights the importance of clinical skills in making ones way through a diagnostic conundrum.

Learning points

- ▶ Insidious onset and subtle symptoms often lead to a delay in the diagnosis of acromegaly.
- ▶ Insulin resistance due to growth hormone excess can cause secondary diabetes mellitus in acromegaly.
- ▶ Rarely patients with acromegaly develop diabetic ketoacidosis as a complication, that is, a challenge to manage due to severe insulin resistance.
- ▶ Surgery is the definitive modality of treatment.

Contributors All authors have contributed to the diagnosis and care of patient as well as writing, editing and review of the manuscript.

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