Use of a somatostatin analogue in treating severe hypoglycaemia and neuroglycopaenia, in association with hyperinsulinaemia, post bariatric surgery

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Abstract
Dumping syndrome is a well-recognised phenomenon post bariatric surgery. However, are all post-prandial symptoms in such patients simply a result of classical dumping? Our case clearly highlights that as clinicians we should be alert to the possibility of post-prandial hyperinsulinaemic hypoglycaemia leading to severe neuroglycopaenia.

We describe a 51-year-old man presenting with symptoms of pallor, light-headedness, nausea, weakness and collapse, in association with low blood glucose, post-prandially. The patient had recorded random capillary blood glucose between 1.9–2.6mmol/L on a blood glucose meter during such episodes. His symptoms developed 12 months following gastric bypass surgery and 100kg weight loss. Initially, he was managed with dietary modification, but to no avail.

The patient was subsequently admitted for inpatient investigation which excluded fasting hypoglycaemia and confirmed post-prandial hypoglycaemia with severe neuroglycopaenia. Hence a diagnosis of hyperinsulinaemic hypoglycaemia was made. He was commenced on octreotide 50µg three times daily and this treatment led to a significant reduction in the frequency and severity of his symptoms.

We feel that this case highlights a problem that will be more frequently encountered as numbers of patients undergoing bariatric surgery increase. Clinicians need to be vigilant to the possibility of this diagnosis and treat appropriately to avoid significant morbidity. Copyright © 2014 John Wiley & Sons.

Key words
bariatric; dumping; hypoglycaemia; somatostatin
with capillary blood glucose recorded at 1.9mmol/L. A decision was taken at this point to arrange an elective admission for supervised fasting to further investigate his hypoglycaemic symptoms.

The patient was fasted for 36 hours, with no symptoms or biochemical hypoglycaemia resulting. Therefore he returned to a normal diet and within 2 hours of his first meal developed profound hypoglycaemia. Capillary blood glucose was recorded at 2.2mmol/L with associated reduced conscious level observed by the medical team, consistent with severe neuroglycopenia. Laboratory venous bloods were taken and, immediately following this, treatment with intravenous glucose was administered. Laboratory plasma glucose was subsequently found to be 3.6mmol/L. Serum insulin and C-peptide levels were raised and consistent with a post-prandial state (see Box 1). Sulphonylurea screen was negative and beta-hydroxybutyrate levels were undetectable. These findings were consistent with a diagnosis of hyperinsulinaemic hypoglycaemia.

The patient was commenced on the alpha glucosidase inhibitor, acarbose 50mg three times daily. Unfortunately, this medication had no impact on his symptoms. Therefore he was switched to octreotide 50µg twice daily by subcutaneous injection. This dose was later increased to 50µg three times daily. This treatment led to a significant improvement in the patient’s symptoms with a reduced frequency of hypoglycaemic episodes together with a reduction in the intensity of the episodes and quicker recovery time. At this stage he was experiencing only two episodes per week with each episode lasting less than 20 minutes. He felt that this treatment had brought about a significant improvement in his quality of life.

Discussion

Classical ‘dumping syndrome’ is a well recognised problem following gastric bypass surgery. It occurs when ingested food bypasses the stomach too rapidly and enters the small intestine largely undigested. The small intestine expands too quickly due to the presence of hyperosmolar contents from the stomach, causing a fluid shift into the gut lumen with plasma volume contraction and acute intestinal distension.1 ‘Early’ dumping begins within 15–30 minutes from ingestion of a meal. Symptoms include: nausea, vomiting, bloating, cramping, diarrhoea, dizziness, and fatigue. ‘Late’ dumping happens 1–3 hours after eating. Symptoms include: weakness, sweating, and dizziness. These latter symptoms have been partly attributed to exaggerated insulin release causing a fall in blood glucose.2

Although relative hypoglycaemic symptoms are well recognised as occurring in association with this syndrome, more significant hypoglycaemia leading to neuroglycopenia and its sequelae of altered cognition and conscious level suggest the need for further investigation and should not be simply ascribed to classical ‘dumping syndrome’.

It seems likely that there is a spectrum of mechanical and hormonal responses to altered gastrointestinal anatomy which can lead to inappropriate hypoglycaemia. This case probably highlights the severe end of the spectrum where both combine, leading to severe hypoglycaemia with neuroglycopenia. The exact aetiology of hypoglycaemia in this condition is not entirely clear with recent reports in the literature suggesting differing mechanisms.

Service et al. reported that nesidioblastosis (a form of islet cell hyperplasia) was identified in resected pancreatic specimens from each of five patients they reviewed, and multiple insulinomas were identified in one.3 Following partial pancreatectomy in these patients, symptoms diminished. The authors hypothesised that hyperfunction of pancreatic islets did not lead to obesity but that β-cell trophic factors may have increased as a result of gastric bypass.

This theory was supported by a study of three patients with severe hyperinsulinaemic hypoglycaemia, refractory to medical management.4 All three patients ultimately required partial pancreatectomy for control of neuroglycopenia. Pancreatic pathology revealed diffuse islet hyperplasia and expansion of β-cell mass in each patient. The authors hypothesised that gastric bypass-induced weight loss may unmask an underlying β-cell defect or contribute to pathological islet hyperplasia, perhaps via glucagon-like peptide 1-mediated pathways.

Contrary to this, Meier et al. in a study of biopsy samples from six affected patients compared with controls were unable to identify any histological evidence of increased β-cell mass.5 They concluded that post gastric bypass hypoglycaemia was not due to increases in β-cell mass or formation but, rather, it was due to a combination of gastric dumping and inappropriately increased insulin secretion. This may have resulted either as a failure to adaptively decrease insulin secretion after bypass surgery, or as an acquired phenomenon.

Myint et al. supported the use of octreotide in this condition, demonstrating that an exaggerated incretin response following altered gastrointestinal anatomy was the likely cause of hypoglycaemia in their patient.6 Injection of a somatostatin analogue successfully suppressed this response acutely and in the long term, thereby avoiding pancreatectomy and its sequelae.

It therefore remains an individual clinician’s choice of how to manage patients with this condition. There are both medical and surgical management options and clearly it remains a decision based on symptoms and comorbidities. In this case study the patient did not want to consider a further surgical procedure and was managed successfully with octreotide.

Declaration of interests

There are no conflicts of interest declared.

References

References are available online at www.practicaldiabetes.com.
References


