specific exercise protocols. The family history of Type 2 diabetes and the appropriate rise in insulin and C-peptide suggest that a subtle abnormality in insulin sensitivity may account for the lack of glucose clearance during intense exercise. Perhaps if the subject was unfit and overweight, diabetes would be unmasked. Is any form of treatment indicated? As the subject had a normal oral glucose tolerance test, one could argue that treatment is not required. However, if the abnormality is related to excess hepatic glucose output with subtle insulin resistance, then an ideal therapeutic option would be metformin, which might prevent the future development of diabetes [10]. However, blood lactate levels increased approximately threefold during intense exercise, which would not be the ideal environment for therapy with metformin, which is associated with lactic acidosis [11].

Competing interests

Nothing to declare.

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Dietary reversal of Type 2 diabetes motivated by research knowledge

Reversal of Type 2 diabetes in the context of bariatric surgery is currently of great interest. Discussion of the rapid and dramatic effects of bariatric surgery upon the pathophysiology of Type 2 diabetes has concentrated almost exclusively on surgically induced change in the incretin hormones [1,2]. Little consideration has been given to reversal of Type 2 diabetes by the effects of caloric restriction alone. We report a person with Type 2 diabetes who returned to normal fasting blood glucose and glycated haemoglobin (HbA_{1c}) after reading a notice about a grant award in *Balance* concerning the effects of a hypocaloric diet on glucose control.

A 46-year-old woman was found to have diabetes on routine screening [oral glucose tolerance test (OGTT) January 2009: 8.1 mmol/l fasting; 14.4 mmol/l 2-h]. At the time of diagnosis HbA_{1c} was 6.9% and weight was 120.2 kg, with body mass index of 42.6 kg/m^2. On diagnosis of diabetes she joined Diabetes UK and read in *Balance* of a grant award for research on the mechanism of hypocaloric reversal of diabetes. She enquired about being a subject, but National Health Service (NHS) ethics, NHS Research and Development (R&D), Primary Care Trust (PCT) R&D and Caldicott permissions had yet to be granted. She asked to participate in due course but set about losing weight. She attended weekly meetings of Overeaters Anonymous Great Britain for support. By the time the research permissions had been obtained 8 months later, weight had fallen to 108.9 kg with fasting blood glucose of 4.8 mmol/l and HbA_{1c} 5.9%.

Motivation to bring about sustained weight loss was provided by the information that this would result in normalization of blood glucose control. Although this may not appear remarkable to many diabetologists who have observed similar effects of weight loss in individual cases, this has rarely been described in the literature. The phenomenon was first described by Claude Bouchardet who observed that

glucose disappeared from his patients' urine during food shortage in the siege of Paris in 1870 [3]. More recently, dietary therapy alone was reported to achieve normal glucose tolerance in 20% of people with Type 2 diabetes [4]. The key to response lies in compliance and the longer-term difficulty lies in sustaining the negative calorie balance.

Close examination of the hypotheses based upon unique changes of incretins following bariatric surgery suggests inconsistencies. The 'hindgut hypothesis' postulates that expedited delivery of nutrients to the distal small intestine enhances glucagon-like peptide 1 (GLP-1) secretion, possibly with other incretins. However, the absolute increase in GLP-1 secretion reported is small [5] and not observed in Type 2 diabetes [6]. High-dose replacement by GLP-1 agonists brings about only modest improvement in glucose control [7]. The 'foregut hypothesis' postulates that reversal of diabetes occurs as a result of exclusion of the duodenum and proximal jejunum from exposure to nutrients [2]. This has been postulated to decrease postprandial gastric inhibitory polypeptide (GIP) and decrease glucagon secretion [1]. However, not all studies show GIP to be decreased and some show increased secretion in the weeks after gastric bypass [5,8].

Whereas the incretin hormones achieve fine regulation, substrate supply drives metabolism. The basic metabolic fact has been overlooked that the restriction of calorie intake which necessarily follows bariatric surgery will bring about a rapid decrease in the fatty liver typical of Type 2 diabetes. The degree of restriction relates to the extent of the surgical procedure. Even moderate dietary restriction is associated with profound change in hepatic insulin sensitivity and marked fall in hepatic glucose output early during a hypocaloric diet [9]. The associated time course of decrease in liver volume is over days [10]. Conversely, the period before onset of Type 2 diabetes is characterized by accumulation of liver fat [11].

The observation of reversal of Type 2 diabetes, by diet rather than by surgery, is most important. This should inform advice given to people with Type 2 diabetes at the time of diagnosis.

The subject of this case report has given written consent to publication.

Competing interests

Nothing to declare.

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Antibodies to cyclic citrullinated peptides (anti-CCP) in Type 1 diabetes mellitus

An association between Type 1 diabetes mellitus (T1DM) and rheumatoid arthritis (RA) remains controversial [1,2]. Both diseases share common genetic traits such as PTPN22 620W allele [3]. A systematic review examining the prevalence of organ-specific autoimmune diseases in patients with RA and their relatives found an excess of such disease in comparison with control subjects, but specific excess of T1DM remains to be confirmed [1]. New markers of RA, antibodies against cyclic citrullinated peptides (anti-CCP), exhibit better specificity than IgM rheumatoid factor (IgM-RF) [4]. Liao has shown that the odd ratios of co-existing T1DM in RA patients was only significantly increased in anti-CCP+ individuals (7.3 vs. 1.3 in negative subjects) [5]. The expression of anti-CCP before the onset of RA could be useful for detecting at-risk subjects [4]. Accordingly, we have studied the prevalence of anti-CCP in adult T1DM patients to determine whether screening for RA by measuring anti-CCP is worthwhile in T1DM patients.

A population of 123 patients with T1DM (according to American Diabetes Association criteria) was retrospectively selected independently to their "RA" status. Their clinical notes were reviewed in order to [1] cluster them into three

