

# Abstracts from ABCD Diabetes Update

<http://dx.doi.org/10.15277/bjd.2023.406>  
*Br J Diabetes* 2023;23:48-50

1–3 February 2023, Loughborough

Top 6 scoring abstracts below. The remaining abstracts are on line @[www.bjd-abd.com](http://www.bjd-abd.com)

## Abstract ID: 5

Turning the T1DE: MDT management of a dangerous condition

*van Heeswijk I*

Royal Derby Hospital

**Background:** Described in a 2017 BBC documentary as “The world’s most dangerous eating disorder”, type 1 diabetes (T1DM) with disordered eating (T1DE, sometimes referred to as diabulimia) is a disorder in which patients intentionally restrict insulin in order to achieve weight loss. It is associated with high morbidity and mortality, due to diabetic ketoacidosis (DKA) and long-term complications of elevated blood glucose levels. Patients require intensive multidisciplinary team (MDT) support and psychological input to manage this often-fatal condition.

**Case report:** A 29-year-old patient was referred to the diabetes pump clinic. She had a 4-year history of T1DM and a glycated haemoglobin (HbA<sub>1c</sub>) of 135 mmol/mol. On average she took insulin degludec three times a week but never took boluses due to her severe anxiety about weight gain. She had multiple episodes of DKA and suffered with lethargy, osmotic symptoms and recurrent infections. Initially diagnosed with gestational diabetes during her first pregnancy, the patient enjoyed the weight loss she experienced when insulin was discontinued after delivery. Five months postpartum, she was re-diagnosed with T1DM due to persistent hyperglycaemia and ketosis. Having come to associate insulin with weight gain, the patient continued to restrict her insulin intake, stating that she would be “6lb lighter by the morning” if she missed a dose. Decisions to inject were influenced by her weight on a particular day. This situation was exacerbated by a relationship breakdown and social services involvement with her children, triggering feelings of self-loathing and low self-worth in the patient.

She was initiated on a Medtronic 780g insulin pump and a Freestyle libre 2 glucose monitoring system, with half of her daily basal requirements given as insulin degludec due to safety concerns. The risks of her behaviour were clearly explained in an honest but non-judgmental manner. She received intensive input from the MDT and underwent cognitive behavioural therapy through the eating disorders team.

Three months later, the patient is consistently receiving basal insulin and is inconsistently bolusing. Her HbA<sub>1c</sub> is 101 mmol/mol and she has had no further episodes of DKA. She unfortunately was hospitalised due to an overdose following loss of custody of her children but is now motivated to improve her health and regain custody.

**Conclusion:** T1DE is a difficult and dangerous condition to manage and it necessitates intensive support from both mental health and diabetes teams. Derby does not yet have an integrated T1DE service but pilots at other centres have given positive outcomes, indicating that these services should be made more widespread nationwide.

## Abstract ID: 9

Hidden life-threatening complication of Cushing’s syndrome identified by blood gas analysis

*Zahid H,<sup>1</sup> Whitelaw BC,<sup>2</sup> Mustafa OG,<sup>2</sup> Taylor DR,<sup>2</sup> Iqbal M<sup>1</sup>*

1. Maidstone General Hospital, Maidstone and Tunbridge Wells NHS Trust; 2. King’s College Hospital NHS Foundation Trust

**Background:** Cushing’s syndrome is caused by excess cortisol, leading to a wide range of clinical features. Associated metabolic consequences include increased insulin resistance, increased hepatic gluconeogenesis and a tendency towards a prothrombotic state.<sup>1</sup>

Diabetic ketoacidosis (DKA) is a life-threatening acute metabolic complication of all forms of diabetes mellitus (DM).<sup>2</sup> DKA as an initial presentation of Cushing’s syndrome is rare, with only a handful of cases reported in the literature.<sup>3,4</sup> We describe the clinical lessons learnt from a patient admitted with clinical and biochemical features of Cushing’s who developed this acute but insidious life-threatening metabolic complication.

**Case report:** A 55-year-old woman presented to the emergency department with symptoms and signs suggestive of Cushing’s syndrome. The initial biochemical tests strongly supported this diagnosis (random serum cortisol at 22:00 hours was 1702 nmol/L and the ACTH was raised (218 pg/ml). Despite optimal initial supportive management, her clinical condition deteriorated rapidly, leading to re-evaluation of the clinical and biochemical parameters.

A careful analysis of arterial blood gases revealed a complex compensated mixed acid-base disorder (pH 7.42, PaCO<sub>2</sub> 2.43, PaO<sub>2</sub> 15.0, bicarbonate [HCO<sub>3</sub>] 12.0, Na<sup>+</sup> 138, K<sup>+</sup> 2.2, Cl<sup>-</sup> 98, lactate 2.3, anion gap 30). Cushing’s syndrome generally causes metabolic alkalosis but this patient had a predominant severe high anion gap metabolic acidosis, with compensatory respiratory alkalosis and a minor metabolic alkalosis. The serum lactate was not significantly raised. Renal function was normal. Blood glucose was 9.5 mmol/L, and there was no clinical evidence of poisoning or a toxicological cause.

The patient was tested for capillary ketones, which were significantly elevated at 6.6 mmol/L. A diagnosis of severe euglycaemic diabetic ketoacidosis was made (euDKA). It was noted that the patient was on sodium-glucose co-transporter 2 inhibitor (SGLT2i) therapy (empagliflozin) for type 2 diabetes (T2DM). The patient was treated according to the conventional DKA protocol. Venous blood gas analysis following resolution of the euDKA demonstrated metabolic alkalosis, which was consistent with severe Cushing’s syndrome (pH 7.51, PaCO<sub>2</sub> 5.38, PaO<sub>2</sub> 8.90, HCO<sub>3</sub> 32.2, Na<sup>+</sup> 140, K<sup>+</sup> 3.6, Cl<sup>-</sup> 104, lactate 1.2, anion gap 8). Further investigations confirmed the diagnosis of pituitary-dependent Cushing’s disease. The patient was commenced on metyrapone to control the hypercortisolemia and she proceeded to pituitary surgery. She is now well and independent.

**Conclusion:** Patients with Cushing’s syndrome generally have either normal acid-base status or a metabolic alkalosis. The presence of severe metabolic acidosis in a patient with Cushing’s syndrome indicated an additional pathological process, later identified as severe euglycaemic diabetic ketoacidosis. This only became evident when the blood gas analysis showed a complex mixed acid-base disorder. Uncommonly,

patients with DKA present with plasma glucose level below 11 mmol/L, which is defined as euDKA.<sup>5</sup>

This is a well-recognized adverse effect of treatment with SGLT2i.<sup>6</sup> It requires identification and treatment as a medical emergency in a similar way to conventional DKA.<sup>7</sup> This case also provides an opportunity to discuss potential mechanisms by which the combination of cortisol excess and SGLT2i therapy facilitates the development of EuDKA.

#### References

1. Prague JK, May S, Whitelaw BC. Cushing's syndrome. *BMJ* (Clinical research ed.) 2013;**346**,f945. <https://doi.org/10.1136/bmj.f945>
2. Papadokostaki E, Liberopoulos E. Euglycemic diabetic ketoacidosis secondary to dapagliflozin in a patient with colon malignancy. *Case Rep Endocrinol* 2019; 3901741. <https://doi.org/10.1155/2019/3901741>
3. Acharya R, Kabadi UM. Case of diabetic ketoacidosis as an initial presentation of Cushing's syndrome. *Endocrinol Diabetes Metab Case Rep* 2017. <https://doi.org/10.1530/EDM-16-0123>
4. Sugino I, Hiroi N, Yoshihara A. Diabetic ketoacidosis associated with adrenocorticotropic hormone-producing pituitary adenoma. *Am J Case Rep* 2011;**12**,31-4. <https://doi.org/10.12659/AJCR.881696>
5. Modi A, Agrawal A, Morgan F. Euglycemic diabetic ketoacidosis: a review. *Current diabetes reviews* 2017;**13**, 315-21. <https://doi.org/10.2174/1573399812666160421121307>
6. Burke KR, Schumacher CA, Harpe SE. SGLT2 inhibitors: a systematic review of diabetic ketoacidosis and related risk factors in the primary literature. *Pharmacotherapy* 2017;**37**(2):187-94. <https://doi.org/10.1002/pharm.1881>
7. Savage MW, Dhatriya KK, Kilvert A, et al. Joint British Diabetes Societies guideline for the management of diabetic ketoacidosis. *Diabetic Medicine* 2011;**28**,508-15. <https://doi.org/10.1111/j.1464-5491.2011.03246.x>

#### Abstract ID: 12

### The effects of diabetes technology on diabetes gastroparesis and cost implications of therapeutic options

*Elena Virgo, Emma Guy, Stonny Joseph*

Department of Diabetes and Endocrinology, East Kent Hospitals Universities Foundation Trust, Kent

**Abstract:** Mrs KW, a 42-year-old mother of three, was diagnosed with type 1 diabetes (T1DM) at the age of 20. She had multiple admissions with recurrent intractable vomiting and with a presumptive diagnosis of gastroparesis: a radio-isotope gastric emptying study revealed a gastric delay of 13 hours. In view of her impaired quality of life, referral was made for a gastric pacemaker insertion. The high cost for this procedure (up to £19,000) and its limited availability on the NHS indicated that access to this procedure was not possible within a reasonable time frame.

Initial management of her gastroparesis revolved around optimizing glycaemia control, avoiding foods that might provoke symptoms and consuming smaller, frequent meals. Unfortunately, these measures had limited success. She suffered from severe distress due to poorly controlled glycaemic levels despite her best efforts, compounded by the significant social and domestic pressures of being an only parent. She had numerous contacts and communications with healthcare providers over the years.

She would be admitted to hospital every 2-6 weeks with diabetic ketoacidosis and hypoglycaemia brought on by her persistent vomiting. These episodes were often managed by using a combination of fixed and variable rate intravenous insulin infusion regimes, anti-emetics and pro-motility agents.

She had 67 hospital admissions between 2015 and 2022, with 256 bed days. We were of the view at this stage that the introduction of diabetes technology would help to break the cycle of vomiting-induced metabolic disturbance and hence the need for recurrent admissions. A hybrid closed loop insulin pump (Medtrum Nano CGM) with a low glucose suspend facility was commenced after reinforcing the patient's carbohydrate counting skills.

The commencement of pump technology led to a dramatic improvement in the patient's quality of life. She had only three documented admissions between April and December 2022 and these were for manageable mild hyperglycaemic episodes requiring a 0-1 day length of stay. Her HbA<sub>1c</sub> improved from 98 to 72 mmol/mol, with less variability in her glucose profile. She is now planned to have a gastric perioral myotomy (G-POEM) with an estimated cost of £4,000.

This case illustrates the challenges of managing T1DM with complicating diabetic gastropathy. It shows how the potential benefit of early introduction of diabetes technology can be a worthwhile investment to improve metabolic control, quality of life, reduce health care costs and avoid frequent hospital admissions.

#### Abstract ID: 25

### A challenging case of DKA in a patient with ESRF at high risk of fluid overload

*Madan A*

Guy's and St Thomas' NHS Foundation Trust

The management of diabetic ketoacidosis (DKA) in patients with end-stage renal failure (ESRF) remains challenging due to the risk of fluid overload and pulmonary oedema with fluid resuscitation. This case describes a 72-year-old man with ESRF secondary to diabetic nephropathy who developed DKA during an inpatient admission on the renal ward. The on-call team were contacted about this patient during the night shift as he had ketones of 5 and a pH of 7.28 on his venous blood gas. He was being treated for a diabetic foot infection and was already in pulmonary oedema. Management and resolution of his DKA were extremely challenging.

Cases like this require particular care when prescribing fluids and insulin, as well as regular assessments for signs of fluid overload. This case illustrates the difficulty in managing DKA in complex renal patients at risk of fluid overload. It also highlights the need for a protocol for management of fluid resuscitation in patients with DKA and ESRF.

#### Abstract ID: 32

### Antibiotics or amputation: balancing the risks and benefits in patients with severe osteomyelitis

*Vathenen R, Amin A, Todd G, Kong W*

Central Middlesex Hospital, Acton Lane, London, NW10 7NS

**Introduction:** Extended antibiotics are an effective alternative to amputation for diabetes foot osteomyelitis (DFOM).<sup>1,2</sup> However, frequent and prolonged antibiotics may be required, increasing the risk of resistant organisms such as methicillin-resistant *Staphylococcus aureus* (MRSA). We present a man with DFOM who avoided amputation through prolonged courses of antibiotics but developed teicoplanin-resistant MRSA.

**Case report:** A 77-year-old man with type 2 diabetes (T2DM) presented in December 2019 with forefoot wet gangrene. Despite successful revascularisation there was minimal improvement with antibiotics. A transmetatarsal amputation was advised but the patient declined.

He slowly improved with multiple extended courses of targeted antibiotics (a total of 15 months of antibiotics, including three months of teicoplanin to treat MRSA).

After six months off antibiotics, his ulcer deteriorated again and bone cultures were positive for teicoplanin-resistant MRSA. This was treated successfully with six weeks of high-dose ciprofloxacin. His foot

is now near healed, with radiological resolution, and he remains independently mobile.

Subsequently, two other patients developed genotype-matched teicoplanin-resistant MRSA and non-limb-threatening infection.

**Discussion:** Managing DFOM with vascular disease is challenging. Amputation carries the risk of non-healing and further progression to major amputation.<sup>3</sup> Whilst conservative management resulted in a good outcome for this man, it led to the development of teicoplanin-resistant MRSA and cross-contamination of two other people with DFOM. This case illustrates the challenges of antimicrobial stewardship in patients with severe foot disease; and balancing risks and benefits of early amputation compared to conservative treatment.

#### References

1. Lázaro-Martínez JL, Aragón-Sánchez J, García-Morales E. Antibiotics versus conservative surgery for treating diabetic foot osteomyelitis: a randomized comparative trial. *Diabetes Care* 2014;**37**(3):789-95. <https://doi.org/10.2337/dc13-1526>
2. Cabeza de Vaca FG, Macías AE, Ramirez WA, et al. Salvaging diabetic foot through debridement, pressure alleviation, metabolic control, and antibiotics. *Wound Repair Regen* 2010;**18**(6):567-71. <https://doi.org/10.1111/j.1524045=75X.2010.00621.x>
3. Landry GJ, Silverman DA, Liem TK, et al. Predictors of healing and functional outcome following transmetatarsal amputations. *Arch Surg* 2011;**146**(9):1005-09. <https://doi.org/10.1001/archsurg.2011.206>

#### Abstract ID: 56

#### Case of management of HNF1A-MODY before, during and after pregnancy

*Smout V, Bawlchhim Z*

Royal Surrey County Hospital

A female patient was diagnosed with HNF1A-MODY as a teenager due to family history. Gliclazide was started and gradually titrated up to 80mg in the morning and 160mg in the evening. By age 30 the patient's HbA<sub>1c</sub> was rising again so Lantus was initiated and titrated to 7 units daily.

The HbA<sub>1c</sub> improved to 45 mmol/mol and she started planning a pregnancy. Folic acid was started and a change of gliclazide to glibenclamide was recommended. The change in medication did not occur,

however, due to difficulties with prescribing it at the general practice.

The patient soon became pregnant and gliclazide was stopped. In the first few weeks she noted that pre-meal glucose readings were raised, so the Lantus dose was increased to 9 units and NovoRapid was added with meals at 1unit:8g carbohydrate. She remained stable on these doses during the rest of the pregnancy. Ultrasound scans showed normal foetal growth, with an abdominal circumference in the 50th centile.

At 36 weeks the patient reported increasing frequency of hypoglycaemia. Her doses of insulin were reduced but a few days later she was still experiencing hypoglycaemia of 3.1 mmol/L despite completely stopping her insulin. At 37+2 weeks she had a Category 2 Caesarean section, delivering a boy weighing 7lb 9oz. She and the baby made an uncomplicated recovery and were discharged home. The patient did not continue any diabetes medication at this point.

While breastfeeding, she was advised to restart Novorapid only, at 5-6 units with meals, as she noticed glucose readings rising to 11-12 mmol/L after eating but normal fasting levels. Once she had stopped breastfeeding, Lantus was restarted at 2 units daily as readings were higher overnight. Sulfonylurea may be restarted at a later stage, depending on her plans for further pregnancies.

Management of monogenic diabetes pre-conception, during pregnancy and in the postnatal period presents various challenges, depending on the type of MODY. HNF1A-MODY is sensitive to treatment with sulfonylurea medication and there is some evidence that glibenclamide may be used in the first two trimesters but it carries risk of macrosomia if continued later in the pregnancy. There are few specific guidelines on the management of different forms of MODY in pregnancy, including the timing of sulfonylurea and insulin use, and it is important these cases are managed in a multidisciplinary setting with regular review before, during and after pregnancy.

#### Reference

- Delvecchio M, Pastore C, Giordano P. Treatment options for MODY patients: a systematic review of literature. *Diabetes Ther* 2020;**11**:1667-85. <https://doi.org/10.1007/s13300-020-00864-4>