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New onset type 2 diabetes presenting with hyperglycaemic hyperosmolar state in a renal transplant patient on growth hormone

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Background

Hyperglycaemic Hyperosmolar State (HHS) is a life-threatening condition rarely seen in paediatrics. It is becoming increasingly recognized with the growing incidence of childhood type 2 diabetes mellitus (T2DM)[1]. We present a child with Bardet-Biedl Syndrome (BBS) with new onset T2DM presenting with HHS.

Patient - Presented with hyperglycaemia (45.7mmol/l) on routine 6-weekly follow-up.

Table 1: patient features

Features	Patient
Age	16
Medical history	BBS, renal impairment requiring transplant, isolated growth hormone (GH) deficiency, obesity
Drug history	Growth hormone, prednisolone, tacrolimus
Family history	T2DM: father and brother
Ethnicity	Asian

Treatment

Acute management included fluid resuscitation and intravenous insulin. He was discharged home on twice daily biphasic isophane insulin. He made good progress, lost weight (BMI improved from 30.3 to 29.9kg/m^2) and changed to once daily glargine. HbA1c improved to 6.3% nine months after presentation. He will change to metformin shortly. GH was discontinued.

Table 2: blood results on presentation

Test	Result (normal range)
Glucose, mmol/l	45.7 (3.0-5.5)
Ketones, mmol/l	0.1 (<0.6)
HbA1c, in % In mmol/mol	12.1 (4-6) 109 (20-40)
Osmolarity, mosmol/kg	311 (278-295)
Urea, mmol/l	10.4 (2.5-6.7)
Creatinine, umol/l	166 (42-114)
pH	7.38 (7.35-7.45)
Base excess, mmol/l	-4.0 (-2 to +2)
C-peptide, nmol/l	1.15 (0.27-1.28)
GAD antibodies, IU/L	Negative

Discussion

- Our patient had multiple risk factors for T2DM.
- Patients with multiple co-morbitidies such as in BBS or renal transplant patients require cautious management as significant DM risk can occur, exacerbated by prescribing diabetogenic medications, such as immunosuppressants[2].
- There was significant family anxiety about the influence of GH in triggering the T2DM, and the impact of the high HbA1c on the transplanted kidney. While the role of GH on the development of T2DM remains controversial[3], in this particular case, given the significant risk of T2DM, re-analysis of the risk-benefit analysis of continuing GH treatment post-transplant was warranted.
- In such cases screening for diabetes is essential, to ensure early treatment, preserve renal function and prevent onset of HHS.

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3. Cutfield WS, Wilton P, Bennmarker H, et al. Incidence of diabetes mellitus and impaired glucose tolerance in children and adolescents receiving growth-hormone treatment.*Lancet* 2000;355:610–3