Postprandial Hypoglycaemia in the Third Trimester: A Case Report

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BACKGROUND

Hypoglycaemia is generally defined as a blood glucose level (BGL) of <4mmol where neuroendocrine responses are observed (1). Postprandial hypoglycaemia (PH) describes hypoglycaemia that typically occurs between 2-5 hours after eating (2-4). PH is more common following bariatric or major gastric surgery, but is otherwise rare (5).

Physiologically, pregnancy is considered a state of insulin resistance to ensure adequate carbohydrate supply for the rapidly growing fetus (6-8). PH has implications in pregnancy as it is associated with neonatal complications such as low birth weight, low APGAR scores, small head circumference (HC) and more frequent hospitalisation (2,9-12). For mothers, the autonomic and neurological symptoms of PH can impact quality of life and carry significant morbidity (2).

CASE PRESENTATION

A 32-year-old gravida 3 para 1 presented multiple times with unprovoked PH from 35 weeks gestation. She had a diagnosis of gestational diabetes mellitus (GDM), and no other pregnancy complications. At 29 weeks, the estimated fetal weight (EFW) was on the 25th percentile with abdominal circumference on the 20th percentile, normal amniotic fluid index (AFI) and fetal doppler studies. She had had a previous uncomplicated vaginal birth of a 3kg baby at 40 weeks, 8 years prior. She had no significant medical history, no history of GDM in her first pregnancy, and there was no family history of diabetes mellitus.

An oral glucose tolerance test (OGTT) at 28 weeks was normal (4.6/8.3/7.0mmol/L), but during a routine antenatal clinic appointment at 31 weeks, urine dipstick analysis demonstrated glucosuria and point-of-care finger-prick test revealed a BGL of 7.5mmol/L. Subsequent BGL monitoring over 2 weeks revealed consistently elevated levels despite lifestyle and dietary adjustments (fasting BGLs 4.7-5.6mmol/L, postprandial BGLs 5.4-9.0mmol/L) and GDM was diagnosed. Two units of protaphane were commenced at 34 weeks, but 5 days later, the patient presented with reduced fetal movements and nausea and was found to be hypoglycaemic with a BGL of 3.4mmol/L. CTG was normal, her BGL normalised after food intake, and her regular protaphane was ceased on discharge. She re-presented 2 days later at 35 weeks and 3 days with a further episode of symptomatic PH. During this admission, her BGL dropped to a nadir of 2.8mmol/L and whilst hypoglycaemic, CTG demonstrated a prolonged deceleration (Figure 1). With correction of BGL, the CTG also normalised and investigations at the time were unremarkable (Table 1).

The patient was transferred to a higher acuity setting where her BGLs were monitored over a further two week period via continuous glucose monitor. Her BGL ranged between 3.1 and 13.2mmol/L, and 33 episodes of PH were recorded. The majority of these occurred at 11 AM and were occasionally associated with decelerations on CTG. The Endocrinology Team recommended further investigations during these episodes, aiming to elucidate an aetiology (Table 2). The impression at the time was favoured to be pancreatogeneous hypoglycaemia given elevated C-peptide and suppressed B-hydroxy butyrate, however nesidioblastosis or insulinoma were thought to be less likely given the clinical course.

Given ongoing hypoglycaemic episodes, the decision was made to proceed with an induction of labour at 37 weeks. She went on to have an uncomplicated vaginal birth of a 2.86kg baby (25-50th percentile) with HC of 32cm and APGARS of 9 and 9. At 6 weeks postpartum, an OGTT was repeated with paired C-peptide showing persistent elevation in C-peptide (Table 3) and the patient continues to be investigated by the Endocrinology Team.

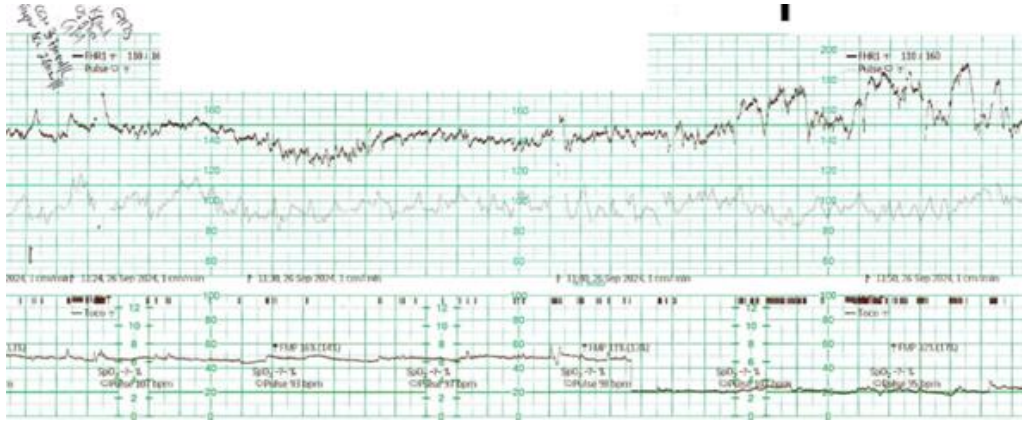

Figure 1. Initial CTG done prior to transfer during episode of postprandial hypoglycaemia demonstrating baseline of 135-140bpm, reduced variability, accelerations present and prolonged deceleration

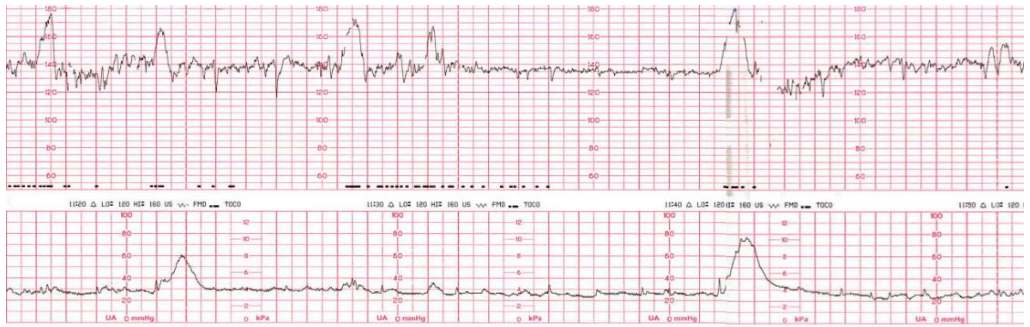

Figure 2. Subsequent CTG during another episode of postprandial hypoglycaemia demonstrating baseline 135-140bpm, normal variability, accelerations present and prolonged deceleration

DISCUSSION

The pathophysiology of PH is not well understood and, consequently, there are no specific biochemical thresholds or standardised tests to guide diagnosis and inform aetiology (3). Notably, OGTT has low sensitivity and specificity (3). Two opposing mechanisms of pathophysiology have been described in the literature including reactive hyperinsulinaemia/insulin resistance (1,12) and tissue oversensitivity (3,12), but these may also reflect differences in early PH (2-3.5 hours after a meal) versus late PH (4-5 hours after a meal) (2).

In patients with GDM, alterations in insulin secretion patterns have also been observed. These include a diminished initial phase of insulin release, an exaggerated second phase of insulin release and proinsulin secretion, as well as increased insulin resistance caused by downregulation of the insulin receptor. Moreover, the potential interplay between PH and GDM remains unclear. This case highlights the clinical challenge of diagnosis and management of PH in pregnancy. Due to its rarity, there is a paucity of knowledge and guidelines surrounding specific biochemical markers for diagnosis and appropriate management, and the potential longer term fetal and maternal implications remain poorly understood.

Haemoglobin	120g/L	HbA1c	5%
White cell count	12.9 x 10^9/L	Insulin non-fasting	57.7mU/L
Platelets	282 x 10^9/L	C-peptide	2.57nmol/L (H)
Sodium	137mmol/L	Anti-insulin Ab	Negative
Creatinine	41umol/L	ACTH	9pmol/L
GGT	20U/L	Morning cortisol	549nmol/L
ALT	48U/L (H)	fT4	8.6pmol/L
Glucose (random)	6.2mmol/L	fT3	5.0pmol/L

Table 1. Initial investigations done prior to transfer

BGL	3.3mmol/L	3.6mmol/L
Insulin	8.9munit/L	11munit/L
Pro-insulin	29.0pmol/L (H)	39.4pmol/L (H)
C-peptide	1.18nmol/L	1.47nmol/L (H)
B-hydroxy butyrate	0.3mmol/L	-
IGF-1		34.5nmol/L

Table 2. Investigations done during postprandial hypoglycaemic episodes

	Fasting	1 hour	2 hour
BGL	5.1mmol/L	3.9mmol/L	4.1mmol/L
C-peptide	0.61nmol/L	2.77nmol/L (H)	1.79nmol/L (H)

Table 3. Postnatal OGTT with paired C-peptide

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