CASE REPORT

Immeasurable glycosylated haemoglobin: a marker for severe haemolysis

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SUMMARY

Glycosylated haemoglobin (HbA1c) is a measurement commonly performed in patients with diabetes. Factors causing a change in the life span of the red blood cell (RBC) can affect the measurement of HbA1c. Thus haemolysis is an important factor that may affect the HbA1c level determination. Haemolysis has been shown to cause a falsely low HbA1c. A 62-year-old man with a history of autoimmune haemolytic anaemia was admitted for severe haemolytic anaemia and an Hb of 2.9 g/dL. HbA1c tested during hospitalisation was unrecordable due to the extremely low Hb. The patient was treated with intravenous steroids, immunoglobulin, fluids and RBC transfusions but continued to haemolyse and eventually expired. We emphasise that an extremely low HbA1c level can serve as a marker of haemolysis and an unrecordable HbA1c level may point towards fatal haemolysis.

BACKGROUND

Glycosylated haemoglobin (HbA1c) is an important determinant of diabetes control. Multiple factors are known to affect the measurement of HbA1c. Haemolysis can lead to a falsely low HbA1c. We report a case of an undetectable HbA1c in a patient with fatal autoimmune haemolytic anaemia (AIHA).

CASE PRESENTATION

A 62-year-old man with diabetes presents with a history of rectal cancer and AIHA for 1 year with weakness, shortness of breath and syncope. He was found to be severely anaemic with an Hb of 6.1 g/dL and predominantly indirect hyperbilirubinaemia. He was admitted for symptomatic anaemia due to AIHA. To evaluate his white cell count of over 50 000, a bone marrow aspiration was performed and it revealed non-Hodgkin's lymphoma. The patient was treated with steroids and rituximab. He was discharged home with an Hb of 6.8 g/dL.

Five days after discharge, the patient again presented with severe shortness of breath, weakness and lactic acidosis. His Hb on admission was 2.9 g/dL. He was admitted to the medical intensive care unit for acute severe haemolysis. A HbA1c sent on admission was reported as 'unrecordable—Hb too low to record' by the analyser. The patient was aggressively treated with high-dose steroids, intravenous immunoglobulin, fluids and medical support. He developed shock and respiratory failure and required mechanical ventilation and vasopressor support. Packed red blood cells were transfused to maintain haemodynamic stability and oxygen-carrying capacity. He continued to haemolyse and expired on the fifth day of hospitalisation.

DISCUSSION

HbA1c reflects a mean glycaemic levels over the preceding 120 days which is the average life span of a red blood cell. The HbA1c level at any point in time is contributed by all the circulating erythrocytes, from the oldest (120 days old) to the youngest. HbA1c is a 'weighted' average of blood glucose levels during the preceding 120 days and the glucose levels in the preceding 30 days contribute substantially more to the level of HbA1c than do the glucose levels of the preceding 90–120 days earlier.¹

Any condition that shortens erythrocyte survival or decreases mean erythrocyte age (eg, haemolytic anaemia, recovery from acute blood loss) will falsely lower HbA1c.² Falsely low HbA1c has been reported in cases of hereditary spherocytosis,³ autoimmune haemolytic anaemia⁴ and glucose-6-phosphate dehydrogenase deficiency.⁵ HbA1c has also been suggested as a screening test for haemolysis.⁶

To our knowledge, this is the first reported case of an immeasurable HbA1c due to severe haemolysis. We believe that in our patient with severe haemolysis, erythrocyte survival was very low resulting in young erythrocytes; thus the glycosylation of Hb was affected causing an immeasurable HbA1c. This case demonstrates that an immeasurable HbA1c may be an indicator of extremely severe and potentially fatal haemolysis.

Learning points

- ▶ When interpreting the results of a glycosylated haemoglobin (HbA1c) level, factors affecting the life span of the red blood cells should be kept in mind as it may affect the measurement of the HbA1c.
- ▶ Haemolytic anaemia can cause a falsely low HbA1c, thus a patient with diabetes and haemolytic anaemia may be falsely considered a well-controlled diabetic.
- ▶ Severe haemolysis can result in an immeasurable HbA1c. Immeasurable HbA1c in a patient with haemolysis may be a marker for potentially fatal haemolysis and thus indicate a poor prognosis.

Competing interests None.

Patient consent Obtained.

Provenance and peer review Not commissioned; externally peer reviewed.

To cite: Aggarwal N, Rai AK, Kupfer Y, et al. *BMJ Case Rep* Published online: [please include Day Month Year] doi:10.1136/bcr-2013-200307

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