

Glycerol intoxication mimicking toxic alcohol ingestion: A case report

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INTRODUCTION

Glycerol is traditionally considered to be of low toxicity and is a widely-available food additive. It is also produced endogenously during lipolysis and gluconeogenesis. Grossly elevated glycerol may be seen in an inborn error of metabolism: glycerol kinase deficiency. In addition, several cases of hyperglycerolaemia due to exogenous glycerol have been reported.

Here, we present a case of hyperglycerolaemia presenting in a similar manner as toxic alcohol ingestion. The source of glycerol is likely exogenous in view of the history of intake of an unlabelled alcoholic beverage.

CASE DESCRIPTION AND INITIAL INVESTIGATIONS

A 47-year-old male Russian ship crew was found confused after consuming a 500 mL-bottle of query spirit given by a friend. Initial blood tests revealed acute kidney injury (urea 14.6 mmol/L, creatinine 479 μ mol/L, phosphate 4.96 mol/L) and lactic acidosis (pH 6.73, pCO₂ 4.2 kPa, base excess -27.6 mmol/L, chloride 74 mmol/L, lactate 28.2 mmol/L).

An increased osmolal gap (77 mOsm/kg) was noted:

Measured plasma osmolality - 370mOsm/kg;

Calculated osmolality - 293 mOsm/kg:

$$2 * 136 (\text{Na}) + 15.1 (\text{urea}) + 5.9 (\text{glucose})$$

Serum ethanol of 32 mmol/L was detected. A significant portion of osmolal gap remained unaccounted for.

RFT				VBG			
Na	130	L	mmol/L	pH	6.73	L	
K	5.0		mmol/L	pCO ₂	4.2	L	kPa
Cl	78	L	mmol/L	HCO ₃	4.0	L	mmol/L
Urea	14.6	H	mmol/L	BE	-27.6	L	mmol/L
Crea	479	H	μ mol/L	Cl	78	L	mmol/L
Ca	2.17		mmol/L				
PO ₄	4.96	H	mmol/L				
				Lactate			
Ethanol					28.2	H	mmol/L
	32	H	mmol/L				

Table 1: Initial investigation results

FURTHER INVESTIGATIONS

Analyses for toxic alcohols and glycols in serum were grossly unremarkable apart from a trace amount of propylene glycol, likely from intravenous medications given after admission.

Test for triglyceride revealed a markedly elevated result (19.8 mmol/L). Low turbidity, which is atypical for a hypertriglyceridaemic sample, was noted in the sample.



Figure 1: Sample of the patient (left) with high triglyceride result, in comparison with a lipaemic sample (right) with similar triglyceride result.

GLYCEROL: AN INTERFERENT OF TRIGLYCERIDE ASSAY

Glycerol is known to be an interferent in routine triglyceride assay as triglyceride assay measures coupled production of glycerol, and subsequently a dye, from triglyceride (see Figure 2).

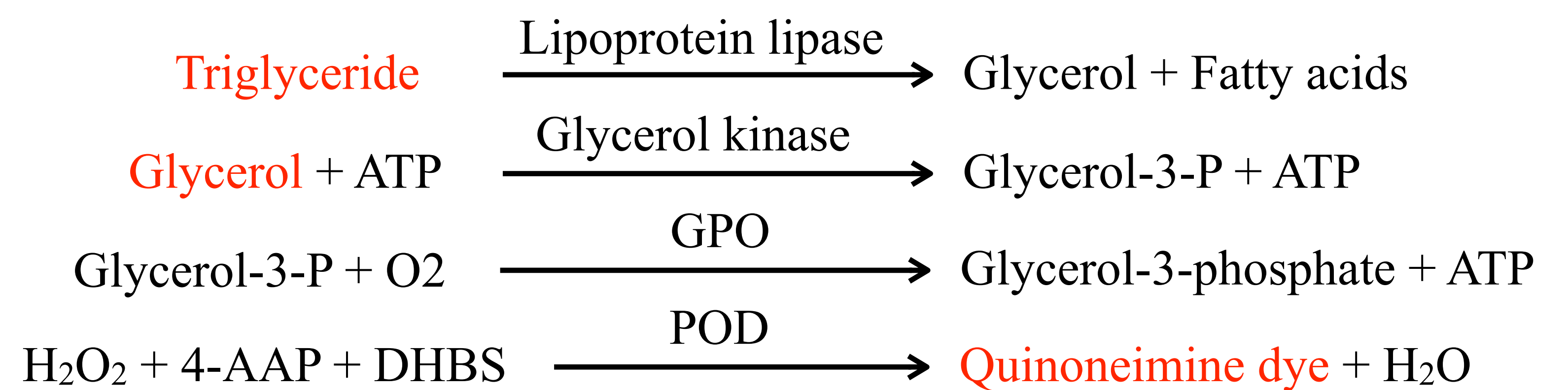


Figure 2: A common coupled enzymatic colourimetric assay for triglyceride

GC-MS DETECTION OF GLYCEROL

Gas chromatography-mass spectrometry (GC-MS) analysis of patient's serum detected a prominent peak of glycerol.

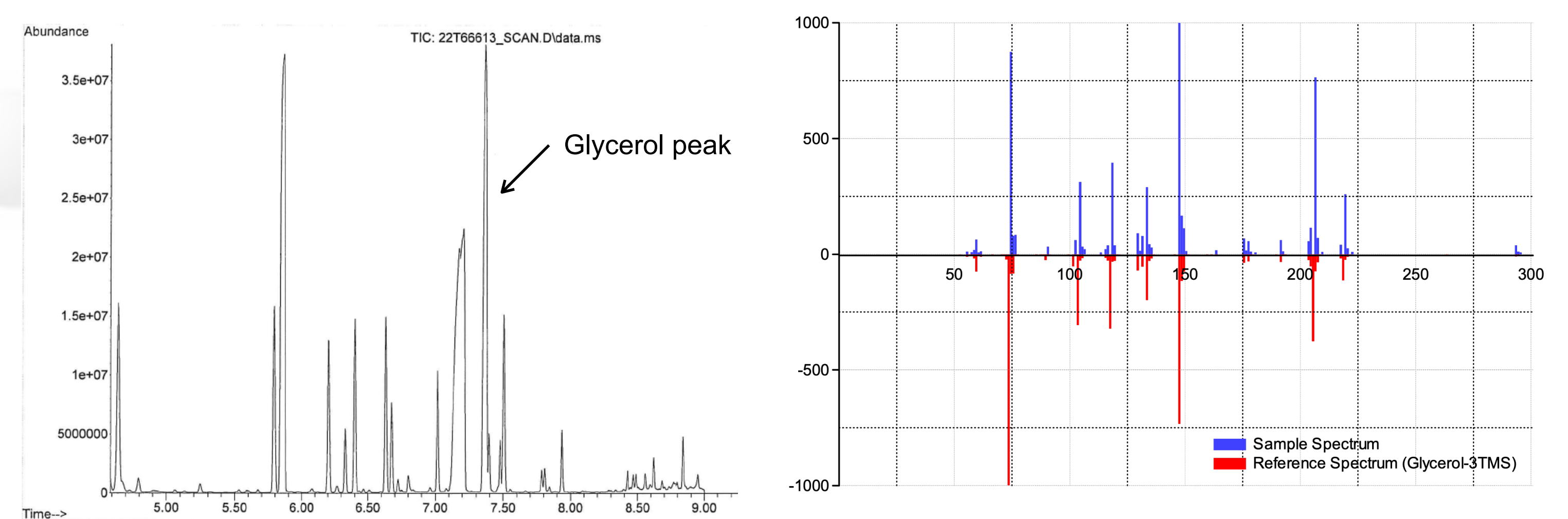


Figure 3: GC-MS findings in the patient.

Left: Gas chromatography with a prominent peak of retention time corresponding to glycerol.

Right: Mass spectrum confirms the chromatographic peak to be glycerol.

PROGRESS

The patient required ICU care and renal replacement therapy to correct the severe acid-base disturbance. At the time of writing (2 weeks after initial presentation), the patient remained dialysis-dependent.

DISCUSSION

The current case of glycerol toxicity mimicked toxic alcohol ingestion. Review of previous suspected cases of toxic alcohol consumption with negative toxicological findings found increased signal of glycerol in assays in some. This may represent an under-diagnosed condition given availability of products with high glycerol content.

CONCLUSION

Glycerol intoxication should be highly suspected in cases presenting in a similar manner as toxic alcohol poisoning with pseudohypertriglyceridaemia. Wide availability of triglyceride assays in clinical laboratories would allow timely diagnosis and treatment of the under-recognised condition.

REFERENCES

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2. Coulson L, Surla A, Tran V, Hoggett K. Severe glycerol intoxication mimicking toxic alcohol ingestion following large volume consumption of vanilla essence. Clin Toxicol (Phila). 2022 Aug 31:1-3.