

Acute Hypocalcaemia Following A Single Unit Of Blood Transfusion

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Introduction

- Hypocalcaemia following the transfusion of large volumes of packed red cells is a well established phenomenon.
- The mechanism is thought to be citrate driven; citrate is added to blood products to prevent clotting in storage. However citrate also chelates calcium.
- In trauma situations where patients have lost large amounts of blood and require large volume of transfusion, both intra-operatively and post operatively, this can be a dangerous complication.
- Symptoms of acute hypocalcaemia range from peri-oral paraesthesia and carpopedal spasm to seizures.

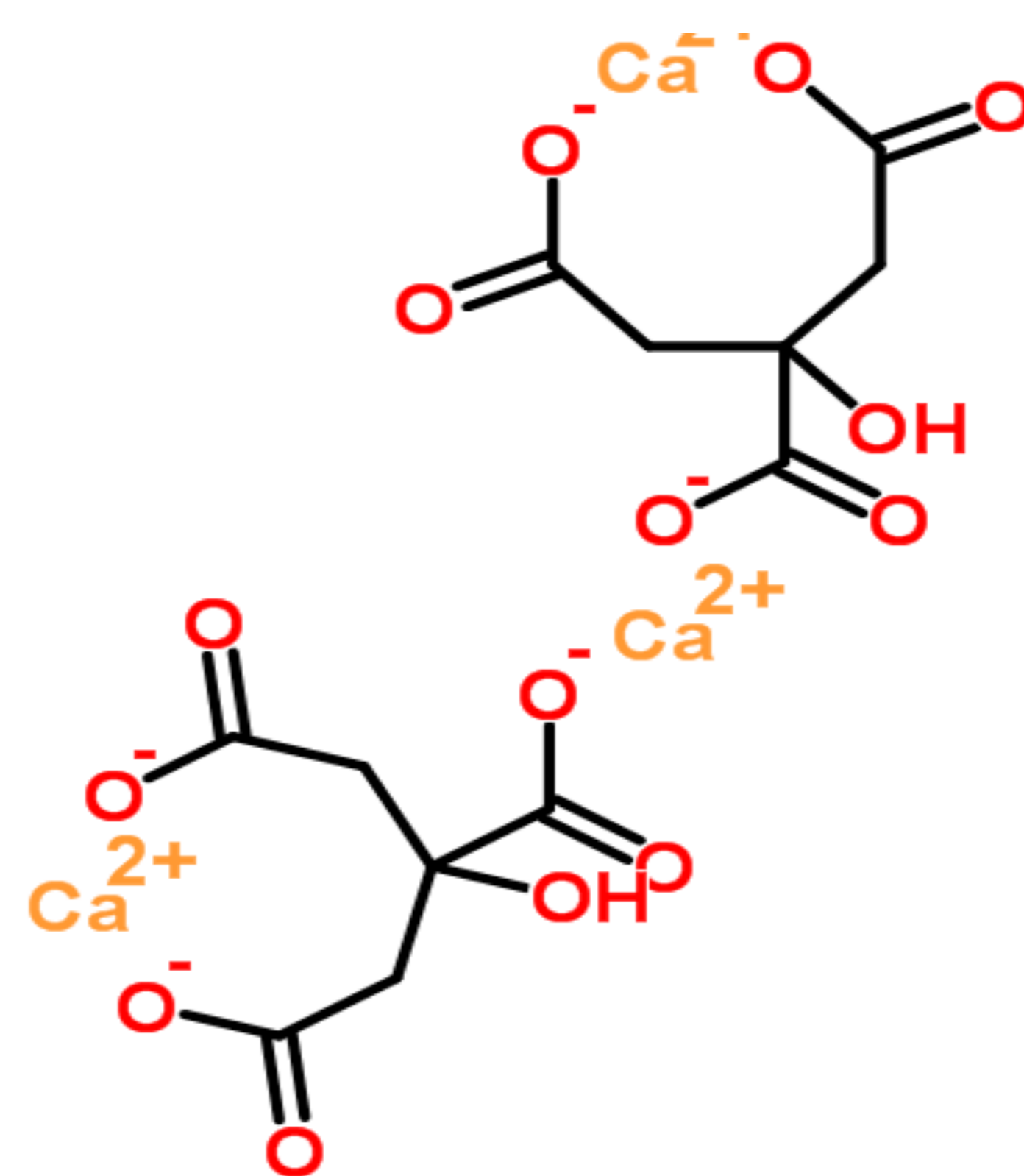
Case Presentation

33 year-old-lady presented to the emergency department with acute abdominal pain and per vaginal bleeding. Her last menstrual period was six weeks prior to admission. She had a positive urine pregnancy test and an urgent trans-vaginal ultrasound confirming an ectopic tubal pregnancy. She underwent an emergency laparoscopic right salpingectomy.

Patient Pathway

- During surgery she required a general anaesthetic and lost approximately 300ml of blood.
- Post-operatively her haemoglobin dropped from 129-86g/L.
- She was transfused 1 unit of packed red cells over 2 hours.
- Shortly after her blood transfusion she reported peri-oral tingling and developed carpopedal spasms.
- On assessment, patient was tachycardic, distressed and hyperventilating, with carpopedal spasm in both hands.
- After 2 cycles of 10mls of 10% calcium gluconate, IV magnesium and IV phosphate, the patient's calcium improved to 2.20 and phosphate 1.25.

	Post Transfusion Level	Normal range
Adjusted Calcium	2.07 mmol/L	2.20-2.60
Phosphate	0.27 mmol/L	1.12-1.45
Magnesium	0.91 mmol/L	0.82-1.24
pH	7.64	7.35-7.45
PCO2	2.4 KPa	4.7-6.0
HCO3	17 mEq/L	22-28



Calcium binding to Citrate



Discussion

- The phenomenon of hypocalcaemia following large volume blood transfusion is well reported¹.
- Small volume transfusion should not precipitate a hypocalcaemic event due to clearance of citrate by the liver.
- **Our case is novel due to the fact that hypocalcaemia was precipitated by a single unit of blood transfusion.**
- It is likely multifactorial with superimposed respiratory alkalosis lowering her ionised calcium further.
- Other potential contributing factors include her low-normal BMI and the increased rate at which blood was transfused (over 2 hours versus 3 hours)
- As such, certain patients should be more closely monitored for serum calcium levels post even small volume blood transfusion

Conclusion

- Clinically significant hypocalcaemia following a single unit of blood transfusion is rare.
- Certain factors such as liver disease (unable to metabolise citrate), rapid transfusions (citrate delivered too quickly for the liver to metabolise) and alkaloses (respiratory alkalosis drives down ionised calcium) predispose patients to this phenomenon.
- Therefore, it may be beneficial to monitor serum calcium in these subgroups with a low threshold for ionised calcium to ensure prompt detection of this phenomenon.

1. Schmitt HJ, Gotz E. [Metabolic disorders caused by blood transfusions]. Infusionstherapie. 1988 Dec;15(6):254-60.