

TRANSPLANT RECIPIENTS ON THE EDGE OF THE HYPOCALCAEMIA ABYSS

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Description of Cases

Case 1

A 59-year old man was admitted for bilateral sequential single lung transplantation (BSSLT) for pulmonary fibrosis. Post-operative biochemistry demonstrated acute hypocalcaemia (ionised calcium (iCa) concentration 0.96 mmol/L), secondary to severe vitamin D deficiency. Initial attempted correction of hypocalcaemia with calcitriol and calcium supplement was unsuccessful. Serum calcium concentration eventually normalised after vitamin D was restored to sufficiency.

Case 2

A 60-year old man with multiple myeloma was admitted for bone marrow transplantation, and developed acute cardiogenic pulmonary oedema post-transplantation. Biochemistry demonstrated acute hypocalcaemia (iCa concentration 0.8 mmol/L) secondary to severe vitamin D deficiency. Trans-thoracic echocardiogram showed severe global hypokinesis. Cholecalciferol, calcitriol, and calcium supplement were commenced, with resolution of hypocalcaemia and improvement of cardiac function.

Case 3

A 45-year old man who underwent BSSLT for cystic fibrosis 13 years ago presented with peri-oral numbness. Biochemistry confirmed severe hypocalcaemia (iCa concentration 0.72 mmol/L), with hypomagnesaemia and severe vitamin D deficiency. Cholecalciferol, calcitriol, magnesium supplement, and calcium citrate were commenced. Normocalcaemia was achieved after one week, and calcitriol was ceased once serum calcium concentration began to rise.

Key Questions for Discussion

- 1) Why are transplant recipients at risk of hypocalcaemia from vitamin D deficiency?
- 2) What are the complications of hypocalcaemia in transplant recipients?
- 3) How should hypocalcaemia be treated?
- 4) How common is hypocalcaemia in patients in the acute setting?

Discussion

The unique milieu of transplantation, created by the combination of specific immunosuppressive medications, anti-resorptive agents for transplant-related osteoporosis, on a background of chronic illness, exposes transplant recipients to significant risk of hypocalcaemia, which frequently escapes medical attention. While hypovitaminosis D is a recognised contributor to transplant-related disorders of bone mineralisation (1), its relationship to severe and life-threatening hypocalcaemia is under-recognised.

Severe hypocalcaemia secondary to vitamin D deficiency in the general population is uncommon, because of multiple compensatory mechanisms available to restore calcium balance. Such mechanisms are however impaired in transplant recipients, increasing their risk of severe hypocalcaemia from vitamin D deficiency.

Negative calcium balance not only adversely affects bone health, but dangerous hypocalcaemia can develop which can lead to life threatening arrhythmia and cardiac dysfunction (2).

Treatment of hypocalcemia should focus on the underlying pathophysiology. Calcitriol is frequently used as first-line treatment for hypocalcaemia. However, it may not be as effective in the treatment of hypocalcaemia secondary to severe vitamin D deficiency, as illustrated by our 3 cases. Vitamin D repletion with cholecalciferol allows safe restoration of calcium homeostasis. Iatrogenic dosing with calcitriol is imprecise, where low doses can be ineffective and high doses increases the risk of hypercalcaemia and hypercalciuria.

In conclusion, transplant recipients are at risk of severe hypocalcaemia because of unrecognized vitamin D deficiency, and side-effects of several medications commonly used in the transplant setting. Monitoring of vitamin D status should be routine practice at follow-up reviews at transplant clinics to ensure sufficiency. Vitamin D sufficiency not only reduces bone loss, but also reduces the risk of life threatening hypocalcaemia.

Reference:

- 1) Ebeling PR. Transplantation osteoporosis. *Curr Osteoporos Rep.* 2007;5:29-37.
- 2) Maiya S, Sullivan I, Allgrove J, Archer N, Tulloh R, Daubeney P, Malone M, Mok Q, Yates R, Brain C, Burch M. Hypocalcaemia and Vitamin D deficiency: an important, but preventable cause of life threatening infant heart failure. *Heart* 2007; Aug 9 [Epub]