Hypercalcemia

Hypercalcemia is the condition in which a person's serum calcium level is higher than normal. It can result from increased calcium intake and absorption, shift of calcium from bones into the extracellular fluid (ECF), or decreased calcium output. Patients display lethargy, hypercoagulation, constipation, pathologic fractures, and possible ECG changes.



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Assessment

> 10.5 mg/dL Ca²⁺
Greater than (10) Tin (.5) Hand
Hypercalcemia is defined as a serum calcium level higher than 10.5 mg/dL. Because the normal range is narrow, even slight increases can have severe effects.

Pathologic Fractures
Fractured Bone
In most cases, the excess calcium in the blood is leached from the bones, which weakens them. This can lead to pathologic fractures.

Lethargy
Leather-jacket
Hypercalcemia decreases neuromuscular excitability, with the most common symptom presenting as lethargy. Fatigue, confusion, and a decreased level of consciousness may be observed with severe cases leading to coma.

Hypercoagulation
Hiker-clogs
Hypercoagulation, otherwise known as the formation of blood clots, can occur more easily in states of hypercalcemia because calcium is a cofactor in the coagulation cascade. The patient is at increased risk for developing deep vein thrombosis (DVT) of the lower extremities or in areas where venous obstruction occurs.

Constipation
Corked Con-toilet
Hypercalcemia can cause constipation due to decreased peristalsis. Patients may also experience nausea, vomiting, anorexia, and abdominal pain.

ECG Changes
Delta ECG
Hypercalcemia results in changes on electrocardiogram (ECG/EKG), which includes a shortened QT interval and shortened ST segment. Cardiovascular changes are the most serious and life-threatening problems of hypercalcemia and should be treated immediately.

QT Shortening
QT-heart Shortened
Hypercalcemia causes increased cardiac contractility, and increases heart rate. This translates into shorter ventricle depolarization and repolarization times, which when viewed on ECG/EKG is a shortened QT interval.

Interventions

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No Calcium Intake

No Calcium Sign

Interventions for hypercalcemia aim to reduce serum calcium levels thus, no calcium intake should be permitted. This includes stopping IV solutions containing calcium such as Ringer’s lactate and oral drugs containing calcium.

Chelating Drugs

Cleats-on Drugs

Calcium chelating drugs are those that bind to calcium thereby lowering serum levels. Examples include plicamycin (Mithracin) and penicillamine (Cuprimine, Pendramine).

Calcitonin

Cow-throne

Calcitonin is a drug used to inhibit calcium resorption from bone and thereby helps to prevent hypercalcemia. It is often administered intravenously in cases of severe hypercalcemia (hypercalcemic crisis, serum calcium greater than 14 mg/dL) since it is relatively fast-acting.

Bisphosphonates

Bike-phosphate-P

After adequate fluid resuscitation and down-trending serum calcium levels, bisphosphonates (e.g. zoledronic acid, pamidronate) are administered intravenously to combat excessive bone resorption. These drugs can take 2-4 days to be effective so they are useful in the long-term.

Loop Diuretics instead of Thiazide Diuretics

Loop-hen on Die-rocket overpowering Tarzan Die-rocket

Although falling out of favor, loop diuretics (e.g. furosemide, Lasix&reg) may be used in the management of hypercalcemia especially in patients who are volume overloaded e.g. renal or heart failure. Loop diuretics promote calcium excretion whereas thiazide diuretics promote calcium reabsorption. For this reason, thiazide diuretics (e.g. hydrochlorothiazide) should be discontinued/avoided in patients with hypercalcemia.

Considerations

Increased Risk for Renal Calculi

Up-arrow Risk of Kidney-boat Cow-captain

As the calcium builds up in the body, crystals can form in the kidneys. Over time, the crystals may combine to form renal calculi or kidney stones.

Increase Fluids

Up-arrow Fluids

In most patients, fluid resuscitation with intravenous normal saline can aid in restoring normal serum calcium levels. Exercise caution in patients who are already fluid overloaded e.g. renal or heart failure.

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