Hypoparathyroidism

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Risk

- Most common cause of both acute and chronic hypoparathyroidism is surgery of the neck, including thyroidectomy, parathyroidectomy, and radical neck dissection.
- Nonsurgical hypoparathyroidism is rare. Etiologies include autoimmune disease, infiltrative diseases (e.g., hemochromatosis, Wilson disease), hypomagnesemia or hypermagnesemia, and genetic disorders involving PTH biosynthesis or parathyroid development (e.g., DiGeorge syndrome).

Perioperative Risks

- Severe hypocalcemia leading to heart failure, hypotension, arrhythmias, laryngospasm, bronchospasm, seizure, or altered mental status

Worry About

- Hypocalcemia and other lyte abnormalities.
- Pts on oral calcium maintenance therapy may require IV supplementation during long surgical procedures.
- Watch for periop causes of hypocalcemia, including both respiratory or metabolic alkalosis and citrate toxicity from large volume RBC transfusions.

Overview

- PTH is normally secreted by the parathyroid glands to maintain calcium and phosphorous homeostasis.
- PTH impacts calcium and phosphorous by increasing (1) bone resorption to release calcium and phosphorous, (2) calcium reabsorption and phosphorous excretion in the kidney, and (3) vitamin D activation, indirectly resulting in an increased absorption of calcium and phosphorous by the intestines.
- Hypoparathyroidism is characterized by hypocalcemia with an inappropriately low PTH level. It is usually accompanied by an elevated serum phosphorous level.
- Symptoms of hypoparathyroidism are due to hypocalcemia, with the severity of symptoms dictated by disease chronicity, rapidity of calcium concentration change, and the overall severity of hypocalcemia.
- Symptoms may range from mild (paresthesias, cramping, tetany) to severe (seizure, laryngospasm, altered mental status, heart failure, hypotension, cardiac arrhythmias).

Etiology

- Most common etiology of acute and chronic hypoparathyroidism is postsurgical, specifically following surgery on the neck.
- Incidence of hypoparathyroidism after total thyroidectomy is 0.5–10%, but it is usually transient. Permanent hypoparathyroidism persisting 6 mo after surgery occurs in only 4.4% of pts.
- Postsurgical hypoparathyroidism is usually evident within several h of surgery and is caused by hypoparathyroid gland damage, removal, or devascularization.
- Acquired hypoparathyroidism can also be caused by isolated autoimmune destruction of parathyroid tissue or as part of an autoimmune polyendocrine syndrome, antibodies to the calcium-sensing receptor, neck radiation, ^{131}I therapy, and infiltrative diseases, including hemochromatosis, thalassemias, and granulomatosis diseases.
- Reversible hypoparathyroidism can be caused by severe hypomagnesemia (e.g., from chronic malnutrition or alcoholism) or hypermagnesemia (e.g., from tocolytic therapy).
- Congenital hypoparathyroidism is seen in genetic disorders involving parathyroid development (e.g., DiGeorge syndrome) or PTH biosynthesis.

Usual Treatment

- Chronic hypoparathyroidism is managed with oral calcium and vitamin D supplementation.
- Pts with chronic hypoparathyroidism presenting for surgery should be maintained on supplemental therapy or given IV calcium when unable to tolerate oral medications.
- Acute severe postsurgical hypoparathyroidism causing ECG abnormalities, cardiovascular instability, seizure, or airway compromise must be treated as a medical emergency with IV calcium. Calcitriol should be given as soon as reasonably possible, although it takes several h to have an effect.
- Mild symptoms (paresthesias, muscle aches) or asymptomatic hypocalcemia can often be treated with oral calcium and calcitriol.

Assessment Points

System	Effect	Assessment by Hx	PE	Test
HEENT			Examine for previous neck surgery; craniofacial abnormalities	
RESP	Laryngospasm Bronchospasm Respiratory muscle weakness	Dyspnea Poor cough	Tachypnea, respiratory distress Wheeze/stridor	
CV	Heart failure QTc prolongation Arrhythmia	Exercise intolerance	Displaced PMI Peripheral edema	TTE (if heart failure suspected) ECG (QT/QTc)
CNS	Paresthesias Altered mental status Seizure Muscle cramping/tetany	Hx of seizure, confusion, numbness/tingling, muscle pain	Chvostek sign Trousseau sign, disorientation, obtundation	Lytes (including total and ionized calcium, magnesium, and phosphorous) Serum PTH, serum albumin
MS	Muscle cramping/tetany Myopathy	Muscle pain, weakness	Examine strength	Lytes, CK

Key References: Shoback D: Clinical practice. Hypoparathyroidism, *N Engl J Med* 359(4):391–403, 2008; Khan MI, Waguespack SG, Hu MI: Medical management of postsurgical hypoparathyroidism, *Endocr Pract* 17(Suppl 1):18–25, 2011.

Perioperative Implications

Preoperative Preparation

- Perform a history and physical exam focusing on previous neck surgery, family history of hypocalcemia, autoimmune endocrinopathies, and congenital defects.
- Assess for signs and symptoms of hypocalcemia, including cardiac and respiratory compromise.
- Check serum lytes, including total and ionized serum calcium, magnesium, and phosphorous. Correct lytes if necessary.
- Continue oral calcium and vitamin D supplemental therapy. Consider IV calcium replacement if symptomatic or serum calcium markedly reduced.
- Consider further laboratory tests if unclear etiology including creatine, albumin, intact PTH, and 25-hydroxyvitamin D.
- Check ECG for baseline QTc.

Monitoring

- Standard ASA monitors.
- Monitor ECG trend. (QTc changes often correlate inversely with calcium concentration.)
- Consider invasive monitoring and access with severe hypocalcemia requiring IV calcium replacement, need for frequent blood sampling, or heart failure monitoring.

Airway

- Assess for potential difficult airway in pts with previous neck surgery or radiation.

Preinduction/Induction

- Choice of induction agent and technique dictated by pt's cardiopulmonary health.
- Untreated hypocalcemia may increase risk of hypotension.

Maintenance

- Continue to monitor serum lytes. Specifically recheck ionized calcium every 1–2 h if ongoing IV therapy.
- Avoid respiratory and metabolic alkalosis.
- Maintain euvolemia. Pts with congestive heart failure may benefit from diuresis.

Extubation

- Greatest risk is development of acute hypoparathyroidism leading to hypocalcemia and respiratory distress, laryngospasm, or bronchospasm following difficult thyroid/parathyroidectomy.
- For pts with preexisting hypoparathyroidism, ensure lytes are repleted prior to extubation and ensure adequate reversal of neuromuscular blockade.

Postoperative Period

- Calcium levels reach the nadir 3 d after surgery, but pts with severe, acute hypoparathyroidism may become symptomatic shortly after surgery.

Anticipated Problems/Concerns

- Severe postop hypocalcemia and potential life-threatening symptoms, including laryngospasm
- Maintenance of serum calcium level throughout periop period for pts with chronic hypoparathyroidism