DISORDERS OF CALCIUM HOMEOSTASIS

HYPOPARATHYROIDISM

Decrease in normal conc. of parathyroid hormone

↓

Decreased Blood calcium conc.
(Hypocalcemia)

But, Bone remains unaffected/ stronger.

↓

- Nervous tissue excitement
- Tetany
- Prolonged QT interval of heart.

Among all muscles, laryngeal muscles are more sensitive to tetanic spasm.

↓

Obstruction in respiration

↓

Death.

HYPERPARATHYROIDISM

- Primary Hyperparathyroidism
- Secondary Hyperparathyroidism.

Primary Hyperparathyroidism :-

Cause :- Abnormality of parathyroid gland
(Tumor ← preg. lactat°)

↓

↑ in Parathyroid hormone

↓

↑ Blood Calcium conc.
↓ Blood phosphate conc.

Effect on Bone :-

➡ Bone may be eaten up entirely
- could lead to multiple fractures even in mild trauma.

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➡ Osteitis Fibrosa Cystica :-

- Extensive Decalcification
- Large punched out cystic areas filled with Osteoclast in form of giant tumor.

➡ Secondary Effect :-

Osteoblastic activity increases in vain attempt to form enough new bone

∴ ALP↑ in blood ≈ Diagnostic finding of hyperparathyroidism.

Effect of hypercalcemia :-

➡ Nervous tissue depression

➡ Muscle activity depression

➡ ↓ QT interval of heart

➡ Constipation

➡ Loss of appetite.

Parathyroid poisoning and metastatic calcification :-

Generally,

PTH ⇒ Bone resorption (phosphate ↑ in blood) < Renal excretion (phosphate ↓ in blood)

In case of Parathyroid Poisoning,

PTH ⇒ Bone resorption (phosphate ↑ in blood) > Renal excretion (phosphate ↓ in blood)

Calcium > 17 mg/dl

↓

Formation of ($CaHPO_4$) crystals calcium phosphate

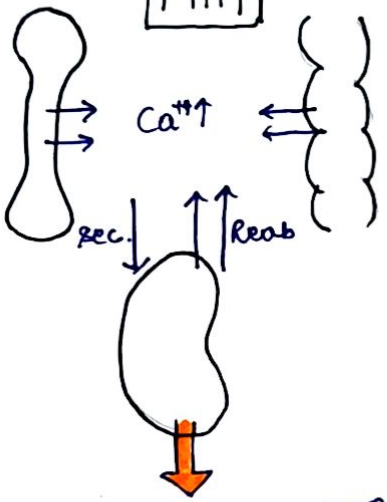
↓

Deposition of $CaHPO_4$ crystals on :-

- Alveoli of lungs
- Tubules of kidney
- Thyroid Gland
- stomach mucosa
- arterial wall

Formation of Kidney Stones :-

PTH↑



Calcium excretion also increases.

↓

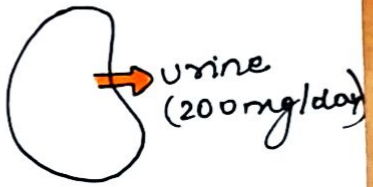
Crystals of $CaHPO_4$

↓

Stones of Calcium and calcium oxala

9900mg ↑ Reab. 10,000mg/day ↓ Exc.

19800mg ↑ Reab. 20,000mg ↓ Exc.



Alkaline urine ➡ Stone solub. ↓

Acidic urine ➡ stone solub. ↑

Secondary hyperparathyroidism :-

- Hyperparathyroidism in response to hypocalcemia.
  [Not d/t primary defect in parathyroid gland]

Hypocalcemia
(calcium ↓)

↓

PTH ↑↑
(Sec. hyperpathyroidism)

Most common cause
- Vit. D deficiency
- chronic renal disease leading to Vit D defidency.