**TOPIC:**

DISORDERS OF THE PARATHYROID GLANDS

**COURSE:**

MEDICAL AND SURGICAL NURSING

**COURSE CODE:**

NSC 306

**GROUP:**

GROUP 3

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# DISORDER OF THE PARATHYROID GLAND

* **ANATOMY AND PHYSIOLOGIC OVERVIEW**

The parathyroid glands (normally 4) are situated in the neck and embedded in the posterior aspects of the thyroid gland.

Parathormone (parathyroid hormone) the protein hormone produced by the parathyroid gland regulates calcium and phosphorus metabolism.

Increased secretion of the hormone will lead to increased calcium absorption from the kidney, intestine and bones which raises the blood calcium level.

The serum level of ionized calcium regulates the output of parathormone which means if there is increase in the calcium level in the blood there will be a decrease in the production of parathormone. Some of the actions of the hormones are increased by vitamin D

* **SPECIFIC DISORDER OF THE PARATHYRIOD GLANDS**

Hperparathyroidism is a parathyroid gland disorder which is caused by overproduction of parathyroid gland. It is characterized by bone decalcification and development of renal caculi (kidney stones) containing calcium.

Some people with this condition don’t experience any symptoms and don’t need any treatment. Others have mild or severe symptoms that might require surgery.

**TYPES OF HYPERPARATHYROIDISM**

There are 3 types of hyperthyroidism

* Primary hyperparathyroidism

* Secondary hyperparathyroidism

* Tertiary hyperparathyroidism

* **PRIMARY HYPERPARATHYROIDISM**

This occurs when there is a problem with at least one of the parathyroid glands. The common cause of this includes benign growth on the glands pre enlargement of one or more of the gland and in area cases cancerous tumors.

* **SECONDARY HYPERPARATHYROIDISM**

This occurs when an underlying condition causes calcium level to be abnormally low and in response the gland secretes excessive parathormone of these glands.

* **TERTIARY HYPERPARATHYROIDISM**

This type occurs when the parathyroid gland keep making too much PTH after the calcium level is back to normal. It occurs in people with kidney problems.

 **CLINICAL MANIFESTATIONS**

The patient may have no symptoms or may experience symptoms resulting from involvement of several body systems, weakness, nausea, vomiting, constipation, hypertension, and cardiac dysrhthmeas may occur. All these signs and symptoms are attributed to the increase concentration calcium in the blood.

Psychological effect may vary from irritability and neurosis to psychosis caused by direct action of calcium on the brain and nervous system. Increase urinary excretion of calcium and phosphate leads to formation of stones in one or both kidneys.

Musculoskeletal symptoms are caused by demineralization of the bones or by bones tumors resulting from overgrowth of osteoclast. The patient will develop skeletal pain especially back and joints. The incidence of peptic ulcer and pancreas is increased with hyperparathyroidism and may be responsible for many GI symptoms.

#  ASSESSMENT AND DIAGNOSIS

**FINDINGS**

Hyperparathyroidism is diagnosed by persistent elevation of serum calcium level and an elevated concentration of parathormones. Radioimmunoassay for parathormone are sensitive and helps to differentiate primary hyperthyroidism from other causes of hypercalcaemia because an elevated serum level of calcium alone is a non specific finding because calcium level in the blood may be altered by diet, medications ,renal and bone changes.

X ray may detect bone changes. Double –antibody parathyroid hormone test is used to distinguish between hyperparathyroidism and malignancy as a cause of hypercalcaemia. Ultrasound, MRI, thallium scan and fine needle biopsy can be used to evaluate the functions of the parathyroid and to localize parathyroid cyst, adenomas, or hyperplasia.

* **MEDICAL MANAGEMENT**

* + **Surgical management**

The recommended treatment of primary hyperparathyroidism is the surgical removal of abnormal parathyroid tissues (parathyroidectomy).

For asymptomatic patient who have only mildly elevated serum and normal renal function, surgery may be delayed and the patient monitored closely for worsening of hypercalcemia, bone deterioration, renal impairment or development of kidney stones.

Surgery is recommended for asymptomatic patient who meet the following criteria

o Younger than 50 o Unable to participate in follow up care o Serum calcium level more than 1.0mg/dl o Urinary calcium level greater than 400mg/day o A 30% decrease in renal function.

* + **Hydration Therapy**

It is because kidney involvement is possible; with hyperparathyroidism are at risk of renal calculi (kidney stones) Therefore a daily fluid intake of 200mls or more is encourages to help prevent the formation of calculus. Cranberry juice is suggested because it lowers the urinary Ph.

The patient is instructed to report other manifestations of renal calculi such as abdominal pain and hematuria. Thiazide diuretics are avoided because they decrease the renal excretion of calcium and further elevate serum calcium because of the risk of hypercalcemic crisis. Patient is instructed to avoid dehydration.

* **MOBILITY**

Mobility of patient is encouraged as much as possible because bones of patient that are subjected to stress give up less calcium.

* **DIET AND MEDICATION**

Nutritional needs are meant but the patient is advised to avoid a diet with excess calcium. If patient has a coexisting peptic ulcer, prescribed antacids and protein feeding is necessary. Anorexia is common so efforts are made to improve appetite Increase fluid intake is encouraged.

* **NURSING MANAGEMENT**

The nursing management of patient undergoing parathyroidectomy is essential

1. **PREOPERATIVE CARE** 
   * The nurse should inform the patient of importance of a restricted calcium diet and increase fluid intake.
   * The patient is reminded to take 200ml or more fluid daily to prevent calculus formation.
   * The nurse informs the patient about the purpose of preoperative test if any are to be preformed e.g. MRI, Needle biopsy and ultrasound.
   * The nurse should engage the patient in preoperative teachings which include demonstrating to the patient how to support the neck with hands after surgery to prevent stress on incision (raising the elbow and placing the hand behind the neck to provide support and reduce strain on the neck muscles).
   * Patient is psychologically reassured to reduce anxiety and boast confidence o The nurse should encourage the patient as much as possible on the importance of mobility.

1. **POST OPERATIVE CARE**

The nurses periodically assess the surgical dressing and reinforce them if necessary.

* + The nurse should be alert on any complaint of pressure or fullness at incision site.
  + If difficulty in respiration occurs due to edema of the glottis, hematoma formation, the nurse should insert an airway to promote respiration.
  + The nurse should assess the intensity of pain and administer analgesic agents as prescribed. o The nurse should ensure support of patient’s head when moving patients head o The nurse should position the patient in a semi fowlers’ position with head supported with pillow in order to promote patients comfort
  + The nurse should anticipate the need for a cold liquid diet since there will be difficulty in swallowing.

1. **PROMOTING HOME CARE**

The nurse reminds the patient and family about the importance of follow up to ensure return of serum calcium level to normal.

* **COMPLICATIONS: HPERCALCEMIC CRISIS**

Acute hypercalcemic crisis can occur with extreme elevation of serum calcium levels. Serum calcium level greater than 15mg/dl (3.7mmol/l), cardiovascular and renal symptoms that can be life threatening. Treatment include rehydration with large volume of Iv fluid.

Diuretics agent to promote renal excretion of excess calcium and phosphate therapy to correct hypophosphatemia and decrease calcium level by promoting calcium deposition in the bone and reducing gastrointestinal absorption of calcium Cytotoxic agents (e.g. mithramycin), calcitonin, and dialysis may be used in emergency situations

**NOTE:** The patient in acute hypercalcemic crises requires close monitoring for life threatening complications and immediate treatments.

* **NURSING CARE PLAN**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Nursing diagnosis | Outcome | Intervention | rational | Evaluation |
| Risk of decrease cardiac output related to alternation in rate | Maintain adequate cardiac output for tissue | Monitor bp lying, sitting, standing to widened pulse  pressure | General hypotension  may occur because of | Patient maintain adequate cardiac output |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| and rhythm evidence by vital signs | needs of the evidence of good vital sign and absence of  arrhythmia after 24 hours of intervention | Administer IV fluid as indicated. thyroid hormone and agonist, topazolite, beta blocker | excessive peripheral vasodilation and decreased circulation volume | after 24 hours of intervention |
| Fatigue related to hypermetabolic state evidence by verbalization of lack of energy to maintain usual routine | Patient should verbalize increase level of energy after 12 hours of intervention | Monitor vital sign noting pulse rate at rest  Use sedative like phenobetal, antianxiety agent | Combat nervousness hyperactivity and isonmia | Patient verbalize increase level of energy after  12 hours |
| Risk of  hypercalcemia related to renal and neurological symptoms evidence by calcium level  >15mg/dl | Decrease calcium in blood after 24 hours intervention | Rehydration with large volume of iv fluid, diuretic agent | It is used to promote renal excretion of excess calcium | There was a decrease in  calcium level |
| Deficient knowledge related to information interpretation evidence by question, request from | Patient will verbalize understanding of disease and potential complication | Review disease process and future expectation  Provide information about sign and | Provides knowledge  base from which patient can make | Patient verbalized more understanding and knowledge about disorders |
| information, statement |  | symptom about hyperparathyroidism and follow up care | informed choice |  |

# HYPOPARATHYROIDISM

The most common cause of hypoparathyroidism is inadequate secretion of parathormone after interruption of the blood supply or surgical removal of parathyroid gland tissue during throidectomy, parathyroidectomy, or radical neck dissection. These small glands are easily overlooked and can be removed inadvertently during thyroid surgery. Atrophy of the parathyroid glands of unknown cause is a less common cause of hypoparathyroidism.

Deficiency of parathormone results in increased blood phosphate (hyperphosphateremia) and decreased blood calcium (hypocalcemia) levels. In the absence of parathormone, there is decreased intestinal absorption of dietary calcium and decreased absorption of calcium from bone and through the renal tubules. Decreased renal excretion of phosphate causes hypophosphaturia, and low serum calcium levels results in hypocalciuria.

* **CLINICLAL MANIFESTATIONS**

Hypocalcemia causes irritability of the neuromuscular system and contributes to the chief symptoms of hypoparathyiodism-tetany.Tetany is a general muscle hypertonia, with remor and spasmodic or uncoordinated contractions occurring with or without efforts to make voluntary movements. Symptoms of latent tenancy are numbness, tingling, and cramps in the extremities, and the patient complains of stiffness in the hands and feet.

In overt tetany the signs include bronchospasm, laryngeal spasm, carpopedal spasm (flexion of the elbow and wrists and extension of the carpophalangeal joints and dorsiflexion of the feet), dysphasia, photophobia, cardiac dysrhythmias, and seizures.

Other symptoms include anxiety, irritability, repression, and even delirium. E.g. changes and hypotension also may occur.

* **ASSESSEMNT AND DIAGNOSTIC FINDINGS**

A positive trousseau’s sign or a positive chvosek’s suggested latency tetany. Trousseau’s sign is positive when carpopedal spasm is induced by occluding the blood flow to the hand for 3 minutes with a blood pressure cuff. Chvosek’s sign is positive when a sharp tapping over the facial nerve just in front of the parotid glands and anterior to the ear causes spasm or twitching of the mouth, nose and eyes.

The diagnosis of hyperparathyroidism often is difficult because of the vague symptoms, such as aches and pains. Therefore, laboratory studies are especially helpful. Tetany develops at serum calcium levels of 5 to 6 mg/dl (1.2 to 1.5mmol/dl) or lower.

Serum phosphate levels are increased, and x-rays of bone shows increased density .Calcification is detected on X ray of the subcutaneous or paraspinal basal ganglia of the brain.

* **MEDICAL MANAGEMENT**

The goal of therapy is to increase the serum calcium level to 9 to 10mg/dl (2.2 to 2.5mmol/L) and to eliminate the symptoms of hypoparathyroidism and hypocalcaemia. When hypocalcaemia and tetany occur after a thyroidectomy, the immediate treatment is administration of IV calcium gluconate.If this does not decrease neuromuscular irritability and seizures activity immediately, sedatives agents such as pentobarbital may be administered.

Parental parathormone can be administered to treat acute hypoparathyroidism with tetany. However, the high incidence of allergic reactions to injections if parathormone limits its use to acute episode of hypocalcemia.The patient receiving parathormone is monitored closely for allergic reactions and changes in serum calcium level.

Because of neuromuscular irritability, the patient with hypocalcaemia and tetany requires and environment that is free noise, drafts, bright lights or sudden movements. Tracheostomy or mechanical ventilation may become necessary, along with Broncho dilating Medications, if the patients develops respiratory distress.

Therapy for chronic hypoparathyroidism is determined after serum calcium levels are obtained. A diet high in calcium and low in phosphorus is prescribed. Although milk, milk products, and egg yolks are high in calcium, they are restricted because they also contain high level of phosphorus.

Spinach also avoided because it contains oxalate, which would from insoluble calcium substance. Oral tablets of calcium salts, such as calcium gluconate, may be used to supplement the diet. Aluminum hydroxide gel or aluminum carbonate also is administered after meals to bind phosphate and promote its excretion through the GI track.

 **NURSING MANAGEMENT**

Nursing management of the patient with possible acute hpyoparathyroidism includes the following o Care of postoperative patients who have undergone thyroidectomy, parathyroidectomy, or radial neck dissection is directed towards detecting early signs of hypocalcaemia and anticipating signs of tetany, seizures and respiratory difficulties.

* Calcium gluconate is kept at the bedside with equipments necessary for emergency IV administration. If the patient requiring administration of calcium gluconate has a cardiac disorder, is subject to dysrhythmias, or is receiving digitalis, the calcium gluconate is administered slowly and cautiously.
* Calcium and digitalis increase systolic contraction and also potentiate each other; this can produce potentially fatal dysrhymias. Consequently, the cardiac patient requires continuous cardiac monitoring and careful assessment.

An important aspect of nursing care is teachings about medications and diet therapy. The patient needs to know the reason for high calcium and low phosphate intake and the symptoms of hypocalcaemia and hypercalcemia; he or she should know to contact the physician immediately if these symptoms occur.

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| NURSING DIAGNOSIS | NURSING OBJECTIVES | NURSING ORDERS AND  SIGNATURE |
| Acute pain related to disease condition as evidenced by patient verbalization | Patient describes satisfactory pain control at a level less than 2-3 on a rating scale of 0-10 within 2 hours of nursing intervention | * Assess level of pain and obtain a baseline data * Administer analgesics * Provide rest period to promote relief, sleep and relaxation. |
| Risk for electrolyte imbalance related to low level of  parathyroid hormone | Patient will verbalize a reduction of fatigue and increased ability to complete desired outcome within 24hours of nursing  intervention | * Assess neuromuscular strength, bone movement and reflexes * Encourage use of calcium containing   antacids   * Administer medications |