Cynthia Yun

DEN2311-D243 – Oral Pathology

Dr. Gwen Cohen-Brown

Hyperparathyroidism

What happens when one or more of the four pea sized glands secrete too much parathormone into the bloodstream? This can be differentiated by two types of hyperparathyroidism, primary hyperparathyroidism and secondary hyperparathyroidism. Primary hyperparathyroidism results from overproduction of the parathormone causing hypercalcemia, which is when blood calcium level is elevated above normal. Secondary hyperparathyroidism occurs as a result of chronic kidney disease, where the calcium level decreases. To compensate for the loss of calcium, the parathyroid glands overwork to produce parathormones. In both types, the parathyroid glands are being overworked, causing it to be enlarged or swollen.

Primary hyperparathyroidism "is a common endocrine disorder that is characterized by hypercalcaemia and elevated or inappropriately normal levels of parathormone" [1]. This results in excessive secretion of parathormone from one or more of the parathyroid glands. The clinical presentation has evolved overtime from "a severe and symptomatic disease, characterized by 'stones, bones, and groans' to one that is typically asymptomatic and incidentally discovered" [1]. In most cases, it is benign, "with either a single adenoma (80%) or multiple gland, generally hyperplastic, disease (20%) responsible" [2].

A routine evaluation biochemically or by laboratory testing can be done to measure the serum levels of calcium and parathormone levels. An abnormally high level would be an indicator or should give clinicians a reason to suspect parathyroid cancer. Risk factors that can be used to determine includes if the patient has been exposed to ionizing radiation in childhood,

excess head and neck radiation, chronic lithium use, chronically low calcium intake. Another risk factor which are unclear in most patients are “in inherited or familiar forms of PHPT, which represent about 5-10% of cases” [1].

Primary hyperparathyroidism predominantly affects women, “usually in their postmenopausal years, with a female/male ratio of 3 to 4:1” [2]. In the United States, it tends to be more prevalent in African Americans than any other racial groups. Although this condition affects predominantly postmenopausal women, it can occur in younger women, which makes doing the routine evaluation critical.

The most effective way to treat primary hyperparathyroidism is surgery. It “offers the promise of definitive cure” [2]. Other alternatives of treatment include preoperative parathyroid localization which has a 95% success rate, monitoring for increase in serum calcium and parathormone levels in non-surgical compliant patients until he/she meets the surgical guidelines or to restrict calcium intake, which only helps prevent with further increase of calcium already produced by the parathormone.

Primary hyperparathyroidism can be confused with familial hypocalciuric hypercalcaemia. They both “have a similar serum biochemical profile” [1]. To differentiate the two, “calculation of the fractional excretion of calcium has been traditionally used” [1]. Usually values below 1% are consistent with familial hypocalciuric hypercalcaemia, but if outside factors make the calculation ineffective, then “obtaining past serum calcium levels (which should be consistently elevated) and family history of hypercalcaemia is helpful” [1]. Also, Primary hyperparathyroidism “can be distinguished from secondnary and tertiary hyperparathyroidism by its different biochemical profile” [1].

Secondary hyperparathyroidism, “a common, serious, and progressive complication of chronic kidney disease, is characterized by high serum parathyroid hormone (PTH), parathyroid grand hyperplasia, and disturbances in mineral metabolism mainly hypocalcemia and hyperphosphatemia” [3]. Secondary hyperparathyroidism occurs as a direct result of chronic kidney disease. “Clinically, SHPT shows renal osteodystrophy, vascular calcification, cardiovascular damage, and fatal outcome” [3].

In the United States, “the estimated prevalence of SHPT in patients with CKD ranges from 2 to nearly 5 million individuals, with 30%-50% of end-stage renal disease (ESRD) patients affected by SHPT” [3]. Middle age adults and women are more commonly affected. Irregularities in serum calcium levels, parathyroid hormone secretion and parathyroid gland function are regulated by the calcium-sensing receptor.

Current treatment options for secondary hyperparathyroidism patients would be to “follow three steps: reduction of phosphorus uptake by dietary restriction or the use of phosphate binders; control of PTH with the used of Vitamin D metabolites, and the use of calcimimetics” along with the calcium-sensing receptor can enhance the “presence of circulating levels of calcium” [3]. Patients who are on hemodialysis are already getting treatment by the main route of elimination. An alternative treatment that proves to be more effective is “Etelcalcetide in hemodialysis patients with SHPT” and it was more effective “than placebo and cinacalcet with a PTH reduction of >30% in 76% of patients with etelcalcetide versus 10% with placebo” [3]. The prognosis with pharmacological management of secondary hyperparathyroidism has developed and improved in recent years.

If all treatment fails, then surgery would be the last resort. For patients on dialysis there will be “increased risk of cardiopulmonary complications and mortality” [3]. In some instances,

due to an incomplete resection during surgery, patients may continue to have secondary hyperparathyroidism.

To treat a patient who presents with hyperparathyroidism, you must know what type it is. Primary hyperparathyroidism results from an overproduction of parathyroid hormone which leads to hypercalcemia. The most effective way of treating this type is by surgery. Secondary hyperparathyroidism results from chronic kidney disease and is more severe. In this type, a dietary restriction would be the most effective treatment, because surgery can bring more complications and mortality. Overall, it is important to get a full medical history of a patient to create an effective individualized treatment plan.

REFERENCES:

1. Walker, Marcella D, and Shonni J Silverberg. “Primary hyperparathyroidism.” *Nature reviews. Endocrinology* vol. 14,2 (2018): 115-125. doi:10.1038/nrendo.2017.104

2. John P Bilezikian, Primary Hyperparathyroidism, *The Journal of Clinical Endocrinology & Metabolism*, Volume 103, Issue 11, November 2018, Pages 3993–4004,

3. Cozzolino, Mario et al. “Treatment of secondary hyperparathyroidism: the clinical utility of etelcalcetide.” *Therapeutics and clinical risk management* vol. 13 679-689. 1 Jun. 2017, doi:10.2147/TCRM.S108490