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Metabolic syndrome in parathyroid diseases

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Abstract

Metabolic syndrome is a cluster of metabolic abnormalities, including central obesity, insulin resistance, dyslipidemia, and hypertension. Parathyroid diseases are a group of disorders that affect the parathyroid glands' function, which regulates the body's calcium and phosphorus levels. There is growing evidence that parathyroid diseases may be associated with metabolic syndrome. There is a growing body of evidence suggesting a possible association between parathyroid diseases and metabolic syndrome. Hyperparathyroidism and secondary hyperparathyroidism are associated with insulin resistance and dyslipidemia, while hypoparathyroidism is associated with hypocalcemia-induced metabolic abnormalities. Further studies are needed better to understand the relationship between parathyroid diseases and metabolic syndrome and to develop effective treatment strategies. Hyperparathyroidism is a common parathyroid disease characterized by excessive secretion of parathyroid hormone (PTH). Parathormone plays a crucial role in calcium homeostasis and bone metabolism. However, excessive PTH secretion can lead to hypercalcemia, which can cause metabolic abnormalities such as insulin resistance and dyslipidemia. Studies have shown that patients with primary hyperparathyroidism have a higher metabolic syndrome prevalence than the general population. Secondary hyperparathyroidism is another parathyroid disease in patients with chronic renal failure. Chronic kidney disease leads to impaired renal function, which results in decreased vitamin D synthesis and increased PTH secretion. Secondary hyperparathyroidism is associated with bone mineral disorders and cardiovascular disease. Studies have also shown that secondary hyperparathyroidism is associated with metabolic abnormalities such as insulin resistance and dyslipidemia.

Keywords: Chronic kidney disease, Metabolic syndrome, Parathyroid disease, Primary hyperparathyroidism, Secondary hyperparathyroidism, Parathyroid hormone, Parathormone, Vitamin D

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Introduction

Metabolic syndrome is a cluster of metabolic abnormalities, including insulin resistance, dyslipidemia, hypertension, and central obesity (1). Parathyroid diseases, including primary and secondary hyperparathyroidism, have been associated with metabolic syndrome (2). In hyperparathyroidism, there is an overproduction of parathyroid hormone (PTH), which can lead to increased calcium levels in the blood. This can contribute to insulin resistance and inflammation, two critical factors in developing metabolic syndrome (3). There is also evidence to suggest that hyperparathyroidism can lead to changes in lipid metabolism and an imbalance in the regulation of glucose levels.

Similarly, in hypoparathyroidism, where PTH is deficient, there is a risk of metabolic syndrome due to altered calcium and phosphorous metabolism. This can lead to an increased risk of insulin resistance and type 2 diabetes, as well as an increased risk of cardiovascular disease (4). This mini-review paper summarizes current

knowledge regarding the relationship between metabolic syndrome and parathyroid disorders.

Search strategy

For this review, we extensively searched various databases including PubMed, Web of Science, EBSCO, Scopus, Google Scholar, Directory of Open Access Journals (DOAJ), and Embase. We used a wide range of keywords to ensure comprehensive results, such as metabolic syndrome, parathyroid disease, primary hyperparathyroidism, secondary hyperparathyroidism, parathyroid hormone, chronic kidney disease, parathormone, and vitamin D

Metabolic syndrome

Metabolic syndrome is a collection of conditions that frequently coexist, significantly heightening the likelihood of cardiovascular disease, diabetes, and stroke (5). For metabolic syndrome, an individual must have three of the following conditions (6,7);

- Abdominal obesity: Excess body fat around the waist,

■ Implication for health policy/practice/research/medical education

Metabolic syndrome is a cluster of conditions that often occur together, including high blood pressure, high blood sugar, excess body fat around the waist, and abnormal cholesterol levels. Evidence suggests that metabolic syndrome is a common occurrence in patients with parathyroid diseases such as hyperparathyroidism and hypoparathyroidism..

which is measured by waist circumference.

- High triglycerides: A type of fat found in the blood that is associated with an increased risk of heart disease.
- Low HDL cholesterol: Good cholesterol that helps remove excess cholesterol from the body
- High blood pressure: A common condition where blood flows through arteries at a higher pressure than normal.
- High fasting blood sugar: Elevated blood sugar levels that are indicative of insulin resistance and risk of developing type 2 diabetes.

Parathyroid diseases such as hyperparathyroidism and hypoparathyroidism can contribute to the development of metabolic syndrome. In hyperparathyroidism, overproduction of PTH can increase calcium levels in the blood, contributing to insulin resistance and inflammation. There is also evidence to suggest that hyperparathyroidism can lead to changes in lipid metabolism and an imbalance in the regulation of glucose levels (2,3,7).

Hypoparathyroidism, on the other hand, can lead to metabolic disturbances due to calcium and phosphorous metabolism alterations. This can lead to an increased risk of insulin resistance, type 2 diabetes, and cardiovascular disease (2,8).

Treating parathyroid diseases should include routine screening for metabolic syndrome and its components and lifestyle modifications such as weight loss, regular exercise, and dietary changes. In some cases, medications to help control blood pressure, blood sugar, and cholesterol levels may be necessary to reduce the risk of cardiovascular disease and other associated conditions (2,3,9).

Primary hyperparathyroidism and metabolic syndrome

Primary hyperparathyroidism is a condition characterized by excessive PTH secretion by one or more parathyroid glands. Studies have shown that patients with primary hyperparathyroidism have an increased prevalence of metabolic syndrome compared to the general population (10,11). The mechanisms underlying this association are not fully understood but may be related to the effects of PTH on glucose metabolism, lipid metabolism, and blood pressure regulation. Parathormone has been shown to impair insulin sensitivity and increase insulin resistance, leading to glucose intolerance and diabetes mellitus. Parathormone also promotes lipolysis and increases serum levels of free fatty acids, which can lead

to dyslipidemia. Additionally, PTH has been shown to increase blood pressure by promoting vasoconstriction and sodium retention (3,12-14).

Secondary hyperparathyroidism and metabolic syndrome

Secondary hyperparathyroidism is a condition that occurs due to chronic kidney disease or vitamin D deficiency. Secondary hyperparathyroidism is characterized by increased PTH secretion due to decreased calcium levels in the blood (15). Patients with SHPT have an increased prevalence of metabolic syndrome compared to those without chronic kidney disease. The mechanisms underlying this association are similar to those observed in primary hyperparathyroidism, including impaired glucose metabolism, dyslipidemia, and hypertension. Additionally, chronic kidney disease patients with Secondary hyperparathyroidism have an increased risk of cardiovascular disease, which may be related to the development of metabolic syndrome (16).

Hypoparathyroidism and metabolic syndrome

Hypoparathyroidism is a rare parathyroid disease characterized by low levels of parathormone. Hypoparathyroidism can lead to hypocalcemia, which can cause metabolic abnormalities such as insulin resistance and dyslipidemia. Studies have shown that patients with hypoparathyroidism have a higher metabolic syndrome prevalence than the general population (3,17,18).

Management of parathyroid diseases should include regular screening for metabolic syndrome and its components, as well as lifestyle modifications such as weight loss, regular exercise, and dietary changes. Medications to help control blood pressure, blood sugar, and cholesterol levels may be necessary (2,3).

Conclusion

Metabolic syndrome is a common comorbidity in patients with parathyroid diseases, including primary and secondary hyperparathyroidism. The mechanisms underlying this association are complex and involve the effects of parathormone on glucose metabolism, lipid metabolism, and blood pressure regulation. Further research is needed to fully understand the relationship between metabolic syndrome and parathyroid diseases and develop effective strategies for preventing and treating these conditions.

Conflicts of interest

The author declare that she has no competing interests.

Ethical issues

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