



Hyperparathyroidism and vessel diseases

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Abstract

Hyperparathyroidism is a condition where the parathyroid glands produce excess parathyroid hormone, increasing calcium levels in the blood. Chronic hypercalcemia due to hyperparathyroidism has been linked with an increased risk of cardiovascular disease and other vascular complications such as hypertension, atherosclerosis, and thrombosis.

Keywords: Hyperparathyroidism, Parathyroid glands, Cardiovascular disease, Hypercalcemia, Vascular disease, Parathyroid hormone, Hypertension, Parathormone, Vessel diseases

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Introduction

Hyperparathyroidism is a condition excess parathyroid hormone (PTH; parathormone) production. This causes an increase in calcium levels in the blood, which can lead to a range of health problems, including cardiovascular disease (1). Multiple studies have shown a link between hyperparathyroidism and an increased risk of hypertension, atherosclerosis, and myocardial infarction (2). One study found that individuals with primary hyperparathyroidism had a significantly higher incidence of cardiovascular disease than those without the condition (3). Another study showed that patients with hyperparathyroidism had a higher prevalence of hypertension and hypertension-related organ damage (4). The mechanisms linking hyperparathyroidism and vascular disease are not entirely understood but may involve several pathways. One possible explanation is that high levels of calcium in the blood can lead to the accumulation of calcium deposits in the blood vessels, contributing to the development of atherosclerosis (5,6). Additionally, PTH can stimulate the release of inflammatory cytokines and activate the renin-angiotensin-aldosterone system, leading to increased blood pressure and vascular damage. Furthermore, hyperparathyroidism can also disrupt the balance of calcium and magnesium in the body, which may contribute to endothelial dysfunction and the development of vascular disease (7,8).

Search strategy

For this review, we searched PubMed, Web of Science,

EBSCO, Scopus, Google Scholar, Directory of Open Access Journals (DOAJ), and Embase, using different keywords including; hyperparathyroidism, parathyroid glands, cardiovascular disease, hypercalcemia, parathormone, vascular disease, parathyroid hormone, and hypertension.

Vascular involvement following parathormone excess

Hypercalcemia due to the much parathormone in the blood can cause a range of symptoms, including fatigue, bone pain, kidney stones, and digestive problems. However, in some cases, it may be asymptomatic and only detected through routine blood tests (9). High calcium levels in the blood can cause calcium deposits in blood vessels leading to atherosclerosis. In addition, PTH can activate the renin-angiotensin-aldosterone system by stimulating cytokines, and high PTH levels can interact with the balance of magnesium and calcium, which might result in the development of vascular disease. Studies have shown a significant correlation between hyperparathyroidism and various cardiovascular diseases, including coronary artery calcification, left ventricular hypertrophy, atrial fibrillation, and heart failure (7,10). These conditions are often associated with increased morbidity and mortality and can adversely affect the quality of life of affected individuals. The exact mechanisms underlying the association between hyperparathyroidism and vascular disease are still not fully understood. It is hypothesized that chronic hypercalcemia may increase oxidative stress and inflammation, leading to endothelial dysfunction and atherosclerosis. Additionally, hyperparathyroidism has

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

Hyperparathyroidism is a condition that can lead to an increased risk of cardiovascular disease, including hypertension, atherosclerosis, and myocardial infarction. The mechanisms underlying this association have yet to be entirely understood but may involve several pathways. Early detection and treatment of hyperparathyroidism can help reduce the risk of developing associated vascular diseases and improve patient outcomes.

been linked with alterations in vitamin D metabolism, which may have an impact on vascular health (1,11).

Hypertension is a common complication of hyperparathyroidism. High levels of parathormone can cause an increase in blood pressure by promoting the constriction of blood vessels and increasing the production of aldosterone. This hormone regulates salt and water balance in the body. This can lead to damage to the walls of blood vessels and an increased risk of heart attack and stroke (12,13).

In hyperparathyroidism, excess calcium levels can deposit in blood vessel walls and result in the formation of plaque and narrowing of blood vessels. This can reduce blood flow to vital organs such as the heart and brain, increasing the risk of heart attack and stroke (1,14).

In addition to hypertension and atherosclerosis, hyperparathyroidism has also been linked to an increased risk for peripheral arterial disease. Peripheral arterial disease occurs when there is a narrowing or blockage in the arteries that supply blood to the legs and feet. This can cause pain, numbness, and difficulty walking (15,16).

The treatment of hyperparathyroidism typically involves surgical removal of the affected parathyroid gland. Studies have shown that parathyroidectomy can improve blood pressure control and decrease the risk of cardiovascular events in patients with primary hyperparathyroidism (17,18).

Conclusion

Hyperparathyroidism is a complex condition that can lead to a variety of clinical manifestations, including bone disease, renal stones, and neuropsychiatric symptoms. There is also growing evidence that hyperparathyroidism may be associated with an increased risk of cardiovascular disease, although the exact mechanisms underlying this relationship are not fully understood. Healthcare providers should be aware of these potential complications and consider screening for hyperparathyroidism in patients with relevant symptoms or risk factors.

Authors' contribution

Conceptualization: SZ.

Validation: HM.

Investigation: SD.

Resources: SM.

Data curation: SM and HM.

Visualization: HM.

Supervision: SD.

Funding acquisition: all authors.

Writing—original draft: SZ and SM.

Writing—review and editing: HM and SD.

Conflicts of interest

The authors declare that they have no competing interests.

Ethical issues

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