Hypothyroidism

Tyler Allen

Margaret H. Rollins, School of Nursing

N102: Nursing Care of Adults

Mrs. Blankenship

March 25, 2021

Hypothyroidism is a condition that results in a general slowing of the metabolic rate due to deficient thyroid hormone levels. Globally, hypothyroidism is most commonly a result of iodine deficiency, as iodine is an essential component of thyroid hormone. In the United States, an autoimmune disorder known as Hashimoto thyroiditis is the leading cause of primary hypothyroidism. Clinical manifestations can vary from patient to patient, from deadly (i.e., myxedema coma) to asymptomatic. Risk factors that may contribute to the development of hypothyroidism include advancing age, female gender, Caucasian ethnicity, history of Type 1 Diabetes Mellitus or other autoimmune disorders, a family history of hypothyroidism or goiter, and a history of hyperthyroidism or radiation treatment.

Diagnosis of hypothyroidism is based on biochemical markers of thyroid stimulating hormone (TSH) and free thyroxine (T4) levels. Without treatment, hypothyroidism carries a risk of high morbidity and mortality, an increased prevalence of illness and death related to that specific condition. However, with hormone replacement therapy, hypothyroidism can be managed and therefore, the potential complications and comorbidities associated with this condition can be prevented. This paper will discuss the incidence of hypothyroidism in the United States, the treatment of choice, and possible considerations relating to improving the overall diagnosis and treatment of hypothyroidism.

Statement of the Problem

Hypothyroidism is divided into two main categories: primary and secondary hypothyroidism. Primary occurs when the thyroid gland is unable to produce adequate amounts of thyroid hormone. In secondary hypothyroidism, the thyroid gland functions normally, however, there is an issue with the pituitary gland or the hypothalamus (i.e. tumors, thyroid releasing hormone resistance/deficiency, brain radiation therapy, dopamine, prednisone, or opioid drug therapy) that results in inadequate amounts of thyroid hormone. Additionally, hypothyroidism can be delineated into overt and subclinical hypothyroidism. Overt hypothyroidism is defined as TSH concentration above the reference range and free T4 concentrations below the reference range. Subclinical hypothyroidism is defined by TSH concentrations above the reference range and free T4 concentration within normal range (Chaker et al, 2017). According to the National Health and Nutrition Examination Survey (NHANESIII), overt hypothyroidism affects 0.3% of adults in the US while subclinical hypothyroidism was found to affect 4.3% (Patil et al, 2021).

Biochemically, hypothyroidism is diagnosed when TSH and T4 levels fall within certain parameters necessary for diagnosis. These parameters can vary depending on the assay utilized and the patient population. Although some patients may be asymptomatic, common signs and symptoms of hypothyroidism include fatigue, lethargy, cold intolerance, hoarseness, hair loss, weight gain, constipation, cold and dry skin, and depression. Myxedema coma is a severe hypothyroid complication precipitated by infection, drugs, and trauma, characterized by impaired consciousness, hypothermia, arrhythmias, respiratory failure, and cardiogenic shock. This can be due to inadequate thyroid hormone therapy level, discontinuation of hypothyroid treatment, undiagnosed hypothyroidism, and acute illness. Even with prompt detection and treatment, mortality can reach 25% to 50% (Patil et al, 2021).

Additionally, according to Chaker et al. (2017), hypothyroidism can result in cardiac issues such as increased vascular resistance, decreased cardiac output, left ventricular dysfunction, myocardial injury, and pericardial effusion. Along with these risk factors, hypothyroidism increases risk of metabolic syndrome features, cholesterol, and homocysteine concentrations. Therefore, hypothyroidism poses an increased morbidity and mortality especially in the United States where heart disease is one of the leading causes of death. However, overt hypothyroidism is generally treated and therefore these complications can be managed. Subclinical hypothyroidism can go unnoticed and untreated, resulting in negative long-term consequences (i.e. increased risk for heart failure) for those patients (Chaker et al, 2017). As asserted by Dey et al. (2019), “early diagnosis and treatment of subclinical hypothyroidism will have possible cardioprotective advantages.” If hypothyroidism is left untreated, patients can experience continued signs and symptoms, cardiovascular complications, myxedema coma, and even death.

Risk Reduction/Treatment of the Problem

The most common reference range for primary hypothyroidism is defined by TSH 0-4-4-0 mIU/L, however, TSH and T4 diagnostic ranges may vary (Chaker et al, 2017). Universal guidelines for hypothyroid screening do not exist and the US Preventative Task Force has found no evidence in support or opposition of screening. According to Patil et al, the American Thyroid Association recommends that screening should begin at age 35 and continue every 5 years thereafter. However, is believed that those with a family history of hypothyroidism and those at increased risk for hypothyroidism should be screened regularly.

According to Chaker et al. (2017), the goal of treatments “include normalization of TSH concentration and resolution of physical and mental complaints, while avoiding undertreatment or over-treatment.” Levothyroxine monotherapy, an exogenous thyroid hormone replacement, is the current standard treatment for hypothyroidism. Levothyroxine doses can vary from patient to patient, though elderly patients and those with atrial fibrillation usually require reduced dosages. It is important to consider that different pharmaceutical brands can have slight variations in their formulas. Therefore, it is important to maintain a consistent formulation by using the same brand. Additionally, this medication should be taken in the morning on an empty stomach for best results. Levothyroxine therapy is monitored and titrated based on serum TSH and T4 levels. Once stabilized, these will be monitored annually.

Levothyroxine-liothyronine combination therapy has been studied more recently. While some studies have shown beneficial effects of combination therapy, the American Thyroid Association guidelines recommend against utilizing combination therapy. Further research is necessary to determine its effectiveness, however, it is at the discretion of the endocrinologist to initiate treatment plans. Other than levothyroxine, and perhaps liothyronine combination therapy, there is little evidence to support other therapies due to safety concerns and the scarcity of long-term data. Concurrent use of thyroid hormones, dietary supplements, and over-the-counter drugs is ill-advised (Chaker et al, 2017).

Hypothyroidism can be prevented by ensuring adequate iodine intake. Avoidance of hyperthyroidism treatments, head/neck radiation, radioactive iodine therapy, thyroid surgery, and medications such as amiodarone can also help prevent this condition. Lifestyle modifications cannot treat hypothyroidism. There are, however, lifestyle modifications that can reduce symptoms such as adherence to a low-calorie diet, living in a warm, comfortable environment, utilizing measures to prevent skin breakdown, engaging in enjoyable activities, and taking measures to reduce constipation. Regular thyroid scanning for high-risk individuals can also help to detect subclinical hypothyroidism, therefore preventing overt hypothyroidism and its potential complications.

Reflection

I believe that there needs to be more research conducted concerning diagnosis and treatment of hypothyroidism. There is currently one diagnostic test and one standard treatment.

However, even with treatment, Chaker et al. (2017) states that “several unresolved issues exist concerning patients who are biochemically well controlled but unsatisfied with their treatment outcomes.” Midgley et al. (2019) also asserts that TSH is a less reliable diagnostic tool than previously assumed. It is concerning that patients can still experience symptoms associated with hypothyroidism even though their serum TSH and T4 levels are within acceptable limits.

Additionally, signs and symptoms of hypothyroidism are often overlooked in older patients, discounted as the normal effects of the aging process. It is important that as a practicing nurse I emphasize the importance of treatment compliance in addition to maintaining a euthyroid state, a positive self-image, and experiencing relief of symptoms. Furthermore, while challenging, it is imperative to not discount clinical manifestations of hypothyroidism for normal aging, especially in Southern Delaware where there is a large elderly population.

Conclusion

Hypothyroidism is seemingly easy to prevent, diagnose, and treat. However simple it may seem; this condition poses many challenges. This condition increases patient’s risk for cardiovascular problems, coma, and death. Treatment is limited by one standard form of levothyroxine monotherapy. Even with treatment, patients can experience persistent symptoms. However, adherence to hormone replacement therapy is essential in combating the high morbidity and mortality rates that accompany hypothyroidism. The risk for cardiovascular events and heart failure is especially concerning considering heart disease is the leading cause of death in the United States. It is important to screen high risk individuals regularly, take patient’s complaints seriously, encourage hormone replacement therapy compliance, and conduct further research into improved diagnosis and treatment methods for hypothyroidism.

References

Chaker, L., Bianco, A. C., Jonklaas, J., & Peeters, R. P. (2017). Hypothyroidism. *Lancet (London, England)*, *390*(10101), 1550–1562. https://doi.org/10.1016/S0140-6736(17)30703-1

Dey, A., Kanneganti, V., & Das, D. (2019). A study of the cardiac risk factors emerging out of subclinical hypothyroidism. *Journal of family medicine and primary care*, *8*(7), 2439–2444. https://doi.org/10.4103/jfmpc.jfmpc_348_19

Midgley, J.E.M., Toft, A.D., Larisch, R. Dietrich, J.W., Hoermann, R.. Time for a reassessment of the treatment of hypothyroidism. *BMC Endocrine Disorders* 19, 37 (2019). https://doi.org/10.1186/s12902-019-0365-4

Patil, N., Rehman, A., Jialal, I. (2021 January 6) Hypothyroidism. *U.S. National Library of Medicine*. https://www.ncbi.nlm.nih.gov/books/NBK519536/