

Pathophysiology analysis of hyperthyroidism



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Hyperthyroidism is a disorder that falls under the category of endocrine disorders. The thyroid gland is overactive and produces more thyroid hormones than the body needs. As a result, there is a myriad of symptoms that the patient will encounter. The symptoms can begin to affect a person's life if not treated. Thankfully, the treatment of hyperthyroidism is easy to utilize and in many cases, it can bring a great amount of improvement and better quality of life for the patient. Even though hyperthyroidism itself is not seen as a life-threatening disorder, it can lead target other things such as the heart, menstrual cycle, fertility, bones, and muscles ("Hyperthyroidism", 2016). Therefore, individuals who have hyperthyroidism should be proactive with their health and take the disorder seriously.

Epidemiology

Hyperthyroidism has a prevalence of around 1% to 3% in the United States (De Leo, Lee, & Braverman, 2016). With regards to the incidence, there are approximately five individuals for every 100, 000 that are diagnosed with hyperthyroidism each year (Capriotti & Frizzell, 2017). Analysis of how hyperthyroidism affects race shows that Caucasians are more susceptible to it than African Americans (Capriotti & Frizzell, 2017). A cause of hyperthyroidism, which is Graves' disease, has an incidence of fourteen people per 100, 000 (Menconi, Marcocci & Marino, 2014). The average age of onset for Graves' disease is between 40 and 60 years old (Capriotti & Frizzell, 2017). When looking at statistics of those with hyperthyroidism, 15% of them have a family member who also has the disorder (Capriotti & Frizzell, 2017). Females get hyperthyroidism more frequently than males and

Graves' disease has a male-to-female ratio of 1.5 to 10 (Capriotti & Frizzell, 2017).

Etiology

Hyperthyroidism is most commonly caused by a condition known as Graves' disease (De Leo, Lee, & Braverman, 2016). Graves' disease is an autoimmune disorder and it is caused by a variety of factors. In Graves' disease there is an intertwining of genetic and environmental factors and as a result, there is no immune tolerance to thyroid antigens (De Leo, Lee, & Braverman, 2016). This leads to the creation of an immune reaction targeted at the thyroid gland (De Leo, Lee, & Braverman, 2016). Autoantibodies that target the thyroid gland such as antihydroperoxidase and antithyroglobulin are one of the factors that cause Graves' disease (Capriotti & Frizzell, 2016). These autoantibodies enact thyroid follicular cells by binding to the thyroid stimulating hormone receptor (De Leo, Lee, & Braverman, 2016). As a result, there is an increased production and release of thyroid hormones. Graves' disease is seen more commonly in patients who have genes HLA-DR, CTLA4, CD40, and PTPN22 which are known as immune regulatory genes (Menconi, Marcocci, & Marino, 2014). Several non-genetic components are thought to cause hyperthyroidism and Graves' disease. These include smoking, stress, the amount of iodine consumption, and infections (Menconi, Marcocci, & Marino, 2014). As stated earlier, females have a higher chance of acquiring Graves' disease and it is perceived that this is due to chromosomal influences and sex hormones (De Leo, Lee, & Braverman, 2016).

The next most common causes of hyperthyroidism are toxic multinodular goiter and subacute thyroiditis. Both account for 15% to 20% of all cases of hyperthyroidism (Capriotti & Frizzell, 2017). In toxic multinodular goiter, the thyroid has autonomously hyperfunctioning nodules (Capriotti & Frizzell, 2017). When looking at the elderly population who reside in areas that are scarce in iodine, toxic multinodular goiter is the most common cause of hyperthyroidism (Kravets, 2016). Subacute thyroiditis occurs after exposure to extreme infection or stress and has three phases (Capriotti & Frizzell, 2017). The first stage is hyperthyroidism, the second stage is hypothyroid function, and the final stage is when the thyroid returns to its normal function (Capriotti & Frizzell, 2017).

Pathogenesis

In hyperthyroidism, the thyroid gland releases a high number of thyroid hormones. The immune system creates autoantibodies called thyroid-stimulating immunoglobulin (TSI) and they attach to thyroid-stimulating hormone (TSH) receptor sites on the thyroid gland (Chuma-Bitcon & Gruson, 2016). TSI becomes in a battle with TSH for the ability to occupy the TSH receptors and as a result, TSI begins to mimic the activity of TSH (Chuma-Bitcon & Gruson, 2016). TSI cause the thyroid gland to enlarge and there is a great increase in the levels of T3 and T4 (Capriotti & Frizzell, 2017). This is called primary hyperthyroid disease process. The presence of TSI causes a loss of the negative feedback system that normally oversees thyroid hormone production (Chuma-Bitcon & Gruson, 2016). Due to the low amount of TSH, there is an increased, erratic release of thyroid hormones by the thyroid gland.

A couple of other malfunctions with the thyroid gland and its hormones lead to hyperthyroidism. Secondary hyperthyroidism is when the pituitary gland elevates its secretion of TSH and this makes T3 and T4 levels increase (Capriotti & Frizzell, 2017). Tertiary hyperthyroidism involves the hypothalamus. The hypothalamus has excessive secretion of thyrotropin-releasing hormone (TRH). Consequently, TSH, T3, and T4 are all abundant in number. Secondary and tertiary hyperthyroidism are not as common as primary hyperthyroidism (Capriotti & Frizzell, 2017).

Clinical Manifestations

Hyperthyroidism affects many systems of the body. This will result in the affected individual presenting with a variety of signs and symptoms.

Hyperthyroidism causes metabolic activities to hasten and the amount of effort put into energy increases (Capriotti & Frizzell, 2017). Some signs and symptoms result due to an excess of thyroid hormones. This wide array of signs and symptoms in the clinical presentation of the individual can be hand tremors, anxiety and irritability, weight loss with normal eating habits, goiter, sensitivity to heat, diaphoresis, tachycardia, and palpitations (Chuma-Bitcon & Gruson, 2016). A goiter is when the thyroid gland becomes enlarged.

During an examination, the provider will be able to palpate the enlarged thyroid gland and hear a bruit while auscultating the thyroid gland (Capriotti & Frizzell, 2017). Women can have an irregular menstrual cycle and men can have erectile dysfunction, gynecomastia, decreased libido (Menconi, Marcocci, & Marino, 2014). The elderly may not present with the aforementioned signs and symptoms or they may be less pronounced. On the other hand, the elderly with hyperthyroidism frequently deal with

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cardiovascular issues like atrial fibrillation (Menconi, Marcocci, & Marino, 2014).

Other signs and symptoms are specific to the underlying causes of hyperthyroidism. The first sign is ophthalmopathy which is enlargement and inflammation of the orbital tissues (Menconi, Marcocci, & Marino, 2014). This causes exophthalmos, which is protrusion of the eyes, as well as soft tissue swelling (Menconi, Marcocci, & Marino, 2014). Both are the result of venous engorgement (Menconi, Marcocci, & Marino, 2014). The ocular muscles that control eye movement become malfunctioned because of hypertrophy and lead to diplopia (Menconi, Marcocci, & Marino, 2014). Another sign present in the underlying cause of hyperthyroidism is dermopathy. Dermopathy is non-pitting edema that is found in the pretibial regions of the legs (Menconi, Marcocci, & Marino, 2014). Another name for this condition is pretibial myxedema. If the dermopathy becomes severe enough, it can appear as elephantiasis (Menconi, Marcocci, & Marino, 2014). A final sign that can be seen with hyperthyroidism is acropachy. Acropachy is clubbing and swelling of the last phalanx of the fingers and toes (Menconi, Marcocci, & Marino, 2014). This condition is rarely seen in those with hyperthyroidism.

Treatment

The main course of action for treating hyperthyroidism is administering antithyroid drugs. This treatment can be used for all ages as well as for pregnant women who have hyperthyroidism. Antithyroid drugs are used for either long-term treatment of hyperthyroidism or as a temporary treatment until the thyroid gland is removed by surgery or treated with radioiodine

(Jastrzebska, 2015). Providers must explain to patients the goal with antithyroid drugs. Antithyroid drugs have proven to be effective in patients with hyperthyroidism.

Once a person undergoes taking antithyroid drugs, the treatment lasts on average around 12-18 months (Jastrzebska, 2015). Dosing of the medication depends on the size of the thyroid gland, how much iodine is present in the body, and how severe the hyperthyroidism (Jastrzebska, 2015). After taking antithyroid drugs for about 4 to 12 weeks, the thyroid gland will have normal functioning and the dose of medication can be decreased (Jastrzebska, 2015). Treatment with the decreased dosage of antithyroid drugs will continue for at least a year and a half (Jastrzebska, 2015). The use of antithyroid drugs can result in remission for about 30% of patients (Jastrzebska, 2015).

Radioiodine therapy is the next type of treatment for hyperthyroidism. It is given after the patient has a normal functioning thyroid gland after administration of antithyroid drugs (Menconi, Marcocci, & Marino, 2014). The purpose of radioiodine therapy is to get the patient to a state of hypothyroidism so that he or she can have a steady remission of Graves' disease (Menconi, Marcocci, & Marino, 2014). In order to determine the amount of radioactive iodine a patient must be given, a 24-hour radioactive iodine uptake test is conducted as well as finding out the size of the thyroid gland (Menconi, Marcocci, & Marino, 2014). The option of giving a fixed dose of radioactive iodine is also an option (Menconi, Marcocci, & Marino, 2014). Once radioactive iodine treatment is started, around 80% of patients will reach a state of hyperthyroidism in about one to six months (Menconi, <https://assignbuster.com/pathophysiology-analysis-of-hyperthyroidism/>

Marcocci, & Marino, 2014). Patients who have a large goiter will need repeat treatments of radioactive iodine because just one use is not helpful (Menconi, Marcocci, & Marino, 2014).

The final method for treating hyperthyroidism is surgical removal of the thyroid gland called thyroidectomy. The surgery is usually performed on those patients who have a large goiter (Menconi, Marcocci, & Marino, 2014). There can be a partial or complete removal of the thyroid gland (Menconi, Marcocci, & Marino, 2014). After removal, the patient will be in a state of hypothyroidism and will not have to deal with the return of hyperthyroidism (Menconi, Marcocci, & Marino, 2014).

Biblical Perspective

When people are afflicted with a disease or disorder, many thoughts tend to become present in the mind. Some may think that they are being punished by God for the lifestyle they may be living. On the other hand, others are more accepting of their particular illness and have faith in God. They depend on doctors to give advice and guidance on the course of action. However, they believe that God ultimately controls what will happen regarding their well-being. Pathophysiology can be very complicated but it is essential to understand the process of diseases and disorders. God does not like to see His children going through adversity. This is the reason why He blessed people with knowledge about pathophysiology. He wants healthcare providers to understand diseases in order to be able to care for patients and serve as a source of information for them. When patients understand the pathophysiology regarding their ailment, they can be a blessing to someone

else going through the same situation. God may take people through illness as a test to strengthen their faith in Him or to use their story as a testimony to uplift others. Isaiah 40: 29 states, “ He gives strength to the weary and increases the power of the weak.” Pathophysiology can be looked at as that source of strength given to us by God. It gives the afflicted a better understanding and the treatments available which is providing strength and power.

Conclusion

Hyperthyroidism is a well understood disorder that can be treated aggressively when the appropriate actions are taken. Healthcare providers have the responsibility of teaching their patients about hyperthyroidism as well as ensuring they know about all possible treatment options. The quality of life for an individual with hyperthyroidism is promising. The lack of initiative will be detrimental and lead to acquiring many other health problems. Hopefully those affected will take the information given to them and apply it to the best of their ability.

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