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Antithyroid Drug-Induced Agranulocytosis

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**Antithyroid Drug-Induced Agranulocytosis**

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We live in a culture that is busy and constantly on the go. With little time to spare, often symptoms of an alteration in bodily function are pushed to the side and attributed to the stress of everyday life. With symptoms including nausea, fatigue, intermittent fever, and irritability, one may be more inclined to disregard these symptoms, only to attribute them to effects of a busy lifestyle. This culture that is previously listed symptoms can accumulate a predisposition of developing hyperthyroidism. According to the American Thyroid Association, 20 million Americans will develop some type of thyroid dysfunction throughout their lifetime, and 60 percent of these individuals will go undiagnosed. When a diagnosis is given, drug treatment options are limited. The two most common drug therapies include Propylthiouracil and Methimazole (Rosove, 1977). Although drug therapy is beneficial in the treatment of hyperthyroidism, adverse effects from drug therapy can occur. A woman's advisory when drug therapy would be Aganulocytosis. Aganulocytosis is a condition in which the bone marrow is not producing an adequate number of neutrophils. With hyperthyroidism, the prescribed antithyroid drug listen, suppresses the ability to produce mature white blood cells, which leads to a drug-induced agranulocytosis. Propranolol, thiamine, and thiamine are used widely in the treatment of hyperthyroidism. This important complication of the use of these drugs is depression of the neutrophil granulocyte count.

Granulocyteopoiesis occurs in about 4 percent and agranulocytosis occurs in about 0.3 percent of treated patients. Although this depression of the granulocyte count is reversible, once the drug is discontinued, serious infections can occur and accompanies agranulocytosis and accounts for almost all deaths related to the drugs (Rosove, 1977).

With such an abundant amount of Americans suffering from thyroid dysfunction, it is important to provide ample information to patients on the adverse effects of antithyroid treatment, with the treatment of hyperthyroidism, it is important to provide ample information to patients on the adverse effects of antithyroid treatment. With the treatment of hyperthyroidism, it is important to provide ample information to patients on the adverse effects of antithyroid treatment. With the treatment of hyperthyroidism, it is important to provide ample information to patients on the adverse effects of antithyroid treatment.

**Case Study**

A 32-year-old female presenting to the unit with a history of Graves’ disease. Presenting symptoms included fever, tenuous enrollment with noted white cell count, thyroid enlargement, and anemia. Patient has been prescribed 13 mg of methimazole, while the drug had been taken for 24 days. Diagnostic testing shows a white blood count of 2.500, with 20 x 10^9/L, lymphocytes 1 100xL, neutrophils 100xL, platelets 250 x 10^9/L, homohemoglobin 97g/L. On 10 days that the patient’s lab test results were showing a decline in red blood cell count, 16 percent of those individuals will go through their lifetime, and 60 percent of these individuals will go undiagnosed. When a diagnosis is given, drug treatment options are limited. The two most common drug therapies include Propylthiouracil and Methimazole (Rosove, 1977). Although drug therapy is beneficial in the treatment of hyperthyroidism, adverse effects from drug therapy can occur. A woman’s advisory when drug therapy would be Aganulocytosis. Aganulocytosis is a condition in which the bone marrow is not producing an adequate number of neutrophils. With hyperthyroidism, the prescribed antithyroid drug listen, suppresses the ability to produce mature white blood cells, which leads to a drug-induced agranulocytosis. Propranolol, thiamine, and thiamine are used widely in the treatment of hyperthyroidism. This important complication of the use of these drugs is depression of the neutrophil granulocyte count. Granulocyteopoiesis occurs in about 4 percent and agranulocytosis occurs in about 0.3 percent of treated patients. Although this depression of the granulocyte count is reversible, once the drug is discontinued, serious infections can occur and accompanies agranulocytosis and accounts for almost all deaths related to the drugs (Rosove, 1977).

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**Underlying Pathophysiology**

As supported in the case study, there is an instance in which bone marrow suppression can occur. The suppression of bone marrow occurs in agranulocytosis with the development of panmyelopoesis. Agranulocytosis is an uncommon effect, which can be caused by several factors. The occurrence of agranulocytosis will be the shift to the left, consisting of almost a complete absence of a cytoplasmic swelling and irregularity in staining (Rosove, 1977).

The falling cause of agranulocytosis in antithyroid drug treatment has yet to be determined. Many theories suggest that the drug gains access to the bone marrow where it affects the utilization of glucose and glycogen in mature granulocytes (Rosove, 1977). The leukoctyes continue to be affected by antithyroid drug therapy, showing a decrease in the activity of nicotinamide adenine dinucleotide (NADH) and adenosine triphosphate (ATP) and plasma membranes ability to fight off and engulf microorganisms (Rosove, 1977). The significance of the pathophysiology is important to practitioners and nurses because of the possibility of admittance to sepsis. By monitoring temperature, heart rate, and blood pressure for acute changes, it will allow for prevention and early diagnosis. As well as, monitoring the patient's WBC, platelets, and oxygen consumption. The higher level of the agranulocytes affects the cellular level which extend through the endothelial cells. The leukoctyes continue to be affected by antithyroid drug therapy, showing a decrease in the activity of nicotinamide adenine dinucleotide (NADH) and adenosine triphosphate (ATP) and plasma membranes ability to fight off and engulf microorganisms (Rosove, 1977).

**Significance in Pathophysiology**

Signs and symptoms of thyrotoxicosis requiring drug therapy, predisposing one to a shift in neutrophil count, are often symptoms that one may experience on an everyday basis. Signs and symptoms include; thyroid syndrome, sweating, goiter, tremors, nervousness weight loss palpitations, however elderly patients will display minimal signs and symptoms. Lab results will show an elevated FT4, FT3, and a serum thyroid stimulating hormone (TSH) as low as 0.04u/L (Laurberg,2015). Finally, as nurses we act as the last line of defense, and it is important to provide education. By educating patients on thyroid drug treatment, adverse affects, and precipitating signs and symptoms, we as a profession, will minimize the number of patients experiencing agranulocytosis.

**Study showing the incidence of agranulocytosis with two different types of antithyroid drug treatment.**

(Nakamura H., Miyawaki A., Miyayoshi M., Imagawa J., Table 3).

**Implications in Nursing Care**

Acute Medicine & Surgery identified and plan of treatment in hopes of minimizing the occurrence of adverse effects of anti-thyroid drug treatment. Many recommended methods include supervising patients and educating patients on their precipitating factors. With the occurrence of agranulocytosis, there is a possibility for fluid loss due to the occurrence of pancytopenia. Giving IV fluid is important to replace electrolytes and fluid volume loss. As nurses, it is important to monitor the patient’s intake and output ratios (Laurberg,2015). Finally, it is important to monitor the patient's intake and output ratios. As nurses we act as the last line of defense, and it is important to provide education. By educating patients on thyroid drug treatment, adverse affects, and precipitating signs and symptoms, we as a profession, will minimize the number of patients experiencing agranulocytosis.

**References**