Endocrine Disorders

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**Thyroid**

Thyroid hormones are essential to body functioning. These hormones are responsible for both metabolic activity and protein synthesis. Thyroid hormones are essential to a child’s mental development and sexual maturity. Research suggests that there are many people with undiagnosed thyroid disorders. As dental professionals we can help in early diagnosis by being the first to suspect and recognize such a disorder. In the case of a suspected thyroid disease, all elective dental treatment should be put on hold as a complete medical evaluation becomes a priority.

**Hypothyroidism**

Hypothyroidism is most commonly found amongst middle-aged and older persons. Hypothyrodism is a syndrome manifested from an insufficiency of thyroid hormones. Symptoms of this disorder are a slower metabolic rate, weight gain despite loss of appetite, lethargy, intolerance to cold, dry and cool skin, and puffiness of the face and eyelids. Blood pressure appears to be normal but the heart rate is slow (Chandna s114).

The common oral manifestations of hypothyroidism are salivary gland enlargement, delayed bone resorption causing compromised periodontal health, delayed dental eruption, anterior open bite, thick lips, and mouth breathing. Childhood hypothyroidism is characterized by thick lips, macroglossia causing a protruded tongue, malocclusion, and delayed tooth eruption. Dental professionals must understand that patients with long standing hypothyroidism may show decreased ability of small blood vessel constriction ability which can then cause an increase in bleeding. To control such bleeding, one needs to apply local pressure for an extended. Furthermore, wound healing is delayed in hypothythyrodic patients due to decreased metabolic activity of fibroblasts, leaving such patients with an increased risk to infections (Chandna s115).

Hypothyrodism should be treated. Pregnant patients have a greater responsibility to treat their condition as it has been found that uncontrolled hypothyroidism can result in premature birth and therefore low birth weight babies, spontaneous abortion, and stillbirth.

Levothyroxine

Brand names: Levothroid, Levoxyl, Synthroid, Tirosint, Unithroid

Levothyroxine is used in to treat hypothyroidism by way of thyroid supplement therapy and TSH pituitary suppression. There are no adverse effects that will influence dental treatment. Patients taking Levothroxine must be aware that they must avoid sodium Iodide when taking this drug. Sodium Iodide is found in seafood a small amount in iodized salt. Furthermore, Levothyroxine can increase the levels and effects of Vitamin K Antagonists while food will reduce the bioavailability of Levothyroxine. Therefore, patients are instructed to take the drug in the morning, on an empty stomach, at least 30 minutes before eating. Levothyroxine is listed to be in pregnancy risk factor A and is the drug of choice for pregnant hypothyroid patients. There is evidence that this drug crosses the placenta and enters breast milk however, there were no resultant adverse effects found.

Liothyronine

Brand names: Cytomel, Triostat

Liothyronine is used to treat both hypothyroidism and nontoxic goiter by way of replacement or supplemental thyroid therapy. There are no adverse effects that will influence dental treatment. The exact mechanism of action is unknown however it is known to influence DNA transcription. Liothyronine has an A pregnancy risk factor.

**Hyperthyroidism**

Hyperthyroidism is a condition marked by an unregulated production of thyroid hormones. General symptoms of this disorder are nervousness, weight loss despite an increasing appetite, and an intolerance to heat with an increase of skin perspiration. Physically head hair is thin and soft and the epidermal layer of skin is thinned.

The common oral manifestations of hyperthyroidism are increased susceptibility to caries, increased susceptibility to periodontal disease, enlargement of extraglandular thyroid tissue, burning mouth syndrome, accelerated dental eruption, maxillary and mandibular osteoporosis, connective tissue disease similar to Sjogren’s syndrome.

Dental management of such patients includes recognizing that such patients may have an elevated blood pressure and heart rate, which may lead to an increase of bleeding. The bleeding can be controlled by local pressure (Chandna S115). Drugs used to treat hyperthyroidism can cause a rare reaction called agranulocytosis, which can result in oral infections because of inadequate wound healing. Epinephrine is contraindicated for patients with hyperthyroidism and elective dental care and surgery should be pushed off in the case of signs and symptoms of thyrotoxiocosis.

Methimazole

Brand Names: Tapazole

This is an anti-thyroid agent used in the treatment of hyperthyroidism and when preparing a patient for radioactive iodine therapy and thyroidectomy. This can cause abnormal taste and salivary gland swelling. The mechanism of action is inhibiting peroxidase, which is a thyroid hormone responsible for the oxidation and coupling reactions necessary for the production of thyroxine. It also, prevents T4 from being converted into its active T3 form in the thyroid however, it does not affect circulating T3 and T4. The pregnancy risk factor is D due to the fact that it has been found to readily cross the placenta and cause congenital anomalies. Uncontrolled maternal hyperthyroidism can cause prematurity, low birth weight and congestive heart failure. It is therefore important that a hyperthyroid patient control their thyroid levels and work closely with their doctor to monitor their thyroid hormone levels and medications.

Potassium Iodine

Brand Names: iOSAT, SSKI, ThyroSafe, Thyroshield

The key adverse effect is metallic taste. This drug works by inhibiting thyroid hormone secretion and can be used to reduce the risk of thyroid cancer as is blocks radioactive iodine from being taken into the thyroid. This drug like methimazole has a pregnancy risk factor of D and therefore must be monitored by a patient’s physician.

Potassium Iodine and Iodine

Also referred to as Lugol’s iodine. This drug is similar to Potassium Iodine with the exception that it can decrease the thyroids size and vascularity. It is therefore often administered to patient 7-10 days before a thyroid surgery to reduce surgical complications.

Sodium Iodine

Brand Names: Hicon, Iodotope

This is also referred to as radioiodine it can produce results similar to surgical thyroidectomy and is therefore indicated for patients with hyperthyroidism in whom surgery is risky. The mechanism of action of Radioiodine is thyroid gland destruction. There are however major disadvantages to this therapy. When using these drugs one must be aware that there can be a lag period of 3 to 6 weeks. This lag period exists because anti-thyroid drugs work by inhibiting hormone synthesis however, it takes 3-6 weeks for hormone stores to be exhausted once they are exhausted one can begin to see a change in thyroid hormone levels. Due to the complications of germ cell damage and fetal thyroid destruction is contraindicated for both young adults and pregnant women as it has a pregnancy risk category of x.

Often in the treatment of hyperthyroidism adjunctive drugs are used. Such drugs include beta blockers and calcium channel blockers. The mechanism of action of these drugs is to lessen the sympathetic over-activity that occurs with excessive thyroid hormones. Beta blocker Propranolol is used in the treatment of thyrotoxic crisis as well for patients with Graves diseases and in preparation for thyroidectomy. NSAIDS should be used with caution as they can decrease the efficiency of the beta blocker drugs. Calcium channel blocker diltiazem is added to treatment when propranolol is inefficient in controlling the sympathetic cardiac stimulation.

Goiter is a condition caused by an increase in the size of the thyroid gland. This occurs due to hypothyroid, euthyroid, and hyperthyroid states. Goiter may be toxic, producing extreme hyperthyroidism, or thyrotoxicosis, or they may be nontoxic. If a goiter becomes excessively large it may compress the esophagus and trachea thus causing additional complications such as difficulty in swallowing and a choking sensation.

Graves disease is the most common cause of hyperthyroidism. Graves’ is an autoimmune condition in which antibodies are mimicking the effects of thyroid-stimulating hormones. This results in an overproduction of the thyroid hormone causing hyperthyroidism. Several symptoms associated with Graves disease are bulging eyes, change in menstrual cycle and an irregular heartbeat. Treatment for Graves disease includes medications used for hyperthyroidism.

Hashimoto is the opposite of Graves disease. Hashimoto is also an autoimmune disorder however, in this case the antibodies are blocking the actions of thyroid stimulating hormones. This causes hypothyroidism and damages the thyroid gland. Left untreated, Hashimoto may lead to Goiter because the thyroid gland may become enlarged due to a constant stimulation to release hormones.

**Diabetes**

Diabetes can be an Autoimmune Disease or the effects of Insulin producing cells in Pancreas. Insulin is a hormone that is needed to convert sugar, starches and other food into energy needed for daily life. It may be hyperglycemia (too much glucose in blood), usually more than 200 mg/dl, which happens when your body doesn't make enough insulin or can't use it the right way or hypoglycemia (too little glucose in blood), usually less than 70 mg/dl. It is an acute complication of diabetes and occurs in individuals who use insulin or specific kinds of oral diabetes medication. There are three types of diabetes which are type 1 diabetes, type 2 and gestational diabetes.

Symptoms and Sign are :

Polyuria (increased urination)

Polydipsia (increased thirst)

Polyphagia (increased appetite)

Burning tongue

Periodontal disease

Delayed healing process

Unusual weight loss

Weakness

Fatigue

Nausea

Blurred vision

Sugar in urine

Infections of bladder, vagina and skin

Decrease wound healing

Diagnosis :

1. A1c which is a glycohemoglobin test which measures the percentage of your hemoglobin — a protein in red blood cells that carries oxygen — is coated with sugar.

The A1C test is used to detect type 2 diabetes and prediabetes but is not recommended for diagnosis of type 1 diabetes or gestational diabetes. The A1C test is a blood test that reflects the average of a person’s blood glucose levels over the past 3 months and does not show daily fluctuations. The A1C test is more convenient for patients than the traditional glucose tests because it does not require fasting and can be performed at any time of the day.

The A1C test result is reported as a percentage. The higher the percentage, the higher a person’s blood glucose levels have been. A normal A1C level is below 5.7 percent.

An A1C of 5.7 to 6.4 percent indicates prediabetes. People diagnosed with prediabetes may be retested in 1 year. People with an A1C below 5.7 percent may still be at risk for diabetes, depending on the presence of other characteristics that put them at risk, also known as risk factors. People with an A1C above 6.0 percent should be considered at very high risk of developing diabetes. A level of 6.5 percent or above means a person has diabetes

2. FPG - Fasting plasma glucose test

The FPG test is used to detect diabetes and prediabetes. The FPG test has been the most common test used for diagnosing diabetes because it is more convenient than the OGTT and less expensive. The FPG test measures blood glucose in a person who has fasted for at least 8 hours and is most reliable when given in the morning.

People with a fasting glucose level of 100 to 125 mg/dL have impaired fasting glucose (IFG), or prediabetes. A level of 126 mg/dL or above, confirmed by repeating the test on another day, means a person has diabetes.

3.OGTT - Oral glucose tolerance test

The OGTT can be used to diagnose diabetes, prediabetes, and gestational diabetes. Research has shown that the OGTT is more sensitive than the FPG test, but it is less convenient to administer. When used to test for diabetes or prediabetes, the OGTT measures blood glucose after a person fasts for at least 8 hours and 2 hours after the person drinks a liquid containing 75 grams of glucose dissolved in water.

If the 2-hour blood glucose level is between 140 and 199 mg/dL, the person has a type of prediabetes called impaired glucose tolerance (IGT). If confirmed by a second test, a 2-hour glucose level of 200 mg/dL or above means a person has diabetes.

**Type 1 diabetes (insulin dependent),** formerly called juvenile diabetes, is usually first diagnosed in children, teenagers, and young adults. In this type of diabetes, the beta cells of the pancreas no longer make insulin or diminished insulin output because the body’s immune system has attacked and destroyed them. It is usually genetic and the insulin replacement is necessary.

**Treatment : Insulin shot/pump is the only effective drug for type 1**

Short/rapid acting,

15-20 min
 **Humalog**

Intermediate Acting
NPH,

 **Humulin**

Long Acting, I injection daily
 **Lantus**

**Adverse Effects :**

Hypoglycemia and should be caution when administering Epinephrine.

**Type 2 diabetes (non-insulin dependent),** formerly called adult onset diabetes, is the most common type of diabetes. About 95 percent of people with diabetes have type 2. People can develop type 2 diabetes at any age, even during childhood, but this type of diabetes is most often associated with older age. Type 2 diabetes is also associated with excess weight, physical inactivity, family history of diabetes, previous history of gestational diabetes, and certain ethnicities.

Type 2 diabetes usually begins with insulin resistance, a condition linked to excess weight in which muscle, liver, and fat cells do not use insulin properly. As a result, the body needs more insulin to help glucose enter cells to be used for energy. At first, the pancreas keeps up with the added demand by producing more insulin. But in time, the pancreas loses its ability to produce enough insulin in response to meals, and blood glucose levels rise. It is usually associated with family history of diabetes.

**Antidiabetic Drugs:**

The 2 classes of antidiabetic drugs which are sulfonylureas and biguanides.

**Sulfonylureas** which stimulates the insulin release in the pancreas.

Diabeta (glyburide) 1.25 mg, 2.5 mg, and 5 mg

Diabinese (chlorpropamide) 100 mg and 250 mg

Glucotrol (glipizide) 5 mg and 10 mg

**Adverse Effects :**

Dermatologic (rash), Photosensitivity, Cardiovascular vasculitis

**Biguanides** which decrease the glucose produce in the liver.

Glucophage (Metformin)

**Adverse Effects :**

GI, Diarrhea, Nausea/ Vomiting, Flatulence

**Gestational diabetes** is a form of type 2 diabetes, usually temporary, that first appears during pregnancy. It usually develops during the third trimester of pregnancy.Gestational diabetes affects 2 to 10 percent of all pregnancies.

 After delivery, blood sugar (glucose) levels generally return to normal, although some women develop type 2 diabetes within 15 years.is a type of diabetes that develops only during pregnancy. The hormones produced during pregnancy increase the amount of insulin needed to control blood glucose levels. If the body can’t meet this increased need for insulin, women can develop gestational diabetes during the late stages of pregnancy.

Although this type of diabetes usually goes away after the baby is born, women who have had gestational diabetes are more likely to develop type 2 diabetes later in life. Research has shown that lifestyle changes and the diabetes medication, metformin, can reduce or delay the risk of type 2 diabetes in these women. Babies born to mothers who had gestational diabetes are also more likely to develop obesity and type 2 diabetes as they grow up.

**Maternal Complications can be**

Hypertension , Gestational hypertension and presence of protein in the urine (proteinuria) - Pre-eclampsia , Increased risk of cesarean delivery, Microvascular complications

Coronary Artery Disease , Retinopathy , Neuropathy , Chances for developing diabetes,especially type 2 diabetes, after pregnancy period

**Fetal Complications**

Baby weighing greater than 9 lbs (Macrosomia) , Blood glucose level less than 40 mg/dl in first few days after birth (Neonatal hypoglycemia) , Deaths in the first week of life as well as fetal deaths (Perinatal mortality) , Congenital malformation , Elevated level of bile pigment (Hyperbilirubinemia) , Increased number of red blood cells (Polycythemia)

Decreased level of calcium in the blood (Hypocalcemia) , Respiratory distress syndrome

**Oral Complications**

 Periodontal Disease, Xerostomia, Pain & burning of tongue, Caries, hyperglycemia

Increased risk of infection , Candida infection

**Drug Interaction**

Aspirin/ NSAIDs, Alcohol and Epinephrine

**Dental Hygiene Considerations**

* Connect diabetes & periodontal disease
* Maintain optimal home & professional care
* Avoid aspirin & NSAIDs
* Reinforce home blood sugar monitoring

Before treatment be sure to Ask patient about taking daily meds & eating.

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