



# Oral Surgery, Oral Medicine, Oral Pathology, Oral Radiology, and Endodontology

**MEDICAL MANAGEMENT UPDATE** Editors: F. John Firriolo, Craig S. Miller, and Nelson L. Rhodus

## Thyroid disorders. Part II: hypothyroidism and thyroiditis

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Part II of the series on thyroid disorders discusses hypothyroidism and thyroiditis that may be found in dental patients. An overview of the conditions is presented. Presenting signs and symptoms, laboratory tests used to diagnose hypothyroidism and thyroiditis, and their medical management is discussed. The dental management of patients with hypothyroidism is discussed in detail. The dentist by detecting the early signs and symptoms of hypothyroidism and thyroiditis can refer the patient for medical diagnosis and treatment and avoid potential complications of treating patients with uncontrolled disease. Patients with thyroiditis may have a short period of being hyperthyroid and it may be best to avoid routine dental treatment during that period. Patients with suppurative thyroiditis should not receive routine dental treatment during the acute stage of the disease. The end stage of Hashimoto's thyroiditis results in hypothyroidism. Central nervous system depressants, sedatives, or narcotic analgesics must be avoided in patients with severe hypothyroidism because significant respiratory depression may occur. In addition, myxedematous coma, particularly in elderly hypothyroid patients, can be precipitated by central nervous system depressants, infection, and possibly stressful dental procedures. In medically well-controlled patients the dental treatment plan is not affected and most dental procedures can be offered to these patients. (Oral Surg Oral Med Oral Pathol Oral Radiol Endod 2006;102:148-53)

The purpose of this paper (part II in the series on thyroid disorders) is to discuss the dental management of patients with hypothyroidism and thyroiditis. The dentist may detect early signs and symptoms of these thyroid disorders and refer the patient for medical evaluation and treatment. In some cases, this may be lifesaving, whereas in others the quality of life can be improved and complications of certain thyroid disorders avoided.<sup>1</sup>

The dentist by history and clinical examination may detect evidence that may be associated with one of these disorders. Patients found to have signs and symptoms of thyroid enlargement or dysfunction should be referred for diagnosis and possible treatment.<sup>1-5</sup>

### HYPOTHYROIDISM

Enlargements of the thyroid gland, termed a *goiter*, can be diffuse, nodular, singular, functional, or non-functional.<sup>5,7</sup> Simple goiter accounts for about 75% of all thyroid swellings.<sup>5</sup> Hashimoto's thyroiditis leads to

hypothyroidism.<sup>5,7</sup> In contrast, patients with subacute thyroiditis may develop a transient period of hyperthyroidism (Table I).<sup>5,7,8</sup> Hypothyroidism can occur as a congenital or acquired condition.<sup>5,7</sup> Worldwide, the most common thyroid disorder is iodine deficiency (diet-related) goiter. In some of these cases, hypothyroidism develops, and in some, hyperthyroidism results. This type of goiter is called *endemic* if more than 10% of a local population is affected.<sup>11-14</sup> Subclinical hypothyroidism is a common, well-defined condition that often progresses to overt disease.<sup>15-17</sup> In addition, concerns are evident that the subclinical states may contribute to hyperlipidemia and other complications.<sup>6,18,19</sup>

### Incidence, Prevalence, and Demographics

Hypothyroidism in Great Britain occurs at a rate of 3 cases per 1000 women per year. The number of established cases was reported to be 14 per 1000 women. The number of established cases in men was 1 per 1000. The mean age at diagnosis was 57 years. About one third of all cases resulted from surgical or radiation treatment for hyperthyroidism.<sup>20</sup>

In the United States hypothyroidism occurs in about

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**Table I.** Classification of hypothyroid disorders and thyroiditis<sup>8-10</sup>

Disorder	Causes
Hypothyroidism (cretinism, myxedema)	Primary
	Idiopathic (end-stage Hashimoto's disease)
	Iatrogenic ( <sup>131</sup> I, surgery, radiation)
	Agenesis or dysplasia
	Goitrous
	Hashimoto's thyroiditis
	Iodine deficiency
	Antithyroid agents
	Insufficient stimulation of the thyroid
	Secondary (pituitary)
Thyroiditis	Isolated TSH deficiency
	TSH synthesis defect
	Defect in TSH receptor
	Hashimoto's
	Subacute
	Pyogenic
	Chronic fibrosing (Riedel's)
Chronic thyroiditis with transient thyrotoxicosis	

TSH, thyroid-stimulating hormone.

1% to 2% of the general population.<sup>9</sup> It occurs in 3% to 4% of ill older patients admitted to the hospital. It is 5 to 6 times more common than hyperthyroidism. It is estimated that 10% of the women older than the age of 40 years have a thyroid hormone deficiency caused by autoimmune thyroid disease.<sup>14</sup> Both hypothyroidism and hyperthyroidism are 5 or more times common in women than in men in the United States.<sup>20,21</sup>

Acquired impairment of thyroid function affects about 2% of adult women and about 0.1% to 0.2% of adult men in North America. Neonatal screening programs in many areas of the world show that hypothyroidism is present in 1 of every 4000 newborns.<sup>7,9</sup> Permanent hypothyroidism also occurs about once in every 3500 to 4000 live births in the United States.<sup>5,7,22</sup> Transient hypothyroidism occurs in 1% to 2% of newborns.<sup>7,9</sup>

The incidence of hypothyroidism is 10 times higher than average in iodine-deficient areas.<sup>9</sup> The incidence also is increased in areas exposed to waterborne goitrogens or where there is excessive consumption of goitrogens such as cassava.<sup>9</sup> The incidence is increased in areas exposed to excessive radiation.<sup>9</sup>

**Etiology and Pathogenesis**

The causes of hypothyroidism (Table I) can be divided into 3 main categories: (1) primary, or permanent loss or atrophy of thyroid tissue; (2) goitrous hypothyroidism (hypothyroidism with compensatory thyroid enlargement due to impairment of hormone synthesis);



Fig 1. Gross clinical hypothyroidism showing nonpitting edema in the skin of the face. Note the dry, puffy facial appearance and the coarse hair. The patient had hypothermia, the skin was cold, and she showed mental apathy. (With permission from Forbes CD, Jackson WF. Color atlas and text of clinical medicine. 3rd ed. St Louis: Mosby; 2003. p. 311.)

and (3) insufficient stimulation of a normal gland (hypothalamic or pituitary disease or defects in the thyroid-stimulating hormone [TSH] molecule).<sup>5,7,22</sup> Primary and goitrous hypothyroidism account for 95% of all cases.<sup>9</sup>

Most infants with permanent congenital hypothyroidism have thyroid dysgenesis: ectopic, hypoplastic, or thyroid agenesis. The acquired form may follow thyroid gland or pituitary gland failure. Radiation of the thyroid gland (radioactive iodine), surgical removal, and excessive antithyroid drug therapy are responsible for the majority of these cases of hypothyroidism; however, some cases appear with no identifiable cause.<sup>5,7</sup>

**Clinical Presentation**

Neonatal cretinism is characterized by dwarfism; overweight; a broad, flat nose; wide-set eyes; thick lips; a large, protruding tongue; poor muscle tone; pale skin; stubby hands; retarded bone age; delayed eruption of teeth; malocclusions; a hoarse cry; an umbilical hernia; and mental retardation.<sup>5,7</sup> All of these characteristics can be avoided with early detection and treatment.<sup>5,7</sup>

**Table II.** Clinical findings and treatment of thyroiditis

Condition	Type	Functional status	Treatment
Thyroiditis	Hashimoto's – rubbery firm goiter, hypothyroidism develops later	Later in disease $T_4$ , $T_3$ , and TBG are decreased, TSH becomes elevated	Thyroid hormone, surgery in rare cases (compression of vital tissues)
	Subacute – enlarged, firm, tender gland, pain that may radiate to ear or jaw	Hyperthyroid returning to euthyroid status	Aspirin, prednisone, propranolol for symptoms of thyrotoxicosis
	Pyogenic – pain, tenderness in gland, fever, malaise	Euthyroid	Incision and drainage, appropriate antibiotics
	Chronic fibrosing – hard, fixed, enlarged gland	Usually remains euthyroid, hypothyroid status can occur	Usually none, surgery if vital tissues compressed, thyroid hormone
	Chronic with thyrotoxicosis – firm, nontender, enlarged gland	Hyperthyroid for 5 to 6 months returning to euthyroid status	Propranolol for symptoms of thyrotoxicosis

TBG, thyroid-binding globulin; TSH, thyroid-stimulating hormone.

The onset of hypothyroidism in older children and adults (Fig 1) is characterized by a dull expression; puffy eyelids; alopecia of the outer third of the eyebrows; palmar yellowing; dry, rough skin; dry, brittle, and coarse hair; increased size of the tongue; slowing of physical and mental activity; slurred, hoarse speech; anemia; constipation; increased sensitivity to cold; increased capillary fragility; weight gain; muscle weakness; and deafness.<sup>5,7</sup>

The accumulation of subcutaneous fluid (intracellularly and extracellularly) is usually not as pronounced in patients with pituitary myxedema (suprathyroid hypothyroidism) as it is in those with primary (thyroid) myxedema.<sup>5,7</sup> The serum cholesterol levels are elevated in thyroid myxedema and are closer to normal values in the patients with pituitary myxedema.<sup>5,7</sup> Untreated patients with severe myxedema may develop hypothermic coma that may be fatal.<sup>5,7</sup>

### Diagnosis

The diagnosis of hypothyroidism is based on history, clinical findings, and laboratory investigation. The primary laboratory test used for the diagnosis is the TSH assay.<sup>9</sup> The serum levels are raised if the patient has overt or mild primary hypothyroidism.<sup>9</sup> The TSH may be normal or low in cases of suprathyroid (pituitary dysfunction) hypothyroidism. Free  $T_4$  assay reveals reduced free  $T_4$  levels in overt disease but normal levels are found in patients with subclinical hypothyroidism. Only about one third of the patients with overt hypothyroidism show reduced levels of free  $T_3$ .<sup>9</sup> Thyroid autoantibody assay (peroxidase antibodies [TPOAb], and thyroglobulin antibodies [TgAb]) shows a positive result in more than 95% of patients with autoimmune thyroiditis.<sup>9</sup> Serum lipid levels are usually measured to detect dyslipidemia that often is associated with primary hypothyroidism. In addition, complete blood

count with indices is obtained to detect anemia that may be associated with hypothyroidism.<sup>9</sup>

### Treatment

Patients with hypothyroidism are treated with synthetic preparations containing sodium levothyroxin (Synthyroid) ( $LT_4$ ) or sodium liothyronine (Leotrix) ( $LT_3$ ).<sup>5,7</sup> The usual prescription for ideal body weight for  $LT_4$  is 75  $\mu\text{g}$  to 112  $\mu\text{g}$  per day for women and 125  $\mu\text{g}$  to 200  $\mu\text{g}$  per day for men.<sup>5,7</sup> A reduction of about 20% for thyroid hormone replacement is seen in hypothyroid patients 70 years of age or older.<sup>7</sup> Hypothyroid patients receiving warfarin or other related oral anticoagulants when treated with  $T_4$  may have further prolonging of the prothrombin time and could be at risk for hemorrhage.<sup>5,7</sup> In addition, hypothyroid patients with diabetes have a decreased need for insulin or sulfonylureas and may become hyperglycemic when treated with  $T_4$ .<sup>5,7,23</sup> Women with hypothyroidism need to increase their thyroid hormone replacement dosage during pregnancy.<sup>24</sup>

### Prognosis

If treatment is started early and is maintained, a complete return to normal thyroid state occurs after several months.<sup>9</sup> Interruption of treatment will result in the return of symptoms. Untreated hypothyroidism may lead to myxedema coma, particularly in the elderly. Myxedema coma even when treated aggressively has a mortality rate of 0% to 50%.<sup>9</sup>

### Complications

Patients with untreated hypothyroidism are sensitive to the actions of narcotics, barbiturates, and tranquilizers, so these drugs must be used with caution.<sup>5,7</sup> Smoking can worsen the disease.<sup>25</sup> There is an increased susceptibility to infection in patients with severe hypo-



Fig 2. Goiter associated with Hashimoto's thyroiditis. This patient has severe hypothyroidism. (With permission from Forbes CD, Jackson WF. Color atlas and text of clinical medicine. 3rd ed. St Louis: Mosby; 2003. p. 312.)

thyroidism. Megacolon, psychosis with paranoia, and infertility are complications that may occur in patients with severe disease.<sup>9</sup>

Myxedema heart disease may occur in patients with severe primary hypothyroidism. The heart becomes enlarged due to dilation and pericardial effusion. It is usually asymptomatic and is usually not associated with an additional risk of morbidity. It regresses after several months of thyroid hormone therapy.<sup>9</sup>

Stressful situations such as cold, operations, infections, or trauma may precipitate a hypothyroid (myxedema) coma in untreated hypothyroid patients.<sup>5,7</sup> The external manifestations of severe myxedema, bradycardia, and severe hypotension are just about always present.<sup>5,7</sup> Myxedematous coma occurs most often in severely hypothyroid elderly patients. It is more common during the winter months, and has a high mortality rate.<sup>5,7</sup> Hypothyroid coma is treated by parenteral levothyroxin ( $T_4$ ), steroids, and artificial respiration. Hypertonic saline and glucose may be required to alleviate

dilutional hyponatremia and the occasional hypoglycemia.<sup>5,7</sup>

## THYROIDITIS

Thyroiditis is inflammation of the thyroid gland and may arise due to a variety of causes. There are 5 types of thyroiditis: Hashimoto's, subacute, Riedel's chronic fibrosing, chronic with thyrotoxicos pyogenic, (Table II).<sup>5,8</sup> Radiation therapy and drugs such as lithium and amiodarone also may cause thyroiditis iatrogenically.<sup>5,8</sup> In some cases (subacute thyroiditis) the inflammation can result in transient hyperthyroidism due to follicle damage and release of preformed thyroid hormone.<sup>8</sup> In contrast, Hashimoto's thyroiditis (chronic autoimmune thyroiditis) results in progressive hypothyroidism. Suppurative thyroiditis requires urgent antibiotic therapy and evaluation by a specialist.<sup>5,8</sup>

## Clinical Findings

Hashimoto's thyroiditis is the most common cause of primary hypothyroidism in the United States.<sup>8</sup> It is an autoimmune disorder presenting most often as an asymptomatic diffuse goiter (Fig 2). High titers of circulating thyroid autoantibodies and thyroid antigen-specific T cells are found. It usually affects young and middle-aged women. However, it can occur in men (20 times more common in women) and at any age.<sup>8</sup> By the time the diagnosis is established, most patients are hypothyroid. There is often a family history of Hashimoto's thyroiditis or other autoimmune thyroid disorders.<sup>5,8</sup> It may be associated with other autoimmune diseases such as pernicious anemia and type 1 diabetes mellitus. Early in the disease the thyroid is enlarged and firm and may have a nodular consistency. Late in the disease the gland may be atrophied and not palpable.<sup>5,8</sup>

Subacute thyroiditis is uncommon and often follows upper respiratory tract viral infection.<sup>8</sup> Patients often present with an enlarged, painful, tender gland with signs and symptoms of hyperthyroidism.<sup>5,8</sup> There is a marked increase in the erythrocyte sedimentation rate (ESR) a low radioactive iodine uptake. There may be a brief phase of hypothyroidism. Recovery of normal thyroid function can be expected. Subacute thyroiditis has a peak incidence in the third through fifth decades. It is about 4 times more common in women than men.<sup>5,8</sup>

Painless thyroiditis also is an autoimmune disorder.<sup>8</sup> Patients usually present with signs and symptoms of hyperthyroidism without thyroid pain or tenderness or fever. The ESR is normal and the radioactive iodine uptake is abnormally low. Transient hypothyroidism may occur before normal thyroid function returns. It occurs in up to 10% of postpartum females and is more common in females than males.<sup>5,8</sup>

**Table III.** Dental management of the hypothyroid patient

<i>Clinical setting</i>	<i>Hypothyroid</i>
Detection of undiagnosed disease	Symptoms
	Signs
Diagnosed disease	Refer for medical Dx and Rx
	Original diagnosis and Rx
	Past treatment
	Current treatment
	Lack of signs and symptoms
Untreated or poorly controlled	Presence of any complications
	Avoid surgical procedures
	Treat oral infection
	Avoid CNS depressants such as narcotics, barbiturates
Well controlled	Avoid oral infections
	Implementation of normal procedures and management
Medical crisis (rare)	Recognition and initial management of myxedematous coma
	Seek medical aid
	Hydrocortisone (100 to 300 mg)
	Cardiopulmonary resuscitation

CNS, central nervous system; Dx, diagnosis; Rx, treatment.

Suppurative thyroiditis is caused by microbial infection of the thyroid.<sup>8</sup> Patients present with severe neck pain, fever, focal thyroid tenderness, and erythema of the overlying skin. It is an acute infection that may require fine-needle aspiration and culture to determine the appropriate antibiotic therapy.<sup>5,8</sup> It may also require surgical incision and drainage if an abscess is present. It is rare and when found is seen in immunocompromised individuals and those with penetrating neck wounds.<sup>8</sup>

Riedel's thyroiditis is a fibrous infiltration of the thyroid gland of unknown etiology.<sup>8</sup> It may represent a variant of Hashimoto's thyroiditis. It presents as a slowly enlarging stony neck mass, which may extend beyond the thyroid gland. As it gets larger it may cause compressive symptoms such as dyspnea, dysphagia, hoarseness, and the sensation of choking.<sup>5,8</sup> The clinical course is unpredictable and may require surgery. It occurs predominantly in females. Riedel's thyroiditis may eventually lead to clinically significant hypothyroidism.<sup>8</sup>

### Dental Management

Examination of the thyroid gland should be part of a head and neck examination performed by the dentist. The anterior neck region can be scanned for indications of old surgical scars; the posterior dorsal region of the tongue should be examined for a nodule that could represent lingual thyroid tissue; and the area just superior and lateral to the thyroid cartilage should be pal-

pated for the presence of a pyramidal lobe. Although difficult to detect, the normal thyroid gland can be palpated in many patients.<sup>2,5</sup> It may feel rubbery and may be more easily identified by having the patient swallow during the examination.<sup>1</sup> As the patient swallows, the thyroid rises; lumps in the neck that may be associated with it also rise (move superiorly). Nodules in the midline area of the thyroglossal duct move upward with protrusion of the patient's tongue.<sup>1</sup>

An enlarged thyroid gland caused by hyperplasia (goiter) feels softer than the normal gland. Adenomas and carcinomas involving the gland are firmer on palpation and are usually seen as isolated swellings.<sup>2,5</sup> Patients with Hashimoto's disease or Riedel's thyroiditis have a much firmer gland on palpation than the normal gland.<sup>8</sup> Patients with suppurative thyroiditis may have fever, a tender gland, erythema of the skin over the thyroid, and tender cervical lymphadenopathy.

In general, the patient with mild symptoms of untreated hypothyroidism is not in danger when receiving dental therapy. Central nervous system (CNS) depressants, sedatives, or narcotic analgesics may cause an exaggerated response in patients with mild to severe hypothyroidism. These drugs must be avoided in all patients with severe hypothyroidism and used with care (reduced dosage) in patients with mild hypothyroidism; however, patients with untreated severe symptoms of hypothyroidism may be in danger if dental treatment is rendered.<sup>1</sup> This is particularly true of elderly patients with myxedema. A myxedematous coma can be precipitated by CNS depressants, surgical procedures, and infections; thus, once again, the major goal of the dentist is to detect these patients and refer them for medical management before any dental treatment is rendered (Table III).<sup>1</sup>

Patients with less severe forms of hypothyroidism also should be identified when possible, because the quality of their life can be greatly improved with medical treatment. In young individuals, permanent mental retardation can be avoided with early medical management. In addition, oral complications of delayed eruption of teeth, malocclusion, enlargement of the tongue, and skeletal retardation can be prevented with early detection and medical treatment.<sup>1</sup>

Once the hypothyroid patient is under good medical care, no special problems are presented in terms of dental management, except for dealing with the malocclusion and enlarged tongue if present.<sup>1</sup>

Patients with subacute thyroiditis and painless thyroiditis may present with symptoms of hyperthyroidism (see part I for discussion of hyperthyroidism) and should be referred for medical evaluation and treatment. Once the hyperthyroidism has been managed the patient can return for dental treatment. Patients with

signs and symptoms suggesting suppurative thyroiditis should be referred immediately for medical evaluation and treatment. After treatment of the acute symptoms the patient can return for continuation of dental treatment.

### Oral Findings

Infants with cretinism may demonstrate thick lips, enlarged tongue, delayed eruption of teeth, and resulting malocclusion. The only specific oral change manifested by adults with acquired hypothyroidism is an enlarged tongue.<sup>1</sup> Patients with subacute thyroiditis may complain of oral pain that is referred from the thyroid gland.<sup>10</sup>

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