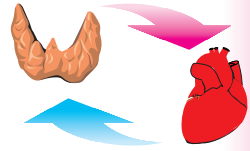


Hypothyroidism

and its effect on heart



All patients referred for diagnosis and treatment of altered cardiac functions should be screened for hypothyroidism¹

CORONARY ARTERY DISEASE

Hypothyroidism is associated with an increased risk of coronary artery disease, and lipid abnormalities are known to have a crucial role in atherogenesis.⁴

LOW DENSITY LIPOPROTEIN (LDL)

Increased levels of LDL cholesterol are a consistent finding in clinically apparent hypothyroidism associated with markedly elevated TSH (thyroid stimulating hormone) levels. Mean levels are increased by 30% - 50% above normal.⁵

The elevation in serum LDL cholesterol that occurs in hypothyroidism is an important risk factor for the development of coronary disease.⁶

CHOLESTEROL LEVEL

Thyroid hormones exert significant effects on circulating cholesterol levels, primarily by augmenting low density lipoprotein cholesterol clearance from plasma to bile.⁵

PULSE RATE

Pulse rate and stroke volume are diminished in hypothyroidism, and cardiac output is accordingly decreased, often to one-half the normal value. Myocardial contractibility is reduced.²

HYPERTENSION

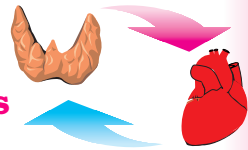
Hypertension is a well-established factor for the development of coronary disease, and it is a frequent finding in hypothyroidism.⁶

ECG

The electrocardiogram reveals characteristic changes. The rate is slow and the voltage is low. The T waves are flattened or inverted. Axis deviation, an increased P-R interval, and widened QRS complexes and prolonged Q₁ interval are seen.²

Hypothyroidism

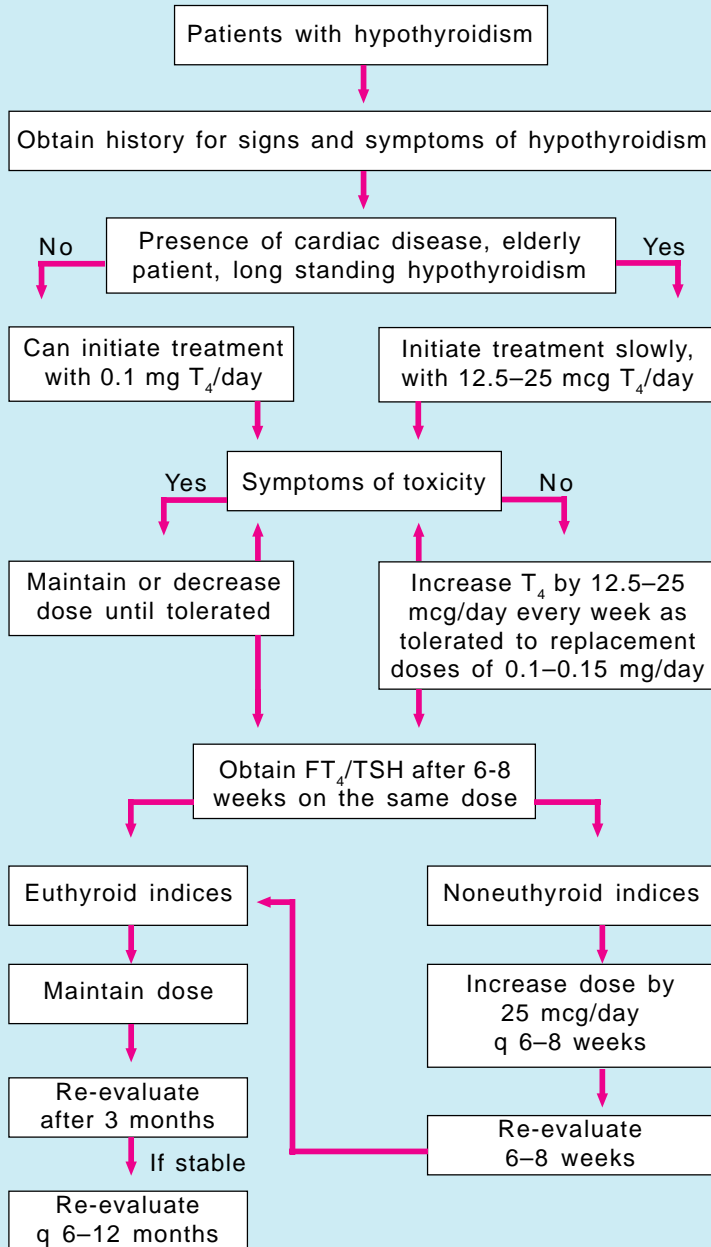
altered levels in cardiac patients



Most patients with coronary artery disease and primary hypothyroidism improve during thyroxine therapy due to improved myocardial function and reduced peripheral vascular resistance as the hypothyroid state is corrected.²

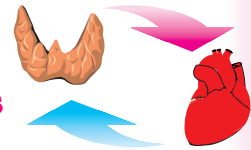
- As compared with normal subjects, patients with hypothyroidism have increases of 50% to 60% in peripheral vascular resistance and decreases of 30% to 50% in cardiac output.⁶
- 20% prevalence of diastolic hypertension.⁶
- All of the changes in cardiovascular function in patients with hypothyroidism respond to T₄ therapy. Oral T₄ replacement therapy starting with low doses and progressing through step-wise increments in time leads to a normalization of cardiac output and left ventricular contractile performance.⁶
- Thyroid hormone replacement in chronically hypothyroid patients causes a decline in serum cholesterol, a lowering diastolic blood pressure, and a return to normal of the elevated serum creatine kinase, aldolase, and myoglobin concentrations.⁶

TREATMENT ALGORITHM FOR MANAGEMENT OF HYPOTHYROIDISM⁷



Hypothyroidism

management in cardiac patients



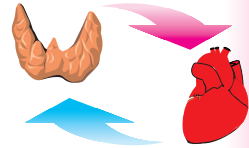
- Dosing requirements depend on a multiplicity of factors that include an evaluation of the patient's age and weight, the severity and cause of the illness, the presence or absence of cardiac disease, and the absorption of the hormone.⁷
- However, in patients with long-standing and severe myxoedema, in elderly patients, and in patients with cardiac disease (i.e., angina, CHF) who are likely to be extremely sensitive to the metabolic effects of thyroxine hormone, therapy must be instituted cautiously with minute doses of thyroxine to avoid cardiovascular complications of heart failure, angina, tachycardia, and myocardial infection.⁷

One hundred patients with mild to severe primary hypothyroidism have been analysed for abnormalities in left ventricular performance utilizing non-invasive techniques. These studies have revealed significant abnormalities in cardiac function which correlated inversely with serum T_4 levels. The abnormalities in cardiac function were completely reversible with thyroid hormone therapy.³

- In most instances, a normal metabolic state should be restored gradually, especially in the elderly or the patient with heart disease, since sudden increases in metabolic rate may tax cardiac or coronary reserve. In adults, an initial daily dose of 25 mcg levothyroxine can be increased by 25 to 50 mcg increments at 4 week intervals until a normal metabolic state is attained.⁸
- In the elderly and in patients with angina a more cautious regime is used starting with 25 mcg daily and increasing the dose by 25 mcg increments every two weeks until euthyroid. If there is an exacerbation of angina then the dose of thyroxine should be reduced by one step and propranolol or similar agent introduced.⁹

Hypothyroidism

importance of thyroxine dosing in cardiac patients



- Thus, while patients with coronary artery disease and angina may benefit from reversal of their hypothyroid state, to avoid precipitating acute myocardial ischaemia the dose should be titrated, starting with 25 mcg a day and increased by increments of 25 mcg at 8-week-intervals until serum TSH falls to normal or symptoms of angina worsen or appear.²
- In elderly patients, in those with cardiovascular disorders, or in those with severe hypothyroidism of long standing, treatment should be introduced more gradually: an initial dose of 25 to 50 mcg daily increased by increments of 25 mcg at intervals of 4 weeks may be appropriate.¹⁰
- There is a complex relationship between the heart and thyroid. Cardiovascular abnormalities may be associated with hypothyroidism as well as with excessive thyroxine replacement therapy, hence the need for caution.¹⁰

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