A Case Report of Successful Coronary Revascularization in a Patient with Severe Angina Pectoris and Hypothyroidism

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Summary: We present a case history of a patient with angina of effort associated with hypothyroidism on whom was performed successfully an aorto-coronary bypass operation. A 59-year old man was admitted because of dull retrosternal chest pain. Examination of thyroid function demonstrated hypofunction of thyroid gland; BMR, -30%; T₃<10 ng/dl; T₄<1 μg/dl; and TSH, 306 μU/ml. Electrocardiogram examined after an exercise tolerance test showed ischemic depression of ST segment in leads I, II, aVL and V₄-₆. Coronary angiogram showed 90% stenosis in the main trunk of left coronary artery and proximal regions of the left anterior descending branch and circumflex branch. Left ventriculogram showed reduced wall motion of the anterolateral segment; however, neither akinesis nor dyskinesis was seen. Effort angina with hypothyroidism was diagnosed and aorto-coronary bypass operation was recommended. 76 days after commencement of treatment for thyroid hormone deficiency, aorto-coronary bypass grafts were placed on both the anterior descending branch and circumflex branch using major saphenous vein. After the operation, 50 μg daily of L-thyroxine was given intravenously and from the first postoperative day, 75 μg daily of thyroxine was given orally. There was no onset of perioperative myocardial infarction and no angina episodes after operation. Postoperative course was uneventful.

Key words: angina pectoris—hypothyroidism—aorto-coronary bypass operation—thyroid hormone therapy—thyroid hormone

Introduction

The complication of hypothyroidism and angina pectoris has been known for long years. Keating et al. (1961) reported that 112 of 1503 patients with hypothyroidism showed anginal symptoms.

Treatment for angina pectoris with hypothyroidism is difficult because positive thyroid hormone therapy may induce angina pectoris or onset of myocardial infarction. In these patients, aorto-coronary bypass surgery is the most important therapy for both angina pectoris and hypothyroidism.

We reported a case with severe angina pectoris and hypothyroidism; the patient received thyroid hormone therapy before and after operation and successful coronary revascularization.

Case Report

A 59-year old man was admitted to the hospital in January 1983 because of dull
retrosternal chest pain for 6 months. In the previous few years, he had complained of skin dryness, general muscle weakness and intolerance of coldness.

Physical examination revealed an obese man with puffy eyelids, delayed movements, slow mentation and hoarse voice. The pulse was normotensive, regular and 64/min.

There was no jugular venous dilatation or thyromegaly. There was a trace of pedal edema; Recoveries of all deep tendon reflexes were greatly delayed. Laboratory findings revealed anemia and elevations of transaminases and LDH as shown in Table 1. The serum cholesterol elevated to 268 mg/dl.

Examination of thyroid function demonstrated hypofunction of thyroid gland: BMR, -30%; Triiodothyronine (T3), less than 10 ng/dl; Thyroxine (T4), less than 1 μg/dl; and TSH, 306 μU/ml.

A chest rentgenogram (Fig. 1). showed no cardiomegaly and no pulmonary congestion.

The electrocardiogram (Fig. 2). showed regular sinus rhythm and the voltage was not decreased. T waves were flat in all leads and inverted negatively in the left precordial leads. Electrocardiogram examined after exercise tolerance test (Master’s

**TABLE 1**

*Laboratory Data*

<table>
<thead>
<tr>
<th>Hematological examination</th>
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<tbody>
<tr>
<td>RBC 299×10^4/mm^3, Hb 10.6 g/dl, Ht 30.7%</td>
<td>WBC 3600/mm^3</td>
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<tr>
<th>Blood chemistry</th>
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<tr>
<td>GOT 181 units, GPT 81 units.</td>
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<tr>
<td>LDH 1355 units.</td>
</tr>
<tr>
<td>Al-P 10 units, r-GTP 19 mIU.</td>
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<td>T-Protein 7.7 g/dl, A/G 2.01.</td>
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<tr>
<td>T-Cholesterol 268 mg/dl.</td>
</tr>
<tr>
<td>BUN 13.5 mg/dl, Cr 1.5 mg/dl,</td>
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<td>FBS 81 mg/dl.</td>
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<tr>
<th>Thyroid function test</th>
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<tr>
<td>T3 below 10 ng/dl, T4 below 1 μg/dl,</td>
</tr>
<tr>
<td>TSH 306 μU/ml.</td>
</tr>
<tr>
<td>RT3U 18.4 %</td>
</tr>
<tr>
<td>BMR-30 %</td>
</tr>
<tr>
<td>Thyroid test 20×, Microsome test 100×.</td>
</tr>
</tbody>
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![Fig. 1. Chest rentgenogram](image1)

![Fig. 2.](image2)
two-step test) showed markedly ischemic depression of ST segment in leads I, II, aVL and V₄₋₆. Echocardiogram showed a slight pericardial effusion. Cardiac catheterization revealed left ventricular end-diastolic pressure of 11 mm Hg and cardiac index was 2.4 l/min/m². A coronary angiogram (Fig. 3) showed no significant stenosis in right coronary artery, but a 90% stenosis in the main trunk of left coronary artery and the proximal regions of the left anterior descending branch and circumflex branch. Peripheral run off of these branches was however, satisfactory. A left ventriculogram (Fig. 4) showed reduced wall motion of the anterolateral segment but neither akinesia nor dyskinesia was seen.

Conclusively, effort angina with hypothyroidism was clinically diagnosed and aorto-coronary bypass surgery was recommended. Since various complications due to hypothyroidism were likely to occur during anesthesia and operation, the patient was treated preoperatively with triiodothyronine and propranolol. The dose...
of triiodothyronine was 2 μg daily at first and gradually increased up to 22.5 μg daily.

When, however, the dose was increased to 22.5 μg daily, anginal pain developed and the operation was performed since the electrocardiogram showed no signs of myocardial infarction. Although, even at this time, thyroid function still showed a low level of T₃, 75 ng/dl; T₄, less than 1 μg/dl; and TSH, 213 μU/ml. The electrocardiogram (Fig. 5) showed improved T waves. Seventy-six days after the treatment with thyroid hormone therapy, the operation was performed; aorto-coronary bypass grafts were placed on both the anterior descending branch and circumflex branch using the major saphenous vein. After the operation, 50 μg of L-thyroxine daily was given consecutively intravenously. 75 μg of thyroxine daily was given orally from the first postoperative day. There was no onset of perioperative myocardial infarction, no angina episodes after operation and the postoperative course was uneventful.

Discussion

Although the complication of hypothyroidism and angina pectoris has been known for many years, therapy for such cases has been controversial. About 60 operated cases (Nelson et al. 1974; Paine et al. 1977; Vertrees et al. 1981; Hay et al. 1981; Myerowitz et al. 1983; Levine 1980) with angina pectoris and hypothyroidism have been reported. From a review of reports of such cases, it was found that there was conspicuous hypercholesterolemia and lesions of coronary arteries were seen in the main trunk of the left coronary artery or in all three major coronary arteries. These findings suggest the importance of aorto-coronary bypass surgery for the disease. Although in these cases thyroid hormone therapy is the most important treatment before and after operation, it has still remained questionable whether...
such therapy should be performed before cardiac catheterization or aorto-coronary bypass operation.

The untreated myxedematous patient is also prone to intraoperative cardiovascular collapse, severe respiratory depression, infection, adynamic ileus and an inappropriate antidiuretic hormone-like syndrome (Williams, 1969). Thus, Paine et al. (1977) have stated that these possibilities must be weighed against the real danger of myocardial infarction preoperatively when thyroid hormone therapy is begun and the possibility that the patient with myxedema and severe angina might be successfully managed with minimal thyroid replacement preoperatively with gradual but more aggressive thyroid replacement in early postoperative period.

Hay et al. (1981) performed aorto-coronary bypass operation in nine patients with preoperative thyroid hormone therapy and nine cases without the therapy and reported that in both groups there were no operative complications, operative death or late death. Since myocardial infarction occurred in four patients receiving hormone therapy, they also pointed out that the lack of hormone therapy before operation would not increase operative risks, whereas thyroid hormone therapy would increase the risk of the development of myocardial infarction. Myerowitz et al. (1983) have stated that preoperative thyroid replacement therapy is, theoretically, dangerous and may not significantly improve hemodynamics until full replacement was achieved. Coronary bypass grafting could be performed safely despite hypothyroidism with excellent early results. In fact, both Nelson et al. (1974) and Paine et al. (1977) have experienced one patient who received preoperative thyroid hormone therapy and died of ventricular fibrillation or myocardial infarction. These results suggest that a serious risk of induction of myocardial infarction with thyroid hormone therapy.

When thyroid hormone therapy is given preoperatively, it should be done under strict monitoring of the patients as was indicated by Paine et al. (1977).

In our case, triiodothyronine was used in combination with propranolol on the understanding that the operation should be performed immediately when chest pain developed.

Despite the administration of a small dose, the electrocardiogram showed improved T waves.

With respect to postoperative thyroid hormone therapy, in all operated cases with or without preoperative thyroid hormone therapy, a satisfactory clinical course was maintained with thyroid hormone therapy immediately after aorto-coronary bypass surgery. Nelson et al. (1974), however, reported complications due to depressed thyroid function that occurred in one patient who had not received thyroid hormone therapy post operatively. Thyroid hormone therapy immediately after the operation may be one of the most important factors in the postoperative recovery.

In all reported cases, there were no cases of death or episodes of chest pain when treatment of hypothyroidism was given after the operation.

Considering the many serious coronary arterial lesions associated with this disease and the successful results which may be achieved with surgical procedures, aorto-coronary bypass operations are recommended for cases with angina pectoris and hypothyroidism.

Conclusion

We managed a patient with angina of effort and hypothyroidism and who received successfully aorto-coronary bypass surgery. Reported cases of the combination diseases are discussed.
References


