

3 Case reports of hypotension caused by sudden hypothyroidism after major orthopedic operation.

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Abstract

Three cases of hypotension after major orthopedic operation were diagnosed clinically with sudden hypothyroidism. These patients were treated by hormone supplementation. We propose a conventional thyroid function examination of all advanced-age patients before major orthopedic surgery.

Keywords: Hypothyroidism, Hypotension, Major orthopedic operation, Thyroid function examination.

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Introduction

Hypothyroidism is a disease which was identified in the mid-19th century [1]. The main clinical features of the disease are pale complexion, nervous system disorders, bradycardia, decreased cardiac output and muscle weakness. Hypothyroidism crisis may occur in severe cases, and death may result from the absence of timely intervention. The causative factors involved in the pathogenesis of hypothyroidism are diverse. Previous reports about hypothyroidism were mainly on cases of hypothyroidism after thyroid operation. However, there are no reports in the literature on hypotension caused by hypothyroidism after major orthopedic operation. In the present study, we report 3 cases of sudden hypothyroidism after major orthopedic surgery in the Department of Orthopedics of Guangdong General Hospital, from December 2016 to April 2017.

Case Descriptions

Case 1: A 76-year-old male patient was admitted to our hospital on December 7, 2016 for a 3-year history of bilateral hip joint pain. The pain got worse during walking, but subsided after rest. Results of CT examination in another hospital showed bilateral osteonecrosis of the femoral head. The patient had a history of long-term hypertension, but his blood pressure was well stabilized after treatment with hydrochlorothiazide and Valsartan. He also had a 5-year history of untreated benign prostatic hyperplasia. The diagnosis results were presented as follows: (a) bilateral osteonecrosis of the femoral head, (b) hypertension and (c) benign prostatic hyperplasia. The patient underwent bilateral total hip replacement under general anesthesia on December 12, 2016. After the operation, he suffered from hypotension when he was sent back to the ward. His condition did not improve after treatment with fluid

infusion; his blood pressure was 45/29 mmHg. Dopamine was administered to increase the blood pressure. The blood pressure of the patient was continuously maintained by dopamine until December 20, 2016 when he was subjected to thyroid function examination by chemiluminescence immunoassay. The results were as follows: total triiodothyronine (T3)=0.58 nmol/L↓, total thyroxine (T4)=36.3 nmol/L↓, free T3=2.48 pmol/L↓, free T4=5.16 pmol/L↓ and thyroid stimulating hormone (TSH)=2.280 μIU/mL. Endocrinology consultation revealed that the patient had no discomfort such as edema, sensation of chill or slow response. Thyroid hormone supplementation was not done, since the patient did not present any clinical evidence of hypothyroidism. Management with dopamine (30 mg/h) was continued for blood pressure control. The five parameters of thyroid function were re-assessed 24 h later on December 21, 2016. The following results were obtained: total T3=0.21 nmol/L↓, total T4=20.5 nmol/L↓, free T3=2.69 pmol/L↓, free T4=5.02 pmol/L↓, and TSH=6.850 μIU/mL↑. Hypothyroidism was queried, and the patient was treated with oral administration of Levothyrocine (50 μg, qd). His blood pressure was well controlled after this treatment, and the dose of dopamine was gradually decreased. Dopamine administration was stopped after 4 days, and thyroid function was again re-assessed. The following results were obtained: total T3=0.86 nmol/L↓, total T4= 41.7 nmol/L↓, free T3=2.61 pmol/L↓, free T4:6.85 pmol/L↓, and TSH=20.080 μIU/mL↑. The blood pressure of the patient was normal and stable, and he was discharged on December 29, 2017.

Case 2: A 76 -year-old female patient was admitted to our hospital on February 21, 2017 for a 1-year history of right lower extremity pain. One year before the admission, the patient suffered from right lower extremity pain without obvious inducement. The pain worsened when he walked, but

was alleviated after bed rest. She had no condition such as fever or dizziness. X-Ray examination showed right femoral head necrosis and right hip joint degeneration. The patient had no chronic illness. Diagnosis result was right femoral head necrosis. The patient underwent right total hip replacement under combined spinal-epidural anesthesia. The operation was smooth. However, she suffered from hypotension on the night of the operation, with blood pressure of 60/40 mmHg. Fluid infusion therapy and dopamine administration with a micro pump were used to control her blood pressure. Three parameters of thyroid function were assessed on the second day after the operation. The results were as follows: free T3=2.78 pmol/L↓, free T4=10.46 pmol/L, and TSH =0.550 μIU/ml. Hypothyroidism was considered, so she was treated with oral administration of Euthyrox. Thyroid function was re-assessed on March 4, 2017, and the following results were got: free T3=2.86 pmol/L↓, free T4=9.74 pmol/L and TSH=0.320 μIU/ml↓. During this period, the dose of dopamine was not reduced. Thyroid function was again re-assessed on March 6, 2017. The results were as follows: free T3:3.88 pmol/L free T4=12.33 pmol/L and TSH=5.250 μIU/mL. The blood pressure of the patient was stable. The dose of dopamine was gradually reduced to 0, and the patient was successfully discharged on March 9, 2017.

Case 3: A 90 -year-old female patient was admitted to our hospital on April 1, 2017 after experiencing 3 days of left hip pain with limitation of activity. Three days earlier, the patient had a fall at home, which resulted in left hip pain with activity limitation; She had no conditions such as swirl, headache and nausea. X-Ray examination showed fracture of left femur neck. There was no evidence of chronic illness. Fracture of left femur neck was diagnosed. The patient underwent left femur head replacement under combined spinal-epidural anesthesia. The operation was smooth. However, the patient suffered from hypotension on the night of the operation, with blood pressure fluctuating around 78/55 mmHg. After cardiology consultation, fluid infusion therapy and dopamine administration were used to increase the blood pressure of the patient. On the second day after surgery, thyroid function was examined based on five thyroid function parameters using chemiluminescence immunoassay. The results were as follows: total T3=0.41 nmol/L↓, total T4=107.3 nmol/L, free T3=1.81 pmol/L↓, free T4=16.01 pmol/L, and TSH=6.140 μIU/ml↑. It was concluded that the hypotension of the patient was related to hypothyroidism. She was managed with oral administration of Euthyrox, and thyroid function tests were repeated 3 days later to obtain the following profile: total T=0.59 nmol/L↓, total T4=104.6 nmol/L, free T3=2.38 pmol/L↓, free T4= 12.60 pmol/L, and TSH = 0.960 μIU/mL. The blood pressure of the patient was stable; the dose of dopamine was gradually reduced to 0, and the patient was successfully discharged on April 13, 2017.

Discussion

Hypothyroidism is a general low metabolic syndrome caused by lower thyroid hormone level or thyroid hormone resistance.

Hypothyroidism caused by thyroid lesions account for more than 95% of all hypothyroidism cases. There are no reports in the literature on cases of hypothyroidism after orthopedic surgery. The high risk factors for hypothyroidism are (1) sex (female), (2) Age>60 years, (3) other autoimmune diseases, (4) family history, (5) history of radiotherapy, especially neck radiotherapy; and (6) multiple sclerosis [2].

The patients in the 3 cases described in this study were advanced in age, and they belong to the high risk hypothyroidism group. However, they were not diagnosed as hypothyroidism cases before surgery because of the fact that sub-clinical hypothyroidism (SCH) may show no clinical symptoms [3,4]. The rate of occurrence rate of SCH in the aged population is 7%~26% [3]. It is quite possible to have cases of SCH before operation. Advanced-age patients have degenerated organ compensation functions. Thus, hyposecretion of thyroid hormone and related clinical symptoms caused by post-operative stress become obvious.

The 3 cases of patients suffered from hypotension within 12 hours after operation. Continuous dopamine administration was needed to maintain normal blood pressure. After endocrinology consultation, although the patient in case 1 was diagnosed as hypotensive, there was no evidence in support of hypothyroidism because he had no discomfort such as edema, chill sensation, or slow response. However, conditions of the 3 cases of patients were improved after treatment with Euthyrox, and there was a positive correlation between blood pressure and thyroxine level. Furthermore, these patients were evaluated for any other etiology of hypotension such as adrenal insufficiency, cardiogenic shock, sepsis, or spinal shock, and found to be negative. In effect, it was confirmed that hypotension in the 3 cases of patients was caused by hypothyroidism.

Stress reaction may disturb steady state of secretion and metabolism of thyroid hormone by affecting the hypothalamus-hypophysis-thyroid axis, thyroid peroxidase, deiodinase and other enzymes in the liver, and autoimmunity system [5]. The levels of TSH in the 3 cases were not always more than normal value. It has been reported that increases in pure T3 may be caused by general acute factors [2]. Thus it was concluded that the decrease in T3 and hypotension were caused by reaction to operation stress.

Cases of hypotension after major orthopedic operation are not rare; most of the cases are caused by factors such as anesthesia, hypovolemia, and cardiac insufficiency before operation. Bone cement implantation syndrome may appear if bone cement is implanted. The 3 cases of patients were treated with fluid infusion immediately after occurrence of shock, and analgesia pump and related drugs which might cause hypotension were stopped. Consultation of related departments was performed. All pre-disposing factors described above were excluded but hypotension was still hard to control. Consequently, the presence of in vivo hormone problem was considered. Three similar cases of patients have visited our department within four months. Hypothyroidism has been linked to death rate of advanced age patients [6]. Thus, conventional screening of

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hypothyroidism before operation should be considered for high risk group of hypothyroidism, especially for advanced age patients.

Conclusion

If a patient suffers from hypotension after major orthopedic operation, hypothyroidism should be highly considered after conventional anti-shock treatment. If the level of thyroid hormone is low, hormone supplement should be performed for relief of hypotension.

References

1. Aydın OU, Gürsoy A, Bilezikçi B, Özbaş S. Papillary Thyroid Carcinoma in a Hemiagenetic Thyroid Gland: A Case Report. *Turk J Endocrinol Metab* 2017; 21:19-21
2. Donna Dunn, Carla Turner. Hypothyroidism in Women. *Nursing for Women's Health* 2016; 12: 2251-2253.
3. Garber JR, Cobin RH, Gharib H, Hennessey JV, Klein I, Mechanick JI, Pessah-Pollack R, Singer PA, Woeber KA. Clinical practice guidelines for hypothyroidism in adults:

cosponsored by the American Association of Clinical Endocrinologists and the American Thyroid Association. *Endocr Pract* 2014; 18: 988-1028.

4. Javed Z, Sathyapalan T. Levothyroxine treatment of mild subclinical hypothyroidism: a review of potential risks and benefits. *Ther Adv Endocrinol Metab* 2016; 7: 12-23.
5. Chu Xiao-qiu, Liu Chao. New thoughts on pathological factors of hypothyroidism. *Chinese J Practical Int Med* 2014; 34: 313-316.
6. Grossman A, Weiss A, Koren-Morag N, Shimon I, Beloosesky Y, Meyerovitch J. Subclinical Thyroid Disease and Mortality in the Elderly: A Retrospective Cohort Study. *Am J Med* 2016; 129: 423-430.

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