

# Hypothyroidism: A Rare Cause Of Delayed Postoperative Recovery

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## Abstract

Introduction: Hypothyroidism causes decreased elimination of anesthetic agents and delayed recovery, increased perioperative morbidity and mortality. Patients are best treated to provide an euthyroid state before surgery. Case presentation: We report the case of delayed emergence in a 22-year-old female caused by primary hypothyroidism, which improved after enteral thyroid hormone replacement. Conclusion: Elective surgery should be delayed on patients with suspected moderate to severe hyperthyroidism until they are euthyroid. In cases of emergency surgery, where a delay is not possible, enteral thyroid hormone replacement is a viable option to reach an euthyroid state.

## INTRODUCTION

Hypothyroidism may depress function of virtually every organ in the body. It may cause cardiovascular depression and therefore decreased perfusion of organs, resulting in impaired cardiovascular autonomic function and attenuated HR response to exercise [1, 2]. It also may depress biometabolism of drugs in liver, thus potentiating and prolonging their effects; hypoglycemia, hyponatremia and hypothermia. Therefore hypothyroidism causes decreased elimination of anesthetic agents and delayed recovery. Since it increases perioperative morbidity and mortality, such patients are best treated to provide an euthyroid state before surgery [3, 4]. However there are emergency cases that demand immediate intervention.

This paper reports an emergency case presenting with suspected hypothyroidism and experienced delayed recovery and discusses in light of recent literature.

## CASE

A 22 years old female weighing 70 kg presented with abdominal pain. The patient was scheduled for emergency surgery due to suspected incarcerated umbilical hernia. Her past medical history was notable for an uncomplicated total thyroidectomy operation three years ago and caesarean section one year before. The patient denied any history of drug usage. The physical examination revealed mild edema on hands and face. Blood sample was taken for serum biochemistry and hemogram. The patient was taken to

operating room before the results were available.

Intravenous hydration was started through a large bore intravenous line. Routine monitorization of noninvasive blood pressure, electrocardiogram and peripheral oxygen saturation was applied. Before induction, blood pressure was measured 80/60 mmHg, heart rate was 60/min, respiratory rate was 22/min, aksillary temperature was 36°C. The patient was induced with propofol 2.5 mg kg<sup>-1</sup>. Neuromuscular blockade was provided with atracurium 0,5 mg kg<sup>-1</sup>. After an uncomplicated intubation, anesthesia was maintained using 40% oxygen, 60% nitric oxide and sevoflurane %1-1.5. During surgery, intravenous fluids and bolus doses of ephedrine 10 mg were used to sustain a mean arterial pressure of 60 mmHg. Although no additional doses of analgesic or neuromuscular blocking agent was administered and sevoflurane and nitric oxide were replaced with 100% oxygen at the time of suturing of skin, the patient showed no signs of arousal or respiration even after 15 minutes. Neostigmine 1.5 mg was administered to facilitate the breakdown of atracurium. After five minutes, the patient showed no signs of recovery and the same dose of neostigmine was repeated. However the patient did not recover and was hypothermic, therefore was transferred to the intensive care unit, where the mechanical ventilation was continued in the form of synchronized intermittent mandatory ventilation mode. Active external heating via air-circulating heating blanket was applied. The preoperative lab results showed a hemogram and electrolytes within normal ranges, an elevated creatine kinase (648 IU L<sup>-1</sup>), an elevated

AST and ALT (85 and ALT: 91 IU L<sup>-1</sup> respectively), highly elevated TSH (112 IU L<sup>-1</sup> normal range: 0.49-4.67), low free T3 (0 pg mL<sup>-1</sup>, normal range: 1.3-3.76) and low free T4: (0.27 ng mL<sup>-1</sup>, normal range: 0.71-1.86). Thyroid hormone replacement therapy was started using levothyroxine sodium 0.4 mg tablet through nasogastric tube, along with hydrocortizone 100 mg intravenous three times a day and antiulcer prophylaxis. At the twelfth hour of the admission to the intensive care unit, the patient began to respond to external stimuli. After another twelve hour, the patient was responding well and stable and was extubated. Thyroid hormone and corticosteroid replacement therapy was maintained with levothyroxine sodium 0.1 mg tablet once a day (Tefor Duotab 0,1 mg, Organon, Türkiye) and methyl prednisolone 100 mg intravenous three times a day (Prednol-L 40 mg ampoule, Mustafa Nevzat, Türkiye). On third day, the patient was discharged from the intensive care unit to the surgical ward. On day ten, the patient was discharged from the hospital.

### **DISCUSSION**

Clinical signs of hypothyroidism may range from cold intolerance to constipation and depression. A hypothyroidic patient may also present with lethargy, muscle weakness and hypoactive reflexes. Primary hypothyroidism is diagnosed through detection of a low free T4 and a high TSH level. The higher the TSH level, the more serious are the clinical signs.

Patients failing to take their thyroid hormone replacement medication typically present with signs and symptoms like somnolance or lethargy, which may easily be misinterpreted at a time when these patients are diagnosed with a surgical emergency. Those patients typically forget about their hormone replacement therapy when asked about their past medical history.

Hypothyroidism causes increased responsiveness to central nervous system depressants. Due to depression of vascular and respiratory reflexes, hypotension and delayed recovery of spontaneous ventilation is common in hypothyroidic patients [3].

If detected before surgery, such patients must receive thyroid hormone replacement therapy before the surgery [3, 5, 6]. Kelsaka and colleagues report that regional anesthesia should be preferred if an appropriate option, if the surgery cannot be delayed until an euthyroid state can be established. They showed that lower abdomen and lower extremity surgeries may be successfully managed through regional

anesthesia if general anesthesia poses a greater risk of hemodynamic instability and delayed recovery [7].

If the surgery cannot be delayed or a regional anesthetic approach is not available however, the replacement therapy should be started as soon as the type of endocrine deficiency is diagnosed through laboratory tests.

In this case, the patient had a history of total thyroidectomy and stated that she did not receive any form of thyroid hormone replacement therapy. Since she had a history of uncomplicated caesarean section one year before, the emergency surgery was not delayed. However, due to mild edema on hands and face, we suspected hypothyroidism and therefore ordered thyroid laboratory test to detect a possible hormone deficiency [8].

Hypothyroidism is known to cause increased susceptibility to neuromuscular blocking agents [6, 7]. Therefore we preferred to administer atracurium 0,2 mg kg<sup>-1</sup> to provide neuromuscular blockade, since atracurium is known to be eliminated spontaneously metabolised independent from organ function[9]. However, in face of inadequate block, the dose was slowly titrated to 0.5 mg kg<sup>-1</sup>.

In this case, nitric oxide was administered to facilitate analgesia despite the knowledge that nitric oxide is known to suppress adrenal hormones[10]. Nitric oxide was preferred over opioids due to the fact that opioids are eliminated via hepatic metabolism and the patient had an elevated ALT level. After surgery, corticosteroid replacement therapy was started as methyl prednisolone 100 mg three times a day and continued as oral therapy. The corticosteroid replacement therapy was started prophylactically to prevent adrenal insufficiency. Therefore the dosage was scheduled as three times a day instead of four times a day to prevent drug accumulation and side effects like hypertension and hyperglycemia. The thyroid laboratory test results were not available before the surgery was finished, however they were helpful in determining the need and dose of hormone replacement therapy afterwards [11].

There is no available agent for parenteral thyroid hormone replacement therapy in Turkey. We administered enteral form of thyroid hormone through nasogastric tube, which is shown to be a way to reach euthyroid state [12].

In conclusion, elective surgery should be delayed on patients with suspected moderate to severe hyperthyroidism until they are euthyroid. In cases of emergency surgery, where a delay is not possible, enteral thyroid hormone replacement is

a viable option to reach an euthyroid state.

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