

Anesthetic management of a pregnant patient with uncontrolled hyperthyroidism for emergency caesarean section - a case report

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Abstract

Background and Aims: Uncontrolled hyperthyroid patient in pregnancy for emergency caesarean section under general anaesthesia managed by giving antithyroid agents, beta blockers, dexamethasone preoperatively to inhibit peripheral conversion of T₄ to T₃ and to control symptoms of hyperthyroidism.

Case presentation: A 20-year-old primigravida, presented at 37 weeks of gestation with complaints of respiratory difficulty, tremors, excessive sweating, prominent eyes, palpitations and anxiety. Patient was given oral propylthiouracil, lugol's solution, tablet propranolol, injection dexamethasone and injection pantoprazole intravenous preoperatively. Nasogastric tube was inserted for further administration of antithyroid medications. Arterial blood pressure cannula secured and central venous cannulation done in case thyroid storm occurs which may require large volume resuscitation. Patient was managed successfully under general anaesthesia and monitored for thyroid storm in postoperative period.

Discussion: In patients with poorly controlled hyperthyroidism labour, delivery or caesarean section can precipitate life threatening thyroid storm. In case of thyroid storm antithyroid drugs can be administered orally or rectally so Ryle's tube was inserted preoperatively. General anaesthesia should be considered in patients of uncontrolled hyperthyroidism requiring emergency surgery as it provides less fluctuations in hemodynamic parameters. Sympathetic stimulation should be avoided in perioperative period. Regional anaesthesia can be performed safely if there are no signs of cardiac failure. In the present case there were no signs of cardiac failure but the patient had tachypnoea so a decision to proceed with general anaesthesia with central venous catheterization and invasive blood pressure monitoring was made.

Keywords: Caesarean section, Emergency, General anaesthesia, Hyperthyroidism, Thyrotoxic storm

Introduction

Hyperthyroidism is a rare condition occurring only in 0.2% of pregnancies.¹ Uncontrolled hyperthyroidism in pregnancy can lead to pregnancy induced hypertension, abortion, intrauterine growth restriction, low birth weight, still birth, maternal congestive heart failure and thyroid storm.² So uncontrolled hyperthyroidism in pregnancy is associated with high morbidity and mortality in both mother and foetus. Hypermetabolic changes of

hyperthyroidism mimic many of the physiologic changes of pregnancy, so a careful evaluation of the patient should be done who is suspected to have thyroid disease in pregnancy.³ The disease should be medically controlled to provide symptomatic relief to the patient and to prevent thyroid storm.

Objectives

Since, presentation of the patient with uncontrolled

hyperthyroidism is not very common in pregnancy, therefore we are discussing a rare case of successful anaesthetic management of uncontrolled hyperthyroid patient who presented for emergency caesarean section under general anesthesia.

Case presentation

A 20-year-old primigravida patient, presented to the hospital at 6 months of gestational age with excessive sweating, prominent eyes and anxiety. She was diagnosed with hyperthyroidism with thyroid function tests T3 2.18 (normal 0.92-2.5 nmolL⁻¹), T4 188.25 (normal 60-120 nmolL⁻¹) and TSH <0.05 (normal 0.35-5.5 μ IUml⁻¹). She was put on oral tablet propylthiouracil 150 mg TID (three times a day). She continued treatment for 2 months and then stopped taking medications. She again presented to the hospital at 37 weeks of gestation with complaints of respiratory difficulty, tremors, excessive sweating, prominent eyes, palpitations and anxiety.

On examination she was conscious and oriented to time, place and person, her heart rate was 132 beats per minute, blood pressure 170/100 mm of Hg, temperature 37°C and respiratory rate 32 per minute. She had moist skin, proptosis and lid lag. Her cardiovascular and respiratory system examination was unremarkable except for sinus tachycardia and tachypnoea. Her tendon reflexes were brisk. Thyroid gland was not enlarged. Airway examination showed adequate mouth opening with mallampatti grade II.

All routine investigations were within normal limits except for thyroid profile with T3 - 1.35 nmolL⁻¹, T4- 146.15 nmolL⁻¹ and TSH- <0.05 μ IUml⁻¹. Electrocardiogram showed sinus tachycardia with a heart rate of 130 bpm. On non-stress test there was none reassuring fetal status due to minimal variability of heart rate, so emergency caesarean section was planned.

Patient was given oral propylthiouracil 150 mg, three drops of lugol's solution orally, 40 mg of tablet propranolol, 2 mg of injection dexamethasone and 40 mg of injection pantoprazole intravenous preoperatively. Nasogastric tube was inserted for further administration of antithyroid medications.

Informed and written consent was obtained for surgery

and anaesthesia. After shifting the patient to operation table, left uterine displacement was done and standard American Society of Anaesthesiology monitors electrocardiogram, pulse oximeter, non-invasive blood pressure, temperature probe and capnography were applied. Her vitals were HR 110 per minute, BP 150/90 mmHg and core temperature 37 °C. Peripheral intravenous catheter of 18G was secured. Under all aseptic precautions arterial blood pressure cannula was secured and continuous blood pressure monitoring started. Central venous cannulation was done in right internal jugular vein in case thyroid storm occurs which may require large volume resuscitation. Cold saline, defibrillator and all the measures of resuscitation were available on the operation table for use in case thyroid storm occurs.

Preoxygenation was done for 3 minutes and rapid sequence induction was done with injection thiopentone 250 mg intravenous and injection succinyl choline 75 mg intravenous. Endotracheal intubation was done after direct laryngoscopy with endotracheal tube of size 6.5 mm internal diameter. Nasopharyngeal temperature monitoring was started after induction of anaesthesia. After delivery of the baby injection fentanyl 100 μ g was given. Injection atracurium 25 mg was given after effect of succinyl choline weaned off. Time taken from induction of anaesthesia to delivery of baby was 4 minutes. A male baby of 2.7 kg was delivered. Apgar score of the baby was 6 and 9 at 1 min and 5 min after delivery. 10 units of injection oxytocin was given as infusion. Her vitals were stable during entire intraoperative period. Blood loss was estimated at 500 ml, 2500 ml of ringer lactate was given. Extubation was done on completion of surgery and patient monitored for signs of thyrotoxicosis in post-operative period in high dependency unit.

Oral propylthiouracil 150 mg TDS, three drops of lugol's solution TDS, oral propranolol 40 mg TDS and dexamethasone 6 mg daily were continued in postoperative period and tapered gradually from third postoperative day. Entire postoperative period remained uneventful and patient was discharged on fifth post-operative day. At birth baby had hoarse cry. His cord serum T4 and T3 were normal but TSH was decreased. Baby was monitored in neonatal intensive care unit for

two days. His rest of the period in hospital was uneventful. He was followed up for hypo or hyperthyroidism on out-patient basis.

Ethical considerations

The participant signed an informed consent form. As it is a clinical case report so institutional ethical approval was not required.

Discussion

Uncontrolled hyperthyroidism is a rare condition occurring in pregnancy. Grave's disease, gestational thyrotoxicosis, single toxic nodule, toxic multinodular goitre, subacute thyroiditis, silent thyroiditis is differential diagnosis for hyperthyroidism in pregnancy.³ Most common cause of hyperthyroidism is grave's disease. It is an autoimmune disease caused by IgG type autoantibodies. These autoantibodies can cross placenta and cause neonatal grave's disease, however it is self-limiting.⁴ In patients with poorly controlled hyperthyroidism labour, delivery or caesarean section can precipitate life threatening thyroid storm.⁵ Anxiety and agitation related to anaesthesia and analgesia can also precipitate thyroid storm.⁶ It is characterised by tachycardia, hyperpyrexia and alterations in level of consciousness.⁷ It should be detected early as there is rapid deterioration if left untreated.⁸ In case of thyroid storm antithyroid drugs can be administered orally or rectally so Ryle's tube was inserted preoperatively in the patient.⁹ Cases of thyroid storm before induction of anaesthesia have also been reported.⁶ In some case reports methimazole was administered intravenously.¹⁰

Signs and symptoms of hyperthyroidism are anxiety, hyperhidrosis, heat intolerance, fatigue, muscle weakness, weight loss, tachycardia, palpitations, dyspnoea, increased appetite, exophthalmos, leg swelling, goitre, cold clammy skin, tremor, thyroid bruit, lid lag and atrial fibrillation usually in elderly. Dyspnoea in hyperthyroidism is due to decreased lung compliance, decreased vital capacity, increased minute ventilation and impaired respiratory muscle function.¹¹ Sensitivity of respiratory centres to hypoxia and hypercapnia is increased. If goitre is large it can compress trachea and cause respiratory distress.¹² In

the present case patient had tachypnoea which might be because of above said reasons.

Propylthiouracil is drug of choice for thyroid storm as it inhibits peripheral conversion of T4 to T3.¹³ Methimazole and propylthiouracil also inhibit synthesis of thyroid hormones. Methimazole can cause birth defects so should not be given in first trimester. Methimazole and propylthiouracil cross placenta and can cause goitre and hypothyroidism in newborn.^{10,13} Beta blockers control hypermetabolic symptoms and inhibit peripheral conversion of T4 to T3.¹³ Long term use of beta blockers in pregnancy can cause intra uterine growth retardation, small placenta, post-natal bradycardia, hypoglycaemia and decreased response to hypoxic stress.¹ Esmolol is a short acting water soluble beta 1 adrenergic blocker that can be used just before delivery as its action is short lived so neonatal side effects would be minimal.¹⁴ Lugol's solution inhibit release of stored thyroid hormones from thyroid follicles. Iodine therapy if used for long duration in pregnancy can cause goitre in foetus. So, iodine therapy should be used for a very short time if at all used in pregnancy.⁵ Dexamethasone inhibit peripheral conversion of T4 to T3.¹³ Lowest effective dose of antithyroid drugs should be used and dose should be tapered once response is achieved. Treatment should be monitored with free T4 and TSH every 2-4 weeks initially and later every 4-6 weeks.³ The patient had stopped taking propylthiourasil 15 days before presenting to the hospital and had signs of uncontrolled hyperthyroidism so she had a high risk of thyroid storm in perioperative period. So, she was given propylthiourasil, lugol's solution, dexamethasone in preoperative period to inhibit peripheral conversion of T4 to T3 and inhibit release of stored thyroid hormones from thyroid follicles. Propranolol was given preoperatively to control tachycardia and also to prevent peripheral conversion of T4 to T3. These drugs were also continued in postoperative period to prevent thyroid storm postoperatively and to control symptoms of hyperthyroidism and tapered gradually.

General anaesthesia should be considered in patients of uncontrolled hyperthyroidism requiring emergency surgery as general anaesthesia provides less fluctuations in hemodynamic parameters and the patient is sedated.

Sympathetic stimulation should be avoided in perioperative period. Propofol and ramifentanyl are beneficial as they lower heart rate and blood pressure.^{6,7} Arterial catheter was inserted for continuous blood pressure monitoring. Central venous line was secured in case thyroid storm occurs which may require large volume resuscitation in this patient.^{8,13} Regional anaesthesia can be performed safely if there are no signs of cardiac failure.¹⁵ In the present case there were no signs of cardiac failure but the patient had tachypnoea so a decision to proceed with general anaesthesia with central venous catheterization and invasive blood pressure monitoring was made.

Conclusions

Uncontrolled hyperthyroidism in pregnancy is associated with high morbidity and mortality in both mother and foetus. Successful anaesthetic management of uncontrolled hyperthyroid patient for emergency caesarean section under general anaesthesia can be done by giving antithyroid agents, beta blockers, dexamethasone preoperatively to inhibit peripheral conversion of T4 to T3 and to control symptoms of hyperthyroidism. In patients with poorly controlled hyperthyroidism labour, delivery or caesarean section can precipitate life threatening thyroid storm. Early detection and adequate preparedness for management of thyroid storm should be there to avoid rapid deterioration.

Acknowledgment

None.

Competing interests

The authors declare that they have no competing interests.

Abbreviations

Beats per minute: bpm;

Blood pressure: BP;

Heart rate: HR;

Three times a day: TID;

Triiodothyronine: T3;

Thyroxine: T4;

Thyroid stimulating hormone: TSH.

Authors' contributions

All authors read and approved the final manuscript. All authors take responsibility for the integrity of the data and the accuracy of the data analysis.

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Availability of data and materials

The data used in this study are available from the corresponding author on request.

Ethics approval and consent to participate

The clinical case report did not interfere with the process of diagnosis and treatment of patient and the patient signed an informed consent form.

Consent for publication

By submitting this document, the authors declare their consent for the final accepted version of the manuscript to be considered for publication.

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