

# Perioperative Management of Thyroidectomy After a Failed Antithyroid Therapy in a Resource Limited Setting: A Clinical Case Report

This article was published in the following Dove Press journal:  
*Open Access Surgery*

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**Background:** Thyroidectomy is the most common endocrine surgical procedure being performed throughout the world. Thyroidectomy in a non-controlled or poorly controlled toxic state may lead to thyroid storm. But, if surgery is the only option all precautions with detail risk-benefit analysis involving a multi-disciplinary team is mandatory.

**Case Presentation:** A 24-year-old female patient who had anterior neck swelling of 4 years duration was taking antithyroid medication of a varying dose for the past 2 years. However, there was no improvement in the clinical feature and deranged biochemical tests. Subtotal thyroidectomy was performed.

**Conclusion:** Even though there are challenges of performing surgery in non-euthyroid patients in a resource-limited area, poor adherence, failure of antithyroid therapy due to long duration of therapy with side effects and complications with persistent toxic state necessitate surgical intervention. The thyroidectomy procedure was performed uneventfully with the available resources after careful risk-benefit analysis. There was no apparent perioperative complication.

**Keywords:** thyrotoxicosis, failed antithyroid therapy, perioperative

## Background

Thyroidectomy is among the most commonly performed endocrine surgical procedure worldwide.<sup>1</sup> Hyperthyroidism, characterized by the suppression of pituitary thyroid-stimulating hormone (TSH) and increased levels of thyroxine (T4) and/or triiodothyronine (T3) usually managed medically with antithyroid medication, radioiodine therapy, and surgery. When surgery is an option, the primary goals before surgery are creating a clinical and biochemical euthyroid state, assessing the degree of end-organ complications, and determining the extent of airway involvement.<sup>2,3</sup>

The necessity for surgery may be attributed to the fact that antithyroid drugs were beyond the reach of some of these patients because of the cost. Apart from the cost, failure of antithyroid therapy can result from non-adherence on the medication by patients due to the long duration of therapy and side effects. The availability of radioiodine therapy was also among the factors that determine the decision to undergo surgery. To ameliorate these effects, there may be a need to operate on a non-euthyroid patient as long as precautionary measures are taken to prevent a thyroid crisis.<sup>4</sup>

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We are presenting perioperative management of thyroidectomy for a patient with thyrotoxicosis manifestations despite adherence to treatment with the recommended antithyroid medication for more than 2 years. This case report was prepared following the CARE checklist.

## Case Presentation

A 24-year-old woman was presented with anterior neck swelling of 4 years duration associated with hot intolerance, sweating, palpitation, and tremor. Her pulse rate was 96 beats per minute. Baseline thyroid function tests revealed a decreased TSH and increased T4 and T3 levels. She took antithyroid treatment, propylthiouracil (PTU) 100mg PO TID, and propranolol 40mg PO/day, which was ordered by a senior surgeon. However, there was no improvement in the clinical feature which was confirmed by deranged biochemical tests on her follow up after 6 months of treatment. The decision was made to continue the medications for an additional 6 months but no improvement was seen. Despite being on antithyroid medication; PTU was escalated to 200mg PO TID; and carbimazole 20 mg PO BID added, for two years, there was no improvement in clinical and biochemical status.

The patient had no history of medication discontinuation but started to complain of nausea and vomiting. Furthermore, left ventricular hypertrophy, hypertension, and cost affordability complain from patient necessitate a decision for surgical intervention despite, the presumed perioperative complications associated with anesthesia and the surgical procedure. Risk and benefit analysis was done by a senior general surgeon and consultant anesthetist since there was no endocrinologist in the hospital.

A thorough preoperative assessment revealed a history of hot intolerance and significant weight loss. She had a Mallampati Class II, Thyromental distance > 6.5 cm, jaw slide class A, and a full range of motion of the neck movement with no restriction. She had no thyroid bruit or congestive eye signs. There was a 4×5cm single nodule anterior neck mass which was firm and moves with swallowing on the anterior neck. Her Metabolic equivalent test (MET) also performed preoperatively and it was greater than seven<sup>7</sup> and had good exercise tolerance. The laboratory result for thyroid function test (TFT) shows TSH <0.002μ IU/mL, T4 =19.18 μg/dl, and T3 = 3.59 ng/mL on her initial hospital visit, the subsequent TSH level were all below 0.2μ IU/mL. The set up lacks some of the investigations like echocardiography and Thyrotropin

receptor antibodies. Written informed consent was taken from the patient and her family according to the hospital protocol.

After psychological reassurance and premedication standard monitoring was attached and baseline vital signs were taken and are within the normal range. Then, a bilateral superficial cervical plexus block was done by the senior anesthetist using 20 mL of 0.25% bupivacaine before the induction of anesthesia. The patient was induced using thiopentone 300mg, suxamethonium 120 mg, pethidine 50 mg, plain Lidocaine 60mg, Diclofenac 75 mg IM. She was intubated by a senior anesthetist uneventfully with a single attempt using a 7 mm ID sized Portex ETT and external manipulation of the neck was avoided. Pressure points were padded and the eyes taped. Anesthesia was maintained by Vecronium (4 mg), halothane (1–1.5%). The vital sign during skin incision and intraoperative time were within the normal range.

Subtotal thyroidectomy was preferred over total thyroidectomy, provided that there was no available monitoring facility to control calcitriol and calcium level. The surgery took 45 minutes and the total duration of anesthesia was 1 hr. Total intra-operative blood loss was 200 mL, urine output of 300 mL, and a total of 500 mL intravenous 0.9% normal saline was given to the patient. Postoperatively, the patient was followed at PACU and wards until discharge. There was no complication happened during the whole postoperative period. Additionally, she is on medical follow up and get free of the toxic features. Currently, she is working on her daily activity without any limitations. Consent for publication of this report was taken from the patient and it was in a written form.

## Discussion and Conclusion

Our report presents a hyperthyroid patient who was on antithyroid medication for two years but failed to achieve a euthyroid state both clinically and chemically. There are three treatment options for this case; Medical treatment, surgical intervention, and radioiodine therapy. Medical treatment consists of antithyroid drugs (propylthiouracil, methimazole, or carbimazole), potassium, or sodium iodide. Beta-adrenergic agonists are often used to counteract the sympathetic effect. Lugols iodine solution which was helpful to achieve euthyroidism and decrease vascularity was not available. Radioiodine therapy, which destroys thyroid cell function<sup>4</sup> is not readily available in our hospital. In our case, a combination of antithyroid drugs (initially propylthiouracil and then changed into carbimazole), and

a beta-blocker (propranolol) were given for two years but did not relieve the symptoms of thyrotoxicosis, and thyroid hormone levels remained high.

Serum TSH measurement has the highest sensitivity and specificity of any single blood test used in the evaluation of suspected thyrotoxicosis and should be used as an initial screening test. However, when the thyrotoxicosis is strongly suspected, diagnostic accuracy improves when a serum TSH, free T4, and total T3 are assessed at the initial evaluation.<sup>5</sup> Our patient was initially evaluated with serum TSH, free T4, and total T3 level because she had toxic manifestations during her initial evaluation. But, consecutive follow up was done by serum TSH level, which is the hospital's protocol in follow up of patients with thyrotoxicosis. Additionally, our set up lacks most of the investigations including echocardiography, and thyrotropin receptor antibodies. Left ventricular hypertrophy with or without hypertension is one of the echocardiography and electrocardiogram findings among patients with uncontrolled thyrotoxicosis<sup>6</sup> which were evident in our case.

There has been a possibility to perform thyroidectomy without increased risk of thyroid storm or perioperative complications in patients with Graves's disease or when non-euthyroid patients cannot tolerate antithyroid drugs<sup>7,8</sup> the patient should be adequately treated with beta-adrenergic blockade, potassium iodide, glucocorticoids in the immediate preoperative period. Gaining the patient's confidence, adequate premedication, and a quiet environment are also crucial before the induction of anesthesia. In our patient, intravenous dexamethasone 8 mg was administered one hour before the induction of anesthesia. However, short-acting  $\beta$ -blockers and potassium iodide were not available. Considering the importance of a multidisciplinary team during the whole perioperative period,<sup>2,9</sup> a surgical team had a meeting before the day of surgery regarding the overall management plan but there is no endocrinologist in our hospital. Subtotal thyroidectomy was performed by a General Surgeon with 6 years of experience whereas a consultant anesthetist with 4 years of experience provided perioperative anesthetic care. Total thyroidectomy is a gold standard according to recent evidence in preventing the risk of recurrences and postoperative thyroid function.<sup>10,11</sup> But, the risk of hypoparathyroidism is higher in total thyroidectomy, besides monitoring of serum calcitriol and calcium level is mandatory during the postoperative time.<sup>12</sup>

Thyroid storm in poorly controlled thyrotoxicosis can be triggered by anesthesia, surgery, and manipulation of

the thyroid gland. Therefore, external manipulation of the neck during intubation should be avoided and intubation should be effortlessly performed.<sup>4,13</sup> Magnesium sulfate seems to be a useful drug by reducing the incidence and severity of dysrhythmias caused by catecholamines<sup>4</sup> so that we had prepared it but there were no such complications encountered. Invasive blood pressure measurement is highly recommended in non-euthyroid cases.<sup>2</sup> Having no arterial catheterization equipment in our set up, we just relied on non-invasive blood pressure measurement and other standard monitoring.

Thiopental, used for induction of anesthesia in this patient, is an agent of choice because; it possesses some antithyroid activity at high doses.<sup>4</sup> In our setup, the safest short-acting opioids were not available for tracheal intubation and maintenance of intraoperative analgesia. The only available opioid was pethidine and we have used it in a small single dose (50mg). Besides, bilateral superficial cervical plexus block (SCPb) was done before induction and plain lidocaine 60mg was given to blunt hemodynamic response to laryngoscopy.

In conclusion, it is challenging to perform a risky surgical procedure on a non-euthyroid patient where resources are limited. However, surgery was the only option in our case which was attributed to poor adherence and failure of antithyroid therapy due to the long duration of therapy and side effects. Furthermore, the patient was unable to afford the antithyroid drugs because of the cost. The thyroidectomy procedure was performed uneventfully with the available resources after a careful risk-benefit analysis. There was no apparent perioperative complication.

## Abbreviations

BID, Twice In a Day; DBP, Diastolic Blood Pressure; ECG, Electro Cardio Gram; HR, Heart Rate; NIBP, Non-Invasive Blood Pressure; PACU, Post Anesthesia Care Unit; PTU, propylthiouracil; T3, triiodothyronine; T4, thyroxine; TID, Triple in a Day; TSH, Thyroid-stimulating hormone; SBP, Systolic Blood Pressure; Spo2, Arterial oxygen saturation.

## Data Sharing Statement

Authors are willing to share the data upon requests.

## Consent for Publication

Informed consent was taken from the patient for publication of this report.

## Acknowledgment

We would like to acknowledge the staff of the department of surgery, and anesthesiology for their professional support during the patient treatment. We would also like to acknowledge individuals who supported us during the write-up of this case report.

## Disclosure

The authors have no conflicts of interest to declare for this work.

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