

# Anaesthetic Challenges In An Untreated Grave's Disease Parturient Undergoing Emergency Caesarean Section

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## ABSTRACT

**Background:** The evaluation and management of hyperthyroidism in pregnancy is challenging to perioperative care givers. The objective of this report was to demonstrate the role of single shot spinal anaesthesia in managing the haemodynamic challenges associated with untreated Graves' disease in pregnancy.

**Method:** Following a 500mls preload with normal saline, patient received 10mg of plain bupivacaine in the lateral position. Continuous monitoring of blood pressure, pulse rate, ECG, temperature, oxygen saturation was carried out throughout the procedure and into the post-operative period. Hypno-sedation was applied as required.

**Results:** At the end of surgery, there was a decrease in the pulse pressure from 94mmHg to 81mmHg. Also the pulse rate decreased from 156beats/min to 121beats. Patient was transferred to the Intensive Care Unit for a few days and subsequently discharged and followed up in the Medical out-patient clinic.

**Conclusions:** Uncontrolled Hyperthyroidism co-existing with pregnancy is very challenging to perioperative care givers. However surgery can be safely performed using a single-shot spinal anaesthesia with bupivacaine and hypno-sedation in addition to the application of background disease pathophysiology and complications in managing the associated haemodynamic challenges.

**Keywords:** Hypno-sedation, hyperthyroidism, spinal anaesthesia, caesarean section

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## INTRODUCTION

Thyroid diseases affect 1-2% of women in the reproductive age and not unexpectedly, found to be common among parturients. However, hyperthyroidism complicates about 1-2 in 1000 pregnancies.<sup>1, 2</sup> About 50% of the affected women have a positive family history of autoimmune thyroid disease.<sup>3</sup> Many of the physiologic changes in pregnancy, especially the hypermetabolic changes, mimic thyroid disease and abnormal thyroid function. It is therefore essential to carefully evaluate

pregnant women suspected to have thyroid disease clinically and interpret laboratory results with caution. The prevalence in Nigeria is however unknown.

The classical features of Graves' disease including skin and eye manifestations are easily identified by trained clinicians and the diagnosis is commonly made on clinical grounds as well as on the basis of laboratory or hormone profile results. Treatment is usually commenced before, and continued during and after pregnancy. Presentation with hyperthyroidism is uncommon in modern obstetrics unless medical care is lacking from primary to tertiary levels in the community. The adverse effects of uncontrolled or poorly treated hyperthyroidism on pregnancy include congestive cardiac failure, preterm labour, pre-eclampsia, foetal growth restriction, foetal death and thyroid storm.<sup>4</sup>

One of the most difficult challenges faced by perioperative care providers including obstetricians and anaesthetists is the evaluation and management of hyperthyroidism in the pregnant patient. It is more challenging when a thyrotoxic parturient needs to be delivered by an emergency caesarean section. In this report we present an unregistered pregnant woman with suspected Graves' disease and thyrotoxicosis who presented with an impacted transverse lie necessitating an emergency caesarean section.

## CASE REPORT

The patient was a 33-year-old trader, Gravida 5 Para 1<sup>+3</sup> who presented as an unbooked emergency to the Obstetric Unit of the University of Port Harcourt Teaching Hospital (UPTH) with a 3-day-history of absence of fetal movements and vaginal bleeding with amniorrhaxis, and a neck swelling of 3-years duration. She did not receive antenatal care and was managed by a traditional birth attendant (TBA) before presenting at the labour ward of the UPTH. There was no fever or loss of consciousness.

She first noticed the neck swelling 3 years earlier. It was initially about the size of a coin but grew progressively over the 3 year period to its present size occupying the breadth of her neck. There was no pain, dysphagia or dyspnoea. She was intolerant of heat and sweated excessively. There were associated irritability, restlessness, weakness, tremor, palpitation, diarrhoea and polyphagia with progressive weight loss. She did not comply with treatment and follow-up for the thyroid disease for more than 30 months prior to presentation. She had a spontaneous vaginal delivery of a male baby at home 3 years earlier without complications.

Clinical examination revealed an anxious, ill-looking lady in painful distress. She had exophthalmos and an obvious neck swelling. She was plethoric, anicteric, warm to touch, not

dehydrated, acyanosed, had no peripheral lymphadenopathy or finger clubbing but she had fine tremors and bilateral pitting oedema up to the level of the mid-thigh.

The anterior neck swelling measured about 6 x 10 cm involving two-thirds of the anterior neck. It was firm, smooth, non-tender and moved with deglutition but not on protrusion of the tongue. A bruit was heard over the swelling. There was exophthalmos, lid lag and lid retraction (Figure 1). She was conscious and alert, well oriented in time, person and place. There was no sign of meningeal irritation and she had normal muscle tone, power and tendon reflexes. Her pulse rate was 160 beats per minute, large volume with a bounding character. The blood pressure was 160/90 mmHg, with a pulse pressure of (70mmHg), the apex beat was at the fifth left intercostal space, mid clavicular line and was heaving. Her heart sounds were normal (I and II only)

The respiratory rate was 28 cycles per minute, her trachea could not be felt, chest expansion was symmetrical, tactile fremitus was normal, percussion notes were resonant, breath sounds were vesicular and vocal resonance was normal. Airway examination revealed a supple neck with adequate mouth opening and a Mallampati score of airway was classification II. There were no loose teeth or dentures. The uterus was 34 weeks size with the dead foetus in impacted transverse lie.

A diagnosis of intrauterine foetal death, impacted transverse lie and untreated thyrotoxicosis in an unbooked primipara at term was made. Her packed cell volume was 40 %, serum electrolytes, urea and creatinine were within reference values. Bed side clotting time was 4 minutes. Urinalysis showed no proteinuria. She was resuscitated with intravenous fluids, started on intravenous antibiotics (i.e. 1g ceftriazone and metronidazole 500mg) and was planned for an emergency Caesarean section under spinal anaesthesia with hypno-sedation (ASA IIIIE). She received intravenous magnesium sulphate, 4g slowly over 15 minutes for blood pressure control.

In theatre her pulse rate was 156 beat per minute; Blood Pressure 219/125 mmHg [severe BP elevation]; and SpO<sub>2</sub> 98%. After a 500 ml 0.9% normal saline preload with the patient in the left lateral position, a subarachnoid block was instituted with 10mg of plain bupivacaine. Intra-operatively she was given i.v pentazocine 60mg, i.v lidocaine plain 200mg, i.v hydralazine 5mg plus 15mg in 200mls of normal saline, i.v thiopentone 60mg. Intravenous oxytocin 5units was administered following the extraction of the foetus while supplemental oxygen at 8 litres per minute continued throughout the intraoperative period.

Intraoperatively the mean arterial blood pressure was maintained between 90 mmHg and 110 mmHg. A 1.8kg macerated male baby was delivered. Surgery lasted 45 minutes with an estimated blood loss of 800mls. She received a total of 3000 ml of normal saline and made adequate urine (250ml). Blood pressure at end of surgery was 167/86mmHg, pulse rate 121beats per minute, peripheral oxygen saturation was 99%.

Postoperatively, she was transferred to the Intensive Care Unit where she was managed with alpha-methyl dopa 500 mg thrice daily, intravenous propranolol 80 mg 12 hourly, i.v carbimazole 60 mg daily and i.v diazepam 5 mg 12 hourly. Further

confirmatory Thyroid Function Tests (TFTs) investigations carried out were Total T4/Serum Thyroxine, Free T4/Free thyroxine FT4, T3/Serum Triiodothyronine and Thyroid Stimulating Hormone (TSH)/Serum Thyrotropin. T4 was only slightly elevated, and T3 was markedly elevated, while TSH was undetectable. She was however discharged home with blood pressure of 140/90mmHg. and counseled on the need for further evaluation, treatment and regular follow-up at the Medical out-patient clinic.

## DISCUSSION

In our environment, the diagnosis of hyperthyroidism can be particularly challenging during pregnancy especially in patients presenting for non-thyroid surgeries.<sup>5, 6</sup> In addition to the lack of well-established thyroid function reference ranges in pregnancy, symptoms of fatigue, heat intolerance, and tachycardia are common to both conditions.<sup>7</sup>

It is well known that no hyperthyroid patient should be scheduled for elective surgery without attaining a euthyroid state.<sup>8</sup> It is usual that the patients present for surgery with a treatment consisting of antithyroid agents and/or beta adrenoceptor blockers, with some level of control several weeks or months before. This may be reduced to 7-10 days if necessary according to the half-life of free T4.<sup>8</sup> The investigation of such patients for emergency surgery in our setting is difficult considering the cost implication, non-availability of reagents and the clinical state of the patient.<sup>6</sup>

The patient in this report, though diagnosed hyperthyroid about 3 years prior to presentation, probably due to poverty and ignorance, declined drug treatment and resorted to a traditional healer for the management of her thyroid disease and even for her pregnancies and deliveries. She however presented in the active phase of labour with a transverse lie which necessitated the need for an emergency caesarean section under spinal anaesthesia. The emergency setting of her presentation could not allow for proper clinical investigation and treatment before surgery. The conduction of tracheal anaesthesia in such thyrotoxic parturient could be very challenging to the attending anaesthetist.

Parturients with massive thyroid swelling like our patient could pose difficulties during general anaesthesia. Such difficulties could include difficult tracheal intubation (a neck swelling that may interfere with clear visualization of the larynx, or prevent normal passage of the tracheal tube); the potential for severe hypertensive response to laryngoscopy and tracheal intubation; and the impairment of intervillous blood flow by positive pressure ventilation.<sup>9</sup> The goals of anaesthesia in such patients include adequate assessment of the airway prior to induction of general anaesthesia, preparation for blunting haemodynamic effects, and maximizing oxygen delivery for mother and baby. In the face of a potentially difficult tracheal intubation, the anaesthetist's first obligation is aimed at removing further risks from the mother. The surgery in our patient however was amenable to the use of regional anaesthesia.

A careful airway assessment (direct laryngoscopy following local anaesthetic sprays) is usually required to determine whether general anaesthesia can be induced prior to securing the airway or after (awake intubation). These decisions may be

challenging as they are often made in the presence of significant foetal distress (cardiac dysrhythmias). Whenever possible, general anaesthesia should be avoided in parturients with difficult airways. The consequences of a sudden hypertensive crisis under general anaesthesia include intracranial haemorrhage, myocardial ischaemia and arrhythmias and pulmonary oedema thereby increasing the morbidity in the woman.

In general, a better approach in abdominal surgery for an uncontrolled hyperthyroidism patient would be to combine general anaesthesia with a regional technique.<sup>10</sup> On some occasions the regional technique alone, spinal or epidural, has allowed suitable anaesthetic and surgical management in urgent surgeries such as diagnostic laparotomies and caesarean sections.<sup>11</sup> The decision to administer spinal anaesthesia on our patient was based on several factors. First, the neuraxial block in this patient prevented airway manipulation which could have further put her life at risk. The thyroid mass could cause a deviation of the trachea from the midline, making laryngoscopy and tracheal intubation more difficult. Second, the use of this technique avoided the haemodynamic responses associated with laryngoscopy and tracheal intubation. A further rise in the arterial blood pressure was thus prevented with the use of spinal anaesthesia in our patient.

The spinal anaesthesia synergistically with other agents was used to prevent further rise in the blood pressure. One of such agents used was magnesium sulphate which is well known for its potent vasodilator effect with minimal myocardial depression.<sup>12</sup> Magnesium produces a dose-dependent depressant effect on cardiac contractility and this is offset by lowering the peripheral vascular resistance while maintaining cardiac pump function.<sup>13</sup> The possible mechanisms for reduction of the anaesthetic requirements include antagonism of NMDA receptors in the CNS by magnesium, and reduction of catecholamine release by sympathetic stimulation, thus decreasing peripheral nociceptor sensitization or the stress response to surgery.<sup>14,15</sup> Intravenous magnesium may be a good agent for deliberate hypotension since it acts as a vasodilator by increasing the synthesis of prostacyclin, and also inhibits the angiotensin converting enzyme

The biochemical mechanisms of clinical progression from an uncontrolled hyperthyroidism to thyrotoxic storm remain unclear.<sup>16</sup> Among all factors that affect the probability of thyroid storm development is thyrotoxic severity and duration, the patient's nutritional state and the magnitude of the precipitating factors.<sup>17</sup> Thyroid storm is a rare and potentially fatal condition with presentations including cardiovascular manifestations.<sup>18, 19</sup> Cardiovascular manifestations, including tachycardia, atrial fibrillation or flutter, systolic hypertension and even heart failure, are some of the characteristic symptoms and signs of hyperthyroidism and could be fatal in cases of thyroid crisis.<sup>19</sup>

Arrhythmias especially, can be present even in the euthyroid pre-operative patient.<sup>10</sup> The cardiovascular consequences such as high blood pressure and tachy-arrhythmias in our patient were controlled with the use of magnesium and intravenous plain lidocaine, based on the direct cardiac depressant and peripheral vasodilatory effects of lidocaine.<sup>15,20</sup> The arrhythmia of thyrotoxicosis is commonly atrial fibrillation(SVT) or sinus

tachycardia. The tachycardia associated with thyrotoxicosis is often controlled with  $\beta$ -blockers. The local anaesthetic agent was found to be very effective in attenuating the haemodynamic anomalies found in our patient during the surgery.<sup>21</sup> Intravenous lidocaine is appealing as a simple and inexpensive method to gain the same benefits than more invasive and costly techniques in reducing the haemodynamic responses.

One of the challenges of anaesthesia in poor resource settings like ours is managing a patient with a morbid condition with minimal time for stabilization before surgery. Our patient discontinued clinical treatment for the thyroid disease rather had alternative therapy by a traditional healer. A variety of factors can influence why patients discontinue their treatment. Cost of treatment could have major impact on the patient's treatment and follow-up. Similarly, associated costs such as transportation and distance from hospital or "opportunity costs" such as having to for-go a day's pay, are other more structural factors.

Social, cultural and psychological influences could also be factors. Perceptions of disease severity, susceptibility and the benefits or disadvantages of staying on treatment are keys in determining clinical attendance. The belief in "miraculous healing" or use of alternative medicine to treat thyrotoxicosis can also influence the treatment and follow-up patterns.

In general, anaesthetic management of a parturient with uncontrolled hyperthyroidism for urgent lower segment caesarean section does not include previous optimization of the hyperdynamic and hypermetabolic states, as there may be no time to make the parturient pharmacologically euthyroid. Such clinical presentation rather tasks the competence of the attending Anaesthetist. Uncontrolled hyperthyroidism in pregnancy exposes the parturient to avoidable risks. Our patient had successful surgery under spinal anaesthesia. She was discharged home following adequate optimization and counseling by the Medical Team.

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**Fig. 1: Showing the Parturient with Grave's Disease**