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**TOTAL THYROIDECTOMY: A VIABLE OPTION IN THE MANAGEMENT OF HYPERTHYROIDISM IN A RESOURCE CONSTRAINED SETTING**

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**TOTAL THYROIDECTOMY: A VIABLE OPTION IN THE MANAGEMENT OF HYPERTHYROIDISM IN A RESOURCE CONSTRAINED SETTING**

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**ABSTRACT**

**Objective:** Although total thyroidectomy was initially thought to be fraught with complications, adequate training and exposure ensure the safety of this procedure which is beneficial in areas where patients' access to good surgical and follow-up care is limited This study aims to describe our experience with total thyroidectomy as the treatment of hyperthyroidism as well as the clinical outcome in the University College Hospital (UCH), Ibadan, Nigeria.

**Design:** This is a retrospective study.

**Setting and Subjects:** This is a review of the records of all patients who had total thyroidectomy for variable forms of toxic goiters in the Endocrine Surgery Division of UCH, Ibadan, Nigeria between January 2001 and December 2015.

**Intervention:** All the patients who had Graves' disease, toxic multinodular goiter, toxic solitary adenoma had total thyroidectomy.

**Outcome:** Reviewed outcomes were mean hospital stay and the incidence of post-operative complications.

**Results:** 652 total thyroidectomies were performed for different pathologies of the thyroid gland. Of these, 149 (22.8%) were for cases of hyperthyroidism consisting of male 16 (15.9%) and female 133 (84.1%). The median hospital stay was for 4 days (range 3-11 days). There was no permanent recurrent laryngeal nerve injury. Nine patients developed variable forms of hypocalcaemia. Only 1.3% of our patients required a peri-operative tracheostomy.

**Conclusion:** We recommend total thyroidectomy to be the first option in the surgical management of patients who have hyperthyroidism

## INTRODUCTION

Hyperthyroidism is defined as the excessive production of thyroid hormones, thus leading to inappropriately elevated serum levels of iodinated thyroid hormones which result in an accelerated metabolic rate.<sup>1</sup> Graves' disease, aptly described, albeit independently by the duo of Robert James Graves in Dublin Ireland and Carl Adolph Basedow in Merseburg Germany in 1835 occurs in between 60-80% of patients with hyperthyroidism,<sup>2,3</sup> while toxic multinodular goiter (Plummer's), solitary toxic adenoma, medication (amiodarone) associated hyperthyroidism and thyroiditis all account for most other causes of hyperthyroidism<sup>(4)</sup>. Anti-thyroid drugs (ATD), radioactive iodine (RAI) along with surgical ablation are all viable options in the management of symptomatic hyperthyroidism.<sup>(4)</sup> Literature however suggests that geographic and economic factors, goiter size, patient preference, disease severity, co-existing morbidity, associated ophthalmopathy and expertise are all amongst the deciding factors which determine the treatment modality plans deployed in the management of these patients<sup>2,3,4,5,6,7, and 8</sup>.

Thyroidectomy has lower failure rates than RAI or ATD. Surgery as a modality of treatment for Hyperthyroidism may be performed with the intent of preserving thyroid function or ablating thyroid function. The surgical options of managing hyperthyroidism have oscillated between sub-total thyroidectomy (bilateral 3 gram thyroid remnant- Enderlen- Hotz procedure) or (a unilateral 7gram thyroid remnant- Hartley-

Dunhill procedure), a near total thyroidectomy (1 gram of thyroid remnant) and a total thyroidectomy in the last century and a half<sup>3,9,10, 11, 12</sup>. Of significance also are the refinements in surgical expertise, anaesthesia and asepsis over the ages.<sup>2, 13</sup>

The controversy on the best surgical option in the management of hyperthyroidism still rages on till date.<sup>10</sup> The arguments for or against the choice of the appropriate surgical procedure majorly revolve around the peri-operative complications and risk profile of the extent of thyroidectomy; risk of recurrence and inevitable hypothyroidism.<sup>10, 11</sup> In the resource constrained setting; these are to be balanced with institutional limitation in the context of prevailing clinical and economic circumstances and available resources.<sup>8</sup> At the start of the new millennium, total thyroidectomy became the preferred procedure of choice in the management of patients with hyperthyroidism,<sup>9, 14, 15, 16</sup> with a low peri-operative complication profile as a prerequisite.<sup>3</sup> Our surgical unit imbibed this as the standard of care in the management of the patients with hyperthyroidism. This choice is based on the premise that the balance between an appropriate one stop surgery with its potential outcomes and the setting in which the surgical practice is situated must be considered at all times. Although total thyroidectomy has been associated with increased risk of complications, increasing experience with better training has significantly reduced complication rates in total thyroidectomy. This study aims to describe the clinical outcome of total thyroidectomy in the University College Hospital, Ibadan, Nigeria.

## MATERIALS AND METHOD

This is a retrospective review of all patients who had total thyroidectomy in Endocrine surgical division of the Department of Surgery, UCH, Ibadan, Nigeria between January 2001 and December 2015. All patients who had total thyroidectomy for Graves' disease, toxic multinodular goiter, toxic solitary adenoma were included while we excluded all cases of partial removal of the thyroid gland and those who had total thyroidectomy for other indications. Data was extracted from a thyroid data base that was generated from patient's case folders, operative theatre records and histopathology reports. All procedures were performed by consultant endocrine surgeons in a general surgery specialty division of Endocrine surgery. The data analyzed include bio-demographic details, clinical features, clinical diagnosis, histology, post-operative complications using SPSS version 17.0. The data were analyzed using descriptive analysis for both the categorical and continuous variables.

**Pre-operative Protocol:** Following a full clinical and biochemical review, we generated two categories of patients. Category A (uncontrolled or poorly controlled symptomatic hyperthyroidism patients) and Category B (well controlled hyperthyroidism patient in remission). Category A patient had a modified Wayne's prognostic index score which is a unique constellation of noted symptoms and signs of toxicity at presentation along with a baseline thyroid function test. They were commenced on Carbimazole and Propranolol for between-four and six weeks following which they were reviewed for clinical and biochemical remission. Patients with ophthalmopathy were referred to the ophthalmologist for

management at this point. When toxicity was controlled, they were migrated to Category B which consisted strictly of patients in remission. The patients who were referred from the Endocrine medical unit for surgical intervention after medical therapy were put in Category B group. It was from Category B that patients for surgery were continually drawn from. The Category A patients were moved to Category B once remission was attained. The pre-operative test for surgically fit patients at this stage included radiographs of the chest, neck and thoracic inlet, serum calcium and phosphate, ultrasound guided fine needle aspiration for cytology, along with size, morphological delineation and relationship of the thyroid gland to contiguous structure. Direct or indirect laryngoscopy was undertaken by the otorhinolaryngologist. Our goal was to ensure surgical intervention within the shortest possible time once control of hyperthyroidism was achieved.

**Peri-operative Protocol:** We performed total thyroidectomy as described by Delbridge et al,<sup>17</sup> this entails capsular dissection of both lobes of the thyroid gland, with eventual shaving off the trachea, with the removal of the pyramidal lobe if present. The recurrent laryngeal nerve was identified at the Berry's ligament only. The orthotopically placed parathyroid glands were also identified. We minced and re-implanted any inadvertently removed or devascularised parathyroid gland in the ipsilateral sternocleidomastoid muscle. The endotracheal tube was removed immediately after surgery. Serum calcium and phosphorus were assayed at 48hours post operatively or if indicated clinically, before then. With commencement of L-thyroxine at 1-2microgram per kg the patients were discharged home 72hrs after surgery. Out-patient care was scheduled for two and six

weeks to (ascertain the adequacy of l-thyroxine dose) and 12 weeks to ascertain if any peri-operative complications (hoarseness, voice fatigue, reduced clarity, hypocalcaemia etc.) had resolved or not. Symptoms exceeding 6 months were classified as permanent and managed appropriately.

## RESULTS

Over a 15year period spanning between January 2001 and December 2015; a total of 652 total thyroidectomies were performed for different pathologies of the thyroid gland. Of

these, 149 (22.8%) were for cases of hyperthyroidism. The gender consisted of male 16 (15.9%) and female 133 (84.1%) with a male to female ratio of 1:8.3. The average age of patients was 34.8+/- 9.4 years (range 18-73 years). The duration of symptoms was between 6 weeks and 14 years (median duration of 11 months) with Graves and solitary toxic adenoma accounting mostly for the lower end of the wide spectrum of duration while toxic multinodular goiter occurred mostly in those that had a longer duration of symptoms. Table 1 shows the clinical diagnosis.

**Table 1**  
*Clinical diagnosis*

Clinical Diagnosis	No (%)
Grave's Disease	78(52.4)
Toxic Multinodular Goiter	51(34.2)
Solitary Toxic adenoma	13(8.7) 7(4.7)
<b>Total</b>	<b>149</b>

The predominant complaints were heat intolerance, weight loss despite increasing appetite, insomnia and exophthalmos. Approximately a third of the patients had a goiter size of at least Grade 2, this occurred more in the TMNG group. The mean thyroid

gland weight differed along the lines of clinical diagnosis with TMNG accounting for gland weight above 180grammes. The indications for surgical intervention are listed in Table 2.

**Table 2**  
*Indications for surgery*

<b>Indications</b>	<b>No (%)</b>
Relapse following ATD	18(12.1)
Patient preference	60(40.3)
ATD toxicity	6(4.0)
Poor ATD compliance	14(9.4)
Nodular goiter	51(34.2)
Compressive symptoms (TMNG)	19(12.8)

Only 2 (1.3%) patients with TMNG had an emergency tracheostomy instituted in the peri-operative period setting because of post-operative stridor. The median hospital stay was for 4 days (range 3-11 days). There was no case of reactionary hemorrhage or permanent recurrent laryngeal injury. Hoarseness, reduced voice clarity, and voice fatigue seen in 27 patients (18%) occurred

more in the TMNG than the Graves or STA groups. Hypocalcaemia occurred in 9 patients (6.0%) with complete resolution by the 12<sup>th</sup> week post operatively in all the patients. Non-compressive hematoma and non-suppurative cellulitis was noted in 19 (12.8%) and 2 (1.3%) patients respectively. The post-operative complications are listed in Table 3.

**Table 3**  
*Post-operative complications*

<b>Post-operative complications</b>	<b>No (%)</b>
Hematoma	0
Compressive	14 (9.4)
Non-compressive	19(12.8)
Seroma Hypocalcaemia	9(6.0)
Transient	1(0.7)
Permanent	
RLN palsy	6(4.0)
Temporary	0
Permanent	0
Bilateral	
Voice related issues	27(18.1)
Tracheomalacia	2(1.3)
Recurrence of hyperthyroidism	0
<b>Non-suppurative Cellulitis</b>	<b>2(1.3)</b>

Outpatients clinic follow up peaked- 131 patients (88%) by the fourth month post operatively and declined to 27 patients (18%) by the 11<sup>th</sup> month after surgical discharge. Immediate response to infiltrative ophthalmopathy was noted in 13 patients (8.5%). About 20 patients (13.5%) alluded to compliance issues (skipped or missed dose),

while 8 patients (5.4%) had intermittent delays in procurement of *l*-thyroxine. In 11 patients (7.4%) amenorrhea (of pregnancy) necessitated increasing the dose of *l*-thyroxine as instructed appropriately. No peri-operative mortality occurred in the patients.

## DISCUSSION

The need to intervene either medically (ATD), surgically or with radioactive iodine treatment in the management of hyperthyroidism is not in doubt; however, the optimal treatment is dependent not only on the disease, but also on the patient and available expertise. This is because all modalities of treatment have known advantages and disadvantages in particular circumstances<sup>8</sup>. A multidisciplinary approach wherein the best suited option for each individual patient is decided by all specialties is the ideal way to treat patients rather than aspiring for the 'ideal' treatment modality.

Thyroidectomy has been found to lead to the least rate of relapse<sup>18</sup> and is also the preferred in the face of contraindications to either of ATD or RAI in managing patients with hyperthyroidism. A subject for debate however is the extent of surgery<sup>3, 4, 12</sup>; sub-total thyroidectomy was traditionally the preferred in the surgical management of hyperthyroidism, but for reasons of autoimmunity<sup>19</sup>, disease recurrence<sup>10</sup> and uncertainty on long term residual thyroid function<sup>9, 20</sup> total thyroidectomy which has a more predictable long term outcome profile was proffered as the solution to prevent the above long term sequelae of partial thyroidectomy.<sup>(9, 21, 22)</sup> We lend our voice to the debate by reviewing and presenting our data of patients who had total thyroidectomy for treatment for hyperthyroidism. Our findings confirmed

Graves' disease as the commonest cause of hyperthyroidism in our environment but compared to earlier epochs from this institution.<sup>23, 24</sup> there is an increase in volume of cases done, as these reviews form only a fraction of cases of hyperthyroidism treated in the various hospital departments. The predominant indications for thyroidectomy in managing hyperthyroidism are patient preference, TMNG, and ATD issues (compliance, toxicity and relapse); this closely mirrors the findings by other authors.<sup>3, 10</sup>

We noted that 6% of cases seen developed hypocalcaemia (temporary) which is comparable with reports from India<sup>(8)</sup>, Europe<sup>4</sup> and Australia<sup>(9)</sup>. Of note however is the varied number of cases operated on by the authors. Our 1% case of permanent hypocalcaemia mirrors the single digit percentage rate reported by various surgeons in Europe<sup>4</sup>, America<sup>10</sup> and Asia.<sup>8</sup> The constraint to interpreting the above rates lies in when the post-operative serum calcium was assayed; as most authors assayed between 6 -72 hours and this may lead to variable reports. The consensus however is to assay the serum calcium at 24hours post operatively.<sup>25</sup> The present study noted a 4% rate of transient recurrent laryngeal nerve palsy and 0% permanent recurrent laryngeal nerve damage, which is in agreement with the literature, with rates varying from 0% to 13%.<sup>26, 27, 28, 29</sup> The studies were performed mainly on Graves' disease as opposed to ours which had a heterogeneous population of hyperthyroid patients, although the sample sizes were comparable. Only 1.3% of our patients required a peri-operative tracheostomy similar to the findings by Pradeep et al<sup>8</sup> who also had heterogeneous cohort of hyperthyroidism patients. As was expected,

tracheostomy was performed in the cases of TMNG which long standing goiters with resultant tracheomalacia had; they were decannulated approximately 6 weeks after surgery.

Non-compressive hematoma occurred in 9.1% of our patients, majority occurred in the TMNG group in tandem with the findings by C Querat et al.<sup>4</sup> This we attribute to a large raw surface area, with resultant capillary ooze being the main culprit as they were not severe enough to necessitate neck re-exploration. Our practice is to use a closed (passive or active) wound drain if the thyroid gland specimen weight exceeded 200grammes, with removal predicated on non or reduced drain activity over the initial 72hours post-operatively. Seroma was aspirated in this group of patients between 8 and 15 days after surgery.

A completion-thyroidectomy was averted in 5.4% of patients who had occult malignancy noted in the surgical specimen, Olurin<sup>24</sup> in 1972 had earlier alluded to the possibility of missed malignancies in their landmark article where about a quarter of the present study volume were operated on, but with 7% occult malignancy rate. Papillary thyroid carcinoma predominated as the histologic type in 3.4% of this patients and is at par with works reported by other authors,<sup>9, 10, 30</sup> this is however lower than the 12% rate seen by Pradeep et al<sup>(8)</sup> in India who alluded to a referral bias as the cause of this increased rate. Indeed, in a low income environment like ours, where access to specialist service (surgery, anaesthesia) is limited and payment is 'out of pocket' the argument to ensure maximum benefits during specialist consultations clearly favors

total thyroidectomy which provides adequate initial treatment of the hyperthyroidism and any associated malignancy. Quite unlike the exacerbation of ophthalmopathy associated with radioactive iodine therapy, the course of ophthalmopathy after a thyroidectomy remains debatable, with conflicting reports in the literature<sup>32, 33, and 34</sup>. We however noted an 8.5% rate of regression of ophthalmopathy in those reviewed for more than 5 months; this could not be concluded due to a decline in follow up thereafter. Our data suggest an early response occurs in that category of patients we subsequently labeled 'responders' due to the total ablation of the antigenic stimuli. Approximately 8% developed amenorrhea of pregnancy within the first year following surgery, and this highlights the importance of total thyroidectomy and *l*-thyroxine substitution in the management of such category of patients whose procreation related intent precludes the use of RAI, which may be simpler than surgery; but has an inconsistent outcome when used.<sup>9</sup>

The complication rates for total thyroidectomy are minimal with experienced surgeons. The low complication outcome profile associated with total thyroidectomy, and the added advantage of long term predictability of thyroid function with no possibility of recurrence or relapse, supports total thyroidectomy as the preferred surgical modality in hyperthyroid patients seen in our setting. We therefore recommend that total thyroidectomy should be the first option in the surgical management of patients who have hyperthyroidism.

## REFERENCES

1. Danielle Devereaux, Semhar Z Tewelde: Hyperthyroidism and thyrotoxicosis. *Emerg Med Clin N Am.*2014; **32** : 277-292
2. Schüssler-Fiorenza CM, Bruns CM, Chen H. The surgical management of Graves' disease. *Journal of Surgical Research.* 2006 **5**; **133** :207-14.
3. Lal G, Ituarte P, Kebebew E, Siperstein A, Duh QY, Clark OH. Should total thyroidectomy become the preferred procedure for surgical management of Graves' disease? *Thyroid.* 2005 ; **15** :569-74.
4. C Querat, Germain, J-M Dumollard, B Estour, M Peoc'h, J-M Prades. Surgical management of hyperthyroidism. *European Annals of Otorhinolaryngology, Head and Neck diseases.* 2015; **132**: 63-66
5. NA Patwardhan, M Moront, S Rao, S Rossi, L E Braverman. Surgery still has a role in Graves's hyperthyroidism. *Surgery* 1993; **114** : 1108-1112
6. D Glinioer, D Hesch, R Lagasse, P Laurberg. The management of hyperthyroidism due to Grave's disease in Europe in 1986. Results of an international survey. *Acta Endocrinol Suppl (Copenh)* 1987;**116**(4 Suppl):S6-23
7. B Solomon, D Glinioer, R Lagasse, L Wartofsky. Current trends in the management of Grave's disease. *J Clin Endocrinol Metab* 1990; **70** : 1518-1524
8. P V Pradeep, A Agarwal, M Baxi, G Agarwal, S Kumar Gupta, S K Mishra. Safety and Efficacy of surgical management of Hyperthyroidism: 15 year experience from a tertiary care center in a developing country. *World J Surg* 2007; **319** : 306-312
9. M S Barakate, G Agarwal, T S Reeve, B Barraclough, B Robinson, L W Delbridge. Total thyroidectomy is now the preferred option for the surgical management of Grave's disease. *ANZ J Surg* 2002; **72** : 321-324
10. S Wilhelm, C R McHenry. Total thyroidectomy for management of Grave's disease in the United States. *World J Surg* 2010 **34** : 1261-1264
11. P Miccoli, P Vitti, T Rago, P Lacconi, L Bartalena, F Bogazzi, E Fiore, R Valeriano, L Chiovato, R Rocchi, A Pinchera. Surgical treatment of Grave's disease: subtotal or total thyroidectomy. *Surgery* 1996; **120** : 1020-1025
12. K Sugino, K Ito, M Nagahama, W Kitagawa, H Shibuya, K Ito. Surgical management of Grave's disease- 10 year prospective trial at a single institution. *Endocrine J* 2008; **55** : 161-167
13. AE Giddings. The history of thyroidectomy *J R Soc Med* 1998; **91** Suppl 33: 3-6
14. A Mishra, A Agarwal, G Agarwal, S K Mishra. Total thyroidectomy for benign thyroid disorders in an endemic region. *World J Surg* 2001;**25** : 307-310
15. E A Mittendorf, CR McHenry. Thyroidectomy for selected patients

- with thyrotoxicosis. *Arch Otolaryngol Head Neck Surg* 2001; **127** : 61-65
16. C U Frigugletti, CS Lin, M A Kulcsar. Total thyroidectomy for benign thyroid disease. *Laryngoscope* 2003; **113** : 1820-1826
17. L I Delbridge, T S Reeve, M Khadra, A G Poole. Total thyroidectomy: the technique of capsular dissection. *Aust N Z Surg.* 1992; **62** : 96-99
18. Topping, L Tallstedt, G Wallin, G Lundell, J G Ljunggren, A Taube, M Saaf, B Hamberger. Grave's hyperthyroidism: Treatment with antithyroid drugs, surgery or radioiodine. A prospective, randomized study. Thyroid Study Group. *J Clin Endocrinol Metab* 1996; **81**:2986-2993
19. H Kurihara. Total thyroidectomy for the treatment of hyperthyroidism in patients with ophthalmopathy. *Thyroid* 2002; **12**: 265-267
20. A Dominello, L Delbridge. Progressive increase in thyroid dysfunction after subtotal thyroidectomy for Grave's disease. *Asian J Surg* 2000; **23**; 131-135
21. N Thompson Invited Commentary: Progressive increase in thyroid dysfunction after subtotal thyroidectomy for Grave's disease. *Asian J Surg.* 2000; **23**: 136
22. I R Gough, D Wilkinson. Total thyroidectomy for management of thyroid disease. *World J Surg* 2000; **24** : 962-965
23. O Famuyiwa, A F Bella. Thyrotoxicosis in Nigeria. Analysis of a five year experience. *Trop Geogr Med* 1990; **42**: 248-254
24. E. O. Olurin. Thyrotoxicosis in Nigeria-a study of forty-six patients. *Postgraduate Medical Journal* 1972; **48**: 609-615.
25. J. Wu, B Harrison. Hypercalcaemia after thyroidectomy. The need for improved definitions. *World J End Surg.*2010;**2**: 17-20
26. T. Harada, K Shimaouka, T Mimura, K Ito. Current treatment of Grave's disease. *Surg Clin North Am* 1987; **67**: 299-314
27. M Barczynski, A Konturek, A Hubalewska-Dydejczyk, F Golkowski, W Nowak. Randomized clinical trial of bilateral subtotal thyroidectomy versus total thyroidectomy for Grave's disease with a 5 year follow up. *Br J Surg* 2012; **99**: 515-522
28. J. Jarhult, C Rudberg, E Larsson, H Selvander, K Sjoval, B Winsa, J Rastad, F A Karlsson. Grave's disease with moderate severe endocrine ophthalmopathy: Long term results of total or subtotal thyroid resection. *Thyroid* 2005; **15**: 1157-1164
29. D. Erickson, H Gharib, H Li, J A Van Heerden. Treatment of patients with toxic multinodular goiter. **Thyroid** 1998; **8** : 277-282
30. M. S. Razack, J M Lore Jr, H A Lippes, D P Schaefer, H Rassael. Total thyroidectomy for Grave's disease. *Head Neck* 1997; **19**: 378-383
31. L. Bartlena, A. Pinchera, C. Marocci. Management of Grave's ophthalmopathy: reality and perspectives. *Endocrine Reviews* 2000; **21** : 168-199
32. J. R. Fernandez-Sanchez, J. Rosell Pradas, O Carazo Martinez, E Vela Torres, F Escobar Jimenez, I. Garbin Fuentes, R. Vara Thorbeck. Graves

- ophthalmopathy after subtotal thyroidectomy and radioactive therapy. *Br J Surg* 1993; **80**: 1134-1136
33. B. Winsa, J. Rastad, G. Akerstrom, H. Johansson, K. Westermark, F. A. Karlsson. Retrospective evaluation of subtotal and total thyroidectomy in Grave's disease with or without ophthalmopathy. *Eur J Endocrinol* 1995; **132**: 406-412
34. L. Tallstedt, G. lundell, O. Torring, G. Wallin, J. G. Ljunggren, H. Blomgren, A. Taube. The thyroid study group. Occurrence of ophthalmopathy after treatment for Grave's hyperthyroidism. *N Eng J Med* 1992; **326**: 1733-1738