

# Outcome of surgery for toxic goitres in maiduguri: A single teaching hospital's perspective

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## Abstract

**Background:** Thyrotoxicosis a common endocrine disorder of the thyroid gland in Nigeria is commonly treated surgically. The outcome of thyroidectomy for toxic goiters in Maiduguri Nigeria is evaluated.

**Materials and Methods:** Over the last 5 years (Jan 2005-July 2010), in a prospective review, the demographic, and clinical data of patients operated for toxic goiters in our department was entered, into a predesigned proforma and analyzed. The objective of the study is to review our experience with subtotal and near-total thyroidectomy as treatment for benign toxic goiters.

**Results:** Seventy-eight patients, 11 males (14.1%) and 67 females (85.9%), with male: female ratio of 1:6.1 and the mean age of  $30 \pm 10.9$  (range, 17-65 years), underwent thyroidectomy for toxic goiters. The mean duration of symptoms was 41.9 (range 3-126 months). There were 53 patients with toxic diffuse goiters (Grave's disease) with their mean age of  $27.6 \pm 6.93$  (range 17-38 years), 23 with toxic multinodular goiters, the mean age of  $43.7 \pm 15.68$  (range 17-65 years) and two with toxic nodule. There was no case of permanent recurrent laryngeal nerve palsy or permanent hypocalcemia. Transient hypocalcemia occurred in 9 (11.5%) patients and hemorrhage with hematoma, requiring exploration in 4 (5.1%). There were two cases of wound infection and no postoperative mortality. The mean hospital stay was  $7.6 \pm 2.34$  (range 5-15 days). There was no disease recurrence over a mean follow-up of 20.7 (range 2-48) months.

**Conclusion:** Subtotal thyroidectomy is an effective procedure for the treatment of thyrotoxicosis with few postoperative complications and majority of patients being euthyroid after long follow-up.

**Key words:** Outcome, subtotal and near -total thyroidectomy, thyrotoxicosis

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## Introduction

Thyrotoxicosis is a common endocrine disorder of the thyroid gland in Nigeria and other West African countries.<sup>[1,2]</sup> Thyroidectomy can induce rapid remission of thyrotoxic symptoms compared to radio-active iodine and antithyroid drugs.<sup>[3]</sup> The nonsurgical treatment modalities seem more attractive because of their ease of administration, but delayed hypothyroidism is very frequent after radioiodine and continuous antithyroid drugs use may be expensive for many of our patients. Improvement in surgical techniques and resulting low incidence of postoperative

complications have made surgery the treatment of choice in toxic goiters.<sup>[4,5]</sup> However, adequate thyroid remnant size should eliminate both recurrent hyperthyroidism and hypothyroidism and result in low incidence of other complications to justify surgery as treatment for toxic goiters. That is why subtotal thyroidectomy is over the years being replaced by total thyroidectomy for management of benign thyroid disease.<sup>[6,7]</sup> Total thyroidectomy may not be readily adopted by many surgeons outside a specialized

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endocrine surgical unit because of the arguably more incidences of permanent recurrent laryngeal nerve palsy, hypothyroidism, and hypoparathyroidism.<sup>[8,9]</sup> Thyroxin, calcium supplements, vitamin D, and parathormone may not be affordable and available to patients in resource limited environments, and the prospects of being on them for life may not be acceptable to all patients.

A prospective review of patients who underwent subtotal and near-total thyroidectomy for diffuse toxic goiter (Graves) and toxic multinodular goiters between 2005 and 2010 in the general surgical unit of the department of Surgery of the University of Maiduguri Teaching Hospital Nigeria was conducted. The objective was to review the outcome of surgery.

## Materials and Methods

All patients who underwent subtotal and near-total thyroidectomy for diffuse toxic goiter and toxic multinodular goiters between 2005 and 2010 in the general surgical unit of the department of surgery of the University of Maiduguri Teaching Hospital Nigeria were prospectively reviewed.

Bio-data, details of clinical features of thyrotoxicosis, preoperative assessment, postoperative complications, and histopathological reports were recorded using a predesigned data extraction form. Our results were entered into a computer and analyzed using descriptive statistics by SPSS for windows version 16.0, Chicago, IL. Patients below age 15 years and pregnant women with thyrotoxicosis were excluded from the study.

All patients had routine preoperative assessment including measurement of serum levels of T3 (triiodothyronine), TSH (thyroid stimulating hormone), T4 (thyroxin), calcium, urea, and electrolytes. Routine indirect laryngoscopy was done by an ENT (ear nose and throat) surgeon for all patients to exclude preexisting vocal cord palsy, by assessing vocal cord mobility preoperatively.

All the patients were controlled on oral carbimazole and propranolol until the day of surgery to prevent thyrotoxic crises. The imaging investigations included plain soft tissue radiographs of the neck in lateral, antero-posterior and thoracic in-let views. An ultrasound of the thyroid gland, assessing its size, and morphology was also done for all the patients. An electrocardiogram of all the patients was done and reported by the cardiologist for any cardiac pathology. Patients with cardiac failure as a result of toxic multinodular goiter were first stabilized by medical treatment before thyroidectomy.

Surgical procedures included subtotal thyroidectomy, near-total thyroidectomy for huge toxic multinodular goiters; we defined near-total thyroidectomy as removal of nearly

all of each lobes of the thyroid leaving unresected only small portions of the gland adjacent to the entrance of the recurrent laryngeal nerve in to the larynx (approximately 5-10 g). Total lobectomy and isthmusectomy was done for patients with toxic nodules. The parathyroid glands were preserved in a cuff of thyroid tissues approximately the size of the distal phalanx of the patients' thumb, with deliberate effort to remove more gland to reduce the incidence of recurrent thyrotoxicosis. The extracapsular technique where the superior pole was ligated with zero chromic catgut was used keeping close to the gland to safe guard the external branch of the superior laryngeal nerve. Redivac™ closed suction drains were left for 24 hours in all the patients. T3, T4, and TSH and serum calcium were routinely assayed for all the patients on their first follow-up visits; others include body weight, appetite changes, and other thyrotoxic symptoms.

The presence of postoperative hypocalcemia defined as serum calcium of less the 2.2 mmol/l (range 2.2-2.7) and symptoms such as carpo-pedal spasms were managed in all the patients as temporary, with intravenous calcium gluconate and determination of serum calcium. It was defined as permanent if symptoms persisted beyond 6 months. RLN palsy hoarseness associated with vocal cord paralysis at laryngoscopy within 6 months of surgery was defined as permanent. The vocal cords of all patients were routinely assessed for mobility via direct laryngoscopy at extubation by the anesthesiologist. All the patients were continued on oral propranolol for 7 days, while carbimazole was stopped immediately after surgery. The patients were followed up in the SOPD (surgical outpatient department) at 1, 2, 4 weeks; 2, 6, and 12 months with clinical evaluation to determine reduction of symptoms of thyrotoxicosis and detection of long and short-term complications of thyroidectomy.

## Results

The study was over 5 years, from January 2005 to July 2010. Seventy-eight patients, 11 men (14.1%) and 67 women (85.9%), underwent either subtotal [ $N = 65$  (83.8%)] near-total thyroidectomy; [ $N = 11$  (14.1%)] or thyroid lobectomy and isthmusectomy [ $N = 2$  (2.5%)], for toxic diffuse, toxic multinodular goiters, and solitary toxic nodules respectively.

Their mean age was  $30.8 \pm 10.9$  (range, 17-65 years) with a male female ratio of 1:6.1. The 15- to 24- and 25- to 34-year age groups accounted for 23 (29.5%) patients each among the females whereas the 15- to 34-year age group accounted 7 (8.9%) patients among the males. Four (5.1%) male patients were between the ages of 35 and 44 years. The mean duration of symptoms was 41.9 months (range, 3-126). There were 53 (67.9%) patients with toxic diffuse goiters (Grave's disease) with their mean age as  $27.6 \pm 6.93$  (range 17-38 years), 23 (29.5%) with toxic multinodular goiters, mean age of  $43.7 \pm 15.68$  (range 17-65 years)

and 2 (2.5%) had toxic nodules. Clinical and biochemical diagnosis of thyrotoxicosis were confirmed in all the patients, 100% had visible thyroid swellings, palpitation, anxiety, heat intolerance, and 42 (53.8%) had thyrotoxic eye symptom. There were five (6.4%) patients with significant thyrotoxic heart disease. The major physical signs of thyrotoxicosis were present in all the patients [Table 1]. All the patients had control of thyrotoxic symptoms with oral carbimazole and propranolol (for a mean duration of  $6.78 \pm 3.3$  weeks; range 2-12), followed by thyroidectomy. Forty eight of 53 patients with diffuse toxic goiter had subtotal thyroidectomy. The surgical procedures carried out for each type of toxic goiter (which included subtotal thyroidectomy, near-total thyroidectomy and lobectomy and isthmusectomy) are shown in Table 2. The mean operation time was  $86.5 \pm 22.4$  minutes (range 60-120). The postoperative complications are outlined in Table 3. The normal ranges of T3 (triiodothyronine), T4 (thyroxin), and TSH (thyroid stimulation hormone) at the UMTH are 0.5-1.85 ng/ml, 5.4-11.4 ng/ml, and 0.3- .9 Miu/L respectively; the mean preoperative values for the same hormones before control with antithyroid drugs were  $7.7 \pm 2.89$  ng/ml,  $26.6 \pm 6.56$  ng/ml, and  $0.134 \pm 0.46$  Miu/L respectively. The mean postoperative values for T3, T4, and TSH 4 weeks after thyroidectomy were  $0.75 \pm 0.36$  ng/ml,  $9.31 \pm 2.07$  ng/ml, and  $3.12 \pm 0.901$  respectively. There was also a mean weight gain of  $5.57 \pm 2.334$  kg on preoperative weight after a follow-up of 6 weeks. There was a decrease in serum levels of T3, and T4 from 2 weeks postoperatively. The mean hospital stay was  $7.6 \pm 2.34$  days (range 5-15). All the patients were

followed up in surgical outpatient, with a mean follow-up duration of 20.7 months (range 2-48).

The patients were controlled on oral carbimazole and oral propranolol for an average duration of  $6.78 \pm 3.30$  (range 2-12 weeks). The histopathology reports were typical for all the patients with diffuse and multinodular goiters with the former having smaller glands (mean weight Toxic diffuse goiters =  $103.75 \pm 25.03$  grams and mean for toxic nodular goiters was =  $418.73 \pm 190.44$  g). Assessment of control of toxic symptoms was based on clinical symptoms, signs, and 4 hourly sleeping pulse rates (done 24-48 hours on admission before thyroidectomy), we considered 80 beats per minute as normal preoperative target. Postcontrol (thyroid function tests) (TFTS) were within normal range for all the patients. Other measures of control were increasing body weight, and reversal of other classical symptoms of thyrotoxicosis. There were no mortalities. Soft tissue radiographs of the neck in lateral, antero-posterior (A/P), and thoracic inlet showed no major compression of the trachea save for deviation and A/P compression of the trachea in two patients with long-standing toxic multinodular goiters.

## Discussion

The findings of this study suggest that subtotal thyroidectomy and near-total thyroidectomy are effective operative treatments for benign toxic goiters, associated with minimal long term postoperative complications despite a general shift toward total thyroidectomy for the same condition.<sup>[7,10]</sup> This is evidenced by the significant decline in the level of serum T3, T4, and appreciation in the levels of TSH, in addition to remission of thyrotoxic symptoms. Successful operative management of thyrotoxicosis demands an adequate excision of the thyroid gland to prevent both recurrent thyrotoxicosis and hypothyroidism; what amount of thyroid tissue to leave behind is not settled.<sup>[11]</sup> In our experience, leaving 5-10 g of thyroid tissue with careful ligation of the inferior thyroid artery branches on the thyroid gland, leaving the main trunk, preserves both the parathyroid glands and the recurrent laryngeal nerves.

Complications are few after near-total and subtotal thyroidectomy. The absence of permanent vocal cord palsy and 6.4% transient hyperparathyroidism (permanent 0%) in this series are in keeping with ranges of 0-4.3 and 0-3.8%

**Table 1: Clinical features of thyrotoxicosis**

| Clinical Features           | Frequency (%) |
|-----------------------------|---------------|
| Eye signs (exophthalmus)    | 29 (37.2)     |
| Insomnia                    | 76 (97.4)     |
| Palpitations                | 76 (97.4)     |
| Cardiac failure             | 5 (6.4)       |
| Heat intolerance            | 76 (797.4)    |
| Preference for cold         | 76 (97.4)     |
| WT. loss/increased appetite | 78 (100.0)    |
| Fine tremors                | 78 (100.0)    |
| Change in voice             | 13 (16.7)     |
| Oligomenorrhea              | 32 (41.0)     |
| Others                      | 14 (17.9)     |

Others: pretibial myxoedema, proximal myopathy, hair loss, thyroid acropathy, anxiety, amenorrhea.

**Table 2: Operative procedures for different types of toxic goiter**

| Type of thyroidectomy | Type of toxic goiter          |                                 |                          | Total (%) |
|-----------------------|-------------------------------|---------------------------------|--------------------------|-----------|
|                       | Graves's disease (n = 53) (%) | Toxic multinodular (n = 23) (%) | Toxic nodule (n = 2) (%) |           |
| Subtotal              | 48 (61.5)                     | 17 (73.9)                       | 0 (0)                    | 65 (0)    |
| Near-total            | 5 (6.4)                       | 6 (26.1)                        | 0 (0)                    | 11 (0)    |
| Lobectomy+            |                               |                                 |                          |           |
| isthmusectomy         | 0 (0)                         | 0 (0)                           | 2 (100)                  | 2 (0)     |
| Total                 | 53 (0)                        | 23 (0)                          | 2 (0)                    | 78 (100)  |

**Table 3: Postoperative complications of thyroidectomy in 41 patients with thyrotoxicosis**

| Complications                            | Frequency (%) |
|------------------------------------------|---------------|
| Wound infection                          | 1 (1.2)       |
| Permanent RLN damage                     | 0 (0)         |
| Permanent hypoparathyroidism             | 0 (0)         |
| Tension hematoma with airway obstruction | 2 (2.5)       |
| Laryngeal edema                          | 1 (1.2)       |
| Recurrent thyrotoxicosis                 | 3 (3.8)       |
| Hypothyroidism                           | 2 (2.5)       |
| Transient hypocalcemia                   | 5 (6.4)       |
| Others                                   | 15 (19.2)     |

RNL = Recurrent laryngeal nerve (leading to permanent vocal cord palsy).  
Others = Seroma under skin incision, N = 7, hypertrophic scar, N=3,  
change in voice (hoarseness) = 4, subcutaneous hematoma = 1.

respectively from earlier series.<sup>[7,12,13]</sup> The low complication rate is attainable when diffuse toxic goiter is treated by subtotal thyroidectomy. Recurrent thyrotoxicosis is less when 5-10 g of thyroid tissue is left. The most dreaded complications; permanent RLN palsy and laryngeal edema are rare. Wound infection is negligible as in many other studies<sup>[14,15]</sup> because of the excellent blood supply to the neck. Postoperative complications are related to size of goiter, level of control of toxic symptoms, experience of the surgeon and to a lesser extent, the duration of the goiter and surgical technique used.<sup>[16]</sup> The recurrent goiters may be associated with more incidences of RLN palsies because of the distorted anatomy and fibrosis.

The surgical techniques were subtotal and near-total thyroidectomy, with total unilateral lobectomy and isthmusectomy (Dunhill's operation) for the two patients with toxic nodules. Particular attention must be given to surgical techniques aiming at minimizing the most important postoperative complications. Delbridge and colleagues<sup>[17]</sup> have advocated the capsular dissection over the noncapsular technique to bring the incidence of permanent hypoparathyroidism and RLN palsy to the minimum. In the capsular dissection, branches of the superior and inferior thyroid arteries are ligated individually as well as directly on the surface of the thyroid gland, whereas the noncapsular technique involves mass ligation of the superior pole, with the inferior thyroid artery ligated in continuity to preserve the blood supply to the parathyroid glands. Whereas total thyroidectomy is advocated in many centers, its main drawbacks comprise the inevitable hypothyroidism and potentially more surgical complications including damage to the recurrent laryngeal nerves.<sup>[18]</sup>

Although subtotal and near-total thyroidectomies are performed for nonmalignant toxic goiters, with very few side effects, making it appealing; because of the cost of thyroxin and calcium supplement for life in a resource limited environment, there is need to develop the skill

of total thyroidectomy which removes the problem of recurrence completely. This is pertinent in specialist general and endocrine surgical units. Many patients in Maiduguri and environs do not turn up for follow-up as long as there are no major problems, making the assessment of long-term outcome of surgery difficult. There are many reasons for this behavior including fresh consultations for the same problem.

## Conclusions

Thyrotoxicosis (hyperthyroidism) is a common encounter of the general and specialist endocrine surgeon, though the current trend in operative treatment is total thyroidectomy, subtotal, and near-total thyroidectomy have been effective in the management of patients with toxic goiters in resource limited environments where patients cannot readily afford continuous supply of thyroxin, calcium supplements, and follow-up. Subtotal thyroidectomy is still associated with low morbidity and is the operation of choice where supplements of thyroxin and sometimes calcium cannot be assured for life.

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