ORIGINAL RESEARCH

Multidisciplinary thyroid disease management in The Gambia: Results of a 6-year multinational collaboration

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Abstract

Background
Thyroid disease remains prevalent in West Africa, with pathogenetic contributions from dietary and genetic factors. Specialist services for the management of thyroid disease were previously unavailable at Serrekunda General Hospital, leaving a considerable unmet need at this large urban referral hospital in The Gambia.

This study sought to document clinical characteristics and outcomes among patients attending a multidisciplinary, collaborative, 1-stop clinic offering surgical and medical management of thyroid disease in The Gambia.

Methods
We retrospectively evaluated demographic, clinical, and outcome data from patients with thyroid disease who were medically or surgically treated from March 2012 through January 2018 by visiting teams representing Medicos en Accion (MEA), a Canadian nonprofit organization. Variables evaluated included history of presenting concern, comorbidities, current medications, thyroid function status, surgical procedure, histopathology, and postoperative outcomes, including surgical complications. Patients were followed up at least biannually; long-term follow-up was defined as ≥1 year after thyroidectomy. A subset of surgical specimens underwent histopathologic analysis.

Results
A total of 352 patients were assessed (331 female; median age, 36 years). Primary diagnoses included toxic multinodular goitre (MNG, 30.6%), nontoxic MNG (37.5%), solitary nodule (8.6%), and Graves' disease (13.8%). Hyperthyroidism was present in 49.2% of patients at initial assessments, yet only 28.5% of these patients were on appropriate medical therapy. Hypertension was found in 33.8% of all patients, but less than half (42.9%) of these were on treatment at presentation.

Thyroidectomy was performed for 83 patients (23.6%): 35 total thyroidectomies and 48 partial thyroidectomies. At the end of a median follow-up duration of 12 months, all patients were disease-free with reference to their initial surgical indications. Serious postoperative complications occurred in 2 patients, both of whom recovered fully with no long-term sequelae.

Conclusions
This study demonstrated the feasibility of establishing a multidisciplinary thyroid clinic in a low-resource setting, leading to improved access to care and public awareness of thyroid disease, as evidenced by the annual increase in patients managed through the study period at Serrekunda General Hospital. These results provide previously unavailable evidence on the profile of thyroid disease in The Gambia.

Keywords: thyroid disease, thyroid function tests, multinodular goitre, thyroidectomy, thyroid clinic, multinational partnership, multidisciplinary, The Gambia

Introduction

Thyroid disease has an unequal global distribution with the highest prevalences in low-income countries, particularly those in sub-Saharan Africa.[1] The prevalence of endemic goitre, the most common type of thyroid disease in Africa, ranges, in different study populations, from less than 10% in Tanzania, Lesotho, and Burkina Faso, to more than 60% in the Democratic Republic of Congo, Uganda, and South Africa.[2] The prevalence of autoimmune thyroid disease, of which Graves' disease is the most common, has been increasing in Africa, with studies reporting prevalences among adults ranging from 34% in South Africa,[2] to 62% and 83% in Togo and Ghana, respectively.[2],[3] In Africa, the burden of thyroid disease is greatest among women of childbearing age.[4]-[7] Hypothyroidism, thyroiditis, toxic multinodular goitre (MNG; reported to be common in Gabon), and unclassified goitre, each account for 10% or less of thyroid disease diagnoses.[1],[2]

In The Gambia, a policy report by the National Nutrition Agency estimated the prevalence of goitre to be 16% in 1999 (not peer reviewed).[8] The main drivers of endemic goitre in The Gambia may be the same as those in other African countries, namely, iodine and selenium deficiencies, as well as high consumption of goitrogenic foods, notably poorly processed cassava roots containing thiocyanates, which interfere with iodine uptake.[5]-[7],[9] In 2010, The Gambia's Ministry of Health and Social Welfare stipulated that iodized salt be used nationwide as prophylaxis against endemic goitre; despite these efforts, goitre remains endemic in The Gambia.

In Africa, although surgery is the most common treatment option for goitre, access to surgical care is limited, particularly for the more complex procedures.[4],[10],[11] Poor coordination between medical and surgical departments at many public health facilities contributes to delays in treatment for thyroid disease, prompting patients to seek alternative sources of care, including visiting philanthropic medico-surgical teams.[12] We retrospectively analysed nearly 6 years of patient data to assess thyroid disease outcomes following treatment in a multidisciplinary 1-stop clinic for thyroid disease in The Gambia.

Methods

Study design and setting

This study was a retrospective review of data from patients with thyroid disease evaluated from March 2012 through January 2018 by visiting medico-surgical teams, mainly representing Medicos en Accion (MEA), a Canadian nonprofit organization, both before and after the 2015 establishment of the Serrekunda General Hospital (SGH) Thyroid Clinic, a multidisciplinary 1-stop clinic in a large public referral hospital approximately 14 km from The Gambia's capital, Banjul. SGH has 114 beds and 2 operating theatres; it serves a catchment area of approximately 600 000 people. The Hospital hosts once- or twice-yearly missions from 3 medico-surgical philanthropic teams, including MEA, which specializes in general surgery and spearheaded the establishment of the SGH Thyroid Clinic. The missions, which last 2 to 3 weeks, include training of Gambian clinicians and delivery of free-of-charge and safe general surgical care, access to which is otherwise limited in The Gambia.

Clinical procedures

Patients referred to our clinic underwent clinical examinations to determine initial diagnoses and to measure thyroid size. In addition to ultrasound imaging, the serum levels of free 3,5,3′-triiodothyronine (fT_3), free thyroxine (fT_4), and thyroid-stimulating hormone (thyroid function tests) were determined at initial visits; at follow-up visits, only thyroid-stimulating hormone was ordered for most patients. Computed tomography was conducted if requested by a clinician. Antibody testing and other thyroid tests were unavailable at the study facility during the study period. Patients were managed for hyperthyroidism or hypothyroidism as appropriate. Comorbidities, such as hypertension and diabetes mellitus, were also diagnosed and managed.

Surgical treatment

The decision to perform surgery was based on multiple factors, including presenting clinical features, pathology, and the affordability and access to postoperative thyroid replacement therapy. Indications for surgery included mass effect, failure of medical therapy, prolonged noncompliance with medication, and suspected malignancy.

Preoperatively, patients were taken through an informed consent process that included education about the risks of the proposed surgical procedure. Preoperative management included a dose of Lugol's iodine, administered to reduce the vascularity of the thyroid gland and minimize the risk of thyroid storm in thyrotoxic patients.

All thyroidectomies were performed or directly supervised by skilled visiting attending general surgeons or otorhinolaryngologists in collaboration with visiting surgeons, along with local surgical registrars and/or specialist surgeons. Standard surgical procedures, including identification of the recurrent laryngeal nerves and parathyroid glands, as well as parathyroid autotransplantation, were performed as required. Thyroid tissue conservation was guided by the gross appearance of the gland. Surgical specimens were sent for local histopathologic evaluation at the Pathology Unit of the Edward Francis Small Teaching Hospital in Banjul.

All patients remained in hospital for at least 1 postoperative night. Most patients who underwent total thyroidectomy were discharged with a 1-month supply of calcium and Vitamin D supplements; parathormone measurement was unavailable in The Gambia during the study period. Hyperthyroid patients who underwent total thyroidectomy were prescribed life-long levothyroxine tablets 1 week postoperatively; euthyroid patients were prescribed levothyroxine on discharge. Patients were scheduled for clinical and biochemical evaluation at 3-monthly intervals for the first 12 postoperative months. Subsequently, long-term visits were scheduled at 3-monthly intervals, and biochemical thyroid function testing was requested at every other visit. Long-term outcomes were assessed over 1 postoperative year, with additional assessments if clinically indicated.

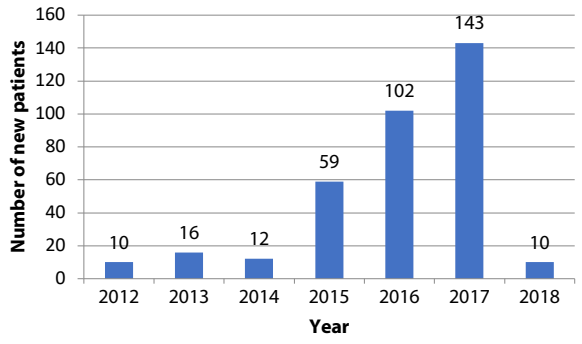

Figure 1. Annual distribution of new patients from March 2012 through January 2018 at Serrekunda General Hospital Thyroid Clinic, The Gambia

In 2018, data were only collected in January.

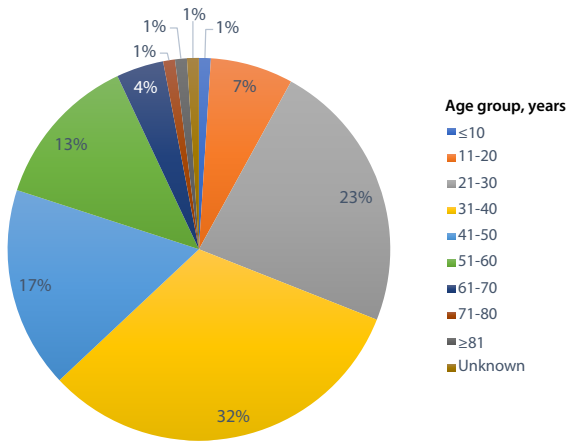

Figure 2. Percentage age distribution of patients from March 2012 through January 2018 at Serrekunda General Hospital Thyroid Clinic, The Gambia

Data collection

Demographic and clinical data on patients with thyroid disease were transcribed from medical records into an Excel 2010 (Microsoft Corp., Redmond, WA, USA) database developed for this purpose in November 2015; data on patients treated before November 2015 were entered retrospectively into the database. Information entered into the database included demographic factors, history of presenting concern, comorbidities, current medications, thyroid function status, preoperative clinical evaluation features, surgical procedure, histopathology, radiography, laboratory test results, and surgical complications.

Data analysis

The following variables were analysed: age, sex, diagnosis, presenting signs and symptoms, preoperative goitre size, comorbidities, thyroid function test results, surgical indication, type of surgery, short- and long-term surgical outcomes, duration of postoperative hospital stay, and histopathologic findings. Univariate and bivariate analyses were conducted

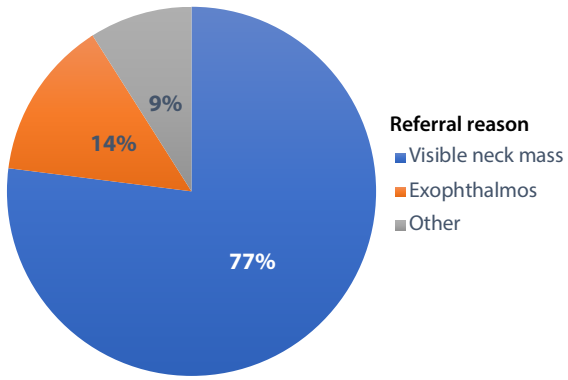

Figure 3. Reasons for referral to Serrekunda General Hospital Thyroid Clinic, The Gambia, from March 2012 through January 2018

using Microsoft Excel. Continuous variables were summarized by calculating means, and categorical variables were evaluated using frequencies and percentages. Data trends were evaluated using tables and graphs. Frequencies of presenting diagnoses, thyroid function at presentation, types of surgical intervention, and postoperative outcomes were evaluated. Hemithyroidectomy was defined as the removal of a single lobe or tissue from more than 1 lobe and the isthmus, leaving another lobe or remnant gland tissue on the unaffected side. Total thyroidectomy referred to removal of all thyroid tissue. The size of the surgical specimen was assessed in terms of the largest dimension.

Ethical considerations

Ethical approval for this study was granted by the Joint Gambia Government/Medical Research Council Ethics Committee. Patient anonymity was maintained throughout. There was no cost to patients for clinical care. MEA provided financial assistance to patients who were managed by MEA personnel but were unable to pay for requested biochemistry or radiography tests.

Results

In total, 352 patients with thyroid disorders were treated from March 2012 through January 2018, with the number of new patients increasing progressively each year (Figure 1). The female-to-male ratio was 16:1, the median age was 36 years (interquartile range, 29-48 years) (Figure 2), and the mean patient follow-up duration was 51.5 months (range, 32-71 months).

Diagnoses

The most common reasons for referral for thyroid evaluation were visible anterior neck swelling (with or without compressive symptoms) and/or clinical features of hyperthyroidism without ophthalmopathy (77.2%), and hyperthyroidism with ophthalmopathy (13.8%) (Figure 3). In total, 9.0% of patients primarily presented with recurrent goitres, thyroid cysts, previous thyroid surgery complications, or hypothyroidism symptoms.

Table. Number and types of thyroidectomy from March 2012 through January 2018 at Serrekunda General Hospital, The Gambia

Year	Partial thyroidectomy	Total thyroidectomy	Total
2012	2	3	5
2013	3	3	6
2014	4	1	5
2015	17	9	26
2016	12	7	19
2017	10	12	22
2018	0	0	0
Total	48	35	83

Based on history and clinical presentations alone, further characterizations of patients were as follows: 68.1% had MNG (30.6% were toxic, 37.5% were nontoxic); 13.8% possibly had Graves' disease; 8.6% had solitary nodules; 2.3% had thyroid cysts; and 7.3% had other presentations, including diffuse simple goitres or complications of medication noncompliance with treatment that was ongoing at the initial evaluation. At the largest dimension, gland sizes ranged from 5 cm to 17 cm (mean gland size, 9 cm).

Thyroid function status and comorbidities varied across patients at presentation. In total, 49.2% of patients were hyperthyroid (among whom 28.5% had previously sought treatment), 41.3% were euthyroid, and 2.4% were hypothyroid. Data were unavailable for 7.1% of the study patients. In total, 119 patients (33.8%) had hypertension, among whom 51 (42.9%) were on appropriate treatment.

Surgical procedures

In total, 83 patients (23.6%) underwent thyroidectomy (Table). Of these, 48 (57%) underwent total thyroidectomy, while the remaining 35 (42.2%) underwent partial thyroidectomy. Patients who underwent thyroid surgery were more likely to have larger anterior neck masses, compressive symptoms, and lower self-esteem, compared with patients whose thyroid conditions were treated with medication. Indications for thyroidectomy were primarily compressive symptoms (n=44, 53.0%) and cosmetic reasons (n=35, 42.2%). Nineteen patients (43.2%) with compressive symptoms had tracheal deviation. Four patients (4.8%) underwent thyroidectomy for other reasons, including 1 patient for suspected malignancy.

Other than the obviously larger anterior neck masses and tracheal deviation in some of the patients who underwent thyroidectomy, there were no obvious clinical differences that specifically distinguished those who underwent thyroidectomy from those who did not.

Histopathologic examinations were carried out on 39 of 83 surgical specimens, all of which were identified as benign MNG. Macroscopically, 2 lesions were nodular (each containing a dominant nodule), 36 were multinodular (comprising nodules of varying sizes), and none of the specimens were designated as *simple diffuse* (i.e., not nodular). A single histopathology report identified a specimen as both nodular and MNG. Microscopically, follicles were colloidal nodules. All specimens had fibrotic elements. Haemorrhage within nodules was also reported in most specimens (n=38, 97.4%). Hypertrophic, hyperplastic, or degenerative changes were also noted in all specimens.

Postoperative outcomes

The mean postoperative hospital stay was 1.5 days (range, 1-2 days). Two patients (2.4% of surgical patients) had postoperative expanding haematomas that required surgical evacuation. Preoperatively, both of these patients had large, hypervascular, and toxic MNGs. One of the 2 patients had a temporary tracheostomy and possible nerve injury, as evidenced by hoarseness, but this resolved in less than 2 months; there were no long-term sequelae.

Seventy patients (84.3%) were seen at their scheduled 1-year postthyroidectomy visits. Of these, 39 (55.7%) had undergone thyroidectomy, and the remaining 31 (44.2%) had undergone total thyroid removal. Of these 39 patients, 1 (2.6%) was hyperthyroid, and the remaining where euthyroid. Of the 31 total thyroidectomy patients who presented at 1 year, 27 (87.1%) were euthyroid, and the remaining 4 (12.9%) were hypothyroid. These results were based on the findings of biochemical thyroid function testing.

Discussion

We evaluated nearly 6 years of data on patients attending a high-volume, speciality clinic providing multidisciplinary management of thyroid disease in The Gambia. Most patients in this low-income setting were successfully managed with medication, and overall, the short- and long-term outcomes of thyroidectomy were favourable. Consistent with previous studies, we found that most patients presenting with thyroid disease were women of childbearing age; in many settings, such patients access inadequate medical care.[6],[13] Additionally, our data agree with others' in that untreated hypertension was a common comorbidity.[3],[13] Furthermore, our results agree with previous findings that anterior neck swelling, MNG, and hyperthyroidism are prevalent among patients with thyroid disease.[10]-[12],[14] As found by others, cosmetic reasons and compressive factors remain major reasons for thyroidectomy.[10],[12]

Clinical presentation

In contrast to well-resourced settings, in resource-limited settings, patients with thyroid disease frequently present only when clinical features of complications set in—a trend observed in our data.[4],[12],[15] Over 75% of patients in our cohort presented with the primary complaint of obvious anterior neck mass, while a further 14% presented primarily due to progressive ophthalmopathy (exophthalmos or proptosis of either eye), which is associated with visual complications and—in our setting—social stigma. Similar

frequencies of these clinical complications of thyroid disease have been reported elsewhere in Africa.[1],[12],[16],[17] No patients with pressure symptoms requiring emergency care were reported, which—aside from the general rarity of pressure symptoms presenting as emergencies—we speculate may have been because any such patients presented directly to our emergency department or the country's leading referral hospital, the Edward Francis Small Teaching Hospital in Banjul.

About 70% of our goitre patients had MNG, which was the most common thyroid condition diagnosed in our patient cohort, a finding consistent with studies of other African cohorts.[11],[12],[14],[17]-[19] The nontoxic (simple) subtype of MNG was the dominant variety in our study, as has been similarly reported in other studies from Africa, including those from West Africa.[6],[16],[20] About 14% of our study patients were diagnosed with probable Graves' disease, a rate similar to that reported among patients in a study conducted in Kenya.[17],[21] While studies from Nigeria,[22] Guinea,[18] and Uganda[10] reported higher prevalences—58%, 37%, and 32%, respectively—a Ghanaian study reported a lower rate (6.3%).[19]

In our study, the diagnosis of Graves' disease was largely clinical (ophthalmopathy plus signs and symptoms of thyroid toxicity), supported by standard serum thyroid function test results. Most patients diagnosed with Graves' disease also had visible anterior neck masses, the implications of which include compressive symptoms and social stigmatization. At the time of writing, thyroidectomy is the only option available in The Gambia for managing visible goitres. Pretibial myxoedema was absent in all our suspected Graves' patients, corroborating a report that documented 56% of the total patient cohort with possible Graves' disease, only 6% of which also had pretibial myxoedema.[3]

Surgical procedures

An appreciable proportion of patients in our cohort (23.6%) underwent surgical management for thyroid disease. Other publications report rates of surgical management of thyroid disease ranging from 15% to 63%.[10],[11],[16] Consistent with other studies, we found that common indications for surgery were compressive symptoms and cosmetic considerations, both being related to goitre size.[4],[9] However, a study from Senegal reported that only 6% of surgical procedures for thyroid disease were performed because of compressive symptoms.[16] In our study, 2 patients underwent procedures following persistent thyrotoxic relapses subsequent to euthyroid seroconversion achieved by drug therapy. Another patient underwent thyroidectomy for a suspected malignancy; studies from Africa have reported malignancy rates in patients surgically treated for thyroid disease in the range of 3% to 11%.[10]-[12]

Surgical outcomes

Total thyroidectomy poses some risks, including permanent hypoparathyroidism, permanent hypocalcaemia, and recurrent laryngeal nerve injury.[16],[23],[24] However, in our cohort, serious complications following thyroidectomy occurred in only 2 patients (2%), both of whom had postoperative expanding haematomas. A study conducted in Mali reported a higher frequency of serious complications following thyroidectomy: unilateral recurrent nerve palsy (4%), expanding haematoma (2%), and wound infection (2%).[11] We attribute the low rate of postthyroidectomy complications in the study cohort to the surgical expertise present at the SGH Thyroid Clinic, as surgical expertise has been shown to correlate with lower rates of postoperative complications.[24]

Treatment barriers and gaps

On initial presentation, 100 patients (57.9%) who were thyrotoxic were on treatment or had sought prior treatment; a similar study from Uganda found that 26% of thyrotoxic patients were on treatment.[10] Medications needed for the treatment of thyroid toxicity require frequent dosing and are not always available through the public health system; thus, the cost of medication may be an important barrier to treatment in our thyrotoxic study population, as was observed in a similar study.[4] At the time of writing, thyroid ablation therapy with radioactive iodine is unavailable in The Gambia, so surgical management remains the primary treatment option for thyroid gland inactivation.

Surgical management with total thyroidectomy, however, carries the risk of hypothyroidism as a complication, particularly among patients unable to adhere to thyroid hormone replacement therapy or those with infrequent attendance to clinic visits for monitoring. Difficulties in accessing medical care, low rates of clinic attendance, and poor adherence to prescribed medications have been reported among rural patients with thyroid disease elsewhere in Africa.[4],[17] However, poor accessibility and adherence to medication, along with suboptimal clinic attendance, may reflect patient difficulty in navigating a complex healthcare system,[22],[25] a barrier that the 1-stop model of this thyroid clinic has aimed to address.

Limitations

This study had limitations. Only a subset of surgical samples underwent histopathologic analyses; thus, cases of malignancy in the study population could potentially have been missed. Data on patient outcomes, including whether the patients underwent thyroidectomy, were missing for 7.3% of patients; however, we do not believe that data were missing in a systematic (biased) manner. Another significant limitation was that medication compliance was not adequately assessed to enable quantitation. Additionally, when patients reported compliance but biochemical thyroid assessment contradicted patient reporting, the causes of such discrepancies could not be ascertained.

Conclusions and recommendations

Overall, this study found favourable surgical outcomes. However, challenges remained with medication adherence among patients receiving treatment for thyroid disease at

this multidisciplinary, specialized, 1-stop clinic in The Gambia. To the best of our knowledge, this is the first published report of a study that investigated thyroid disease in The Gambia. Despite being specialized and comprehensive, care for thyroid gland inactivation at the SGH Thyroid Clinic is largely limited to surgical removal. Consideration should be given to expanding therapeutic options to include radioactive iodine therapy, which is currently available in neighbouring Senegal.[26] Our study findings highlight the success of the multidisciplinary collaborative approach to thyroid disease treatment in The Gambia, as well as an unmet need for medical and surgical services for thyroid disease in The Gambia. To further enhance this approach, steps should be taken to harness clinical partnerships with medical specialist groups, and such partnerships should be made sustainable. However, empowering local doctors through training would be even more sustainable in the long term.

It is hoped that different aspects of data from our clinic may be periodically harnessed to provide information on thyroid disease in The Gambia for practical, investigative, and policy purposes.

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