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Research Article

Presentation and Management Outcomes of Hyperthyroidism in a Sub -Saharan African Teaching Hospital

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Abstract

Background: Hyperthyroidism is a common endocrine disorder in the sub-region and Graves' disease is the commonest cause. Previous epochs have alluded to a steady rise in its prevalence in the sub-region.

Method: This paper is a retrospective review of outcomes in the management of hyperthyroid patients with or without ophthalmic manifestations in a tertiary hospital in a resource-limited environment.

Results: A total of 228 hyperthyroid patients managed by the endocrinology, endocrine surgery, nuclear medicine and ophthalmology units over a 7 year period were reviewed. Four-fifth of the patients were females. Graves' disease was the commonest cause. The three standard modalities of care were available during the period of review, while the ophthalmology department was involved in the management of those with thyroid associated ophthalmopathy (TAO). Remission was achieved with Anti-Thyroid Medications (ATD) in two-thirds of patients. Patients subjected to surgical intervention (Total thyroidectomy) had no recurrence, while Radio-Active Iodine (RAI) treatment achieved remission in more than half of patients treated. All patients referred for ophthalmology care were managed successfully with conservative methods.

Conclusion: All current therapies have both advantages and disadvantages. The presence of all modalities of care will be most beneficial if a multidisciplinary approach is employed, where the best treatment option for each patient is jointly decided by relevant specialties, rather than the existing practice, where each specialty focuses on an 'ideal' treatment modality within their field. Total thyroidectomy remains a safe treatment modality in Low income countries.

Keywords: Hyperthyroidism, Grave's disease, Plummer's disease, radio-active iodine, Ibadan

Background

Excess production of thyroid hormones results in an accelerated metabolic rate (hyperthyroidism) [1]. 60-80% of hyperthyroidism is attributed to Graves' disease [2] while toxic multinodular goiter (Plummer's disease), solitary toxic adenoma, thyroiditis and medication (Amiodarone) associated hyperthyroidism all account for other cases of hyperthyroidism [3]. The ideal treatment of hyperthyroidism should not only restore normal thyroid function, but should also prevent recurrence and forestall hypothyroidism with or without progression of ophthalmopathy [4]. Antithyroid Drugs (ATD), Radioactive Iodine (RAI) and surgical ablation (total thyroidectomy) are all established and viable options in the management of symptomatic hyperthyroidism. Although initial reports were disappointing; recent research on the autoimmune etiopathogenesis of Graves' disease suggest monoclonal antibody (anti CD 20) as another viable modality of care [4]. Thyroid Associated Ophthalmopathy (TAO) and the ophthalmic manifestations of hyperthyroidism are caused, most often, by an autoimmune related orbital inflammation, which causes deposition of Glycosaminoglycans (GAGs) in the soft tissues of the orbit and ocular adnexa [5-7]. This may lead to lid lag and (or) lid retraction, chemosis, conjunctival injection and protrusion of the eyeballs (i.e. proptosis or exophthalmos). In extreme cases, connective tissue fibrosis and ocular restriction cause double vision [7,8] and sight loss may occur from optic nerve compression within the orbit [9].

Generally, all current therapies demonstrate variable advantages and disadvantages [10]. A multi-disciplinary approach, where treatment options for patient are decided by relevant specialties, would be the ideal way to treat patients rather than the existing practice, where each specialty focuses on an 'ideal' treatment modality within their field. Documented continental variations exist in High-Income Countries (HIC) as regards the preferred modality of care with a notable preference for I -131 in America while ATD and surgical treatment predominate in Europe and Asia respectively [11]. However, gaps exist in treatment protocols and modalities available in Sub Saharan Africa. This is largely due to the prevalence of uncoordinated healthcare system and poor funding.

This paper reviews the outcomes of management of hyperthyroid patients with or without ophthalmic manifestations in a tertiary hospital in a resource-limited environment while critically evaluating

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Table 1: Patient characteristics and clinical diagnosis.

	Graves's Disease	Toxic Multinodular Goitre	Solitary Thyroid Adenoma
Gender M:F	1:05	1:07	1:06
AGE(year)	17 – 64 (38 ± 9.4)	29 – 78 (45.7 ± 16)	21-63 (33 ± 11)
(Mean ± SD)			
Ophthalmopathy	43	14	1
Dermopathy	3	-	-
WHO Goitre Size (Grade II and III)	83%	97%	74%
Symptoms and signs			
a. Heat Intolerance		192(84%)	
b. Weight loss despite increased appetite		169 (74%)	
d. Insomnia		123(54%)	
d. Menstrual irregularity		93(41%)	
e. others			
Eye signs (n=58)			
Lid lag		22 (38%)	
Lid retraction		43(74.1%)	
Chemosis		21 (36.2%)	
Periorbital swelling		22 (37.9%)	
Conjunctival Injection		28 (48.3%)	

potential for improvement in multidisciplinary care and treatment outcomes.

Methods

This is a retrospective review of all patients treated for hyperthyroidism at the specialty clinics of the endocrinology, endocrine surgery, nuclear medicine and ophthalmology units at the University College Hospital (UCH), Ibadan, Nigeria from January 2009 to December 2015 (7 year period). All patients with diagnosis of hyperthyroidism using clinical (Wayne's Prognostic Index) and biochemical (serum thyroid function test) criteria, with completed treatment regimens were included. Those who dropped out without completing recommended treatment regimens and those with incomplete treatment records were excluded. Data was extracted from a specialty (thyroid) data base which was generated from patients' clinic folders, histopathology reports, and operative records. The analysed data include bio demographic details, clinical features, diagnosis, histology, post treatment outcomes and complications using SPSS version 17.0. The data was analysed using descriptive analysis for both categorical and continuous variables.

Endocrine medicine protocol

Sequel to clinical and biochemical confirmation of hyperthyroidism, a full blood count, and liver function test is obtained before commencement of ATD's with counsel given on possible side effects of the ATD. Carbimazole is the preferred ATD except in patients who have drug reactions to carbimazole and in first trimester of pregnancy where propylthiouracil is used. Higher doses are used at initiation of therapy to achieve remission. The thyroid function is checked 4-6 weeks after commencement of therapy and then every 2- 3 months once the patient is euthyroid. As the clinical findings and thyroid function test approach or return to normal, the dose is tapered to achieve a maintenance dose. In some patients with Graves' disease, after 18-24 months, an attempt at outright discontinuation may be attempted. Definitive treatment depends on etiology, prognosis and patient's preference after discussing all available options of treatment. Occasionally a beta blocker is used as adjunct to offer prompt relief of adrenergic symptoms whilst steroids are used in particular circumstances (e.g. thyroid storm or thyroiditis).

Nuclear medicine protocol

After a detailed medical review; a full blood count, thyroid function test and thyroid ultrasound are the minimum investigations prior to Technetium-99 (Tc99m) - pertechnetate scintigraphy studies. Following intravenous injection of 3mCi Tc99m- Pertechnetate, planar images are acquired after 30 minutes using a Low Energy All-Purpose (LEAP) collimator. Activities of Iodine-131 for therapy are empirically determined based on thyroid scintigraphy findings. In the absence contraindications to I-131 therapy, the patients are advised on a low iodine diet and instructed to stop ATDs for at least 5 days prior to treatment. I-131 is administered orally as a capsule. Post treatment follow up is scheduled at 1, 3, and 6 months respectively. Treatment response was defined as biochemical euthyroidism or hypothyroidism at six months post RAI therapy. An assessment of treatment failure was made when patients remained biochemically hyperthyroid and symptomatic at 6 months after a single treatment of radioiodine. ATDs are commenced at the pre- treatment dose and the patients planned for a repeat RAI therapy. Once biochemically hypothyroid, thyroxine replacement was commenced and patients were followed up every 4th month until euthyroid or sent to the referring physician for follow up.

Endocrine surgery protocol

Sequel to clinical and biochemical confirmation of euthyroidism.

Table 2: Specialty and clinical diagnosis.

Specialty	Graves's Disease	Toxic Multinodular Goitre	Solitary Thyroid Adenoma	Others	N
Medicine	66	23	0	1(Thyroiditis)	90
Surgery	37	24	9	0	70
Nuclear Medicine	62	6	0	0	68
Total	165	53	9	1	228

Pre-operative tests for surgically fit patients include chest and neck radiographs, serum calcium, and ultrasound guided FNAC (size, morphology and relationship to contiguous structures). Indirect laryngoscopy is requested and the patient is admitted and counseled for a total thyroidectomy as described by Delbridge et al. [12], which entails capsular dissection of both lobes of the thyroid gland and isthmus. The recurrent laryngeal nerves are identified by protocol only at the Berry's ligament area, whilst orthotopically place parathyroid glands are also identified. Inadvertently removed or devascularised parathyroid glands are minced and re-implanted in the ipsilateral sternocleidomastoid muscle. Endotracheal extubation is immediately after surgery and serum calcium assay is done at 48hrs post operatively or if indicated clinically before then. Discharge is usually at 72hrs after surgery with L-Thyroxine at 1-2mcg per kg commenced at discharge. Outpatient care is scheduled for 2 and 6 weeks to ascertain if any perioperative complication has resolved or not. Complications persisting after six months are classified as permanent.

Ophthalmology protocol

Ocular examination was performed according to the guidelines provided by the European Group for the study of Graves Ophthalmopathy (EUGOGO) [13] and as described in an earlier publication [14]. Patients presenting with lid retraction, lid lag and dry eye symptoms were offered ocular emollients and advised to wear protective spectacles, provided there was no corneal exposure. Severe proptosis associated with marked chemosis, lagophthalmos, exposure keratopathy or evidence of new onset optic neuropathy attributable to the increased intra-orbital pressure were predetermined as criteria for orbital decompression surgery or orbital radiation therapy. All patients received topical ocular emollients and were advised to wear protective glasses to manage symptoms of dry eye.

Results

A total of 228 patients were managed by the 4 specialty units in the UCH, Ibadan during the 7 year period and were included in this review. Of these; 90 (39.5%), 68 (29.8%) and 70 (30.7%) patients were seen by Endocrinology, Nuclear medicine and Endocrine surgery respectively. There were 34 males and 198 females (M: F ratio=1: 5.8). The average age was 38±9.4 (range 17-74 years). The duration of symptoms at presentation was < 12 months in 137 (59.1%) and > 12 months in 113 (48.9%). All 58 (25%) evaluated by the ophthalmologist had some mild degree of Thyroid Associated Ophthalmopathy (TAO), and were managed conservatively with topical lubricant and spectacles or protective sunglasses. Lid retraction, lid lag and conjunctival injection were the commonest signs occurring in 23 patients (10%) of cases. Periorbital swelling was less common (4.8%) and chemosis was present in only 9 patients (4%). There was no recorded worsening of occular symptoms post RAI. Large majority of our patients were non-smokers. Table 1 shows the patient characteristics and clinical diagnosis. Table 2 shows the specialty and clinical diagnosis while agranulocytosis was the main complication of medical treatment seen in 6 (2.6%) patients. Compliance was ascertained in 145 (63.4%) patients. Table 3 highlights the outcomes of therapy in each specialty.

Table 3: Outcome of treatment.

Nuclear Medicine (N=68)	
1. Remission	36 (52.9%)
2. Repeat of treatment	9 (13.2%)
3. Failure of treatment	14 (20.6%)
4. Complications of treatment	-
Medical Therapy (N=90)	
1. Remission	61 (67.8%)
2. Persistent Hyperthyroidism	29 (32.2%)
3. Complications of treatment	10 (11.1%)
4. Agranulocytosis	6(2.6%)
Surgery (N=70)	
1. Hypocalcaemia	3 (4.3%)
2. Hematoma	
a. Compressive	-
b. Non-compressive	1 (1.4%)
3. Seroma	4 (5.7%)
4. Recurrent laryngeal nerve palsy	
a. Temporary	-
b. Permanent	-
c. Bilateral	-
5. Voice related issues (voice fatigue and hoarseness)	9 (3.9%)
6. Non suppurative Cellulitis	2 (0.9%)
7. Recurrence	
a. Hyperthyroidism	-
b. Goitre	-
Ophthalmology (N=58)	
1. Corneal exposure	-
2. Clinical improvement	All reported symptomatic
3. Optic neuropathy	-
4. Vision loss	No significant physical regression
5. Regression	-
6. Worsening	-

Discussion

The treatment modalities for hyperthyroidism include ATD,

RAI and Total thyroidectomy with all exhibiting a similar level of effectiveness as initial treatment [15] albeit with varied rates of relapse [16]. Although our review is multidisciplinary, our data indicates a high and rising prevalence of hyperthyroidism in UCH Ibadan consistent with initial reports [17-20]. Although Graves' disease is reported to have a low prevalence amongst blacks [21], it accounts for majority (73%) of cases of hyperthyroidism seen in our practice. This is similar to figures quoted by other authors [22,23]. Similarly thyroid dermopathy (pretibial myxedema) a rare manifestation of Graves' disease, occurred in only 3.3 % of our patients, akin to the reported occurrence rate of 1-4% reported in literature [24]. While most patients with dermopathy usually have coexisting ophthalmopathy [25] this was not observed in our retrospective review. Toxic multinodular goiter accounted for a quarter of patients seen while solitary toxic adenoma accounted for a very small number. Less common causes of hyperthyroidism such as amiodarone-induced thyrotoxicosis, sub-acute thyroiditis, iodine-induced hyperthyroidisms were not seen.

A diagnosis of hyperthyroidism in our centre is largely based on a combination of clinical, biochemical, radiological and pathological findings with or without evaluation of thyroid antibodies while clinical and ultrasonography findings assist in diagnosing toxic multinodular goiter and solitary toxic adenoma. Our reduced emphasis on the assay of thyroid associated antibodies is borne out of the fact that they are not usually required for diagnosis or monitoring disease related activities [26] as titres may be low or undetectable in patients with Graves' disease due to exclusive intrathyroidal production or assay insensitivity [22]. Some studies also suggest a lower prevalence of thyroid antibodies in blacks [27]. We endeavour to test for thyroid auto antibodies in patients without obvious clinical manifestations suggestive of Graves' disease provided availability and affordability is not an issue. This is because more often than not payment is 'out of pocket' for our patients and emphasis is mainly on performing the basic investigations that must be done to achieve a diagnosis; this sometimes makes our practice less robust,–Indeed patients, physician's preference, age, the size of the thyroid gland, spectrum of available local resources, and the severity of hyperthyroidism are determinants involved in the choice of treatment [5,28]. The availability of three treatment modalities enables patients to have options in our hospital, but at times this is biased by the referral patterns. However, inter-specialty referrals and deliberations alter the patients' choice of modality of care in select cases. With an 85% rate of diagnostic accuracy Wayne's Prognostic index is invaluable in low resource settings such as ours [29], where the most readily available and cheapest modality of diagnosis is our clinical acumen. Our low dose titrated ATDs regimen, administered for between 12-18 months achieved a remission rate of 67.8%; which is comparable and slightly better than the 61% reported by Modebe in Enugu, Nigeria [30]. We attribute the higher remission rates to improved compliance by the patients [31]. Other investigators initially advocated a block and replace regimen in order to achieve improved long term remission rates [32,33], long term studies have however showed no improved outcome from high dose therapy [34-36]. Agranulocytosis was an uncommon finding in our study. In these patients, ATD were discontinued and they were subsequently referred for either surgical or RAI therapy as this is a contra-indication to the continued use of ATDs in those who manifest it [37]. Although RAI therapy in Ibadan is just slightly over a decade [38], its acceptance, challenges, safety and efficacy as a treatment option for hyperthyroidism has been documented [39,40]. Advantages inherent in the half-life of radionuclides for RAI allow for international sourcing; however this accounts for its prohibitive costs in our low income setting [39,40].

From a scientific and operational stand-point in the UCH Ibadan, empirical treatment with 555Mbq is convenient in our setting, although successful outcomes have been reported using lower activities [41,42]. We aim to minimize the high retreatment rates associated with use of lower activities of RAI [43]. Thus the logistics and costs associated with re-treatment make initial treatment with higher activities favorable in our setting. Although multiple factors are associated with efficacy, our treatment success rate of 67% is higher in comparison with other studies [44-47].

A third of the patients had toxic nodular goiter consequently making surgery the key modality of care in this subset of patients because of cosmesis (goiter), aero-digestive inlet obstruction and the risk of malignant foci or toxicity. Moreover ATD do not induce remission in patients with toxic nodular goiter, and maintaining a euthyroid state is unlikely following discontinuation of therapy. An increased prevalence and aggression of clinical thyroid cancer in the setting of Graves' disease has been reported in this category of patients as opposed to euthyroid patients who develop thyroid cancer [48]. The prevalence of nodular toxic goiters in our setting may be explained by the two-three fold increase in nodular goiters seen in endemic goiter areas where iodine intake is moderately deficient [49]. The predominance of relatively large thyroid glands (WHO grade II and III) in our environment [50] may also negate the use of RAI in terms of the higher activities of radioactive iodine needed or need for a second treatment with RAI as well as the higher risk for adverse effect [40]. In addition, the important cosmesis requisite in these patients favors surgical ablation ultimately, even though biochemical control might have been achieved by other specialty means (RAI or ATD's). The prevalence of females in the child bearing age group in our review may also play an important role in choice of therapy for females desirous of pregnancy within 12 months because of the instruction and need to avoid pregnancy until 6 months after RAI treatment. Surgical options vary; however total thyroidectomy is the preferred in Ibadan with minimal complications [50]. It eliminates the risk of recurrence, whilst ensuring a commensurate low level of post-operative complication and achieves the aim of eliminating any foci of occult malignancy; this makes surgery a compelling component of the armamentarium in deciding which specialty takes the lead in managing these patients in our environment. Majority of patients with TAO have mild occular symptoms and require only minimal intervention [6]. In this study, Graves' disease bore the commonest ophthalmic manifestation of hyperthyroidism in patients in Ibadan; however, the clinical profile of our patients was significantly different from that reported by Caucasian studies [14]. Practically all our patients had mild ocular disease and no single patient presented with active orbital inflammation or significant ocular motility disorder. It is noteworthy that among both male and female patients in this study, the prevalence of smoking was extremely low. It is therefore possible that the lack of severe TAO may be as a result of low prevalence of smoking in these patients, or may represent an unknown protective effect related to yet undetermined racial or cultural factors. In this

study, all our patients responded well to the systemic treatment of their hyperthyroidism in addition to topical treatment for dry eye symptoms. However, as expected, cosmetic appearance remained unchanged for the few with mild to moderate exophthalmos and periorbital fullness.

Conclusion: All the current therapies have both advantages and disadvantages. The presence of all modalities of care is beneficial to patients. Total thyroidectomy remains a safe and definitive treatment modality in low income countries like Nigeria

- What is already known on this topic: The clinic-pathologic profile and outcomes of care of patients with hyperthyroidism
- Graves' disease is the commonest cause of hyperthyroidism

What this study adds:

- Clinic-pathologic profile of patients with hyperthyroidism in Ibadan, Southwestern Nigeria
- Availability of various options of treatment in an interdisciplinary setting in Ibadan,Nigeria
- Outcomes of treatment with surgery, radioactive iodine and antithyroid drugs in a sub-Saharan setting

References

1. Devereaux, D, Tewelde SZ. Hyperthyroidism and thyrotoxicosis. Emergency medicine clinics of North America. 2014; 32: 277-292.
2. Schüssler-Fiorenza CM, Bruns C, Chen H. The surgical management of Graves' disease. Journal of Surgical Research. 2006; 133: 207-214.
3. Querat C, Germain N, Dumollard JM, Estour B, Peoc'h M, Prades JM. Surgical management of hyperthyroidism. European Annals of Otorhinolaryngology. Head and Neck diseases. 2015; 132: 63-66.
4. Prasek K, Płazińska MT, Królicki L. Diagnosis and treatment of Graves' disease with particular emphasis on appropriate techniques in nuclear medicine. General state of knowledge. Nucl Med Rev Cent East Eur. 2015; 18: 110-116.
5. Bartalena L. Graves' Orbitopathy: Imperfect Treatments for A Rare Disease. European Thyroid Journal. 2013; 2: 259-269.
6. Mallika P, Tan A, Aziz S, Syed Alwi S, Chong M, Vanitha R, et al. Thyroid Associated Ophthalmopathy – A Review. Malays Fam Physician. 2009; 4: 8-14.
7. Naik VM, Naik MN, Goldberg RA, Smith TJ, Douglas RS. Immunopathogenesis Of Thyroid Eye Disease: Emerging Paradigms. Surv Ophthalmol. 2010; 55: 215-226.
8. Grubbs LK S. Hyperthyroidism: Focus On Graves' Disease. Clinician Reviews. 2004.
9. Mckeag D, Lane C, Lazarus JH, Baldeschi L, Boboridis K, Dickinson AJ, et al. Clinical Features Of Dysthyroid Optic Neuropathy: A European Group On Graves' Orbitopathy (EUGOGO) Survey. Br J Ophthalmol. 2007; 91: 455-458.
10. Pradeep PV, Agarwal A, Baxi M, Agarwal G, Kumar Gupta S, Mishra SK. Safety and Efficacy of surgical management of hyperthyroidism: 15 year experience from a tertiary care centre in a developing country. World J Surg. 2007; 31: 306-312.
11. Bahn Chair RS, Burch HB, Cooper DS, Garber JR, Greenlee MC, Klein I, et al. American Thyroid Association, American Association of Clinical Endocrinologist, Hyperthyroidism and Thyroid Association and American Association of Clinical Endocrinologists. Thyroid. 2011; 21: 593-646.
12. Delbridge L, Reeve TS, Khadra M, Poole AG. Total thyroidectomy: the technique of capsular dissection. ANZ J Surg. 1992; 62: 96-99.
13. European Group on Graves Ophthalmpopathy. Wiersinga WM, Perros P, Kahaly GJ, Mourits MP, Baldeschi L, Boboridis K, et al. Clinical Assessment Of Patients With Graves' Orbitopathy: The European Group On Graves' Orbitopathy Recommendations To Generalists, Specialists And Clinical Researchers. Eur J Endocrinol. 2006; 155: 387-389.
14. Ogun OA, Adeleye JO. Severe Ophthalmological Complications Of Thyroid Disease Are Rare In Ibadan, Southwestern Nigeria: Results Of A Pilot Study. Ophthalmol Eye Dis. 2016; 8: 5-9.
15. Brent GA. Clinical practice. Graves' disease. N Engl J Med. 2008; 358: 2594-2605.
16. Törring O, Tallstedt L, Wallin G, Lundell G, Ljunggren JG, Taube A, et al. Graves' hyperthyroidism: treatment with antithyroid drugs, surgery, or radioiodine--a prospective, randomized study. Thyroid Study Group. J Clin Endocrinol Metab. 1996; 81: 2986-2993.
17. Famuyiwa OO, Bella AF. Thyrotoxicosis in Nigeria. Analysis of a five year experience. Tropical and Geographical medicine 1990; 42: 248-254.
18. Oluwasanmi JO, Alli AF. Goitres in Western Nigeria. Trop Geogr Med 1968; 20: 357-366.
19. Olurin EO, Itayemi SO, Oluwasanmi JO, Ajayi OO. The pattern of thyroid gland disease in Ibadan. Nig Med J. 1973; 3: 58-65.
20. Olurin EO. Thyrotoxicosis in Nigeria- a study of forty-six patients. Postgrad Med J. 1972; 48: 609-615.
21. Vanderpump MPJ, Michael W, Tunbridge G. The epidemiology of autoimmune thyroid disease. Autoimmune endocrinopathies. Humana Press. 1999: 141-162.
22. Weetman AP. Graves' disease. N Engl J Med. 2000; 343: 1236-1248.
23. Jacobson DL, Gange SJ, Rose NR, Graham NM. Epidemiology and estimated population burden of selected autoimmune diseases in the United States. Clin Immunol Immunopathol. 1997; 84: 223-243.
24. Fatourechi V. Thyroid dermopathy and acropachy. Best Pract Res Clin Endocrinol Metab. 2012; 26: 553–565.
25. Bartalena L, Fatourechi V. Extrathyroidal manifestations of Graves' disease: a 2014 update. J Endocrinol Invest. 2014; 37: 691-700.
26. Hollowell JG, Staehling NW, Flanders WD, Hannon WH, Gunter EW, Spencer CA, et al. Serum TSH, T4, and Thyroid Antibodies in the United States Population (1988 to 1994): National Health and Nutrition Examination Survey (NHANES III). 2002; 87: 489-499.
27. Jorde R, Ytre-Arne K, Stormer J, Sundsfjord J. Short term treatment of Grave's disease with methimazole in high versus low doses. J Intern Med. 1995; 238: 161-165.
28. Tallstedt L, Hundell G, Torring O, Wallin G, Ljunggren JG, Blomgren H, et al. Occurrence of ophthalmopathy after treatment for Graves' hyperthyroidism. N Engl J Med. 1992; 326: 1733-1738.
29. Kalra S, Khandelwal SK, Goyal A. Clinical scoring scales in thyroidology: a compendium. Indian J Endocri Metab. 2011; 15: 89-94.
30. Modebe O. Experience with Carbimazole in the treatment of the hyperthyroidism of Grave's disease in Nigerian patients. Afr J Med Med Sci. 1995; 24: 347-351.
31. Franklyn JA. The management of hyperthyroidism. N Engl J Med. 1994; 330: 1731-1738.
32. Romaldini JH, Bromberg N, Werner RS, Tanaka LM, Rodrigues HF, Werner MC, et al. Comparison of effects of high and low dosage regimens of antithyroid drugs in the management of Graves' hyperthyroidism. J Clin Endocrinol Metab. 1983; 57: 563-570.
33. Meng W, Meng S, Mannchen E, Hampel R, Kirsch G, Dannenberg J, et al. Effect of duration of therapy and low and highly dosed thiamazole treatment on Basedow's Grave's disease. Exp Clin Endocrinol. 1991; 97: 257-260.
34. Reinwein D, Benker G, Lazarus JH, Alexander WD. A prospective randomized trial of antithyroid drug dose in Grave's disease therapy. European Multicenter

study group on antithyroid drug treatment. J Clin Endocrinol Metab.1993; 76: 1516-1521.

35. Lucas A, Salinas I, Rius F, Pizarro E, Granada ML, Foz M, et al. Medical therapy of Grave's disease: does thyroxine prevent recurrence of hyperthyroidism? J Clin Endocrinol Metab. 1997; 82: 2410-2413.

36. Edwards CJ, Tellez M. Treatment of Grave's disease by carbimazole: high dose with thyroxine compared to titration dose. Eur J Endocrinol. 1994; 131: 120-124.

37. Cooper DS, Goldminz D, Levin AA, Ladenson PW, Daniels GH, Molitch ME, et al. Agranulocytosis associated with antithyroid drugs: effects of patient age and drug dose. Ann Intern Med. 1983; 98: 26-29.

38. Adedapo KS, Fadiji IO, Orunmuyi AT, Onimode Y, Osifo BO. Radioactive iodine ablation therapy: a viable option in the management of Graves' disease in Nigeria. Afr J Med Med Sci. 2012; 41: 193-196.

39. Adedapo KS, Onimode YA, Ejeh JE, Adepoju AO. Avoidable challenges of a nuclear medicine facility in a developing nation. Indian J Nucl Med. 2013; 28: 195-199.

40. Onimode YA, Ejeh JE, Orunmuyi AT. Adverse Reactions to Radioiodine 131I Therapy of Goiter in West African Tertiary Hospital. Mol Imaging Radionucl Ther. 2016; 25: 128-133.

41. De Leo S, Lee SY, Braveran LE. Hyperthyroidism. Lancet. 2016; 388: 906-918.

42. Onimode YA, Ankrah A, Adedapo KS. Outcome of Radioiodine Therapy in a West African Population. World J Nucl Med. 2016; 15: 24-29.

43. Ogunjobi KO, Ejeh JE, Adedapo KS, Eniojukan JF. Effectiveness of fixed dose radioactive iodine (RAI) for the treatment of hyperthyroidism: experience of a teaching hospital in South West Nigeria. Mol Imaging Radionucl Ther. 2013; 22: 36-41.

44. Karyampudi A, Hamide A, Halanaik D, Sahoo JP, Kamalanathan S. Radioiodine therapy in patients with Graves' disease and the effects of prior carbimazole therapy. Indian J Endocri Metab. 2014; 18: 688-693.

45. Allahabadia A, Daykin J, Sheppard MC, Gough SC, Franklyn JA. Radioiodine treatment of hyperthyroidism—prognostic factors for outcome. J Clin Endocrinol Metab. 2001; 86: 3611-3617.

46. Bonnema SJ, Hegedüs L. Radioiodine therapy in benign thyroid diseases: effects, side effects, and factors affecting therapeutic outcome. Endocrine reviews. 2012; 33: 920-980.

47. The Cochrane Library. Ma C, Xie J, Wang H, Li J, Chen S. Radioiodine therapy versus antithyroid medications for Graves' disease. The Cochrane Library. 2016.

48. Belfiore A, Russo D, Vigneri R, Filetti S. Graves' disease, thyroid nodules and thyroid cancer. Clin Endocrinol. 2001; 55: 711-718.

49. Belfiore A, La Rosa GL, Padova G, Sava L, Ippolito O, Vigneri R. The frequency of cold thyroid nodules and thyroid malignancies in patients from an iodine-deficient area. Cancer. 1987; 60: 3096-3102.

50. Afolabi AO, Ayandipo OO, Afuwape OO, Ogundoyin OA. A fifteen year experience of total thyroidectomy for the management of simple multinodular goitres in a low medium income country. S Afr J Surg. 2016; 54: 40-45.

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