Pathology and the Surgical Management of Goitre in an Endemic Area Initiating Supplementary Iodine Nutrition

Histopathologie et Prise en Charge du Goitre Dans Une Zone Endémique Initiant Une Supplémentation Alimentaire en Iode

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ABSTRACT

Goitre in the West African sub-region is caused by iodine deficiency and goitrogens in the diet. Supplementary iodine nutrition on a mass scale was started in Ghana in 1996. In areas where iodine deficiency have been corrected the histological pattern of goitre changes and this influences surgical decision making. Data on the histological types of goitre in our institution is lacking.
OBJECTIVE: **To define the histopathological types of goitre in this initial period of iodine supplementation and relate this to the types of thyroid surgeries that were performed.**
METHODS: **It was a prospective study of consecutive patients who underwent thyroidectomy from January 2003-December 2007. Descriptive statistics was employed in analyzing the data**
RESULTS: **Five hundred and twenty eight cases were studied made up of 470 (89%) females and 58 (11%) males with mean age of 41.98yrs, SD ±12.90yrs. The excised mean thyroid tissue weight was 161.4g, SD ±116.3yrs. Hyperplastic goitres were 373 (70.7%), toxic goitre 70 (13.3%), adenoma 37 (7.0%), carcinoma 25 (4.7%) and thyroiditis 23 (4.4%). Papillary carcinoma accounted for 56% (14) cancers. Subtotal thyroidectomy was performed in 278 (52.7%) of patients, near total thyroidectomy 107 (20.3%), lobectomy 98 (18.6%), total thyroidectomy 24 (4.5%), excision or completion thyroidectomy 20 (3.8%) and de-bulking 1 patient. Overall, complications occurred in 32 patients (6.1%) and were made up mostly of haemorrhage in 10 (1.9%), Hypocalcaemia 10 (1.9%), unilateralRecurrent Laryngeal Nerve(RLN) injury 3 (0.57%), Tracheal collapse 3 (.57%) and Bilateral RLN injury 2 (0.4%).**
CONCLUSION: **The introduction of iodine supplementationon a mass scale in Ghana is yet to have its fullest impact on thyroid diseases. Goitres are still large and cause pressure effects. Toxic, inflammatory and malignant goitres are gaining prominence, and surgery for malignant goitre was oncologically inadequate.Near total thyroidectomy is recommended as the minimum surgery to avert the need for completion thyroidectomies in view of the lack of preoperative pathological diagnosis of thyroid lesions. WAJM 2013; 32(1): 45–51.**

Key words: **Goitre, iodine deficiency, iodated salt, Endemic goitre, Thyroidectomy.**

RÉSUMÉ

Dans la sous région Ouest Africaine, le goitre est dû à une carence en iode et aux goitrogènes alimentaires. Une supplémentation alimentaire en iode à large échelle a été démarrée au Ghana en 1996. Dans les zones où le déficit en iode a été corrigé, les aspects histologiques du goitre avaient changé et avaient influencé la prise de décision chirurgicale. Les données sur les types histologiques de goitre manquent dans notre institution.
OBJECTIF: Définir les types histopathologiques du goitre dans cette période initiale de supplémentation en iode et les rapporter aux types de chirurgie qui ont été réalisés.
MÉTHODES: Il s'agissait d'une étude prospective de patients consécutifs ayant subi une thyroïdectomie de Janvier 2003 à Décembre 2007. Une statistique descriptive a été réalisée pour analyser les données.
RÉSULTATS: Cinq cent vingt huit cas ont été étudiés dont (89%) femmes et 58 (11%) hommes avec une moyenne de 41,98 ans, Ecart-Type ±12,90 ans. Le poids moyen du tissu d'exérèse de thyroïde était de 161,4g, Ecart-Type ±116,3g. Les types histologiques étaient: un goitre hyperplasique dans 373 cas (70,7%), un goitre toxique dans 70 cas (13,3%), un adénome dans 37 cas (7,0%), un carcinome dans 25 cas (4,7%) et une thyroidite dans 23 cas (4,4%). Le carcinome papillaire représentait 56% (14 cas) des cancers. Une thyroïdectomie sub totale a été réalisée dans 278 cas (52,7%), une thyroïdectomie presque totale dans 107 cas (20,3%), une lobectomie dans 98 cas (18,6%), une thyroïdectomie totale dans 24 cas (4,5%), une excision ou une thyroïdectomie complémentaire dans 20 cas (3,8%) et une chirurgie de réduction de masse dans un cas. En tout, une complication était survenue chez 32 patients (6,1%) avec essentiellement une hémorragie dans 10 cas (1,9%), une hypocalcémie dans 10 cas (1,9%), une lésion unilatérale du nerf laryngé récurrent dans 3 cas (0,57%), un écrasement trachéal dans 3 cas (0,57%) et une lésion bilatérale du nerf laryngé récurrent dans 2 cas (0,4%).
CONCLUSION: L'introduction de la supplémentation en iode à large échelle au Ghana est supposée avoir son plein impact sur les maladies thyroïdiennes. Les goitres sont toujours volumineux entrainant une compression. Les goitres toxiques, inflammatoires et malins deviennent prépondérant et la chirurgie des goitres malins n'est pas carcinologiquement adéquate. La thyroïdectomie presque totale est recommandée comme étant la chirurgie minimale pour éviter le besoin de thyroïdectomie complémentaire devant l'absence de diagnostic histologique préopératoire des lésions thyroïdiennes. **WAJM 2013; 32 (1): 45–51.**

Mots clés: Goitre, déficit en iode, sel iodé, goitre endémique, Thyroïdectomie

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Abbreviations: FNAC, Fine Needle Aspiration Cytological; **KBTH,** Korle-Bu Teaching Hospital

INTRODUCTION

Operation for thyroid disease is the commonest endocrine surgery performed in many surgical centres where goitreis endemic. The established practice of thyroid surgery defines the extent to which the gland should be excised based on both the pre-operative and intra-operative findings with lobectomy being the minimum and total thyroidectomy the maximum. Surgeon, institutional and country differences, however, exist in many aspects of the management of thyroid swellings, from indications for surgery to extent of excision in benign, toxic and even malignant goitre. For instance, the place of surgery in benign small swellings that are not causing pressure effects is not clear.[1] Also the extent to which the gland should be excised in Graves' disease is still a subject of debate.[2–4]

Currently, the literature is becoming dominated with suggestions to offer near total or total thyroidectomy as the minimum surgery for benign disease in endemic goitre areas with the main aim of averting a completion-thyroidectomyin cases with incidental thyroid cancer in multinodular goitre.[5–7] This suggestion stems from the many logistical constraints in these areas that make it impossible to have a pre-operative histopathological diagnosis. A second surgery to remove a remnant thyroid tissue carries a theoretical increased risk of both recurrent laryngeal nerve injury and debilitating permanent hypoparathyroidism

Accra is located in the endemic goitre zone of West Africa.[9] Iodine deficiency and goitrogens in the diet have been blamed for the high prevalence of the disease which prompted a national policy in the year 1996 to initiate iodine supplementation through dietary salt.[10]

Varied presentations of goitre are noticed in clinical practice but the pathological forms inendemic areas conform to a defined pattern, with large hyperplastic or colloid goitres being the commonest histological type accounting for over 70% of cases.[6,7] With dietary iodine supplementation in the population the patterns have usually changed with increased prevalence of malignant,[11, 12] toxic[13] or inflammatory[14] goitres.

This study was undertaken, seven years following the mass usage of iodized salt, to define the pathological pattern of goitre in this initial period of iodine supplementation, and to correlate this with the extent of thyroid gland excision as practiced at the Korle-Bu Teaching Hospital (KBTH). Information on the regular intake of iodized salt was sought from all the patients who were recruited into the study. The study also evaluated the relationship between gland size, extent of excision of the gland, histopathological findings and post-operative complications. Post-operative complication was defined as complications occurring within 30 days after surgery.

SUBJECTS, PATIENTS AND METHODS

This was a prospective study in which consecutive patients who were admitted to the general surgical wards and underwent thyroidectomy were studied. Data on the management of goitres as currently practiced by surgeons in the Hospital was collected using a proforma designed for the study. No standardised management protocol was used for the study. The study period wasJanuary 2003 to December 2007. During this period all patients who underwent thyroidectomy in the general surgery units of the Korle-Bu Teaching Hospital were included in the study.

The variables that were assessed included age, sex, intake of iodized salt, presenting symptoms, test for thyroid endocrine function, fine needle aspiration cytology results, extent of thyroidectomy, excised wet gland weight, the histopathological results and the post operative complications. The data was obtained from the patients' case notes and by interviewing the patients directly before surgery and during the post-operative period. The statistical analysis of the data gathered was descriptive.

At the Korle-Bu Teaching Hospital thyroid surgery is performed by general surgeons. During the study period ten general surgeons in four units of the Department of Surgery performed all the thyroidectomies. Patients with thyroid swellings or symptoms of toxicity were evaluated at the out-patients department where the history was taken and the physical features of the gland assessed. Ultrasound evaluation of the gland was routinely performed in patients with clinically solitary nodules and in selected patients when some features of the swelling were in doubt. Plain X-Ray of the neck and the thoracic inlet to define the course of the trachea and pre-operative assessment of vocal cord mobility were routinely done. In patients with toxic symptoms the serum TSH, T3 and T4 levels were assessed during the initial visit and the patients made euthyroidbefore surgery. Endocrine function was not routinely assessed in patients without toxic symptoms. The use of Fine Needle Aspiration Cytology (FNAC) in evaluating thyroid swelling was selectively performed. All the surgeons employed intra-capsular excision of the gland except in total thyroidectomy. Corrugated drainage of the deep dead space was routine and lasted on average 48 hrs. The average length of stay in hospital after surgery was four days. The serum calcium level was assessed post-operatively in patients with symptoms suggestive of hypoparathyroidism and calcium supplementation given as required. For all patients who developed significant hoarseness or change in voice and/or respiratory distress post-operatively, vocal cord mobility was assessed by indirect laryngoscopy by the ENT surgeon who also performed emergency tracheostomy whenindicated. .

RESULTS

In the study period, 552 patients underwent thyroid surgery at the KBTH. The histopathological results of 24 patients were not available for study and so were excluded from the analysis. The 528 remaining patients were made up of 470 (89%) females and 58 (11%) males (Tables 1 and 2) with mean age of 41.98 yrs (SD ±12.9yrs). Over 50% of the patients were aged between 30 and 40 years. Seventy (13.3%) of the patients presented with hyperthyroidism, and were made up of 61 with toxic nodular goitres and ninewith Graves' disease. Twenty (3.78%) patients had recurrent goitre, majority (16 patients) of whom had their initial surgery elsewhere. All the remaining 438 patients presented with

Table 1: Distribution of Histological Types of Goitre by Age Groupings in Females

Histolopathological Types	10 – 19	20 – 29	30 – 39	40 – 49	50 – 59	60 – 69	70 +	Total
Nodular hyperplasia	9	50	100	77	65	25	9	332
Colloid Goitre	0	2	2	3	0	1	0	14
Toxic Nodular Hyperplasia	3	6	12	18	7	5	0	51
Grave's Disease	0	4	1	2	2	0	0	9
Hashimoato's Thyroididitis (spelling check)	0	5	1	5	2	1	0	14
Lymphocytic Thyroiditis	0	0	5	3	0	0	0	8
Follicular Adenoma	0	12	10	3	3	2	1	31
Hurtle Cell Adenoma	0	0	0	0	0	0	0	0
Papillary Carcinoma	0	1	3	2	2	2	0	10
Follicular Carcinoma	0	0	1	0	3	0	0	4
Mixed Follicular & Papillary Carcinoma	0	1	0	0	0	0	0	1
Hurtle Cell Carcinoma	0	0	0	0	1	0	0	1
Anaplastic Carcinoma	0	0	1	0	0	0	0	1
Medullary Carcinoma	0	0	0	0	0	0	0	0
Total	**9 (1.9)**	**81(17.2)**	**136(28.9)**	**113(24.0)**	**86(18.3)**	**36(7.7)**	**10(2)**	**470(100)**

Table 2: Distribution of Histological Types of Goitre by Age Groupings in Males

Histolopathological Types	10 – 19	20 – 29	30 – 39	40 – 49	50 – 59	60 – 69	70 +	Total
Nodular hyperplasia	0	5	2	9	7	5	2	30
Colloid Goitre	0	1	1	1	0	0	0	3
Toxic Nodular Hyperplasia	0	0	4	2	2	2	0	10
Grave's Disease	0	0	0	0	0	0	0	0
Hashimoato's Thyroididitis	0	0	0	0	0	0	0	0
Lymphocytic Thyroiditis	0	0	1	0	0	0	0	1
Follicular Adenoma	0	1	1	1	2	0	0	5
Hurtle Cell Adenoma	0	0	0	1	0	0	0	1
Papillary Carcinoma	0	0	2	2	0	0	0	4
Follicular Carcinoma	0	0	0	1	1	0	0	2
Mixed Follicular & Papillary Carcinoma	0	0	1	0	0	0	0	1
Hurtle Cell Carcinoma	0	0	0	0	0	0	0	0
Anaplastic Carcinoma	0	0	0	0	0	0	0	0
Medullary Carcinoma	0	0	1	0	0	0	0	1
Total	**0(0)**	**7(12.1)**	**13(22.4)**	**17(29.3)**	**12(20.7)**	**7(12.1)**	**2(3.4)**	**58(100)**

Table 3: Histopathological Types of Goitre Diagnosed

Histopathological Type	Number of Patients (Percentage)
Nodular Hyperplasia	362 (68.6)
Colloid Goitre	11 (2.1)
Toxic Nodular Hyperplasia	61 (11.6)
Grave's Disease	9 (1.7)
Hashimoto's Thyroiditis	14 (2.7)
Lymphocytic Thyroiditis	9 (1.7)
Follicular Adenoma	36 (6.8)
Hurtle Cell Adenoma	1 (0.2)
Papillary Carcinoma	14 (2.7)
Follicular Carcinoma	6 (1.1)
Mixed Follicular & Papillary Carcinoma	2 (0.4)
Hurtle Cell Carcinoma	1 (0.2)
Anaplastic Carcinoma	1 (0.2)
Medullary Carcinoma	1 (0.2)
Total	**528 (100.0)**

thyroid swelling and wanted it removed because of its' size and/or pressure effect on the trachea. In twelve patients there were significant respiratory pressure symptoms at the time of presentation necessitating urgent surgery. They included one patient with unilateral vocal cord paralysis, four patients with compression of the trachea at the thoracic inlet and the remaining had gross deviations and narrowing of the trachea by the enlarged thyroid.

The excised thyroid tissue was weighed before it was fixed in formalin. Tissues from 468 (88.6%) glands were weighed and the average weight was 161.4g (SD ± 116.3g), range 20–1,340g.

Table 3 details the histopathological types of goitres that were operated upon.

The goitres were predominantly hyperplastic and colloid goitres 373 patients (70.7%) followed by toxic goitre 70 patients(13.3%).There were 37 (7%) adenomas and 23(4.4%) thyroiditis. Carcinomas accounted for 25(4.7%) with papillary carcinoma being the commonest variant accounting for 56% of the cancers Thirty two patients (6.1%) developed post-operative complications as outlined in Table 4. Life threatening respiratory embarrassment occurred in 12 patients shortly after surgery, four from significant haemorrhage, three each from tracheal collapse and unilateral recurrent laryngeal nerve injury, and two from bilateral recurrent laryngeal nerve injury. There were no intra-operative deaths but two patients with malignancy, one with anaplastic carcinoma and the other with medullary carcinoma died from metastatic tumour during the study period.

Fine Needle Aspiration Cytology

Ninety five Fine Needle Aspiration Cytological (FNAC) investigations were performed on 93 patients. Two patients with an initial non-diagnostic report had repeat FNAC and one was diagnosed as papillary carcinoma. Fifty three patients had FNAC diagnoses of benign lesions and 40 of them underwent surgical excision of their glands. Four of the remaining 13 had small cysts that were aspirated and nine had solid lesions that were less than 1.5cm who were put on surveillance. The histopathological results of the 40 patients who underwent surgery were nodular hyperplasia 37, two Hashimoto's thyroiditis and one lymphocytic thyroiditis. Twenty six patients who had unsatisfactory FNAC reports subsequently had surgery. Twenty-fourwere diagnosed histo-pathologically as hyperplastic goitres; one Hashimoto's thyroiditis and one follicular adenoma. Ten FNACs were reported as malignant. Three of these patients had clinical evidence of local invasion of adjacent structures as well as distant metastasis at presentation and the FNAC was needed to aid non-surgical treatment since the tumours were not resectable. Two of them had papillary and one had anaplastic carcinoma. The seven who had surgery were diagnosed histopathologically as follicular adenoma three patients, papillary carcinoma two patients, lymphocytic thyroiditis and anaplastic carcinoma one patient each. Four patients with suspiciouslesions hadintermediate cytological reports but following thyroidectomy and histo-pathology two were reported as nodular hyperplasia, one Hurtle cell tumour and one follicular adenoma.

Recurrent Goitres

Patients with recurrent goitres were 20 (3.8%). One of these was a recurrent toxic nodule. The histological diagnoses of these nodules were nodular hyperplasia 15, follicular carcinoma two, colloid goitre one, mixed follicular and papillary carcinoma one and papillary carcinoma one. Four patients with recurrent goitre developed post-operative complications, viz, one each of haemorrhage, transient hypocalcaemia, tracheal collapse and unilateral recurrent laryngeal nerve injury. The overall complication rate was 6.1%, index thyroidectomies 5.5% and completion thyroidectomies 20%.

Toxic Nodular Goitres

Fifty eight patients were diagnosed clinically with toxic nodular goitre and three with solitary toxic nodule. The histopathological diagnoses of these patients were, respectively, toxic nodular hyperplasia 57, and one each of Hashimoto's thyroiditis, lymphocytic thyroiditis and follicular adenoma. Subtotal thyroidectomy and near total thyroidectomy were performed on 38 and 23 patients respectively. Two patients each had lobectomy and total thyroidec-tomy. Post-operative complications occurred in eight patients (13.1%) with toxic nodular goitre.

Malignant Goitre

Of the 25 patients (4.7%) who had malignant goitre it was in only three that the preoperative diagnosis was confirmed by FNAC. They were made up of 17 females(3.6%) and eight males(13.8%). The histopathological types were papillary 14 (56%), follicular 6 (24%), mixed papillary and follicular 2 (8%) and one (4%) each of Hurtle cell, medullary and anaplastic carcinoma. Surgical excision of the thyroid gland was generally inadequate for patients with malignant disease but only one patient subsequently underwent a completion-thyroidectomyduring the study period. Lobectomy was performed in ten, subtotal thyroidectomy in seven, near total thyroidectomy in three, total thyroidectomy in three, and completion-thyroidectomy and debulking excision in one patient each. Only one patient had

Table 4: Post-Operative Complications in 32 Patients

Complication	Number (%)	Mean gland wt. (gm)	Number of complications per surgical procedure				
			L	STT	NTT	TT	CT
Haemorrhage	10 (1.89)	267	0	5	3	0	2
Hypocalcaemia	10 (1.89)	166	1	3	4	1	0
Unil. RLN Inj	3 (0.57)	150	0	1	0	1	1
Tracheal Collapse	3 (0.57)	247	0	0	1	2	0
Bil. RLN Inj	2 (0.38)	40	0	2	0	0	0
Wound Infection	2 (0.38)	120	1	0	1	1	0
Seroma	2 (0.38)	280	0	1	1	0	0
Malaria	1 (0.19)	230	0	1	0	0	0
Jaundice	1 (0.10)	334	1	0	0	0	0
Pneumonia	1 (0.19)	334	1	0	0	0	0
Total	**35**		**4**	**13**	**10**	**5**	**3**

L, Lobectomy; STT, Subtotal thyroidectomy; NTT, Near total thyroidectomy; TT, Total thyroidectomy; CT, Completion-thyroidectomy; Unil RLN Inj, Unilateral recurrent laryngeal nerve injury; Bil RLN Inj, Bilateral recurrent laryngeal nerve injury.

tracheal collapse after a total thyroidectomy for thyroid cancer.

Extent of Thyroid Gland Excision in Relation to Complications

The range of thyroid surgery performed included debulking in one patient, excision or completion-thyroidectomy in 20 (3.8%), lobectomy in 98 (18.6%), subtotal thyroidectomy 278 (52.7%), near total thyroidectomy 107 (20.3%) and total thyroidectomy 24 (4.5%) patients. Overall, 32 patients developed 35 post operative complications. Haemorrhage and temporary hypoparathyroidism were the most frequent complications. Bilateral recurrent laryngeal nerve injury occurred in two patients and immediate tracheostomies were performed. Unilateral recurrent nerve injury and tracheal collapse occurred in three patients each, Table 4. Two patients (2.0%) who had lobectomy developed post operative complications, the others were 12 patients (4.3%) after subtotal thyroidectomy, ten patients (9.3%) after near total thyroidectomy, four patients (16.7%) after total thyroidectomy and four patients (20%) after excision of recurrent goitre or completion thyroidectomy

Intake of Iodizedsalt by Patients

Four hundred and forty one patients (83.5%) were taking iodized salt regularly at the time of presentation or interview. Of these 213 (48.3%) patients were taking it before their thyroid swelling or toxic symptoms were noticed while 228 (51.7%) patients started using it when they noticed the thyroid swelling and their attention was drawn to the relationship between iodine intake and thyroid disease. The 87 (16.5%) patients who were not taking it at the time of presentation or interview knew nothing about the relationship between iodine intake and thyroid disease; only a few said they could not afford the iodized salt for cooking.

Of the 61 patients who had toxic nodular goitre nine were not taking iodized salt because they were told the intake of iodine supplementation will make their condition worse, 30 were taking the iodized salt before they noticed both the neck swelling and the toxic symptoms

but continued to take it as at presentation and 23 who were not taking the iodized salt started taking it after the onset of their symptoms. For the nine patients with Graves' disease four were advised against the intake of iodized salt and so stayed away from it but five were taking it regularly, two before the symptoms started and three after the onset of the symptoms.

DISCUSSION

It is evident that goitres in the patients studied were predominantly large (mean weight 161.4gm) non-toxic hyperplastic or colloid goitre and accounted for 70.7% of the disease. This was followed by toxic goitres (13.3%), thyroid adenoma (7%), thyroid carcinoma (4.7%) and thyroiditis (4.4%). This is the first report on surgically treated thyroid swellings in Accra with no previous data to compare with. This observed pattern of thyroid pathology is, however, similar to other recent reports from endemic goitre regions, both in the developed and developing world, at the initiation of iodine supplementation.[15, 16] It however contrasts sharply with the findings in a review of 1000 cases in Ibadan, which lies within the same endemic goitre region of West Africa as Accra, two decades ago.[17]

Changes in iodine intake in defined populations have been shown to cause other forms of both clinical and morphological thyroid disease. In iodine sufficiency the changes have been towards toxic goitres,[13, 18] thyroiditis[19, 20] and papillary predominant epithelial cancers.[22]

Toxic goitres accounted for 13.3% (70) of thyroid disease with toxic nodular goitre in the majority 87.1%. The high number of toxic nodular goitre might be due to the modest number of patients who were regularly taking in iodized salt. In the early stages of iodine deficiency the gland undergoes diffuse hyperplasia. When the exposure to iodine deficiency becomes chronic the gland develops nodular hyperplasia of widely differing follicular cell numbers, colloid content and follicular height.[23] Improvement in iodine deficiency is accompanied by an increased prevalence of hyperthyroidism due mainly to increased iodine incorporation into nodules that are

autonomously functioning resulting in increased synthesis and secretion of hormone.[24, 25]

The prevalence rate of thyroid cancer in this study was 4.7% and they were all epithelial tumours. The cancers were most prevalent between ages 30 to 59 years. They had a female preponderance of 2.1:1 but were more frequent in male goitres, 13.8% compared with 3.6% in female goitres. The most frequent epithelial malignancy was the papillary variant (56.0%) followed by follicular carcinoma (24%); giving a ratio of 2.3:1. This ratio is similar to what has been found in many recent reports on thyroid pathology from endemic goitre regions with improved iodine intake, including Turkey,[26] Spain,[27] India,[28] Ethiopia,[29] Italy[30] and Kenya[31] but lower than the higher ratios of 4:1 and over noted in iodine replete areas.[22] The current finding of a predominance of the papillary variant of thyroid cancer in areas such as ours could further be explained by the recent improvements in access to health care and in the diagnosis of thyroid diseases.Follicular adenomas usually have an indolent course, however, there is currently emerging evidence from pathological, immunocytological and gene expression profiling by microarray studies that suggests that these adenomas and the Hurthle cell variant have malignant potential. These studies were able to diagnose two percent malignant tumours, which were papillary carcinoma and the papillary variant of follicular carcinoma, in these otherwise benign lesions.[32] Our study reports 6.8% (36) follicular adenomas and one Hurthle cell adenoma which may need further detailed assays to fully characterize them.

There were 14 cases of Hashimoto's thyroiditis and nine of lymphocytic thyroiditisthe pathogenesis of the latter being closely linked to iodine supplementation. Iodine prophylaxis has been associated with an increase in prevalence and lymphoid infiltration densities of lymphocytic thyroiditis.[19, 20]

Our institutional surgical approach has been to conserve healthy thyroid tissue as much as is practically possible during surgery. This approach has been informed by the large number of patients

who default in their follow-up treatment. It is of note that in our practice many patients after thyroidectomy show noncompliance to the postoperative follow-up programmes due to socio-cultural and economic reasons. These patients are mostly seen for assessment only when there are serious complications causing them to seek medical help or recurrent growth of the thyroid. These behaviours have over the years influenced, strongly, decisions on thyroid surgery.

This liberal policy to conserve healthy thyroid tissue accounted for the numbers of patients who had subtotal thyroidectomy, 52.7%, and lobectomy, 18.6%, since these have been the preferred approaches for patients with nontoxic multinodular goitres for decades now. Near total thyroidectomy or total thyroidectomy was performed only when no healthy remnant tissue could be preserved, in toxic goitres and in suspected or confirmed malignancy. The avoidance of extensive resection of the gland had a great potential to decrease the incidence of post surgical hypothyroidism because the remnant thyroid tissue undergoes hypertrophy to maintain hormone production when patients discontinue follow-up management and stop the intake of supplementary l-thyroxine.

The overall complication rate following thyroidectomy was high, 6.1%, however permanent life threatening complications (bilateral damage to the recurrent laryngeal nerve) occurred in two patients who underwent subtotal thyroidectomy for smaller swellings (50gm and 30gm). The proportions of the individual complications are all lower than rates prescribed for best practice in thyroid surgery.[33] The incidence of complications increased in proportion to the extent of thyroidectomy done but was unrelated to the mean weight of the gland excised. The most frequent of these complications were haemorrhage andtransient hypoparathyroidism.

Differentiated thyroid cancer, especially the papillary and follicular cancers, are slow growing tumours with good prognosis when adequately resected, TSH production suppressed with l-thyroxine and residual or recurrent

diseases ablated with radio-iodine. A worrying observation in this study is the large number of patients with cancer who did not have adequate oncological surgery. Those who had lobectomy turned down a second surgery except one who had a completion-thyroidectomy. All patients received post-operative TSH-suppressive dose of l-thyroxine. Two patients died during the study period; both defaulted in their post-operative treatment and reported back with metastatic disease.

In developing economies such as ours it will not be cost effective in the management of thyroid swellings to subject each patient with large non-toxic multinodular goitre of long standing to the full range of investigations required to diagnose autonomous toxic, inflammatory or malignant nodules. Surgery is usually indicated in these patients since swellings of these seizes do not regress and could be complicated acutely with dire consequences. Ultrasound guided biopsies in these large goitres with distorted architecture could be challenging since cancers could still be missed. In such situations when diagnosis cannot be obtained before surgery the minimum reasonable surgery to be prescribed is near total thyroidectomy followed by tailored post-operative l-thyroxine replacement. This will offer adequate surgery for the few, but significant number of, patients with neoplasms. This study has shown that the significant complications that were associated with near total,and total, thyroidectomies are acceptable inline with best practice guidelines.

Conclusion

A greater proportion of patients presenting with goitre at the Korle-Bu Teaching hospital were not taking iodized salt regularly despite the mass intro-duction of this salt in the market. Goitres, which are predominantly hyperplastic, are still large and causepressure effects. Toxic, inflammatory and malignant goitres are gaining prominence but surgery for thyroid cancers was oncologically inadequate. In view of this we recommend near total thyroidectomy as the minimum surgery for patients with non-toxic multinodular goitre

undergoing surgery with or without a pre-operative cytological diagnosis.

CONFLICT OF INTEREST

There was no conflict of interest in this study

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