

Histological Study of Thyroid Gland in Cases of Non Toxic Goiter

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Abstract

Background: non toxic goiter is a prevalent thyroid pathology worldwide characterized by unilateral or bilateral thyroid enlargement which arises due to many factors affects the thyroid tissue.

Objective: To determine the histological findings observed in non toxic goiter of the resected thyroid tissue in Mosul city.

Materials & Methods: Patients were classified according to the preoperative clinical diagnosis into those with non toxic multinodular goiter & those with solitary thyroid nodules, preoperative clinical diagnosis was confirmed by Fine Needle Aspiration Cytology. Postoperatively the thyroid tissue biopsies were collected and fixed in 10% formaline, processed & stained with Haematoxylline & Eosin for histological analysis.

Results: non toxic goiter is more common in female than male. Specimens obtained from patients presented with multinodular goiter showed variable sized thyroid follicles, huge follicles were filled with colloid and lined by flattened epithelial cells, most of the nodules were not encapsulated. Specimens obtained from follicular adenoma showed well developed microfollicles with intact fibrous thin capsule. Degenerative changes in the stromal tissue such as haemorrhage, fibrosis & even calcification were present in some of the cases. If hyperthyroidism associated with a discrete swelling it indicates a manifestation of toxic multinodular goiter. Solitary thyroid nodule was observed as a hard, irregular swelling with apparent unusual fixity associated with scanty normal follicular cells together with colloid.

Conclusion: Incidence of multinodular goiter in Mosul city is more in female than male & in both sexes it increases between 20 to 50 years of age.

Key Words: Thyroid, Goiter, Solitary thyroid nodule, Multinodular, Histology.

الخلاصة

خلفية البحث: تضخم الغدة الدرقية غير السام من الامراض الشائعة في العالم و التي تتميز بزيادة حجم الغدة الدرقية نتيجة عدد من العوامل المؤثرة على نسيج الغدة الدرقية.

هدف البحث: اجريت هذه الدراسة لتقييم حالات تضخم الغدة الدرقية غير السام في مدينة الموصل.

طريقة العمل: تم تصنيف المرضى حسب التشخيص السريري المسبق للعملية الجراحية الى مجموعة يعانون من تضخم الغدة الدرقية متعددة العقيدات غير السام ومجموعة اخرى يعانون من العقيدة الدرقية المتوحدة. تمت دراسة النسيج بعد رفعه اثناء العملية الجراحية حيث ثبت النسيج المأخوذ بعد العملية باستخدام مادة الفورمالين بتركيز 10% ومعاملتها نسيجيا ثم صبغها باستخدام الهيماتوكسيلين والايوسين.

النتائج: وجد من خلال هذه الدراسة ان نسبة حصول تضخم الغدة الدرقية غير السام في الاناث اكثر من الذكور. النماذج المأخوذة من المرضى المصابين بحالة تضخم الغدة متعددة العقيدات اظهرت وجود حويصلات مختلفة الأحجام، الحويصلات كبيرة الحجم تكون مملوءة بمادة غروانية ومغلقة داخليا بخلايا ثلاثية متسطحة و تكون معظمها غير متكيسة. اما النماذج المأخوذة من حالات الورم الغدي اظهرت وجود حويصلات صغيرة الحجم و متكيسة بغلاف ليفي كامل كما لوحظ وجود نزف موضعي، تليف، وتكلس نسيجي في بعض الحالات، وفي حالة كونها مصحوبة بارتفاع نسبة هورمون الغدة الدرقية في الدم فهذا يعني تحول الحالة من تضخم الغدة غير السام الى سام. تكون العقيدة الدرقية المتوحدة غير منتظمة الشكل، صلبة اللمس ومختلفة في درجة ثبوتها ونسيجيا تحتوي على خلايا حويصلية طبيعية فيها مادة غروية.

الاستنتاج: نسبة انتشار تضخم الغدة الدرقية متعدد العقيدات في مدينة الموصل في الاناث اكثر من الذكور, وفي كلا الجنسين يزداد انتشاره بين سن 20-50 سنة.
مفتاح الكلمات: الغدة الدرقية, تضخم الغدة الدرقية, العقيدة الدرقية المتوحدة, متعددة العقيدات, دراسة نسيجية.

Introduction

Multinodular non toxic goiter is the most prevalent thyroid pathology worldwide characterized by unilateral or bilateral thyroid enlargement with morphologically and/or functionally transformed follicles and euthyroidism ⁽¹⁾.

Environmental factors such as malnutrition, drug, stress, pollution and infection and constitutional factors such as female gender, several genetic factors like circulating thyroid growth factors all contribute in different degree to the development of nodular thyroid enlargement ⁽²⁾. Smoking especially in the areas of mild iodine deficiency is associated with thyroid enlargement & goiter ⁽³⁾, the use of oral contraceptives may reduce the risk of goiter ⁽⁴⁾.

Nodular goiter become a special health problem particularly in the endemic areas ⁽⁵⁾. Goiter is endemic when its prevalence is more than 10% in children aging between 6 to 12 years & sporadic when this prevalence is 10% or less ⁽⁶⁾.

Thyroid nodule represents a significant diagnostic dilemma for the treating surgeon, it presents as discrete swelling in an otherwise impalpable gland which is considered as solitary thyroid nodule or as dominant nodule in a clinically multinodular gland of a multinodular goiter ⁽⁷⁾.

Five percent of thyroid nodules are malignant ⁽⁸⁾, the prevalence is higher in children, in patient under age of 30 years and over age of 60 years & in those with history of radiation ⁽⁹⁾. On the other hand, malignancy rates are lower in multinodular goiter and predominantly in cystic lesion ⁽¹⁰⁾. However the exact cause of thyroid carcinoma is not well known but head and neck irradiation in childhood is a known predisposing factor ⁽¹¹⁾. Moreover iodine

deficient areas are known to have a high frequency of thyroid carcinoma ⁽¹⁾.

Our study aimed to demonstrate the histological findings of both multinodular goiter & solitary thyroid nodule observed in the resected thyroid tissue.

Materials and Methods

In this study 30 specimen of thyroid tissue were collected in Al-Salam Teaching Hospital from thirty patients of both sexes who were admitted to the surgical out-patients department for the complaint of enlarged thyroid gland. Detailed history, thorough physical examination and hormonal assay (T3, T4 & TSH) were carried out, the history includes their age, sex, occupation, presence of pressure symptoms (like voice changes, dysphagia, stridor & choking sensation) in addition to drug history, family history of goiter & history of iodine deficiency & radiation during childhood. Patients were classified according to the preoperative clinical diagnosis into those with non toxic multinodular goiter & those with solitary thyroid nodule, preoperative clinical diagnosis was later confirmed by Fine Needle Aspiration Cytology.

All the patients showing multinodular goiter or thyroid nodules whether solitary or dominant nodule of multinodular type who were decided to be operated on by surgeon were underwent FNAC which was done one day before operation.

Subtotal thyroidectomy was performed for those with multinodular goiter and lobectomy with isthmusectomy was performed for those with solitary thyroid nodule. Following the resection of thyroid tissue, the specimens were collected, fixed by 10% formalin solution and processed histologically, the sections obtained were stained with Haematoxyline and Eosin for histological analysis, we investigate &

compare the size of thyroid follicles, presence of capsule and degenerative changes in both multinodular goiter and solitary thyroid nodule cases.

Results and Observations

Histological findings:

- Specimens obtained from patients presented with multinodular goiter showed variable sized thyroid follicles either microfollicles, medium sized follicles or large sized follicles (Fig.1), some nodules are composed of huge follicles, filled with colloid and lined by flattened epithelial cells, others were extremely cellular & hyperplastic, their colloid was pale and finely vacuolated, all the nodules were well circumscribed, most of them were not encapsulated (Fig. 2)
- Another benign thyroid disease associated with goiter is follicular adenoma showed well developed microfollicles with intact fibrous thin capsule, the architectural & histological appearance was different from multinodular goiter and also from that of the surrounding normal tissue which showed signs of compression, there was no vascular or capsular invasion and considerably few colloid (Fig.3) The follicular cells are crowded and may form clusters.

- Degenerative changes in the stromal tissue such as hemorrhage (Fig.4), fibrosis & even calcification were present in some of the cases with variable number of chronic inflammatory cells indicating coexistence of chronic thyroiditis (Fig.5).

In this study, the total number of cases included was 30, the ages of patients ranged from 10 to 70 years, 4 patients were male and 26 patients were female. The age and gender distribution is shown in Table 1. We observed that the overall incidence of goiter in Mosul city in both sexes increase between 20 to 50 years & it affect female more than male.

Histopathological findings observed in the patient's reports diagnosed 26 (86.7%) benign lesions and 4 (13.3%) as malignant lesions as shown in Table 2: 15 cases (50%) were reported as non toxic multinodular goiter, 6 (20%) reported as follicular tumors of which 2 (6.7%) cases as follicular adenoma which revealed no capsular or vascular invasion & 4 (13.3%) cases as follicular carcinoma in which vascular & capsular invasion was obvious, 3 (10%) as subacute thyroiditis and 2 (6.7%) cases as Hashimoto's thyroiditis. In the malignant group of 4 (13.3%) cases, 2 (6.7%) as papillary carcinoma, 1(3.3%) as undifferentiated carcinoma and 1(3.3%) as lymphoma.

Table 1: Age & sex distribution in 30 patients presented with goiter included in the study.

Age (years)	Male	Female	Total	%
10-20	0	4	4	13.3
21-30	2	9	11	36.7
31-40	1	5	6	20
41-50	1	6	7	23.3
51-60	0	1	1	3.3
61-70	0	1	1	3.3

Table 2 : Histopathological results of thyroid tissue biopsies from 30 patients presented with goiter.

<i>Diagnosis</i>	<i>Histopathological Diagnosis</i>
<i>Benign</i>	26 (86.7%)
<i>Nontoxic multinodular goiter</i>	15 (50%)
<i>Follicular tumour</i>	6 (20%)
<i>Follicular adenoma</i>	2 (6.7%)
<i>Follicular carcinoma</i>	4 (13.3%)
<i>Subacute thyroiditis</i>	3(10%)
<i>Hashimoto's thyroiditis</i>	2(6.7%)
<i>Malignant</i>	4 (13.3%)
<i>Papillary carcinoma</i>	2 (6.7%)
<i>Undifferentiated carcinoma</i>	1 (3.3%)
<i>Lymphoma</i>	1 (3.3%)

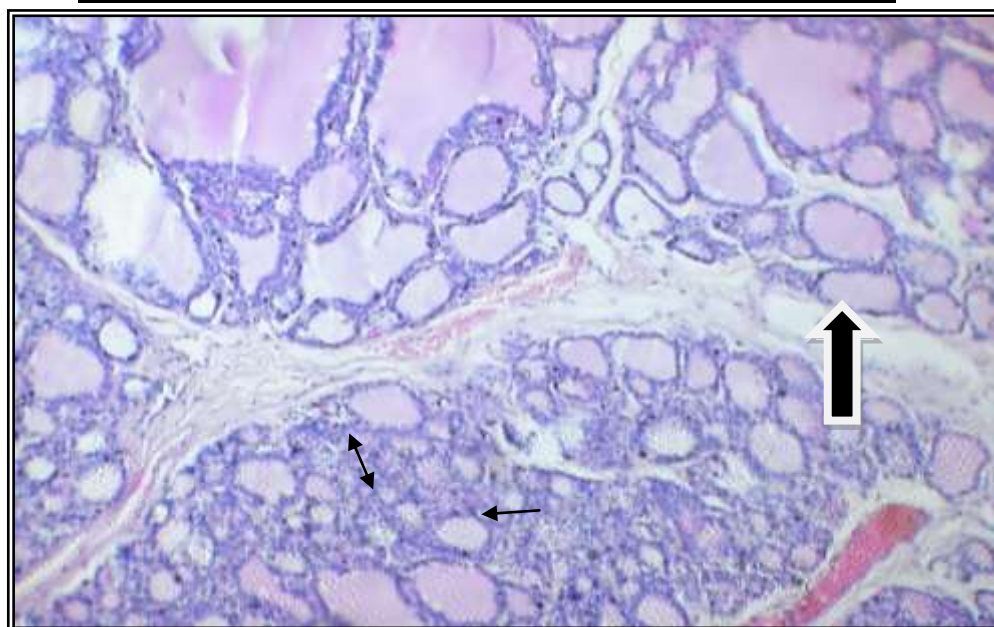


Fig.1: Photomicrograph of thyroid tissue from patient presented with multinodular goiter showed variable sized thyroid follicles, either micofollicles (double head arrow), medium sized follicles (thin arrow), or large sized follicles (thick arrow) all the nodules were well circumscribed with no capsule (H&E X100).

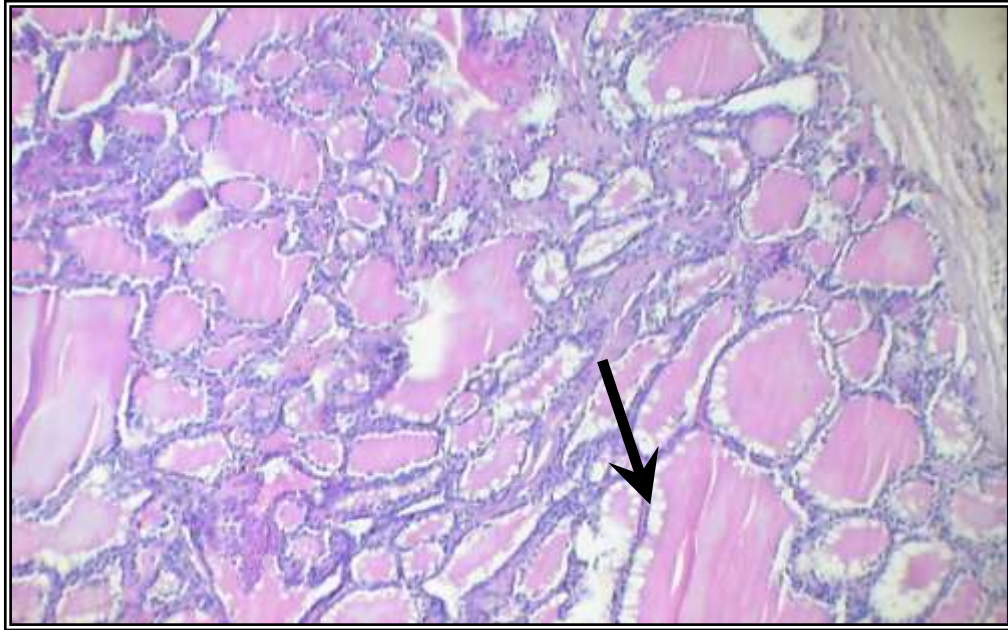


Fig.2: Photomicrograph of thyroid tissue from patient presented with multinodular goiter showed thyroid follicles filled with pale and finely vacuolated colloid and lined by flattened epithelial cells (H&E X100).

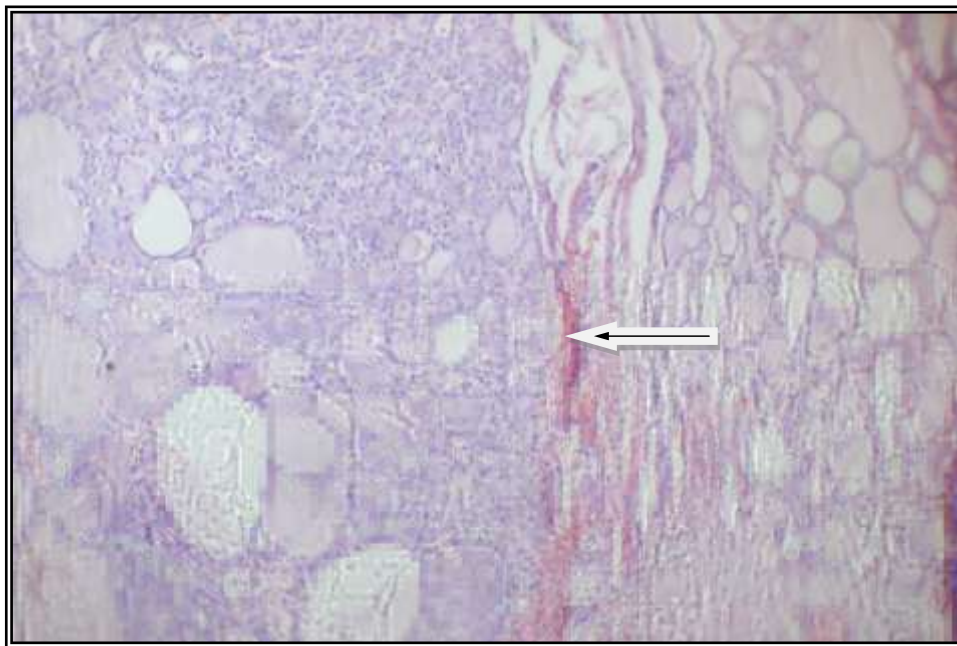


Fig.3: Photomicrograph of follicular adenoma showing intact fibrous thin capsule (arrow) with compression of the surrounding normal tissue, no vascular or capsular invasion and considerably few colloid (H&E X100).

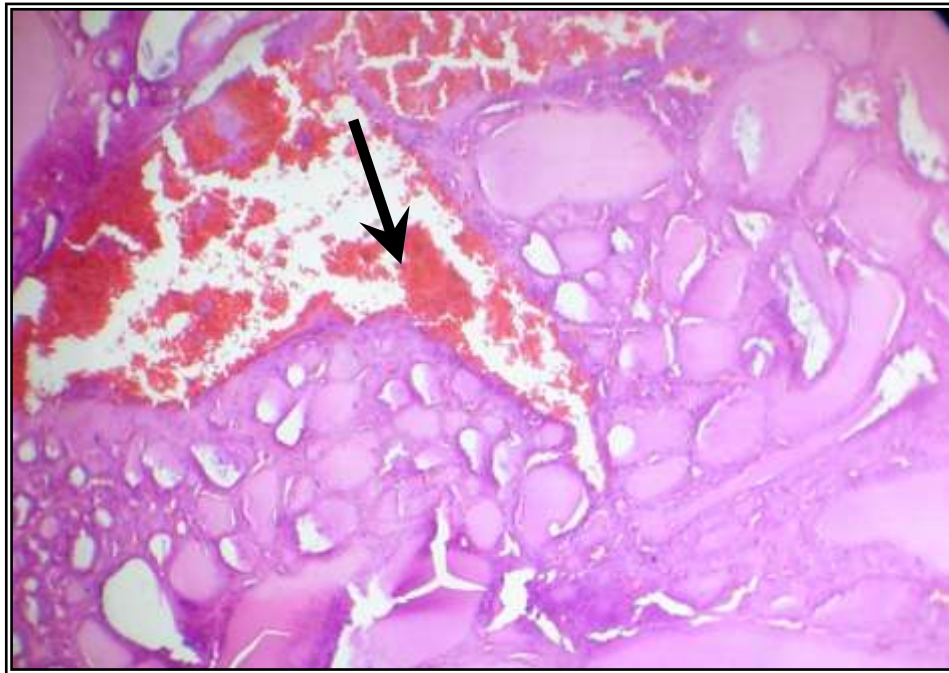


Fig.4: Photomicrograph of goiterous thyroid tissue showing haemorrhage in the stromal tissue (arrow) indicating coexistence of chronic inflammatory process (H&E X100).

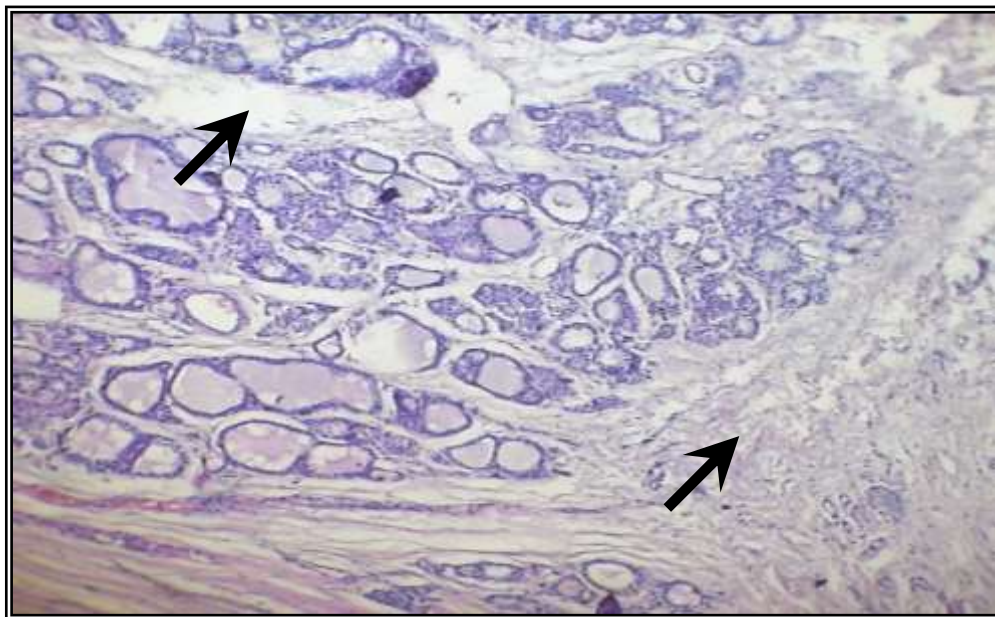


Fig.5: Photomicrograph of goiterous thyroid tissue showing fibrosis of the stromal tissue (arrow) with thickened trabeculae separating between the lobules (H&E X100).

Discussion

Nontoxic goiter may be presented as diffuse or nodular enlargement of thyroid

gland which is not associated with thyrotoxicosis and does not result from an autoimmune or inflammatory process. We found that goiter is more common in female than male and this agree with the

findings of many researchers ⁽⁷⁾ who stated that multinodular goiter is more prevalent in female and more liable to malignancy than in male, in addition the incidence of thyroid cancer is more in patients between 20 and 60 years old. Other researchers ⁽¹²⁾ observed that goiter is predominantly a disease of women, the female to male ratio is about 2.5:1.

Multinodular goiter is one of the most common endocrine diseases worldwide. It is more prevalent in areas where iodine is lacking in the diet. In iodine deficient areas, hypothyroidism results with an increase in TSH. Increasing TSH causes growth of the thyroid gland and the development of diffuse nontoxic goiter. With growth of the thyroid gland, thyroid function often becomes autonomous, that is, thyroid hormone secretion becomes independent of TSH secretion ⁽¹³⁾. Multinodular goiters evolve from diffuse goiters. One or more follicles will have greater intrinsic growth and functional capability and continue to grow and function despite declining TSH secretion causing first a nontoxic multinodular goiter and ultimately a toxic multinodular goiter⁽¹⁾. Though usually associated with iodine deficiency, multinodular goiter also occurs in populations whose diets are iodine replete; this suggests other factors such as genetic influences may play a role in development of multinodular goiter. A gene located on chromosome 14q, MNG-1, has been associated with familial nontoxic multinodular goiter and polymorphism of codon 727 has been associated with toxic multinodular goiter⁽¹³⁾.

It was assumed that simple multinodular goiter is unlikely to be malignant, the risk of malignancy is higher in a solitary thyroid nodule, thus a dominant nodule in a multinodular goiter as well as a single nodule should be evaluated ⁽¹⁴⁾. In agreement with other researchers ⁽¹⁵⁾, We observed that surgical specimens of non toxic multinodular goiter contains irregularly enlarged thyroid

follicles lined by flattened epithelium filled with colloid material containing clear vacuoles due to increased activity of the epithelium to produce more thyroid hormone.

Microfollicles may be seen in smears obtained from follicular adenoma, they do not show vascular or capsular invasion this observation similar to that shown by some researchers ⁽¹⁶⁾.

In our study undifferentiated carcinoma constitute 3.3% of the study group, similar percentage (<5%) was reported by other workers ⁽¹⁷⁾. From the results of this study, we concluded that the incidence of multinodular goiter in Mosul city was more in female than male & in both sexes it increased between 20 to 50 years of age.

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