

Single lobe disease in endemic goitre

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Abstract

Objectives: To describe the clinical, volumetric and cytological features of the contra lateral lobe in a series of patients with long standing unilateral endemic goitre.

Patients and methods: This study included 60 patients from the west of Sudan with clinically detectable and long standing unilateral simple endemic goitre that required surgery, with the simultaneous exploration of the contra lateral lobe.

Results: Out of 60 patients with unilateral goitre, 50 (83%) were found to have the disease on the ipsilateral lobe only (monolobar goitre). The contra lateral lobe in these 50 patients showed normal size with nodularity. 20 patients with monolobar disease had intra-operative fine needle aspiration cytology (FNAC), of which 16 patients showed normal thyroid tissue. All patients with monolobar disease had lobectomy. Post-operatively they continued to have normal blood levels of T3, T4 and TSH.

Conclusion: We report a series of patients with endemic goitre who had advanced forms of the disease that affect only one lobe in the presence of a structurally and functionally normal contra lateral lobe.

Keywords: endemic goitre, unilateral goitre, monolobar goiter.

Introduction

Endemic goitre is a very common thyroid disorder in Sudan. The prevalence of this disease may reach 86% in some regions of the west¹. The usual presentation of this disease is bilateral involvement of the two lobes of the thyroid gland, often in an asymmetrical pattern². In our hospital, we have noticed that some patients from endemic goitre areas in the west of Sudan to present with unilateral simple goitre that needed surgery and later on proved to express the disease on the ipsilateral lobe only (Figure 1a-c). The contra lateral lobe in these patients was found to be disease-free. This is in contrast to the bilateral nodularity that characterizes endemic goitre (Figure 1d).

Our search in the literature had revealed deficiency both in the description of such an unusual type of endemic goitre and the possible causes underlying its development. The primary aim of our study is to describe a series of cases with this unusual form of the disease based on clinical, operative and cytological findings.

Patients and Methods

This is a hospital based study done during the period 2003-2007 in the University Charity and Teaching Hospital, Khartoum Sudan. The study included 60 patients from endemic goitre areas who presented with a long standing (6 years on average) unilateral goitre that required surgery, either because of compression symptoms or the

presence of a significant cosmetic deformity (figure1).



Fig 1: Pre-operative photograph of a patient with one-sided monolobar multinodular goiter causing tracheal compression

Clinical examination of the neck showed that the goitre was on one side of the midline. No swelling was detected neither by inspection nor by palpation on the contra lateral side (Goitre grade 0

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by WHO classification system)³. The medial border of the goitre together with the medial border of the sternocleidomastoid muscle on the opposite side and the level of the thyroid cartilage above were found to form an empty triangular space which we called **the empty triangle sign**, a term which we introduced to indicate the absence of goitre on the contra lateral lobe (figure 2).

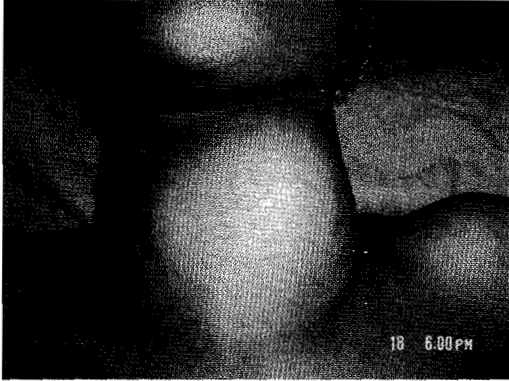


Fig 2: The empty triangle sign

Demographic data including age, sex, tribe, and residence, as well as the duration of goitre, symptoms indicative of hypo or hyperthyroidism, compressive symptoms, and previous treatment for the thyroid disease. The function of the gland was assessed with serum T3, T4 and TSH.

The surgical procedure carried out for the affected lobe was lobectomy. Regarding the contra lateral lobe, the plane between its anterior surface and the strap muscles was entered, the pretracheal fascia overlying its surface was carefully dissected, and the lobe was then mobilized and examined for nodularity. If the contra lateral lobe was initially found to be normal in the general appearance and texture, then its three linear dimensions were measured in millimeters using a ruler (figure 3).



Fig 3: Measurement of the normal lobe

Patients whose contra lateral lobes were found to be nodular- regardless of their volumes or to show the mildest degrees of enlargement as compared to reference volumes were considered to have bilateral disease. For more accurate assessment of the contra lateral lobe, intraoperative fine needle aspiration [FNA] for cytology was performed. This was done on 20 patients whose contra lateral lobes were macroscopically normal. The test was done by repeated passages through the glandular tissue using a 24 gauge needle. The aspirate was spread on a glass slide, fixed with alcohol and sent for cytology.

The volume of each lobe was calculated in milliliters using an ellipsoid formula as follows:

$$\text{Volume} = c (CC \times LM \times AP)$$

Where *CC* is the craniocaudal dimension, *LM* is the lateromedial dimension and *AP* is the anteroposterior dimension. *C* represents a constant which equals 0.52 (or $\pi/6$). The lobe volumes obtained were analyzed using the SPSS version 10.

The above formula which calculates the thyroid lobe volume from its ultrasonically measured three dimensions was found by many investigators to give volumes correlating well with the actual lobe volume and, therefore, was adopted in our calculations⁴. All resected lobes were subjected for histopathological examination. Serum T3, T4 and TSH levels were measured postoperatively at 3 months intervals for a period of 12 months.

Results

Out of the 60 patients 57 were females (F: M = 19:1), with an average age of 40 years (range 20-86). The mean duration of the goitre was 6 years. All patients studied were clinically euthyroid and their thyroid function tests were within the normal limits. 60% of patients had surgery because of the presence of pressure symptoms (tracheal compression), 27% because of the presence of significant cosmetic deformities and 13% because of both symptoms.

Out of 60 patients with unilateral goitres, 50(83%) patients had multinodular goitre that is confined to the enlarged lobe only (monolobar goitre). The remaining 10 patients did not meet the criteria of monolobar affection because 8(13%) patients had bilateral disease and 2(4%) patients to have huge benign adenoma.

Of the 20 patients who had FNA, 16 showed uniform follicular cells and colloid background consistent with normal thyroid tissue, two aspirates were unsatisfactory, one aspirate

showed abundant colloid with scanty follicular cells consistent with colloidal goiter and one aspirate showed degenerative follicular cells with haemosidren deposition consistent with a cystic lesion. At an earlier stage of our study, we relied on contra lateral lobe volumes corresponding to those of normal subjects in endemic goitre areas (14-16.5 ml) and the absence of modularity for the diagnosis of monolobar goitre, but later on we introduced cytology for more accurate diagnosis.

The majority of patients with monolobar affection (92%) were found to have a contralateral lobe volume in the range of 4-12 ml (figure4), corresponding to a whole thyroid volume of 10-26 ml. The mean lobe volume was nine ml. There was no apparent correlation between the volumes of the contra lateral lobe, the age of the patient, his/ her sex or the duration of the goitre.

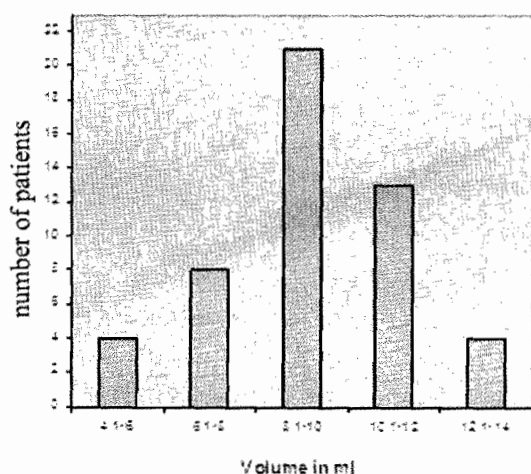


Figure 4: A graph showing the volume of the contra lateral lobe in 50 patients with monolobar goiter

An interesting intraoperative finding which was seen in the majority of patients with the monolobar disease and may indicate that the two lobes have different growth characteristics was the presence of a distinct and a well defined plane between the normal lobe and the isthmus when the later was found to be affected by the disease as well. Another important finding was the presence of a normally looking and well defined pretracheal fascia and loose aerolar tissue over the surface of these lobes. In other words, the whole contra lateral hemi thyroid compartment appeared normal.

Histopathological examination of the resected lobes had confirmed benign multinodular goitre in the 50 patients. Postoperatively all patients continued to have normal blood levels of T3,T4 and TSH, which were measured at intervals

of 3 months for a duration of 12 months, indicating preserved function in the unaffected lobe.

Discussion

The female predominance in this study is in keeping with the fact that simple goitre is far more common in females⁵. Patients who were found to have small and/or solitary nodules on the contralateral lobe that do not characterize endemic multinodular goitre, for example simple cysts, were considered as patients with bilateral nodularity⁶. Multinodular endemic goitre is a multistage disease that has different clinical features corresponding to different pathological stages. In the pathophysiology of multinodular goitre, the thyroid gland first goes through a phase of global hyperplasia and then through a phase of colloid storage. Both these phases are accompanied with enlargement of the thyroid gland. Later on, active lobules form as a result of fluctuating stimulation by TSH. Hemorrhage and central necrosis will then ensue and necrotic lobules will coalesce to form nodules surrounded by scar tissue and sometimes calcification⁷. In other words nodularity develops in an already enlarged gland either because of hyperplasia or colloid accumulation as entailed by the natural history of the disease⁸. Since the disease is slowly developing and passes through different stages of enlargement with the ultimate formation of nodules, it is clear that the primary aim of FNA in our study is to pick up those cases with early stages of the disease.

Considering ethnic and geographical factors, there is a wide variation in the volume of the thyroid gland of normal subjects. Critical review of the literature has shown a range of volumes of 10-25 ml in non-endemic areas, and 30-35 ml in endemic goitre areas, corresponding to a single lobe volume of 4-11.5 ml and 14-16.5 ml respectively^{9, 10, 11}. In our study, 92% of patients with monolobar goitre were found to have a contra-lateral lobe volume corresponding to that of normal subjects in non-endemic goitre areas.

Based on our findings, the confinement of the disease to one lobe only raises very interesting questions. Firstly, are there any differences in the genetic make-up of the two lobes of the thyroid gland that make the contra-lateral lobe refractory for the disease? Secondly, why should there be a delay in the appearance of the disease on the contra lateral lobe, especially that the disease has reached advanced forms on the affected side? We hope that further studies in this regard will answer these questions.

In the literature, there are some diseases reported to present in an asymmetrical pattern or to affect only one side of the body^{12, 13}. The process of thyroid gland organogenesis and the molecular basis of its development are rather complex. Moreover, the genetic bases of thyroid developmental abnormalities are largely unknown, though mutations that take place in the regulatory genes are believed to be responsible for these developmental abnormalities¹⁴.

To conclude, we describe a series of patients with endemic goitre who were found at the time of surgery to have a disease that affects only one lobe of the thyroid gland, and in the presence of structurally and functionally normal contra lateral lobe. On the face of the increasing number of patients presenting to us with this unusual form of endemic goitre, we think that it deserves further studies.

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