Toxic Goiter: a Clinical & Demographic Study

Mazin Abdul Sahib Shakir*, Mohammed H. Al-Alwan

*FIBS (Al-Yarmouk Teaching Hospital), **FRCS (Dean of Al-Mustansiriya College of Medicine)

Abstract:

A prospective study was conducted at Al-Yarmouk Teaching Hospital, during the period January 2002 to October 2004, to describe the demographic distribution and clinical assessment of patients with toxic goiter. There were 42 patients with toxic goiter out of 225 patients with goiter who were operated on. The incidence of thyrotoxicosis was 18.67% .Toxic nodular goiter represents 78.57%, Grave's disease represents 14.29% and toxic adenoma represents 7.14% of thyrotoxic patients. Palpitation was the most frequent presenting symptoms 92.86%.

Key words: goiter, toxic, thyrotoxicosis, demography

Introduction:

Thyrotoxicosis refer to a spectrum of clinical manifestations that are related to primary excess secretion of active thyroid hormone with loss of normal feedback mechanism controlling the secretion of thyroid hormone , thyrotoxicosis generally presents in one of three forms : diffuse toxic goiter (Graves' disease) , toxic nodular goiter or toxic single nodule[1] . Thyrotoxicosis is usually associated with the presence of a significant goiter but even that clue may not be present in 1 – 3 % of patients with typical picture of hyperthyroidism [2]. Uncommon causes of hyperthyroidism include : thyrotoxicosis factitia , functioning metastatic thyroid carcinoma [3], trophoblastic tumors that secrete human chorionic gonadotropin having thyroid-stimulating properties [4], inappropriate secretion of thyrotropin by pituitary tumors [5] , struma ovarri [6], iodide – induced hyperthyroidism and thyroiditis[7].Hyperthyroidism is treated either by antithyroid drugs , radioiodine or surgery ,surgery is not first line therapy in all patients with hyperthyroidism , however , in experienced hands , surgery is a good therapeutic alternative that can be carried out with no mortality , few complications , and – provided that a minimal remnant is left – very few recurrences [8].

Patients and Methods:

During a thirty three months period from January 2002 to October 2004 , two hundreds and twenty five (225) patients were collected in this prospective study , 200 patients were females and 25 patients were males , all patients were admitted to the same surgical unit at Al – Yarmouk Teaching Hospital , complaining of goiter . Out of these 225 patients, 42 patients were found to have thyrotoxicosis, 33 patients were females and 9 patients were males. Those 42 patients with toxic goiter were submitted for full history, physical examinations and available laboratorial investigations. The diagnosis of thyrotoxicosis was based on clinical manifestations and an elevated serum level of tri-iodothyronin (T3) and thyroxin (T4) with normal or suppressed TSH serum level. Preoperative preparation was done for those thyrotoxic patients using carbimazole and propranolol, the last dose of propranolol was given orally 2 – 3 hours prior to operation. We used to admit the patients one day prior to surgery. Preoperatively vocal cords examination (indirect laryngoscopy) was done to all patients in the (Ear, Nose and Throat) out – patient department and another examination was done immediately after surgery in the operating room by the anesthetist. All these patients with toxic goiter underwent thyroid surgery, during exploration; identification of the recurrent laryngeal nerves on both sides was made in the vast

majority of cases to prevent nerve damage. In all patients Redivac vacuum suction drains were left behind in the operative site and removed around 48 hours postoperatively. Patients were followed up noting down the postoperative complications.

Analysis of the results and review of literature is given in this study.

Results:

In this prospective study, the data of 42 patients with toxic goiter who underwent thyroid surgery were analyzed. In our series there is 225 patients with goiter who were admitted to the surgical unit , 42 patients out of these 225 patients showed the clinical and biochemical diagnosis of toxic goiter , this corresponding to a total incidence of toxic goiter of (18.67 %) (Table-1-)

Table-1: Incidence of toxic goiter

Type of Goiter	No.	%
Toxic goiter	42	18.67
Non-toxic goiter	183	81.33
Total	**225**	**100**

Table-2: Sex distribution of toxic goiter

Sex	No.	%
Female	33	78.57
Male	9	21.43
Total	**42**	**100**

In our series the patients with toxic goiter were arranged into three age groups (Table-3)

Table-3: Demography of 42 patients with toxic goiter according to three age groups.

Age group (years)	No.	%
24 – 33	19	45.24
34 – 43	19	45.24
44 – 53	4	9,52
Total	**42**	**100**

The patients with Graves' disease fall mainly in the first age group (younger age group). From 6 patients with Graves' disease, 5 patients (83.33 %) were in the 1st age group. The patients with toxic nodular goiter and toxic nodule were situated mainly in the 2nd and 3rd age groups (older age groups). From 33 patients with toxic nodular goiter 19 patients (57.58 %) were situated in the older age groups. All 3 patients (100 %) with toxic nodule were in the older age groups. (Table -4-)

Table-4: Demography of 42 patients with different types of toxic goiter according to the three age groups.

	Total		1st age group (24-33 years)		2nd age group (34-43 years)		3rd age group (44-53 years)	
	No.	%	No.	%	No.	%	No.	%
Graves' disease	6	14.29	5	83.33	1	16.67	0	0
Toxic nodular goiter	33	78.57	14	42.42	16	48.48	3	9.09
Toxic nodule	3	7.14	0	0	2	66.67	1	33.33
Total	**42**	**100**	**19 patients**		**19 patients**		**4 patients**	

The number of patients with Graves' disease in our series was 6 patients (14.29 %), 5 patients were females (83.33 %) and one patient was male (16.67 %) Female to male ratio was 5: 1. Average age was 28 years (range 24 – 34 years) The number of patients with toxic nodular goiter in our series was 33 patients (78.57 %), 26 patients were females (78.78 %) and 7 patients were males (21.21 %) Female to male ratio was 3.71 : 1. Average age 38 years (range 24 – 50 years) .The number of patients with toxic nodule was 3 patients (7.14 %), 2 were females (66.67 %) and one was male (33.33 %) .Female to male ratio was 2 : 1.Average age 44.3 years (range 41 – 50 years) (Table-5-)

Table 5: Incidence of different types of toxic goiter and their distribution according to sex.

	Total		Female		Male	
	No.	%	No.	%	No.	%
Graves' disease	6	14.29	5	83.33	1	16.67
Toxic nodular goiter	33	78.57	26	78.78	7	21.21
Toxic nodule	3	7.14	2	66.67	1	33.33
Total	**42**	**100**	**33 patients**		**9 patients**	

The most common presenting symptom in 42 patients with toxic goiter was palpitation 39 patients (92.86%), and the least common was dyspnea 4 patients (9.52%) .Table-6

In patients with Graves' disease, all of them (6 patients) had clinical evidence of eye involvement (lid lag, lid retraction, and exophthalmus) (Table-8-)

Thyroid scanning were performed for only 18 patients (42.86%), the radio- iodine uptake is usually elevated to the range of 50 – 80 %.

All our 42 patients underwent thyroid surgery. All patients with Graves' disease and toxic nodular goiter underwent subtotal thyroidectomy .While the only three patients with toxic nodule, two patients of them underwent lobectomy with isthmusectomy and one of them had subtotal thyroidectomy.We used to put drain in the operative site in all cases. In this series vacuum drains were used, most of the drains were removed 48 hours post operatively. Postoperatively, the mortality rate was zero. Temporary hoarseness of voice was recorded in two patients (4.76 %) and unilateral immobility of the vocal cord was detected by the anesthetist postoperatively and by otolaryngologist and the patients recovered within 3 months in both cases. Neither thyroid storm nor hematoma was recorded as a complication in our study. One patient (2.38 %) developed transient hypocalcaemia postoperatively. Three patients (7.14 %) had stitch abscess, the overall incidence of morbidity in our series was 14.28 %. (Table 9)

Table 6: Presenting symptoms in thyrotoxic patients.

Presenting Symptoms	No.	%
Palpitation	39	92.86
Nervousness	35	83.33
Preference for cold	35	83.33
Sweating	23	54.76
Weight loss	16	38.10
Tiredness	6	14.29
Increase appetite	6	14.29
Dyspnea	4	9.52

Table 7: Presenting signs in thyrotoxic patients.

Presenting Sign	No.	%
Palpable thyroid	42	100
Tachycardia	42	100
Hyperkinesis	24	57.14
Hot hand	18	42.86
Moist hand	18	42.86
Finger tremor	18	42.86
Lid lag	7	16.67
Lid retraction	7	16.67
Exophthalmos	6	14.29
Thyroid bruit	4	9.52
Atrial fibrillation	1	2.38

Table-8: Incidence of eye signs in all thyrotoxic patients & in Graves' disease patients.

Presenting eye sign	All thyrotoxic patients		Graves' disease patients	
	No.	%	No.	%
Lid lag	7	16.67	6	100
Lid retraction	7	16.67	6	100
Exophthalmus	6	14.29	6	100

Table 9: Incidence of early post operative complications

Complications	No.	%
Thyroid storm	0	0
Hematoma	0	0
Hoarseness of voice	2	4.76
Stitch abscess	3	7.14
Hypocalcaemia	1	2.38
Total	**6**	**14.28**

Discussion:

Forty two patients with toxic goiter were selected in this prospective study within a period of 33 months. The incidence of toxic goiter in our series was 18.67 %. Burglund J. mentioned a mean incidence for toxic goiter of 25.80 % in demographically well - defined population (100 000 persons) with only one general hospital [9]. In a study in Iraq in 1993, the incidence of toxic goiter was 14 % (10).A higher level of incidence was reported from Denmark during the Second World War [9]. In our series 33 patients with toxic goiter were females and 9 patients were males, with female to male ratio 3.67: 1, these findings commensurate with findings which were obtained by a

study done by Furszyfer J. in Rochester [11]. However in another Arab country, Saudi Arabia, Hardy M.J. , found that toxic goiter is proportionally more common in male population than in the west where the result was 1 in 6 [12]. In our study we found that the majority of the patients with toxic goiter were in the 3rd and 4th decade of life (24-43 years) which corresponds to 90.48 % , and the patients with Graves' disease were mainly in the younger age group, in the third decade of life (24-33years), confer an incidence of 83.33 % of the cases of toxic diffuse goiter . In a study in U.S. ,they found that the peak age of presentation is between 30 - 40 years [13], while patients with toxic nodular goiter and toxic nodule were located in older age group than Graves' disease, 22 patients out of 36 patients of toxic nodular goiter and toxic nodule (61.11 %) were above the age of 34 years. In one study in non - endemic area in Wickham, England, Turnbridge W.M.G. found that the incidence of the nodules increased in individuals older than 45 years [14]. In our series the incidence of Graves' disease was 14.29 % with female to male ratio of 5: 1.In U.S., Graves' disease is the most frequent cause of thyrotoxicosis accounting for 60 - 90 % of cases, with higher incidence in females ranging from 5:1 to 10:1[15]. Burglund J. found an incidence of 68 % with female to male ratio of 3.7: 1 [9]. Kalk W.J. found an incidence of   88 % with female to male ratio of 7.9: 1 [16]. In our study the incidence of toxic nodular goiter was 78.57 % with female to male ratio of 3.71: 1. In U.S., toxic nodular goiter accounts for approximately 15 – 30 % of cases of hyperthyroidism [17]. In a study in an iodine deficient community (which is defined as a mean 24h urinary iodine excretion of 55 mcg. /day). Aghini – Lambardi reported doubling of prevalence of toxic nodular goiter in comparison to toxic diffuse goiter [18]. Burglund J. found that the incidence of toxic nodular goiter was 21 % with female to male ratio of 8.6: 1 [9]. The higher incidence of toxic nodular goiter in our study than other studies can be explained by variation in the incidence of toxic nodular goiter in endemic and non – endemic goiterous areas [9] .Another explanation is the delay in the diagnosis and treatment of multinodular goiter that ultimately converted to toxic nodular goiter. The incidence of toxic nodule in our study was 7.14 % with female to male ratio of 2: 1. In Sweden reported an incidence of 11 % with female to male ratio of 2.4 : 1 [9] .The diagnosis of toxic goiter depends on adequate clinical assessment and the demonstration of abnormal test for thyroid function .Thyroid scanning were performed for only 18 patients (42.86%) , the radio-iodine uptake is usually elevated to the range of 50 – 80 % [19] .Clinically all cases (42 patients) presented with swelling in the neck , in our study the most common presenting symptoms were palpitation (92.86 % of cases) , followed by nervousness and preference for cold which corresponds for 83.33 % for each one of these symptoms. While the least common presenting symptom was dyspnea, this corresponds to 9.52 %. The high incidence of palpitation as a presenting symptom in our study can be explained by the higher incidence of toxic nodular goiter (78.57%) which is associated with higher incidence of cardiac symptom and complications [20], the most common presenting signs in our study were goiter and tachycardia with an incidence of   100 %, these findings were matching with the findings which were reported by Al-hindawy [21]. And the least common sign was atrial fibrillation with an incidence of 2.38 %.   Graves' disease ophthalmopathy usually occurs in association with hyperthyroidism [22]. In our study we found that the incidence of eye signs (including exophthalmus, lid lag and lid retraction) in patients with Graves' disease was 100 %. Wall J.R. found that infiltrative ophthalmopathy occur in 20 – 40 % of cases of Graves' disease [22]. In U.S it occurs as many as 100 % of cases including subclinical cases documented by orbital CT scan or orbital ultra-sonography revealing swelling of the extra ocular muscles and /or increase intra-orbital fat[23] .In our study abnormal test to thyroid function were observed in all 42 patients with clinically suggested toxic goiter . All our patients with toxic goiter underwent thyroid surgery and in the majority (95.24%) subtotal thyroidectomy was done, two patients (4.76%) who had toxic nodule underwent lobectomy and isthmusectomy .In a study in Mayo clinic 446 patients who had thyroidectomy were observed, 96% underwent subtotal thyroidectomy   and   0.30%   had   total   thyroidectomy   [24].   Regarding   the   post-operative

complications, the mortality rate is zero, the morbidity rate in our series was 14.28% .The incidence of recurrent laryngeal nerve paralysis was 4.76%, the paralysis was temporary, and recovered within three months postoperatively, .The incidence of post-operative hypocalcaemia in our series was 2.38%, which was transient and the patient recovered within a week. In Japan, Kato A., found that hypoparathyroidism was avoided in 23 patients (95.80%) out of 24 patients who had total thyroidectomy and in 7 patients (87.50%) out of 8 patients who had subtotal thyroidectomy[25]. Three patients (7.14%) developed stitch abscess for which drainage under local anesthesia was done. None of our patients had reoperation for hemorrhage and this is due to precise ligation of thyroid vessels and perfect hemostasis . Cichon S. in Poland ,found that the lowest percentage of this complication (hematoma) was observed after operation of non toxic goiter (0.39%) and the highest in a group of patients operated due to Graves' disease (1.02%) [26] .The other long term complications are not included in our work, such as recurrent hyperthyroidism and hypothyroidism.

Conclusion:

The incidence of toxic goiter was 18.67% and toxic nodular goiter was the most common type of toxic goiter representing 78.57%, therefore early diagnosis and treatment of nodular goiter is mandatory to lower the incidence of toxic goiter in our community.

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