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Research Article

THYROID EYE DISEASE-A CLINICAL HORMONAL AND ULTRASONOGRAPHIC EVALUATION

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A B S T R A C T

Introduction: Thyroid eye disease is defined as an autoimmune inflammatory disorder that affects orbital muscles and fat. Although usually associated with hyperthyroidism, Graves' ophthalmopathy may accompany hypothyroidism or Hashimoto's thyroiditis. **Objective:** To evaluate ocular, ultrasonic and hormonal findings in thyroid eye disease. **Methodology:** This is a study involving 50 patients of various age group with signs and symptoms of thyroid ophthalmology department of Gauhati Medical College and hospital, Guwahati, Assam. **Results and observations:** Out of 50 patients, bilateral ophthalmopathy was seen in 41 (82%) patients and unilateral in 9 (18%) patients.84% had hyperthyroidism, 4% had hypothyroidism and 12% had euthyroidism. On B scan ultrasonography 62% cases with proptosis had enlarged extraocular muscles, most commonly involving inferior rectus muscle (74%).

INTRODUCTION

Thyroid eye disease (TED) is a complex orbital inflammatory disease, which can be sight threatening, debilitatingand disfiguring. TED is also known as Graves' ophthalmopathy, named after Robert J. Graves, an Irish physician who first described thyrotoxicosis in a woman presenting with goitre, rapid heartbeat and exophthalmos[1]. The modern association of hyperthyroidism, diffuse goitre and exophthalmos has been attributed to the work of Caleb Hiller Parry, Robert James Graves' and Carl Von Basedow. In 1786, Parry observed a case of thyroid enlargement and the protrusion of eyes butthe eponymic honour has been bestowed most commonly onGraves for his complete and detailed description of a case of thyroid disease with exophthalmos that appeared in 1835 [2].

Primary risks factors for TED are environmental influences especially smoking but also prior pathogen exposures, stress and previous use of radioiodine in addition to a complex genetic component[3]. Graves' ophthalmopathy affects women approximately 6 times more frequently than men.The peak rate occurs in age groupm40-44 years and 60-64 years in women and 45-49 years and 65-69 years in men [4].

A unique feature of TED in comparison to other autoimmune diseases is that it is self-limiting. The suggested reason is the absence of lymphoid tissue (and hence lymphoid neogenesis) within the orbit.

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The disease commences with an active (inflammatory) phase with rapidly worsening symptoms and signs, reaching a point of maximum severity which then improves to a static plateau but does not resolve to baseline (inactive phase). This is known as Rundle's curve [5].

Among the patients of Graves' ophthalmopathy in the incidences of cohort, approximately 90% had Graves' hyperthyroidism, 11% had primary hypothyroidism, 3% had Hashimoto's thyroiditis and 6% were euthyroid. There was a close temporal relationship between the development of hyperthyroidism and Graves' ophthalmopathy. In about 20% of patient's diagnosis is made at the same time; in approximately 60% of patients, eye disease occurred within 1 year of onset of thyroid disease.[4] The severity of the ophthalmopathy usually does not parallel to serum levels of T_4 or T_3 but closely related to thyroid-stimulating immunoglobulins. The thyroid ophthalmopathy is a self-limited process that becomes quiescent within 3-5 years of its onset[6]. As many as 10% of patient of thyroid eye disease develop severe vision threatening ophthalmopathy, although some patients with neuropathy can experience spontaneous improvement [4].

Diagnosis of thyroid eye disease is relatively easy in patients having characteristic eye signs and evidence of hyperthyroidism. But it is difficult to establish the diagnosis when a case of dysthyroid eye diseases presents with unilateral proptosis or without any signs of systemic manifestations of hyperthyroidism. To establish a correct diagnosis, it is important to assess the thyroid function and clinical ocular findings supplemented with ultrasonography and or CT scan of the orbits and antibody studies.

MATERIALS AND METHODS

This prospective observational study was conducted for a period of one year between July to in the Reginal institute of Ophthalmology and Endocrinology department of Gauhati medical college and hospital, Guwahati. A total of 50 patients were included in the study. A detailed history, local and systemic examinations including laboratory investigations were done in all cases fulfilling the criteria after taking informed consent from the patient and or the attendant.

Ophthalmic evaluation consists of the following: -

- Elicitation of proper ocular history such as any photophobia, lacrimation, or any history of diplopia etc.
- Thorough external ocular examination under diffuse light and slit lamp.
- Fluorescein / Rose Bengal staining of the cornea.
- IOP examination by Schiotz tonometer.
- Exophthalmometry.
- Forced duction test.
- Central visual field charting.
- Color vision testing by Ishihara plates.
- Fundus examination by Heine direct ophthalmoscope.
- B-scan ultrasonography of orbit.

The results were statistically analysed.

Diagnostic criteria

- Unilateral or bilateral lid retraction with no alternative explanation.
- Lid retraction and unilateral exophthalmos.
- Bilateral exophthalmos.
- Ophthalmoplegia associated with bilateral lid retraction or exophthalmos.
- USG evidence of extraocular muscle involvement.

Inclusion criteria

- Thyrotoxicosis patients with eye signs.
- Cases with diffuse goitre with eye signs.
- Cases with eye signs but no evidence of thyroid dysfunction.

RESULTS AND OBSERVATIONS

50 patients with different signs and symptoms of thyroid ophthalmopathy were examined in the study.

Distribution of Age In Relation To Sex

Among 50 patients, maximum number of cases i.e. 9 males and 23 females were in the age group of 31 - 50 years.

Table No 1

Sex	Age group in years						Total
	10-20	21-30	31-40	41-50	51-60	>60	
Male	1	1	3	6	2	1	14
Female	3	5	11	12	4	1	36
Total	4	6	14	18	6	2	50

Distribution of Symptoms

Table No 2

Symptoms	No. of cases	Percentage (%)
Discomfort / pain	16	32
Lacrimation/photophobia	13	26
Diplopia	8	16
Blurred vision	4	8
Decreased vision	2	4
No symptom	7	14

Distribution of Eye Findings in Order Offrequency **Table No.3**

Ocular Findings	No.	Percentage *(%)*
Eye lid retraction	41	82
Exophthalmos	29	58
Soft tissue	28	56
Lid lag	21	42
Restrictive myopathy	17	34
Dry eye	16	32
Raised IOP	15	30
Optic nerve involvement	3	6
Exposure keratopathy	2	4

Distribution of Ophthalmopathy In Relation To Thyroid Status

Table no. 4

Thyroid status	No. of cases	Percentage (%)
Hyperthyroid	42	84
Hypothyroid	2	4
Euthyroid	6	12
Total	50	100

Distribution of Stage of the Disease

ACTIVE: Ophthalmopathy with pain/redness.
INACTIVE: Ophthalmopathy without pain/redness

Table No 5 Distribution of Stage of The Disease

Ophthalmopathy	No. of cases	Percentage (%) I
Active stage	28	56
Inactive stage	22	44
Total	50	100

Relationship of Ophthalmopathyto Thyroid Status

Of the 28 active cases 78.5% had high T_3, 89.2% had high $T_4$and 89.2% cases had suppressed TSH indicating hyperthyroid state. In 3 patients (10.7%) had low T_3 but normal TSH probably indicating effect of antithyroid drug therapy. 10.7% had normal T_3, normal T_4 and TSH indicating euthyroid Graves'.

Of the inactive cases, 72.7% had high $T_3$and high T_4 and 77.2% had suppressed TSH indicating hyperthyroidism. Of the 3 patients with low T_3 and T_4. 2 had high TSH indicating hyperthyroidism, while 1 patient on antithyroid therapy had normal TSH indicating a drug effect.

Distribution of Extraocular Muscleenlargement As Evidenced By B-Scanultrasonography

Table No 6

Enlarged EOM	No. of cases	Percentage (%)
With proptosis	31	62
Without proptosis	9	18
Normal	10	20
Total	50	100

Frequency of Involvement of Extraocular Muscles As Evidenced By B-Scan Ultrasonography

Table No 7

Extraocular muscle	No. of cases	Percentage (%)
Inferior rectus	37	74
Medial rectus	28	56
Superior rectus	13	26
Lateral rectus	11	22

DISCUSSION

The study on "Thyroid Eye Disease - A Clinical, Hormonal And Ultrasonographic Evaluation" have been studied by various workers in different times, in different parts of the world and it is observed that it varies widely from place to place and among individuals.

In our study, there are 4 cases in the age group of 10-20 years; one had mild proptosis while other three cases had only mild eye lid retraction with no other signs and symptoms. Urelsky S. H. and Kennerdell J. S. (1980)[7] also observed that the thyroid eye disease in children and adolescent was uncommon but when occurred the findings were quite mild.

In our series of 50 cases, we have found only two cases with age more than 60 years and presented with proptosis and rise of intraocular pressure but had normal vision. Nordyke *et al* (1988)[8] found that severe form of lesion occurred less frequently in old and almost disappeared in sixth and seventh decades. So, decrease of severity with increasing age could not be observed in our study.

In our study, highest number of patients (36%) complained of pain and ocular discomfort followed by lacrimation and photophobia (26%) which is quite similar to Bartley *et al* (1994, 1995)[9,10,11] who found that at time of diagnosis, the most frequent ocular symptom was pain or discomfort (30%) followed by lacrimation and photophobia (15-20%).

Out of our total 50 cases, 16% cases complained of diplopia and our finding is nearly same with several other studies like Khurana *et al* (1992)[12] 13.33%, Kendler *et al* (1993)[13] 20% and Bartley *et al*(1994)[9] 17%.

Decrease vision is noted in 4% patients of our study which is supported by Kindler *et al* (1993)[13] and Bartley *et al* (1994)[9] and they found 6% and 2% of their cases having decreased vision.

Comparison of distribution of various ocular findings in different studies

Table 8

Ocular findings	Present study	Other studies
Eyelid retraction	82%(out of 50 cases)	94% by Day *et al* (1959)[14] Out of 200 cases
Soft tissue involvement	56%	77.2% by Kendler *et al* (1993)[13]
Proptosis	62%	60% by Bartley *et al*(1994)[9]
Restrictive myopathy	34%	54% by Bartley *et al*(1994)[9]
Raised IOP	30%	22% by Allen co workers (1985)[10]
Optic neuropathy	6%	5.8% by Bartley *et al*(1996)[15]

Out of total 50 cases 56% were under active group and 44% were underinactive group. It was seen that irrespective of hormone level (T_3, T_4& TSH); signs of thyroid eye disease were present in all the cases with mild and moderate to marked degree of the disease. So, we observed that though thyrotoxicosis is the underlying cause of thyroid eye disease, there is no direct relationship between the thyroid hormone levels (T3, T_4 & TSH) and course of ophthalmopathy.

Few other authors who support our findings are Adams DD. and Kennedy T.H. (1974)[16], Lawton NF.[17] and Fells P. (1978)[18] and Wall JR and Joyner D.M. (1982)[19].

We have found that the most commonly involved extraocular muscle in our cases as evidenced by ultrasound was inferior rectus (74%), followed by medial rectus (56%), superior rectus (26%) and lateral rectus (22%). This is corroborated by the study of Dervon H. and Char MD. (1990)[20] Several authors also found the similar involvement of extraocular muscles are shown in the following table- 9

Authors	Inferior rectus (%)	Medial rectus (%)	Superior rectus (%)	Lateral rectus (%)
Enzmann (1979)[21]	77	75	51	50
Thalacker (1981)[22,23]	80	44	24	0
Wiersinga (1989)[21]	60	50	40	22
Nugent (1990)[21]	61	57	63	42

CONCLUSION

The thyroid eye disease usually occurs in young adults. Females are most commonly affected than males. The most common ocular complaint is ocular discomfort/pain. Eye lid retraction is the most common feature of TED being present either unilaterally or bilaterally at some point in their clinical course. The proptosis associated with TED is commonly bilateral. Elevation followed by abduction is the most commonly found limited ocular movements seen in TED. The intra ocular pressure may be raised with or without measurable amount of proptosis. Severe loss of vision is found with the involvement of cornea & optic nerve. The combination of bilateral exophthalmos, lid retraction, stare with an enlarged thyroid gland are virtually pathognomonic of endocrine exophthalmos. There is no direct relationship between thyroid hormone level and the course of the TED. With the help of B-scan ultrasonography the enlargement of extraocular muscles can be evidenced even without the measurable amount of proptosis. The most commonly involved muscle in TED is inferior rectus.

As the patients were studied over a period of one year, follow up was not possible in our study. However, patients should be assessed regularly over several years to determine the course of ophthalmopathy and persistence of residual effects if any.

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