

A CLINICAL STUDY ON HYPERTHYROIDISM IN VARIOUS GOITERS

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Abstract

Background: We want to do a clinical study on Hyperthyroidism in various Goiters. **Materials and Methods:** It was a prospective study conducted on 100 goiter patients who attended outpatient of the Department of General Surgery at Sri Venkateshwara Ramnarayan Ruia Government General Hospital Tirupati, during the period from April 2021 to May 2022. **Result:** All the cases were diagnosed clinically and correlated with relevant investigations. In this study age of the patients ranged from 18 to 70 years. The mean age was 39.43 years with a standard deviation of 9.60 years. Patients presented with a duration of illness of 6 to 12 months. Diffuse toxic goiter or grave's disease was the common type of hyperthyroidism (64%), followed by toxic multinodular goiter (22%), followed by toxic solitary nodule (6%). TRAb was used to differentiate between Graves' disease and other causes of hyperthyroidism in our study. In our study majority of the patients had Graves' disease (64%) and 53 patients with Graves' disease had medical management. 17 patients were made euthyroid in 6 to 9 months and planned for surgery. In patients who had toxic multinodular goiter and toxic solitary nodule, they were made euthyroid in 3-4 months and planned for thyroidectomy. Total thyroidectomy was the surgery of choice in our study. All the patients who were planned for surgery were made euthyroid and posted for surgery, so thyroid storm was not evident in our study. Mortality following surgery was zero in our study. **Conclusion:** Hyperthyroidism is one of the common endocrine disorders. Hyperthyroidism is more common among females. Hyperthyroidism occurs most commonly in 3rd and 4th decade of life. Toxic multinodular goiter and toxic solitary nodules are made euthyroid in 3 to 6 months and planned for surgery. Hyperthyroid patients are made euthyroid with appropriate anti-thyroid medications to prevent thyroid storm intraoperatively and postoperatively. Total thyroidectomy is the common surgery done for diffuse thyroiditis and toxic multinodular goiter.

INTRODUCTION

The term goiter (Latin gutter meaning throat) is used for generalized enlargement of the thyroid gland. Hyperthyroidism means excess of thyroid hormone production by the gland itself. Thyrotoxicosis means physiological and biochemical manifestations of excess thyroid hormones. Thyroid disorders are one of the most common endocrine diseases worldwide. The incidence of thyroid diseases is rising due to excess use of goitrogens, changes in food habits, and radiation exposure. According to recent estimates in India, 42 million people are affected by thyroid diseases. A few states like Goa, Gujarat, and Kerala, and hilly areas like the Himalayas are the endemic regions for thyroid diseases. Thyroid disease differs from other diseases in terms of ease of diagnosis and access to treatment. Early diagnosis and treatment are

the cornerstone of management. Thyroid diseases are mainly seen in females with a prevalence of 2% and male to female 1:10 ratio. During puberty, pregnancy, lactation, and menopause there are variations in thyroid hormones, so females are affected more than males usually. The common causes of hyperthyroidism include Graves disease, others are toxic multinodular goiter and solitary toxic nodules. In iodine-sufficient areas, in hyperthyroid patients, Graves disease is the most common cause of hyperthyroidism. The goal of this study is to evaluate patients with hyperthyroidism, type of goiter, modality of management, and outcome from the treatment.

Aims & Objectives

Aim: A clinical study on hyperthyroidism in various goiters.

Objectives: To study the age and sex distribution of hyperthyroidism, To study hyperthyroidism in

various goiters, To study the duration of illness in the study population, To study the management and complications of the surgery, To study a note on thyroid storm during the operative procedure and measures to avoid it.

MATERIALS AND METHODS

Study Design: Prospective study.

Study Subjects: 100 goiter patients with hyperthyroidism.

Study Settings: Department of General Surgery at Sri Venkateshwara Ramnarayan Ruia Government General Hospital Tirupati.

Study Period: One year from the approval by the institutional ethical and scientific committee.

Study Methods: Clinical history, Diagnosis, Laboratory investigations like

Thyroid profile, Antithyroid antibodies, FNAC

Data was collected in standardized proforma from all patients at SVRRGGH; Tirupati. Patients fulfilling inclusion and exclusion criteria are selected. Informed and written consent of all the patients who are included in the study are taken.

Inclusion Criteria

All the patients presenting with signs and symptoms of hyperthyroidism and goiter who attended the Department of General Surgery SVRRGGH TIRUPATI and all the patients aged above 18 years.

Exclusion Criteria

Age less than 18 years, Patients having other neck swellings, Patients not willing to available modality of management.

RESULTS

In the present study, a hundred patients with thyrotoxicosis were admitted to the general hospital of SVRRGGH from April 2021 to May 2022 as per inclusion and exclusion criteria.

In the present study, the majority i.e. 41% of the patients were in the age group of 31 – 40 years and 30%, 22%, 4%, and 3% were in the age group of 41 – 50 years, 18 – 30 years, 51 – 60 years and >60 years respectively. The mean age of the patients in the study was 36.43 years with a standard deviation of 9.60 years. [Table 1]

In the present study, the majority i.e., 75% of the study participants were females and 25% were males. [Table 2]

In the present study, the duration was 6 months to 1 year in the majority i.e. 61% of the cases followed by <6 months in 26% of the cases and >1 year in 13% of the cases. The mean duration of illness was 8.39 months with a standard deviation of 4.37 months [Table 3]

In the present study, the most common symptom among the patients was neck swelling in 93% of the participants followed by palpitations, weight loss, tremors and menstrual irregularities in 71%, 70%, 57% and 15% of the cases respectively. [Table 4]

In the present study, Goiter was the most common sign seen in 100% of the cases followed by tachycardia and eye signs in 75% and 12% of the cases respectively. [Table 5]

In the present study, diffuse thyroiditis was the most common feature on USG seen in 72% of the cases followed by multi nodular goiter and Solitary nodule thyroid in 22% and 6% of the cases respectively. [Table 6]

In the present study, antibodies were positive in 64% of the cases. [Table 7]

In the present study, in the thyroid profile T3 and T4 were elevated in 100% of the cases and TSH was lowered in 100% of the cases. [Table 8]

In the present study, total thyroidectomy was the surgery performed in 27% of the cases. Near total thyroidectomy, Subtotal thyroidectomy and Hemi thyroidectomy were the other surgical procedures done in 3%, 4% and 3% of the cases respectively. Medical management was done in 63% of the cases. [Table 9]

In the present study, seroma, hypocalcemia, hypothyroidism recurrent laryngeal nerve injury, hematoma and wound infection were the post operative complications seen in 23.2%, 16.2%, 13.9%, 1.3%, 6.9% and 6.9% of the cases who underwent surgical management respectively. [Table 10]

In the present study, surgical management was done in 66.7%, 53.3%, 31.9%, 29.3%, and 25% of the cases in the age groups of >60 years, 41 – 50 years, 18 – 30 years, 31 – 40 years and 51 – 60 years respectively. [Table 11]

In the present study, surgical management was done in 41.3% and 48% of females and males respectively. Medical management was done in 58.7% and 52% of the females and males respectively. [Table 12]

In the present study, anti-bodies were positive in 26.6% and 73.4% of cases who underwent surgical management and medical management respectively and the difference was found to be statistically significant. [Table 13]

In the present study, antibodies were positive in 88.9% of cases with diffuse thyroiditis in USG and negative in 11.1% of the cases. All the cases of multi nodular goitre and solitary nodule thyroid on USG were negative for antibodies. The difference was found to be statistically significant. [Table 14]

In the present study, majority were Grave's disease in 64% of the cases followed by Multi nodular goiter, thyroiditis, and Solitary nodule thyroid in 22%, 8% and 6% of the cases respectively. [Table 15]

In the present study, out of 64 cases of Grave's disease, 7 cases underwent total thyroidectomy and 2 cases each underwent near total and sub total thyroidectomy. 53 cases of Graves's disease underwent medical management. In the cases of thyroiditis, 6 out of 8 cases underwent medical management. In the cases of multi nodular goiter, 18 out of 22 cases underwent total thyroidectomy. In the cases of solitary nodule, 3 out of 6 cases underwent

near total thyroidectomy and 3 cases underwent medical management. [Table 16]

Table 1: Distribution of study participants by age

Age group (in years)	Number	Percentage
18 – 30	22	22%
31 – 40	41	41%
41 – 50	30	30%
51 – 60	4	4%
>60 years	3	3%
Total	100	100%

Table 2: Distribution of study participants by sex

Sex	Number	Percentage
Female	75	75%
Male	25	25%
Total	100	100%

Table 3: Distribution of study participants by duration of illness

Duration of illness	Number	Percentage
<6 months	26	26%
6 months – 1 year	61	61%
>1 years	13	13%
Total	100	100%

Table 4: Distribution of study participants by symptoms

Symptoms	Number	Percentage
Neck swelling	93	93%
Palpitations	71	71%
Weight loss	70	70%
Tremors	57	57%
Menstrual irregularities	15	15%

Note: Percentages are mutually inclusive

Table 5: Distribution of study participants by signs

Signs	Number	Percentage
Goiter	100	100%
Tachycardia	75	75%
Eye signs	12	12%

Note: Percentages are mutually inclusive

Table 6: Distribution of study participants by features on USG

USG features	Number	Percentage
Diffuse thyroiditis	72	72%
Multi nodular goitre	22	22%
Solitary nodule thyroid	6	6%
Total	100	100%

Table 7: Distribution of study participants by presence of TRAb antibodies

Presence of antibodies	Number	Percentage
Positive	64	64%
Negative	36	36%
Total	100	100%

Table 8: Distribution of study participants by Thyroid Profile

Thyroid profile	Number	Percentage
T3, T4 – High	100	100%
TSH – Low	100	100%
Total	100	100%

Table 9: Distribution of study participants by management done

Management done	Number	Percentage
Total thyroidectomy	27	27%
Near total thyroidectomy	3	3%
Subtotal thyroidectomy	4	4%
Hemi thyroidectomy	3	3%
Medical management	63	63%
Total	100	100%

Table 10: Distribution of study participants by post-op Complications

Complications	Number (n = 43)	Percentage
Recurrent Laryngeal nerve injury	4	9.3%
Hematoma	3	6.9%
Hypocalcemia	7	16.2%
Hypothyroidism	6	13.9%
Wound infection	3	6.9%
Seroma	10	23.2%

Table 11: Distribution of study participants by age and Management done

Age Group (in years)	Surgical Management		Medical Management		Total
	Number	Percent	Number	Percent	
18 – 30	7	31.9%	15	68.1%	22 (100%)
31 – 40	12	29.3%	29	70.7%	41 (100%)
41 – 50	16	53.3%	14	46.7%	30 (100%)
51 – 60	1	25%	3	75%	4 (100%)
>60 years	2	66.7%	1	33.3%	3 (100%)
Total	43	43%	57	57%	100 (100%)

Chi-square = 8.803, p = 0.066

Table 12: Distribution of study participants by Sex and Management done

Sex	Surgical management		Medical management		Total
	Number	Percent	Number	Percent	
Female	31	41.3%	44	58.7%	75 (100%)
Male	6	24%	19	76%	25 (100%)
Total	37	37%	63	63%	100 (100%)

Chi-square = 0.340, p = 0.560

Table 13: Distribution of study participants by presence of antibodies and Management done

Antibodies	Surgical management		Medical management		Total
	Number	Percent	Number	Percent	
Present	17	26.6%	47	73.4%	64 (100%)
Absent	26	72.2%	10	27.8%	36 (100%)
Total	43	43%	57	57%	100 (100%)

Chi-square = 19.598, p = 0.000

Table 14: Distribution of study participants by presence of antibodies and USG neck findings

USG Neck	Antibodies positive		Antibodies negative		Total
	Number	Percent	Number	Percent	
Diffuse thyroiditis	64	88.9%	8	11.1%	72 (100%)
Multi nodular goiter	0	0%	22	100%	22 (100%)
Solitary nodule thyroid	0	0%	6	100%	6 (100%)
Total	64	64%	36	36%	100 (100%)

Chi-square = 69.136, p = 0.000

Table 15: Distribution of study participants by diagnosis

Diagnosis	Number	Percent
Grave's disease	64	64%
Thyroiditis	8	8%
Multi nodular goiter	22	22%
Solitary nodule thyroid	6	6%
Total	100	100%

Table 16: Distribution of study participants by diagnosis and surgery done

Diagnosis	Total thyroidectomy	Near total thyroidectomy	Sub total thyroidectomy	Hemi thyroidectomy	Medical management	Total
Grave's disease	7	2	2	0	53	64
thyroiditis	2	0	0	0	6	8
Multi nodular goiter	18	1	2	0	1	22
Solitary nodule thyroid	0	0	0	3	3	6
Total	33	3	4	3	57	100

DISCUSSION

Hyperthyroidism is one of the most common endocrine disorders seen in clinical practice. It can

occur in 2 forms, primary thyrotoxicosis (diffuse toxic goiter) or secondary thyrotoxicosis (toxic multi nodular goiter, toxic solitary thyroid nodule). The observations and results of present study are

compared with available other studies and discussed here.

Age Distribution: Hyperthyroidism is seen in any age group but most of them present between 20-50 years age. In a study conducted by Bhandarkar et al,^[1] patients at 2nd decade were 5%, 3rd decade were 23%, 4th decade were 33%, 5th decade were 30%, 6th and more than 6th decade were 12%. In our present study patients in the 2nd decade were 3%, 3rd decade were 22%, 4th decade were 41%, 5th decade were 30% above 6th decade were 7%. Mean age group in our study is 39 years with a standard deviation of 9.6. In a study conducted by Javid.F et al,^[2] most of the patients were at age groups of 20 to 50 years and peak age group was 30 years. In a study conducted by Arindambose et al,^[3] in 2015 60.78% of patients were at the mean age group of 19-45 years, 29.32 were at the age of >45 years. Peak incidence of hyperthyroidism seen in age groups of 30-50 years and it correlates with other studies also. Thus hyperthyroidism is seen usually in the adult population. The above data of the present study correlates with other studies mentioned.

Distribution: In a study conducted by Bhandarkar et al,^[1] they had male 30% cases females 70% cases. In a study conducted by AIIMS 2000 males were 36.6%, females were 64.64%. In a study conducted by Javid et al female to male ratio was 2.4:1.^[2] In a study conducted by Arindam Bose et al 2015,^[3] males were 37.07%, females were 71.05%. In the present study male population was 24% female population 76%. Hyperthyroidism is more commonly seen in female population than male population. The present study correlates with other studies shown above.

Duration of illness: In a study conducted by Bhandarkar et al,^[1] patients were presented in <6 months were 33%, 6 months-1 year were 52%, >1 year were 15%. In our present study patients with 61% were presented in <6 months, 26% people presented in 6 months to 1 year. 13% presented after >1 year. Most of the patients attend hospital within less than 6 months of symptoms onset in them.

Symptoms: Occurs due to elevated thyroid hormones in the body. In a study conducted by Bhandarkar et al,^[1] neck swelling was found in 89% of the population, palpitations found in 91% population, weight loss found in 97% patients, tremors noted in 98% cases.

In a study conducted by AIIMS 2000 neck swelling noted in 95% patients, palpitations noted in 91%, weight loss observed in 96%, tremors observed in 91% cases. In a study conducted by Sridhar et al,^[4] neck swelling noted in 92% cases, palpitations noted in 65% cases, weight loss observed in 67% cases, tremors present in 66% cases. In a study conducted by Javid F et al,^[2] palpitations 91.7%, tremors 88.2%, weight loss in 76.6%. In our study group among 100 patients, 98 patients has neck swelling, 71 patients have palpitations, 70 patients have weight loss, 57 patients has tremors, out of 75 female patients 15 females have oligomenorrhea /

amenorrhea. The most striking report of hyperthyroidism due to Graves disease was the presence of secondary amenorrhea reported by Dr. Basedow in 1840. In a study conducted by Kakuno et al,^[5] hyperthyroidism patients has 25% cases has oligomenorrhea. Different patients present with a wide range of symptoms, usually palpitations are the most common symptom noted in hyperthyroidism. Here in this study hyperthyroidism in goiter, goiter is the most common symptom seen (93%).

Signs: In a study by Bhandarkar et al 11 89% cases have goiter, tachycardia seen in 94% cases. In AIIMS 2000 study goiter is seen in 95% cases, tachycardia seen in 100% cases, eye changes 43% cases. In a study conducted by Sridhar et al,^[6] 92 patients had goiter, eye changes seen in 37 patients. In a study by Javid F et al goiter in 100% cases, Tachycardia in 100% cases, eye signs in 26.5% cases.^[7] In the present study, we have included 100 goiter patients, 75% patients have tachycardia, 20% patients have eye changes like lid retraction, absence of blinking.

USG findings: On USG, Diffuse thyroiditis of Graves disease shows increased vascularity, and hyperthyroidism due to destruction of thyroid gland shows reduced vascularity.

On ultrasonography, out of 100 patients 72 subjects has diffuse goiter including Graves disease and thyroiditis, 22 subjects has multinodular goiter, 6 subjects has toxic nodular goiter.

Thyroid antibodies: The thyroid receptor antibody assay (TRAb) assay is done using the electrochemiluminescence immunoassay cut off value for TRAb is 1.75 IU/L. There are many causes of hyperthyroidism of which Graves disease is most common others being toxic multinodular goiter, thyroiditis, toxic solitary nodule. These can be differentiated using technetium pertechnetate scan, radioactive assay, TrAb test and usg doppler. TRAb test remains the better assay owing to its cost effective, rapid turnover. Other assays require radiation safety measures, specialized equipments. In a study conducted by John et al,^[6] in 2017, in 227 hyperthyroidism patients 140 (64%) subjects had TRAb positive (>1.75 IU/L) for Graves disease.

In our present study, out of 72 subjects of diffuse goiter patients, 64 subjects has positive to TrAb which is 64% of the total population in study.

Type of goiter: In a study conducted by Bhandarkar et al,^[1] 84% patients has diffuse goiter/ Graves disease, and toxic multinodular goiter was found in 5% of cases. In a study conducted by AIIMS 2000 83% of cases had diffuse goiter, 12% had toxic multinodular goiter, 4% had toxic solitary nodule, and 1% had sub-acute thyroiditis. In a study conducted by Pamnani et al,^[7] 2014 Diffuse goiter/ Graves disease 74.4% of toxic multinodular goiter in 14.6%, and toxic solitary nodules in 11%. In a study conducted by Simlne de Leo et al 80, patients had diffuse goiter/ Graves disease. 8 In a study by Javid F et al most common goiter was Diffuse toxic goiter in 70.6% of cases, toxic MNG in 23.6% of cases, solitary toxic nodule, and thyroiditis in 2.9% of cases.

In the present study, there were 64 diffuse goiter/ Graves disease, 22% of cases had toxic multinodular goiter, 6% had solitary nodules, and thyroiditis was noted in 8% of cases. In another study, Nair et al showed 63.1% of subjects had Graves disease and 36.9 % of subjects had a toxic multinodular and toxic solitary nodule.

The present study is compared with other studies which have hyperthyroidism and goiter, majority of the subjects had diffuse toxic goiter (Graves' disease) which is followed by toxic multinodular goiter and solitary thyroid nodules followed by other causes of hyperthyroidism. From the above studies, it is evident that most hyperthyroidism patients have Graves disease.

Treatment: There are 3 modalities of management in hyperthyroidism.

Anti-thyroid drugs, radioactive iodine therapy, and thyroidectomy. All three treatment options are usually effective in treating patients with Graves disease but patients with toxic adenoma or toxic multinodular goiter should be treated with radioactive iodine therapy or surgery because they rarely go into remission. In toxic MNG and toxic solitary nodule patients, anti-thyroid drugs are used to achieve an euthyroid state before planning for surgery. In these cases anti-thyroid drugs are used when radioactive iodine therapy or surgery are contraindicated, or the patient has a short life expectancy. There are 2 regimens for treating hyperthyroidism and Graves disease, titration regimen and block-replacement regimen.^[9] In the Titration regimen, antithyroid drugs are titrated to the lowest dose of titration to achieve an euthyroid state. In block and replacement regimen, high doses of ATD are given and replaced with levothyroxine tablets. A drawback of ATD therapy is that there is a high recurrence rate of hyperthyroidism after stopping the drug.^[10] Recurrences are more common in the first year than in subsequent years, especially during the first 6 months after stopping the drug, but rarely after 4-5 years. Patients who have a higher risk of recurrence are those with severe hyperthyroidism, large goiter, high T3:T4 ratio, and higher levels of TRAb.

As the study period is 1 year, relapses after anti-thyroid drugs couldn't be studied after medical treatment effectively, but other studies like Vishnu Sundaresh et al,^[11] found high relapses(52.55%) with anti-thyroid drugs alone. Thyroidectomy is the definitive treatment for hyperthyroidism with goiter. These patients were treated initially with anti-thyroid drugs till patients became euthyroid and then planned for surgery.

Patients were treated with carbimazole 10 mg 8th hourly per day, additionally, patients who had tachycardia and palpitations were treated with propranolol 40mg thrice a day till patients became euthyroid, and thyroid profile was repeated every 4th week, most of the patients achieved euthyroid status in less than 6 to 8 months and then planned for thyroidectomy. As the thyroiditis is with infective

etiology medical management is sufficient, so in our study out of 8 patients 6 patients had medical management 2 patients had large goiter so surgery had been done on them.

Treatment algorithm in Graves disease, Thioamides are started for 12 to 18 months. If remission occurs monitor thyroid function after 3 months and then annually. If relapse occurs, long-term Thioamides therapy is given or monitoring thyroid function is after 3 months and annually. Definitive therapy includes radioactive iodine therapy or total thyroidectomy.

Surgery: Surgery should be planned when the patient becomes euthyroid. Sufficient preoperative preparation will reduce intraoperative and postoperative complications. Definitive surgery in hyperthyroidism with goiter is total thyroidectomy. It prevents relapse and remission which is seen after medical management or radioiodine therapy, and helps in detecting carcinoma in specimens. Other surgeries like near-total thyroidectomy, subtotal thyroidectomy, and hemithyroidectomy are planned based on the general condition of the patient, and thyroid status. In a study conducted by C. Queret et al,^[12] out of 200 thyrotoxicosis patients, 43.65 had MNG and underwent total thyroidectomy, 39% had Graves disease underwent total thyroidectomy, 17.5% had Solitary thyroid nodule and had hemithyroidectomy, and concluded that surgical management is the superior treatment for managing hyperthyroidism with goiter because it helped in preventing relapses.

Surgery in graves disease: In a study conducted by T.K. Palit et al,^[13] thyroidectomy successfully treated hyperthyroidism in 92% of patients with Graves disease. There were no cases of recurrent hyperthyroidism after total thyroidectomy. In a study by Xiaodong Liu et al,^[14] patients with Graves disease who underwent surgery as first-line management had a long-term reduction in mortality, cardiovascular disease, atrial fibrillation, and psychiatric illness when compared with patients treated with ATD or RAI. The surgery group had a lower recurrence and medical costs among the three treatments.

Presently in our study, of Graves disease patients, 62% of patients had a total thyroidectomy, 3.1% of patients had near-total thyroidectomy, 3.1 % of patients had subtotal thyroidectomy, and 31% patients had medical management. Relapses are absent after doing total thyroidectomy. When surgery is done by an experienced surgeon mortality and morbidity will be fewer. Members of the American Thyroid Association (ATA), the European Thyroid Association (ETA), and the Japanese Thyroid Association (JTA) surveyed Grave's disease management using questionnaires. Their goal was to identify how an experienced thyroid clinician uses diagnostic methods and three different treatments available for the disease. Their report identifies, summarizes, compares, and contrasts the similarities and differences in these findings in three different

regions of the world. In general, ATA members used fewer diagnostic tests than European and Japanese members. For Index patients, radioiodine was the treatment of choice for 69% of ATA respondents, but only 22% and 11% of ETA and JTA responders respectively. In contrast, only 30.5% of ATA respondents had antithyroid drugs as first-line therapy, compared with 77% of ETA respondents and 88% of JTA respondents.^[15]

Complications following surgery: Thyroidectomy is done in thyroid disorders which frequently occur in females.

Total thyroidectomy is an effective means of achieving remission but carries risks associated with general anesthesia, paraplegia, and temporary or permanent hypoparathyroidism. For patients who refuse prolonged medical treatment, and who have large goiters or suspicious nodules, surgery is useful. In a study conducted by Yan et al,^[16] undergoing thyroidectomy; 71% were females, 29% were males, mean and standard deviation of females were 47+12 years. In a study conducted by Huang et al,^[17] female to male was 5.2: 1; the mean age group was 40 years. In our study, 31 female patients and 6 male patients underwent surgery.

The above studies indicate that thyroid surgeries are done mostly in female patients.

Postoperative hematoma is characterized by respiratory distress, pain, and dysphagia. When the hematoma is observed patients should be shifted to the operation theater and should open the wound deliberately and the hematoma should be evacuated. Postoperative hematoma is prevented by thorough hemostasis intraoperatively.

In present study hematoma is seen in 3 patients(6.9%). 2 patients who had undergone total thyroidectomy and 1 patient who had near total thyroidectomy had postoperative hematoma as a complication.

Vocal Cord Palsy: Vocal cord palsy occurs due to injury to recurrent laryngeal nerves; it may be unilateral/ bilateral, reversible/irreversible. On laryngoscopy, recurrent laryngeal nerve injury is evident by change of vocal cord with normal position prior to surgery to a paramedian position with immobility after thyroidectomy. The complication ranges in between 0.5%-5% in different institutes. Vocal cord palsy may be prevented by identification of RLN and careful separation during the procedure. In the present study the incidence of vocal cord palsy is seen in 9.3% patients. 4 patients who had total thyroidectomy had vocal cord palsy. The complication was a temporary neuropraxia type recovered in a 5 to 6 months period. Palsy was seen in females mainly and in total thyroidectomy procedure. Different studies had a difference in complication rate from 5 to 8%. It occurs due to the difference in surgeon experience, type of the operation done. Careful dissection and usage of bipolar cautery reduces the risk of RLN injury.

Seroma Formation: In this study common complication seen is seroma formation occurring in

23.2% patients. It is mostly seen after total thyroidectomy. Seroma means collection of fluid at a surgical site as a postoperative complication. In thyroid surgery seroma formation is not a serious complication but has more morbidity. In a study conducted by Ali Ramouz,^[18] seroma formation occurred in 2.2% of patients. Ban et al,^[19] conducted a study on seroma formation in patients who had robotic thyroidectomy and found that 1.73% patients had seroma formation.

In the present study, 23.2% patients had seroma as wound complication; 8 patients who had total thyroidectomy and 2 patients who had subtotal thyroidectomy had seroma. Upon needle aspiration resolution of seroma observed.

Hypocalcemia: Hypocalcemia is the next common complication occurring during thyroidectomy. Occurs due to parathyroid gland injury. Occurred in 16.2% patients in our study. Hypocalcemia means total serum calcium levels less than 8.5mg/dl. Symptoms include tetany, circumoral paresthesia. It is diagnosed on post operative day 1 by sending serum calcium levels. Hypocalcemia occurs mostly after total thyroidectomy.

In the present study serum calcium was sent on post operative day 3. In a study conducted by Vitalijus Eismontas et al²⁰, 23% patients had symptomatic hypocalcemia. In our study among 6 patients who had total thyroidectomy; 1 patient had near total thyroidectomy and hypocalcemia. Hypocalcemia is not seen in patients who have undergone subtotal and hemithyroidectomy. While performing total thyroidectomy or near total thyroidectomy parathyroid should be preserved. If it couldn't be preserved, parathyroid auto transplantation in ipsilateral sternocleidomastoid may be performed.

Wound Infection: Wound infection is a less common complication after the surgery.

In our study 6.9% patients had wound site infection. It is seen in 3 patients with total thyroidectomy, hemithyroidectomy and subtotal thyroidectomy each. It increases the length of hospital stay.

Thyroid Crisis/ Thyroid Storm: Thyroid crisis/ thyroid storm is a complication occurring after thyroidectomy. At the beginning of the 20th century, in patients who had toxic goiter undergoing thyroid surgery, mortality was approximately 6%. In a few studies, the incidence of thyroid crisis hadn't reduced. Clinical features include fever, vomiting, tachycardia, restlessness, dehydration, and coma. Thyroid crisis is not seen these days because hyperthyroid patients are made euthyroid 2-3 months before elective thyroidectomy. Unless the patient is made euthyroid he is not posted for surgery except when the thyroid is complicated by a large goiter causing obstructive symptoms. Hyperthyroid patients are made euthyroid with medical therapy like antithyroid drugs (propylthiouracil, methimazole), beta-blockers (propranolol), and iodine therapy (saturated potassium iodide).

In the present study, no patient had a thyroid storm/ thyroid crisis.

Thyroid surgery is performed in an area of complex anatomy that will control many important physiological functions and metabolisms. In our study, total thyroidectomy was the main surgery performed and it is the surgery which had high morbidity. Excellent results cannot be achieved unless the operating surgeon operating is well-trained in surgery and familiar with anatomy. Thyroidectomy is seldom associated with mortality. Recently there have been many advances in thyroid surgeries like Minimally Invasive Video Assisted Thyroidectomy(MIVAT), Robot-assisted trans axillary thyroidectomy(RATT), and Transoral endoscopic thyroidectomy with vestibular approach(TOETVA).

CONCLUSION

- Hyperthyroidism is one of the common endocrine disorders & more common in females
- Hyperthyroidism occurs most commonly in 3rd and 4th decades of life
- Various presentations of hyperthyroidism include goiter, palpitations, tremors, eye and skin changes.
- Most common cause of hyperthyroidism is Graves disease.
- Other causes of hyperthyroidism include toxic multi nodular goiter , toxic solitary nodule, thyroiditis.
- Thyroid receptor antibodies are used to differentiate Graves disease from other causes of hyperthyroidism.
- Graves disease is most often managed medically 9 to 12 months and is planned for surgery based upon the relapses with anti thyroid medications.
- Toxic multinodular goiter and toxic solitary nodule are made euthyroid in 3 to 6months and planned for surgery.
- Hyperthyroid patients are made euthyroid with appropriate anti thyroid medications to prevent thyroid storm intraoperatively and post operatively.
- Total thyroidectomy is the common surgery done for diffuse thyroiditis and toxic multinodular goiter.

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