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A Prospective Observational Study on Surgical Management of Thyrotoxicosis

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ABSTRACT

Thyrotoxicosis occurs as a result of an increase in thyroid hormone synthesis and secretion by the thyroid gland and its effects on various system with altered biochemical levels. The aim is to make the patient euthyroid by preoperative treatment, intraoperative consideration, extent of resection and reduce postoperative complications like recurrent hyperthyroidism and hypothyroidism. Totally 30 patients with varied clinical presentations are confirmed to be suffering from the thyrotoxicosis and tests were appropriately evaluated and Thyrotoxicosis controlled and consented patients were operated. This most commonly manifests as Diffuse Toxic Goiter and Toxic multinodular goiter. The management of thyrotoxicosis is based on three treatment modalities, namely anti-thyroid medication, radioactive iodine ablation or surgery. The present study of 30 cases, 23 presented with TMNG and 7 being diffuse toxic goiter (primary thyrotoxicosis). Over al incidence of Hypocalcemia stands at 6.67%. one case of wound infection was seen and documented in this study with overall incidence of 3.33%. There were zero case of scar hypertrophy. Surgery increasingly plays an important role in the management of thyrotoxicosis with immediate and has evolved into a cost-effective treatment with minimal associated morbidity and mortality. Total thyroidectomy is the surgery of choice in Graves' disease, while a total thyroidectomy or thyroid lobectomy are utilized in patients with toxic nodular goiters. Although thyroid surgery can be associated with significant complications, in high volume operative centers surgery provides effective long-lasting resolution of hyperthyroidism and therefore should be considered an integral component of treatment rather than the last resort of clinicians. Surgery should be proposed as an immediate and completely effective solution for thyrotoxicosis, especially when compared with prolonged medical therapy, because it can provide a demonstrable improvement in quality of life (QOL) of the patients.

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Key Words

Thyrotoxicosis, hyperthyroidism, hypothyroidism, thyroidectomy, quality of life

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INTRODUCTION

Thyrotoxicosis" refers to a clinical state that results from inappropriately high thyroid hormone action in tissues generally due to inappropriately high tissue thyroid hormone levels[1] Hyperthyroidism refers to over activity of the thyroid gland leading to high synthesis and excessive production of thyroid hormones[1]. Thyrotoxicosis occurs in approximately 2% of women and 0.2% of men[2]. The most common cause of thyrotoxicosis is Graves' disease. Its frequency as the cause of thyrotoxicosis ranges from approximately 60-90% in different regions of the world[3]. Graves' disease is an autoimmune disorder where antibodies mistakenly attack the thyroid gland, particularly the TSH receptor sites. The attack stimulates the gland to synthesize and overproduce thyroid hormone. Toxic multinodular goiter (TMNG) is a condition in which the thyroid gland contains multiple nodules that are hyper functional, causing an overproduction of thyroid hormones. TMNG usually occurs in patients who are more than 40 years old and accounts for 5% of the total cases of hyperthyroidism. Toxic adenomas and Toxic multi-nodular goitre are more frequent in women (4-10:1)[4-6]. The underlying problem in patients with thyrotoxicosis is acceleration of many physiologic processes and the clinical manifestations reflect that acceleration. None are specific., it is usually the combination of several that suggests the possibility of the disorder. The extent and severity of the clinical manifestations of thyrotoxicosis are not strongly correlated with its biochemical severity. The assessment of thyrotoxic manifestations and especially potential cardiovascular and neuromuscular complications, is essential to formulating an appropriate treatment plan. The importance of age as a determinant of the prevalence and severity of hyper thyroid symptoms has been recently confirmed[7]. There are two effective and relatively safe treatment options, therapy and thyroidectomy. Thyroidectomy has a high cure rate for the hyper thyroids of Graves' disease. Total thyroidectomy has a nearly 0% risk of recurrence, whereas subtotal thyroidectomy may have an 8% chance of persistence or recurrence of hyper thyroids at 5 years.

MATERIALS AND METHODS

This is a prospective study in the General Surgery, Fathima Institute of Medical Sciences, Kadapa. Totally 30 patients with varied clinical presentations are confirmed to be suffering from the thyrotoxicosis and tests were appropriately evaluated and Thyrotoxicosis controlled and consented patients were operated. The clinical details were entered onto a proforma specification, given in the following pages. The data derived from the proforma was tabulated and analyzed.

Mode of Admission: Patients admitted with signs and symptoms of thyrotoxicosis and with confirmed elevated thyroid hormone levels. Patients with clinical features of thyrotoxicosis with or without treatment. A total of 30 patients were included in this study. Pre-operative assessment. All the patients were subjected to basic investigations like complete hemogram, blood sugar, urea, urine analysis, chest x-ray, ultrasound and other specific investigations like Indirect laryngoscopy, serum calcium, cervical x-ray and CT scan for suspicious of intra-thoracic extension. Indirect laryngoscopy done for all patients as routine work up. Serum calcium was assessed pre-operatively and were in normal limits. Normal range 8.10-10.40 mg/dl. This is to have base line value against which it can be compared in post-operative period for diagnosing cases of hypocalcemia. Cervical x-ray was done for all patients. Ct scan for suspicious of intra thoracic extension. TSH, T3, T4 levels were estimated with their reference ranges: Free T3: 2.50-3.90pg/ml. Free T4: 0.61-1.12ng/dl TSH .:0.34-5.60mIU/L. All patients found to have elevated free T3, T4 levels and suppressed TSH levels and have clinical and lab features of thyrotoxicosis, formed the subject of the study. After the preoperative assessment was done patients were posted for total thyroidectomy. Surgery was in all cases performed under general anesthesia with intubation.

Indications For Surgery: Large goiter with or without compressive symptoms. Failure of ongoing medical treatment. Recurrence after anti thyroid medication.

Preference For Surgery: All patients controlled with anti-thyroid medication and those patients taken up for surgery if antithyroid drugs was ineffective for primary thyrotoxicosis or After controlling thyrotoxicosis symptoms with medical therapy in case of toxic multinodular goiter., those with large goiter with or without compressive symptoms. Patient preference because of desire to avoid radioiodine, potential side effects of antithyroid drugs and as to obtain rapid correction.

Post-Operative Care: Drainage and dressing was inspected for soakage on the night of surgery. Drainage tube is removed 24-48 hours after surgery if no active bleeding in noted. Serum calcium levels post-operatively were monitored 12hrs, 24hrs with preoperative values. If found to be <8.0 mg/dl were started on oral calcium if asymptomatic and oral or intravenous calcium supplementations if symptomatic. Postoperatively thyroid hormones levels were monitored and thyroxine supplementation was started by 1.7mcg/kg body weight. All 30 patients were confirmed to be in a condition of hyperthyroidism

when the surgical option was proposed and underwent total thyroidectomy in a state of clinical or biological euthyroidism after medical therapy like antithyroid medications (methimazole) and also received propranolol for control of cardiac associated thyrotoxic symptoms.

Quality of Life is Assessed Based on 3 Parameters: Ability to attend the work and Return of daily activities. Continued need for medications. Frequent hospital admissions on Persistence of symptoms. In this study quality of life is assessed by regular follow up of patient by initial weekly follow up for 1 month, there after once in 3 months over a period of 2yrs.

Inclusion Criteria: Patients with thyrotoxic features irrespective of primary or secondary thyrotoxicosis who will be clinically and biochemically proved with increased thyroid hormone levels will be included. All patients aged above 16yrs who are diagnosed with Thyrotoxicosis and admitted under General Surgery, Fathima Institute of Medical Sciences, Kadapa were included.

Exclusion Criteria: Patients who are <16 yrs of age will be excluded from this study. Patients with goiter who are clinically non-toxic will be excluded. Those cases found to be unfit for surgeries due to chronic diseases or not-willing for surgery.

RESULTS AND DISCUSSIONS

In this study highest age incidence fall into 4th and 5th decade. Youngest case encountered at 16 yrs. that is diffuse goiter and oldest at 67yrs which TMNG. In the present study 93% were females and 7% were males. Thus the present study shows female predominance of 93%.

Type of Goitre: The present study of 30 cases, 23 presented with TMNG and 7 being diffuse toxic goiter (primary thyrotoxicosis).

Table 1: Age Relation with Type of Goiter in 30 Patients

Age	Goiter Type		
	Primary Thyrotoxicosis	TMNG	Total N=30
16-25	1	2	3
26-35	3	2	5
36-45	2	5	7
46-55	1	8	9
56-65	0	5	5
>65	0	1	1
Total	7	23	30

Toxic multinodular goiter being most common in this study and mainly after 45 yrs of age. The Incidence of various thyrotoxic signs and symptoms in our study are tabulated below:

Table 2: Frequency of Thyrotoxic Symptoms (N=30)

S.No	Clinical features	No. Of cases (N=30)	Percentage(%)
1	GOITRE	ALL	100%
2	Palpitations	24	80%
3	Tremors	16	53.33%
4	Weight Loss	9	30%
5	Heat Intolerance	5	16.67%
6	Nervousness	5	16.67%
7	Tachycardia	10	33.33%
8	Menstrual Abnormalities	3	10%
9	Bruit	2	6.67%
10	Eye Signs	3	10%

Most common presenting feature is goiter and next most common patients presented this study is palpitations.

Table 3: Indications for Surgery (N=30)

Indications		No of cases(N=30)	Percentage
Large goiter	Without compressive symptoms	5	16.67%
	With compressive symptoms	3	10%
Failure of treatment		15	50%
Recurrence after therapy		2	6.6%

Failure to antithyroid medications being the most common indication for patients to undergo surgery for thyrotoxicosis.

Hemorrhage: Per Operative hemorrhage in this study was due to large goiter which is due to high vascularity. There were no case of wound hematoma or reactionary hemorrhage documented post operatively in this study period.

Table 4: Frequency of Hemorrhage (N=30)

S No	Type	No of Cases	Percentage
1	Intra OP	2	6.6%
2	POST OP	0	0%

Intra operative hemorrhage accounts for 6.6% in my study due to large goiter and its high vascularity.

Table 5: Overall Incidence of Hypocalcemia (N=30)

S No	Type	No of Cases	Percentage
1	Transient	2	6.67%
2	Permanent	0	0%

Overal Incidence of Hypocalcemia stands at 6.67% in this study. Though All are transient non are permanent. Hypocalcemia was due to large goiter and more extensive surgery.

Table 6: Incidence of Nerve Injury (N=30)

S No	Type		No of Cases(N=30)	Percentage
1	RLN	Unilateral	1	3.33%
		Bilateral	0	0%
2	SLN		0	0%

There was case of cord palsy due to recurrent laryngeal nerve (unilateral) in injury with overall incidence being 3.33% in this study. Though it was case of transient RLN palsy which recovered over a period of 3-6 months.

Incidence of Wound Infection: Only one case of wound infection was seen and documented in this study with overall incidence of 3.33%.

Incidence of Scar Hypertrophy: There were zero case of scar hypertrophy was noted of this 30 cases. In this study postoperatively complication most commonly being Hypocalcemia. 2nd most common being RLN injury was noted in this study (3.33%). Both hypocalcemia and RLN injury are transient and no case of permanent hypocalcemia or RLN injury was noticed. Only 1 case of wound infection was seen. No case of reactionary hemorrhage was seen in this study.

Table 7: Ability to Attend the Work and Return of Daily Activities(N=30)2

Pod	No of Cases	Percentage
7th	4	13.3%
9th	5	16.67%
10th	9	30%
14th	12	46.6%

Most of the patients in my study return to the activity mainly after 14th pod. There was not much difference in 7th-9th pod. Ability to attend work mainly depends on occupation status. In this study earlier before surgery all patients were on antithyroid medications and medications for control of thyrotoxic symptoms but after surgery 2 of my patients who had hypocalcemia remain to be oncalcium supplements and as well as thyroxine. Rest of the patients remain on thyroxine supplements.

Frequent Hospital Admissions on Persistence of Symptoms: Post operatively symptoms improved for all the patients in this study. None of the patients had overt thyroid dysfunction at the time they completed the questionnaire. Only one patient had taken frequent visits and admissions for symptoms of hypocalcemia. Though none of these patients developed any permanent morbidity following surgery. The clinical syndrome of thyrotoxicosis can be caused by many diseases, the two most common causes being GD and toxic nodular goiter. The relative frequency of GD and TMNG varies from series to series. In Japan, TMNG is rare and GD constitutes the bulk of cases of thyrotoxicosis, 3 whereas in most surgical series from the USA and other countries, GD constitutes approximately two-thirds of cases. In our study, toxic nodular goiter constituted almost 73% of the cases. Most of the patients who were diagnosed to have thyrotoxicosis were in the age group of 40-50 years. Most of the patients who presented with Graves 'disease were in the age group 20-30 years. Most of the cases with toxic MNGwere in the age group of 40-55 years. In our study, incidence of thyrotoxicosis in females was high compare to males. In our study all the patients had goiter. The most significant clinical features were palpitation, tremors, weight loss, heat intolerance, excitability, menstrual abnormality and bruit are in the order of frequency. TSH, Total T4, Total T3 was done for all the cases. In all the cases the TSH was reduced and T4 and T3 was raised confirming the hyperthyroid state and indicating the severity of the disease. All the patients in whom surgery was planned, were given antithyroid drugs and taken up for surgery after adequate control of toxicity. This prevented the complication of thyroid storm in the preoperative and in the post-operative period. After giving antithyroid medications, euthyroid state was attained between 2 weeks to maximum of 8 weeks. The aim of this study was to clarify the surgical indications and the effectiveness of total thyroidectomy in the treatment of thyrotoxicosis and quality of life after surgery. 30 patients underwent total thyroidectomy in our department. In this patients the indications for total thyroidectomy were: 8 large goiters with compressive symptoms, 15 patients with failure or intolerance of previous treatment, 2 recurrent hyperthyroidism after medical treatment., 5 patients with preference for surgery. The mean postoperative hospital stay was 7 days (range: 5-9). Transient hypocalcaemia occurred in 2 patients (6.6%) and transient unilateral recurrent laryngeal nerve injury in another 2 patients (3.3%). None of the patients had permanent hypocalcaemia or permanent recurrent laryngeal nerve injury. All 30 treated patients relieved their symptoms and became biochemically hypothyroid after the operation. All patients after Total thyroidectomy medication were kept on single medication on thyroxine only except 2 patients additionally were on calcium supplements for hypocalcemia. Thus after total thyroidectomy results are rapid, reliable resolution of hyperthyroidism and removal of multi nodular goitre, requires no re-treatment, removes any coexisting malignancy and post-surgical hypothyroidism is simple to treat. Surgical management of hyperthyroidism enables good endocrinal control if surgery is complete. Patients need to be fully informed of all possible postoperative complications that could occur, especially vocal ones. Long- term follow-up is necessary to detect recurrence, which can occur >20 years after partial thyroidectomy surgery, here possibility of which is ruled out by total thyroidectomy. Total thyroidectomy is reserved for patients with severe disease or large goiters in whom recurrences would be highly problematic, but carries an increased risk of hyper parathyroidism and laryngeal nerve damage. By AM Fam physicians of American family physicians of hyperthyroidism stated that Risk of hypothyroidism (25 percent) or hyperthyroid relapse (8 percent) temporary or permanent hypoparathyroidism or laryngeal paralysis (<1 percent)., higher morbidity and cost than radioactive iodine., requires patient to be euthyroid preoperatively with antithyroid drugs or iodides to avoid thyrotoxic crisis[8]. Ahmed Al-Adhami, *et al.,* Of 71 AF procedures: one developed acute

airway obstruction., one permanent RLN palsy., four permanent hypocalcaemia and none developed recurrent toxicity. There were no deaths within a year of surgery the shift to ablative surgery virtually eliminated the need for lifelong specialist follow-up, albeit with an insignificant rise in permanent hypocalcaemia[9]. Postoperative complications comprised 4% permanent recurrent laryngeal nerve palsy (1 year follow-up), 9% hematoma requiring surgical revision and 3% definitive hypocalcemia. Normalization of thyroid hormone levels was observed in 198 patients. Two recurrences occurred due to incomplete resection (1 case of Graves' disease and 1 intrathoracic toxic goiter that occurred respectively 18 and 5 months after resection). Postoperative complications were more frequent in multinodular goiter (23%) than in Graves' disease. In 46 patients (65.7%) the indications for total thyroidectomy were: 25 compressive goiters, in 24 patients (34.3%) with failure or intolerance of previous treatment, surgical indications were: 9 persistent and 5 recurrent hyperthyroidism after medical treatment., 6 patients with cardiotoxicity., 3 patients with recurrent disease after per cutaneous ethanol injection., 1 patient with antithyroid drug intolerance. The mean postoperative hospital stay was 3.2 days. Transient Hypocalcemia occurred in 6 patients (8.6%) and transient unilateral recurrent laryngeal nerve injury in another 3 patients (4.2%). None of the patients had permanent Hypocalcemia or permanent recurrent laryngeal nerve injury. All 70 treated patients relieved their symptoms and became biochemically hypothyroid after the operation. Total thyroidectomy results in a rapid, reliable resolution of hyperthyroidism and removal of multinodular goitre, requires no re-treatment, treat[10]. Branka Bukvic, MD *et al..,* The QoL of the GD patients was worse than that of the TNG patients, with significant differences in eye symptoms, anxiety and sex life domain, preoperatively and in eye symptoms, anxiety, emotional susceptibility and overall QoL (P= 0.001, P=0.027, P=0.005 and P=0.013, respectively), postoperatively[11]. The improvement in QoL in the GD patients was significant after surgical treatment in all ThyPRO domains. In the TNG patients, the improvement was significant in all but one ThyPRO domain, sex life. The QoL of GD patients is worse than those of TNG patients. Surgery may improve QoL in patients with GD and TNG even if they have achieved satisfying thyroid status with medication treatment, preoperatively[11].

CONCLUSION

The management of thyrotoxicosis is based on three treatment modalities, namely anti-thyroid medication, radioactive iodine ablation or surgery. Surgery increasingly plays an important role in the management of thyrotoxicosis with immediate and has evolved into a cost-effective treatment with minimal associated morbidity and mortality. Total thyroidectomy is the surgery of choice in Graves' disease, while a total thyroidectomy or thyroid lobectomy are utilized in patients with toxic nodular goiters. Although thyroid surgery can be associated with significant complications, in high volume operative centers surgery provides effective long-lasting resolution of hyperthyroidism and therefore should be considered an integral component of treatment rather than the last resort of clinicians. Surgery should be proposed as an immediate and completely effective solution for thyrotoxicosis, especially when compared with prolonged medical therapy, because it can provide a demonstrable improvement in the quality of life (QOL) of the patients.

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