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Comparison of postoperative complications in benign thyroid disorders: subtotal versus total thyroidectomy, an institutional experience

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Abstract: *Subtotal and total thyroidectomy are the surgeries commonly performed for benign thyroid disorders. Total thyroidectomy was not routinely performed in the past as it was believed that complications like hypoparathyroidism and recurrent laryngeal nerve injury are more common after total thyroidectomy. However subtotal thyroidectomy is associated with recurrence of the disease which warrants a second surgery. Reoperation has higher rate of above mentioned complications. The aim of our study was to compare the post operative complications in patients undergoing subtotal thyroidectomy with those undergoing total thyroidectomy. Our study involved 140 patients out of which 37 and 103 patients underwent subtotal and total thyroidectomy respectively. Post operative complications, mainly hypoparathyroidism and recurrent laryngeal nerve injury were compared between the study groups. The incidence of complications were almost similar in both the groups and was slightly higher in patients with total thyroidectomy. As chances of recurrence of disease is high in patients undergoing subtotal thyroidectomy and nil in total thyroidectomy group, we came to the conclusion that total thyroidectomy can be considered as a suitable and safe operative procedure for benign thyroid diseases.*

Keywords: *total, subtotal, thyroidectomy, nerve injury, hypoparathyroidism*

I. Introduction

The outcome of endocrine surgical diseases is measured by the success of the operation at relieving the endocrinopathy and the ability of the surgeon to minimize postoperative morbidity. It has been estimated that about 42 million people in India suffer from thyroid disorders out of which benign disorders constitutes the bulk.[1] Surgical resection is the treatment of choice in majority of benign thyroid disorders. Total thyroidectomy, subtotal thyroidectomy, near total thyroidectomy, lobectomy are the surgical options available, out of which commonly performed are total and subtotal thyroidectomies.[2]

For treatment of benign thyroid disorders, mainly multinodular goitres subtotal thyroidectomy was preferred traditionally. Subtotal thyroidectomy was considered safe compared to total thyroidectomy because of its lower incidence of iatrogenic injuries (recurrent laryngeal nerve palsy and hypoparathyroidism), and it was thought that leaving behind some thyroid tissue would prevent thyroxine supplementation.[3] But with long term follow up it was found that nodular goitre often recurs after surgery and the recurrence rate increases with time. Although reoperations have been associated with high morbidity, the high morbidity associated with total thyroidectomy is presumptive.[4,5] With appropriate surgical technique, the complication rate of initial total thyroidectomy can be minimized. Hence it is argued that if total thyroidectomy can be performed as safely as lesser procedures for benign disease the indications for its use may be justifiably expanded to situations where recurrent disease is a significant problem. [6,7,8]

The central premise of this study is to compare postoperative complications following total thyroidectomy and subtotal thyroidectomy in benign thyroid disorders in a tertiary care institution.

II. Materials and methodology

This prospective study was conducted from November 2011 to June 2013 (20 months) after obtaining ethical clearance from the institution's ethical committee. The patients undergoing subtotal and total thyroidectomy for benign disorders of thyroid gland in Surgery and ENT department were included while those with thyroid malignancy were excluded. The total thyroidectomy technique involved the removal of entire gland from one trachea-oesophageal groove to the other. In the subtotal thyroidectomy group, about 5 grams of thyroid tissue was left behind on either side in the tracheoesophageal groove. Preoperative FNAC reports, thyroid functions test, serum calcium estimation and indirect laryngoscopy assessment for vocal cord mobility, done by otorhinolaryngologists, were noted. Signs of postoperative hypocalcaemia such as tingling and

numbness of extremities, circumoral numbness, muscular cramps, carpopedal spasm, Chovstek and Trousseau sign were noted. Calcium levels on postoperative day 1, 3 and after one month at follow up was recorded. Drug supplementation in the form of intravenous or oral calcium and thyroxine, immediately after surgery and at discharge, if needed was noted. Other observations included were occurrence of haemorrhage, surgical site infection, recurrent laryngeal nerve palsy and the follow up treatment of these patients. Data was collected from preoperative investigations, operative and histopathological reports and outpatient records were used for additional information including follow up. The data analysis was performed on SPSS 16.0 software and differences between the groups were analysed with chi square test (95% confidence interval) and $p < 0.05$ was considered significant.

III. Observations

3.1 Demographics: 140 patients underwent subtotal and total thyroidectomy for benign disorders of thyroid gland and were included in our study. The mean age of the study population was 41.4 ± 10.87 years, 123 (88%) patients being females. In the study period, 103 (74%) patients underwent total thyroidectomy and 37 (26%) patients underwent subtotal thyroidectomy.

3.2 Preoperative observations: In all 140 patients vocal cords were normal and equally mobile. The mean preoperative calcium was 9.18-±0.40 mg/dl.

3.3 Postoperative signs of hypocalcaemia: 5 out of 37 in subtotal thyroidectomy group against 30 out of 104 patients in total thyroidectomy group developed tingling and numbness of extremities which was statistically significant (p=0.044). Incidence of circumoral numbness, muscular cramps, Chovstek sign, carpopedal spasm, Trousseau sign was comparable in both groups (TABLE 1).

3.4 Hypocalcaemia: Calcium level done on postop day 1 and 3 in both groups was statistically significant in favour of the subtotal group (TABLE 2). 10 patients received calcium supplements (2 intravenous along with oral calcium supplements and 8 patients received only oral calcium), 13 received levo-thyroxine, 4 patients received both and 10 patients did not receive any medications in the subtotal thyroidectomy group. In the total thyroidectomy group, 66 patients received both calcium and levo-thyroxine supplementation (12 patients required intravenous calcium). 34 patients received only levo-thyroxine, which was started after 10 days only after noting the final histopathology report (Fig.1). 3 patients who underwent total thyroidectomy for benign thyroid disorders were reported as malignancy. Thus, levo-thyroxine was not given to them. None of the patients required calcium infusion. Mean serum calcium level at one month follow up was comparable in both groups (TABLE 2). During this follow up, 5 patients of the subtotal thyroidectomy group who needed oral supplementation had normal calcium levels and did not require further treatment. Hence these were termed as temporary hypocalcaemia. In total thyroidectomy groups out of the 33 patients who were discharged with oral calcium tablets, 16 required calcium tablets for one month and 13 for less than 6 months before achieving normal serum calcium level and these were termed as temporary hypocalcemia. However, 4 patients required oral calcium supplementation for more than 6 months after surgery, and were considered as having permanent hypocalcemia.

3.5 Recurrent laryngeal nerve palsy: In subtotal thyroidectomy group 2 out of 37 patients had unilateral recurrent laryngeal nerve palsy, postoperatively manifested with hoarseness of voice and 3 out of 103 presented similarly in the other group.

3.6 Others: Average drain output and the character of drain fluid up to drain removal when the output was less than 20 ml was similar in both groups. There were no patients who developed haemorrhage or surgical site infection in either groups.

IV. Figures And Tables

Table 1: Signs of hypocalcaemia

Signs of hypocalcemia	Present number%		Absent number (%)		p value
	Subtotal thyroidectomy	Total thyroidectomy	Subtotal thyroidectomy	Total thyroidectomy	
Tingling and numbness of extremities	5 (14.3%)	30 (85.7%)	32 (30.5%)	73 (69.5%)	0.044
Circumoral numbness	5 (14.7%)	29 (85.3%)	32 (30.2%)	74 (69.8%)	0.075
Muscular cramps	0 (0.0%)	1 (100.0%)	37 (26.6%)	102(73.4%)	1.000
Carpopedal spasm	1 (50.0%)	1 (50.0%)	36 (26.1%)	102(73.9%)	0.460
Chovostek sign	1 (100.0%)	0 (0.0%)	36 (25.9%)	103(74.1%)	0.264

Table 2: Hypoparathyroidism evaluation

Calcium levels	Subtotal thyroidectomy (Mean±SD)	Total thyroidectomy (Mean±SD)	p value
1st postop day	8.66±0.84	8.35±0.79	0.044
3rd postop day	9.18±0.67	8.80±0.74	0.007
1 month after surgery	9.53 ± 0.41	9.40 ± 0.522	0.191

Table 3: Recurrent laryngeal nerve palsy in two groups

Surgery performed	Nerve injury present	Nerve injury absent	P value
Subtotal thyroidectomy	2 (40.0%)	35 (25.9%)	0.608
Total thyroidectomy	3 (60.0%)	100 (74.1%)	

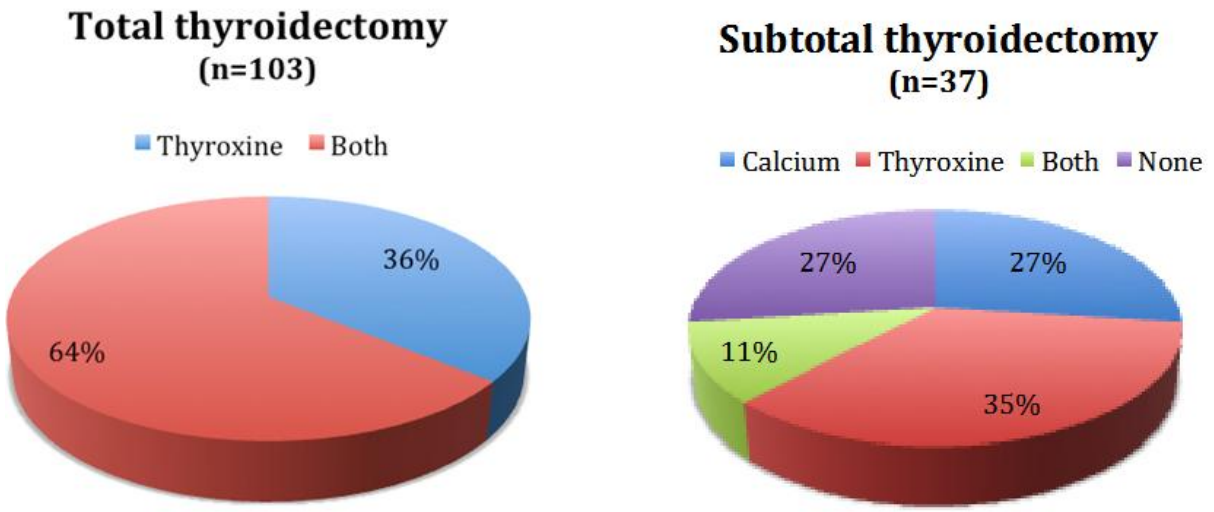

Figure 1: Pie chart showing drug supplementation after surgeries

V. Discussion

The safest or best surgical treatment of benign thyroid disease is very subjective and remains a topic of debate even to this day and the preference of technique is governed by many factors. Clinical factors such as involvement of both or single lobes, presence or absence of compressive symptoms and age of patients, surgical factors like lower incidence of iatrogenic injuries and hypoparathyroidism and miscellaneous factors such as institutional practices, personal preferences are a few that are widely considered before choosing the appropriate technique. Our study was hence undertaken to review few of these key factors and its application to our institute.

We found that total thyroidectomy was preferred to subtotal thyroidectomy during our study period as the chances of recurrence of disease were nil. The mean age of the patients in our study was 41.4 ± 11.4 years and male to female ratio of 1: 7.2 which was similar to age group and gender distribution reported in the literature in various countries.[1,5,8]

Signs like tingling and numbness of extremities, circumoral numbness, muscular cramps, carpopedal spasm, Chovstek's sign were examined for hypocalcemia. Postoperative hypocalcaemia is the most common immediate surgical complication of total thyroidectomy.[9] Overall the pathogenesis of postoperative hypocalcaemia is likely to be multifactorial. In our study totally 38 (27.1%) patients out of 140 patients developed hypoparathyroidism 24.2% of which was temporary. They were distributed as 13.5% in subtotal thyroidectomy group and 28.1% in total thyroidectomy group. The incidence of temporary hypoparathyroidism is similar to the work done by Ozbas et al.[10] Previous studies have led surgeons to consider temporary non-significant hypocalcaemia as a usual pathophysiological part of the surgery and not as a complication.[11] 3.9% of our patients developed permanent hypoparathyroidism in total thyroidectomy group and none in the subtotal thyroidectomy group. However, a study by Serpell and Phan reported hypoparathyroidism rate of 1.8% and with a similar rate of permanent hypoparathyroidism between subtotal and total thyroidectomy group and has stated that this cannot be a reason to justify the subtotal procedure.[12] L-thyroxine supplementation was required in 17 out of 37 patients (45.9%) following subtotal thyroidectomy which was not as high as the numbers seen in few other studies.[13]

Iatrogenic trauma during thyroidectomy has been historically accepted as the most frequent cause of superior laryngeal nerve paralysis.[14,15] Mechanisms of iatrogenic injury include intubation, transection, crush,

traction, inadvertent ligature placement, and thermal injury. Compression by large thyroid goitres, benign neoplasms and nonthyroid malignancies, such as the laryngeal carcinoma, may also injure the nerve. Irrespective of recurrent laryngeal nerve and/or injuries to the external branch of the superior laryngeal nerve, voice may temporarily be affected by thyroidectomy. Most of the subjective complaints and acoustic voice parameters return to normal in a few months after surgery.[16] 50% of patients with unilateral recurrent laryngeal nerve palsy can be asymptomatic.[17] It is not always possible to preserve normal postoperative voice function, even though the identification and preservation of the recurrent laryngeal nerve has become a routine approach in modern thyroid surgery.[9]

We observed, unilateral recurrent laryngeal nerve paralysis 5 (3.57%) patients. One occurred following subtotal thyroidectomy, which was temporary and the patient, underwent left medialisation thyroplasty after 6 weeks**.** She was advised vocal strengthening exercises regularly. Follow up after 6 months showed complete recovery from voice change. Hence diagnosis of transient recurrent laryngeal nerve palsy was made. The other unilateral palsy in this group was permanent after the left recurrent laryngeal nerve was inadvertently cut during surgery. Indirect laryngoscopy done at one month follow up period revealed left vocal cord palsy. Voice evaluation done showed inadequate pitch, reduced loudness and breathy voice. Patient was counselled and voice therapy was advised. Follow up at 6 months showed persistent voice change and was thus diagnosed as permanent recurrent laryngeal nerve palsy. This was not fully in accordance with Ozbas et al who reported incidence of temporary recurrent laryngeal nerve palsy of 2.4% and permanent recurrent laryngeal nerve palsy of 0.6% in subtotal thyroidectomy.[10] In comparison, the 3 patients in the total thyroidectomy group revealed persistent voice change in the form of hoarseness of voice at their 6 month follow up and diagnosed as permanent recurrent laryngeal nerve palsy. No bilateral recurrent laryngeal nerve paralysis occurred in our study. Martensson and Terins, in their study showed a progressive increase in the incidence of nerve injury from 5% for unilateral lobectomy up to 18% for total and subtotal lobectomy.[18] A study by Perzik reported an incidence of only 0.4% nerve injury in total thyroidectomies for nodular goitre. This was in contrast with 5% nerve injury when the same surgery was performed for thyroid cancer.[14] This could be attributed to the more extensive dissection done because of degree of spread of the malignancy rather than to operative technique.

There are numerous possible aetiologies for hematoma formation after thyroid surgeries such as slipping of a ligature on a major vessel, reopening of cauterized veins, retching during recovery, valsalva manoeuvres during reversal of anaesthesia, increased blood pressure in the immediate postoperative period, and oozing from the cut edge of the thyroid gland in partial thyroidectomies like subtotal thyroidectomy. [20] In our study, none of the patients developed neck hematoma following subtotal and total thyroidectomy though the incidence of hematoma development reported in the literature is 0% to 1.6%.[19,20,21,22] None developed surgical site infections either.

The most common histopathological variant seen in benign thyroid condition is colloid adenomatous nodule. In both groups, final histopathological examination showed colloid goitre and Hashimotos thyroiditis in most patients. Adenomatous nodule, colloid adenomatous goitre, follicular adenoma, lymphocytic thyroiditis, follicular adenoma in colloid goitre, nodular Hashimoto's thyroiditis, follicular adenoma in colloid goitre and multinodular goitre with secondary cystic changes were noted in both groups. In subtotal thyroidectomy group, 1 parathyroid gland was identified in 2 cases. In total thyroidectomy group, 1 parathyroid gland was identified in 18 cases and 2 parathyroid glands were identified in 2 cases. Final histopathological reports of 3 patients who underwent total thyroidectomy were found to be positive for malignancy.

In our study completion thyroidectomy was not done in any of the patients. This was because; we documented 3 (2.9%) unexpected thyroid malignancies in total thyroidectomy group. However, due to the completeness of surgical procedure at the first instance there was no further intervention needed. The percentage of incidental malignancies in total thyroidectomy group was considerable lower than reported in other studies. [23,24]

VI. Conclusion

In our study, incidence of hypoparathyroidism and recurrent laryngeal nerve injury was marginally favourable in patients who underwent subtotal thyroidectomy. Total thyroidectomy is effective and safe for treatment of benign multinodular goitre to prevent recurrence and to eliminate need for completion thyroidectomy in case of final diagnosis of incidental thyroid malignancy. The outcome of patients undergoing subtotal and total thyroidectomy procedures on benign thyroid disorders in our institution is similar and comparable to reported literature from other institutes at the national and global level.

References

[1]. A Mishra, A Agarwal, G Agarwal And S K Mishra. Total Thyroidectomy For Benign Thyroid Disorders In An Endemic Region, World Journal Of Surgery *25, 2001, 307-310.*
[2]. Bailey And Love, *Short Practice Of Surgery. 26th Edition. (Crc Press, New York, 2013).*
[3]. Pappalardo G, Guadalaxara A, Frattaroli Fm, Illomei G And Falaschi P. Total Compared With Subtotal Thyroidectomy In Benign

[4]. Nodular Disease: Personal Series And Review Of Published Reports. *European Journal Of Surgery 164, 1998, 501-510*
[5]. Matory Yl, Spiro Rh. Wound Bleeding After Head And Neck Surgery. *Journal Of Surgical Oncology 15, 1993, 17–19.*
[6]. O. Alimoglu, M. Akdag And M. Sahin. Comparison Of Surgical Techniques For Treatment Of Benign Toxic Multinodular Goitre. *World Journal Of Surgery 29, 2005, 921-924.*
[7]. Reeve T, Thompson Nw. Complications Of Thyroid Surgery: How To Avoid Them, How To Manage Them, And Observations On Their Possible Effect On The Whole Patient. *World Journal Of Surgery 24, 2000, 971–975.*
[8]. Bergamaschi R, Becouarn G, Roncerey J, Et Al. Morbidity Of Thyroid Surgery. *American Journal Of Surgery 176, 1998, 71–75.*
[9]. A. Rios-Zambudio, J. Riquelme, T. Soria, M. Canteras And P. Parilla. Prospective Study Of Postoperative Complications After Total Thyroidectomy For Multinodular Goitres By Surgeons With Experience In Endocrine Surgery. *Annals Of Surgery, 240, 2004, 100-105.*
[10]. N.Bhatacharrya, Mp. Fried. Assessment Of Morbidity And Complications Of Total Thyroidectomy. *Arch Otolatyngology Head Neck Surgery, 128 2002, 389-392.*
[11]. S. Ozbas, S. Kocak, S. Aydintug, A. Cakmak, Ma. Demirkiran And Gc. Wishart. Comparison Of The Complications Of Subtotal, Near Total And Total Thyroidectomy In The Surgical Management Of Multinodular Goitre. *Endocrine Journal, 52, 2005, 199-205.*
[12]. Khadra M, Delbridge L, Reeve Ts, Poole Ag And Crummer P. Total Thyroidectomy: Its Role In The Management Of Thyroid Disease. *Australian And New Zealand Journal Of Surgery, 62, 1992, 91-95.*
[13]. Jw. Serpell, D. Phan. Safety Of Total Thyroidectomy. *Australian And New Zealand Journal Of Surgery 77(1) 2007,77, 15-19.*
[14]. M. Vaiman, A. Nagibin, P. Hagag, A. Kessler And H. Gavriel. Hypothyroidism Following Partial Thyroidectomy. *Otolaryngology And Head Neck Surgery, 138 (1), 2003, 98 –110.*
[15]. Perzik S L. The Place Of Total Thyroidectomy In The Management Of 909 Patients With Thyroid Disease. *American Journal Of Surgery, 132, 480-483.*
[16]. L. Soylu, S. Ozbas, H.Yahya Uslu, S. Kocak. The Evaluation Of The Causes Of Subjective Voice Disturbances After Thyroid Surgery. *Am J Surg 2007, 194: 317–322.*
[17]. Rueger R. Benign Disease Of The Thyroid Gland And Vocal Cord Paralysis. *Laryngoscope, 84, 897–907.*
[18]. Sasson A R, Pingpank J F, Wetherington R W, Hanlon Al. Incidental Parathyroidectomy During Thyroid Surgery Does Not Cause Transient Symptomatic Hypocalcaemia. *Archives Of Otolaryngology And Head Neck Surgery, 127, 2001, 304-308.*
[19]. Martensson H, Terins J. Recurrent Laryngeal Nerve Palsy In Thyroid Gland Surgery Related To Operations And Nerves At Risk. *Archives Of Clinical Surgery, 120 1985, 475-477.*
[20]. Burkey Sh, Van Heerden Ja, Thompson Gb, Et Al. Reexploration For Symptomatic Hematomas After Cervical Exploration. *Surgery, 130, 2001, 914 –922.*
[21]. Shaha Ar, Jaffe Bm. Practical Management Of Post-Thyroidectomy Hematoma. *Journal Of Surgical Oncology, 57, 1994, 235– 238.*
[22]. Matory Yl, Spiro Rh. Wound Bleeding After Head And Neck Surgery. *Journal Of Surgical Oncology, 15,1993, 17–19.*
[23]. Shandilya M, Kieran S, Walshe P. Cervical Haematoma After Thyroid Surgery: Management And Prevention. *Irish Medical Journal, 266, 2006, 266–268.*
[24]. Sy. Guraya, Ah. Al-Zobydi. Total And Near Total Is Better Than Subtotal Thyroidectomy For The Treatment Of Bilateral Benign Multinodular Goitre; A Prospective Analysis. *British Journal Of Medical Research, 1(1) 2011, 1-6.*
[25]. Gh. Sakorafas, V. Stafyla, T. Kolettis, G. Tolumis, G. Kassaras And G. Peros. Microscopic Papillary Thyroid Carcinoma As An Incidental Finding. *J Postgrad Med, 1,2007, 53.*