

Incidence of Complication in Neartotal ortotalas Compared to Subtotal Thyroidectomy

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Abstract

Background: Surgical management of thyroid diseases is still controversial. Complications such as bleeding, hypoparathyroidism and recurrent laryngeal nerve injury (RLNI) represent nearly half of all the complications of thyroid surgery. The latter complication after thyroidectomy, although infrequently encountered, can jeopardize the quality of life.

Total thyroidectomy is the choice for the treatment DTC, benign diseases for eradication of disease, it helps in prevention of recurrence, the facilitation of treatment with radioactive iodine and in eliminating the risk of malignant change in radiated thyroid glands.

Objective: To assess whether the results support that total thyroidectomy is safe and can be considered as the optimal surgical approach for treating benign thyroid diseases.

Patients and Methods: This study was carried out in Baghdad Teaching Hospital during the period from June 2013 to November 2013. It included fifty two (52) patients with different thyroid diseases who underwent different thyroidectomies operations: 25 patients who underwent total thyroidectomy (18 patients who underwent primary total thyroidectomy (TT), 7 patients who received completion thyroidectomy) (Group 1), 14 patients underwent Near total thyroidectomy (NTT) (Group 2) and 13 patients underwent Subtotal thyroidectomy (STT) (Group 3), so postoperative complication rates regarding hypoparathyroidism and recurrent laryngeal nerve injury (RLNI) were compared.

Results: There is no significant differences in the rate of transient or permanent complications (hypoparathyroidism and RLNI) in TT & NTT as compared to STT.

Conclusions: Total thyroidectomy can be undertaken safely with a low complication rate. There are no significant difference in the rate of postoperative complications associated with total thyroidectomy compared with subtotal thyroidectomy or total.

Keywords: Total thyroidectomy, Near total thyroidectomy, Subtotal thyroidectomy, Recurrent laryngeal nerve injury, Hypocalcemia.

Introduction

Thyroidectomy is a common, safe surgical procedure and is typically associated with low morbidity if identification and preservation of the parathyroid glands and laryngeal nerves are performed. The main postoperative complications are recurrent laryngeal nerve (RLN) injury and hypoparathyroidism⁽¹⁾.

Total thyroidectomy (TT) is increasingly being performed, and current indications include cancer, toxic and nontoxic multinodular goitre and Graves's disease⁽²⁾.

Most surgeons avoid the procedure owing to the possible complications such as permanent recurrent laryngeal nerve injury and permanent hypoparathyroidism. It has been shown that the complication rates of permanent recurrent laryngeal nerve palsy (0-1.3%) and permanent hypoparathyroidism (1%) following subtotal thyroidectomy are similar to those following total thyroidectomy^(2,3).

Recurrent Laryngeal Nerve Injury (RLNI) one of the most important complications of thyroid surgery. An almost certain way to ensure the integrity of the RLN is to always identify the nerves during all surgical procedures on thyroid and parathyroid glands.

Factors affecting this complication include: Surgeon's experience, histopathologic diagnosis, previous thyroid surgery, surgical technique and anatomic variations are important⁽⁴⁾.

The reported incidence of post-thyroidectomy hypoparathyroidism ranges from less than 1 to 15%⁽⁵⁾.

The primary cause of hypocalcemia is secondary hypoparathyroidism following damage to, or devascularisation of, one or more parathyroid glands during surgery owing to the close proximity of the thyroid capsule. The accidental removal of one or more parathyroid gland(s). Destruction of the parathyroid glands as a result of lymphadenectomy along the recurrent laryngeal nerve (RLN) or hypoparathyroidism due to hematoma formation⁽⁶⁾.

Total thyroidectomy is the choice for the treatment of DTC⁽⁷⁾. It is also indicated in patients with benign diseases for the eradication of disease, prevention of recurrence, the facilitation of treatment with radioactive iodine and in eliminating the risk of malignant change in radiated thyroid glands⁽⁸⁾.

Non-total thyroidectomy does not avoid the risk of postoperative complications. In fact, the complication risk of non-total thyroidectomy is similar to that of total thyroidectomy, and the risk of repeat surgery owing to recurrence is up to 20 times greater with non-total thyroidectomy⁽⁹⁾.

Patients and Methods

This was a prospective study carried out at Baghdad teaching hospital during the period from June to November 2013.

The study included a total of 52 patients who underwent surgery for thyroid diseases, regardless of their age or gender, presenting to the first surgical unit in Baghdad teaching hospital.

They were examined and the patients were allocated into three groups; (Group 1) included 25 patients who underwent total thyroidectomy (18 were subjected to a total thyroidectomy and 7

patients who received completion thyroidectomy). Group 2 included 14 patients who underwent near-total thyroidectomy, and Group 3 included 13 patients who underwent subtotal thyroidectomy, so postoperative complication rates were compared.

The surgical standard procedure of total thyroidectomy was followed; this included a resection of both thyroid lobes with sub capsular excision and ligation of the branches of the inferior thyroid artery bilaterally while identifying the recurrent laryngeal nerve on both sides and an attempt to identify and preserve all parathyroid glands. The deep cervical space was drained with a drain routinely in all patients. In near-total thyroidectomy the same procedure was done, but here we laid about 2 grams of thyroid tissue on one side.

The subtotal thyroidectomy was carried out with a capsular approach and we left the upper posterior part with 4 grams of thyroid tissue bilaterally, away from (RLN) bilaterally and parathyroid glands. All of the operations were carried out by the same surgical team.

All information related to patients' age, sex, family history, previous thyroid surgery, history of radiation and duration of follow up were recorded prospectively (Table 1).

Clinical assessments in all patients included measurements of serum thyrotropin, thyroxine, tri-iodothyronine, and calcium, ultrasound estimation of thyroid size, and morphology and FNA.

To exclude pre-existing vocal cord palsy, an otolaryngologist assessed vocal cord motility preoperatively in all patients. All thyrotoxic patients received pharmacologic therapy, which was continued until the day of the surgery, to prevent a perioperative thyroid crisis.

The preoperative examination of the vocal cord discovered 4 cases of unilateral vocal cord paralysis; those patients had undergone previous thyroid surgery (STT). These cases were not included in our results regarding RLNI (we include only the new complications of the cases).

The mean period of postoperative stay was (3.1 ± 3.8) days.

Evaluated complications were transient and permanent hypocalcemia, transient and permanent recurrent laryngeal nerve (RLN) injury, recurrence, infection, bleeding and scar formation.

Serum calcium concentration and vocal cord mobility were examined preoperatively in all patients.

The serum calcium concentration was assessed on the postoperative first day in routine and repeated on the postoperative second day (to assess hypocalcemia) to see whether the result was less than 8 mg/dL.

We defined postoperative hypocalcemia as a calcium level lower than 8.0 mg/dL (reference range 8.2-10.2 mg/dL).

In patients who were asymptomatic and did not require vitamin D or calcium supplementation, we defined temporary hypocalcemia as a calcium level lower than 8.0 mg/dL in at least 2 consecutive samples (daily for 3 days). In these patients, the hypocalcemia resolved within days. Conversely, in patients who were symptomatic and required vitamin D with or without calcium supplementation, we considered temporary hypocalcaemia to be severe when calcium levels remained lower than 8.0 mg/dL for more than 3 days. In these patients, hypocalcaemia usually resolved within 6 months.

Patients who required vitamin D and calcium supplementation for more than 6 months, were considered as having permanent hypocalcaemia.

Vocal cord mobility was assessed via indirect laryngoscopy postoperatively as well in all patients. We defined recurrent laryngeal nerve injury as hoarseness associated with vocal cord paralysis at laryngoscopy within 6 months postoperatively.

After 6 months, we considered recurrent laryngeal nerve injury to be permanent. At the time of extubation, the anesthesiologist evaluated vocal cord motility in all the patients.

Hormonal treatment with L-thyroxine started after thyroidectomy in all patients. Patients with total and near total thyroidectomy receive lifelong treatment with thyroxin 100 µg with follow up by a thyroid function test. In patients who developed hypocalcemia they received calcium supplement 1000mgthreetimes/day and one alpha tab. 1µg once a day. During the follow up period the serum calcium was rechecked regularly, and the calcium supplement was reduced or continued according to the patients' status; in those patients who had a normal s. calcium level the supplementation reduced gradually and stopped.

By using SPSS software for Windows Version 20, 2008, IBM, US statistical package for social sciences, data of patients were entered and analyzed with appropriate statistical tests.

Descriptive statistics were presented as mean ± standard deviation (SD), frequencies (numbers) and proportions (%).

A Chi square test was used to assess the significance of association between the complications and the type of operation; the level of significance (P value) ≤ 0.05 considered as significant.

Results

There were 52 patients enrolled in this study; all were subjected to thyroidectomy, there were 45 females (86.5%) and 7 males (13.5%). The mean age of the patients was (40.9 ± 10.9) years.

Positive family history was found in 14 patients (26.9%) and 7 patients (13.5%) had previously experienced thyroid surgery (recurrence) while only one patient had a history of radiation. The mean duration of follow up was 3.13 ± 1.1 weeks after surgery.

Table 1. General characteristics and history of study patients (N= 52)

Characteristic	Value
Gender n (%)	Female
	Male
Age (mean ± SD) years	
Positive family history n (%)	
Previous thyroid surgery	
History of radiation	
Duration of followup (mean ± SD)month.	
Range (m.)	1- 5 m.

Peri-operative findings: Examination of the patients revealed that about two thirds of them 36 patients (69.2%) had MNG, 9 patients (17.3%) had diffuse goiter, and 7 patients (13.5%) with solitary nodules.

The vocal cord was mobile in the majority of patients; 48/52 (92.3%) while it was not mobile in 4 patients (7.7%).

Thyroid function test: Out of the 52 patients, 38 (73.1%) were euthyroid, while 14 patients (26.9%) had hyperthyroidism.

Ultra sound findings: 37 patients had MNG (71.15%), 7 cases had a solitary nodule (13.5%), and 8 patients were with diffuse goiter (15.38%).

FNA findings of 52 patients revealed malignancy in one patient (1.92%) while 51 patients had no malignancy (98.08%).

Histopathology: malignant 15 cases (28.8%), non-malignant 37 (71.2%).

Table 2: Peri-operative findings of the studied group (N=52).

Finding		No.	%
Examination	MNG	36	69.2
	DG	9	17.3
	Solitary nodule	7	13.5
Vocal cord mobility	Mobile	48	92.3
	Not mobile	4	7.7
Thyroid function test	Euthyroid	38	73.1
	Hyperthyroidism	14	26.9
Ultra sound findings	MNG	37	71.15
	Diffuse goiter	8	15.38
	Solitary nodule	7	13.5
FNA findings	Non-Malignant	51	98.08
	Malignant	1	1.92
Histopathology	Non-malignant	37	71.2
	Malignant	15	28.8

Complications

Figure 1, show the frequency distribution of incident complications among those studied: Clinically hypoparathyroidism was found in 10 patients (19.2%), on biochemical tests the mean s. calcium

was (8.1 ± 0.5) mg/dl, on the other hand, hypocalcaemia was transient in 9, while permanent hypocalcaemia remained in one only.

Unfortunately, change in voice had occurred in 7 patients (13.5%), and it was transient in 4 patients (7.7%), while permanent change in voice reported in 3 patients (5.8%).

Recurrence in 2 patients (3.8%) and infection in one patient only (1.92%).

Fortunately, none of the patients complicated with bleeding or scar formation.

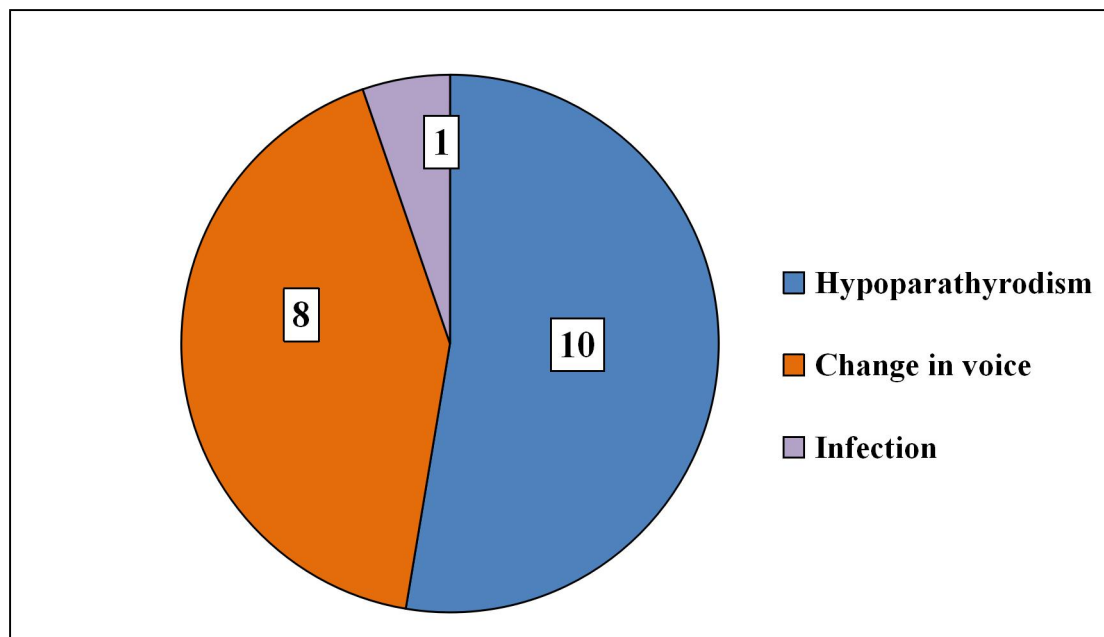


Figure 1: Frequency distribution of complication among those studied.

(None of them had neither bleeding nor scar formation)

It had been found that 6 patients out of the 25 patients who were subjected to total thyroidectomy developed hypoparathyroidism; 5 patients (20%) had transient and only one patient had permanent hypoparathyroidism, as compared to 4 of the 14 patients with near total thyroidectomy (all with transient hypoparathyroidism), and none of those with subtotal thyroidectomy, however the difference was statistically not significant, $P=0.13$.

Regarding the RLN injury, all the 7 patients with these complication had a unilateral injury. Among those with total thyroidectomy 3 patients (12%) had transient injury and 2 patients (8%) had permanent RLN injury. Among those with near total thyroidectomy only one patient (7.1%) had transient. While one patient of those with subtotal had RLN injury (7.6%) had permanent RLN injury. However the difference was statistically not significant, $(P=0.43)$.

The only one patients who had infection was exposed to total thyroidectomy, no statistically significant association between the type of operation and the development of infection, $P= 0.48$.

Table 3: Association between type of operation and complications.

	Type of Thyroidectomy			Total (N=52)	P value
Complication	Total (n=25)	Near total (n=14)	Subtotal (n=13)		
Hypoparathyroidism					
Transient	5(20.0)	4(28.6)	0(0.0)	9(17.3)	0.13 NS
Permanent	1(4.0)	0(0.0)	0(0.0)	1(1.9)	
Total	6(24.0)	4(28.6)	0(0.0)	10 (19.2)	
RLN injury					
Transient	3 (12.0)	1 (7.1)	0 (0.0)	4 (7.7)	0.43 NS
Permanent	2 (8.0)	0 (7.1)	1 (7.6)	3 (5.8)	
Total(all are unilateral)	5 (20.0)	1 (7.1)	1 (7.6)	7 (13.5)	
Infection	1 (4.0)	0 (0.0)	0 (0.0)	1(1.9)	0.48

NS; not significant

Discussion

The current study shows that there is no significant difference in the percentage of transient or permanent hypoparathyroidism between TT and NTT as compared to the STT (p value was 0.43).

The result of the current study goes with the results of other studies that total thyroidectomy eliminates the risk of recurrence, and that the procedure, at least in experienced hands, does not increase the risk of postoperative complications⁽¹⁰⁻¹²⁾, while Johannes et al.(2012)⁽¹³⁾ disagree with our result. He found that the risk of permanent hypoparathyroidism seems to be unacceptably high after total thyroidectomy for Graves' disease, at least when the procedure is carried out by ordinary endocrine surgeons, and that the complete elimination of recurrent hyperthyroidism does not outweigh this disadvantage. Presumably, Dunhill's operation with a remnant of 1-2g could be the best procedure to minimize both permanent hypoparathyroidism and recurrent Graves's disease.

Decreased total s.Ca levels measured on postoperative day 1 were observed in 52.6% of the studied cases. This phenomenon has frequently been debated and often partially explained by hemodilution after surgery^(6,14). However, decreasing s.Ca levels within the first 3 days postoperatively may be caused by the surgical strategy used in this study, such as identifying the RLN extensively in every patient to avoid permanent RLN palsy. Although performed by this procedure may partially interrupt the blood supply of the parathyroid glands, leading to transient hypocalcemia^(15,16).

Also, the results show that there is no significant difference in transient unilateral RLNI in TT (12%) as compared to NTT (7.1) and STT (p value 0.13).

Also, the current study shows that there is no significant difference in the permanent RLNI in TT (8%) as compared to NTT and STT (p value 0.13).

In the current study, the new cases of permanent RLNI that were noticed in TT actually occurred during completion thyroidectomy operation; no permanent RLNI occurred in a primary TT operation.

In fact, both of the permanent complications (of the RLNI and hypoparathyroidism) of the current study were noticed in TT occurred in the re-operated complete TT only.

This results go with the fact that the complication risk of non-total thyroidectomy is similar to that of total thyroidectomy, and the risk of repeat surgery owing to recurrence is up to 20 times greater with non-total thyroidectomy⁽¹⁷⁾.

A possible explanation for this is, although total thyroidectomies are managed with the same technique, it should be kept in mind that a surgeon is more careful in preoperatively diagnosed malignant diseases in order not to leave even a microgram of tissue resembling thyroid to maximize the ¹³¹I ablation effect. So this results in a little bit more aggressive surgery in preoperatively diagnosed malignancies⁽¹⁸⁾.

Echternach et al. in a study of 761 patients concluded that laryngeal complications after thyroidectomies are primarily caused by injury to the vocal folds from intubation and to a lesser extent by injury to the laryngeal nerve⁽¹⁹⁾.

Vaiman et al. (2010)⁽²⁰⁾ found the complication rates among a total of 7123 patients for temporary and permanent RLN palsy; 2.8% and 1.4%, respectively, in total thyroidectomy for benign disorders; and 4.6% and 3%, respectively, in a complete thyroidectomy after a subtotal thyroidectomy. At the same study temporary and permanent hypoparathyroidism rates were 24% and 3.5%, respectively, in the total thyroidectomy group while 25.2% and 5.9%, respectively, in complete thyroidectomy after subtotal thyroidectomy.

Conclusions

Total thyroidectomy can be undertaken safely with a low complication rate. Also, total thyroidectomy achieves an immediate and permanent cure with no risk of disease recurrence or repeat surgeries.

Author contributions: 

Study concept: Tharwat I Sulaiman

Study design: Tharwat Sulaiman

Acquisition of data: Ahmed Abbas

Analysis Interpretations of data: Ahmed Abbas, Aws Basheer

Drafting of manuscript: Ahmed Abbas, Aws Basheer

Critical revision: Tharwat Sulaiman

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الملخص

الخلفية: تعتبر عمليات رفع الغدة الدرقية من العمليات الجراحية الشائعة، تشكل المضاعفات: إصابة العصب الحنجري الراجع وانخفاض مستوى الكالسيوم في الدم نسبة 50% من مضاعفات ما بعد الجراحة.

اهداف البحث: ليتسنى للجراحين اتخاذ قرار لتحديد نوعية العمليات في المستقبل هل نكتفي بالرفع الجزئي أم نجري العمليات المذكورة كما في الدول المتقدمة.

الطريقة: شملت الدراسة اثنان و خمسون مريضاً يعانون من أمراض مختلفة في الغدة الدرقية ويحتاجون الى تدخل جراحي، أدخل هؤلاء المرضى الى الطابق الثاني في مستشفى بغداد التعليمي للفيرة من الأول من حزيران لسنة 2013م ولغاية الثلاثون من شهر تشرين الأول لسنة 2013م.

تم تقسيم المرضى الى ثلاث مجموعات : الاولى 25 مريض اجري لهم رفع كامل للغدة الدرقية، الثانية 14 مريض اجري لهم رفع شبه الكامل للغدة الدرقية , الثالثة 13 مريض اجري لهم رفع تحت الكامل للغدة الدرقية ثم تم تقييم النتائج معتمدين على نسبة ظهور المضاعفات في العمليات المختلفة للغدة الدرقية.

النتائج: أظهرت الدراسة الحالية عدم وجود فرق هام أحصائي بالنسبة لظهور المضاعفات في عمليات الرفع الكامل وشبه الكامل للغدة الدرقية مقارنة بعمليات الرفع تحت الكامل للغدة الدرقية.

الاستنتاجات: الرفع الكلي للغدة الدرقية يمكن ان يجري بأمان مع معدل مضاعفات قليلة. ليس هناك فرق مهم بين معدل المضاعفات بعد العملية بين الرفع الكلي والرفع تحت الكلي. الرفع الكلي للغدة الدرقية مقبول بشكل واسع في الوقت الحاضر بالنسبة للأمراض السرطانية والحميد