

# Post-Thyroid Surgery Complications in Patients with Palpable Thyroid Gland

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## ABSTRACT

**Objective:** To determine the rate of post-thyroid surgery complications in patients with a palpable thyroid gland.

**Study design and setting:** Cross sectional observational, Department of ENT, Jinnah Postgraduate Medical Center, Karachi.

**Methodology:** Patients were enrolled from OPD and wards. Patients with palpable thyroid gland with plan for thyroid surgery were included. Thyroid surgery was performed by a surgeon having >5 years of experience. Patients were discharged by 48–72 hours postoperatively. All patients had their vocal cords checked at the time of extubation. On the follow-up visit at day 5, final diagnosis of complications was assessed. For data analysis, SPSS v23.0 was used. Cross tabulation was done with type of surgery (lobectomy, isthmusectomy, subtotal thyroidectomy, near total thyroidectomy and total thyroidectomy) to see effect of these on outcome variables by applying chi square test. A p-value ≤0.05 was taken as significant.

**Results:** Total 157 patients with palpable thyroid gland were selected for this study. Mean age of the patients was 39.8±12.2 years. Total 112(71.3%) were males and 45(28.7%) were females. Out of 157 patients, 14(8.9%) had hypoparathyroidism, while, 72(45.9%), 40(25.5%), 16(10.2%) and 15(9.6%) had hypothyroidism, hyperthyroidism, RLN paralysis and airway obstruction respectively.

**Conclusion:** More extensive procedures are associated with greater number of complications in thyroid surgery. Complications of thyroid surgery can be minimized by sound knowledge of normal and pathologic anatomy and an unhurried, gentle operation technique.

**Keywords:** Thyroidectomy, Post-thyroid Surgery Complications, Lobectomy, Isthmusectomy, Subtotal Thyroidectomy

## INTRODUCTION

Thyroid surgery is a common surgical procedure used to treat various thyroid conditions, such as thyroid cancer, goiter, and hyperthyroidism (1). While thyroid surgery is generally considered safe and effective, there are potential complications which could take place either during surgery or post-operatively. These may vary from minor to severe complications which can significantly affect patient's health and quality of life (2).

In thyroid surgeries hypothyroidism is a fairly common complication that can occur if adequate thyroid hormone is not produced by thyroid glands (3). Such a condition might lead to range of symptoms, such as weight gain, fatigue, dry skin, and intolerance to cold. Hypothyroidism can occur in any patient undergoing thyroid surgery, but it is more likely in patients who undergo a total thyroidectomy, which involves the complete removal of the thyroid gland (4). Patients who undergo a partial thyroidectomy may also be at risk of developing hypothyroidism, especially if the remaining thyroid tissue is damaged or removed during the surgery (5).

Another potential complication of thyroid surgery is hyperthyroidism, which may lead to over-production of thyroid hormones which can cause symptoms like loss of weight, rapid heartbeat, and depression. Hyperthyroidism is more common in patients who undergo a partial thyroidectomy, as the remaining thyroid tissue may become overactive (6).

Complications related to the surgery itself are also possible. Bleeding is a common complication that can occur during or after thyroid surgery. If significant bleeding occurs, additional surgery or blood transfusions may be necessary (7). Infection is another possible complication, which can lead to fever, pain, and swelling at the incision site. In rare cases, infection can spread throughout the body and become life-threatening (8).

Damage to the recurrent laryngeal nerve is another potential adverse event of thyroid surgery. This nerve controls larynx muscles that are crucial for breathing and speaking (9). Damage to this nerve can cause hoarseness, difficulty speaking, and even difficulty breathing. Damage to the parathyroid glands, which are

located near the thyroid gland, is also possible. These glands produce a hormone that helps regulate calcium levels in the body (10). If the glands are damaged during surgery, the patient may develop hypocalcemia, which can cause muscle cramps, numbness, and tingling in the fingers and toes (11).

To reduce the risk of complications, it is important for patients to undergo a thorough preoperative evaluation, including imaging studies such as ultrasound or CT scan. This can help the surgeon in determining exact location and size of gland and plan surgical approach accordingly (12). In some cases, the surgeon may recommend a different surgical technique, such as a minimally invasive approach or a robotic-assisted procedure, to reduce the risk of complications (13).

After surgery, patients should be closely monitored for signs of complications, including changes in thyroid function, bleeding, infection, and nerve damage. TSH and T4 levels may be performed for monitoring hypo or hyperthyroidism (14). Patients should also be instructed to report any unusual symptoms, such as difficulty swallowing or breathing, hoarseness, or persistent pain or swelling at the incision site (15).

In conclusion, while thyroid surgery is generally considered safe and effective, there are potential complications that can occur (16). Patients should be aware of the potential risks of thyroid surgery and should work closely with their healthcare team to minimize these risks. With proper care and monitoring, the vast majority of patients can achieve a successful outcome after thyroid surgery. Objective of this research is to determine rate of post-thyroid surgery complications among patients with a palpable thyroid gland

## METHODOLOGY

This cross sectional observational study was carried out using non-probability consecutive sampling technique at the Department of ENT, Jinnah Post-Graduate Medical Center, Karachi for a period of six months from March to August 2022. Sample size was calculated using Epi Info-7, keeping the prevalence of hyperthyroidism (having least proportion) in the post-thyroidectomy

period at 07 %, 95 % confidence interval and 4.4 % margin of error, the sample size came out to be 157.

Patients of either gender, in-between 18 to 60 years of age, having palpable thyroid gland for at least six months undergoing lobectomy, isthmusectomy, subtotal thyroidectomy, near total thyroidectomy or total thyroidectomy were included in the study. Patients with a previous history of thyroid surgery, on or history of thyroid irradiation therapy and prior vocal cord paralysis diagnosed on indirect laryngoscope pre-operatively were excluded.

**Data Collection Procedure:** After ethical approval from the Ethical Review Committee of JPMC and after taking informed consent from the patients, data collection started. In accordance with inclusion and exclusion criterion, patients were recruited in the research from OPD and ward of ENT Department of JPMC, Karachi. Thyroid surgery was performed by ENT surgeon with a minimum of five years' surgical experience.

Performance of surgery was carried out using collar incision of two finger breadths above sternal notch. From sternal notch to the thyroid cartilage, sub-platysmal flaps were raised. Only in cases with large goiter was the strap muscles divided. Middle thyroid veins were ligated and divided wherever observed. Ligation of superior thyroid pedicle was done its division was carried out in downward retraction and lateral identification of external branch of superior laryngeal nerve.

Identification of Recurrent Laryngeal Nerve (RLN) was done above level of inferior thyroid artery and ligation of inferior thyroid artery in continuity. In accordance with extent of surgery, the surgery was completed. Neck drainage was done using suction drain as per requirement. Patients were discharged 48-72 hours post-operatively. All patients had their vocal cords thoroughly checked at time of extubation.

On surgery day and after two subsequent days, serum calcium was checked for all patients. Other investigations included thyroid function tests, ultrasound and thyroid scans along with Fine Needle Aspiration Cytology (FNAC). On 5<sup>th</sup> follow up day, final diagnosis of complications were assessed as per patient complains and thorough examination.

**Data Analysis Procedure:** SPSS v23.0 was used for analysis of data. For qualitative variables, frequency and percentages were reported for gender, family history of thyroid disease, surgery type (lobectomy, sub-total thyroidectomy, near total thyroidectomy and total thyroidectomy) along with outcome variables such as common complications of thyroid surgery. For quantitative variables, mean and standard deviation were reported for age and duration of disease. Stratification of data was carried out and their effect was seen by applying chi square test on outcome variables keeping p-value of 0.05 as statistically significant.

Table 2: Cross tabulation of type of thyroid surgery with complications encountered (n=157)

Outcome /Complication	Lobectomy	Isthmusectomy	Subtotal thyroidectomy	Near Total thyroidectomy	Total thyroidectomy	p-value
Hypoparathyroidism	3 (16.7%)	1 (6.7%)	5 (10.4%)	0	5 (8.1%)	0.476
Hypothyroidism	6 (33.3%)	8 (53.3%)	18 (37.5%)	7 (50%)	33 (53.2%)	0.212
Hyperthyroidism	3 (16.7%)	4 (26.7%)	18 (37.5%)	4 (28.6%)	11 (17.7%)	0.124
Right Laryngeal Nerve Paralysis	2 (11.1%)	2 (13.3%)	4 (8.3%)	2 (14.3%)	6 (9.7%)	0.421
Airway Obstruction	4 (22.2%)	0	3 (6.3%)	1 (7.1%)	7 (11.3%)	0.021

**DISCUSSION**

The results of this study reported each type of thyroid surgery contained some frequency of complications, the highest complication being observed as hypo and hyperthyroidism which was reported in all types of thyroid surgery. The most common complication was reported in 72(45.9%) patients i.e. hypothyroidism, followed by hyperthyroidism in 40(25.5%) patients.

Similar to the findings of our study, one of the most common complications of thyroid surgery is hypothyroidism (17). A research conducted by Lang et al. (2015) observed risk of developing hypothyroidism after thyroid surgery was higher in patients that underwent a total thyroidectomy in comparison to a partial thyroidectomy. The study also found that older age and a pre-existing diagnosis of thyroiditis were risk factors for hypothyroidism after thyroid surgery (18).

**RESULTS**

Amongst 157 patients included, mean age was 39.8 ±12.2 years. 112 (71.3 %) of patients were males while 45 (28.7 %) females. 47 (29.9 %) of patients were in-between 18-30 years of age, 57 (36.3 %) patients were in-between 31-45 years of age while 53 (33.8 %) patients included were >45 years of age.

18 (11.5 %) of patients underwent lobectomy, 15 (9.6 %) isthmusectomy, 48 (30.6 %), subtotal thyroidectomy, 14 (8.9 %) near total thyroidectomy and 62 (39.5 %) total thyroidectomy.

In terms of complication, 14 (8.9 %) of patients were found to have hypoparathyroidism, 72(45.9%) hypothyroidism, 40(25.5%)hyperthyroidism, 16(10.2%)RLN paralysis and 15 (9.6 %) airway obstruction.

Table 1: Baseline demographics of patients included in the study (n=157)

Variables	Mean ± SD / Frequency (%)
Mean age (years)	39.8 ±12.2
Age groups	18-30 years 47 (29.9 %)
	31-45 years 57 (36.3 %)
	>45 years 53 (33.8 %)
Gender	Male 112 (71.3 %)
	Female 45 (28.7 %)

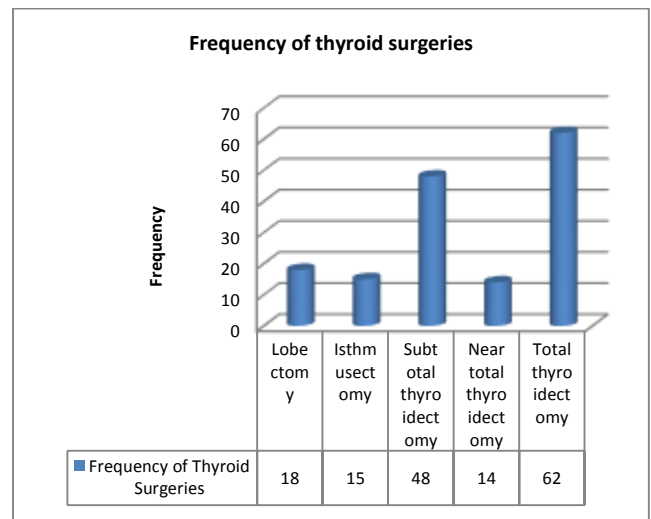


Figure 1: Graphical representation of frequency of thyroid surgeries(n=157)

Another potential complication of thyroid surgery is hyperthyroidism that takes place when thyroid gland over-produces thyroid hormone (19). According to a study by Sitges-Serra et al. (2014), hyperthyroidism was more common in patients who underwent a partial thyroidectomy compared to a total thyroidectomy. The study also found that the risk of hyperthyroidism increased with the size of the remaining thyroid tissue after partial thyroidectomy (20).

Damage to recurrent laryngeal nerve is another potential complication of thyroid surgery (21). A study by Lee et al. (2017) found that the incidence of recurrent laryngeal nerve injury after thyroid surgery was 4.8%. A study also found that risk of nerve injury was greater in patients who underwent a total thyroidectomy compared to a partial thyroidectomy (22).

Damage to the parathyroid glands, which are located near the thyroid gland, is also possible (23). A study by Promberger et al. (2012) found that the incidence of permanent hypoparathyroidism after thyroid surgery was 1.6%. The study also found that the risk of permanent hypoparathyroidism was higher in patients who underwent a total thyroidectomy compared to a partial thyroidectomy (24).

For reducing risk of complications, it is important for patients to undergo a thorough preoperative evaluation, including imaging studies such as ultrasound or CT scan. This can help the surgeon to determine size and location of the gland and plan the surgical approach. In some cases, the surgeon may recommend a different surgical technique, such as a minimally invasive approach or a robotic-assisted procedure, to reduce the risk of complications (25).

## CONCLUSION

In conclusion, thyroid surgery is a safe and effective treatment for a variety of thyroid conditions, but there is potential for further evaluation of the subject matter.

## REFERENCES

- Sarkar S, Banerjee S, Sarkar R, Sikder B. A review on the history of 'thyroid surgery'. *Indian Journal of Surgery*. 2016 Feb;78:32-6.
- Segel JM, Duke WS, White JR, Waller JL, Terris DJ. Outpatient thyroid surgery: safety of an optimized protocol in more than 1,000 patients. *Surgery*. 2016 Feb 1;159(2):518-23.
- Parry Z, Macnab R. Thyroid disease and thyroid surgery. *Anaesthesia & Intensive Care Medicine*. 2017 Oct 1;18(10):488-95.
- Vacante M, Biondi A, Basile F, Ciuni R, Luca S, Di Saverio S, et al. Hypothyroidism as a Predictor of Surgical Outcomes in the Elderly. *Frontiers in Endocrinology*. 2019 Apr 24;10:258.
- Lang BH, Wong CK, Wong KP, Chu KK, Shek TW. Effect of thyroid remnant volume on the risk of hypothyroidism after hemithyroidectomy: a prospective study. *Annals of surgical oncology*. 2017 Jun;24:1525-32.
- De Leo S, Lee SY, Braverman LE. Hyperthyroidism. *The Lancet*. 2016 Aug 27;388(10047):906-18.
- Pontin A, Pino A, Caruso E, Pinto G, Melita G, Dionigi G. Postoperative bleeding after thyroid surgery: care instructions. *ŞişliEtfalHastanesi Tip Bülteni*. 2019;53(4):329-36.
- Rahman MM, Rabhani SG, Rashid MA, Chowdhury MA, Nihar F, Kamal MS. Assessment of morbidity and mortality of thyroid surgery. *Anwer Khan Modern Medical College Journal*. 2015;6(2):15-9.
- Gunn A, Oyekunle T, Stang M, Kazaure H, Scheri R. Recurrent laryngeal nerve injury after thyroid surgery: an analysis of 11,370 patients. *Journal of Surgical Research*. 2020 Nov 1;255:42-9.
- Lukinović J, Bilić M. Overview of thyroid surgery complications. *ActaClinicaCroatica*. 2020 Nov 1;59(Supplement 1):81-6.
- Del Rio P, Rossini M, Montana CM, Viani L, Pedrazzi G, Loderer T, et al. Postoperative hypocalcemia: analysis of factors influencing early hypocalcemia development following thyroid surgery. *BMC surgery*. 2019 Apr;18(1):1-8.
- Wang TS, Sosa JA. Thyroid surgery for differentiated thyroid cancer—recent advances and future directions. *Nature Reviews Endocrinology*. 2018 Nov;14(11):670-83.
- Meltzer C, Klau M, Gurushanthaiah D, Tsai J, Meng D, Radler L, et al. Surgeon volume in thyroid surgery: surgical efficiency, outcomes, and utilization. *The Laryngoscope*. 2016 Nov;126(11):2630-9.
- Makay Ö. Less than total thyroidectomy for goiter: when and how?. *Gland surgery*. 2017 Dec;6(Suppl 1):S49.
- Rosato L, Avenia N, Bernante P, De Palma M, Gulino G, Nasi PG, et al. Complications of thyroid surgery: analysis of a multicentric study on 14,934 patients operated on in Italy over 5 years. *World journal of surgery*. 2004 Mar;28:271-6.
- Dogan S, Sahbaz NA, Aksakal N, Tural F, Torun BC, Yıldırım NK, et al. Quality of life after thyroid surgery. *Journal of endocrinological investigation*. 2017 Oct;40:1085-90.
- Kasemsiri P, Trakulkajornsak S, Bamroong P, Mahawerawat K, Piromchai P, Ratanaanekchai T. Comparison of quality of life between patients undergoing trans-oral endoscopic thyroid surgery and conventional open surgery. *BMC surgery*. 2020 Dec;20:1-7.
- Lang BH, Wong CK. A cost-effectiveness comparison between early surgery and non-surgical approach for incidental papillary thyroid microcarcinoma. *European journal of endocrinology*. 2015 Sep;173(3):367-75.
- Röher HD, Goretzki PE, Hellmann P, Witte J. Complications in thyroid surgery. Incidence and therapy. *Der Chirurg; Zeitschrift für AlleGebiete der OperativenMedizen*. 1999 Sep 1;70(9):999-1010.
- Sitges-Serra A. Low-risk papillary thyroid cancer: times are changing. *Expert Review of Endocrinology & Metabolism*. 2014 Jan 1;9(1):9-18.
- Dionigi G, Wu CW, Kim HY, Rauseri S, Boni L, Chiang FY. Severity of recurrent laryngeal nerve injuries in thyroid surgery. *World journal of surgery*. 2016 Jun;40:1373-81.
- Lee J, Fraser S, Glover A, Sidhu S. Prospective evaluation of the utility of routine neuromonitoring for an established thyroid surgical practice. *ANZ Journal of Surgery*. 2017 Oct;87(10):E138-42.
- Tjahjono R, Nguyen K, Phung D, Riffat F, Palme CE. Methods of identification of parathyroid glands in thyroid surgery: A literature review. *ANZ Journal of Surgery*. 2021 Sep;91(9):1711-6.
- CuricRadivojević R, Prgommet D, Markešić J, Ezgeta C. Hypocalcaemia after thyroid surgery for differentiated thyroid carcinoma: preliminary study report. *Collegium antropologicum*. 2012;36(2):73-8.
- Cannizzaro MA, Lo Bianco S, Picardo MC, Provenzano D, Buffone A. How to avoid and to manage post-operative complications in thyroid surgery. *Updates in surgery*. 2017 Jun;69:211-5.