

Original Article

Early Complications after Thyroid Surgery: An Observational Study.

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Abstract

Background: Thyroid operations are often crucial for managing thyroid conditions. Surgical treatment depends on the goitre and the type of patient presented during treatment. While effective, thyroid surgery carries certain risks. Common early surgical complications include hypocalcaemia, infection, hematoma, and laryngeal nerve palsy, any of which can pose significant health risks for patients. **Objective:** The paper pointed out the immediate complications after thyroid surgery. **Methods and Materials:** This prospective study was conducted in the ENT outdoor and indoor department of the Comilla Medical College from 1 January 2023 to 31 December 2023. Sixty patients who were admitted for thyroid surgery were selected. Each patient was monitored for one month post-surgery to document any complications that arose, which were noted and analysed. **Results:** Complications were observed in 15 patients (25%). Recurrent laryngeal nerve injury was the most common complication in 13.33% (n=8) of cases, followed by hypocalcaemia at 6.66% (n=4). Hypocalcaemia was associated with thyroid cancer in 3 cases (13.63%). Complications were predominantly linked to malignant tumours, the extent of surgical intervention, and the surgeon's skill level. **Conclusion:** Careful dissection, accurate identification, and preservation of the laryngeal nerves and the parathyroid gland are essential to reducing complication rates. A solid understanding of anatomy and proficient surgical techniques are critical factors in minimizing risks.

Keywords: Thyroidectomy, Recurrent laryngeal nerve injury, hypocalcaemia, hematoma.

Introduction: Difficulties in thyroid surgery may be categorised in several ways. It may include immediate, transitional, and long-delayed local, general, and operation-specific issues. Immediate complications may involve bleeding, hoarseness of speech, blockings of the respiratory pathway, thyroid storm due to inadequately prepared thyrotoxicosis patients, and intermediary difficulties, including seroma production, bacterial contamination, and short-term paralysis of the vagus nerve, which included the external branch and recurrent laryngeal nerve. Long-delayed problems, temporary low levels of thyroid hormones, persistent lowering levels of thyroid hormone, irreversible damage of branches of vagus nerves, damage of the suboccipital (C1) and greater occipital (C2), and scarring¹.

Surgical intervention for the thyroid is often required for benign or malignant tumours or when the gland's enlargement (e.g., nodular goitre or multinodular goitre) causes difficulty in respiration or deglutition. Indications of thyroid surgery are multispeed, and it encompasses neoplastic goitre and toxic goitres after making it to the euthyroid stage. The essence of thyroidectomy depends on the tumour cytology (benign or malignant), extent, patient age and sex, and metastasis in the lymph nodes². Forty percent of patients died due to bleeding during surgery and postoperative sepsis during the 18th century, which was a very high mortality for that time. However, modern advancements in bactericidal, stupeficient, surgical methods and improved instruments have significantly reduced sickness and death rates.

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During thyroid surgery, total thyroidectomy may destroy the parathyroid gland, leading to hypocalcaemia, which is one of the regular problems⁴. Change of voice after thyroidectomy is due to branches of the vagus nerve. Injury to the recurrent laryngeal nerve (RLN), a usually frightened outcome of thyroid surgery, can lead to difficulty in speech and is frequently caused by tearing, clipping, or pulling of the nerve⁵. Contributing factors include insufficient anatomical knowledge, limited surgical experience, and anatomical distortions caused by malignancy or huge multinodular goiters⁶.

Operative area contamination is among the most frequent postsurgical problems and constitutes many nosocomial infections. These infections are often mixed and are treated with continuous dressing and combined broad-spectrum parenteral antimicrobial agents. Pre-emptive antimicrobial agent treatment has been shown to lower impurity rates, reduce postsurgical indisposition, shorten hospital stays, and lower contamination prices⁷.

Postoperative haemorrhage or hematoma is a serious risk that may lead to respiratory difficulties. Reported post-thyroidectomy haemorrhage rates vary from 0.36% to 4.3%^{1,2}, with contributing factors including ligature slippage, vessel reopening, retching, high blood pressure, and oozing from incisions⁸. A compressive hematoma causing acute dyspnea, though rare, can be life-threatening and lead to severe long-term effects⁹.

Due to the thyroid gland's proximity to the branches of the vagus nerve, such as recurrent laryngeal nerves and parathyroid glands, two critical complications arise from thyroidectomy¹⁰. Successful outcomes rely heavily on accurate anatomical understanding and methodical surgical proceedings to reduce complications. Complication rates are also influenced by the intensity and type of thyroid disease, the surgical approach, and the surgeon's skill level, with research indicating a direct relationship between surgeon expertise and complication incidence¹¹.

The paper highlighted the immediate complications after thyroid surgery in the different indications at specialised surgical centres.

Methods and materials:

This prospective study was conducted in the ENT outdoor and indoor department of the Comilla

Medical College from 1 January 2023 to 31 December 2023. Sixty patients who were admitted for thyroid surgery were selected. Each patient was monitored for one month post-surgery to document any complications that arose, which were noted and analysed.

Inclusion Criteria:

This research incorporates different types of neoplastic goitres, nodular goitres, and single nodules in both sexes.

Exclusion Criteria:

The inflammatory lesions of the thyroid include thyroiditis, and patients with radiotherapy are taken for any malignant condition in the head-neck region; gestational women and those unsuitable for the operation were excluded.

Comprehensive histories covered the onset and characteristics of thyroid swelling and potential contributory aspects. Moreover, information on previous treatment history, co-existing conditions, personal history of thyroid disorders, medication use, and additional related data was collected. Comprehensive bodily and general checkups were performed, explicitly focusing on thyroid swelling. Standard serological and specialised investigations were conducted, including thyroid function tests, FNAC, neck X-rays (anteroposterior and lateral views to assess extension behind the sternum for huge mass), ultrasonography, and X-rays of the thoracic region. Preoperative assessment of vocal cords was carried out for all patients using rigid laryngoscopy with a 70⁰-rod. Participants with either high or low levels of thyroxin were treated with appropriate drugs to make them euthyroid before surgical procedures.

Sixty participant's surgeries were performed under general anaesthesia by senior or mid-level surgeons from our department. Conventional tie and suture methods were used to ligate vessels, with dual ligation of big vessels like branches of the thyroid vessels. Muscle haemorrhage and residual thyroid tissue were managed with monopolar cauterisation and securing with Vicryl. Before skin stitching, strap muscles were lightly approached to facilitate the detection of any post-surgical hematoma. A closed suction drain (Romo Vac Set®, GS-5002, Romsons International, India) was routinely placed, routed through the lateral neck and positioned between strap

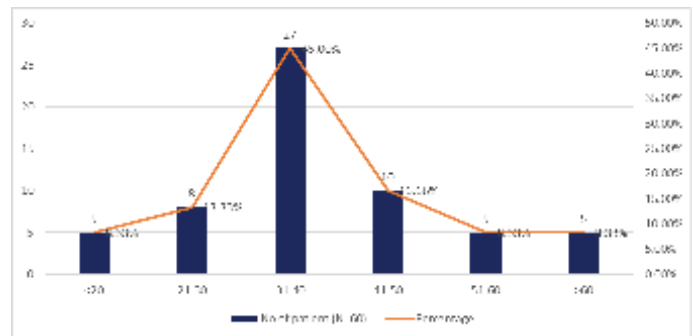
muscles to minimize bleeding risks. The surgeon handled all steps, including skin incision, subplatysmal dissection, drain insertion, and closure. A single dose of 2gm Ceftriaxone was administered parenterally during surgery. Careful identification and preservation of recurrent laryngeal nerves and parathyroid glands were attempted whenever visible.

Surgical procedures—total or near-total thyroidectomy, hemithyroidectomy (right or left), or completion thyroidectomy with or without neck dissection—were conducted as indicated. Hypoparathyroidism or hypocalcemia was diagnosed when calcium levels fell below 7.5 mg/dL (or below 8.5 mg/dL if symptomatic), typically presenting 24-48 hours post-surgery with symptoms such as numbness, paresthesia over the fingertips and perioral area, and muscle cramps. Before discharge, RTL was used to assess vocal cord positioning. Patients were discharged 3-4 days post-surgery following drain removal and dressing change, with instructions to return seven days post-operation. Follow-ups were scheduled weekly for one month to monitor for complications. Data collection and analysis were performed using SPSS.

Result:

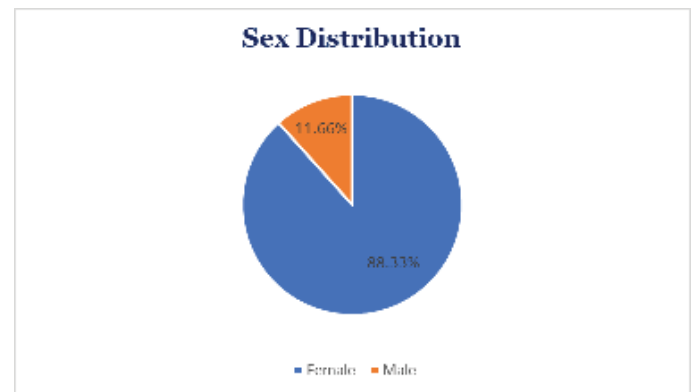
Maximum participants were in the 31-40 years age comprising 27 (45%); secondly, 10 (16.66%), 41-50 years age set with females leading than males in a ratio of 7.6:1. The age of the participant extended from 15 to 80 years with an average age of 37.73 yrs. The p-value of age and sex was <0.001 (Table VI). A total of 15 patients (25%) developed complications. It was observed that the highest occurrence of nerve damage was 13.33% (n=08), followed by hypocalcaemia 6.66% (n=04). Other complications were wound infection 03.33% (n=02) and esopharyngeal injury 01.66% (n=01) (Table V). Among the 60 participants in the paper, 27 (45%) were diagnosed as neoplastic, and 33 (55%) were non-neoplastic. Among the malignant lesions, the occurrence of a papillary type of cancer was high, 28.33% (n=17), and among the non-neoplastic lesions, solitary thyroid nodule was high, 35% (n=21) (Table-IV). We classified the complications into two groups: major and minor. In the significant group, recurrent laryngeal nerve injury (n=08) and hypocalcaemia (n=04), and in the minor group, wound infection (n=02) and oesophagal injury (n=01) were included. The P-value of both groups was <0.001 (Table VI).

Table I: Age distribution among participants



The ages of the participants.

Table II: Sex distribution:



Thyroid cancer is more common in women than men in a ratio of 7.6:1.

Table III: Type of surgery done:

Name of surgery	Number of surgeries	percentage
Total thyroidectomy	17	28.33%
Hemi thyroidectomy(Rt/Lt)	38	63.33%
Near total thyroidectomy	03	05.00%
Completion thyroidectomy	02	03.33%
Total	60	100%

Table IV: Indication of surgery:

Indication	Number of surgeries	percentage
Multinodular goitre	12	20%
Solitary thyroid nodule	21	35%
Papillary cell carcinoma	17	28.33%
Follicular cell carcinoma	03	05%
Medullary carcinoma	02	03.33%
Follicular adenoma	03	05%
Hurthel cell tumour	02	03.33%
Total	60	100%

Table V: Type of complications:

Name of complications	Number of complications	percentage
Rec. laryngeal nerve palsy	08	13.33%
Hypoparathyroidism	04	06.66%
Wound infection	02	03.33%
Pharyngeal injury	01	01.66%
Total	15	25 %

Table VI: p-value of qualitative variables:

Sl. No.	Variables	Group-1	Group-2	Z-value	P-value
1	Sex	Woman=53(88.33%)	Man=07 (11.67%)	3.5627	<0.001
2	Age	15-30 years13 (21.67%)	31-80 Years=47 (78.33%)	4.3886	<0.001
3	Types of Surgery	Hemithyroidectomy=38(63.33%)	Total Thyroidectomy & others=22 (36.67%)	1.2393	>0.05
4	Indication of Surgery	Non-Malignant=36 (60%)	Malignant=24 (40%)	2	<0.05
5	Major Complications of Surgery	No of Complication=48 (80%)	Major Complication=12 (20%)	3.997	<0.001
6	Minor complications of Surgery	No of Complication=47 (78.33%)	Minor Complication=13 (21.67%)	4.3886	<0.001

Discussion:

The indications for thyroid surgery in this study were determined based on preoperative fine needle aspiration cytology (FNAC) results, with postoperative histopathological findings analysed about the observed complications. The primary indication was thyroid neoplasm, accounting for 46.66% (n=28) of cases, with five benign cases (8.33%) and 23 malignant cases (38.33%), as shown in Table IV.

Post-thyroidectomy complications are influenced by factors such as the surgical procedure type, the operation approach, surgeon expertise, instrument sterilisation, and the skill level of the surgical team. It has been noted that complications like vocal cord palsy can be minimized by experienced surgeons with advanced training study, recurrent laryngeal nerve (RLN) injury was the most frequently observed complication, affecting 13.33% (n=8), followed by hyperparathyroidism (6.66%, n=4), wound infection (3.33%, n=2), and oesophageal injury (1.66%, n=1), as shown in Table V. The overall problem rate in this study was 25% (n=15), which aligns with rates

reported in similar studies of 21%¹², 20%¹³, 17%¹⁴ our lateral Ras observed in 13.33% (n=8/60), a slightly higher incidence than those reported in other studies, which ranged from 0.5%, 1.9%, 0.3% and 1.23%^{13, 14, 15, 23}. This higher rate could be related to trainees and the use of monopolar diathermy. Extensive excision, malignancy, and recurrent goitre are independent risk factors for RLN injury. Thomusch O et al. reported a 9.3% RLN injury rate and noted it as the most common postoperative complication in their study involving 1,425 patients. No bilateral RLN injuries were observed in our series, and the injury sites were explicitly studied.

Lower calcium levels, one of the most common postoperative complications of thyroid surgery, can be temporary, everlasting, organic, or medical. Entire cases of temporary and organic hypocalcaemia were comprised in this paper¹⁷. Hypocalcaemia typically appears within 24 to 48 hours after the operation, with symptoms including cramps, paresthesia around the mouth and peripheries, carpopedal twitching, seizures, and confusion¹⁸. In our study, hypocalcaemia occurred in 6.66% (n=4) of patients, comparable to the 5% incidence reported by Talukder et al.¹⁴. Hypocalcaemia risk is higher in total or near-total thyroidectomies compared to hemithyroidectomy temporary hypocalcaemia cases; three (13.33%) involved total, near-total, or completion thyroidectomies. Other studies have reported higher rates, such as 29.4% by Mohammad Zahirul Islam et al.²³ and 24.3% by Md Nazmul Hoque et al.¹⁹, especially in cases involving thyroid malignancies¹⁹, hypocalcaemia was associated with cell carcinoma in two cases (9%) and chronic lymphocytic thyroiditis and follicular cell carcinoma in one case each, resulting in an overall malignancy-related hypocalcaemia rate of 13.63%. Other studies have shown similar rates^{15,19,23}, with Kazi Atiquzzaman et al.¹⁵ reporting 15% and Mohammad Zahirul Islam 29.4%²³.

Wound infection is rare after thyroid surgery, with reported incidences between 0.31% and 0 in the study; however, wound infections in two patients (3.33%) were higher than the 1.7% rate reported by L. Rosato et al.²¹, in a 300-patient. Contributing

factors may include diabetes, immunodeficiency, poor postoperative care, general health status, and advanced patient age. One patient in our series had a poor overall condition, which may have contributed to this increased rate.

Though rare, hematoma formation is a serious complication due to the risk of acute airway obstruction, especially within the first few postoperative hours. Kazi Atiquzzaman et al.¹⁵ reported a 0.61% incidence, while L. Rosato et al.²¹ found a rate of 1.7%; however, no hematoma cases were reported in our series.

Esophageal injury, another uncommon complication, was found in total thyroidectomy for papillary cell carcinoma (Vanaja Ratna Kumari et al.²²). Two oesophageal injuries were noted in a series of 20 patients. Hypertrophic scar and keloid formation were not observed in our study. Historically, thyroid surgery had a death frequency of 40%, ending a century ago. Today, fatalities from thyroid surgery are extremely rare, and no deaths occurred in our series, consistent with most modern reports.

Limitation:

A short period and a small sample size are the limitations of our study in representing the actual incidence. An extensive series of patients and a wide time range may reach a reasonable precision.

Conclusion:

Complications after thyroid surgery depend on explicit anatomical knowledge, meticulous and bloodless dissection, surgeons' skill, the extent of the surgery, patients' condition, comorbidities, and thyroid pathology. Identification and preservation of recurrent and superior laryngeal nerves, along with parathyroid gland and careful post-operative management, are of paramount importance to reduce common complications.

References:

1. Chaplin JM, Sharma N, Watkinson JC. Surgical management of differentiated thyroid cancer. In: Watkinson JC, Gilbert RW, Editors. *Stell and Maran's Textbook of Head and Neck Surgery and Oncology*. Fifth edition. London: Hodder Arnold; 2012. P 445.
2. Abebe B, Mensur O. Goiter in a teaching hospital in North Western Ethiopia. *East Afr J Surg* 2006 Dec;11(2):21-27.
3. Becker WF. Presidential address: pioneers in thyroid surgery. *Ann Surg* 1977 May;185(5):493-504.
4. Slough, CM.; Johns, R.; Randolph, GW.; Lore, JM Jr.; Romanchisen, P. History of thyroid and parathyroid surgery. Randolph GW, editor. *Surgery of the thyroid and parathyroid glands*, 1st ed. Philadelphia: Saunders; 2002. p. 3-11.
5. Hisham AN, LuJunan MR. Recurrent laryngeal nerve in thyroid surgery: A critical appraisal. *ANZ J Surg* 2002; 72(7):887-91.
6. Myssiorek D. Recurrent Laryngeal nerve paralysis: anatomy and etiology. *Otolaryngol Clin N Am*. 2004; 37(1):25- 44.
7. Md. Abul Hossain, Md. Ariful Islam, Tapas Chakraborty, Firoz Ahmed Khan, Md. Mozharul Islam. Incidence of postoperative surgical site infection in thyroid surgery following a single dose of prophylactic antibiotic. *Bangladesh J Otorhinolaryngol* 2016; 22(1): 15-20
8. Shaha AR, Jaffe BM. Practical management of post-thyroidectomy hematoma. *J surg oncol*. 1994 Dec;57 (4):235-8.
9. N. Christou, M. Mathonnet. Complications after total thyroidectomy. *Journal of visceral surgery* (2013) 150, 249-256.
10. Thomusch O, Machens A, Sekulla C, et al. Multivariate analysis of risk factors for postoperative complications in benign goitre surgery: a prospective multicenter study in Germany. *World J Surg* 2000; 24:1335—41.
11. Sosa JA, Bowman HM, Tielsch JM, Powe NR, Gordon TA, Udelsman R. The importance of surgeon experience for clinical and economic outcomes from thyroidectomy. *Ann Surg*. 1998; 228:320–30.

12. L. Rosato, G. Mondini, A. Ginardi, G. Clerico, M. Pozzo, P. Raviola. Incidence of complication of thyroid surgery. *Minerva Chir.* 2000 Oct;55(10):693-702.
13. Apoorva Kumar Pandey, Tripti Maithani, Alok Agrahari, Arvind Varma, Chetan Bansal, Aparna Bhardwaj, Virendra P Singh, Sonam Rathi. Postoperative Complications of Thyroid Surgery: A Corroborative Study with an Overview of Evolution of Thyroid Surgery. *International Journal of Head and Neck Surgery*, October-December 2015;6(4):149-154.
14. Talukder DC, Sarker SC, Ahasan SA, Haque MM, Arefin MK, Musabbir N, Rahman CMM. Evaluation of post-operative complications following thyroid surgery. *J Dhaka Med Coll.* 2018; 27(2) : 108-113.
15. Kazi Atikuzzaman, Mushfiqur Rahman, Ripon Kumar Roy. Early and Late Complications after Thyroid Surgery: A Retrospective Study in 163 Patients. *Bangladesh J Otorhinolaryngol* 2022; 28(1): 50-55.
16. Md. Wahiduzzaman, Syed Farhan Ali Razib, Afroja Hossain, Kamrul Hasan Tarafder, Sheikh Hasanur Rahman, Hasib Rahman. Md. Hasanul Haque. Study of Recurrent Laryngeal Nerve Paralysis Following Thyroidectomy. *Bangladesh J Otorhinolaryngol* 2018; 24(2): 162-166.
17. Antakia R, Edafe O, Uttley L, et al. Effectiveness of preventative and other surgical measures on hypocalcemia following bilateral thyroid surgery: a systematic review and meta-analysis. *Thyroid* 2015; 25:95-106.
18. Mehanna HM, Jain A, Randeva H, Watkinson J, Shaha A. Postoperative hypocalcemia difference a definition makes. *Head Neck.* 2010 Mar;32(3):279-83.
19. Md. Nazmul Haque, Saif Rahman Khan, Moshammat Fatima Akhter, Mohammad Ashequr Rahman Bhuiyan, Mohammad Zakaria Sarker, Mahmudul Amin Sakik. Evaluation of Hypoparathyroidism following Total Thyroidectomy. *Bangladesh J Otorhinolaryngol* 2020; 26(2): 116-120.
20. Akin M, Kurukahvecioglu O, Anadol AZ, Yuksel O, Taneri F. Analysis of surgical complications of thyroid diseases: results of a single institution. *Bratisl Lek Listy* 2009 Jan;110(1):27-30.
21. L. Rosato, G. Mondini, A. Girandi, G. Clerico, M. Pozzo, P. Raviola. Incidence of complications of thyroid surgery. *Minerva Chir*;2000 Oct;55(10):693-702.
22. Dr B Vanaja Ratna Kumari, Dr Rama Krishna reddy. Thyroid surgery: postoperative complications: An observational study. *Journal of Cardiovascular Disease Research*; vol 14, issue 10, 2023.
23. Mohammad Zahirul Islam, AF Mohiuddin Khan, Shaikh Nurul Fattah, Dipankar Lodh, Mohammad Nazrul Islam, Uzzal Chandra Ghosh. Hypocalcaemia after Total Thyroidectomy: *Bangladesh J Otorhinolaryngol* 2019; 25(1): 19-27.