

Initial Outcome of Early Complications Following Thyroid Surgery-A Prospective Observational Study

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Abstract

Background: Thyroid surgery in an experienced hand is relatively safe, however, not free from complications. Considering very limited comprehensive scientific reports, the study was designed to evaluate the pattern of early post-operative complications and their initial outcome.

Methods: This prospective observational study was conducted at Department of ENT & Head Neck Surgery at Dhaka Medical College Hospital, Dhaka, from January 2019 to December 2019. Total 100 patients who underwent thyroid surgery were selected according to other inclusion and exclusion criteria. Written informed consent were taken from each participant. All patients were subjected to detailed history, clinical examination and relevant investigation. Data collection was done by the researcher (myself) with an aid of a questionnaire. Data analysis were done by the SPSS version 22.0.

Results: Mean age of total study population was 42.47±9.61 SD (years) with female predominance with a percentage of 77. Of all, 64% patients underwent hemithyroidectomy and 36% underwent total thyroidectomy. Regarding co-morbidity; Hypertension (13%), Diabetes mellitus (12%), Hypertension with Diabetes mellitus (7%), Obesity (3%) were commonest. Around 14% respondents experienced early post-operative complications. The major complications were recurrent laryngeal nerve palsy (10%), airway obstruction (2%), tension hematoma (1%), seroma (1%).

Conclusion: In present study, the commonest early complication observed was recurrent laryngeal nerve palsy. However, two cases of recurrent laryngeal nerve palsy were noted as adverse outcome after seven days follow up. Good surgical expertise and keen post-operative monitoring is essential to avoid complications.

Keywords: Outcome, Early Complications, Thyroid Surgery.

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I. Introduction

The thyroid gland is the largest endocrine organ in the body. It weighs 15-20g in adulthood. It is a highly vascular, reddish-brown, bi-lobed structures with each lobe joined together by a narrow isthmus. It is situated in the lower anterior neck straddling the upper trachea (Scott-Brown's 8th ed.). Right recurrent laryngeal nerve leaves the vagus as it crosses superficial to the right subclavian artery & loops under the artery ascending in the tracheo-esophageal groove to reach the larynx. On the left, the nerve originated from the vagus as it crosses the aortic arch. It then loop the arch and the ligamentum arteriosum to reach the tracheo-esophageal groove. The parathyroid glands lie on either side of the thyroid [1]. Parathyroid hormone, along with vitamin D, regulates calcium and phosphorus concentrations in the body [2]. The thyroid gland produces two related hormones eg: thyroxine (T4) and triiodothyronine (T3). Postoperative complications from thyroid surgeries are usually related to patient condition, the thyroid disease, surgeon's experience and type of surgery [3,4]. Thus, the percentages of undesirable results in thyroid surgeries may vary considerably, considering baseline disease persistence or recurrence and postoperative complications [5]. Postoperative complications classified as early complication (upto 24 hours), intermediate complication (1-7days), late complication (after 7 days): [6]. Thyroidectomy complications may be divided into temporary or permanent. The temporary may vary from severe to life threatening ones, all the way to mild and meaningless events. Permanent complications of which prevalence is variable, represent the main concern of those who treat thyroid diseases surgically. Despite its importance, the risk factors associated with post-thyroidectomy complications are not sufficiently analyzed [7]. Most of the complications are related to either

parathyroid gland injury (metabolic derangements) or injury to the recurrent laryngeal nerves (RLN). Other complications include superior laryngeal nerve injury, infection, airway compromise, bleeding and rarely thyrotoxic storm. Those developing complications like permanent hypocalcemia and recurrent laryngeal nerve injury have a diminished quality of life and increased health costs and often require lifelong replacement therapy and further surgical procedures and rehabilitation. Other important complications are bleeding, wound infection, airway obstruction (due to compressing haematoma, tracheomalacia). Hypoparathyroidism is the most common complication of thyroidectomy. Hypoparathyroidism can be temporary, less than 6 months post-surgery (8-30%) or permanent, more than 6 months post-surgery (1.7- 3.5%); (Scott-Brown's 8th ed.). Thyroid surgery in the hands of experienced surgeons is currently one of the safest procedures performed. This study intends to assess the occurrence of early postoperative complications following different thyroidectomy procedures and to identify the possible risk factors, the role of adequate preoperative patient preparation, careful and meticulous surgical technique and early recognition of postoperative complications with the prompt institution of treatment in reducing morbidity and providing the patient with the best chance of a satisfactory outcome.

II. Methodology

Study design: Prospective Observational Study.

Study place: Department of ENT & Head Neck Surgery at Dhaka Medical College Hospital, Dhaka.

Study period: From January 2019 to December 2019 for a period of one year.

Study population: All the patients who underwent thyroid surgery in the Department of ENT & Head Neck Surgery at Dhaka Medical College Hospital, Dhaka were selected as study population.

Selection criteria:

Inclusion Criteria

- All patients presented with thyroid swelling in euthyroid state selected for surgery.
- Patients of all ages and both sexes.
- Patients who gave consent.

Exclusion Criteria

- Patients suffering from severe co-morbidity
- Patients who had co-existing complications (i.e. Vocal cord palsy, Skin involvement, Fixity to surrounding structure, Hypo or Hyperthyroid state).
- Previous thyroid surgery.
- Patients who would need additional surgery (i.e. Neck dissection).

Sample size

A total number of 100 patients with thyroid disease underwent surgery were enrolled for this study after fulfilling the inclusion and exclusion criteria.

Data collection technique

This study aimed to understand various complications after thyroid surgeries and the factors responsible for such complications. This prospective observational study was conducted in the Department of ENT & Head-Neck Surgery at Dhaka Medical College Hospital, Dhaka, from January 2019 to December 2019 for a period of one year. Formal ethical clearance was taken from the ERC of DMC. All the patients presented with thyroid problem, classified according to clinical, radiological, biochemical and histopathological criteria were primarily approached as study population. Following selection of the patients in according to the inclusion and exclusion criteria, patients with problem in thyroid selected for thyroid surgery got admitted in the Department of ENT & Head Neck Surgery, Dhaka Medical College Hospital, Dhaka were enrolled in this study. Patient were enrolled by consecutive sampling after fulfilling the inclusion and exclusion criteria. After selecting the patients, informed written consent was taken from the subjects following describing the purpose, methods, benefits and hazards of study. Total 100 patients were included and interviewed in this study. Face to face interview was conducted by using a semi- structured questionnaire containing socio-demographic parameters and relevant clinical information. A thorough clinical examination along with examination of other systems performed. Apart from routine laboratory tests, thyroid profile, Ultrasonogram (USG) of neck, Fine Needle Aspiration Cytology (FNAC), Serum calcium, Parathormone (PTH), indirect laryngoscopy, Serum electrolyte, Electrocardiography (ECG), Echocardiogram, Fibre optic laryngoscopy(FOL), X-ray Chest & Neck,CT scan of neck were performed. Patients were monitored from time of admission till their 7th postoperative day. The operated specimen was sent for histopathological examination. The two types of surgeries such as total thyroidectomy and hemithyroidectomy were performed. Different types of early postoperative complications and their initial outcome were also evaluate.

Data were collected by using semi-structured questionnaire designed for the study by the researcher. Data analysis and presentation was made by statistical software SPSS 22 windows version 10.

Data processing and analysis

Data were collected, compiled and tabulated according to key variables and functional assessment scoring. The analysis of different variable was done according to standard statistical analysis. Quantitative data were expressed as frequency & percentage and qualitative data were expressed as mean & standard deviation. Data were processed and analyzed using software 'Statistical Package for Social Science' version 22.0. For all analyses level of significance was set at 0.05 and p-value <0.05 was considered significant.

III. Results

This study was held among 100 patients who underwent thyroid surgery in Department of ENT & Head Neck Surgery, Dhaka Medical College Hospital. Majority respondents were in age group 31-40 years (35%) and followed by in decreasing order 41-50 years (31%), 51-60 years (21%), 21-30 years (11%) and less than 20 years (2%). Mean age of respondents were 42.47±9.61 years. Majority respondents were female (77%) and 23% were male. Majority respondents were Muslim by religion (92%) and 8% were followers of other religion (Hindu, Christian etc). Majority respondents hailed from rural area (54%) and 46% from urban area.

Table-1: demographic profile of the patients (N=100)

Age group	Number	Percentage
<20 years	2	2 %
21-30 years	11	11 %
31-40 years	35	35 %
41-50 years	31	31 %
51-60 years	21	21%
Gender		
Male	23	23 %
Female	77	77 %
Religion		
Muslim	92	92 %
Other	8	8 %
Residence		
Urban	46	46 %
Rural	54	54 %

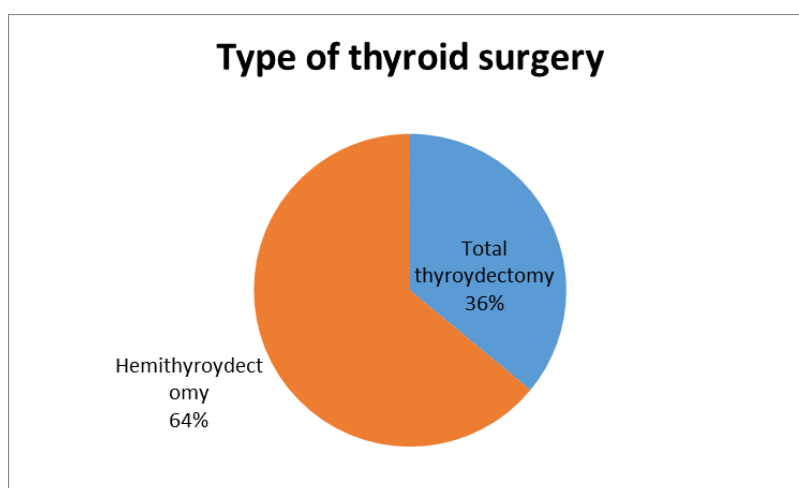


Figure 1: Distribution of respondents by type of thyroid surgery (n=100)

Majority respondents underwent hemithyroidectomy (64%) and rest underwent total thyroidectomy (36%).

Table 2: Distribution of respondents by presence of co-morbidity (n=100)

Co-morbidity	Percentage (%)
HTN	13%
DM	12%
DM+HTN	7%
Obesity	3%

Around 13% respondents had HTN as co-morbidity and followed by in decreasing order DM (12%), HTN+DM (7%), Obesity (3%).

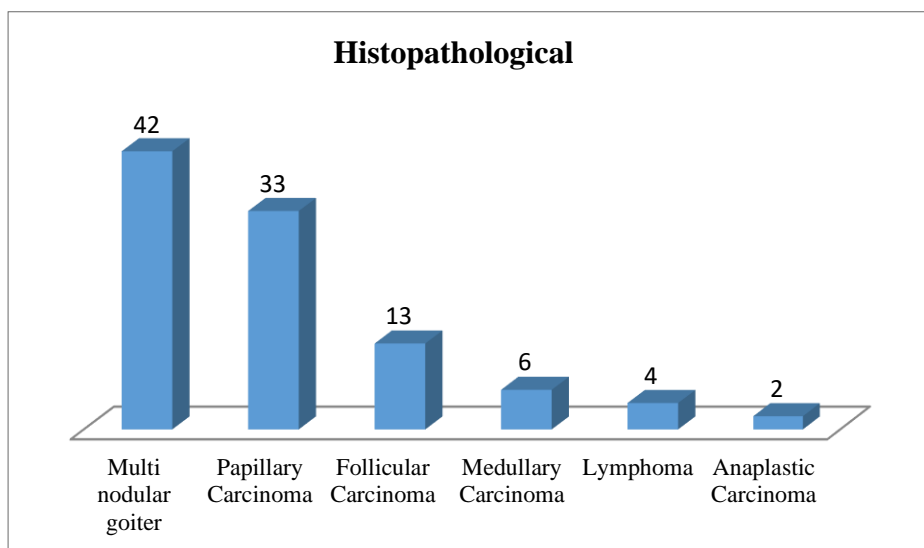


Figure 2: Distribution of respondents by histopathological findings (n=100)

Majority respondents' histopathological diagnosis was multinodular goiter (42%) and followed by in decreasing order papillary carcinoma (33%), follicular carcinoma (13%), medullary carcinoma (6%), lymphoma (4%) and anaplastic carcinoma (2%).

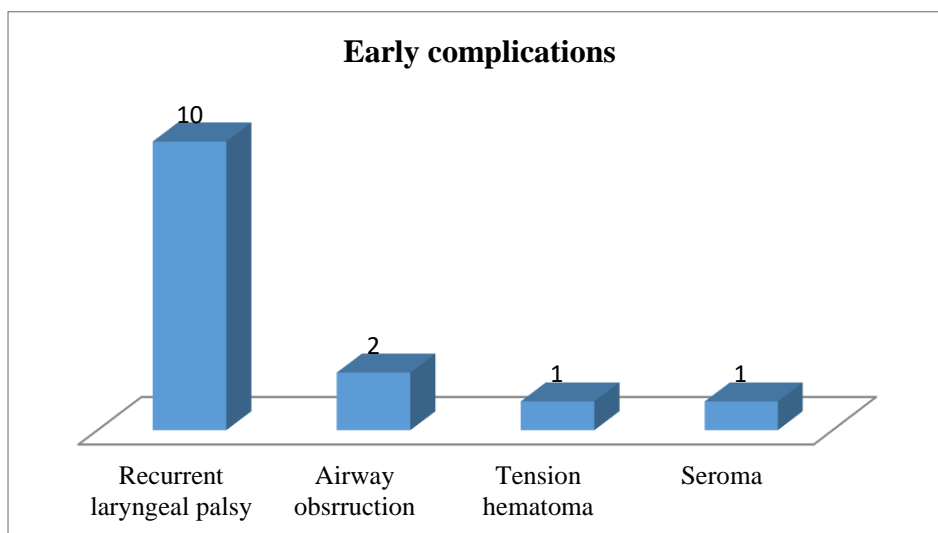


Figure 3: Early complications among respondents (n=100)

Around 10% having recurrent laryngeal nerve palsy, 2% having airway obstruction and 1% having tension hematoma and 1% having seroma were found as early post-operative complication.

Table 3: Association between early complications and co-morbidities (n=100)

Comorbidities	Early Complication					Total	p-value
	No complication	Recurrent laryngeal Nerve Palsy	Tension Hematoma	Airway Obstruction	Seroma		
No Comorbidities	65	0	0	0	0	65	
Hypertension	9	3	0	0	1	13	
Diabetes Mellitus	12	0	0	0	0	12	

Hypertension & Diabetes Mellitus	0	5	1	1	0	7	.243*
Obesity	0	2	0	1	0	3	
Total	86	10	1	2	1	100	

*p value was determined by chi square test

Table 4: Association between early complications and type of surgery (n=100)

Type of operation	Early Complication					Total	p-value
	No complications	Recurrent Laryngeal Nerve Palsy	Tension Hematoma	Airway Obstruction	Seroma		
Hemi-thyroidectomy	60	4	0	0	0	64	
Total thyroidectomy	26	6	1	2	1	36	.028*
Total	86	10	1	2	1	100	

*p value was determined by chi square test

Table 5: Association between early complications and histopathological findings (n=100)

Histopathological Findings	Early Complication					Total	p-value
	No complication	Recurrent Laryngeal Nerve Palsy	Tension Hematoma	Airway Obstruction	Seroma		
MNG	35	5	1	0	1	42	
Lymphoma	3	0	0	1	0	4	
Papillary carcinoma	31	2	0	0	0	33	
Follicular carcinoma	11	1	0	1	0	13	.135*
Medullary carcinoma	4	2	0	0	0	6	
Anaplastic carcinoma	2	0	0	0	0	2	
Total	86	10	1	2	1	100	

*p value was determined by chi square test

Table 6: Outcome of early complications during 1st follow up (1st POD) and subsequent follow up (7th POD)

Type of early complications	1 st POD follow-up			7 th POD follow-up		
	n	Recovered	Not recovered	n	Recovered	Not recovered
RLN Palsy	10	4	6	6	4	2
Airway Obstruction	2	2	-	-	-	-
Tension Hematoma	1	1	-	-	-	-
Seroma	1	1	-	-	-	-

Of all, 64% patients underwent hemithyroidectomy and 36% underwent total thyroidectomy. Regarding co-morbidity; Hypertension (13%), Diabetes mellitus (12%), Hypertension with Diabetes mellitus (7%), Obesity (3%) were commonest. Around 14% respondents experienced early post-operative complications. The major complications were recurrent laryngeal nerve palsy (10%), airway obstruction (2%), tension hematoma (1%), seroma (1%).

IV. Discussion

This study was held among 100 patients who underwent thyroid surgery in Department of ENT & Head Neck Surgery, Dhaka Medical College Hospital. Majority respondents were in age group 31-40 years (35%) and among the rest 31% were in age group 41-50 years, 21% were in 51-60 years, 11% were in 21-30 years and 2 respondents were aged less than 20 years. Mean age of respondents were 42.47±9.61 years. In a similar study by Haque, Farid and Islam, the highest number of s (28%) belongs to the age group of 21 to 30 years followed by 24.5% in the age of 31 to 40 years [8]. Rahman et al. reported that in their study maximum incidence was in third and fourth decade [9]. In this study female predominance was noted with 77% female respondents and 23% were male respondents. A study by Haque et al. also observed majority of the patients with 76% female and 24% male [11]. An analysis of preoperative risk factors for 30-day morbidity and mortality by after inpatient total thyroidectomy by Cautley et al. identified intrinsic patient factors that significantly contributed to postoperative

complications which were age, race, dependent functional status, history of CHF, smoking history, wound infection, and history of preoperative sepsis. These preoperative factors also varied in prevalence by study population, with higher rates in inpatient compared with outpatient surgery [11]. These results were consistent with a previous analysis of 2011 to 2012 by Khavanin et al [12]. According to histopathological study, 42% respondents was multinodular goiter (42%) and 33% were papillary carcinoma, 13% were follicular carcinoma, 6% were medullary Carcinoma, 4% were lymphoma and 2% anaplastic carcinoma. Rahman et al., found in a similar study, 54% solitary nodular goiter (54%), 20% multinodular goitre (20%), 4% adenomatous goiter (4%) and eleven patients with thyroid carcinoma with or without metastasis. Out of eleven patients of thyroid cancer 9 had papillary carcinoma (81.81%) and 2 (18.19%) had follicular carcinoma [9]. Haque, Farid and Islam found that 48.5% suffered from multinodular goiter followed by simple nodular goitre 28%, colloid goitre 10.5%, carcinoma of thyroid 7.5%, toxic nodule 4% and thyroiditis 2.5% [8]. Present study didn't find such variation in histopathological diagnosis because of limited study duration and a small sample size which didn't reflect the ration generalized population probably. Eighty six Percent respondents had no complication after surgery and 14% respondents had early postoperative complications. The major complication was transient recurrent laryngeal nerve palsy (10%) and other complications were airway obstruction (2%), tension hematoma (1%) and seroma (1%). Out of 14%, 12% early postoperative complications were resolved and 2% still having recurrent laryngeal nerve palsy was outcome of early postoperative complication. A study by Erbil et al found the rate of recurrent laryngeal nerve palsy 1.8% and hypoparathyroidism 6.6% [4]. In a study by Celik et al. temporary and permanent RLN injury was found at the rate of 1.5%, temporary and permanent hypoparathyroidism were found 12% and 2.1% respectively [13]. Sekhar et al found transient hypocalcemia in 12 patients, temporary RLN palsy in 6 patients and airway obstruction in 2 patients among 100 patient of thyroidectomy [14]. The critical location of thyroid gland in the neck area and its important neighboring structures have made thyroidectomy a sensitive procedure which may lead to sever post-surgical complications [15]. Curing the disease and keeping the complications to a minimum has remained as a challenge for thyroid surgery [16]. Thyroidectomy had been considered as a surgery with mortality rate of about 50% before admirable effort of "Theodor Kocher" who reduced this rate to less than 4.5% by advocating surgical methodology [17,18]. Nowadays mortality and morbidity of thyroidectomy are well-known and rarely occur in practice; nevertheless, some of fem, like post-operative hemorrhage and airway obstruction, are life-threatening and may be fatal if no prompt action is taken [19]. Recurrent laryngeal nerve palsy (RLNP) or hypomobility and hypocalcemia are two major complications of thyroidectomy [20]. Post-operative bleeding, seroma formation, wound infection, hematoma are post-surgical complications of thyroidectomy [21]. Risk and complications of thyroidectomy is depended on indication and extent of surgery, number of thyroidectomies performed in a center and surgeon's experience to a wide extent. Both patients and physicians should be aware of possible risks and complications of every procedure in order to achieve a better shared decision making and informed consent.

V. Limitations

There were a number of limitations of the study, which includes:

- Complicated case (Thyroid with neck mass, Revision surgery, second surgery) not included
- Samples was collected in only one centre
- Long term follow up were not assessed

VI. Conclusion

Thyroidectomy is a surgical procedure indicated as elective treatment for symptomatic thyroid swellings or neoplasms. In present study, the commonest early complication observed was recurrent laryngeal nerve palsy. Finally, two cases of recurrent laryngeal nerve palsy were noted as adverse outcome. Good surgical expertise is essential to avoid complications. Keen postoperative monitoring of patient is invaluable and helps in early detection and management of those complications.

VII. Recommendation

The highest prevalence of thyroidectomy was in women (77%). The most frequent thyroid surgery was hemithyroidectomy and the most common histopathological diagnosis was multinodular goiter (42%). Around 10% having recurrent laryngeal nerve palsy, 2% having airway obstruction and 1% having tension hematoma and 1% having seroma were found as early post-operative complications. Finally, two cases of recurrent laryngeal nerve palsy were noted as adverse outcome at 7th postoperative day. Further study is necessary to infer the findings over the general population.

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