

Thyroid Surgery: Complications and Techniques

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Thyroid surgery is one of the commonest operations done by ear nose and throat (ENT) surgeons. This procedure has been through tremendous evaluation to make it safe procedure. In spite of improved techniques, every thyroid surgeon has come across complications associated with this surgery. This study aims to understand various complications after thyroid surgery and factors responsible for complications and discuss preventive techniques for these complications. Study was done in the department of ENT and Head-Neck surgery, Rangpur Medical College Hospital, Rangpur from 13th December 2013 to 12th December, 2014. Fifty (50) patients who underwent thyroid surgery were included in this study. In this study female patients were predominant (F:M=6.14:1). Thyroid surgery was performed for different indications. Multinodular goitre was the most frequent indication (58%) which was followed by papillary carcinoma of thyroid (28%) & then follicular carcinoma (14%). Temporary hypoparathyroidism (16%), unilateral recurrent laryngeal nerve palsy (10%), haemorrhage (2%), wound infection (2%) were common complications. No fatality was found in this study. In our study temporary hypoparathyroidism (16%) and recurrent laryngeal nerve (RNL) palsy (10%) were the most common complications. Improved surgical techniques and efficient methods of complication management can reduce post-operative mortality and morbidity.

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Key words: Complication, recurrent laryngeal nerve injury, temporary hypoparathyroidism, technique

Introduction

Thyroid swelling is one of the most common complaints of patients presenting to the ENT Department. Depending on the diagnosis, while some of the patients are started on medical treatment, some patients undergo surgical treatment.

In our country the prevalence of goiter (thyroid swelling) is 10-15%, which indicates that the whole country is endemic. The endemicity varies from one place to other.

The highest prevalence rate in Bangladesh is in the district of Rangpur and Jamalpur, the range varies from 12-30%. Pockets of endemicity are up to 50% in different locations of the country.¹

The type of surgery performed varies depending on the diagnosis. Several surgical procedures have been used such as hemithyroidectomy, subtotal thyroidectomy, near total thyroidectomy and total thyroidectomy.

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Total or near total thyroidectomy are operations where entire gland or removal of both thyroid lobes and isthmus with preservation of the parathyroid or total lobectomy and isthmusectomy with removal of more than 90% of the contra lateral lobe respectably. This goal of this surgery is to remove as much thyroid tissue as possible without damaging or injuring any of the important structure in the neck.² Indications for total or near total thyroidectomy are papillary carcinoma, follicular carcinoma, medullary carcinoma and large multinodular goiter.³ Of the above mention surgery total or near total thyroidectomy is the most extensive one, so the complications following total or near total thyroidectomy are more common.

Following thyroidectomy some complications may develop, these are Early, intermediate and late complications, such as hemorrhage, respiratory obstruction, haematoma formation, recurrent laryngeal nerve paralysis, thyroid crisis, wound infection hypoparathyroidism, keloid, ugly scar etc. Among them hemorrhage, recurrent laryngeal nerve palsy, hypoparathyroidism regarded as complications of technique.

Haematoma deep to the cervical fascia is usually due to slipping of a ligature on the superior thyroid artery. Occasionally hemorrhage from a thyroid remnant or a thyroid vein may be responsible. Respiratory obstruction is very rarely due to collapse or kinking of the trachea. Most cases are due to laryngeal oedema resulting pressure from haematoma and vocal cord paralysis. The complication which is most feared is trauma to the recurrent laryngeal nerve. This may be unilateral or bilateral, transient or permanent. Transient paralysis may result from pressure on the nerve by clot or by oedema in which case recovery can be anticipated. Transient paralysis occurs in about 3% of nerve at risk and recovers within 3 week to 3 months.

Permanent paralysis is extremely rare if the nerve has been identified at operation.³ Hypocalcaemia is also common in total or near total thyroidectomy. This may be caused by removal of or injury to the parathyroid glands, or due to the hypoxia of the parathyroid glands, with resultant lowering of the serum calcium. Intravenous calcium gluconate (10%) administered slowly provides an immediate solution to the symptoms. Hypothyroidism developing gradually over a period of months or year after operations is an acceptable complication of total or near total thyroidectomy and is readily treated with thyroxin.

However hemithyroidectomy, total or near total thyroidectomy are a common operation and are associated with specific morbidities which are related to the experience and technique of the surgeon, extent of the disease and the general condition of the patient.

Aims and Objectives

1. To evaluate the complications of thyroid surgery.
2. To point out the techniques to minimize the complications.

Methods

1. Sample size: 50 patients
2. Type of study: Prospective
3. Place of study: Department of ENT-Head & Neck surgery Rongpur Medical College Hospital
4. Duration of study: 13th December 2013 to 12th December 2014
5. Sampling technique: Purposive sampling
6. Sample: Samples are selected under the following inclusion and exclusion criteria

Inclusion Criteria

Patient underwent thyroidectomy the with indication of

- Multinodular goiter involving one or both lobe.
- Papillary carcinoma

- Follicular carcinoma
- Medullary carcinoma

Exclusion Criteria

- Anaplastic carcinoma
- Lymphoma
- Toxic nodular goiter

7. Data Collection: Data has been collected by thorough history, clinical examination and relevant investigation
8. Data analysis: All collected data are checked and verified to reduce inconsistency. Numerical data obtained from the study are compiled and analyzed. The result will be presented in table.

The study material consisted of 50 patients with thyroid swelling who underwent elective thyroidectomy at Department of E.N.T and Head Neck surgery, Rangpur Medical College Hospital from 13th December 2013 to 12th December 2014. History was taken from all the patients. Thorough clinical examination along with E.N.T. examination was performed. Apart from routine laboratory tests, thyroid function test(T3, T4 & TSH) Ultra sonogram of Neck & thyroid gland, FNAC, serum calcium, electrolyte, ECG, Echo, X-ray Chest & Neck. USG of whole abdomen, CT scan and MRI in selective cases were performed.

Then the patients were admitted for thyroid surgery under general anesthesia after taking written informed consent. The cases were followed up every day during post operative hospital stay, which was about 7 days. Weekly follow up was given for first month, then monthly for next 2 months. The complications were noted and entered in a proforma.

Hypoparathyroidism were considered when the calcium level were below 7.5 mg/ dl or less than 8.5 mg/dl with symptoms due to

hypocalcaemia. Recurrent Laryngeal nerve injury was considered to be a post surgical alteration of the tone, timber or intensity of voice, with confirmation of alteration of vocal cord movement by laryngoscopy.

Results

Table I: Age incidence (n=50)

Age Group (year)	No. of Patients	Percentage
11-20	3	6%
21-30	8	16%
31-40	20	40%
41-50	11	22%
51-60	7	14%
61-70	1	2%

In this series of 50 patient's age ranged from 12-63 years. Majority patients belonged to age group of 31-50 year, with a maximum incidence in 4th and 5th decade respectively (Table I).

Table II: Sex distribution of patients (n=50)

Sex	Total No. of Patients	Percentage	Ratio Female : Male
Female	43	86%	6.14:1
Male	7	14%	

Table II shows that out of 50 cases 43 patients (86%) were female and 7 patients (14%) were male. In this series, thyroid disease was prevalent among female, which shows a similarity of incidence with other studies. Female to male ratio in this series was 6.14:1.

Table III: Age- Sex Correlation (n=50)

Age group (in year)	No. of Patients	No. of Female	Male	Female: Male
11-20	3	3	Nil	3:0
21-30	8	8	Nil	8:0
31-40	20	16	4	4:1
41-50	11	10	1	10:1
51-60	7	5	2	5:2
61-70	1	1	0	1:0

In table III sex distributions in different age group has been show. Incidence was high among female in all age Group.

Table IV: Types of thyroid disease for which surgery was carried out (n=50)

Type of thyroid disease	No. of Patients	Percentage
Multinodular Goitre	29	58%
Papillary Carcinoma	14	28%
Follicular Carcinoma	7	14%

In this series (Table IV) out of 50 patients 58% had multinodular goitre, papillary carcinoma 28%, Follicular carcinoma 14%. All cases were confirmed by Histopathological examination.

Table V: Types of operation (n=50)

Type of operation	Numbers
Hemithyroidectomy	24
Total thyroidectomy	26
Total	50

Table VI: Disease,-Age Correlation (n=50)

Age Group (in year)	Multinodular Goitre	Papillary Carcinoma	Follicular Carcinoma	Total
11-20	Nil	3	Nil	3
21-30	4	4	0	8
31-40	15	3	2	20
41-50	7	2	2	11
51-60	3	2	2	7
61-70	Nil	Nil	1	1

In this Table VI shows thyroid diseases in respect to age. Multinodular goitre is prevalent in 3rd & 4th decade, papillary Carcinoma occur in all age group & follicular carcinoma occur in 3rd, 4th & 5th decade of life.

Table VII: Types of Complications of thyroid surgery (n=50)

Post operative complications	No. of Patients	Percentage
Haemorrhage/Haematoma	1	2%
Voice charge, air way obstruction	Nil	0%
Laryngeal Oedema	Nil	0%
Recurrent laryngeal nerve paralysis	Temporary 5 Persistent 2	10% 4%
Hypoparathyroidism (Temporary)	Temporary 6	12%
Wound infection	1	2%
Thyrotoxic crisis Subclinical hypothyroidism Total	13	26%

Table VII shows that different complications with overall incidence of 26%. Out of 50

patients 1 patients developed haematoma, 5 patients developed temporary unilateral vocal cord palsy out of these patients, 3 patients improved of unilateral vocal cord palsy was improved, 2 patients did not show any improvement. 6 patients developed transient hypocalcaemia, which was improved latter on 1 patients developed wound infection and one patients developed heamatoma.

Table VIII: Time when Complication Developed (n=50)

Types of Complications	Early	Intermediated	Late
Haemorrhage/ Haematoma	1	-	-
Laryngeal Oedema	-	-	-
Recurrent laryngeal nerve paralysis	-	5	2
Hypoparathyroidism (Temporary)	6	-	-
Wound infection	-	1	-
Thyrotoxic crisis	-	1	-
Total	7	6	1

In this study (Table VIII), 5 patients developed early complications like haematoma temporary hypoparathyroidism, 6 patients with intermediate complications like temporary recurrent laryngeal nerve palsy wound infection & late complication like permanent unilateral recurrent laryngeal nerve palsy.

Table IX: Temporary and Persistent Nature of Complications (n=50)

Type of complications	Temporary	Persistent
Haematoma	1	-
Reccurent Laryngeal Nerve Paralysis	5	2
Hypoparathyroidism	6	-
Wound infection	1	-

Table IX shows that 1 patients suffered from haematoma were cured within a shortperiod. 5 patients developed recurrent laryngeal nerve paralysis, of them 3 patient developed temporary 'paralysis and 2 patient developed complication which was persistent on the follow up period. 6 patient developed hypoparathyroidism, which was temporary in nature. And 1 patient developed wound infection, which was temporary.

Table X: Laterality of Recurrent Laryngeal Nerve Paralysis (n=50).

Type of complications	of Unilateral no	Bilateral No	
Recurrent laryngeal paralysis	5 Nerve Right 4	Nil	
		Left 1	Nil

Table X shows that all the 5 patients developed recurrent laryngeal nerve paralysis were unilateral in nature. Among them 4 are right and 1 are left. None of the patients developed bilateral paralysis.

Table XI: Age- Complications Correlation (n=50)

Age Group	No. of Patient	No. of Complication	No. of Complication/ No. of Patient* 100 %
11-20	3	1	33%
21-30	8	2	25%
31-40	20	5	25%
41-50	11	3	27%
51-60	7	2	28%
61-70	1	0	0%

Table XI shows complications were more or less evenly spread between 11-60 years age group.

Table XII: Sex- Complication (n=50)

Sex	No. of Patient	Number of Complication	Types of Complication
Female	43	11	Haematoma-1
			Recurrent Laryngeal Nerve Paralysis-4
			Hypoparathyroidism-5
			Wound Infection-1
Male	7	2	Haematoma-Nil
			Recurrent Laryngeal Nerve Paralysis-1
			Hypoparathyroidism-1
			Wound Infection-Nil

Table XII show that both male and female patient, hypoparathyroidism is more common than other complication. In female, recurrent

laryngeal nerve paralysis was second most common complication.

Table XIII: Disease-Complication Correlation (n=50)

Disease of Thyroid Gland	No. of Patient	No. of Complication	Percentage of Complication
Multinodular Goitre	29	8	27%
Papillary Carcinoma	14	4	28%
Follicular Carcinoma	7	1	14%

Table VIII shows that rate of complications were not less in multinodular goitre than thyroid carcinoma.

Table XIV: Disease-Complications Correlation (n=50)

Diseases	No. of Patient	No. of Complication	Complications	%
Multinodular Goitre	29	8	Haematoma-1	3.44%
			Recurrent Laryngeal nerve paralysis-3	10.34%
			Hypoparathyroidism-3	10.34%
			Wound Infection-1	3.44%
Papillary Carcinoma	14	4	Haematoma-nil	0%
			Recurrent Laryngeal nerve paralysis-2	14.28%
			Hypoparathyroidism-2	14.28%
Follicular Carcinoma	7	1	Wound Infection-nil	0%
			Haematoma-nil	0%
			Recurrent Laryngeal nerve paralysis-nil	0%
			Hypoparathyroidism-1	14.28%
			Wound Infection-nil	0%

Table XIV shows that hypoparathyroidism was 14.28% in case of thyroid carcinoma patient. And temporary recurrent laryngeal nerve paralysis was 9.52%.

Discussion

The technique of thyroid surgery has been in evaluating for many years. Classic articles by Kocher, Halsted, Lahey, Crile and Riddle have provided surgeons with principles that have significantly reduced operative morbidity and mortality for thyroid surgery.⁴ This study was carried out among 50 cases who underwent thyroid Surgery and post operative follow up were done to see the complications of thyroid surgery. In this study, highest numbers of patients were in 31-40 years age group. Whereas other study found maximum patients in 41-50 years age group.⁵ In this series, out of 50 patients, 43 patients were female and 7 patients were male with a ratio of 6.14:1. The female preponderance is also been in other studies.⁵

Out of 50 patients, 29 patients suffered from multinodular goiter, 21 patients suffered from differentiated thyroid carcinoma (14 patients had papillary carcinoma and 7 patients with follicular carcinoma).

Papillary carcinoma was commonest (32%) in 21- 30 years (28%) age group. Follicular carcinoma was common (33%) in 51-60 years age group. Multinodular goitre was commonest in 31-40 years age group.

In this study 13 patients (26%) developed complications. Of these, 1 patient (2%) developed post operative Haematoma. It is higher than previous study where haematoma is stated at 1%.⁶ It was due to oozing from the cut edge of the strap muscles, remaining thyroid tissue and wound surface which was managed by cauterization with bipolar diathermy after exploration of wound.

During operation, haemorrhage can be avoided by positioning the patient with the neck hyper-extended and the head of the operating table elevated at 30.° This position provides excellent exposure and reduce cervical venous pressure. Substantial blood vessels in the operative field should be tied with fine ligature, whereas small vessels can be managed with the bipolar diathermy.⁷

Kahky also showed that application of methylcellulose (surgical) can be used to effectively manage bleeding from the cut surface of the thyroid gland.⁸ Most surgeons favor the use of a small caliber closed Suction drain for the at least first 48 hours to remove blood and serum from the operative bed.

In this series, 5 patients (10%) had unilateral recurrent laryngeal nerve paralysis. Among them four (4) were in the right and one (1) was in the left side. Three 3 patients (6%) showed gradual improvement of voice in subsequent follow up. Their voice became almost normal by compensation of the opposite vocal cord within 3 months, two patients (4%) did not showed significant improvement event after average period of 6 months follow up. Transient paralysis may result from pressure on the nerve by oedema in which cases recovery can be anticipated, In a study in University of Michigan, USA the rate of recurrent laryngeal nerve paralysis was 6.2% and among them permanent paralysis occurred in 2.5%.⁴ Lalida et al, found the incidence of recurrent laryngeal nerve paralysis at 6.09%.⁹ Reported incidence of permanent RLN palsy varied from 0-11%.⁴ A Bangladeshi study by Iqbal pouted much lower rate of 0.9%.¹⁰ In our study all the 5 (10%) cases had unilateral recurrent laryngeal nerve paralysis, none had bilateral paralysis. But on follow up 3 patients improved significantly and 2 did not improve.

RLN is at great risk of injury in the region of posterior suspensory ligament of thyroid gland (ligamentum Berry).⁴ We do routinely identify the RLN early in the operation as advocated by others.^{11,12} As a dissection proceeds to the area of ligamentum Berry, however, we typically identify the RLN close to or through the ligament. Routine identification of RLN both initially in the ligamentum should be practiced. Also when course of RLN difficult to follow due to extensive thyroid carcinoma in central compartment, the nerve should be identified and traced from thoracic inlet towards larynx to prevent injury.⁴

In this study 12% of patients suffered from transient hypocalcaemia. This is consistent with the study of University of Michigan where the rate was 16.8%. They also found permanent hypo-parathyroidism in 4%-of cases, but it was absent in our study, Reported permanent post-operative hypoparathyroidism varies from 1.2% to 11% in different studies.⁴

The hypo-parathyroidism is rarely the result of inadvertent removal of all parathyroid glands but more commonly due to disruption of their blood supply. Prevention of ischemia to parathyroid gland is important in avoiding this complication. So all branches of inferior thyroid artery should be ligated medial to that artery's branches to parathyroid gland in order to avoid compromised blood flow to the parathyroids. Parathyroids are carefully dissected from thyroid capsule started at a point medial to their blood supply.⁴

Injury to the parathyroid gland during dissection is usually accompanied by a change in color of the gland from tan to black purple. If the gland is devascularized, it should be removed. Gland is simply transplanted or placed into sternocleidomastoid muscle or forearm.⁴ The incidence of hypoparathyroidism is also

directly related to the surgeon's experiences and techniques for thyroid surgery. Out of 50 patients, one patient developed wound infection. This case was managed by exploration and followed by secondary stitch. The frequency of hypoparathyroidism was 14.28% in carcinoma cases and 10.34% in multinodular cases. Whereas it varies from 1.2% to 11% in other studies.^{13,14} In this study, the mortality was nil.

Conclusion

From this study it can be concluded that, a good number of patients still suffers from complications following total or near total thyroidectomy. Hypoparathyroidism and recurrent laryngeal nerve palsy are the commonest complications. Improved surgical techniques and efficient method of complication management can reduce post-operative mortality and morbidity.

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