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Prevalence of Complications after Thyroidectomy at Government Referral Hospitals in Bahirdar City

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ACRONYMS

CTG: Controlled toxic goiter

DO: Dunhills operation

HPT: Hypo-parathyroidism

IOF: Intra operative finding

IP: Incidental parathyroidectomy

NTT: Near total thyroidectomy

RLN: Recurrent laryngeal nerve

RLNI: Recurrent laryngeal nerve injury

SMNG: Simple multinodular goiter

SSI: Surgical site infection

STT: Subtotal thyroidectomy

TFT: Thyroid function test

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Abstract

Background: Thyroidectomy is one of the safest operations performed for patients with thyroid diseases, but at times complications such as recurrent laryngeal nerve injury with airway obstruction, hypocalcemia, cervical hematoma and surgical site infection can arise following thyroidectomy. Even though some of these complications are minor, others are grave and have significantly affected the quality of life of patients and some others have endangered the lives of patients. As to my knowledge, there is limited study done in this city on prevalence of complications after thyroidectomy.

OBJECTIVE: The objective of this study is to determine the prevalence of overall complications after thyroidectomy at government referral hospitals in Bahirdar city.

Methods: Facility based retrospective cross sectional study was conducted on 163 patients operated for thyroid disease between January 1, 2018 and December 31, 2019 in government referral hospitals in Bahirdar city. Structured check list was used to retrieve information from medical records. Data was cleaned, coded and entered to SPSS 20 for analysis.

Result: In this study 163 patients who underwent surgery for thyroid diseases were included. The majority of the patients were in the third and fourth decades of their life and most live outside Bahir Dar city. The most common chief compliant was anterior neck swelling and the most common operation was subtotal thyroidectomy followed by dunhills procedure. Eighteen patients(11%) have developed complications and the commonest complication was voice change(6.1%).

Conclusion and recommendation: Overall prevalence of complication after thyroidectomy was lower than most international studies but the prevalence of voice change was higher than other studies, so intraperative identification and preservation should be encouraged to reduce this complication.

Keywords: **c**omplications, RLNI, hypoparathyroidism, re-exploration, SSI

1. INTRODUCTION

1.1. BACKG ROUND

Thyroidectomy is defined as total or partial removal of the thyroid gland. It is performed when a patient has malignant thyroid disease or some other pathology of the thyroid gland including excess production or release of thyroid hormones (hyperthyroidism) or enlarged thyroid gland (goiter) due to many reasons causing local compression on trachea or esophagus with resultant difficulty in breathing or swallowing respectively and due to the effect of the goiter on cosmoses of the patient. Studies have identified complications which can happen after thyroid surgery which include transient or permanent hypocalcaemia, transient or permanent recurrent laryngeal nerve injury (RLNI), postoperative cervical hematoma, surgical site infection (SSI) and death(Padur et al., 2016, Jatzko et al., 1994, Suzuki et al., 2016, Tartaglia et al., 2016, Safioleas et al., 2006). The prevalence of these complications is variable in the literature and varies based on the specific complication studied but the overall prevalence is 20-24%(Pandey et al., 2015). Injury to recurrent laryngeal nerve (RLN) are the most grave of the complications during thyroidectomy(Hayward et al., 2013). Prevalence of permanent injury to recurrent laryngeal nerve is 0.5% to 5% of the patients, whereas temporary injuries are documented in 1%-30% of thyroidectomies according to various studies (Joliat et al., 2017). This recurrent laryngeal nerve injury is associated with hoarseness of voice which can impact the quality of life and in severe cases can result in severe airway obstruction which is life threatening (Zakaria et al., 2011). Radical surgical resection, recurrent nerve skeletalization, Injury due to electrocautory, surgery for malignant thyroid disease, and operation for recurrent goiter are identified as significant risk factors for RLNI(Pandey et al., 2015). Intraoperative identification and preservation of RLN was shown to reduce the incidence of RLNI after thyroidectomy (Steurer et al., 2002). Hypocalcaemia was another complication of thyroidectomy and its incidence is shown to be variable in studies. The causes of hypocalcaemia were associated transient or permanent injury to parathyroid glands which are vital for calcium metabolism in human body. Lack of intraoperative identification, total thyroidectomy, female sex, reoperation for thyroid diseases and thyroidectomy for malignant conditions of the thyroid gland were some of the risk factors for postoperative hypocalcaemia(Noureldine et al., 2014, Padur et al., 2016). Some studies have suggested preoperative anatomic localization of the parathyroid glands to increase the rate of

intraoperative identification and preservation of the glands to avoid postoperative hypocalcaemia(Shou et al., 2019). Postoperative cervical hematoma after thyroidectomy is a grave complication that can easily endanger the life of the patient due to its ability to cause compression on the adjacent trachea with resultant upper airway obstruction. There has been death due to this postoperative cervical hematoma; the associated factors were male gender, old age, Graves' disease, hypertension, antithrombotic agent use, previous thyroid surgery, bilateral thyroidectomy, and neck dissection(Fan et al., 2019, Lang et al., 2012). Surgical site infection(SSI) is a rare complication after thyroidectomy owing to the clean nature of thyroidectomy wound and good blood supply to the neck region.

1.2. STATEMENT OF THE PROBLEM

There is a significant variation in the literature about the prevalence and associated factors of complications after thyroidectomy. In India, the overall postoperative complication rate was 20%. Incidence of permanent vocal cord palsy observed in 2.5%. In Saudi Arabian study, Incidence of permanent HPT was nil in benign disease and 33% in malignant disorders (Pandey et al., 2015). In Iran and the most common complication was hypocalcaemia with a frequency of 54.4%. this study has identified the skill of the surgeon as important factor to reduce complication(Chahardahmasumi et al., 2019). In a study performed in Italy the prevalence of hypoparathyroidism was between 3.3%-8% (Giuffrida et al., 2019). In this study reoperation was associated with a higher rate of complication. Even though thyroidectomy is one of the most commonly performed procedure by general, endocrine, ENT, and head and neck surgeons in Ethiopia; there are no recent well designed studies done on the prevalence and associated factors of complications with this procedure. This study will help surgeons and patients to reduce the morbidity associated with the complications after thyroidectomy.

1.3. CONCEPTUAL FRAMEWORK

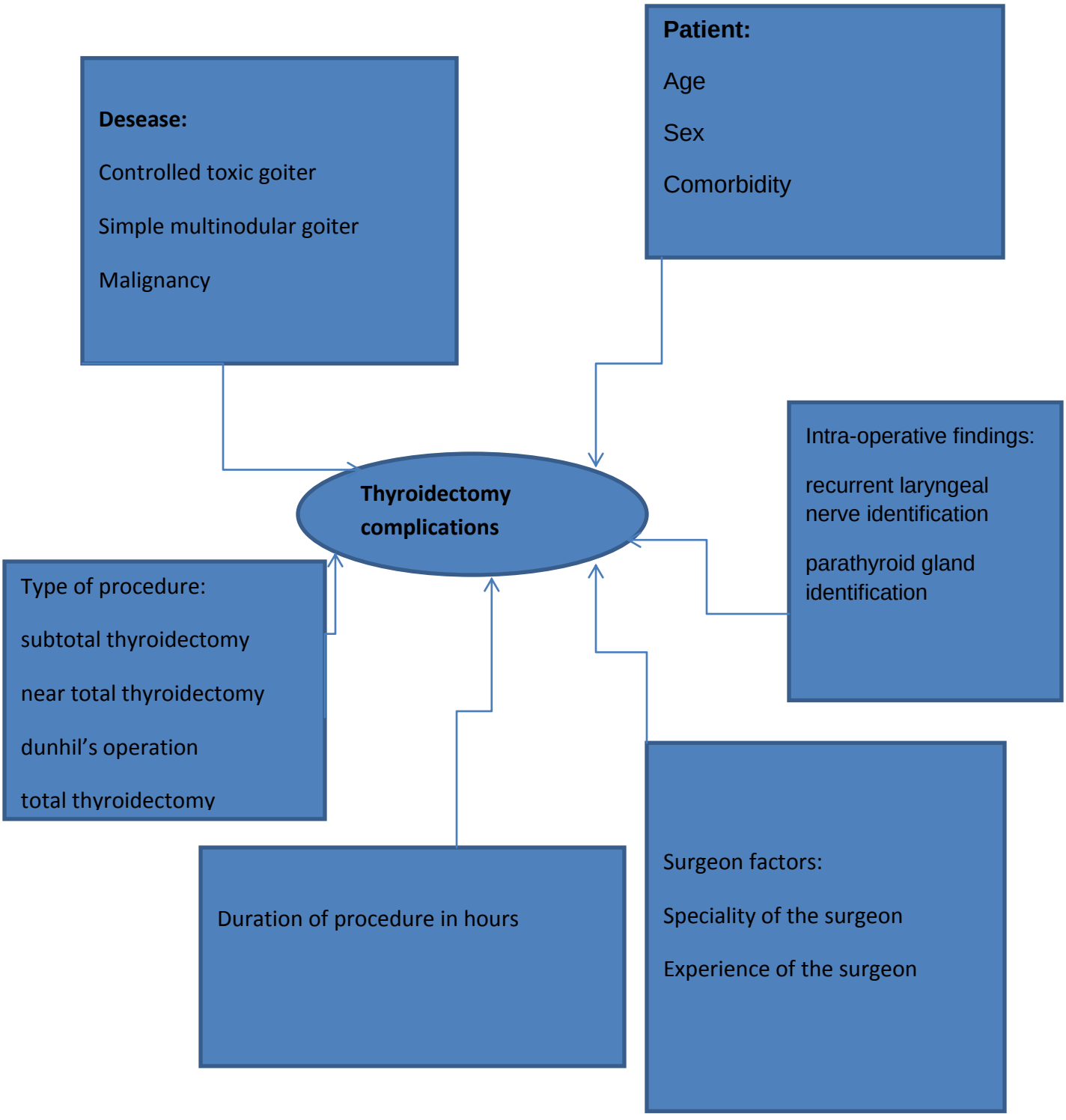

Figure 1: conceptual framework of a study on prevalence of complications after thyroide at referral government hospitals in Bahir Dar city.

2. LITERATURE REVIEW

The prevalence of complications in thyroid surgery has been reported variable in the literature. In a study done in India,the overall postoperative complication rate was 20%. Incidence of permanent vocal cord palsy observed in 2.5%. Extensive surgical resection, surgery for thyroid malignancy, and reoperation are said to be

Independent risk factors for RLNI as found in this study. Incidence of permanent

HPT was nil in benign disease and 33% in malignant disorders(Pandey et al., 2015). Cohort study was done in Iran and the most common complication was hypocalcaemia with a frequency of 54.4%. Skill of the surgeon and age of the patient are found to affect the development of early as well as late complications in some studies (Chahardahmasumi et al., 2019). Another retrospective study done in Italy has shown that the rate of hypoparathyroidism was observed in 3.3% of patients after primary thyroidectomy and in 8% of patients that underwent completion thyroidectomy, while 3.9% patients showed transient hypoparathyroidism. Hypoparathyroidism mostly occurred in patients presenting with extensive extra thyroidal tissue involvement by the tumor or in patients who underwent secondary thyroidectomy. Permanent recurrent laryngeal nerve palsy was observed in 1.1% of all patients after total thyroidectomy(Giuffrida et al., 2019). In a meta-analysis done in China the incidence of IP in thyroidectomy ranged from 2.9% to 31.0%. studies have found the association betweeen malignancy, central neck dissection, total thyroidectomy.reoperation and incidental parathyroidectomy(IP) and in turn, IP was found to increase the incidence of temporary and permanent postoperative hypocalcaemia(Bai et al., 2018). Randomized prospective study done in India showed the incidence of postoperative hypocalcaemia to be 16.37% (however, only 1 patient developed permanent hypocalcaemia) and the prevalence of wound infection and seroma formation was 2.58% (Gangappa et al., 2016). However other studies have shown a high prevalence of RLNI, in a retrospective study in King Fahd hospital of the University, Al-Khobar, Saudi Arabia, the rate of RLNI was 12.8% in malignant thyroid disease and the transient RLN injury rate was 2.9%, and permanent in 0.33% in the benign ones and like other studies the rate was highest (21.7%) in recurrent goiter cases(Zakaria et al., 2011). Transient RLNI rate was 1.9% in subtotal compared to 7.2% in total/ near total thyroidectomy this value shows the variation of RLNI prevalence with the type of operation performed(Zakaria et al., 2011). In article review done in turkey, the rate of permanent recurrent laryngeal nerve palsy was 0.8% for bilateral subtotal thyroidectomy, 1.4% for Dunhill

procedure, and 2.3% for total thyroidectomy. The prevalence is dependent on the type of the procedure performed, permanent hypoparathyroidism occurred in 1.5% following subtotal resection, in 2.8% after Dunhill procedure, and 12.5% after total thyroidectomy(Makay, 2017). Multivariate analysis showed that the extent of surgical resection significantly increased the risk of recurrent laryngeal nerve injury and hypocalcemia(Makay, 2017). However in another study done in Serbia the incidence of complications was not statistically significantly different in relation to the type of surgical intervention (Bojic et al., 2015). In a study done in Maryland USA, mild and significant hypocalcemia occurred in 22.4% and 29.9% patients, the majority of which affected women(Noureldine et al., 2014). The development of significant hypocalcemia was associated with female sex, and presence of malignant disease after total thyroidectomy(Noureldine et al., 2014). In another retrospective systematic review done in India, the incidence of temporary hypocalcemia was 24%, permanent hypocalcemia was 3%. and the incidence of recurrent laryngeal nerve injury was 1% and malignancy and thyrotoxicosis are associated with high incidence of these complications(Padur et al., 2016). Incontrast, another study done in Wisconsin USA has shown no association between the prevalence of hypocalcemia and the age, gender, or thyroid pathology(Youngwirth et al., 2010). In a study which was undertaken in Switzerland, the incidence of RLNI was 14% after thyroid surgery and a previous reoperation is the associated factor(Joliat et al., 2017).

In another study done in Tokyo, Japan the prevalence of neck hematoma requiring intervention was 1.8%. This study identified that surgery for Graves' disease, total thyroidectomy (benign or malignant), thyroidectomy for malignant tumor, and thyroidectomy with neck dissection were independent risk factors for wound hematoma requiring early intervention(Suzuki et al., 2016). Institution based study in china identified the prevalence of postoperative neck hematoma to be 0.7 % with history of previous thyroid operation and large dominant nodule as identified independent risk factors for hematoma formation after thyroidectomy(Lang et al., 2012). In a retrospective study done in Germany, the rate of permanent recurrent laryngeal nerve (RLN) palsy was between 0.8(for bilateral subtotal thyroidectomy) and 12.5% for total thyroidectomy showing the significance of the type of procedure in determining the prevalence of recurrent laryngeal nerve injury(Thomusch et al., 2003). The extent of surgical resection, the surgeon's experience and identification of the RLN reduced the risk of permanent RLNI(Thomusch et al., 2000).The development of permanent hypocalcemia was reduced if at least two parathyroid

glands were preserved (Thomusch et al., 2003, Thomusch et al., 2000). In a study done in Italy the prevalence of permanent RLNI was o.4%, permanent hypoparathyroidism was 2% and postoperative hemorrhage was 1.3%(Rosato et al., 2000). A study done in France has shown that the prevalence of RLNI was 2.6%, and hypocalcemia has occurred in 1.2% with systematic dissection of recurrent laryngeal nerve showing reduced injury to RLN(Megherbi et al., 1992). In another Austrian study the incidence of permanent recurrent laryngeal nerve injury was 0.5% and identification of recurrent laryngeal nerve intra-operatively had significantly lowered the rate of injury(Jatzko et al., 1994). Serbian study has shown overall complication rate of 14.3% with most common complication being recurrent laryngeal nerve injury in 9.3% of the patients, postoperative hypocalcemia in of 4.7% of the patients (persistent in 1.3%) and reoperations, more extensive surgical resection, malignant diseases and hyperthyroidism were associated with higher prevalence of complications(Ignjatović et al., 2003).

In a study done at Tikur Anbessa, 3% of patients operated for thyroid disease had significant intraoperative hemorrhage requiring blood transfusion, otherwise the prevalence of RLNI, and hypocalcemia were not mentioned in numbers(Kotisso et al., 2004).

In another study done in Tikur Anbessa, postoperative complication; hematoma and respiratory obstruction, were seen in 12% of the cases(Messele and Tadesse, 2003, Giuffrida et al., 2019).

3. SIGNIFICANCE OF THE STUDY

This study is important to assess the magnitude of complications during thyroid surgery at government referral hospitals in bahirdar city.

The finding of this study will help to reduce the incidence of complications in patients who are going to undergo thyroid surgery in our institution in particular and in our country in general by identifying factors that increase these complications.

This will also help us to compare the outcome of the procedure with international standards and help improve our practice to the current state of art care.

This will also act as a base line for other researchers to do further study in the field and contribute to the scientific community by providing a recent study in the region.

4. OBJECTIVE OF THE STUDY

To determine prevalence of overall complications after thyroidectomy at referral government hospitals in Bahirdar city

5. METHODS

5.1. STUDY AREA AND PERIOD

The study was conducted from January 1, 2018 to December 31, 2019 at the two referral government hospitals in Bahir Dar city, Amhara National and Regional state, North West, Ethiopia. Bahir Dar is the capital city of Amhara National Regional State, located 565 km Northwest of Addis Ababa with an altitude of 1799 meters above sea level with warm and temperate climate with estimated population of 168,899 as per 2016 World population review. There are two referral government hospitals in Bahir Dar city. Among these hospitals Tibebe Ghion Specialised Hospital is a specialized and teaching university hospital which gives service for more than 5 million populations. In this hospital there are 100 surgery beds with 45 Residents and 25 surgeons with different speciality. Felege Hiwot comprehensive Specialized Hospital is another hospital in the city which belongs to Amhara National and Regional state and it services for more than 5 million populations. The hospital has 90 surgery beds with 8 surgeons.

5.2. STUDY DESIGN

Facility based cross sectional study

5.3. SOURCE POPULATION

All patients operated for thyroid diseases in two referral government hospitals in bahirdar city

5.4. STUDY POPULATION

Patients operated for thyroid disease(undergone thyroidectomy) in two referral government hospitals in Bahir Dar city from January 1,2018 to December 31, 2019 who fulfill the inclusion criteria

5.5. INCLUSION CRITERIA

All adult patients operated for thyroid disease in two referral government hospitals in Bahir Dar city during January 1, 2018 to December 31, 2019

5.6. EXCLUSION CRITERIA

All patients with incomplete recording were excluded from the study.

5.7. SAMPLE SIZE DETERMINATION

Sample size will be determined using single population proportional formula. The total sample size will be calculated using the following assumption to come up with final sample size.

Confidence level =95%

Margin of error (precision) = 5%

Prevalence of complication of 12%(local study with largest magnitude) as study done in Addis Abeba, Ethiopia (Messele and Tadesse, 2003).

$$n = \frac{z^2 p(1-p)}{d^2}$$

Where n = sample size, p=0.12, d = 0.05(5 % error of margin), z= 1.96 (standard normal probability for 95% CI) sample size will be 163.

5.8. STUDY VARIABLES

5.8.1. INDEPENDENT VARIABLES

- Age
- Sex
- Place of residence
- Duration of compliant
- Previous surgery for the same compliant
- Diagnosis at admission
- Type of procedure
- Specialty of surgeon

- Experience of the surgeon
- RLN identification
- Parathyroid gland identification
- Duration of procedure

5.8.2. DEPENDENT VARIABLES

Thyroidectomy complication

5.9. OPERATIONAL DEFINITIONS

Complication: development of voice change that persist beyond six months, hypoparathyroidism, cervical hematoma that required re-exploration or surgical site infection after the operation in the hospital or during follow up period.

5.10. DATA COLLECTION AND TOOLS

The data was collected using structured check list and include information regarding socio-demographic character, disease factors, surgeon factors, intraoperative factors and postoperative condition of the patient. Data was collected by two General practitioners and supervised by one General practitioner in each hospital.

5.11. SAMPLING TECHNIQUE

Systematic sampling technique was used.

5.12. DATA PROCESSING AND ANALYSIS

Data was entered to SPSS 20 software packages for analysis. Descriptive statistics was computed. The results were described using tables and graphs.

5.13. DATA QUALITY CONTROL

Orientation on how to carry out data collection was given for the data collectors. Before collecting data, the check list was tested by using 5% of the total sample size to check the

consistency of the check list format and the data collector's performance. The check list was modified based on the pretest results.

5.14. ETHICAL CLEARANCE

Ethical approval was obtained from the institutional review board of college of medicine and health sciences at Bahir Dar University.

5.15. DISSEMINATION OF RESULTS

Findings of the study will be submitted to TGSH and FHRH, Bahir Dar University and Amhara Regional Health Bureau. It will also be submitted for scientific publications.

6. RESULT

A total of 163(55 from TGSH and 108 from FHRH) records of patients operated for thyroid disease were analysed. The ratio of females to males was 5.2: 1 and the mean age of the patients was 42.5 years with the minimum age of 23 and maximum age of 75. Considering their residence majority of the patients were from outside Bahirdar City(58.9%) most of whom traveled a significant distance to arrive at referral Hospitals at Bahir Dar City.

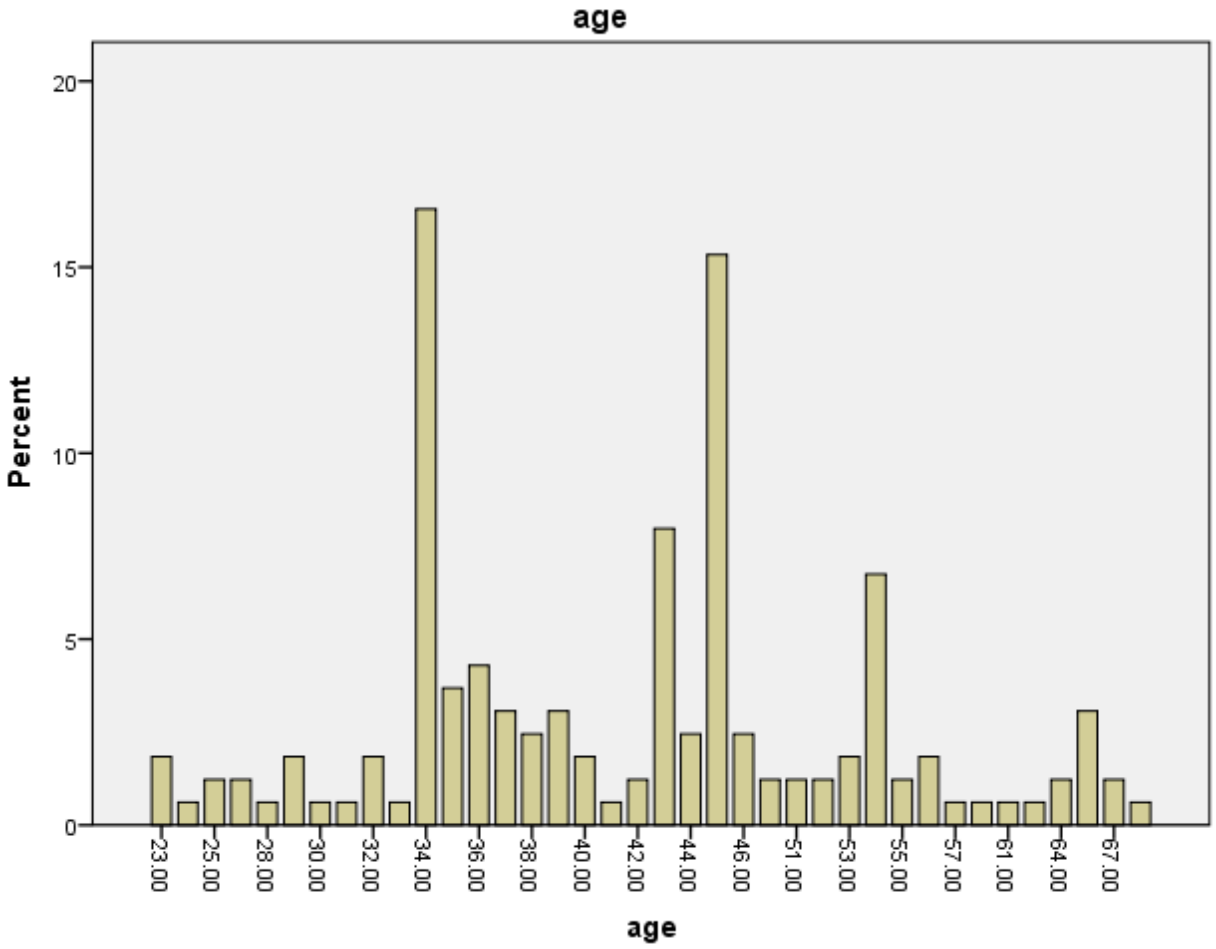

Figure 2 Age distribution of patients on prevalence of complications after thyroidectomy at referral government hospitals in bahirdar city

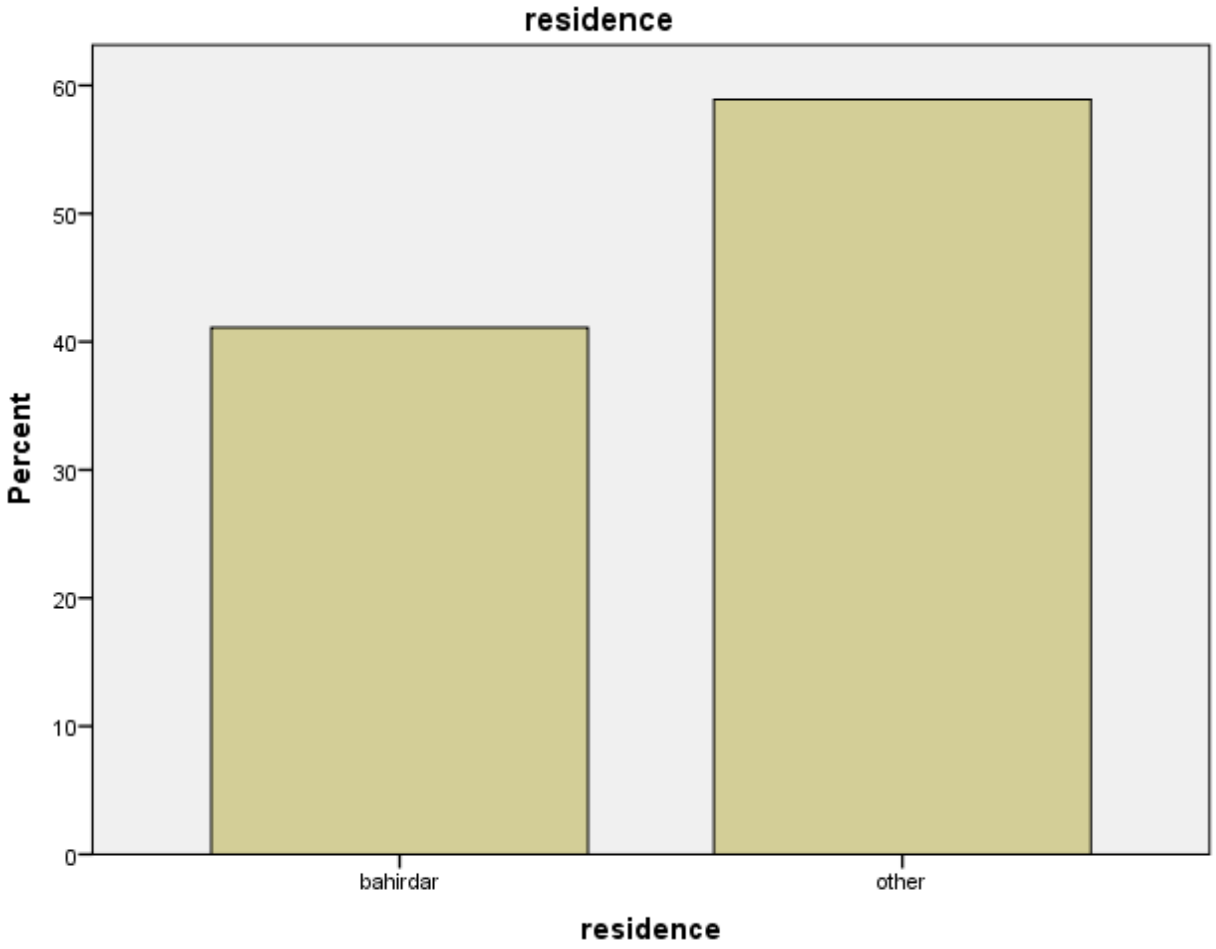

Figure 3. Residence of patients on prevalence of complications after thyroidectomy at referral government hospitals in bahirdar city

Table 1. Distribution of sex, chief compliant and duration of chief compliant on prevalence of complications after thyroidectomy at referral government hospitals in bahirdar city

Variable		Frequency	percent
Sex	Male	26	16.0
	Female	137	84.0
Chief compliant	Anterior neck swelling	147	90.2
	Heat intolerance	15	9.2
Duration of chief compliants	Weeks	3	1.8
	Months	27	16.6
	Years	133	81.6

Most of the patients (57.1%) have come by themselves and significant number(42.9%)of them have come by a referral from other health institutions.
Majority(84.5%) of the referrals are from other government institutions.
The bulk of referrals are due to patient preference (36%) and absence of operation theater facility (34%) in the referring institutions.

The majority(89%) of the patients are admitted with a diagnosis of controlled toxic goiter(54%) and simple multinodular goiter(35%) and most of them had been on antithyroid drugs for months and years before surgery. In patients with simple multinodular goiter the reason for admission was compressive symptoms. There were six cases of carcinoma(most of them were papillary type) and there were three cases of graves' disease and three cases of toxic solitary nodule.

Table 2. Admission diagnosis on prevalence of complications after thyroidectomy at government referral hospitals in bahirdar city

Diagnosis	Frequency	percent
SMNG	57	35.0
CTG	88	54.0
graves disease	3	1.8
carcinoma	6	3.7
controlled solitary nodule	5	3.1
other	3	1.8

After admission to the hospital majority (51%) of the patients were operated within 1-2 days of admission and another 40% of the remaining patients were operated within 3-4 days of admission to the hospital.

Most of the patients were operated by general surgeons and residents of general surgery.

Bilateral subtotal thyroidectomy, lobectomy and and dunhills procedure were the most commonly performed procedures.

Table 3. Operation performed on prevalence of complications after thyroidectomy at government referral hospitals in bahirdar city

Type of procedure	Frequency	Percent
total thyroidectomy	2	1.2
total thyroidectomy with neck dissection	4	2.5
bilateral subtotal thyroidectomy	62	38.0
near total thyroidectomy	16	9.8
dunhills procedure	36	22.1
lobectomy	43	26.4

Considering the specialty of the surgeon, 73% of the procedures were performed by general surgeons, 21% by general surgery residents and 9% were by head and neck surgeon.

Duration of the procedure in majority was 1-2 hrs and in most of the cases recurrent laryngeal nerve and parathyroid glands were not identified. Complications have occurred in 19 of 163 patients (11.7%)

Most frequent post operative complication was hoarsness of voice which occurred in ten patients and has persisted for more than six months postoperatively. Four patients have developed symptomatic hypocalcemia; three patients have SSI and one patient has developed cervical hematoma requiring exploration and evacuation.

Table 4. Complication by type on prevalence of complications after thyroidectomy at government referral hospitals in bahirdar city

Type of complication	Frequency	Percent
airway obstruction	2	1.2
hypocalcemia	4	2.5
hoarseness of voice	10	6.1
ssi	3	1.8
Total	19	11.7

Postoperatively about 70% were discharged within two days of operation and about 96%were discharged within five days of surgery.

All of the patients had improved after the surgery from their initial compliant.

Most of the patients did not have biopsy or thyroid function tests.

7. DISCUSSION

In this study the ratio of females to males was 5.2: 1 which was lower than a study in india(Gangappa et al., 2016), similar to the one in gonder and it is comparable to study in Saudi Arabia(Zakaria et al., 2011). Majority of the patients are in their third and fourth decades which was consistent with other studies (Zakaria et al., 2011, Gangappa et al., 2016).

The majority of the patients have come after years of compliant which could indicate the distance of their residence from the health institution and it was consistent with a study in gonder in which most have come after four years of anterior neck swelling.

Almost all of the patients have come with a compliant of anterior neck swelling and/or heat intolerance comprising more than 99% of the patients

Most of the patients were operated with in five day of admission to the hospital and the most frequent operation performed was subtotal thyroidectomy and dunhills procedure.

There were a total of 19 postoperative complications recoreded (11.7%) which was lower than othe studies(Pandey et al., 2015) internationally, of which 10 (6.1%)were voice change attributed to recurrent larygeal nerve injury whose prevalence in this study was significantly higher than other international studies(Zakaria et al., 2011) , 3 were hypocalcemia secondery to hypoparathyroidism, 3 were surgical site infections which were treated by simple wound care but have significantly affected the quality of life of the patient and 2 were airway obstructions requiring hematoma evacuation emergently. Both of these patients were operated on the same day of the operation and have required blood transfusion during their stay in the hospital.

The prevalence of hypocalcemia in this study was 2.5% which was lowe than similar study in India(Pandey et al., 2015)

The prevalence of SSI in this study was 1.8% which was higher than other similar studies in Wisconsin, USA(Elfenbein et al., 2014).

8. CONCLUSION AND RECOMMENDATIONS

The overall complication rate was lower than other similar international studies.

The most common complication was hoarsness of voice secondary to recurrent nerve injury and this has caused significant worry to the patient and has significantly affected the quality of life of the patient.

Every effort must be made to identify recurrent laryngeal nerve and parathyroid glands to reduce the rate of injury to these essential structures whose injury has significant impact on the quality of life of patients.

Hospital stay after admission and before surgery should be minimized as much as possible by preoperative optimization of patients and adequate preparation by the operating room team to minimize cancellation of procedures on the day of surgery.

Laryngoscopy should be done for all patients preoperatively and post operatively to see the position of the vocal cords.

There should be biopsy and TFT on follow up.

9. LIMITATION OF THE STUDY

The study design must be prospective to follow and record all the complications

Absence of laryngoscopy result for patients who developed persistent voce change postoperatively.

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11. ANNEXES

11.1. ANNEXE I DECLARATION

This is to certify that the thesis entitled “prevalence of complications after thyroidectomy at government referral hospitals in Bahir Dar City”submitted in partial fulfillment of the requirements for the speciality in general surgery in Department of General Surgery Bahir Dar University, is a record of original work carried out by me and has never been submitted to this or any other institution to get any other degree or certificates. The assistance and help I received during the course of this investigation have been duly acknowledged.

Name of the candidate	Date	Place

11.2. ANNEX II Approval of thesis for defense

I hereby certify that I have supervised, read, and evaluated this thesis titled "Prevalence of complications after thyroidectomy at government referral hospitals in bahirdar city" by Tekalign Grmiso prepared under my guidance. I recommend the thesis be submitted for oral defense (mock-viva and viva voce).

Dr Melesse Gebeyehu(MD, General and Head and Neck surgeon)

Advisor's name Signature _____ December 2020

11.3. ANNEX III Examiner's approval form

We hereby certify that we have examined this thesis entitled "Prevalence of complications after thyroidectomy at government referral hospitals in bahirdar city" by Tekalign Grmiso.

We recommend and approve this thesis as a partial fulfillment for speciality in General Surgery

Board of Examiners

_____	_____	_____
External examiner's name	Signature	Date
_____	_____	_____
Internal examiner's name	Signature	Date
_____	_____	_____
Chair person's name	Signature	Date

11.4. ANNEX II DTA COLLECTION CHECKLIST

BAHIRDAR UNIVERSITY COLLEGE OF MEDICINE AND HEALTH SCIENCES, DEPARTMENT OF SURGERY

Part I. Socio-demographic condition, encircle one answer after reading it carefully.

1. Age of the patient_____
2. Place of residence_____
3. Sex of the patient
    A. Male
    B. Female

Part II. Information on chief compliant

1. What was the chief compliant?
    A. Anterior neck swelling
    B. Heat intolerance
    C. Cold intolerance
    D. SOB/difficulty on swallowing
    E. Voice change
    F. Other specify_____
2. Duration of chief compliant_____
3. How did you come to this hospital?
    A. By myself
    B. By referral from other institution
4. If by referral, from where were you referred from?
    A. Other government health facility
    B. Private health facility
5. If by referral what was the reason for referral?
    A. Patient preference
    B. Absence of surgeon
    C. Absence of investigation modality

D. Absence of operation room facility

E. Other sepecify_____

Part III. Information on diagnosis on admission

1. What was the diagnosis on admission?
   A. Simple multinodular goiter
   B. Controlled Toxic multinodular goiter
   C. Graves' disease
   D. Thyroid carcinoma
   E. Controlled Toxic solitary nodule
   F. Other specify_____
2. If simple multinodulargoite, what was the reason for admission?
   A. SOB
   B. Difficulty of swallowing
   C. Cosmosis
   D. Other specify_____
3. If controlled toxic goiter how long has she/he been on medication?
   A. >6 weeks
   B. 6 weeks- 3 months
   C. 3 months-6 moths
   D. 6 months- 1 year
   E. >1 year
4. If thyroid carcinoma, what was the histologic type?
   A. Papillary carcinoma
   B. Follicular neoplasia
   C. Anaplastic carcinoma
   D. Other specify_____
5. How long did she/he stay in the hospital before surgery?
   A. Operated the next day

B. 2-3 days

C. 3days -1 week

D. 1-2 weeks

E. Other specify_____

Part IV. Information on operation

1. What was the specialty of the surgeon who did the operation?
   A. General surgeon
   B. ENT surgeon
   C. Head and neck subspecialist
   D. General surgery resident
   E. Other specify_____
2. Experience of the surgeon
   A. <1 year
   B. 1-3 years
   C. 4-5 years
   D. >5 years
3. If done by a general surgery resident, who was the consultant?
   A. General surgeon
   B. ENT surgeon
   C. Head and neck subspecialist
   D. Other specify----------
4. What was the operation performed?
   A. Total thyroidectomy
   B. Total thyroidectomy with neck dissection
   C. Bilateral subtotal thyroidectomy
   D. Near total thyroidectomy
   E. Dunhills' procedure
   F. Other specify----------

5. If neck dissection was done, what was the type of neck dissection?
    A. Central
    B. Modified
    C. Radical
    D. Selective
    E. Other specify----------
6. If B for question number 5, what was the specific type of dissection?
    A. Type I
    B. Type II
    C. Type III
7. How long did the procedure take?

    _____
8. Did you identify recurrent laryngeal nerve intra-operatively?
    A. Yes
    B. No
9. Did you identify parathyroid glands intra-operatively?
    A. Yes
    B. No
10. Did you encounter any problem intraoperatively?
    A. Yes
    B. No
11. If yes to question number 8, please specify----------

Part V. post-operative condition

1. Did the patient develop post-operative problem?
    A. Yes
    B. No
2. If yes what was the problem?
    A. Cervical hematoma requiring surgical re-exploration

B. Airway obstruction
C. Hypo-calcemia
D. Hoarseness of voice
E. Seroma collection
F. Surgical site infection
G. Other specify----------

3. If airway obstruction was developed, what was the cause?
   A. Cervical hematoma collection
   B. RLN injury
   C. Tracheomalacea
   D. Other specify----------
4. If airway obstruction, how was it treated?
   A. By tracheostomy
   B. Conservatively
   C. Other specify
5. If voice change has occurred, how long did it stay?
   A. 24 hrs
   B. >24 hrs
6. If hypocalcemia, how was it treated?
   A. By IV calcium gluconate
   B. By PO calcium chloride
   C. Other specify----------
7. How long did the patient stay in the hospital after operation?
   A. <3 days
   B. 3 days-1 week
   C. >1 week
   D. Other specify----------
8. If the patient stayed more than 3 days, what was the reason?
   A. SSI

B. Hospital acquired infection
C. RLN injury
D. Hypocalcaemia
E. Other specify----------

Part VI. Information on follow up

1. Has the initial chief compliant improved on follow up?
   A. Yes
   B. No
2. If no to question number 1, specify it----------
3. Does the patient has TFT on follow up?
   A. Yes
   B. No
4. If yes, what is the result?
   A. Euthyroid
   B. Hyperthyroid
   C. Hypothyroid
5. Does the patient has biopsy result on follow up?
   A. Yes
   B. No
6. If yes to question number 5, what is the result?
   A. Benign
   B. Malignant with free margin
   C. Malignant with positive margin
   D. Other specify
7. Does the patient develop recurrent problem on follow up?
   A. Yes
   B. No
8. If yes to question number 7, after how long did the patient develop the recurrence?

A. <1 year

B. 1-2 years

C. >2 years

9. if yes to question number 7, what was the recurrent problem?

A. SMNG

B. Toxic goiter

C. Thyroid carcinoma

D. Other specify

10. What was the pathology on recurrence?

A. Benign

B. Malignant