INCIDENCE OF POST-THYROIDECTOMY HYPOCALCAEMIA IN KENYATTA NATIONAL HOSPITAL.

This dissertation is submitted in part fulfillment for the award of the degree of Master of Medicine in General Surgery of the University of Nairobi.

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DECLARATION:

Student's Declaration;

This Dissertation is my original work and has not been presented at any other university.

Signature……. Date……

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DEDICATION

This work is dedicated to my dear mother, Sarah Njiro Mwige for her unique outlook on life.

ACKNOWLEDGEMENT

Special appreciation to my supervisors; Dr. Nyaim Elly Opot and Dr. Kiptoon Dan Kipkemboi whose contribution has been invaluable throughout the period of this study.

Sincere gratitude goes to my family for their unwavering support and encouragement and to Almighty God for this wonderful opportunity to pursue my dreams.

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ABBREVIATIONS

Ca - Calcium

CA - Carcinoma

Dkt - Daktari

Dr - Doctor

ERC - Ethics and Research Committee

KNH - Kenyatta National Hospital

OR - Odds Ratio

Post-op - Post-operative

Pre-op - Pre-operative

PTH - Parathyroid hormone

SOPC - Surgical Out-Patient Clinic

SPSS - Statistical Package for Social Sciences

T3 - Triiodothyronine

T4 - Thyroxine

TSH - Thyroid Stimulating Hormone

UON - University of Nairobi

ABSTRACT

Background:

Thyroidectomy is a major and frequent operation in Kenyatta National Hospital with hypocalcaemia as a common and serious complication resulting in significant morbidity.

Objective:

To determine the incidence of post-thyroidectomy hypocalcaemia in Kenyatta National Hospital.

Study design:

Prospective descriptive cohort study.

Setting:

Surgical Out-patient Clinic, Surgical wards, Theatre and Renal Unit - Biochemistry laboratory.

Patients and methods:

Twenty-five (25) patients aged 17 to 74 years scheduled to undergo elective thyroidectomy were enrolled into the study from April to October, 2014. Blood for serum calcium and albumin levels was collected pre-operatively; within 48 hours and 2 weeks post-operatively, and submitted to the Renal Unit biochemistry laboratory. Data was collected using a structured questionnaire.

Main outcome measure:

The calculated ionized calcium levels pre-operatively and post-operatively within 48 hours and at 2 weeks.

Data analysis:

Data was entered into a secured access database. Differences in the patients who developed post-thyroidectomy hypocalcaemia were calculated using the $\chi 2$ test for categorical variables and the Mann-Whitney U test for continuous variables using SPSS version 18. Regression was used to determine the Odds Ratio of developing hypocalcaemia. Data was presented in tables, graphs and charts.

Results:

The overall incidence of post-thyroidectomy hypocalcaemia using calculated ionized calcium levels was 68%. In patients with pre-operative hypocalcaemia, 80% developed post-operative hypocalcaemia versus 60% in patients with pre-operative normocalcaemia.Patients who underwent bilateral surgery had a higher incidence (80%) of post-operative hypocalcaemia versus 50% for those who had unilateral surgery. All the patients who underwent unilateral surgery developed mild hypocalcaemia while those who underwent bilateral surgery developed mild and severe hypocalcaemia at 75% and 25% respectively. The patients had a median age of 39 years. An increase in age did not increase risk of developing hypocalcaemia. Male patients were 84% less likely (odds ratio/OR 0.156) to get post-thyroidectomy hypocalcaemia but the P value of 0.09 was not significant. All the patients in the study were asymptomatic.

Conclusion:

Post-operative hypocalcaemia is common in patients undergoing thyroid surgery in our set-up. Patients who underwent bilateral surgery and those with pre-operative hypocalcaemia had a higher incidence of post-operative hypocalcaemia. An increase in age did not increase risk while female patients were more likely to develop post-thyroidectomy hypocalcaemia.

1.0 INTRODUCTION

Thyroidectomy is one of the major and frequent operations performed in general surgical units. The most notable thyroid surgeons were Kocher (1841–1917) and Billroth (1829–1894). Kocher collected data on 268 thyroid operations and identified recurrent laryngeal nerve injury, myxoedema and tetany as serious post-operative complications.[1, 2, 3, 4]

The normal total calcium concentration in plasma is 2.25-2.55mmol/L. Fifty percent is ionized, 40% is bound to proteins (90% binds to albumin), and 10% circulates bound to anions (phosphate, carbonate, citrate, lactate, and sulphate). Ionized calcium is the necessary plasma fraction for normal physiologic processes. The levels of ionized calcium are rigidly controlled by parathyroid hormone (PTH), vitamin D and calcitonin through complex feedback mechanisms. The absence or deficiency of PTH (hypoparathyroidism) results in hypocalcaemia.[5, 6,7,8,9]

Hypoparathyroidism is one of the most common and serious complications from thyroid and parathyroid surgery resulting from direct trauma to the parathyroid glands, devascularisation of the glands, or removal of the glands during surgery. Fortunately, in most instances post-operative hypoparathyroidism is a temporary condition. However, when it is permanent, the patient is committed to lifelong symptomatic treatment with calcium, and/or Vitamin D. To avoid this complication, the surgeon must make every effort to preserve one or more viable parathyroid glands, particularly while performing a total or subtotal thyroidectomy.[2, 10, 11, 12]

Hypocalcaemia after thyroidectomy is initially asymptomatic in most cases. Clinical manifestations of hypocalcaemia may appear between 1 to 7 days after surgery. The symptoms and signs of hypocalcaemia result from increased neuromuscular excitability caused by low levels of ionised calcium. If it is not treated, the patient will develop potentially life-threatening manifestations, such as carpopedal spasm, tetanic seizures, and laryngeal spasm.[9, 11, 12]

Evaluation of parathyroid function is performed by measuring either ionised calcium (or total calcium and albumin) and phosphate levels perioperatively, or PTH postoperatively.[9, 11, 12]

Hyperthyroidism was the second most common endocrine disorder seen in KNH after Diabetes Mellitus in 2003. During the study period 39% of the hyperthyroid patients were managed surgically, with better long-term outcomes than those managed medically. During

the immediate post-operative period, 5% patients developed hypocalcaemictetany. The long-term outcome of surgery in 80% patients followed up for more than one year showed that 6% developed chronic hypoparathyroidism.[13]

1.1 LITERATURE REVIEW

Hypoparathyroidism is a condition of parathyroid hormone (PTH) deficiency and is the commonest cause of hypocalcaemia and often develops post-thyroidectomy, although thyroidectomy is still considered a safe procedure. It is a major cause of post-operative morbidity and affected patients might require a prolonged hospital stay and life-long supplementation with calcium and vitamin D. Hypocalcaemia occurs when the concentration of ionized calcium in serum falls below 4.4mg/do or 1.1mmol/L.[5,6,8,9]

Hypoparathyroidism and the resulting hypocalcaemia can either be temporary or permanent. The cut-off threshold is generally considered to be 6 months. It is usually temporary but some cases can become permanent. Temporary hypocalcaemia is further divided into two categories; transient (<1 month), and prolonged (1 to 6 months). Transient temporary hypocalcaemia often resolves after a few days. Prolonged temporary hypocalcaemia can progress to permanent hypocalcaemia if not successfully treated.[11, 14,15,16,17]

The reported incidence of temporary hypocalcaemia following thyroid surgery ranges widely from 1.6-71%, while the incidence of permanent hypocalcaemia is 0.4-13.8%.[16, 18, 19, 20]

Transient hypocalcaemia is the most frequent complication after total thyroidectomy and continues to challenge even the experienced surgeon.[2, 10,12,21,22]

It is equally important to identify whether hypocalcaemia is temporary and transient, temporary and prolonged, or permanent because this not only influences the type and duration of treatment, but it can also affect the incidence of pharmacologic side-effects.[23]

Some surgeons believe that a one day postoperative hospital stay is sufficient for post-thyroidectomy patients. However, the risk of severe post-operative hypocalcaemia is a limiting factor.[15, 24, 25, 26]

Individual surgical experience is significantly associated with decreased complication rates and length of stay post-thyroidectomy. Higher-volume surgeons were found to have the shortest length of stay and lowest complication rates. Thyroid surgery can also be performed

safely in a surgical residency training program under direct supervision of an experienced surgeon with little morbidity to the patients.[14, 15,24,25,26]

Extra capsular total thyroidectomy has been shown to reduce any injury to the parathyroids and to the recurrent laryngeal nerves. In recent years, total thyroidectomy and near-total thyroidectomy have emerged as the preferred surgical options in the surgical treatment of patients with non-toxic multi-nodular goitre, especially in endemic iodine-deficient regions.[3,22,27,28,29]

Aging is associated with a decrease in defence mechanisms against hypocalcaemia. Being older than 50 years was associated with an increased risk of postoperative hypocalcaemia in patients who underwent total thyroidectomy.[30]

A study was carried out in patients undergoing thyroidectomy to identify factors increasing the risk of postoperative hypocalcaemia. 83% of all patients experienced hypocalcaemia postoperatively, with 13% requiring treatment for symptoms. Patients with advanced thyroid cancer, substernal thyroid disease, Graves' disease, or other manifestations of preoperative hyperthyroidism had significantly increased rates of hypocalcaemia compared to patients with small cancers or benign euthyroid disease. Independent predictors of transient hypocalcaemia included levels of pre-operative calcium, peri-operative parathyroid hormone (PTH), pre-operative 25-hydroxyvitamin D and postoperative magnesium.[16, 20, 31]

Total thyroidectomy, repeat thyroidectomy, near-total thyroidectomy, and thyroidectomy plus neck dissection all significantly increase the incidence of hypocalcaemia, whereas lobectomy or subtotal thyroidectomy for benign euthyroid disease are considered low risk operations. As more of the thyroid gland is inadvertently removed, the risk of hypocalcaemia rises. Inadvertent excision and auto-transplantation of more than one parathyroid gland during thyroidectomy and female sex also significantly increases the rate of hypocalcaemia.[11, 20,26,31,32]

Hemi-thyroidectomy is reported in some studies, not to increase the incidence of hypocalcaemia. After unilateral thyroid lobectomy ionized calcium, PTH, and calcitonin levels were unchanged, but total calcium level decreased because albumin level decreased. After bilateral thyroid lobectomy, ionized calcium decreased due to decreased PTH level and calcitonin level did not change while total calcium level decreased due to a decrease in albumin-bound calcium level.[14, 33]

In a prospective study on the morbidity of thyroid surgery in more than a thousand patients over 50 months, high surgical volume and identifying the parathyroid glands failed to reduce morbidity. Temporary hypoparathyroidism rates were higher after parathyroid auto-grafting or accidental excision. Completion and total thyroidectomy with node dissection increased the rate of permanent hypoparathyroidism.[20, 34]

In a retrospective study of 152 patients who underwent thyroidectomy in two teaching hospitals in Jordan, post-operatively forty-four (29.0%) had their serum calcium decreased but remained within the normal range. Ten (6.6%) patients developed transient hypocalcaemia while four (2.6%) had permanent hypocalcaemia. Ten (6.6%) of the patients had inadvertent removal of parathyroid glands but only one (0.06%) developed transient hypocalcaemia which resolved within a few days.[1]

In a prospective study of 50 patients who underwent thyroidectomy in Sudan, incidence of post-operative hypocalcaemia was about 22%. The study also found that total thyroidectomy increased the risk of post-operative hypocalcaemia, while ligation of the inferior thyroid arteries and operations done by registrars (once the technique is mastered) did not increase this risk.[35]

In a study carried out in KNH in 2003, hyperthyroidism was the second most common endocrine disorder to diabetes mellitus. During the study period 39% of the patients were managed surgically. In the immediate post-operative period 5% developed hypocalcaemictetany, while 6% developed chronic hypoparathyroidism after follow-up for more than one year.[13]

Patients having undergone a procedure where all parathyroid glands have been placed at risk for injury should undergo evaluation for iatrogenic hypoparathyroidism. A normal post-operative PTH level can accurately predict normocalcemia after thyroid surgery. Identification of at risk patients with low PTH levels will facilitate prompt calcium replacement therapy and safe early discharge from hospital. Measurement of the total calcium level as a predictor of post-thyroidectomy hypocalcaemia has been reported in literature. Serum total calcium levels are believed to be altered by serum protein levels via a change in protein-bound calcium levels. Patients with a decrease in total serum calcium may not have “true” hypocalcaemia, which is defined as a decrease in ionized calcium.[6,11,14,27,36]

An effective method of evaluating parathyroid function is to follow ionized calcium (or total calcium and albumin) levels in the perioperative period. This is because a fall in serum total protein level secondary to hemodilution associated with the stress of surgery causes a decrease in the serum total calcium level that is unrelated to parathyroid function. If iatrogenic hypoparathyroidism is a concern, close follow-up care is warranted until calcium levels demonstrate that parathyroid function is intact.[11,15,20,23,36]

Wong, et al found that the combination of immediate post-operative PTH levels < 1.5 pmol/l and morning serum calcium < 2.0 mmol/l could accurately identify patients at risk of hypocalcaemia following total thyroidectomy, allowing safe, early discharge.[27,37]

Limiting supplementation to patients with intact parathyroid hormone level of less than 6 pmol/l or a serum calcium level of less than 2 mmol/l on post-operative day 1 may eliminate unnecessary calcium/vitamin D intake, phlebotomy, and follow-up assessments in up to 58% of patients undergoing thyroidectomy.[38]

A study was carried out to develop a simple and reliable method for predicting post-operative hypocalcaemia in total thyroidectomy patients. A decrease in blood calcium greater or equal to 0.275mmol/l, perioperatively was a sensitive predictor of hypocalcaemia. The efficacy of early administration of calcium plus Vitamin D in patients in whom the difference between pre- and post-operative blood calcium was $\geq$ 0.275mmol/l allowed most patients to avoid symptomatic hypocalcaemia, while permitting a significantly reduced hospital stay.[39]

2.0 STUDY JUSTIFICATION

Thyroidectomy is a major and frequently performed operation in the general surgical units of Kenyatta National Hospital. Hypoparathyroidism and the resultant hypocalcaemia is a major cause of postoperative morbidity after thyroid surgery with the incidence varying from 0% to 71%.[1,5,11,20,31]

In a study carried out in KNH on hyperthyroidism in 2003, 39% of the patients underwent thyroidectomy. In the immediate post-operative period 5% developed hypocalcaemictetany and 6% developed chronic hypoparathyroidism. In a prospective study of 50 patients who underwent thyroidectomy in Sudan, 22% developed hypocalcaemia.[13,35]

This study aims to determine the incidence of hypocalcaemia post-thyroidectomy in Kenyatta National Hospital.

2.1 STUDY OBJECTIVES

2.1.1 MAIN OBJECTIVE

To determine the incidence of post-thyroidectomy hypocalcaemia in Kenyatta National Hospital.

2.2.2 SPECIFIC OBJECTIVES

1. To determine the relationship between type of thyroidectomy and occurrence of hypocalcaemia.
2. To determine the relationship between age and occurrence of post-thyroidectomy hypocalcaemia.
3. To determine the relationship between sex and occurrence of post-thyroidectomy hypocalcaemia.

3.0 METHODOLOGY

3.1 Research design

Prospective descriptive cohort study.

3.2 Location of study;

Kenyatta National Hospital - Surgical Outpatient Clinic (SOPC), Surgical wards (5A,5B,5D), Amenity surgical wards, Theatre and the University of Nairobi - Biochemistry laboratory.

3.3 Study population;

Patients aged 13 years and above scheduled to undergo elective thyroidectomy.

3.4 Sample size

Formulae for sample size calculations for a prospective cohort study;[40,41]

$$n_0 = \left[\frac{1.96^2 \text{ p } (1 - \text{p})}{(\text{d})^2}\right]$$

n_0 = is the sample size (95),

p = rate of developing hypocalcaemia 6.6%,[1]

d = width of the confidence interval ($\pm$5%),

1.96 is the z - score.

Since the patients undergoing thyroidectomy during the study period were few, the formula below was applied to adjust for this in a finite population;

$$n = \left[\frac{n_0}{1 + \frac{n_0 - 1}{N}}\right]$$

N = Number of patients who underwent thyroidectomy in the 7 months from June to December 2013 (from theatre records) = 34.

n = is the final sample size (25)

3.5 Sampling procedure

Consenting patients who met the inclusion criteria were recruited into the study by the principal researcher.

3.5.1 Inclusion criteria

1. Patients scheduled to undergo elective thyroid surgery (lobectomy, sub-total, near-total, total or completion thyroidectomy).
2. Patients aged 13 years and above.
3. Patients or guardians who gave informed consent for participation in the study.

3.5.2 Exclusion criteria

1. Patients who declined to give informed consent for participation in the study.
2. Patients who decided to withdraw from the study before its completion.
3. Patients on calcium supplementation prior to surgery.

3.6 Patients, materials, methods and laboratory

The setting for the study was the Kenyatta National Hospital - Surgical Outpatient Clinic(SOPC), Surgical wards (5A,5B,5D), Amenity surgical wards, Theatre and the Biochemistry laboratory (Renal Unit).

The study commenced after approval by the Department of Surgery, University of Nairobi and the Kenyatta National Hospital Ethics and Research Committee.

Patients presenting to the SOPC and surgical wards scheduled for elective thyroid surgery were recruited into the study after pre-consent counseling and written informed consent obtained.

Data was collected using pretested questionnaires administered by the principal researcher.

Two millilitres of blood was collected in a plain sampling bottle pre-operatively by the principal researcher and submitted to the Renal Unit laboratory for analysis of serum calcium and albumin levels. Another sample of blood was collected between 24 to 48 hours post-operatively and submitted to the same laboratory for serum calcium and albumin levels. After discharge from the wards, patients were followed up in the SOPC at two weeks post-operatively and another sample collected.

The patients then exited from the study and continued routine SOPC follow-up visits.

Reference ranges;[7]

Normal values:

Serum Calcium 2.20-2.60 mmol/L

Ionized Calcium 1.10-1.35 mmol/L

Hypocalcaemia:

Serum Calcium </=2.19mmol/L (<2.20)

Ionized Calcium </=1.09mmol/L (<1.10)

Mild hypocalcaemia:

Serum Calcium 1.75-2.19 mmol/L

Ionized Calcium 0.90-1.09 mmol/L

Severe hypocalcaemia:

Serum Calcium </=1.74mmol/L (<1.75)

Ionized Calcium </=0.89mmol/L (<0.9)

Serum Calcium refers to Corrected Calcium levels using Payne's formula;[7]

Corrected calcium (mmol/L) = serum calcium (mmol/L) + 0.8{4.0 - serum albumin (g/L)}

Where 4.0 represents the average albumin level.

Conversions:

Calcium(mg/dl) x 0.25 = calcium(mmol/L)

Albumin(g/dl) x 10 = albumin(g/L)

Ionized Calcium was calculated using the following formula;[42]

iCa (mmol/L) = {0.9 + [0.55 x tCa (mg/dL) – 0.3 x albumin (g/dL)]}

Where the Ca is the measured serum calcium in mg/dL and serum albumin in g/dL.

3.7 DATA HANDLING

A pretested questionnaire was administered for data collection. The collected data was entered into a password-protected customized Microsoft Access database with in-built checks to minimize data entry error. Once data entry was completed, the principal investigator compared it with the hard copy forms to ensure accuracy.

3.8 DATA ANALYSIS AND PRESENTATION

Differences in variables were calculated by the $\chi 2$ test for categorical variables and the Mann–Whitney U test for continuous variables using the SPSS version 18. Data was presented in the form of graphs, charts and tables.[43,44]

3.9 ETHICAL CONSIDERATIONS

Approval to carry out the study was sought from the Department of Surgery, University of Nairobi and the Kenyatta National Hospital Ethics and Research Committee.

Patients recruited into the study signed an informed consent form after a clear explanation of the nature and purpose of the study administered by the principal investigator. The parent/guardian gave consent on behalf of participants less than 18 years of age.

Each participant was informed that participation is voluntary and that they could withdraw from the study at any point without jeopardizing their treatment in any way.

Each patient was assigned a study number and was only identified by the inpatient number in the questionnaire, therefore ensuring anonymity. The questionnaires were only handled by the principal researcher. The password protected database was only accessed by the principal researcher and statistician.

3.10 STUDY LIMITATIONS

1. Sample selection bias: the study cohort was selected only from the population pool in KNH, a referral hospital.
2. Patients lost to follow-up during the study duration.
3. Inclusion of patients with benign and malignant thyroid lesions in the study.
4. Patients undergoing repeat thyroid surgery.

4.0 RESULTS

A total of 25 patients who underwent elective thyroidectomy and met the inclusion criteria were recruited into the study. The recruitment of study participants took place over seven months from April to October 2014 in KNH.

The type of surgery was either;

1. unilateral, or
2. Bilateral.

Unilateral refers to surgery on one lobe of the thyroid gland.

Bilateral refers to surgery on both lobes of the thyroid gland.

		Hypocalcaemia	
Calcium reference range	Normal	Mild	Severe
Serum/Corrected(mmol/L)	2.20-2.60	1.75-2.19	<1.75
Ionized(mmol/L)	1.10-1.35	0.90-1.09	<0.90

Table 1 shows the characteristics of the study patients with 60% of the patients undergoing bilateral lobectomy. Majority of the patients were female (80%) with a median age of 39 years. The median for ionized calcium remained within the standard scale at all the time-points. However, the median levels for corrected calcium at 48hrs and 2 weeks post operation were below the standard scale.

Table 1: Characteristics of the study patients

	Overall (all patients) N = 25
	n (%) IQR
Surgery Unilateral: Bilateral:	 10 (40) 15 (60)
Median age (yrs)	39 (32.5 – 56)
Age (yrs) Less than 30 years 30 – 40 years >= 40 years	 4 (16) 9 (36) 12 (48)
Sex Female: Male:	 20 (80) 5 (20)
Pre-operative corrected calcium	2.16(1.98 – 2.22)
Pre-operative ionized calcium	**1.12 (1.02 – 1.15)**
48 hrs Post-operative corrected calcium	2.08 (1.85 – 2.17)
48 hrs Post-operative ionized calcium	**1.07 (0.94 – 1.11)**
2 weeks Post-operative corrected calcium	2.1 (1.91 – 2.24)
2 weeks Post-operative ionized calcium	**1.08 (0.98 – 1.16)**
Pre-operative hypocalcaemia (corrected calcium) Yes: No:	 15 (60) 10 (40)
Pre-operative hypocalcaemia (ionized calcium) Yes: No:	 **10 (40%)** **15 (60%)**
48 hrs Post-operative hypocalcaemia (corrected calcium) Yes: No:	 20 (80%) 5 (20%)
48 hrs Post-operative hypocalcaemia (ionized calcium) Yes: No:	 **14 (56%)** **11 (44%)**
2wks Post-operative hypocalcaemia (corrected calcium) Yes: No:	 16 (64%) 9 (36%)
2wks Post-operative hypocalcaemia (ionized calcium) Yes: No:	 **13 (52%)** **12 (48%)**

Graph 1 shows the age distribution for the patients in the study. The age group between 31-40 years had the highest number of patients in the study.

Graph 1: the age distribution for the patients in the study

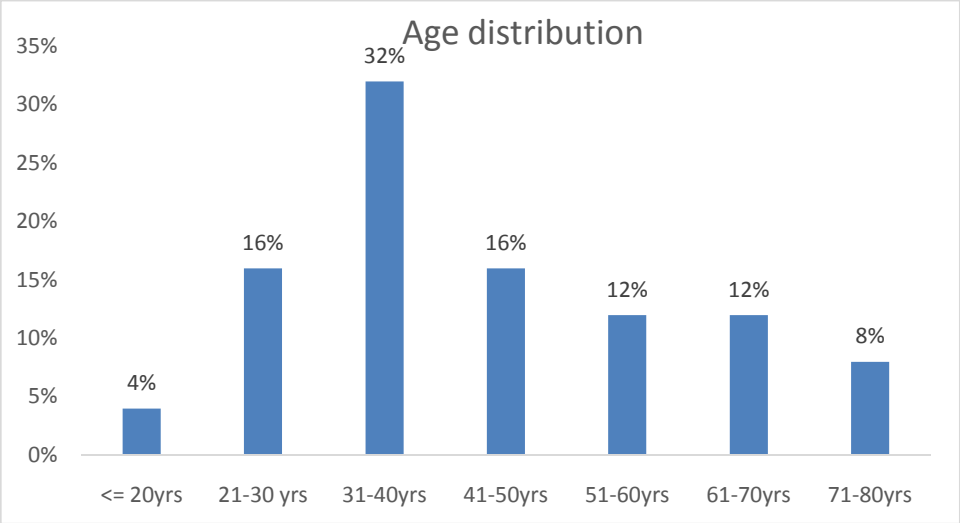


Chart 1 shows the incidence of post-operative hypocalcaemia among the study patients. Most of the patients (68%) developed hypocalcaemia after surgery as determined using the ionized calcium levels.

Chart 1: Overall hypocalcaemia incidence;

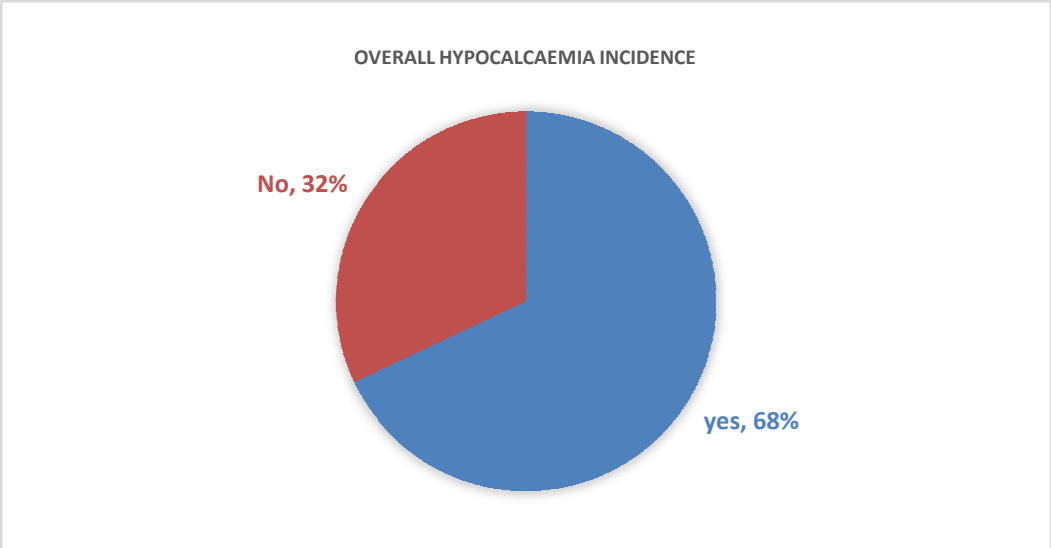


Chart 2 shows the levels of overall post-operative hypocalcaemia incidence as either mild or severe. Most patients (82%) developed mild hypocalcaemia.

Chart 2: Levels of overall hypocalcaemia incidence;

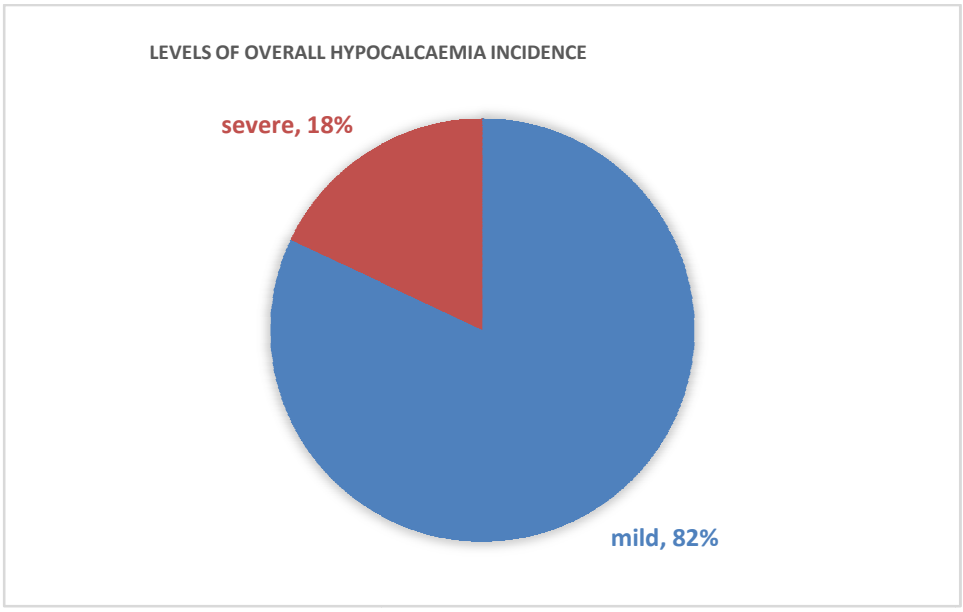
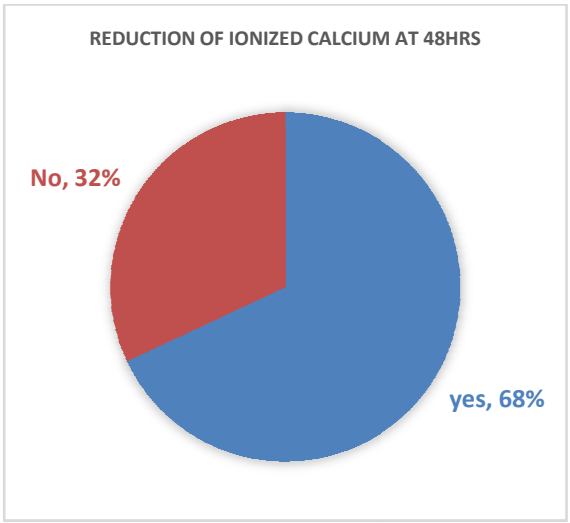


Chart 3 shows the number of patients with reduced ionized calcium levels at 48 hours and 2 weeks post-operatively. At 48hrs, most of the patients (68%) reported a reduction in the ionized calcium levels. This however reduced to 56% at 2 weeks.

Chart 3: number of patients with reduced ionized calcium levels at 48 hours and 2 weeks post-operatively



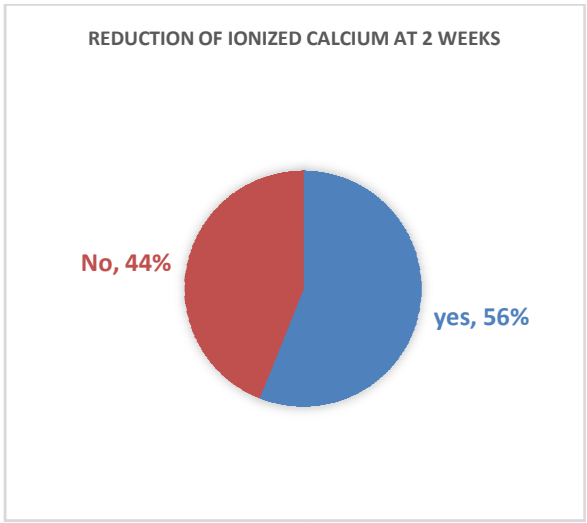


Chart 4 shows the pre-operation hypocalcaemia levels as determined by both the ionized and corrected calcium. Among the 15 patients who had pre-operation hypocalcaemia as determined by corrected calcium, 87% had mild hypocalcaemia. Among the 10 patients who had pre-operation hypocalcaemia as determined by ionized calcium, 80% had mild hypocalcaemia.

Chart 4: Pre-operative hypocalcaemia levels

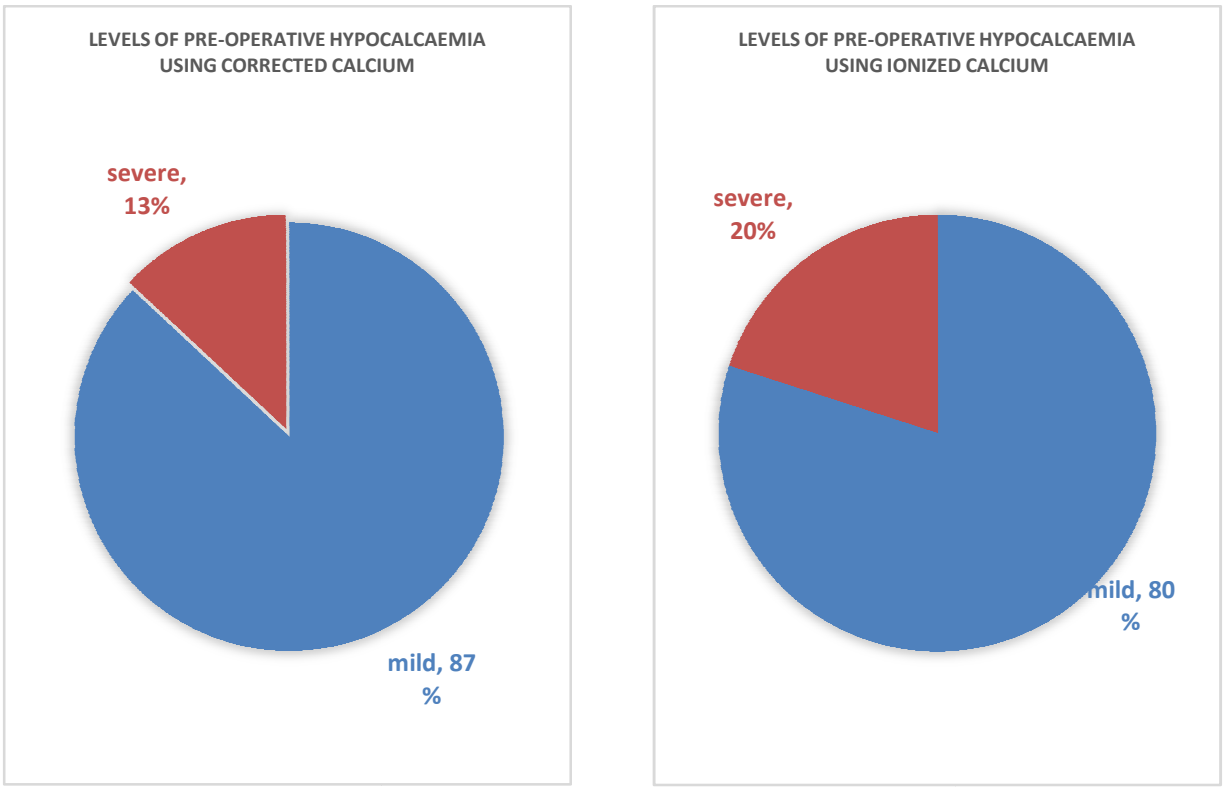
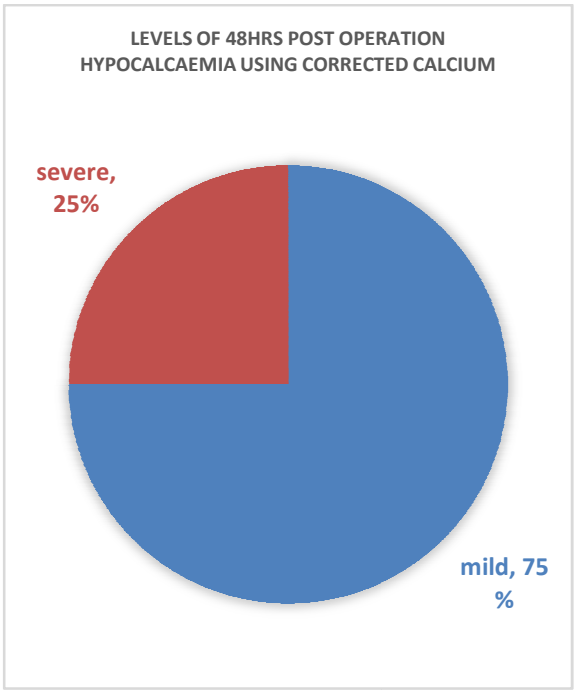


Chart 5 shows the 48hrs post-operation hypocalcaemia levels as determined by both ionized and corrected calcium. Among the 20 patients who had post-operation hypocalcaemia at 48hrs determined by corrected calcium, 75% had mild hypocalcaemia. Among the 14 patients who had post-operation hypocalcaemia at 48hrs using ionized calcium, 64% had mild hypocalcaemia.

Chart 5: 48hrs Post-operative hypocalcaemia levels



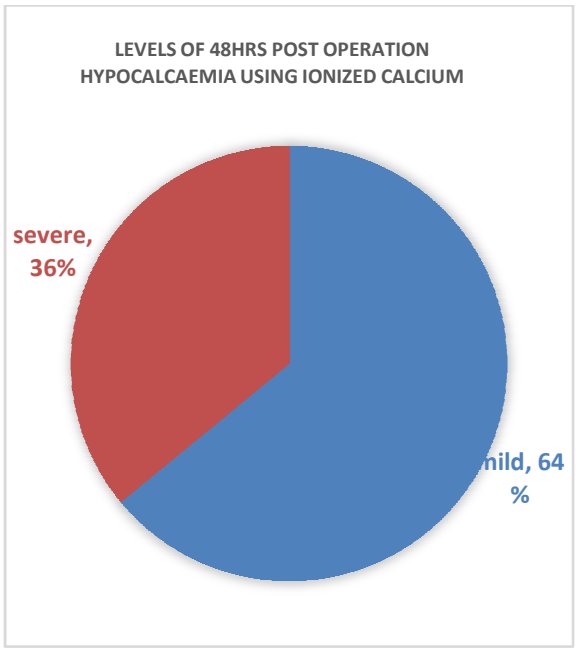
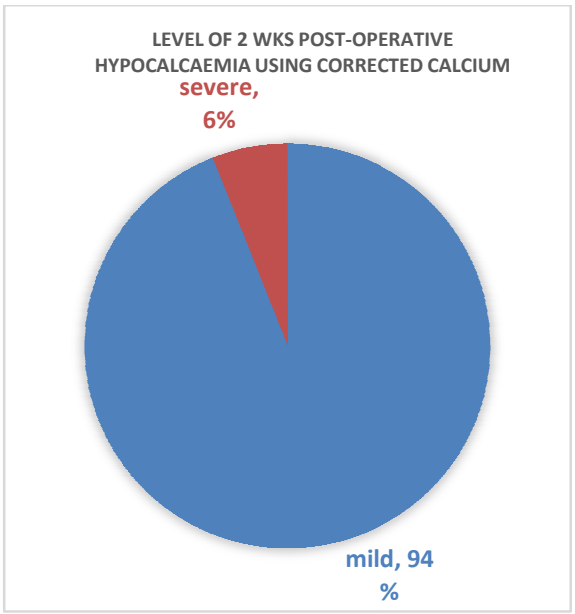
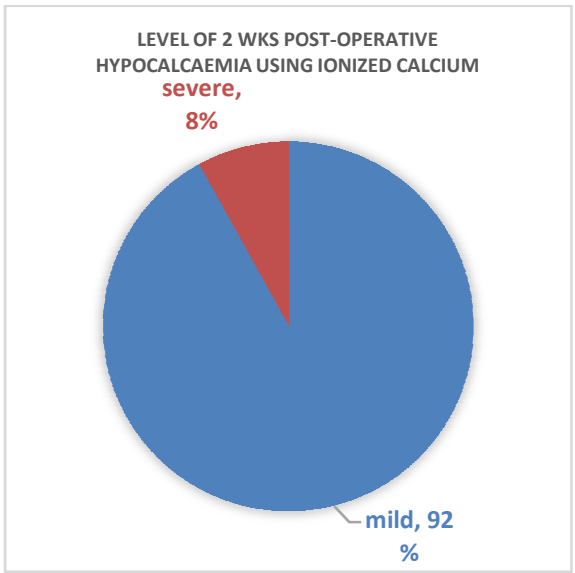


Chart 6 shows post-operation hypocalcaemia at 2 weeks as determined by ionized and corrected calcium levels. Of the 16 patients who had post-operation hypocalcaemia at 2 weeks determined by corrected calcium, 94% had mild hypocalcaemia. Of the 13 patients who had post-operation hypocalcaemia at 2 weeks using ionized calcium, 92% had mild hypocalcaemia.

Chart 6: 2week Post-operative hypocalcaemia levels





Graph 2 shows the comparison of calcium levels at the various time points for patients who had pre-operative hypocalcaemia and those who had pre-operative normocalcaemia. The calcium levels for the normocalcaemic group remained higher at both time points.

Graph 2: the comparison of calcium levels

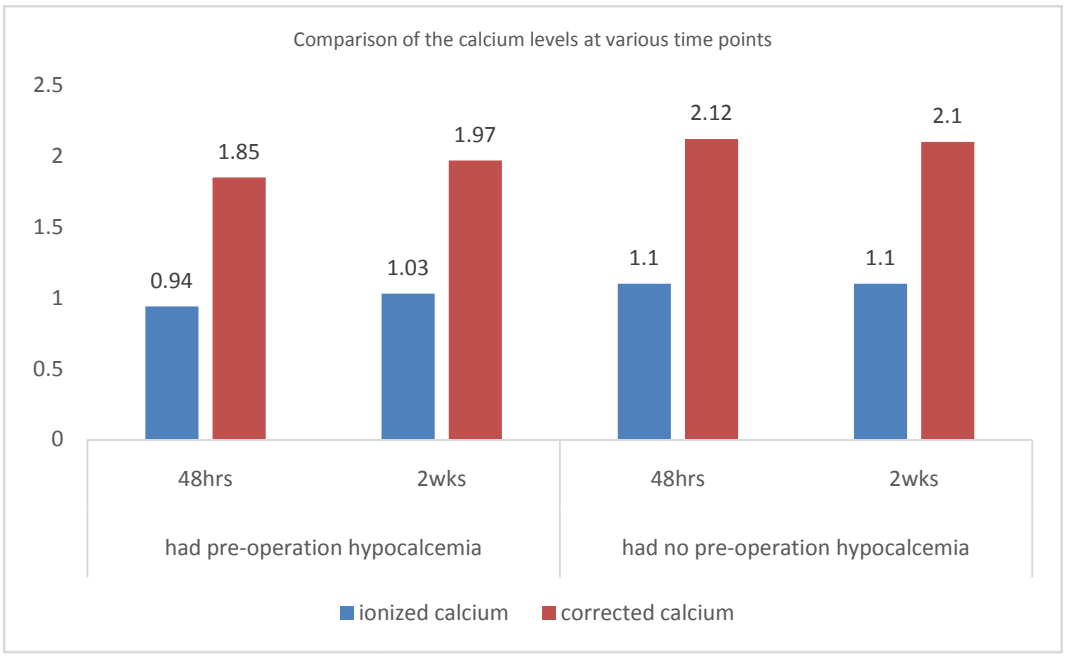
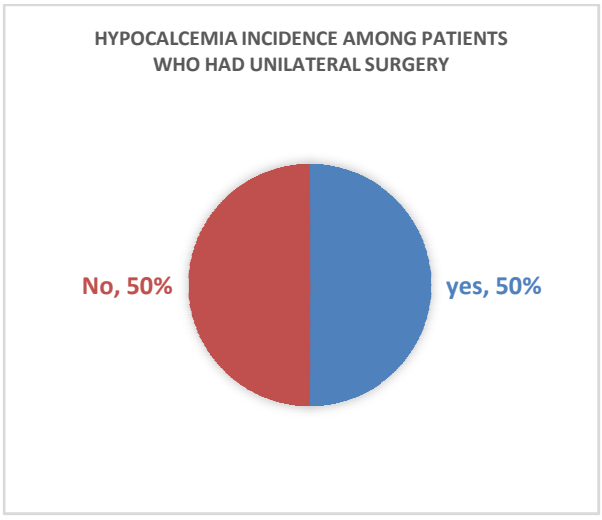
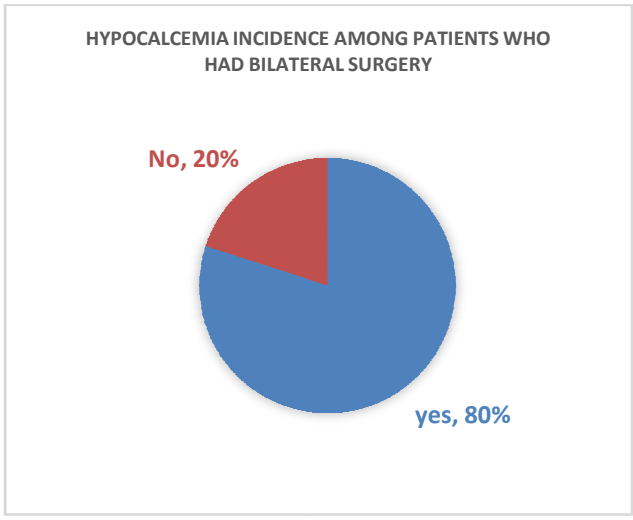


Chart 7 shows the incidence of post-operative hypocalcaemia among the two types of surgery. Patients who underwent bilateral surgery had a higher incidence of post-operative hypocalcaemia (80%) using ionized calcium levels.

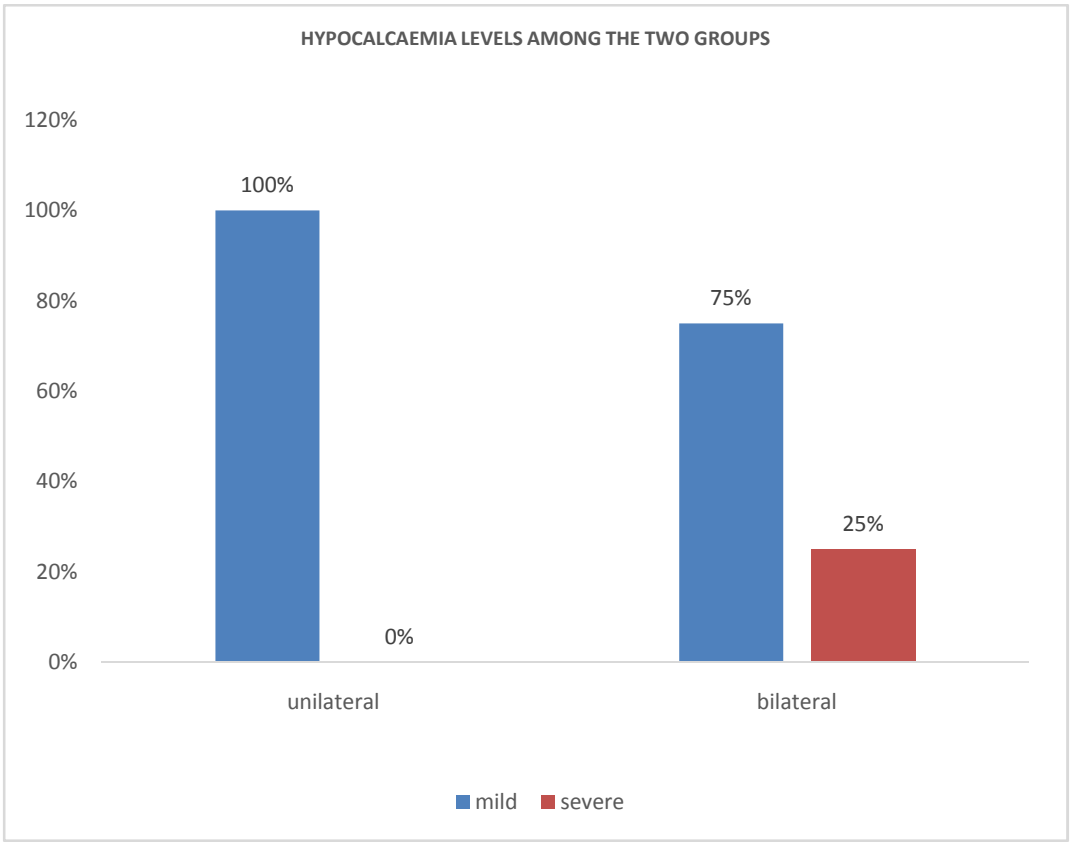
Chart 7: incidence of post-operative hypocalcaemia





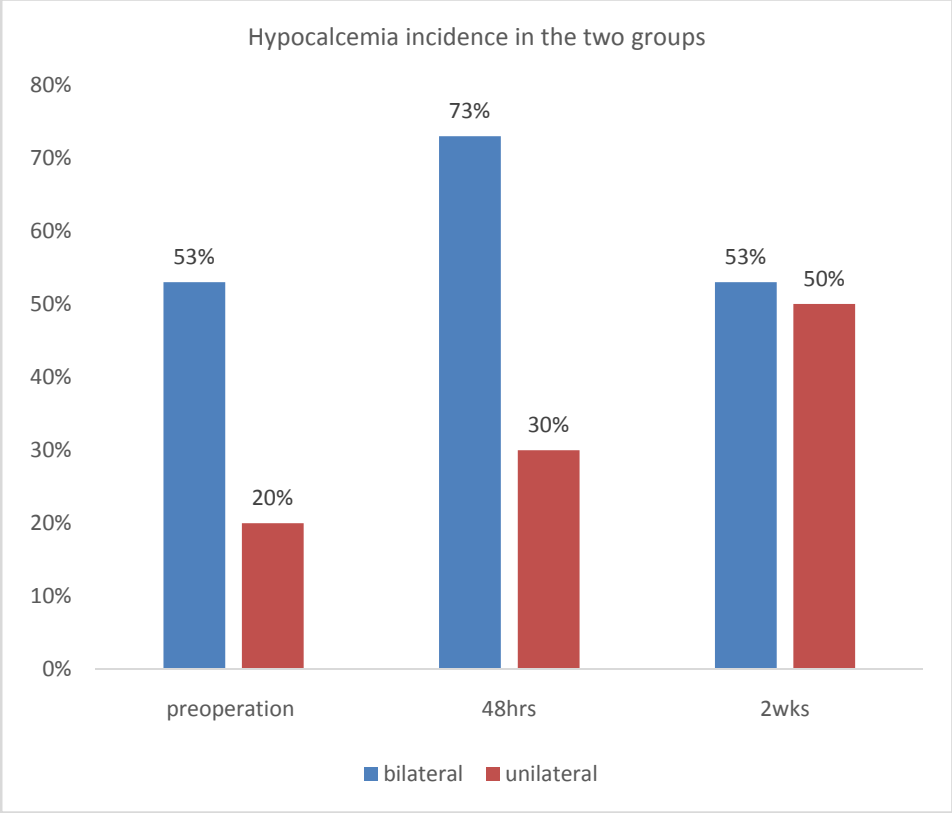
Graph 3 shows the comparison of hypocalcaemia levels among the two types of surgery using ionized calcium. All patients who underwent unilateral surgery developed mild post-operative hypocalcaemia. Of the patients who underwent bilateral surgery and developed post-operative hypocalcaemia, 75% were mild while 25% were severe.

Graph 3: Comparison of hypocalcaemia levels;



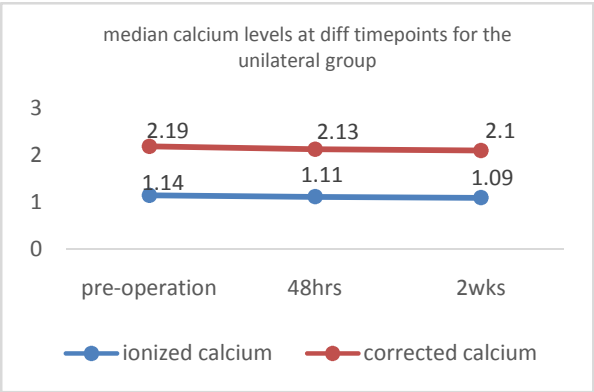
Graph 4 shows the incidence of hypocalcaemia in the two study groups as determined by the ionized calcium levels at the various time points. The incidence at each time point is independent of the others. A higher incidence of hypocalcaemia among the patients who had bilateral surgery was recorded at 48hrs post-operatively (73%) while for patients undergoing unilateral surgery, the highest incidence was recorded at 2weeks post-operation (50%).

Graph 4: the incidence of hypocalcaemia in the two study groups as determined by the ionized calcium levels at the various time points



Graph 5 shows the median calcium levels at different time points for the two study groups. At all time-points, the median calcium levels for the unilateral group remained higher than the bilateral study group.

Graph5:median calcium levels at different time points for the two study groups



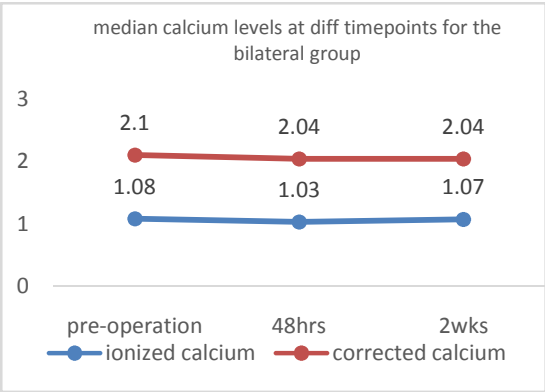


Table 2 shows the relationship between the two study groups and various indicators. There was no significant difference between most indicators across both groups. However, there was a significant difference between the hypocalcaemia status at 48hrs between the two groups (p=0.032).

Table 2: Characteristics of the study patients by the two study groups;

	Overall (all patients) N = 25		
	Unilateral N = 10	**Bilateral N = 15**	**P – value**
Age (yrs) Less than 30 years 30 – 40 years >= 40 years	 3 (75) 5 (56) 2 (17)	 1 (25) 4 (44) 10 (83)	 0.059
Gender Male: female:	 3 (60) 7 (35)	 2 (40) 13 (65)	0.307
Median Age (yrs)	35 (27 - 45)	43 (35 – 57)	0.085
Overall Hypocalcaemia Yes: No:	 **5 (29)** **5 (63)**	 **12 (71)** **3 (37)**	**0.115**
Pre-operative ionized calcium (median)	**1.14 (1.08 – 1.18)**	**1.08 (0.995 – 1.15)**	**0.09**
Pre-operative corrected calcium	2.19 (2.08 – 2.22)	2.1 (1.92 – 2.2)	0.129
48hrs Post-operative ionized calcium	**1.1 (1.04 – 1.23)**	**1.03 (0.86 – 1.10)**	**0.08**
48hrs Post-operative corrected calcium	2.13 (2.03 – 2.19)	2.04 (1.7 – 2.16)	0.96
2wks Post-operative ionized calcium	**1.09 (0.98 – 1.15)**	**1.07 (0.96 – 1.16)**	**0.846**
2wks Post-operative corrected calcium	2.1 (1.92 – 2.25)	2.04 (1.88 – 2.24)	0.892
Pre-op hypocalcaemia - iCa Yes: No:	 2 (20) 8 (53)	 8 (80) 7 (47)	0.096
48hrs post-op hypocalcaemia -iCa Yes: No:	 **3 (21)** **7 (64)**	 **11 (79)** **4 (36)**	**0.032**
2wks post-op hypocalcaemia - iCa Yes: No:	 2 (67) 8 (36)	 1 (33) 14 (64)	0.315

Table 3 shows the overall comparison of pre & post-operative hypocalcaemia. Among the 10 patients who had pre-operative hypocalcaemia, 80% developed post-operative hypocalcaemia. Among patients who had pre-operative normocalcaemia, 60% developed post-operative hypocalcaemia.

Table 3: comparison of overall incidence of pre-operative hypocalcaemia vs. post-operative hypocalcaemia;

	Had post-operative hypocalcaemia?		
	No	Yes	Total
Had Pre-operative hypocalcaemia?			
Yes	2 (20%)	8 (80%)	10
No	6 (40%)	9 (60%)	15
Total	8	17	25

Table 4 shows the comparison of pre & post-operative hypocalcaemia among patients who had bilateral surgery. Among the 8 patients who had pre-operative hypocalcaemia, 75% developed post-operative hypocalcaemia. Among patients who had pre-operative normocalcaemia, 86% developed post-operative hypocalcaemia.

Table 4: comparison of incidences of pre-operative hypocalcaemia vs. post-operative hypocalcaemia among the bilateral group;

	Had post-operative hypocalcaemia?		
	No	Yes	Total
Had Pre-operative hypocalcaemia?			
Yes	2 (25%)	7 (75%)	8
No	1 (14%)	6 (86%)	7
Total	3	12	15

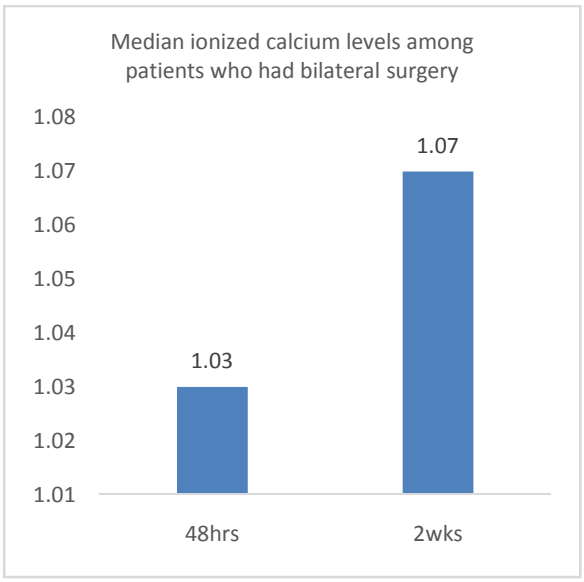
Table 5 shows the comparison of pre & post-operative hypocalcaemia among the patients who had unilateral surgery. Among the 2 patients who had pre-operative hypocalcaemia, both developed post-operative hypocalcaemia. Among patients who had pre-operative normocalcaemia, 37% developed post-operative hypocalcaemia.

Table 5: Comparison of incidences of pre-operative hypocalcaemia vs. post-operative hypocalcaemia among the unilateral group;

	Had post-operative hypocalcaemia?		
	No	Yes	Total
Had Pre-operative hypocalcaemia?			
Yes	0 (0%)	2 (100%)	2
No	5 (63%)	3 (37%)	8
Total	4	5	10

Graph 6 shows the median ionized calcium levels between the two study groups at 48hrs and 2 weeks post-operation. There was a rise in patients who had bilateral surgery and a fall in those who had unilateral surgery from 48 hours to 2 weeks.

Graph 6: median ionized calcium levels between the two study groups at 48hrs and 2 weeks post-operation



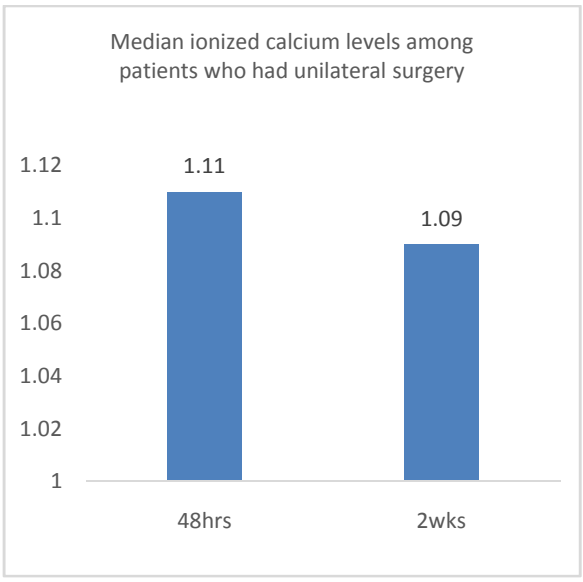


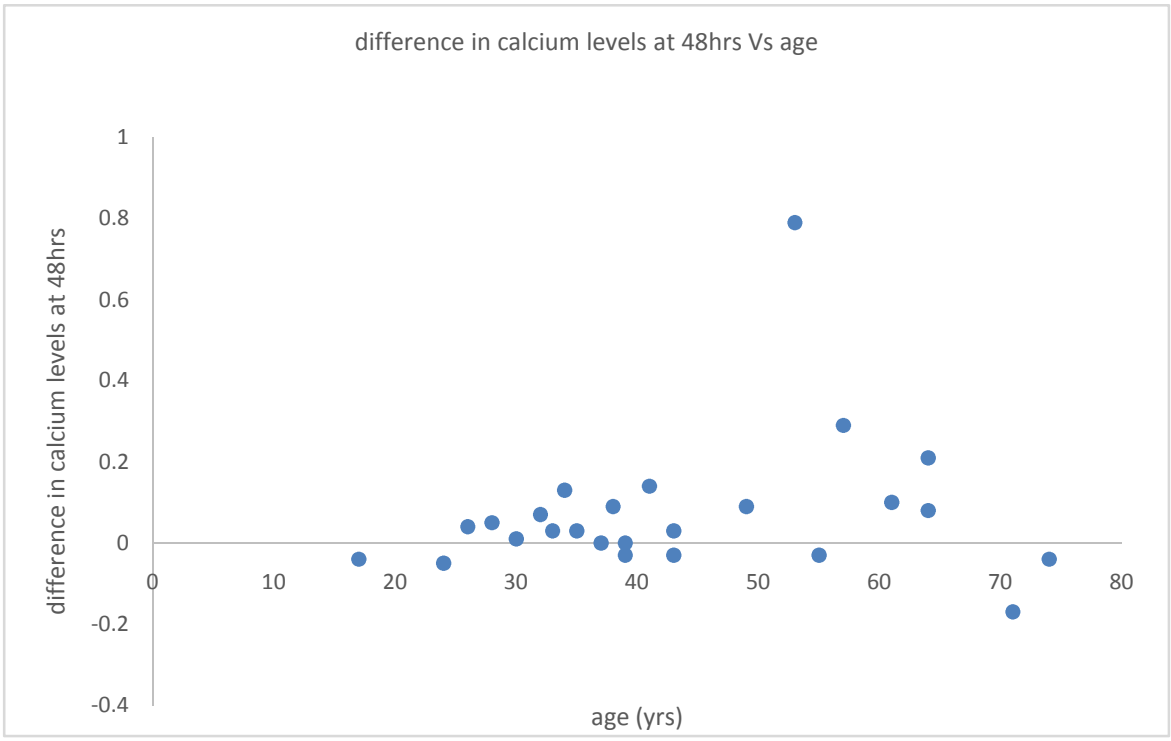
Table 6 shows the odds of developing post-operative hypocalcaemia in relation to age and gender. An increase in age did not increase risk of developing hypocalcaemia (p = 0.697). Though males were 84% less likely to get hypocalcaemia compared to females, the p-value of 0.09 was not significant.

Table 6: Odds ratio for developing post-operative hypocalcaemia;

Variable	OR(95% CI)	P value
Age (yrs)	1.01 (0.951 – 1.078)	0.697
Gender		
Female	1	0.09
Male	0.156 (0.18 – 1.334)	

Graph 7 shows a positive correlation between the age and the difference in ionized calcium levels, 0.166 though the correlation is not significant (p= 0.426). This implies that a rise in age leads to an increased difference in ionized calcium levels pre-operatively and 48hrs post-operatively.

Graph 7: a positive correlation between the age and the difference in ionized calcium levels



5.0 DISCUSSION

The reported incidence of temporary hypocalcaemia following thyroid surgery in literature ranges from 1.6-71%. An effective method of evaluating parathyroid function is to measure ionized calcium levels in the perioperative period. The overall incidence of post-thyroidectomy hypocalcaemia in this study was 68% using a calculated ionized calcium level of less than 1.10 mmol/L. Out of the 25 study participants, 17 had ionized calcium levels below 1.10 mmol/L at either 48 hours or 2 weeks post-operatively. This corresponds to the upper limit of the range reported in literature. Of the 68%, 82% had mild hypocalcaemia. All the patients who developed post-thyroidectomy hypocalcaemia were asymptomatic.[14,16,18,20,36]

The higher incidence may be attributable to the fact that ten (40%) of the patients had pre-operative hypocalcaemia. In the comparison of calcium levels at various time points for patients who had pre-operative hypocalcaemia versus those who had pre-operative normocalcaemia, calcium levels for the normocalcaemic group remained higher at both 48 hours and 2 weeks. In the patients who had pre-operative hypocalcaemia, 80% developed post-operative hypocalcaemia while in patients who had pre-operative normocalcaemia only 60% developed post-operative hypocalcaemia. The level of pre-operative calcium has been reported as an independent predictor of post-thyroidectomy hypocalcaemia in literature.[20]

The patients ages ranged from 17 to 74 years with a median of 39 years (32.5-56 years). Most of the patients (32%) were between 31-40 years. An increase in age did not increase risk of developing hypocalcaemia ($p = 0.697$), although there was a positive correlation between a rise in age and difference in ionized calcium levels at 48 hours which was not significant ($p = 0.426$). This contradicts a study that has shown being older than 50 years was associated with increased risk of post-operative hypocalcaemia in patients who underwent total thyroidectomy.[30]

In this study the M:F ratio was 1:4. Male patients were 84% less likely with odds ratio/OR 0.156 (0.18 – 1.334) to get hypocalcaemia compared to females with OR 1.0 but the P value of 0.09 was not significant. Female sex has been proven in meta-analyses as a factor significantly increasing the rate of post-thyroidectomy hypocalcaemia with OR 2.28 (1.53 – 3.40).[20]

The type of surgery was classified as either unilateral or bilateral. There was a significant difference between the hypocalcaemia status at 48hrs between both groups ($p=0.032$).Patients who underwent bilateral surgery had a higher incidence (80%) of post-operative

hypocalcaemia versus 50% for those who had unilateral surgery. This is contrary to studies which state that after unilateral thyroid lobectomy ionized calcium levels were unchanged but decreased after bilateral thyroid lobectomy. In this study ionized calcium levels decreased after both unilateral and bilateral thyroid lobectomies.[14,33]

All patients who underwent unilateral surgery and developed post-operative hypocalcaemia were classified as mild. The 2 patients who had pre-operative hypocalcaemia both developed post-operative hypocalcaemia and in the patients who had pre-operative normocalcaemia, 37% developed post-operative hypocalcaemia. The highest incidence of hypocalcaemia among the patients undergoing unilateral surgery was at 2weeks post-operatively (50%).

In patients who underwent bilateral surgery and developed post-operative hypocalcaemia, 75% were categorized as mild and 25% severe. Of the 8 patients who had pre-operative hypocalcaemia, 75% developed post-operative hypocalcaemia while in patients who had pre-operative normocalcaemia, 86% developed post-operative hypocalcaemia.The highest incidence of hypocalcaemia among the patients who had bilateral surgery was recorded at 48hrs post-operation (73%).

6.0 CONCLUSION:

In this study the overall incidence of developing post-thyroidectomy hypocalcaemia is 68%. Patients who underwent bilateral versus unilateral surgery had a higher incidence of post-operative hypocalcaemia as did those with pre-operative hypocalcaemia versus pre-operative normocalcaemia.

An increase in age did not increase risk of developing post-thyroidectomy hypocalcaemia while female patients were more likely to develop post-thyroidectomy hypocalcaemia.

It is therefore recommended, that all patients undergoing thyroidectomy should have both pre-operative and post-operative calcium levels done.

Patients with mild hypocalcaemia should be placed on oral calcium replacement therapy while patients with pre-operative/chronic hypocalcaemia require oral calcium and vitamin D supplements. Patients with severe hypocalcaemia should have intravenous calcium replacement and once they are normocalcaemic, discharged home on oral calcium and vitamin D supplements.

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APPENDICES

APPENDIX I:

Data collection sheet/Questionnaire;

INCIDENCE OF POST-THYROIDECTOMY HYPOCALCEMIA AS SEEN IN KENYATTA NATIONAL HOSPITAL.

Data collector:

(a)Demographic data:

Study number.....

In-patient number.....

Age (years).....

Gender/Sex.....

Residence.....

Telephone/Mobile number.....

(b) Pre-operative data;

Date of admission for surgery/thyroidectomy.....

Diagnosis on admission.....

Date pre-op calcium done.....

Pre-operative calcium levels;

Serum calcium	mg/dl	mmol/l
Serum albumin	g/dl	g/l
Ionized calcium	mmol/l	

(c) Peri-operative data;

Date of surgery/thyroidectomy .....

Type of thyroidectomy done.....

(d) Post-operative data - inpatient;

Date 48 hours post-op.....

24 to 48 hours post-operative calcium levels;

Serum calcium	mg/dl	mmol/l
Serum albumin	g/dl	g/l
Ionized calcium	mmol/l	

Intervention

Yes No

Specify.....

(e) Post-operative data - outpatient;

I. Date 2 weeks post-op.....

2 weeks post-operative calcium levels;

Serum calcium	mg/dl	mmol/l
Serum albumin	g/dl	g/l
Ionized calcium	mmol/l	

Intervention

Yes No

Specify.....

APPENDIX II:

CONSENT FORM;

English version;

This informed consent form is for patients 13 years and above at the Kenyatta National Hospital scheduled to undergo elective thyroidectomy during the study period. We are requesting these patients to participate in this research project whose title is **"Incidence of post-thyroidectomy hypocalcaemia in Kenyatta National Hospital.''**

Principal investigator: DrMwige, Peace Mukami

Institution: School of Medicine, Department of Surgery- University of Nairobi

Supervisors: DrNyaim, EllyOpot and DrKiptoon, Dan Kipkemboi.

This informed consent has three parts:

1. Information sheet (to share information about the research with you)
2. Certificate of Consent (for signatures if you agree to take part)
3. Statement by the researcher

You will be given a copy of the full Informed Consent Form.

Part i: Information sheet;

My name is Dr. Mwige, Peace Mukami, a Post-Graduate student at the University of Nairobi's School of Medicine. I am carrying out a study to determine, "Incidence of post-thyroidectomy hypocalcaemia in Kenyatta National Hospital."

Thyroidectomies are frequently performed in Kenyatta National Hospital for the management of benign and malignant thyroid disease. Hypoparathyroidism is one of the most common and serious complications from thyroid surgery and results in hypocalcaemia.

This study aims to determine the incidence of post-thyroidectomy hypocalcaemia and the relationship between type of thyroidectomy and occurrence of hypocalcaemia.

I am inviting you to participate in this study and you are free to either agree immediately after receiving this information or later after thinking about it. You will be given the opportunity to ask questions before you decide and you may talk to anyone you are comfortable with about the research before making a decision. After receiving this information concerning the study, please seek for clarification from either myself or my assistant if there are words or details which you do not understand.

If you agree to participate, you will be asked to provide personal information and other details related to your thyroid disease. Blood samples shall be collected both before and after surgery and analyzed in the laboratories using standard protocol.

All the information which you provide will be kept confidential and no one but the researchers will see it. The information about you will be identified by a number and only the researchers can relate the number to you as a person. Your information will not be shared with anyone else unless authorized by the University of Nairobi /Kenyatta National Hospital - Ethics and Research Committee (UON/KNH-ERC).

Your involvement in this research will be through an interview and clinical evaluation. 2 ml of blood will be obtained one time (1) pre-operatively and two times (2) post-operatively with risks including discomfort at the puncture site and minimal bleeding. Your participation is voluntary and refusal to participate in the research or withdrawal from it will not affect the treatment which you receive at this hospital. All the information that you give us will be used for this research only.

All patients hospitalized for elective thyroid surgery during the study period are invited to participate.

This proposal has been reviewed and approved by the UON/KNH-ERC which is a committee whose work is to make sure research participants like you are protected from harm. It was submitted to them through the Chairman, Department of Surgery, School of Medicine at the University of Nairobi with the approval of a university supervisor. The contact information of these people is given below if you wish to contact any of them for whatever reason;

- **Secretary, UON/KNH-ERC,**

  P.O. Box 20723- 00202,

  KNH, Nairobi.

  Tel: 020-726300-9

  Email: KNHplan@Ken.Healthnet.org

- **Chairman,**

  Department of Surgery, School of Medicine - University of Nairobi,

  P.O. Box 19676-00202,

  KNH, Nairobi.

  Tel: 020-2726300

- **University of Nairobi research supervisors;**

    - **Dr. Nyaim Elly Opot,**

      Department of Surgery, School of Medicine - University of Nairobi,

      Tel: 020-2726300

    - **Dr. Kiptoon Dan Kipkemboi,**

      Department of Surgery, School of Medicine - University of Nairobi,

      Tel: 020-2726300

    - **Principle researcher:**

      Dr. Mwige Peace Mukami,

      Department of Surgery, School of Medicine, University of Nairobi

      P.O. Box 19676-00202,

      KNH, Nairobi.

      Mobile phone: 0722-750385

Part ii: Consent certificate;

I……..freely give consent of myself or for my proxy (Name…….) to take part in the study conducted by Dr. Mwige Peace Mukami , the nature of which has been explained to me by her/her research assistant. I have been informed and have understood that my participation is entirely voluntary and I understand that I am free to withdraw my consent at any time if I so wish and this will not in any way alter the care being given to me or my proxy. The results of the study may directly be of benefit to me or my proxy and may assist in the management of post-thyroidectomy hypocalcaemia.

……

Signature/left thumb print (Participant/Next of kin)

Date……

Day/Month/Year

Thumb print of participant if illiterate (a witness must sign below)

Statement by the witness if participant is illiterate

I have witnessed the accurate reading of the consent form to the participant, and the individual has had the opportunity to ask questions. I confirm that the individual has given consent freely.

Name of witness……

Signature of witness……..

Date…….....

Day/Month/Year

Part iii: Statement by the researcher;

I have accurately read out the information sheet to the participant, and to the best of my ability made sure that the participant understands that the following will be done:

- Refusal to participate or withdrawal from the study will not in any way compromise the care of treatment.
- All information given will be treated with confidentiality.
- The results of this study might be published to facilitate reduction in the rate of post-thyroidectomy hypocalcaemia.

I confirm that the participant was given an opportunity to ask questions about the study, and all the questions asked by the participant have been answered correctly and to the best of my ability. I confirm that the individual has not been coerced into giving consent, and the consent has been given freely and voluntarily.

A copy of this Informed Consent Form has been provided to the participant.

Name of researcher or assistant taking consent……

Signature of researcher or assistant taking consent……

Date……
Day/Month/Year

FOMU YA IDHINI;

Kiswahili version;

i. Sehemu ya kwanza - Maelezo;

Mimi ni Dkt. Mwige, Peace Mukami ,kutoka Idara ya Upasuaji ya Shule ya Utabibu – Chuo Kikuu cha Nairobi (University of Nairobi). Ninafanya utafiti kuhusu, “Tukio la upungufuwakalsiamumwilinikufuataupasuajiwatezikatikaHospitaliKuu ya Kenyatta.”

Ningependa kukuchagua wewe ama mgonjwa wako katika utafiti huu wangu.

Lengo langu ni kutambua kiwango cha wagonjwa wanao-fanyiwa upasuaji wa tezi ambao hupata upungufu wa kalsiamu mwilini. Katika utafiti huu utatakiwa kutoa tarifa yako binafsi na tarifa kuhusu ugonjwa wa tezi unaougua. Damu itachukuliwa na kuchunguzwa katika maabara kwa mujibu wa kupima kiwango cha kalsiamu mara moja kabla na mara tatu baada ya upasuaji wa tezi. Habari zote zitakazo kusanywa zitashughulikiwa kwa siri na hazita tambazwa ila tu kwa ruhusa kutoka kwa kamati ya maadili na utafiti ya chuo kikuu cha Nairobi na hospital kuu ya Kenyatta.

Sababu ya utafiti huu ni kuthibitisha kiwango cha upungufu wa kalsiamu mwilini kufuata upasuaji wa tezi.

Kuhusika kwako kwenye utafiti huu hauna malipo yeyote ila ni kwa hiari yako mwenyewe na pia unaweza kujiondoa kwa utafiti huu wakati wowote bila kuhatarisha matibabu yako katika Hospitali Kuu ya Kenyatta.

Naomba mimi ama msaidizi wangu tukuulize maswali ambayo yatajibiwa kwa fomu maalum. Habari yote ambaye utatuarifu ni ya siri kati yako nasi watafiti na haitaenezwa kwa watu wengine.

Unaweza kuuliza maswali yoyote kuhusu utafiti huu na ukiridhika tafadhali ijaze fomu ya idhini iliyo hapa chini. Unaweza pia kuuliza swali lolote baadaye kwa kupiga simu kwa mtafiti mkuu ama mwenyekiti wa idara ya upasuaji katika chuo kikuu cha Nairobi ama msimamizi wa utafiti huu ukitumia nambari za simu zifuatazo;

- Katibu, Kamati ya Maadili na Utafiti ya Chuo Kikuu cha Nairobi na Hospitali Kuu ya Kenyatta. Sanduku la Posta 20723 KNH, Nairobi 00202. Nambari ya simu 726300-9.
- Mwenyekiti, Idara ya Upasuaji ya Chuo Kikuu cha Nairobi. Sanduku la Posta 19676 KNH Nairobi 00202. Nambari ya simu: 020-2726300.
- Wasimamizi wa utafiti, Chuo kikuu cha Nairobi;

    - **Daktari Nyaim, EllyOpot**, Sanduku la Posta 19676 KNH, Nairobi 00202. Nambari ya simu: 020-2726300.
    - **Daktari Kiptoon, Dan Kipkemboi**, Sanduku la Posta 19676 KNH, Nairobi 00202. Nambari ya simu: 020-2726300.
- **Mtafiti mkuu;**

    - **Daktari Mwige, Peace Mukami**, Idara ya Upasuaji ya Shule ya Utabibu – Chuo kikuu cha Nairobi, Sanduku la Posta 2678 00202- KNH Nairobi. Nambari ya simu: 0722-750385.

ii. Sehemu ya pili - Idhini;

Mimi (Jina)……..kwa hiari yangu ama kwa hiari ya mgonjwa wangu (Jina la Mgonjwa) .....……
nimekubali kushiriki katika utafiti huu unaofanywa na Daktari Mwige Peace Mukami kutokana na hali ambazo nime elezwa na sio kwa malipo ama shurutisho lolote.

Nime elewa kwamba nina weza kujiondoa wakati wowote nitakapo na hatua hii haita hatarisha matibabu ninayopata ama anayopata mgonjwa wangu. Matokeo ya utafiti yaweza kuwa ya manufaa kwangu ama kwa wagonjwa wengine kwa jumla na yaweza kusaidia kwa matibabu ya upungufu wa kalsiamu mwilini kufuata upasuaji wa tezi, Hospitali kuu ya Kenyatta.

…….
Sahihi/ama alama ya kidole cha gumba katika sanduku
Tarehe…….....
Siku/Mwezi/Mwaka

Jina la shahidi……
Sahihi……
. Tarehe…….
(Siku/Mwezi/Mwaka)

Kidole cha gumba kwa wale wasio jua kuandika (Shahidi atie sahihi hapa chini)

iii. Sehemu ya tatu - Dhibitisho la mtafiti;

Hii ni kuidhinisha ya kwamba nimemueleza mshiriki ama msimamizi wake kuhusu utafiti huu na pia nimempa nafasi ya kuuliza maswali. Nimemueleza yafuatayo;

- Kwamba kushuriki ni kwa hiari yake mwenyewe bila malipo.
- Kushuriki hakutasababisha madhara ama kuhatarisha maisha kamwe.
- Anaweza kujiondoa kutoka kwa utafiti huu wakati wowote bila kuhatarisha matibabu anayopata katika hospital kuu ya Kenyatta.
- Habari ambazo atapeana hazita tambazwa hadharani bila ruhusa kutoka kamati ya maadili na utafiti ya chuo kikuu cha Nairobi na Hospitali kuu ya Kenyatta mdhamini mkuu wautafitiwa hospital kuu ya Kenyatta na chuo kikuu cha matibabu.

Jina la mtafiti ama msimamizi wake……

Sahihi……..

Tarehe…….

(Siku/Mwezi/Mwaka)

KNH/UON-ERC LETTER OF APPROVAL

UNIVERSITY OF NAIROBI
COLLEGE OF HEALTH SCIENCES
P O BOX 19676 Code 00202
Telegrams: varsity
(254-020) 2726300 Ext 44355

KNH/UON-ERC
Email: uonknh_erc@uonbi.ac.ke
Website: www.uonbi.ac.ke

KENYATTA NATIONAL HOSPITAL
P O BOX 20723 Code 00202
Tel: 726300-9
Fax: 725272
Telegrams: MEDSUP, Nairobi

KENYATTA NATIONAL HOSPITAL APPROVED 14 MAR 2014 P.O. BOX 20723-00202 NAIROBI

Ref: KNH-ERC/A/65 Link:www.uonbi.ac.ke/activities/KNHUoN 14th March 2014

Dr. Mwige Peace Mukami
Dept.of Surgery
School of Medicine
University of Nairobi

Dear Dr. Mukami

RESEARCH PROPOSAL: INCIDENCE OF POST-THYROIDECTOMY HYPOCALCAEMIA IN KENYATTA NATIONAL HOSPITAL (P610/12/2013)

This is to inform you that the KNH/UoN-Ethics & Research Committee (KNH/UoN-ERC) has reviewed and **approved** your above proposal. The approval periods are 14th March 2014 to 13th March 2015.

This approval is subject to compliance with the following requirements:

a) Only approved documents (informed consents, study instruments, advertising materials etc) will be used.
b) All changes (amendments, deviations, violations etc) are submitted for review and approval by KNH/UoN ERC before implementation.
c) Death and life threatening problems and severe adverse events (SAEs) or unexpected adverse events whether related or unrelated to the study must be reported to the KNH/UoN ERC within 72 hours of notification.
d) Any changes, anticipated or otherwise that may increase the risks or affect safety or welfare of study participants and others or affect the integrity of the research must be reported to KNH/UoN ERC within 72 hours.
e) Submission of a request for renewal of approval at least 60 days prior to expiry of the approval period. (*Attach a comprehensive progress report to support the renewal*).
f) Clearance for export of biological specimens must be obtained from KNH/UoN-Ethics & Research Committee for each batch of shipment.
g) Submission of an *executive summary* report within 90 days upon completion of the study
This information will form part of the data base that will be consulted in future when processing related research studies so as to minimize chances of study duplication and/or plagiarism.

For more details consult the KNH/UoN ERC website **www.uonbi.ac.ke/activities/KNHUoN.**

Protect to Discover

Yours sincerely

PROF. A.N. GUANTAI
CHAIRPERSON, KNH/UON-ERC

c.c. The Deputy Director CS, KNH
The Principal, College of Health Sciences, UoN
The Dean, School of Medicine, UoN
The Chairman, Dept. of Surgery, UoN
The Assistant Director, Health Information, KNH
Supervisors: Dr. Nyaim Elly Opot, Dr. Kiptoon Dan Kipkemboi