بسم الله الرحمن الرحيم

MONA MAGHRABY

شبكة المعلومات الجامعية

التوثيق الالكتروني والميكروفيلم

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جامعة عين شمس

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The timing of parathyroid hormone measurement as an early Predictor of postoperative hypocalcemia post total Thyroidectomy Prospective Study

Thesis
Submitted for Partial Fulfillment of Master Degree in General Surgery

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2021

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List of abbreviations

Ca	: Calcium
CaSR	: Calcium Sensing Receptor
CCA	: Common Carotid Artery
EBSLN	: External Branch of the Superior Laryngeal Nerve
ECA	: External Carotid Artery
GFR	: Glomerular Filtration Rate
IBSLN	: Internal Branch of Superior Laryngeal Nerve
ICA	: Internal Carotid Artery
IP	: Inferior Parathyroid
IPTH - 24hr	: Identify Parathyroid Hormone -24
IPTH	: Intact Parathyroid Hormone
ITA	: The Inferior Thyroid Artery
LGT	: Levator Glandulae Thyroideae
LMA	: Laryngeal Mask Anesthesia
Po	: Postoperative
PTH	: Parathyroid Hormone
RLN	: The Recurrent Laryngeal Nerve
SCM	: Sternocleidomastoid
SLN	: Superior Laryngeal Nerve
SMNG	: Simple Multi-Nodular Goiter
SMNG	: Simple Multi-Nodular Goiter
SP	: Superior Parathyroid
STA	: Superior Thyroid Artery
TALH	: The ascending Loop of Henle
TT	: Total thyroidectomy
VDR	: Vitamin D Receptor

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Introduction

Thyroidectomy is one of the most common head and neck surgeries currently performed and although considered a safe procedure with low morbidity, it may present some complications. Postoperative hypocalcemia is the most common complication (particularly following total thyroidectomy) and may increase the length of hospital stay. The incidence of this event varies widely (1.6–68%), reflecting the considerable heterogeneity among the studies ***(Filho et al., 2018).***

The occurrence of postoperative hypocalcemia may be influenced by various factors including surgeon/surgery features (surgeon's experience, technical difficulties, surgical extent and duration, surgical complications related to parathyroid glands), patients' characteristics (age, gender), underlying diseases/surgery indications (thyroid auto- immunity, large goiters, thyroid carcinoma, thyrotoxicosis) and biochemical factors (metabolism of calcium, vitamin D, phosphorus, magnesium) ***(Cmilansky & Mrozova, 2014).***

Regardless, the main reason for this complication is acute parathyroid dysfunction after surgery, which may be due to mechanical or thermal trauma, as well as devascularization or accidental removal of the parathyroid glands ***(Raffaelli et al., 2016).***

There is no consensus on the definition of post-thyroidectomy hypocalcaemia. Several authors employ biochemical criteria: total and/or ionized serum calcium below a cut-off level. However, there is no constant calcium threshold below which symptoms occur, and

many biochemically hypocalcaemic patients recover in a few days without symptoms ***(Castro et al., 2018).***

After thyroid operations, a physiological decrease in the serum calcium level can be observed in 12-24 hours and most of these cases automatically recover in 24 hours. Simultaneously, serum phosphate decreases in a much lesser degree. Hemodilution, renal tubular calcium absorption amount and calcitonin secretion which are caused by antidiuretic hormone released after surgery based stress can lead to these changes ***(Glinoer et al., 2000).***

postoperative hypocalcemia may be an isolated laboratory finding or present with symptoms, usually about 24–48h after the surgery although, less frequently, they may occur in up to 4 days.In most cases the hypocalcemia is mild and presents with spontaneous resolution, however it may present in a severe form in some cases, leading to concerns in the clinical practice due to the difficulty to recognize it rapidly in those patients and to the possible delay until its manifestation ***(Filho et al., 2018).***

Hospital discharge on the first postoperative day (1^{st} PO) in thyroidectomies is reported in the literature as being safe. The benefits of hospital discharge on the 1st PO compared to prolonged hospitalization include lower costs, less postoperative complications and better psychological outcomes. However, in most symptomatic patients, hypocalcemia develops on the second postoperative day (2nd PO) ***(Rosa et al., 2015).***

The nadir for hypocalcemia typically occurs at around 24–48 hours postoperatively but may be as delayed as post-op day 4. Therefore, detecting patients requiring calcium replacement therapy

with serial calcium measurements can take multiple blood tests over several days. Placing all patients on calcium therapy unnecessarily commits many patients to unnecessary treatment and puts them at risk for hypercalcemia. A clinical laboratory method for early prediction of postoperative hypocalcemia could, therefore, facilitate earlier implementation of treatment, and early discharge ***(Le et al., 2014).***

In the context of escalating health care costs, a number of initiatives have focused on various ways to facilitate timely hospital discharge without compromising patient safety. The importance of a reliable measure to predict a person's relative risk for developing clinically significant hypocalcemia following thyroidectomy should not be underestimated. Because of its relatively shorter half-life, changes in parathyroid hormone (PTH) precede changes in calcium by hours. Intraoperative PTH has been less readily adopted for use during thyroidectomy. There is no consensus about the best time to obtain PTH levels for accurately predicting a patient's risk for clinically significant hypocalcemia. It is also unclear whether the absolute value of PTH versus the percentage change from preoperative to intraoperative/ postoperative levels is a better predictor for postoperative hypocalcemia ***(Lee, D. et al., 2015).***

Serum calcium levels are controlled by the parathyroid hormone (PTH), which has a half- life of approximately 2– 5 min. Because of this feature, the levels of intact PTH (IPTH) and/or the percent decline of its serum concentrations during the first hours or days after surgery has been studied and correlated with the occurrence of postoperative hypocalcemia ***(Filho et al., 2018).***

Aim of the Work

The aim of this study is to evaluate the role of IPTH as an early marker of postoperative hypocalcemia. Using a prospective design, to compare and determine the most accurate cut-off point of IPTH, as well the best time-point after surgery to measure it.