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ORIGINAL ARTICLE

Hypoparathyroidism following thyroidectomy: Predictive factors

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KEYWORDS
Hypoparathyroidism;
Predictive factors;
Thyroidectomy;
Hypocalcemia;
Parathyroid gland;
Histological diagnosis

Abstract
Objective: To evaluate the incidence and predictive factors for transient and permanent hypocalcemia and hypoparathyroidism following thyroidectomy.
Method: We studied all the 162 patients that underwent thyroid surgery in the ENT department of the Centro Hospitalar Vila Nova Gaia/Espinho from January 2005 to December 2014. We reviewed pre-operative, 6 h and 12 h after surgery ionized calcium and PTH levels. All patients were reviewed and evaluated according to the following criteria: gender, age, thyroid function, histologic diagnosis of the specimen, surgery extension and presence or absence of hypoparathyroidism.
Results: There were 31 (19.1%) cases of transient hypoparathyroidism and 8 (5%) of permanent hypoparathyroidism. No significant difference was found for transient hypoparathyroidism when patients were analyzed by gender. However, all cases of permanent hypoparathyroidism were observed in female individuals.

Comparing hemithyroidectomy with all other surgical procedures, we found that extension of surgery was a great predictor of transient ($p = 0.0001$) and permanent ($p = 0.001$) hypoparathyroidism.

Diagnosis of malignancy was a strong predictor of transient hypoparathyroidism ($p = 0.002$). It was also associated with permanent hypoparathyroidism, although differences did not reach statistical significance ($p = 0.096$).
Conclusion: Extension of surgery (total thyroidectomy) and diagnosis of malignancy are predictors of transient and permanent hypoparathyroidism.
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PALABRAS CLAVE
Hipoparatiroidismo;
Factores predictivos;
Tiroidectomía;
Hipocalcemia;
Glándula paratiroidea;
Diagnóstico histológico

Hipoparatiroidismo tras tiroidectomía: factores predictivos

Resumen
Objetivo: Evaluar la incidencia y los factores predictivos de hipocalcemia transitoria y permanente e hipoparatiroidismo tras la tiroidectomía.
Método: Se estudiaron todos los pacientes sometidos a cirugía de tiroides en el Servicio de ORL del Centro Hospitalario de Vila Nova de Gaia/Espinho desde enero de 2005 a diciembre de 2014. Se revisaron los valores de calcio ionizado preoperatorio, a las 6 y a las 12 h de la intervención, y los niveles de PTH. Se revisaron y evaluaron todos los archivos de acuerdo con los siguientes criterios: sexo, edad, función tiroidea, diagnóstico histológico de la muestra, extensión de la cirugía y presencia o ausencia de hipoparatiroidismo.
Resultados: Encontramos 31 (19,1%) casos de hipoparatiroidismo transitorio y 8 (5%) de hipoparatiroidismo permanente. No se encontraron diferencias significativas en cuanto a hipoparatiroidismo transitorio cuando los pacientes fueron analizados por sexo. Sin embargo, todos los casos de hipoparatiroidismo permanente se observaron en individuos de sexo femenino. Comparando la hemitiroidectomía con el resto de los procedimientos quirúrgicos, se encontró que la extensión de la cirugía fue un gran factor predictivo de hipoparatiroidismo transitorio (p = 0,0001) y permanente (p = 0,001). El diagnóstico de malignidad es un fuerte factor predictivo de hipoparatiroidismo transitorio (p = 0,002). También de hipoparatiroidismo permanente, aunque las diferencias no alcanzaron la significación estadística (p = 0,096).
Conclusión: La extensión de la cirugía y el diagnóstico de malignidad son factores predictivos de hipoparatiroidismo transitorio y permanente.
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Introduction

Thyroid gland is known for being part of the ENT surgeon work field. In our Center, Centro Hospitalar Vila Nova de Gaia/Espinho, with different surgical indications, several patients undergo thyroidectomy. It is one of the most frequently performed operations worldwide with an incidence of complications that, although not frequent, can be disabling.[1] Injury of the recurrent laryngeal nerve, which can result in dysphonia and dyspnea, is the most frequently reported complication, while metabolic complications related to thyroid function and calcium levels (Ca)[1–3] are often underestimated even though of major importance. The latter is actually the most common complication.[1]

Hypocalcemia is defined as deficiency of calcium concentration in blood stream (normal = 8.5–10.5 mg/dl).[1,2] It can be temporary or permanent and can take place with or without associated symptoms. Complaints appear more often about 24–48 h after surgery and there is no direct correlation between their timing and the severity of the clinical status or ionized calcium levels.[3]

Classic symptoms are neuromuscular, such as perioral, hands or feet numbness, myalgia or lethargy.[1,2] However, it is not rare to observe tachycardia, irritability and bronchospasm/laryngospasm. QT prolongation and arrhythmia can occur and may result, in extreme cases, in death.[1]

45% of serum Ca is free or ionized, and this is its active form, 50% bounded to proteins and 5% attached to other organic complexes.[2] Calcium homeostasis is complex and fundamentally regulated by parathyroid hormone (PTH), vitamin D and Calcitonin.[3,4] PTH is the major agent of calcemia regulation. It is synthesized and secreted by the parathyroid glands in a rate inversely proportional to the concentration of calcium ion. It operates in the kidney promoting bone reabsorption, phosphorus excretion and synthesis of Vitamin D,[1–3] increasing Ca blood levels.[5,6] Small variations in calcemia change PTH secretion within minutes.[5,6]

It should be noted that hypocalcemia is multifactorial and may be also caused by hemodilution, hypoalbuminemia, variations in concentration of phosphate and magnesium and blood pH.[1] Thus, a reduction in total serum calcium does not necessarily mean a reduction in ionic calcium and may, therefore, not be associated with clinical manifestations.[7–9]

Anatomical relationships between parathyroid and thyroid glands explain why post-thyroidectomy hypoparathyroidism relates to the following factors[1,6]:

1. accidental removal of parathyroid glands;
2. handling of parathyroids;
3. ischemia due to injury of parathyroids' delicate blood supply. Even when one or more parathyroid glands are preserved, the whole anatomical territory suffers variations of oxygenation and irrigation during surgery and in the postoperative period.

Either way, PTH will drop with metabolic and clinical consequences. In addition, hypomagnesemia, hyperphosphatemia and metabolic alkalosis may also arise.[10–12]

Thus, many authors advocate Ca ion dosing 6 h, 12 h and 24 h after surgery[10,11] and Ca replacement, when

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