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Vitamin D Düzeylerinin Tiroidektomi Sonrası Gelişen Hipokalsemi Üzerine Etkisi

Effect of Vitamin D Level on Post-Thyroidectomy Hypocalcemia

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ÖZ

GİRİŞ ve AMAÇ: *Bu çalışmada preoperatif olarak ölçülen D vitamini düzeylerinin postoperatif olarak gelişen hipokalsemiler üzerine etkisi araştırılmıştır*

YÖNTEM ve GEREÇLER: *Araştırmamıza 2015 yılı ocak ayı ile 2016 yılı Mart ayı arasında Sakarya Üniversitesi Eğitim ve Araştırma Hastanesi Genel Cerrahi Kliniğinde benign, malign ya da tirotoksikoz nedeni ile opere edilen ve preoperatif olarak D vitamini düzeyi bakılmış 106 hasta retrospektif olarak dahil edilmiştir.*

BULGULAR: *Hastaların yaş ortalaması 50,6dır (min: 19 max: 82). Hastaların 94'ü kadın 12'si ise erkektir. Tiroidektomi yapılan hastaların preoperatif vitamin D düzeyleri değerlendirildiğinde %81,1'inde (n: 86) yetmezlik (<30 ng/dl) ve %19,8 inde (n: 21) normal (>30 ng/dl) olduğu görülmüştür. Postoperatif hastaların %18,9'unda geçici hipokalsemi semptomları gelişmiş olup, hastalar kalsiyum (Ca) tedavisi almıştır. Hipokalsemi semptomlarının oluşmasına etki eden faktörler incelendiğinde; yaş, hipertiroidi, tiroidit, paratiroid bezinin çıkartılması ve operasyon tipinin postoperatif hipokalsemi semptom varlığını etkilemez iken, <30 ng/dl düşük vitamin D seviyesi olan hastalarda daha fazla hipokalsemi geliştiği görülmüştür (%23,3& %0) (p: 0,017).*

TARTIŞMA ve SONUÇ: *Çalışmamızın ve diğer yapılan çalışmaların önerdiği gibi her tiroidektomi operasyonu geçirecek hastaya preoperatif olarak vitamin D düzeylerinin değerlendirilmesi ve sonuçları yetmezlik olarak gelen her hastanın vitamin D replasmanı alması gerektiğini düşünmekteyiz.*

Anahtar Kelimeler: *vitamin D, tiroidektomi, hipokalsemi*

ABSTRACT

INTRODUCTION: *In this study, the effect of preoperative vitamin D levels on postoperative hypocalcemia was investigated.*

METHODS: *We retrospectively investigated 106 patients who were operated for benign – malign thyroid nodules or thyrotoxicosis and whose preoperative vitamin D levels were measured in the General Surgery Clinic of Sakarya University Education and Reserch Hospital between January 2015 and March 2016.*

RESULTS: *The average age of the patients is 50,6 (min: 19, max: 82). There were 94 female and 12 male patients. When the vitamin D levels of the patients undergoing thyroidectomy were evoluated, it was found that 59,8% (n: 63) deficient, 20,8% (n: 22) insufficient (<30 ng/dl) and 19,8% (n: 21) were normal (>30 ng/dl). Transient hypocalcemia symptoms developed in 18,9% of the postoperative patients and the patients had received calcium (Ca) therapy. When factors affecting the occurence of hypocalcemia symptoms were examined, it was seen that age, hyperthyroidism, thyroiditis, parathyroid gland removal and operation type did not affect the postoperative hypocalcemia symptom status; however, patients with vitamin D below 30 ng/dl had more hypocalcemia 23,3% & 0%)(p: 0,017).*

DISCUSSION and CONCLUSION: *As suggested by our study and other studies, preoperative vitamin D levels should be assested in every patient who will undergo thyroidectomy and vitamin D replacement should be performed in every patient who has insufficiency..*

Keywords: *vitamin D, thyroidectomy, hypocalcemia*

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INTRODUCTION

The complications observed after thyroidectomies performed for benign or malignant thyroid diseases are well-described in the literature. Hypocalcemia is one of the main complications of these operations. The causes of post-thyroidectomy hypocalcemia include trauma to the parathyroid glands during surgery, disturbance of blood flow to the parathyroid glands, and accidental removal of the parathyroid glands together with the thyroid gland. In addition, several markers, which can be measured preoperatively, may be predictors of post-operative hypocalcemia, independent of the operation. These are parathormone (PTH), magnesium (Mg) and phosphate (P) levels. Several studies showed that the risk of postoperative hypocalcemia was between 1% and 50% (1-3).

Vitamin D is a lipid-soluble vitamin which plays an important role in the calcium balance of the body. After being produced by sunlight exposure and ingested with diet, it is converted to 25-hydroxyvitamin D3 (25-OHD) in the liver. Serum 25-OHD is biologically inactive. Then, it is converted to 1.25-dihydroxyvitamin D3 (calcitriol) in the kidneys. This active form increases calcium and phosphate uptake from the intestinal lumen and decreases parathormone release. Several studies showed that intraoperative and postoperative serum PTH levels are an early marker of postoperative hypocalcemia (4-7). Many studies also investigated the relation between vitamin D treatment and postoperative hypocalcemia. While vitamin D treatment did not reduce the rate of postoperative hypocalcemia in some studies (8-12), in many studies a decrease in postoperative hypocalcemia was observed with vitamin D treatment (13-16).

This study investigated the effect of preoperative vitamin D levels on postoperative early hypocalcemias.

METHODS

One hundred and six patients who were operated on for benign or malignant reasons or thyrotoxicosis in the General Surgery Clinic of Sakarya University Research and Training Hospital between January 2015 and March 2016, with preoperatively measured vitamin D levels were included in our study. Ninety-four patients (88.7%) were female and 12 (11.3%) were male. In our study, vitamin D levels of <20 ng/ml were considered as deficiency, levels of 20-30 ng/ml were defined as insufficiency and levels of >30 ng/ml were considered as normal. Preoperative vitamin D levels together with age, type of operation, preoperative thyroid function tests, the reason for the operation, postoperative calcium levels, the number of resected parathyroid glands and postoperative calcium treatment status of the thyroidectomy patients were evaluated.

Statistical analysis

Data were entered into SPSS (Statistical Package for Social Sciences) 15.0 software for statistical analysis. Statistical analyses were performed using X2 and Fisher's exact test when parametric assumptions were met and Mann-Whitney U test was used when parametric assumptions were not met. For all statistical analyses, a p value of <0.05 was considered significant.

RESULTS

One hundred and six thyroidectomy patients with preoperative vitamin D measurements were included in our study. Patients' mean age was 50.6 years (range 19 to 82 years). Ninety-four patients were female and 12 were male. Forty patients (37.7%) had hyperthyroidism and 66 (62.3%) had euthyroidism. Of the patients, 88 underwent bilateral total thyroidectomy (BTT), 6 had completion thyroidectomy, 6 had BTT + central neck dissection, 5 underwent hemithyroidectomy and 1 patient had BTT+ central neck dissection + lateral neck dissection. Postoperative pathology reports revealed the presence of parathyroid glands in 10 patients. Of the patients, 26.4% (n=28) had malignancy, 16% (n=17) had lymphocytic thyroiditis and the remaining patients had nodular or multinodular goiter **(Table 1).** Based on the preoperative vitamin D values of the thyroidectomy patients, 59.4% had (n=63) deficiency (<20 ng/dl), 20.8% (n=22) had insufficiency (20-30 ng/dl) and 19.8% had (n=21) normal levels (>30 ng/dl) **(Table 2).**

Table 1. Demographics, clinical characteristics and operation types of the patients

	N (%)
Age (mean)	50,6 (min:19 max:82)
Gender M/F	12/94 (11.3%/88.7%)
Thyroid function	
Hyperthyroidism	40 (37.7%)
Euthyroidism	66 (62.3%)
Operation	
BTT	88 (83%)
Completion thyroidectomy	6 (5.6%)
BTT+ Central Neck Dissection	6 (5.6%)
Hemithyroidectomy	5 (4.7%)
BTT+ Central and Lateral Neck Dissection	1 (0.9%)
Disease type	
Malignancy	28 (26.4%)
Lymphocytic Thyroiditis	17 (16%)
MNG	61 (57.5%)

Temporary hypocalcemia symptoms developed in 18.9% of the postoperative patients and these patients received calcium treatment. None of the patients had permanent hypocalcemia.

Table 2. Preoperative vitamin D levels of the patients

Preop Vit D (ng/dl)	N (%)
< 20	63 (59.4%)
20-30	22 (20.8%)
>30	21 (19.8%)

When the factors effective on the development of hypocalcemia symptoms were analyzed, 45.3% of our patients (n=48) were under 50 years of age and 54.7% (n=58) were over 50 years of age. The statistical analysis showed no effect of age factor on postoperative hypocalcemia (p=0.3). When the patients were analyzed based on their TSH levels, 20 patients had postoperative hypocalcemia. Of these patients, 13 had euthyroidism and 7 had hyperthyroidism. No statistically significant differences were found between both groups (p=0.77). Again, there was no statistically significant difference between both groups regarding the presence of thyroiditis. Postoperative pathology results of 10 patients revealed the presence parathyroid glands. Of these 10 patients, only two had hypocalcemia. When these patients were compared to the patients without resection of parathyroid glands, no statistically significant difference was found in terms of postoperative hypocalcemia (p=0.92). There was no statistically significant difference between the groups regarding the operation types of the patients (p=0.77). Moreover, the patients were also evaluated with respect to whether or not they underwent central neck dissection during the operation and no statistically significant difference was found between both groups (p=0.49). In our study, there were more cases of hypocalcemia among the patients with a vitamin D level of <30 ng/ml (23.3% vs. 0%) (p=0.017). Symptomatic patients had a mean vitamin D level of 15.46 ng/dl, while it was 21.95 ng/dl in asymptomatic patients (p=0.032). The demographics and surgical procedures were similar between the patient groups with normal or low vitamin D levels. Consistent with the literature, there was no difference between thyroidectomies performed for benign or malignant reasons (16.6% vs. 25%; P=0.33) **(Table 3).**

Table 3. Multivariate analysis of factors affecting hypocalcemia

	Hypocalcemia (n %)		No Hypocalcemia (n %)	
Age				
<50	7	35%	41	47.7%
>50	13	65%	45	52.3%
			p:0.30	
TSH				
Hyperthyroidism	7	35%	33	38.4%
Euthyroidism	13	65%	53	61.6%
			p:0.77	
Type of Operation Central dissection				
No	18	90%	81	94.2%
Yes	2	10%	5	5.8%
			p:0.49	
Thyroiditis				
Yes	3	15%	18	20.9%
No	17	85%	68	79.1%
			p:0.54	
Malignancy				
Yes	7	35%	21	24.4%
No	13	65%	65	75.6%
			p:033	
Resection of parathyroid glands	18	90%	78	90.7%
Yes	2	10%	8	9.3%
No			p:0.92	
Vit D				
<30	20	100%	66	76.7%
>30	0	0%	20	23.3%
			p:0.017	
Vit D				
<20	15	75%	48	55.8%
20-30	5	25%	18	20.9%
>30	0	0%	20	23.3%
			p:0.15	

DISCUSSION

Thyroidectomies performed for thyroid diseases account for the major part of the endocrine surgery. The most important and common complication seen after thyroidectomy operations is hypocalcemia. Hypocalcemia is associated with increased hospital stays, increased costs and a decrease in the quality of life of patients. Many studies investigated the relation between vitamin D and post-thyroidectomy hypocalcemia. In a study on 121 patients undergoing total or hemithyroidectomy, preoperative vitamin D levels had no effect on temporary or permanent hypocalcemia (9). However, reasons for thyroidectomy, whether or not central neck dissection was performed or the presence of parathyroid glands in the pathology specimens were not reported for the study groups in this study. Another study with the same study group categorization found a similar result (11). However, many studies found strong associations between low vitamin D levels and postoperative hypocalcemia (10,12,17).

Our study investigated the association between preoperatively measured vitamin D levels and postoperative hypocalcemia in 106 patients who underwent total thyroidectomy for several reasons. The rate of temporary hypocalcemia was 18.9% in our patient group and this rate was consistent with those from other studies in the literature. No patient developed permanent hypocalcemia (18,19). Other factors affecting hypocalcemia, such as age, hyperthyroidism, thyroiditis, the resection of parathyroid glands, and type of operation had no significant effect on the development of hypocalcemia in our study. In our study, the rate of postoperative hypocalcemia after thyroidectomies performed for malignancies was 25% and this rate is consistent with those from other studies in the literature (20).

In our study, the only significant result affecting the rate of postoperative hypocalcemia was low preoperative vitamin D level. Patients with low vitamin D levels have an increased risk of developing postoperative hypocalcemia.

Low vitamin D levels increase the symptoms of temporary hypocalcemia. Low preoperative vitamin D levels may help identify patients at risk for the development of postoperative symptomatic hypocalcemia before the operation. As suggested by our study and other studies, we think that vitamin D levels should be measured in all patients who will undergo thyroidectomy and all patients with vitamin D deficiency should receive vitamin D replacement.

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