ORIGINAL ARTICLE

The effect of body mass ındex on parathyroidectomy complications in primary hyperparathyroidism

El efecto del índice de masa corporalsobrelas complicaciones de la paratiroidectomía en el hiper sparatiroidismoprimario

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Abstract

Objective: *There are few studies evaluating the effect of high body mass index (BMI) on parathyroid surgery. The aim of this study was to examine the relationship between the BMI and post-operative outcome of the patients who were operated for primary hyperparathyroidism (PHP).* **Material and Methods***: Hospital files of patients who were operated for PHP between January 2013 and January 2020 were reviewed retrospectively. Patients operated by surgeons experienced in endocrine surgery (more than 25 cases/year) were included in the study. Patients were divided into two groups according to BMI (Group 1 < and Group 2 ≥ 25). Data were analyzed.* **Results:** *Groups were similar in terms of age (p = 0.715) and sex (p = 0.253). There was no significant difference between groups regarding postoperative hospital stay (p = 0.561), rate of transient hypocalcemia (p = 0.748), or permanent hypocalcemia (p = 0.530). The mean operative time was shorter in Group 1 (84 min in Group 1 and 70 min in Group 2, p = 0.045).* **Conclusion:** *Parathyroid surgery can safely be performed in patients with high BMI by surgeons experienced in endocrine surgery.*

Keywords: *Primary hyperparathyroidism. Parathyroidectomy. Body mass index. Obesity*

Resumen

Objetivos: *Existen pocos estudios evaluando el efecto de un alto índice de masa corporal (IMC) en la cirugía de paratiroides. El objetivo de este estudio fue examinar la relación entre el índice de masa corporal (IMC) y el resultado posoperatorio de-pacientes que fueron operados por hiperparatiroidismo primario (PHP).* **Material y Métodos:** *Expedientes de pacientes que fueron operados por PHP entre enero de 2013 y enero de 2020 fueron revisados retrospectivamente. Pacientes operados por ciruganoscon experiencia en cirugía endocrina (más de 25 casos por año) fueron incluidos. Los pacientes fueron divididos en dos grupos de acuerdo a IMC (grupo 1 < 25 y grupo 2 ≥ 25). Los datos fueron analizados.* **Resultados:** *Los grupos eran similares en cuanto a edad (p = 0.715) y sexo (p = 0.253). No hubo diferencia significativa entre los grupos en relación con la permanencia hospitalaria posoperatoria (p = 0.561), taza de hipocalcemia transitoria (p = 0.748) ohipocalcemia permanente (p = 0.530). La media de tiempo de operación fue menor en el grupo 1 (84 minutos en el grupo 1 y 70 minutos en el grupo 2, p = 0.045).* **Conclusión:** *La cirugía de paratiroides puede ser realizada con seguridad en pacientes con alto IMC por cirujanos con experiencia en cirugía endocrina.*

Palabras clave: *Hiperparatiroidismo primario. Paratiroidectomía. Índice de masa corporal. Obesidad.*

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Introduction

Obesity is a major public health problem with any co-morbidities increasing in number all over the world. Both the patients seeking treatment and undergoing surgeries keep rising. The effect of obesity on surgical procedures has been an area of research since its comorbidities may increase morbidity and mortality[1].

Besides its other comorbidities, obesity is associated with thyroid and parathyroid diseases Serum thyroid stimulant hormone levels are high and risk of thyroid cancer is increased[2]. There is also an increased risk of hyperparathyroidism (PHP)[3]. However, the number of studies examining the effects of high body mass index (BMI) on parathyroid surgery is limited[4]. This study aims to evaluate the relationship between the post-operative results of the patients who were operated for the diagnosis of primary PHP and BMI[3].

Materials and methods

Adult patients who were operated due to PHP between January 2013 and January 2020 were included in the study. Only patients operated by surgeons experienced in endocrine surgery (more than 25 cases/year according to 2016 American Thyroid Association Guidelines[5]) were enrolled.

Patients younger than 18-years-old, who were pregnant, and patients with concomitant thyroid pathology who underwent thyroidectomy for this reason, whose localization could not be detected in the preoperative period by imaging methods and therefore underwent neck exploration, patients who underwent reoperation secondary to inadequate surgery and who had a previous neck surgery (thyroidectomy and parathyroidectomy), and neck radiotherapy history were excluded from the study. Neuromonitoring is not routinely practiced in our center due to technical and financial reasons; patients who were operated using neuromonitoring were also excluded from the study.

All patients were operated under general anesthesia. BMI was calculated using the formula (weight [kg]/height [m^2]). They were divided into two groups as BMI < 25 (Group 1) and BMI ≥ 25 (Group 2). Demographics, post-operative length of hospital stay (days), operative time (min), histological findings, early and late post-operative complications, and incomplete surgery were analyzed retrospectively.

Hypocalcemia was defined as postoperative serum calcium level below 8 mg/dl. Hypocalcemia lasting < 6 months was defined as transient, and hypocalcemia lasting more than 6 months was defined as permanent. Recurrent nerve palsy was diagnosed with indirect laryngoscopy which was performed on patients with dysphonia, dyspnea, and swallowing disorders. Recurrent laryngeal nerve palsy that was persistent for 6 months and documented by laryngoscopy was considered as permanent palsy.

Approval from the institutional research ethics board was obtained (decision number 2021/06-13).

The 25th version of the "Statistics Package for the Social Sciences" by International Business Machines Corporation (IBM) (New York, United States) was utilized for statistical analysis. Fisher's exact t-test was used for comparing nonparametric variables and one-way ANOVA was used for continuous variables. Logistic regression test was used for multivariate analysis. A p-value of less than 0.05 was considered statistically significant.

Results

Ninety-six patients were enrolled. Seventeen (17.7%) were male, 79 (82.3%) were female. In Group 1 (n = 30), there were 27 women (90%), 3 men (10%); in Group 2 (n = 66), there were 52 female (78.8%) and 14 male (21.2%) patients. There was no significant difference in gender distribution between groups (p = 0.253). The mean age patients were 53.80 years (20-92) in Group 1 and 54.88 years (28-85) in Group 2. There was no difference in age distribution between groups (p = 0.715).The mean operation time was 83.80 min in Group 1 and 69.61 min in Group 2, and the mean operative time was significantly shorter in Group 2 (p = 0.045). Mean post-operative hospital stay was similar between groups (p = 0.561) with 1.67 days (1-2) in Group 1 and 1.59 (1-4) days in Group 2. Evaluating post-operative complications; none of patients had surgical site infection, post-operative hematoma, transient, or permanent recurrent nerve palsy. Transient hypocalcemia was observed in three patients in Group 1, and in nine patients in Group 2. One patient in each group had permanent hypocalcemia. There was no statistical difference between the groups in terms of the incidence of transient and permanent hypocalcemia, (p = 0.748, p = 0.530, respectively). Inadequate

Table 1. Demographic and clinical characteristics of patients classified into various BMI groups

	Group 1 (BMI < 25)	Group 2 (BMI ≥ 25)	p-value
Age (mean)	53.8	54.88	0.715
Gender (n, %)			
Male	3 (10%)	14 (21.2%)	0.253
Female	27 (90%)	52 (78.8%)	
Transient hypocalcemia (n)	3	9	0.748
Permanent hypocalcemia (n)	1	1	0.530
Transient recurrent nerve palsy (n)	0	0	
Permanent recurrent nerve palsy (n)	0	0	
Operative time (mean min)	83.80	69.61	0.045
Inadequate surgery (n)	3	2	0.174
Duration of hospitalization (mean, day)	1.67	1.59	0.561

BMI: body mass index.

surgery was found in three patients in Group 1 and two patients in Group 2 (p = 0.174).

Demographic and clinical characteristics of patients classified into various BMI groups are given in table 1.

The specimen pathology results of the patients in both groups are given in table 2. No statistically significant difference was found between the two groups in terms of any parameter except operation time both in univariate and multivariate analyses.

Discussion

Obesity is an increasing health problem, and it has been shown to be associated with increased surgical complications in different studies[6,7]. Studies evaluating the effects of obesity on the outcome of endocrine surgical procedures have also been published and various results have been reported[2,4,8]. Pitt et al. reported no relationship between BMI and post-operative complication rate and operative success in patients who underwent parathyroidectomy with the diagnosis of PHP in a series of 819 cases, and that patients with higher BMI had a longer hospital stay[4]. In a study by Talutis et al., in which they evaluated 19356 patients who had undergone thyroidectomy and parathyroidectomy from the data of the Collaborative Endocrine Surgery Quality Improvement Program (CESQIP), they reported no significant

Table 2. Specimen pathology results of patients in both groups

	Group 1 (BMI < 25)	Group 2 (BMI ≥ 25)
Adenoma (n)	29	51
Hyperplasia (n)	1	3
Atypic adenoma (n)	0	2

BMI: body mass index

relationship between BMI and post-operative hematoma[9]. Similarly, in our study, there was correlation between BMI and post-operative complications in patients who underwent parathyroidectomy with the diagnosis of PHP. In addition, in this study, unlike the study of Pitt et al., no difference was found between the postoperative hospital stay and BMI. This might be due to the fact that all our patients were operated under general anesthesia and that there is no practice as day surgery for parathyroidectomy in our hospital. In a large series in which they evaluated 26.864 patients who underwent thyroidectomy and parathyroidectomy, Buerba et al.[2] reported that obesity was associated with a higher rate of post-operative wound infection and prolonged operation time. This was attributed to preference of general anesthesia instead of local or regional methods in obese patients in their study[2]. Despite operating all patients under general anesthesia our study showed similar results with prolonged operative time in obese patients. We, therefore, think that the reason behind longer operative time might be secondary to the anatomical differences. The increased fatty tissue in obese patients complicates the exposure and causes difficulty in the dissection of parathyroid tissue. In a study by Finel et al.[10] in which they studied the relationship between BMI and thyroidectomy complications, they reported that there was a relationship between high BMI and prolonged operation time. They attributed this to dissection difficulty due to insufficient exposure and excess adipose tissue like ours[10].

Conclusion

Our study showed that higher BMI does not result in a higher rate of complications despite a more prolonged duration of surgery. Parathyroidectomy for PHP can safely be performed in patients with high BMI by surgeons experienced in endocrine surgery.

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Conflicts of interest

No conflicts of interest were declared by the authors.

Ethical disclosures

Protection of human and animal subjects. The authors declare that the procedures followed were in accordance with the regulations of the relevant clinical research ethics committee and with those of the Code of Ethics of the World Medical Association (Declaration of Helsinki).

Confidentiality of data. The authors declare that they have followed the protocols of their work center on the publication of patient data.

Right to privacy and informed consent. Right to privacy and informed consent. The authors have obtained approval from the Ethics Committee for analysis and publication of routinely acquired clinical data and informed consent was not required for this retrospective observational study.

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