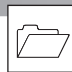

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The prevalence of hypoparathyroidism after thyroid surgery depending on the diagnosis, the extent of the procedure, and the presence of parathyroid glands in the postoperative examination

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Key words: *nodular goitre; thyroid cancer; surgical treatment; complications; hypoparathyroidism*

Introduction

Complications after thyroidectomy include bleeding, hoarseness of throat, dysphagia, paresis, laryngeal nerve palsy and hypoparathyroidism, and less commonly, tracheal instability, lymphorrhoea, and occasionally thyroid storm [1, 2]. Postoperative hypoparathyroidism may constitute one of the complications associated with thyroidectomy due to cancer and benign goitre. It is usually caused by removal, damage, or ischaemia of the parathyroid glands [3, 4].

Material and methods

A retrospective study on 595 patients with total thyroid removal caused by cancer and benign nodular goitre was performed between 2015 and March 2019 at the Department of Oncological Surgery of the Medical University of Silesia in Katowice. The study was conducted in order to assess the prevalence of hypoparathyroidism, defined as serum levels of parathyroid hormone (PTH) < 15 pg/mL (normal 15–60 pg/mL) and ionised calcium (Ca) < 4 mg/dL (4–5.2 mg/dL) at four hours and 30 days after surgery, as well as factors that may influence it.

In the case of cancer, the scope of the surgery included total extracapsular removal of the thyroid gland with the central lymphatic system and, in some instances, lateral lymphadenectomy. In terms of goitres, the procedure involved total extracapsular thyroidectomy. The procedures were performed by four surgeons with years of experience.

Parathyroid hormone and Ca levels were not determined before surgery. The check was performed four hours after the surgery, and the calcium level was tested the following day. The calcium level was also measured 30 days after the surgery. In patients with borderline or below normal PTH levels in the postoperative period, the PTH was also checked. All patients with low PTH levels received calcium supplementation at 3 g/day and alphacalcidol at 2.0 μg/day. In patients with decreased PTH levels as at 30 days after surgery, supplementation with calcium and Alfadiol was maintained for another three months.

The study included an analysis of the prevalence of hypoparathyroidism according to:

1. The diagnosis: cancer, benign goitres, goitres with inflammation (Hashimoto's disease).
2. The extent of the surgery: central or lateral lymphadenectomy.
3. The presence of parathyroid glands in postoperative histopathological material (H-P).

The percentage of patients who had normalised levels of PTH and Ca within 30 days of the procedure campared to those characterised by abnormal levels immediately after the procedure (recovery rate) was calculated. The odds ratio is the ratio of the chance of recovery (i.e. normalising PTH or Ca levels if they were below normal immediately after the surgery) in the case of a procedure performed in the cancer group compared to that of a procedure performed in the group diagnosed with benign goitres.

Statistical analysis

The condition of patients, which is assessed regarding hypoparathyroidism, measured by way of PTH and Ca level testing after the surgery and 30 days after the procedure, is summarised in the table below. To determine the existence of significant differences between the patient groups, the results were compared using the chi-square test and Dunn's post-hoc test. The χ^2 test was used to examine whether the existing differences in the number of healed patients (who had normalised the levels under study) were significant. OR values with 95% confidence interval for the compared groups were calculated.

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Results

The study covered 595 patients, including 508 (85.3%) women and 87 (14.6%) men, aged 6 to 86 years, with an average of 53 years. 225 cancers, 336 nodular goitres, and 30 nodular goitres with inflammation were diagnosed in the H-P.

Decreased PTH and Ca levels in the group of patients diagnosed with hypoparathyroidism, who did not regain normal parathyroid gland function immediately after the surgery and 30 days after the procedure, and the effect of the diagnosis, the type of procedure, and the presence of parathyroid glands in H-P on postoperative hypoparathyroidism, are presented in Supplementary File — Table 1.

The outpatient follow-up check performed six months after the surgery revealed persistent symptoms of hypoparathyroidism in seven (1.1%) patients included in the study group with decreased PTH levels after the procedure, which required continued calcium and alphacalcidol supplementation.

Discussion

In the study, out of 225 patients operated for cancer, 29 (12.8%) were diagnosed with hypoparathyroidism 30 days after the surgery; in the group of patients who underwent central lymphadenectomy, it was 23 (10.4%), while in those after lateral lymphadenectomy it was 6 (23%). Among 336 persons diagnosed with mild goitres, decreased PTH levels were observed in 23 (6.8%), while among those with goitres and associated inflammation decreased PTH levels were observed in 1 (2.9%). The prevalence is comparable to that reported in the literature, which is between 6.9% and 46% [5, 6].

In the study, parathyroid gland removal was performed on 85 (14.2%) persons, resulting in hypoparathyroidism in 13 (2.1%) patients after 30 days, which is lower than the rate reported in the literature on the subject, which ranges from 6.4% to 31.1% [7, 8]. However, it still shows that incidental parathyroid gland removal is possible and expected.

The study included a comparison of the prevalence of hypoparathyroidism depending on the diagnosis (H-P): cancer, benign goitre, and goitre with inflammation. In terms of the extent of the removal, it includes central and lateral lymphadenectomy, as well as the presence of the removed parathyroid gland in H-P. The study revealed that in significantly more cases, hypoparathyroidism persisting 30 days after the surgery accompanies resection of thyroid cancer with central and lateral lymphadenectomy and removal of parathyroid glands compared to benign goitre and goitre with associated inflammation. This appears to be consistent with data contained in the literature on the subject, where central lymphadenectomy during thyroid removal due to cancer is the most common risk factor for hypoparathyroidism [9, 10].

The study was limited because not all patients with low PTH levels after 30 days after the surgery appeared for a follow-up check in subsequent months. Therefore, the number of patients with decreased PTH levels six months after the procedure may be underestimated and amount to more than seven.

Conclusions

Hypoparathyroidism is not an uncommon occurrence after thyroidectomy, even in facilities with extensive experience in this matter. Compared to total thyroid removal due to benign goitre, surgery for cancer with associated central and lateral lymphadenectomy significantly increases the risk of postoperative hypoparathyroidism. In surgical practice, it is reasonable to conduct routine Ca and PTH level checks after the procedure and 30 days after thyroidectomy.

Competitive interests

The authors declare that they have no conflict of interest.

SHORT COMM.

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