Postoperative hypoparathyroidism – what the family doctor should know

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Objectives. The aim of the study was to retrospectively evaluate, in own material, the prevalence and clinical picture of hypoparathyroidism, caused by various surgical procedures performed on the thyroid gland.

Material and methods. The study group involved 145 patients after thyroid surgery, treated for various reasons in the Department of Endocrinology of the Medical University in Lublin in the years 2000–2017. The authors analyzed the medical histories and clinical pictures of the patients and the results of laboratory tests, including calcium, phosphorus and PTH concentrations.

Results. 32 patients were diagnosed with hypoparathyroidism, and 113 patients without calcium concentration disorders. The analyzed groups did not differ significantly in respect to gender, age and indications for thyroid surgery. We found no correlation between the length of follow up and PTH concentration, a weak negative correlation with total calcium concentration and a quite strong negative correlation with ionized calcium concentration in the subgroup with newly diagnosed hypoparathyroidism.

Conclusions. The clinical picture of hypocalcaemia varies, and it is important to take into account the possibility of hypoparathyroidism in a patient after thyroid surgery.

Key words: hypoparathyroidism, hypocalcaemia, tetany, thyroid operation.

Background

Hypoparathyroidism is a condition of parathyroid hormone (PTH) deficiency, which can be inherited, but it is also encountered mainly after thyroid or parathyroid gland surgery. PTH stimulates calcium reabsorption in the kidneys and calcium release from the bones. It also stimulates renal production of 1,25-dihydroxyvitamin D (calcitriol) from 25-hydroxyvitamin D. Hypocalcaemia caused by PTH deficiency can lead to cramping and twitching of the muscles or tetany and many other symptoms.

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aged 20–88 years (median 63), treated for various reasons in the Department of Endocrinology of the Medical University of Lublin in the years 2000–2017.

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The obtained results were analyzed statistically. Values measured in a nominal scale were characterized using count and percentage, while in a ratio scale using mean value and standard deviation. Variables with normal distribution (calcium concentration) and skew distribution (time between thyroid surgery and the diagnosis of hypoparathyroidism and between surgery and hospitalization; age) were evaluated using the Shapiro–Wolf test. The chi-square test was used to evaluate the differences between the analyzed groups. A significance level of $p < 0.05$, indicating the presence of statistically significant differences or dependencies, was accepted. The correlation between the two parameters was analyzed using the Pearson correlation test.

### Results

32 patients (2 M, 30 F; 22.1% of the entire group) were diagnosed with hypoparathyroidism (HPTH), and 113 patients (14 M, 99 F; 77.9% of the entire group) without calcium concentration disorders (NHPTH). Among 32 HPTH patients, 2 were admitted from the emergency ward due to their first episode of tetany.

In the HPTH group, hypoparathyroidism was most often observed after thyroid cancer operation (45.5%; $n = 5$). Graves’ disease, a toxic multinodular goiter and a goiter with compression symptoms caused this complication in 31.3% ($n = 5$), 21.4% ($n = 3$) and 18.2% ($n = 19$), respectively (Table 1).

#### Table 1. Frequency of hypoparathyroidism according to the indication for thyroid surgery

<table>
<thead>
<tr>
<th>Hypoparathyroidism (%)</th>
<th>Goiter with compression</th>
<th>Toxic multinodular goiter</th>
<th>Graves’ disease</th>
<th>Thyroid cancer</th>
</tr>
</thead>
<tbody>
<tr>
<td>(n = 19)</td>
<td>(n = 3)</td>
<td>(n = 5)</td>
<td>(n = 5)</td>
<td>(n = 5)</td>
</tr>
<tr>
<td>18.2</td>
<td>21.4</td>
<td>31.3</td>
<td>45.5</td>
<td>16%</td>
</tr>
</tbody>
</table>

### Discussion

Parathyroids are small endocrine glands of lentil grain size, usually totaling four in number, located on the posterior surface of the thyroid gland. Rarely they may be located inside the thyroid, in the mediastinum or even inside the thymus.

Thyroid surgery is frequently performed for various indications: suspicion of cancer, goiter with a compression of the trachea or esophagus (causing dyspnoea, hoarseness or difficulty in swallowing), visible or unsightly mass on the neck, or when a goiter is causing symptoms due to the overproduction of thyroid hormones (toxic nodular goiter or Graves’ disease). The extent of thyroid surgery can be generally classified as partial or total. Recommendations concerning the extent of an operation are determined by the reasons for surgery. A hemithyroidectomy may be recommended in the case of a toxic solitary nodule or benign one-sided nodules that are causing local compression symptoms. A total or near–total thyroidectomy may be advised for patients with Graves’ disease, because it removes target tissue for the thyroid-stimulating hormone receptor antibodies. Such a procedure is also recommended in a large multinodular goiter. A subtotal thyroidectomy leaves a thyroid remnant and is therefore less likely to cause complications; however, it can often cause recurrences of hyperthyroidism, requiring reoperations [4]. There is also the possibility that a subtotal thyroidectomy, which is thought to be somewhat safer than a total thyroidectomy, may leave an undetected thyroid cancer in place [5]. In the case of papillary cancer, a total or near-total thyroidectomy with subsequent treatment with radioactive iodine is recommended by most surgeons as the treatment of choice. Such recommendations also refer to the treatment of follicular thyroid cancer confirmed by a histopathological examination.
Potential major complications of thyroid surgery include bleeding, injury of the superior or recurrent laryngeal nerve, hypoparathyroidism, thyrotoxic storm and infection. Because the parathyroid glands are usually located close to the thyroid and share the blood supply and lymphatic drainage, thyroid surgery may affect them. Hypoparathyroidism can result either from direct trauma to the parathyroid glands, or devascularization, or removal of the glands during surgery. Postoperative hypoparathyroidism with subsequent hypocalcaemia can be persistent or transient, and in most cases, it is initially asymptomatic.

The risk of hypocalcaemia is higher after a total thryoidectomy or total thyroidectomy with node dissection, and in a transient form, it was observed in 16–55% of total thyroidectomies, more frequently in Graves’ disease than a nontoxic multinodular goiter, although the incidence of permanent hypoparathyroidism didn’t differ between these groups.

In our material, hypoparathyroidism was most often caused by a total thyroidectomy due to thyroid cancer (45.5% of cancer operations were complicated by hypoparathyroidism). In relation to Graves’ disease and a toxic multinodular goiter, recurrent hypoparathyroidism was most often observed in individuals after a total thyroidectomy compared to less extensive procedures. On the other hand, other authors didn’t observe a relationship between the extent of surgery and permanent or transient hypoparathyroidism among patients with Graves’ disease.

In our opinion, it seems that the incidence of complications may be more relevant to the surgeon’s experience than to the extent or indications for surgery.

The latency between surgery and the diagnosis of hypoparathyroidism in our study ranged from 3 days to 15 years, and in the subgroup admitted from the emergency ward, it was 3 days to 11 months. Patients with iatrogenic hypoparathyroidism usually present with tetany occurring within a few weeks from the thyroidectomy. However, the clinical presentation of hypoparathyroidism can be less obvious and much delayed. The first manifestation may present as movement disorders, such as chorea, symptoms of increased intracranial pressure or epileptic seizures. Time intervals from surgery to first seizures up to 61 years were reported in single cases.

Family physicians play a key role in the process of diagnosis and management of hypoparathyroidism. Suspicion of hypocalcaemia requires a differential diagnosis – examining the patient’s neck for any sign of thyroid surgery may be useful, followed by calcium and vitamin D metabolite supplementation. Treatment can be further enhanced by introducing thiazide diuretics, which decrease urinary calcium excretion by increasing distal renal tubular calcium reabsorption. Combining diuretics with a low-salt, low-phosphate diet and phosphate binders is beneficial.

Conclusions

Many patients who are under the care of family doctors undergo thyroid surgery for various reasons. It is crucial to remember that hypoparathyroidism can be one of the most common and more serious complications of such operations, and its clinical presentation can be distant in time. The clinical picture of hypocalcaemia can vary greatly from patient to patient, and it is important to take into account the possibility of hypoparathyroidism in a patient after thyroid surgery. This mainly depends on the general practitioner and how quickly the diagnosis is made and the appropriate treatment is implemented.

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References


