**Total thyroidectomy: safe and adequate treatment for papillary microcarcinoma of the thyroid gland**

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**Key-words.** Papillary microcarcinoma; thyroid gland; total thyroidectomy

**Abstract.** Total thyroidectomy: safe and adequate treatment for papillary microcarcinoma of the thyroid gland. **Objective:** The purpose of this study was to evaluate the incidence of and surgical approach in patients with papillary thyroid microcarcinoma (PTMC; thyroid cancer ≤ 10 mm) when these patients underwent surgery for presumed benign thyroid conditions.

**Material and methods:** Between January 2006 and December 2013, 1460 adult patients underwent partial or total thyroidectomy for presumed benign thyroid conditions in the Department of Otorhinolaryngology, Head and Neck Surgery, Comenius University, Jessenius Faculty of Medicine, University Hospital in Martin, Slovakia. Of this population, 78 patients with incidental PTMC were further studied.

**Results:** Incidental papillary microcarcinoma was more frequently detected in patients with multinodular goitre (P = 0.034) or Hashimoto’s thyroiditis (P = 0.0013) than in patients with other thyroid diseases. Multifocal and bilateral occurrence of PTMC was identified in 26% and 18% of patients, respectively. The initial surgical procedure was hemithyroidectomy in 23% of patients. All patients initially treated with hemithyroidectomy underwent completion thyroidectomy 10-32 days (median 19 ± 7 days) after initial surgery. There were no significant differences in postoperative complications (recurrent laryngeal nerve injury, hypoparathyroidism) between patients with hemithyroidectomy and patients with total thyroidectomy at the first operation (P = 0.647). Completion surgery in patients with hemithyroidectomy was not followed by a significant increase in the incidence of complications (P = 0.228).

**Conclusion:** Incidental PTMC is more often detected in patients that undergo surgery for multinodular goitre and Hashimoto’s thyroiditis. Total thyroidectomy constitutes a safe and adequate surgical approach in patients with PTMC.

**Introduction**

Thyroid microcarcinoma has been defined as thyroid cancer ≤ 10 mm in diameter, usually papillary (papillary thyroid microcarcinoma, PTMC). The term “occult thyroid papillary carcinoma” was in use before the World Health Organization proposed a major diameter of 1 cm for occult papillary carcinoma and renamed it “microcarcinoma.” Nonetheless, various terms are currently used to define this thyroid cancer, such as small, tiny, minute, minimal, and incidental thyroid papillary cancer.1,2

An incidental finding of PTMC during pathological examination of resection specimens in patients that underwent surgery for benign thyroid conditions remains a common scenario, despite advances in preoperative investigations, particularly ultrasound and fine-needle aspiration cytology (FNAC).3 PTMCs are found at rates of 0.5-35.6% at autopsy or in surgical specimens where carcinoma is not suspected.4

The ideal therapeutic approach in PTMC patients remains a subject of debate among endocrinologists and surgeons. Even more controversial is what should be done for patients with incidentally found PTMC when less-than-total thyroidectomy has been performed. There is no consensus in the management of this disease, resulting in a wide spectrum of responses ranging from observation without treatment5 to total thyroidectomy plus radioactive iodine treatment.6

The purpose of this study was to evaluate the surgical approach in patients with unsuspected PTMC on thyroidectomy specimens that underwent surgery in the Department of Otorhinolaryngology, Head and Neck Surgery, Comenius University, Jessenius Faculty of Medicine, University Hospital
in Martin, Slovakia. We compared the incidence of PTMC in multinodular goitre, Hashimoto’s thyroiditis, Graves-Basedow disease, thyrotoxicosis, and solitary nodule of the thyroid gland. We also examined changes in pathological parameters and rates of complications in patients that underwent completion surgery.

Materials and methods

A total of 1460 adult patients underwent partial or total thyroidectomy for presumed benign thyroid conditions in the Department of Otorhinolaryngology, Head and Neck Surgery, Comenius University, Jessenius Faculty of Medicine, University Hospital in Martin, Slovakia between 1 January 2006 and 31 December 2013. All patients included in the study were scheduled for surgical treatment of benign thyroid pathology (multinodular goitre, Hashimoto’s thyroiditis, Graves-Basedow disease, thyrotoxicosis, or solitary nodule of the thyroid gland).

Thyroid ultrasound was performed in all patients. FNAC of thyroid nodules with features suggestive of malignancy on ultrasonography (hypoechoegenicity, microcalcifications, absence of peripheral halo, irregular borders, intranodular hypervascularity, and regional lymphadenopathy) was performed in 511/1460 patients (35%). In patients with multiple nodules, one nodule dominant/suspicious for malignancy or two nodules > 10 mm in maximal diameter were biopsied. Thyroid FNAC results were classified using the Bethesda system for reporting thyroid cytopathology: class I, nondiagnostic/unsatisfactory; class II, benign; class III, atypia of undetermined significance/follicular lesion of undetermined significance; class IV, follicular neoplasm/suspicious for follicular neoplasm; class V, suspicious for malignancy; class VI, malignancy.

Frozen sections were obtained when requested by the operating surgeon. At our institute, perioperative histology is a standard method for diagnosing nodular goitre. Perioperative histology is performed when an endocrinologist indicates hemithyroidectomy and FNAC does not show benign pathology (category II); follow-up FNAC is not performed. Patients with cancer on frozen sections underwent total thyroidectomy and revision of cervical lymph nodes with therapeutic central and/or lateral compartment lymphadenectomy of the involved lymph nodes. These patients were excluded from further analysis.

The operating surgeon decided whether to extend the thyroidectomy based on the extent of the lesions, the patient’s wishes, and intraoperative findings. Thyroidectomy consisted of hemithyroidectomy (unilateral lobectomy plus isthmectomy), primary total thyroidectomy, and completion thyroidectomy. Other techniques for surgery of the thyroid gland, such as subtotal thyroidectomy and near-total thyroidectomy, are not performed at our institute. Hemithyroidectomy is preferred to unilateral lobectomy. Isthmectomy is performed when benign thyroid pathology is localized only to the isthmus.

Pathological classification was performed for all patients according to World Health Organization guidelines. The largest tumour size was recorded. Patients were categorized as PTMC if the largest tumour diameter was ≤ 1 cm; otherwise, patients were categorized as non-PTMC and were excluded from further study. Multifocal PTMC was defined as two or more tumour sites with a diameter ≤1 cm.

The status of the parathyroid glands and the recurrent laryngeal nerve was assessed clinically via total and ionized serum calcium levels and indirect laryngoscopy, respectively, before and the day after surgery/completion surgery. Recurrent laryngeal nerve injury and hypoparathyroidism (total serum calcium < 2.2 mmol/l and ionized serum calcium < 1.13 mmol/l) were considered permanent if they persisted 6 months after surgery.

We studied the following parameters: thyroid condition (multinodular goitre, Hashimoto’s thyroiditis, Graves-Basedow disease, thyrotoxicosis, or solitary nodule of the thyroid gland), extent of surgery at the first operation, extent of completion surgery, postoperative complications (temporary and permanent recurrent laryngeal nerve lesions and hypoparathyroidism), tumour size, tumour number (multicentricity), and tumour bilaterality.

Statistical analysis was performed with STATISTICA Cz 10. Frequencies of categorical data were tabulated and evaluated with the chi-squared test using Yates’s correction. For ordinal data, median and interquartile ranges were calculated and tested with the Kruskal-Wallis test, Mann-Whitney test, or two-factorial analysis of variance with the post-hoc Duncan test. P-values <0.05 were regarded as statistically significant.
Incidental microcarcinoma and thyroidectomy

Results

Between 2006 and 2013, 1620 adult patients underwent partial or total thyroidectomy, 1460/1620 patients (90%) for presumed benign conditions (18% male, 82% female, mean age 53.78±13.97 years, range 19-84 years) and 160/1620 patients (10%) for cancer (20% male, 80% female, mean age 44±12 years, range 21-76 years). In the 1460 patients that underwent surgery for presumed benign conditions (multinodular goitre, Hashimoto’s thyroiditis, Graves-Basedow disease, thyrotoxicosis, or solitary nodule of the thyroid gland), PTMC was found in permanent sections in 78 cases (5%; 31% male, 69% female, mean age 57.04±15.8 years, range 24-84 years). There were no differences in gender (P=0.189) among the patient groups (benign condition vs. cancer vs. PTMC). Patients with malignant tumours were significantly younger than patients with benign conditions (P=0.0021) or PTMC (P=0.0019). The median size of PTMC was 5.7±3.25 mm (range 2-10 mm).

Incidental papillary microcarcinoma was more frequently detected in patients with multinodular goitre (P=0.034) or Hashimoto’s thyroiditis (P=0.0013) than in patients with other thyroid diseases (Figure 1). In 20/78 cases (26%), PTMC was multifocal, and it was bilateral in 14/78 (18%) cases. Bilateral occurrence of PTMC was higher in patients that underwent surgery for multinodular goitre (P=0.013) or Hashimoto’s thyroiditis (P=0.002) than in patients with other presumed benign conditions (Figure 2).

The initial surgical procedure was hemithyroidectomy in 18/78 patients (23%) and total thyroidectomy in 60/78 patients (77%). All patients initially treated with hemithyroidectomy underwent completion thyroidectomy 10-32 days (median 19±7 days) after initial surgery. Final pathology analysis of the remnant thyroid lobe after completion thyroidectomy detected bilateral PTMC in 7 patients (39%).

Table 1 summarizes the incidences of the main postoperative complications, recurrent laryngeal nerve injury and hypoparathyroidism. There were no significant differences in postoperative complications between patients with hemithyroidectomy and patients with total thyroidectomy at the first operation (P=0.647). Completion surgery in patients with hemithyroidectomy was not followed by a significant increase in the incidence of complications (P=0.228).

Discussion

Microcarcinomas are occult carcinomas that are small (≤10 mm in diameter), papillary in type, and exhibit benign behavior. Incidental identification of PTMC on permanent sections of thyroids removed for reasons other than cancer is common. We found 78 PTMCs in 1460 patients (5%), a rate close to the incidence reported in similar studies.9,10 Twenty-six percent of these PTMCs were multifocal and 18% were bilateral, similar to other published series.10,11 The mean tumour size was 5.7±3.25 mm. Incidental PTMC was detected significantly more often in patients that underwent surgery for multinodular goitre and Hashimoto’s thyroiditis than in other patients. In contrast to our results, Noguchy et al.12
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Total thyroidectomy) is very controversial for lower-risk papillary thyroid carcinoma. In most clinical settings, decisions about the extent of thyroidectomy should be individualized and made in consultation with the patient. Some prominent thyroid-cancer specialists advocate unilateral lobectomy for most patients with low-risk papillary or follicular thyroid carcinoma based on the low mortality reported for most patients and the high complication rates reported for more extensive thyroidectomy. However, the large thyroid remnant after unilateral thyroidecomy may complicate long-term follow-up via serum thyroglobulin measurements and whole-body radioactive iodine imaging.16

Patients treated at the Mayo Clinic for low-risk papillary thyroid carcinoma experienced no improvement in survival rates after undergoing procedures more extensive than ipsilater lobectomy.17 Hay et al.18 uncovered no significant differences in cancer-specific mortality or distant metastasis rates between patients treated by unilateral or bilateral lobectomy for low-risk papillary thyroid carcinoma. However, the 20-year frequencies of local recurrence and nodal metastasis after unilateral lobectomy were significantly higher than the rates after bilateral lobectomy.18

There has been a long-unresolved debate in the literature about the optimal initial treatment for papillary thyroid cancer, including the extent of thyroidectomy. For cases identified preoperatively, the rationale for total thyroidectomy includes the frequent multifocal nature of the disease, the ability to reduce the risk of recurrence, the ability to allow radioactive iodine treatment, and the greater ease of patient monitoring via whole-body radioiodine scans and serum thyroglobulin levels. The American Thyroid Association14 and the European Thyroid Cancer Task Force15 recommend total thyroidectomy for most papillary thyroid cancer cases. However, the correct approach for treating low-risk, small ( ≤ 1 cm), well-differentiated intrathyroidal tumours remains controversial, particularly when there is no definite diagnosis of carcinoma prior to surgery.

The appropriate extent of thyroid resection (ipsilateral lobectomy or hemithyroidectomy versus total thyroidectomy) is very controversial for lower-risk papillary thyroid carcinoma. In most clinical settings, decisions about the extent of thyroidectomy should be individualized and made in consultation with the patient. Some prominent thyroid-cancer specialists advocate unilateral lobectomy for most patients with low-risk papillary or follicular thyroid carcinoma based on the low mortality reported for most patients and the high complication rates reported for more extensive thyroidectomy. However, the large thyroid remnant after unilateral thyroidecomy may complicate long-term follow-up via serum thyroglobulin measurements and whole-body radioactive iodine imaging.16 Patients treated at the Mayo Clinic for low-risk papillary thyroid carcinoma experienced no improvement in survival rates after undergoing procedures more extensive than ipsilater lobectomy.17 Hay et al.18 uncovered no significant differences in cancer-specific mortality or distant metastasis rates between patients treated by unilateral or bilateral lobectomy for low-risk papillary thyroid carcinoma. However, the 20-year frequencies of local recurrence and nodal metastasis after unilateral lobectomy were significantly higher than the rates after bilateral lobectomy.18

Table 1

<table>
<thead>
<tr>
<th>Surgical procedure</th>
<th>Temporary unilateral RLN injury</th>
<th>Permanent unilateral RLN injury</th>
<th>Temporary bilateral RLN injury</th>
<th>Permanent bilateral RLN injury</th>
<th>Temporary hypoparathyroidism</th>
<th>Permanent hypoparathyroidism</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of patients</td>
<td>No. of patients (%)</td>
<td>No. of patients (%)</td>
<td>No. of patients (%)</td>
<td>No. of patients (%)</td>
<td>No. of patients (%)</td>
<td>No. of patients (%)</td>
</tr>
<tr>
<td>Initial hemiTTE</td>
<td>18</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Completion TTE</td>
<td>18</td>
<td>1 (5.6%)</td>
<td>0</td>
<td>0</td>
<td>2 (11%)</td>
<td>0</td>
</tr>
<tr>
<td>Initial TTE</td>
<td>60</td>
<td>2 (3%)</td>
<td>1 (1.7%)</td>
<td>0</td>
<td>10 (17%)</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>78</td>
<td>4 (3.8%)</td>
<td>1 (1.3%)</td>
<td>0</td>
<td>12 (15%)</td>
<td>0</td>
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Abbreviations: RLN: recurrent laryngeal nerve; hemiTTE: hemithyroidectomy; TTE: total thyroidectomy. Data are shown as median ± standard deviation.

reported that microcarcinoma coincided with Graves-Basedow disease in 48% of their patients and with Hashimoto’s thyroiditis in 2% of their patients. This discrepancy may be due to differences in the patient populations included in these studies. The current investigation included only patients with pure papillary carcinoma, whereas the study by Noguchi et al.12 included a small number of follicular carcinomas, cases of papillary and follicular carcinomas in the same thyroid, and cases of papillary and medullary carcinomas in the same thyroid. On the other hand, similar to our results, Bircan et al.13 detected accompanying Hashimoto’s thyroiditis in 39% of patients with papillary microcarcinoma.

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Proponents of completion surgery6,19 believe that completeness of the surgical resection is an important determinant of outcome, and that residual thyroid tissue represents the most common site of disease persistence and recurrence. Moreover, complete resection permits accurate staging of the disease, facilitates postoperative treatment with radioactive iodine (where appropriate), and permits
accurate long-term surveillance for disease recurrence, as both radioactive iodine whole-body scanning and measurement of serum thyroglobulin levels are affected by residual normal thyroid tissue.

Total thyroidectomy is indicated in all patients with malignant tumours of the thyroid gland at our department. Here, all patients who were initially treated via hemithyroidectomy underwent completion of thyroidectomy. Prophylactic lymphadenectomy of the central and lateral neck compartments in patients with thyroid cancer is not routinely performed at our institute. Only cases with no suspicion of microcarcinoma were enrolled in this study; therefore, no preoperative or perioperative suspicion of lymph-node metastasis occurred. As a consequence, no lymphadenectomy was performed in these patients.

Papillary microcarcinoma is frequently multifocal and bilateral, another reason why total thyroidectomy is preferred for all patients with thyroid carcinoma at our institute. Other PTMC foci were identified in remnant thyroid lobes in 7 patients (39%) from the group that underwent hemithyroidectomy.

Incidentally detected PTMC, even when multifocal, is a biologically indolent tumour with very good prognosis. PTMCs rarely metastasize to distant sites and have an excellent prognosis, with a reported mortality of <0.5%.2,9 The extent of surgery did not influence the extremely low mortality of patients with PTMC in several previous studies17-21; thus, morbidity is the main concern associated with these patients.

A potential argument in favour of hemithyroidectomy for small carcinomas is the lower incidence of surgical complications associated with this technique. In the current study, there was no significant difference in the rate of permanent complications between the hemithyroidectomy and total-thyroidectomy groups. Similar results have been reported by other authors.22 Moreover, a comparative retrospective analysis by Hirsch et al.22 indicated that patients with low-risk papillary thyroid carcinoma that were initially treated with hemithyroidectomy were referred more often for neck ultrasound and FNAC than patients with larger tumours or more advanced disease that were treated with total thyroidectomy. In addition, more patients in the hemithyroidectomy group underwent repeat surgery for suspected recurrent/persistent disease.21 It is reasonable to assume that these factors negatively affect patient quality of life. Using a mathematical model of decision analysis, Esnaola et al.24 reported that total thyroidectomy maximized quality-adjusted life expectancy versus thyroid lobectomy in low- and high-risk patients with papillary thyroid carcinoma. The high numbers of sonographic and cytological tests for hemithyroidectomy result in a higher annual follow-up cost for patients after hemithyroidectomy than after total thyroidectomy.

An additional common argument favouring hemithyroidectomy for PTMC is that performing this partial surgery may possibly spare the requirement for life-long thyroxine treatment. Nevertheless, in the study by Hirsch et al.22, most patients in the hemithyroidectomy group were administered thyroxine after surgery.

Conclusion

The results of the current study show that incidental PTMC (thyroid cancer ≤10 mm in diameter) was more often detected in patients that underwent surgery for multinodular goitre or Hashimoto’s thyroiditis. Total thyroidectomy constitutes a safe and adequate surgical approach in patients with PTMC. Given the frequent multifocal nature of the disease, complete resection of thyroid tissue reduces the risk of recurrence, allows radioactive iodine treatment, and facilitates monitoring via whole-body radiiodine scans and serum thyroglobulin levels.

References


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