Thyroid surgery performed on an overnight basis: a 17 years of experience

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ABSTRACT

Objective: This study aimed to evaluate the results of thyroid surgeries with hospitalization periods shorter than 18 hours performed in a surgical endocrinology service, correlating these results with type of procedure, the definitive diagnosis and complications associated with the procedure. **Subjects and methods:** The procedures performed, complications associated, hospitalization period, and relationships among these variables were assessed in consecutive patients subjected to different types of thyroid surgeries from January 1997 to March 2014 by the same group of surgeons. Data were analyzed by frequency, and the associations between the hospitalization period and other variables were analyzed using the Pearson chi-square test and Fisher's exact test, using a multiple comparisons test with Bonferroni correction. **Results:** Among the 3,411 surgeries performed, 799 of them were malignant neoplasia, 2,505 were benign tumors and 107 were Graves' disease. The following procedures were performed: total thyroidectomy (1597 patients); total thyroidectomy with neck exploration (369 patients); lobectomy plus isthmectomy (1084 patients); total thyroidectomy complementation (145 patients); total thyroidectomy with neck dissection (84 patients); modified radical total thyroidectomy (13 patients); nodulectomy (11 patients); unresectable (9 patients); central neck dissection (48 patients); lateral neck dissection (38 patients); and others (13 patients). The following surgical complications, characteristic of the procedure: hemorrhage in 41 (1.2%) patients, hypoparathyroidism in 10 (0.3%) patients and recurrent laryngeal nerve (RLN) injury in 23 (0.7%) patients. Hospitalization shorter than 18 hours was observed in 97% of patients. **Conclusion:** Thyroid surgery can be safely performed in virtually all patients on an overnight basis in specialized services. Arch Endocrinol Metab. 2015;59(5):434-40

Keywords
Thyroidectomy; ambulatory surgery; thyroid surgery; surgical complications in thyroid procedure

INTRODUCTION

Surgical treatment of thyroid gland diseases involves well-established procedures. It is subject to the risks characteristic of any surgical procedure involving thyroidectomy, regardless of whether it is associated with neck dissection, and it features specific morbidities (bleeding with airway compression, recurrent laryngeal nerve injury and hypoparathyroidism). However, similar to more complicated procedures (1), thyroid surgeries performed in specialized centers feature lower complication rates and shorter hospitalizations (2,3). This combination leads to greater patient satisfaction and lower costs for health care systems.

The difficulties in thyroid surgery are mainly associated with the anatomy of the gland, including its location, vascularization and relationship to important functional structures (recurrent laryngeal nerve and parathyroid glands). These factors are responsible for the possible complications that are characteristic of the surgical treatment of thyroid gland diseases (4) by total thyroidectomy, partial thyroidectomy, partial thyroidectomy complementation and neck dissection and/or explorations due to malignant neoplasms in the thyroid gland.

Surgical management of thyroid gland disorders began to be rationally planned after the introduction of anesthesia and antisepsis. Emil Theodor Kocher was mainly responsible for the standardization of thyroid surgery. In 1883, he published a study including 43 thyroidectomies with a mortality rate of 6.9% that contrasted with the rates above 20% observed at the time. The contribution of Kocher to the development of thyroid surgery was so important that, in 1909, he was awarded the Nobel Prize in medicine (4,5). Notably, in 1927, with the technique standardized and 5,000

thyroidectomies performed, Kocher reported a surgical mortality rate of 0.11%. The need for pre- and postoperative hospitalization periods changed in the subsequent decades (6,7). Currently, meticulous surgical techniques combined with the evolution of anesthesia and perioperative support allow thyroid surgery to be safely performed on an *overnight basis*.

This study aimed to evaluate the results of thyroid surgery performed on an *overnight basis* in a surgery service specifically dedicated to surgical endocrinology that is integrated with two services of clinical endocrinology.

SUBJECTS AND METHODS

This retrospective study was based on the prospective database of consecutive patients subjected to different types of thyroid surgeries in the Clinical and Surgical Endocrinology Services of the Nossa Senhora da Conceição Hospital and Endocrine Surgery of the Mãe de Deus and Divina Providência Hospitals in the period between January 1997 and March 2014. Age, gender, indications of surgery, type of procedures performed, hospitalization period, complications associated with the procedure (bleeding requiring surgical reintervention, permanent recurrent laryngeal nerve(s) injury(s) and permanent hypoparathyroidism) and the relationships between these variables were assessed. Bleeding was considered patients in wich there was need for surgical reintervention in the hospitalization period and hypoparathyroidism refer to a definitive, that is defined as the patient that maintains hypocalcemia that requires reposition of calcium suplementation after 2 months post operative time. A procedure performed on an *overnight basis* corresponds to procedures in which patients remain in the hospital for a maximum of 18 hours from hospital admission to discharge. Since 1997, all patients with elective surgeries, regardless of age, comorbidities or type of procedure, are eligible for hospital discharge on the morning after surgery. The patients are informed about all processes involving the perioperative period (fasting, admission, surgical environment, anesthetic and surgical procedures, immediate recovery, diet reintroduction, pain control, discharge and possible complications). Patients arrive at the hospital one hour before the scheduled procedure. The surgeries are performed in the afternoon, starting at 12 pm, under general anesthesia. The first patient procedure begins at noon and the Schedule runs until 10:00 PM with a patient undergoing surgery every two and a half hour on average, and discharged early in the morning after procedure, with a mean hospital stay of 18 hours, by definition not considered as inpatient (time of stay in the hospital over than 24 hours). The patients are then moved to a recovery room where they spend the night and are discharged the following morning with appropriate instructions.

Regarding the use of drains, it was routine procedure in these surgeries until 2005, using portovac 1/8, which were taken 1 hour before hospital discharge. After this period, we began using a slightly compressive dressing with gauze and micropore in order to remove the space created by the absence of the thyroid, which is taken 1 hour before discharge. No patient was discharged with drain.

The surgeries were categorized as follows:

Partial thyroidectomy includes unilateral thyroid lobectomy and isthmectomy.

Total thyroidectomy includes bilateral thyroid lobectomy combined with isthmectomy. Near-total thyroidectomy, where the posterior thyroid capsule is preserved to protect the recurrent laryngeal nerve or the parathyroid glands, was included in the total thyroidectomy group.

Total thyroidectomy with central neck exploration is indicated in cases of diagnosis or suspicion of differentiated cancer (papillary or a variant thereof) in which the exploration did not result in dissection and/or resection of lymph nodes. In these situations, central neck exploration includes the central neck compartment, peritracheal nodes and lateral nodules for the assessment of the carotid-jugular lymph nodes by opening the carotid sheath.

Total thyroidectomy with neck dissection is indicated when one or more lymph nodes were resected.

Modified radical total thyroidectomy includes resection of the prethyroid muscles while preserving the sternocleidomastoid muscle.

Nodulectomy was performed for benign and solitary nodules of the isthmus.

Tumors of patients diagnosed with anaplastic thyroid cancer whose thyroidectomies were considered to lack benefit (incomplete) or were performed for palliation (clearing the airway) were described as unresectable.

Central or lateral neck dissections were performed in patients who underwent to thyroidectomy who presented recurrence of differentiated tumors or medullary carcinoma.

Procedures that did not include thyroid surgery in the original proposal were grouped as "other", such as parathyroid surgery that required lobectomy.

Descriptive analyses of the variables by frequencies, measures of central tendency (means) and variabilities (standard deviations) were performed using Microsoft Excel® 2010.

The possible associations between the hospitalization period (period shorter or longer than 18 hours), the different types of surgery and the complications that occurred were analyzed using Pearson's chi-square test and, when necessary, Fisher's exact test, with multiple comparisons test with Bonferroni correction, using WINPEPI software (version 11.25). A 95% confidence interval for $p < 0.05$ was used.

RESULTS

A total of 3,411 patients had surgeries. Of these patients, 3,007 (88%) were female and 404 (12%) were male. The mean age was 48.8 ± 15.5 years, ranging from 7 to 90. The distributions by age group and definitive histopathological diagnosis are shown in table 1.

Table 1. Characteristics of 3,411 patients subjected to thyroidectomy (or procedures associated with thyroidectomy) regarding gender, age and definitive diagnosis

N = 3,411 patients	
Gender	
Female	3,007 (88%)
Male	404 (12%)
Age (years)	
Mean and SD (years)	48.7 ± 15.5 (7 to 90)
0 to 12 years	4 (0.1%)
13 to 20 years	20 (0.6%)
21 to 40 years	462 (13.5%)
41 to 60 years	1,934 (56.7%)
61 to 80 years	952 (27.9%)
Older than 81 years	39 (1.2%)
Definitive AP diagnosis	
Colloid multinodular goiter	1,227 (36.1%)
Differentiated carcinoma	747 (22.0%)
Colloid nodular goiters	697 (20.5%)
Follicular adenoma	314 (9.2%)
Hashimoto's thyroiditis	191 (5.6%)
Graves' disease	107 (3.1%)
Medullary carcinoma	41 (1.0%)
Anaplastic carcinoma	11 (0.3%)
Others	76 (2.2%)

The hospitalization period was shorter than 18 hours in 97% of patients. Among the 105 patients who remained hospitalized more than 18 hours, 78 (74.3%) of these cases were due to social causes, while 27 (25.7%) of them were due to complications associated with the procedure (Table 2).

Table 2. Hospitalization periods of patients subjected to different types of thyroidectomy (in hours)

Hospitalization period	N
Shorter than 18 hours	3,396 (97%)
Longer than 18 hours	105 (3%)
Social causes (NO)	78 (2.2%)
Associated with the procedure (eligible)	27 (0.8%)

NO = not offered an early discharge option (outpatient or overnight care).

A total of 78 (74%) patients were hospitalized longer than 18 hours due to social causes, including lack of transportation to their places of origin or hospitalization due to another comorbidity; these patients were not eligible for discharge.

Although the service offers care for adult patients, it is part a teaching hospital with multidisciplinary integration, which resulted in the care of four patients younger than 12 years. Those patients were operated by the same group, as requested by pediatric endocrinologists.

Regarding drains, they were used in 1,321 procedures with 16 (1.2%) bleedings and among patients without drains (2,090), bleeding ocurred in 25 (1.2%) patients. These results (1.2% of bleeding with or without drains) shows that there is no relationship between the use of drainage or not to prevent or minimize bleeding.

Definitive diagnoses of benign pathology, such as nontoxic colloid nodular goiter (CNG) and colloid multinodular goiter (CMNG), were observed in 1,968 (57.7%) patients. In cases of CMNG that were diagnosed either before or during the procedure, total thyroidectomy was the procedure of choice if possible, given the high rate of recurrence of multinodular goiters after partial thyroidectomy (8-10).

Definitive anatomopathological diagnosis of malignant tumors was observed in 799 (24%) patients, where 747 (93.6%) of them were differentiated cancer: papillary and follicular thyroid cancer and their variants, such as the follicular variant of papillary and Hürthle cell carcinomas. In all procedures, total thyroidectomy with central neck exploration was the proposed surgical procedure when there was a defined cytological diagnosis of cancer or when there was clinical or intraoperative suspicion, as suggested by the literature, in addition to being the procedure adopted in our services (11,12).

Surgical treatment was indicated in 107 patients with Graves' disease, who were then subjected to total thyroidectomy because anything less than total thyroidectomy fails to correct hyperthyroidism in 30% of cases (8,13).

Total thyroidectomy was the most common procedure and was performed in 1,631 (46.4%) patients, followed by lobectomy plus isthmectomy, which was observed in 1,063 (31.3%) patients. Total thyroidectomy with neck exploration, which is a standard procedure in cases with a previous diagnosis and/or suspicion of carcinoma, was observed in 384 (11.4%) patients. Total thyroidectomy was complemented by lobectomy in 84 (2.5%) patients due to histopathological examinations indicating carcinoma in previous partial surgeries, while in 55 (1.9%) patients, the procedure was performed due to goiter or nodule development in the remaining lobe after partial thyroidectomy. These results demonstrated that the majority of the procedures involved total thyroidectomy combined or not with procedures such as neck dissection and/or only exploration, which occurred in 69.2% of patients (Table 3).

Table 3. Distribution of the various surgeries performed in the analyzed population

Procedures performed	N
Total thyroidectomy	1,631 (46.4%)
Lobectomy + isthmectomy	1,063 (31.3%)
Total thyroidectomy + neck exploration	384 (11.4%)
Total thyroidectomy + neck dissection	84 (2.5%)
Total thyroidectomy complementation	139 (4.2%)
Central neck dissection	48 (1.4%)
Lateral neck dissection	38 (1.1%)
Modified radical total thyroidectomy	13 (0.4%)
Nodulectomy	11 (0.3%)
Unresectable	9 (0.3%)
Others	11 (0.3%)
Total	3,411

The following surgical complications were associated with the procedure: hemorrhage in 41 cases (1.2%), permanent hypoparathyroidism in 10 cases (0.3%) and recurrent laryngeal nerve injury in 23 cases (0.7%) (Table 4).

Table 4. Complications associated with the procedures

Complications	N
Hemorrhage	41 (1.2%)
Permanent RLN injury	23 (0.7%)
Permanent hypoparathyroidism	10 (0.3%)
Total	74 (2.2%)

RLN: recurrent laryngeal nerve.

Among the 41 patients who presented hemorrhage, 34 (83%) of them were subjected to total thyroidectomy with or without complementation, while the other 7 (17%) patients were subjected to lobectomy plus isthmectomy ($p < 0.001$). A multiple comparison test revealed significant differences between the group subjected to the total thyroidectomies, the group subjected to the partial thyroidectomies and the group that had thyroidectomy complementation ($p < 0.05$). Regarding the reason for the procedure among the 41 patients who presented hemorrhage, 11 (1.38%) were diagnosed with thyroid cancer, whereas 1.15% were diagnosed with benign tumors. This finding demonstrates that there is no relationship between benign and malignant tumors and hemorrhage in this population ($p = 0.605$). In 38 of these 41 (92.7%) patients, reoperations were performed within 6 hours after the procedure and 3 of them were in the first 18 hours after the procedure. Of these 41 patients who underwent reoperation for bleeding, 18 (43.9%) of them remained hospitalized for more than 24 hours.

Symptomatic permanent recurrent laryngeal nerve injury was observed in 23 (0.7%) patients subjected to total thyroidectomy with or without complementation ($p < 0.001$). None of the patients subjected to partial thyroidectomy presented permanent recurrent laryngeal nerve injury in this study. Although this injury was observed in 9 cases of the 799 cancer patients (1.12%) and in 14 cases of the 2,612 (0.53%) patients operated with benign pathology, there was no significant difference between the two groups ($p = 0.074$).

Total thyroidectomy with or without complementation was performed in all of the 10 patients with definitive hypoparathyroidism, in which 5 of them were diagnosed with a malignant tumor (3 patients with papillary carcinoma, 1 patient with the follicular variant of papillary carcinoma and 1 patient with anaplastic thyroid carcinoma), representing 0.7% of the patients. The percentage of patients operated due to benign tumors was 0.37%, with no significant difference between the two groups. Thyroidectomy occurred due to Graves' disease in 2 patients and CMNG in the other 3 patients.

DISCUSSION

The age group distribution corresponds to the highest frequency of these diseases and is similar to studies with large numbers of participants (5,7,8). The prevalence of females is 7-fold higher than males, which contrasts

the gender distribution reported in the literature (a female prevalence that ranges from 2.5- to 5-fold) (7,8). In the United States of America, 59,478 patients underwent thyroidectomy in 2009, and the mean (SD) age was 53.0 (16.4) years (4,8).

This study mainly aimed to assess the safety of these procedures when performed in patients hospitalized for less than 18 hours from the time of admission until discharge; such procedures are referred to as care on an overnight basis.

The safety of such procedures depends on the correct preoperative evaluation of these patients, on coordination between the surgeon and the endocrinologist and, especially, on the instructions provided to patients and consequent knowledge of patients and their families regarding the procedure and the expected or possible implications. Similar management has been applied to larger operations to reduce costs and to minimize complications using protocols known as Fast Track Recovery (14). Using this routine, 97% of patients undergoing the various procedures analyzed in this study were discharged in fewer than 18 hours after admission; none of them required readmission after discharge due to complications associated with the procedure for any reason. Only one patient subjected to total thyroidectomy because of Graves' disease was readmitted in the emergency department of our hospital with hypocalcemia five days after the procedure, due to non-compliance with the guidelines prescribed by our service.

Excluding the patients who needed to stay in the hospital due to social reasons and those who were already hospitalized for other reasons, only 27 (0.8%) of the 3,333 patients had complications that prevented their discharge in fewer than 18 hours.

In the recent past, thyroid surgery was considered to have risks due to possible specific complications and those associated with the procedure: hemorrhage, recurrent laryngeal nerve (RLN) injury and hypocalcemia, which is a result of either transient or definitive hypoparathyroidism. These complications are still the main reasons for longer hospital stays. The cases of hemorrhage occurred in the early hours after the surgery and, in most of the cases, were resolved within the first four hours by reintervention; therefore, this complication did not prevent discharge on the day after the procedure for some of these patients.

Similarly, dysphonia, whether transient or not, caused by RLN manipulation or injury did not prevent the expected discharge because dysphonia does not affect the functional independence of a patient in their home environment.

Hypoparathyroidism is still the main reason for patients remaining hospitalized, and serum calcium is often supplemented to prevent possible hypocalcemia. Because the manifestations of hypocalcemia usually occur 48 hours after thyroidectomy, the patient should be properly informed to be able to identify symptoms or signs of hypocalcemia and how to proceed correctly if this complication occurs. Therefore, these patients receive a discharge notice instructing them to go to the emergency department if necessary. The notice also includes information for emergency physicians about how to treat and instruct a patient with such complications. These instructions and the availability of someone from the team to provide assistance allow these patients to be safely discharged from the hospital the morning following the procedure.

Between 2005 and 2011, Mazeh and cols. (15) subjected 608 patients to thyroidectomy, of which 298 (49%) were performed on an overnight basis. The complication rates were no different between patients who underwent partial or total thyroidectomy and between those who remained hospitalized after surgery compared to those who underwent the overnight procedure (15).

In 2011, Tuggle and cols. (16) identified 6,762 patients subjected to thyroidectomy, 1,168 (17%) of who had their surgery performed on an overnight basis. Rosato and cols. (17) demonstrated that thyroidectomy was usually performed on an overnight basis by more experienced surgeons and in hospitals with high volumes of these surgeries. Hospital readmission rates were similar in both groups (hospitalized or overnight): 1.4 and 2.4%, respectively (16,17). The lower readmission rate observed in the present study, in which only 1 patient among the 3,411 analyzed cases was readmitted, is attributed to proper instructions given at the time of discharge, the support system offered to the patients in both hospitals, and the availability of the institutions and the team for care and management if necessary.

Data from 3,660 thyroid surgeries were collected in a multicenter study conducted in Scandinavia. After thyroidectomy, hemorrhage was observed in 2.1% of the cases and was more frequent in older and male patients. A similar finding was observed in the study performed by the AAES, but not in the cases analyzed in the present study (10).

Kandil and cols. (4) analyzed 46,261 thyroidectomies performed in the USA over 10 years and determi-

ned that recurrent laryngeal nerve injuries were associated with the volume of thyroid surgeries performed by the surgeon. Nerve injuries occurred at a rate of 1.5% when the surgery was performed by low-volume surgeons (fewer than 10 surgeries/year), at a rate of 1.2% by intermediate-volume surgeons (10 to 99 surgeries/year) and at a rate of 0.8% by high-volume surgeons (more than 100 surgeries/year).

Although it seems reasonable that hypoparathyroidism is only reported in total thyroidectomies or surgeries that complement the total thyroidectomy, the evaluated cases (10,11,14) do not separate the total and partial thyroidectomies. Although Kandil and cols. demonstrated hypoparathyroidism at rates of 12.1%, 9.4% and 4.7% when performed by low-, intermediate- and high-volume surgeons, respectively, it is not clear if these complications are transient or permanent (4).

In a study conducted by Barczyński and cols. in Scandinavia, unilateral paresis was associated with more advanced patient age, intrathoracic goiter and thyrotoxicosis. After six months, the prevalence of nerve paralysis was 0.97% and was considered permanent. After total thyroidectomy, hypocalcemia occurred in 9.9% of patients immediately after surgery and in 4.4% of patients after six months, which was considered definitive (10).

Bleeding is the main reason for longer time hospitalization in patients undergoing surgical procedure related to thyroid. This study demonstrates that bleeding was related to the extent of the procedure because the bleeding was higher in total thyroidectomies (1.51%) than in the partial thyroidectomies (0.66%) ($p < 0.001$).

Surgery for Hashimoto's thyroiditis, although associated with the complications of thyroid surgery, may be a difficult procedure because of the dense inflammatory process that usually occurs around the thyroid gland; there was no statistically significant difference in the incidence of hemorrhage in the patients analyzed in the present study. Three hemorrhages were observed in 174 (1.7%) cases, while in the entire group of patients, hemorrhage occurred in 41 (1.2%) patients subjected to all types of thyroidectomy ($p = 0.599$). These results are not in agreement with a study that analyzed 1,791 patients with significantly higher rates of postoperative complications, both transient and permanent, for this type of surgery (17,18).

Taking into account studies associating the experience of surgeons or reference centers in these procedures (4,5), the results obtained in our service, which performs more than 200 thyroid surgeries per year, would be in agreement with a study from Maryland that included 5,860 patients and surgeons who performed more than 100 thyroid surgeries per year with lower complication rates (15,19).

Even comparing only the first two analyzed years (1997 and 1998), when 79 and 97 surgeries were performed, respectively, the complications and hospitalization periods were similar. One recurrent laryngeal nerve injury and 1 hemorrhage were observed in 1997 (2.4%) and 1 nerve injury and 1 hypoparathyroidism were observed in 1998 (2%), similar to what was observed in the entire population analyzed in this study ($p = 0.897$) (Figure 1).

The dysfunctional manifestations observed after thyroidectomy in patients who do not present spontaneous voice changes are well established. Studies have shown that although videolaryngoscopy does not cause functional and morphological changes, voice quality may change when patients are metrically evaluated by speech pathology and videostrobolaryngoscopy (19). Similarly, among patients without phonation complaints, functional and morphological changes in the vocal cords may be revealed in up to 6.6% of cases using videolaryngoscopic analysis and transcutaneous ultrasound to evaluate the vocal cords (20,21). Laryngeal

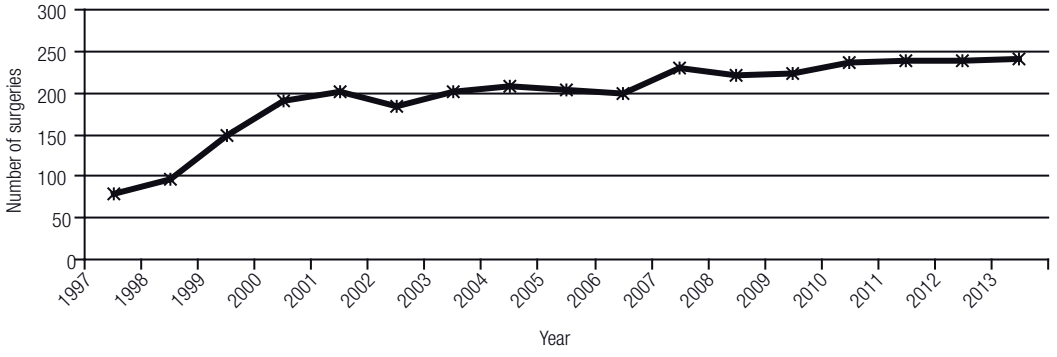

Figure 1. Number of thyroid surgeries performed by the service each year from 1997 to 2013.

dysfunction is relatively common after thyroidectomy because of the dissection of the prethyroid muscles and their capacity to adhere directly to the trachea after thyroid removal, causing changes in the quality and tone of the voice (17).

Although the goal of this study was not to evaluate the cost-effectiveness of thyroid surgery performed on an overnight basis in our service, this measure might be an important and decisive factor to be considered in services that perform this type of surgery. Vrabec and cols. (22) reported a 35% reduction in hospital bills compared to patients hospitalized for 36 hours. In the present study, 50% of the patients were from public institutions that offer care exclusively to patients of the SUS (Unified Health System), and the difficulties the public service encounters in hospitalizing patients are well known. In this program of surgeries performed on an overnight basis, the patients are not placed in conventional hospital beds; rather, they spend the night in the recovery room, and from there, they are discharged the next morning. The most important factor in the cost-effectiveness of this program is likely the availability of hospital beds for other patients in the healthcare system. Similarly, hospital bills in private hospitals would also be positively affected by this procedure.

The experience of this service and data from the literature have demonstrated that thyroid surgery, regardless of its extent, can be safely performed on an overnight basis so long as the characteristic complications of these surgeries, such as hemorrhage, either occur within 4 hours or can be properly managed in outpatient care. Therefore, when an experienced surgeon performs surgical procedures associated with the thyroid in a reference hospital and when instructions and perioperative care are available, it is safe to recommend that thyroid surgery be performed on an overnight basis.

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