

## Original Article

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# Outpatient hemithyroidectomy for benign thyroid disease

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**ABSTRACT**

**INTRODUCTION:** Hemithyroidectomy for benign thyroid disease has traditionally been considered an inpatient procedure due to concerns about post-operative complications, in particular the risk of post-thyroidectomy bleeding (PTB).

Hemithyroidectomy in an outpatient setting has not yet been evaluated in a Danish context. This study aimed to evaluate outpatient compared to inpatient hemithyroidectomy in selected patients (no suspicion of malignancy, < 100 ml lobe, American Society of Anesthesiologists class I or II and no anticoagulation therapy) to investigate the safety of the procedure.

**METHODS:** This cohort study was conducted between June 2014 and June 2019 in a Danish regional hospital and included all hemithyroidectomy patients. Data were obtained retrospectively from medical records. The primary outcome was PTB, and secondary outcomes included nerve injury, infection, perioperative drain placement, reintervention and unplanned hospital contacts.

**RESULTS:** Hemithyroidectomy was performed in 229 patients. For 137 patients, the procedure was planned in an outpatient setting; and among these, 124 patients (91%) were completed as planned. None of the patients in either the outpatient or inpatient setting experienced PTB. In the outpatient group, 1.5% had permanent nerve injury of the recurrent nerve and 0.7% had a superficial wound infection which was treated with oral antibiotics.

**CONCLUSIONS:** Hemithyroidectomy for benign thyroid disease is safe to perform in an outpatient setting for a selected patient group.

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In Denmark, approximately 1,800 hemithyroidectomies are performed annually according to the patient administration system. Among these, more than 90% are benign according to the histopathology results.

Traditionally, hemithyroidectomy has been an inpatient procedure with a minimum of 1-2 days of post-operative observation in the hospital due to the risk of serious post-operative complications. The major concern is the possible development of post-thyroidectomy bleeding (PTB), which may lead to a potentially life-threatening compression of the trachea [1]. The first description of hemithyroidectomy in an outpatient setting was described in the US [2] in 1986. Since then, the number of hemithyroidectomies and total thyroidectomies in an outpatient setting has increased [3, 4] especially in the US. Many of these studies have shown that outpatient thyroidectomy is safe and feasible with the incidence of PTB ranging from 0.19% to 0.48% [5-9]. There is no international consensus of the selection criteria for outpatient thyroid operations. The American Thyroid

Association has developed a guideline for selection of patients for outpatient thyroidectomy focusing on American Society of Anesthesiologists (ASA) class, patient understanding/capabilities and home/geographical environment [10]. European studies have similar criteria, but no generic European guidelines exist [11-13].

The standard Danish practice for all thyroid operations is a minimum of one overnight stay in hospital, primarily for observation. A Danish national thyroid study from 2009 reported a frequency of PTB of 4.2%, and therefore the practice of overnight observation after thyroid surgery continued to be encouraged [14]. Another Danish study from 2015 reported a re-operation rate of 2.8% due to PTB, and therefore did not recommend routine outpatient thyroid surgery for unselected patients [15]. However, both of these studies reported data from unselected patient groups and included both total thyroidectomies and hemithyroidectomies. Outpatient hemithyroidectomy for a selected patient group has not yet been evaluated in a Danish setting.

This study aimed to evaluate outpatient compared to inpatient hemithyroidectomy in selected patients in a Danish setting and to investigate the safety of the procedure.

## METHODS

### Study design and setting

This is a retrospective single-centre cohort study including all hemithyroidectomies performed at the Department of Otorhinolaryngology, Head and Neck Surgery, Hospital Sønderjylland, Denmark, from June 2014 to June 2019. An outpatient hemithyroidectomy is defined as a procedure where the patient has surgery and is discharged on the same calendar day. The thyroid surgery was performed by one of three consultants. Two of these consultants were experienced surgeons.

### Patient selection

The indications for hemithyroidectomy were typically nodular goiter, isolated noduli or cysts leading to compression symptoms. All patients had an ultrasound examination (ULS) to verify the enlargement of the thyroid lobe. When relevant, scintigraphy and fine-needle aspiration were performed.

Surgery in an outpatient setting was offered if the patients met the inclusion criteria (**Table 1**). Otherwise, patients were offered surgery in an inpatient setting.

**TABLE 1 / Patient flow.**

*Inclusion criteria*

ASA class I or ASA class II

Cervical thyroid lobe < 100 ml

Normal movement of vocal cords by preoperative fibrelaryngoscopy

Social and physical setting conducive to safe post-operative management including primary caregiver > 18 yrs old

*Exclusion criteria*

Anticoagulation treatment except acetylsalicylic acid if paused 7 days before surgery

Suspicion of malignancy

Travelling time between hospital and place of abode > 1 h

Previous contralateral hemithyroidectomy

ASA = American Society of Anesthesiologists.

**Surgical procedure**

All patients arrived fasting on the day of surgery. Patients scheduled for an outpatient procedure met in the outpatient clinic, which was open Monday to Friday from 07:00 to 18:00.

The surgery method was similar for patients regardless of setting. All thyroid surgeries were performed under general anaesthesia, starting with a Kocher's incision dividing the skin, subcutaneous tissue and platysma and creating two skin-platysma flaps. The affected lobe of the thyroid gland was dissected while ensuring haemostasis by LigaSure Exact Dissector (Covidien, Mansfield, USA\*) and bipolar forceps. A nerve monitor NIM-Response 3.0 (Medtronic, Florida, USA\*) was used to locate the recurrent nerve. At the end of the surgery, the anaesthesiologist did a forced Valsalva manoeuvre with water held in the wound to ensure complete haemostasis. The wound-closing procedure involved closing of the linea alba and the platysma with resorbable sutures. The skin was sutured with absorbable monophyl suture, and bandage dressings were placed on the skin. No compression was used.

After surgery, hospitalised patients stayed overnight, whereas the patients selected for an outpatient setting were observed for at least six hours before being discharged. Before discharging the patient, a fibrelaryngoscopy and clinical examination were completed to ensure that no signs of a haematoma were observed. Patients could continue in an outpatient setting even if one of the vocal cords was not moving normally as long as there were no breathing problems. Before discharge, specific instructions were repeated to all patients stressing that they should contact the hospital in the event of neck swelling, respiratory distress or signs of infection, and the patient was given the direct telephone number to the ward.

Post-operatively, all patients had a follow-up appointment with the surgeon after 10-14 days and three months. In cases with complications, further consultations were arranged.

**Outcomes**

Complications were defined as PTB within three months (primary outcome), single-sided nerve injury, infection, readmission and reintervention. The risk of bilateral recurrent laryngeal nerve injury and hypocalcaemia was not considered a relevant endpoint in this study, as half of the gland and related structures remained undissected and since no total or completion thyroidectomies were included in this study.

## Data collection and analyses

Patients were identified retrospectively by searching in the local surgical database for the following codes: hemithyroidectomy and thyroid lobe resection.

Information about age, gender, comorbidities, the weight of the excised gland, drains, hospital length, post-operative complications and unplanned contacts to the hospital was also obtained from the medical records.

Data were analysed.

The frequency of complications was described for inpatient and outpatient settings and differences were analysed using the chi-squared test or the Wilcoxon-Mann-Whitney test.

To estimate power, two study populations were used – 229 patients from Hospital Sønderjylland and 5,490 patients from a Danish Cohort from 2009 [14]. Godballe et al reported a PTB frequency of 4.2% and Hospital Sønderjylland reported no PTBs; therefore a PTB-rate of 0.0001% was used for this smaller cohort. A Monte Carlo simulation was used to estimate the power of Fischer's exact test, indicating if there was a difference between the PTB frequency from the cohort by Godballe et al and the PTB rate from the Hospital Sønderjylland cohort. This simulation indicated that at a significance level of 0.005, we could estimate a power of 98.21%. We therefore concluded that this study with 224 patients had sufficient power.

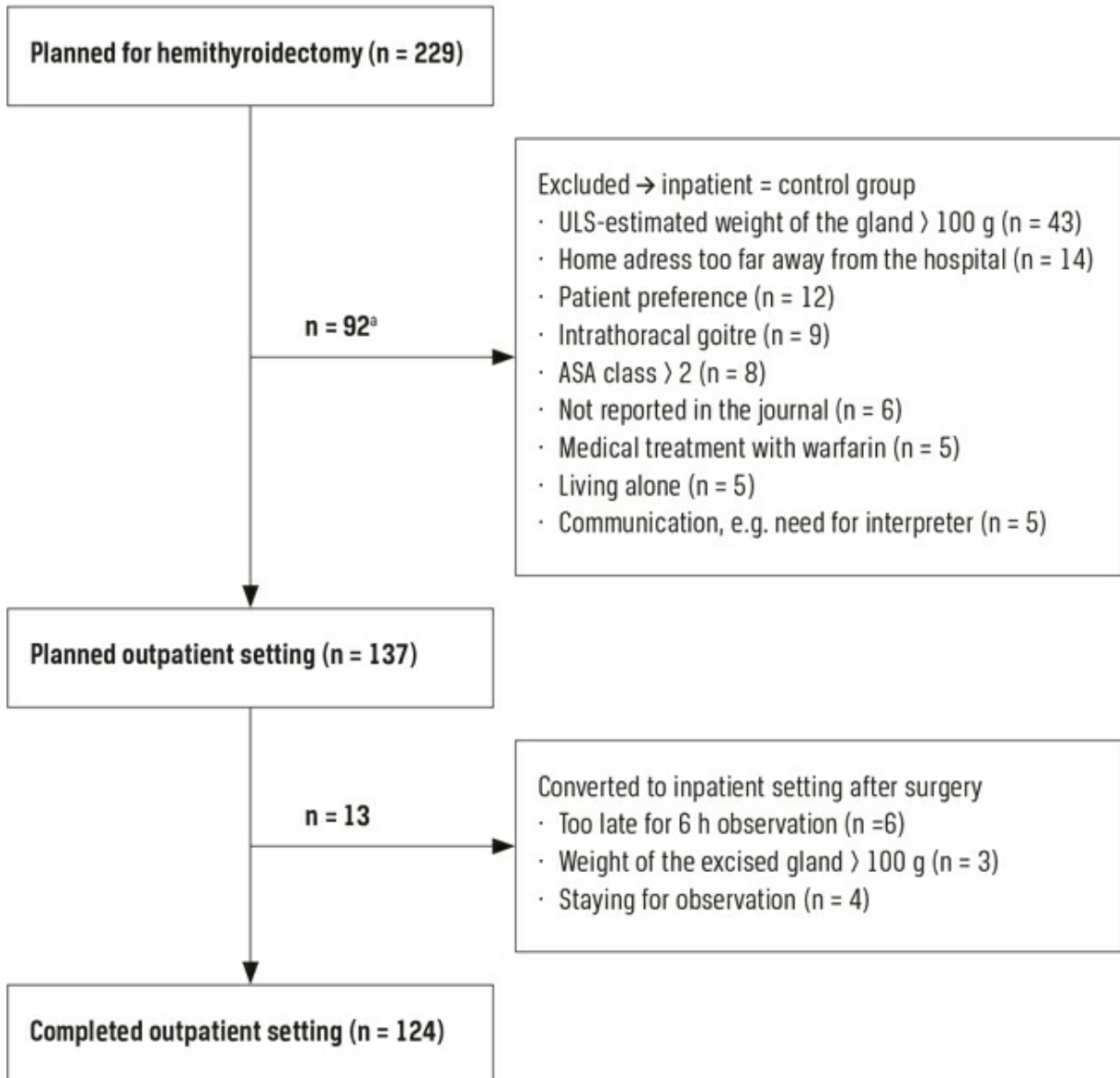
## Ethical considerations

The Regional Ethics Committee of Southern Denmark waived the need for approval as the study was considered a quality assurance study. Permission to retrieve data was approved by the hospital management. Data were managed according to the recommendations from the Danish Data Protection Agency.

## RESULTS

A total of 229 hemithyroidectomies were included in this study (**Figure 1**). Among these, 92 patients (40%) did not meet the outpatient criteria, primarily due to the ULS-estimated weight of the gland > 100 g. A total of 137 patients had planned outpatient surgery, among whom 124 (91%) completed the outpatient setting. For a variety of reasons (**Figure 1**), 13 patients were excluded from this outpatient group.

**FIGURE 1 /** Inclusion and exclusion criteria.



ASA = American Society of Anesthesiologists; ULS = ultrasound.

a) Patients can be excluded due to > 1 criterion.

The patients in the outpatient setting were significantly younger than the patients in the inpatient setting, but no gender difference was seen (Table 2).

**TABLE 2 /** Patient characteristics.

Differentialdiagnose	Inpatient (n = 92 (40%))	Outpatient (n = 137 (60%))	Total (N = 229 (100%))	p-value <sup>c</sup>
Age, yrs, median (IQR)	57 (47-68)	50 (41-55)	51 (44-60)	< 0.001 <sup>c</sup>
Females, n (%)	70 (76)	110 (80)	180 (79)	0.447 <sup>c</sup>
Weight of the excised lobe, g, mean (± SD)	91 (± 62) <sup>a</sup>	41 (± 28) <sup>b</sup>	63 (± 53)	< 0.001 <sup>c</sup>

IQR = interquartile range; SD = standard deviation.

a) 24 missing observations.

b) 49 missing observations.

c) Wilcoxon-Mann Whitney test or  $\chi^2$ -test.

Complications observed after hemithyroidectomy are illustrated in Table 3. None of the patients in either group had PTB. Eight patients had an affection of the recurrent nerve of whom three had permanent nerve injury leading to vocal cord paresis. Three patients had superficial wound infections which were managed non-surgically with oral antibiotics. In the inpatient group, four patients had a drain placed during surgery which was removed after one to two days. One of these patients had a subsequent wound infection. No patients died or underwent re-operation.

**TABLE 3 /** Outcomes: complications observed after hemithyroidectomy.

The values are n (%).

	Inpatient (n = 92)	Outpatient (n = 137)	Total (N = 229)
Haematoma	0	0	0
<i>Nerve injury</i>	3 (3.3)	5 (3.6)	8 (3.5)
Permanent	1 (1.1)	2 (1.5)	3 (1.3)
Temporary	2 (2.2)	3 (2.2)	5 (2.2)
<i>Infection</i>	2 (2.2)	1 (0.7)	3 (1.3)
Deep: need to reintervene or intravenous antibiotic treatment	0	0	0
Superficial: oral antibiotic treatment	2 (2.2)	1 (0.7)	3 (1.3)
Peroperative drain placement	4 (4.3)	0	4 (1.7)
<i>Unplanned contacts to hospital: 3-mo. observation period</i>	2 (2.2)	12 (8.7)	14 (6.1)
Readmission	0	0	0
Extra control	2 (2.2)	10 (7.3)	12 (5.2)
Telephone contact	0	2 (1.5)	2 (0.9)

DISCUSSION

We found no significant difference in the rate of complications between hemithyroid surgery in an inpatient or outpatient setting. There were no PTBs or other life-threatening complications or additional surgery registered in either group.

This is the first study to evaluate outpatient hemithyroidectomy in a Danish setting. Many studies have concluded that outpatient thyroid surgery can be safe and feasible in selected patients [5-9, 11-13, 16], and this study supports these findings. Of note are particularly large studies from the USA which included all types of thyroid surgery [5, 6], but several small studies from Europe have also reported that outpatient hemithyroidectomy is feasible and safe with a PTB rate of 0.0% [11-13, 16]; similar to our findings.

Outpatient hemithyroidectomy is not yet accepted as a standard procedure in Denmark. This may be due to the two Danish studies which reported high PTB frequencies [14, 15] for total thyroidectomy and hemithyroidectomy in a non-selected patient group. In contrast, our study found a 0.0% PTB rate for hemithyroidectomy in the selected patient group. The variation between these PTB rates leads us to consider if it is the surgery procedure, selection criteria or surgery type that contributes to these differences.

### **Surgery procedure**

LigaSure is not used routinely for thyroid surgery in Denmark. The LigaSure Exact Dissector was used in combination with bipolar forceps to ensure haemostasis in every operation. However, a systematic review and meta-analysis [17] reported no significant difference in PTB rates after total thyroidectomy with the use of alternative energy devices compared with conventional haemostasis. They included randomised controlled trials that compared PTB rates in a minimum of two of the following: conventional haemostatic technique, Harmonic Scalpel or LigaSure. Future studies ought to evaluate the device used for haemostasis for hemithyroidectomies in a selected patient group.

### **Patient selection**

Age, male gender, malignant histology, serious comorbidities and active bleeding disorder have been reported as risk factors for PTB [1, 3, 14]. Therefore, we find it reasonable to offer outpatient thyroid surgery to selected patients with benign thyroid disease, ASA class I or II and no anticoagulation treatment.

To our knowledge, the size of the thyroid gland has not been reported as a predictor of post-operative complications. Therefore, it may be questionable if it should be used as an exclusion criterion for an outpatient setting. In this study, patients with a thyroid lobe gland weight > 100 g did not have more complications after surgery. However, it seems reasonable to make an individual assessment to decide which is the most optimal setting, especially in cases with a considerable enlargement of the thyroid gland. If the weight of the excised gland had not been part of the exclusion criteria, this study could have included 180 patients (79%) in the outpatient group instead of 137 (60%).

Is the use of a drain related to PTB? In the two Danish studies, 54% and 40% of the patients had a drain inserted during surgery [14, 15]. In our study, only 1.7% had drains inserted. A meta-analysis [18] found no significant differences between patients with or without drains in relation to developing PTB. The analysis also found that the patients in the drain group were more likely to have post-operative infections than those in the no-drain group (pooled odds ratio = 2.94 (95% confidence interval: 1.27-6.85);  $p = 0.012$ ). In our study, none of the four patients with drains developed PTB, but one had a post-operative wound infection.

### **Surgery type**

Since we had no PTBs in either patient group, we considered if the surgery type (hemithyroidectomy versus total thyroidectomy) was the cause of the significantly lower PTB rate. Large studies have reported significantly lower

PTB rates for unilateral than for bilateral thyroid surgery [1, 14]. In future studies, PTB rates for hemithyroidectomy and benign surgery should be investigated.

In this study, we observed the patients for a minimum of six hours after surgery. The median time span from surgery to the onset of symptoms of PTB has been reported to be two hours with 81% of the cases occurring within six hours post-operatively [1]. Other studies have found similar patterns; reporting that haematomas requiring urgent decompression occurred within the first few post-operative hours when the patient is still in the hospital for observation and recovering from the anaesthesia [19, 20]. Therefore, we concluded that six hours of observation after surgery was appropriate for an outpatient setting.

## Clinic

Studies have demonstrated that significant cost savings are associated with thyroid surgery in an outpatient compared with an inpatient setting [4, 5]. In addition, patient satisfaction was high for outpatient surgery [11, 16]. Future studies should preferably include a cost-effectiveness analysis focusing on whether the additional cost of the haemostatic device compensates the cost-saving of the outpatient setting, including the extra controls, as observed in this study.

In our experience, outpatient hemithyroidectomy appears to be feasible and safe in a selected patient group, and we consider it reasonable to continue to offer outpatient hemithyroidectomy. Other hospitals may consider the same approach for a similar group of selected patients to meet the needs for earlier discharge and cost savings without increasing the risk of post-operative complications.

## Limitations

Since this is a single-centre study including only 229 patients from one regional hospital, multicentre and possibly also national studies should be conducted to confirm these findings. The cohorts in the existing studies evaluating outpatient hemithyroidectomy are small [11-13, 16]. Therefore, it is relevant to conduct a review and meta-analysis to evaluate the risk of PTB after hemithyroidectomy in an outpatient setting.

Another limitation of this study was that the amount of bleeding during surgery and the time taken to complete the surgery were not regularly or consistently recorded in the patient database.

## CONCLUSIONS

Hemithyroidectomy can be performed safely as an outpatient procedure for selected patients (no suspicion of malignancy, < 100 ml lobe, ASA class I or II and no anticoagulation therapy). No incidence of PTB or other life-threatening complications were found.

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participated in the critical scrutiny and revision of the manuscript and approved the final version. The corresponding author attests that all listed authors meet the authorship criteria and that no others meeting the criteria have been omitted. *Transparency statement:* The guarantors of the study affirm that the manuscript is an honest, accurate and transparent account of the study being reported; that no important aspects of the study have been omitted; and that any discrepancies from the study as originally planned (and, if relevant, registered) have been explained.

\* The two devices mentioned in Methods has been specified 7 February 2022. No changes to Discussion.

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