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Feasibility criteria for total thyroidectomy in outpatient surgery
Critères de faisabilité d'une thyroïdectomie totale en chirurgie ambulatoire

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Abstract

Introduction: France is pursuing a policy of cutting healthcare costs, and outpatient surgery is one of the objectives of this policy. Thyroid surgery could be suitable for outpatient management, provided there is an appropriate patient selection process. The aim of this study was to assess the risk factors for postoperative complications in total thyroidectomy (TT).

Design: A single-center observational study was carried out from January 2010 to December 2015.

Method: Correlations between, on the one hand, age, gender, obesity, history of surgery, antiplatelet and/or anticoagulation treatment, the surgeon's experience, surgery time, repeated lymph node dissection, and surgical indication (cancer, lymphocytic thyroiditis, Graves' disease or multinodular goiter) and, on the other hand, onset of postoperative complications (postoperative hypocalcemia, uni- or bi-lateral lesions of the recurrent laryngeal nerves, and premature compressive hematoma) were assessed.

Results: 424 consecutive TTs were included. 85 patients showed postoperative hypocalcemia (20.04%), 18 recurrent laryngeal nerve lesion (4.25%), and 4 compressive cervical hematoma (0.94%). Overall morbidity was 24.06%. Risk factors identified for postoperative hypocalcemia comprised: female gender [OR=3.2584; 95%CI (1.5500-7.7515); P=0.0036], surgery time [OR=1.0095; 95%CI (1.0020-1.0172); P=0.0129], and surgical indication for benign adenoma [OR=5.0642; 95%CI (1.7768-14.5904); P=0.0022]. None of the study variables emerged as risk factors for recurrent laryngeal nerve lesion. Repeated dissection increased the risk of re-do surgery for compressive hematoma [OR=25.1373; 95%CI (0.8468-32.2042); P=0.0347].

Conclusion: Surgery time, female gender, repeated dissection and total thyroidectomy for benign adenoma are risk factors that should be considered in decision-making for performing TT on an outpatient basis.

Résumé

Introduction : La politique de santé en France vise à diminuer le coût des soins, et la chirurgie ambulatoire fait partie des objectifs. La chirurgie thyroïdienne serait adaptable aux soins ambulatoires à condition qu'il existe au préalable un processus de sélection adapté des patients. Le but de cette étude était d'évaluer les facteurs de risque de complications post-opératoires lors d'une thyroïdectomie totale (TT).

Modèle : Une étude monocentrique observationnelle a été menée de janvier 2010 à décembre 2015.

Méthode : Les corrélations entre, d'une part, l'âge, le sexe, l'obésité, les antécédents chirurgicaux, la prise d'antiagrégants plaquettaires et/ou de traitement anticoagulant, l'expérience du chirurgien, la durée de l'intervention, l'évidement ganglionnaire répété, les indications chirurgicales (cancer, thyroïdite chronique lymphocytaire, maladie de Basedow ou goitre multinodulaire) et, d'autre part, l'apparition de complications post-opératoires (hypocalcémie post-opératoire, lésions unilatérales ou bilatérales des nerfs laryngés récurrents ou hématome compressif prématuré) ont été estimées.

Résultats : 424 TT consécutives ont été incluses dans l'étude. Quatre-vingt-cinq patients ont présenté une hypocalcémie post-opératoire (20,04 %), 18 patients ont présenté une lésion des nerfs laryngés récurrents (4,25 %) et 4 patients ont présenté un hématome cervical compressif (0,94 %). Le taux de morbidité global était de 24,06 %. Les facteurs de risque identifiés pour l'hypocalcémie post-opératoire étaient le sexe féminin [OR = 3,2584 ; IC 95 % (1,5500-7,7515) ; p = 0,0036], la durée opératoire [OR = 1,0095 ; IC 95 % (1,0020-1,0172) ; p = 0,0129] et l'indication chirurgicale pour adénome bénin [OR = 5,0642 ; IC 95 % (1,7768-14,5904) ; p = 0,0022]. Aucune des variables de l'étude n'est apparue comme un facteur de risque d'une lésion des nerfs laryngés récurrents. L'évidement ganglionnaire répété augmente le risque d'une révision chirurgicale pour hématome compressif [OR = 25,1373 ; IC 95 % (0,8468-32,2042) ; p = 0,0347].

Conclusion : La durée de l'intervention, le sexe féminin, l'évidement ganglionnaire répété et une thyroïdectomie totale pour un adénome bénin sont des facteurs de risque à prendre en considération lors de la prise de décision d'une TT en ambulatoire.

Keywords: outpatient; risk factors; surgery; thyroid
Mots clés : ambulatoire ; chirurgie ; facteurs de risque ; thyroïde

I. INTRODUCTION

In light of budgetary requirements imposed on healthcare institutions, developing outpatient surgery is a universal necessity. France is still lagging behind in the development of this type of surgery compared with other OECD (Organisation for Economic Cooperation and Development) countries. To reduce this gap, a multiannual national programme was launched in 2010 by the French Ministry for Health together with Regional Health Agencies (ARS, *Agences Régionales de Santé*), led by the Directorate General for Healthcare Provision (DGOS, *Direction Générale de l'Offre de Soin*), to help set a target higher than 50% for outpatient surgery by 2016 [1]. In 2014, outpatient surgery amounted to 44.9% of all surgeries, compared with 37.7% in 2012 [2].

According to the analysis of data from the Medical Information Systems Program (PMSI, *Programme de médicalisation des systèmes d'information*), 35,367 thyroidectomies were performed in France in 2010, resulting in a cost of several tens of millions of euros reimbursed by national insurance (including 37 million euros to reimburse boxes of levothyroxine and 2.4 million euros for those signed off from work) [3]. One of the potential solutions to decrease these costs is to decrease average length of stay in hospital and to consider eventually introducing outpatient thyroid surgery.

Indeed, total thyroidectomy is a surgical procedure that is suitable for outpatient treatment. The procedure is not very painful, causes little bleeding, is not very aggressive from a physiological point of view, is reliable, and does not last long. However, it creates risks of severe complications that could lead to patient death

through acute respiratory distress syndrome or irreversible cerebral anoxia in the event of compressive cervical haematoma without emergency evacuation. Furthermore, other non-lethal complications for patients may occur (symptomatic hypocalcaemia or recurrent nerve lesions).

The aim of this study was therefore to establish risk factors for postoperative complications of total thyroidectomy.

II. SUBJECTS AND METHOD

1- Population and study's design

This work is an observational and descriptive study involving patients of the Angers University Hospital (*Centre Hospitalier Universitaire d'Angers*).
All the adult patients who underwent a total thyroidectomy in our centre between January 2010 and December 2015 were consecutively included in the study.
Patients who underwent an isthmolobectomy, any other partial thyroidectomy (including completion thyroidectomy), or parathyroid surgery were excluded. Patients who had a surgical indication for additional dissection (central neck dissection and/or dissection of the deep cervical lymph chain) were also excluded.

Patient data were collected prospectively by the medical team during patient hospitalisation in our centre using a standard questionnaire and were subsequently entered into a database.
The database was included in the register of the French data protection authority (CNIL, *Commission Nationale de l'Informatique et des Libertés*) to safeguard the personal data of patients.

2- Variables studied

The different complications studied included: recurrent nerve lesions, immediate postoperative hypoparathyroidism, and the occurrence of postoperative bleeding. They were defined, respectively, by: the presence of bilateral or unilateral paralysis of the vocal cords linked to postoperative dysphonia and shown using nasofibroscopy performed by a specialised physician on D1; symptomatic (2.00 mmol/L < Ca++ < 2.20 mmol/L) or asymptomatic (Ca++ < 2.00mmol/L) hypocalcaemia in the first 3 postoperative days requiring calcium plus vitamin D supplementation; and the formation of a haematoma in the thyroid bed requiring further surgery in the operating room.

Calcium plus vitamin D supplementation could be administered in various ways: calcium intravenous injection, calcium per os, and alfacalcidol per os, either alone or in combination with calcium per os.

The nasofibroscopy was not routinely performed; it was only done in case of postoperative dysphonia.

The variables studied as potential risk factors were: age, sex (male or female), obesity (BMI>30), the surgeon's experience (number of total thyroidectomies performed during career), antiplatelet and/or anticoagulation treatment, surgery duration (in minutes), recurrent dissection, an operated thyroid disorder, intraoperative search for recurrent nerves, and past surgery and/or cervical radiation therapy.

The anatomopathological analysis of the sample following surgical excision determined the disorder operated on (multinodular goitre (MNG), Graves' disease, lymphocytic thyroiditis, benign adenoma, cancer).

The study's primary endpoint was the appearance of a recurrent nerve lesions, the need for postoperative calcium plus vitamin D supplementation, and/or further surgery for haematoma.

3- Surgical techniques

Trained surgeons performed the thyroidectomies, via anterior cervicotomy only.

Classic dissection techniques were used. Haemostasis techniques included ligatures; vascular clips; sutures; monopolar, bipolar, or ultrasonic electrocoagulation; or a combination of several techniques.

When the preoperative assessment recommended it, recurrent lymph node dissection was performed during the same surgery.

Drainage of the thyroid bed was not done systematically and was left to the surgeon's discretion based on intraoperative observations.

None of the surgeries were performed using neurostimulation of the recurrent laryngeal nerves.

4- Statistical analysis

Data were described in a conventional way in the descriptive analysis, as mean ± standard deviation for Gaussian quantitative variables and as median (95CI) for the other quantitative variables, and as n (%) for qualitative variables.

As part of the descriptive analysis, Fisher's exact test, Student's t-test or the Mann-Witney U test were performed, depending on the context.

We also performed multivariate logistic regressions to explain our binary variables. A manual backward selection was performed for the selection of explanatory variables to be included in the model. The variables age, sex, obesity (BMI>30) and surgery duration were forced into each model. The odds ratio (OR) derived from the logistic regression are presented with the 95% confidence intervals (95CI).

Statistical analysis was performed using R Statistical Software.

III. RESULTS

1- Population characteristics

Four hundred and twenty-four patients who underwent total thyroidectomy between January 2010 and December 2015 were included in our study.

The population flow diagram can be seen in Figure 1.

The median age of our cohort was 51 years [95CI (49.5-52.5)] and most patients were female (77.65%).

All the demographic and clinical characteristics of the population are summarised in Table 1.

Eighty-five patients (20.04%) presented symptomatic and/or substituted hypocalcaemia and required calcium plus vitamin D supplementation, 18 patients (4.25%) presented a recurrent lesion shown by nasofibroscopy, and 4 patients (0.94%) required reoperation for compressive haematoma.

The overall premature morbidity observed in our study was 24.06%.

The distribution of complications in univariate analysis is summarised in Table 2.

2- Postoperative hypocalcaemia

In multivariate analysis, female patients were more likely to present symptomatic and/or substituted hypocalcaemia [OR=3.2584 95CI(1.5500-7.7515), *p=0.0036*]. Furthermore, the longer the surgery duration, the higher the risk of postoperative hypocalcaemia [OR=1.0095 95CI(1.0020-1.0172), *p=0.0129*]. Finally, the final diagnosis was also linked to the likelihood of receiving calcium plus vitamin D supplementation. Indeed, patients who were diagnosed with MNG, Graves' disease, lymphocytic thyroiditis or cancer were all less likely to develop a postoperative hypocalcaemia than those who were diagnosed with a benign adenoma [OR=5.0642 95CI(1.7768-14.5904), *p=0.0022*]. All the results are summarised in Table 3.

An analysis of the benign adenoma sub-group was performed to try to determine whether the size of the adenoma could explain the result's significance. Assuming a non-normal distribution, a Mann-Witney U test was performed to compare medians. There is no significant difference in the medians of adenoma sizes in the groups "with hypocalcaemia" and "without hypocalcaemia". Results are presented in Table 4.

3- Recurrent laryngeal nerve lesions

No independent risk factor was found in multivariate analysis. Results are presented in Table 5.

4- Compressive haematoma

One variable stands out in multivariate analysis. Patients having undergone recurrent lymph node dissection were more likely to require further surgery for compressive haematoma compared with patients who did not [OR=25.1373 95CI(0.8468-32.2042), *p=0.0347*]. Results are presented in Table 6.

IV. DISCUSSION

Patients principally undergo total thyroidectomies for multinodular goiter (with or without thyroid dysfunction) or Grave's disease for which only total thyroidectomy is recommended [4]. It remains a high-risk surgery. Although decreasing, its morbidity rate (20% to 30% all complications combined) [5] makes surgeons reluctant to perform the procedure on an outpatient basis. In an American study, Charles T. Tuggle *at al.* showed that even in specialised centres with many patients, outpatient procedures remain rare and are performed on a small number of carefully selected patients [6].

Several learned institutions have published recommendations relating to outpatient management of total thyroidectomies (TT). The American Thyroid Association indicates that the surgery can be performed on an outpatient basis for carefully selected patients and insists on informing the latter about the potential risks, but does not recommend outpatient treatment [7]. In 2013, the French Association of Endocrine Surgery (AFCE, *Association Francophone de Chirurgie Endocrinienne*) made recommendations to that effect (grade C) [5], recommending 24-hour hospitalisation (1 night) for TT patients.

The association also indicated that the surgery could be performed on an outpatient basis in the case of carefully selected, well-informed patients and insisted on the surgeon's responsibility in making this decision.

There are many relative contraindications (CIs) and exclusion criteria for TT on an outpatient basis, including those relating to the patient and his or her disorder as well as a number of psychological and social factors: [5] [8-15]

- Obesity (BMI > 30kg/m²),
- Antiplatelet and/or anticoagulation treatment,
- Age over 50 years,
- Certain thyroid disorders (lateral dissection for suspicion of lymph node metastases, Graves' disease, extensive resection for a locally advanced malignant disorder, iterative surgery),
- The surgeon's lack of experience,
- Male gender,
- A plunging goitre or excision volume > 80mL
- Lack of sufficient knowledge of the language,
- The patient's lack of motivation.

Several studies have suggested that some of these contraindications could be lifted. They argue, for example, that anticoagulation treatment (and antiplatelet treatment) is not a contraindication as long as the haemostasis is performed carefully [16]. Furthermore, being aged over 50 years seems to be protective factor against postoperative hypocalcaemia [17], while J.B. Finel *et al*. have shown that a BMI over 25 does not seem to be a risk factor for postoperative complications [18].

There is a lack of consensus relating to the treatment of postoperative hypocalcaemia and its incidence varies depending on the definition it is given. It is temporary in 20 to 30% of cases, and permanent in 1 to 4% of cases [19]. In our study, patients with minor and symptomatic postoperative hypocalcaemia (calcaemia corrected between 2 and 2.20 mmol/L), as well as those with major hypocalcaemia with or without clinical

signs (calcaemia corrected < 2 mmol/L), received calcium plus vitamin D supplementation. The postoperative hypocalcaemia rate was 20.04%. We were able to demonstrate that female gender was an independent risk factor for postoperative hypoparathyroidism, which confirms the results of the study by Duclos *et al.* (BMJ, 2012) [20]. The same is true for surgery duration: the longer it is, the higher the risk of postoperative hypocalcaemia. Surgery duration can be linked to the surgeon's experience. Indeed, a trained surgeon decreases the risk of parathyroid gland lesions, while 5 to 19 years of experience guarantees the lowest complication rate [20]. Surprisingly, our study showed that patients who underwent surgery for benign adenoma were more at risk of developing postoperative hypocalcaemia than patients who underwent surgery for MNG, cancer, lymphocytic thyroiditis or Graves' disease. The size of the adenoma did not seem to explain this phenomenon (Table 4). After rereading anatomopathological reports of total thyroidectomy samples, we were able to demonstrate a higher incidence of incidental parathyroidectomies (IP) in the group of patients who underwent surgery for a benign adenoma and who presented postoperative hypocalcaemia. This most likely explains our results, especially knowing that IPs are significantly linked to a higher risk of symptomatic hypocalcaemia 2 weeks after the surgery, as well as the risk of premature postoperative biochemical hypocalcaemia [21].

There is a lack of consensus on the ways to predict the occurrence of postoperative hypoparathyroidism despite the fact that many studies have already addressed the topic by trying to determine whether the calcium or PTH rate could be a predictive marker. Notably, Nahas et al. were able to show that an increased calcium levels between the 6^{th} and 12^{th} hour following surgery had a 100% positive value for predicting a return to normal calcium levels [22]. Nevertheless, with PTH reaching its lowest level at the 3^{rd} postoperative hour (contrarily to the calcium rate, which is at its lowest on the 3^{rd} day), it seems to be a more effective marker within the framework of outpatient treatment [23]. More so than the PTH rate, its decrease seems to provide a strong argument for postoperative hypocalcaemia. According to a meta-analysis performed in 2007 by Noordzij *et al.*, if the PTH rate decreases by 65% compared with its basal rate in the 6^{th} postoperative hour, it is predictive of hypocalcaemia with

Se = 96.4% and Sp = 91.4% [24]. A routine PTH assay in all centres performing total thyroidectomies therefore seems beneficial for the treatment of patients on an outpatient basis.

Recurrent paralysis contributes to thyroid surgery morbidity and to a deterioration of the patient's quality of life. According to a meta-analysis involving 27 studies, published in 2009, recurrent paralysis affects 9.8% of patients on average when it is temporary and 2.3% of patients on average when it is permanent [25]. In our study, 18 patients were affected by postoperative dysphonia, which revealed vocal cord paralysis (4.25%). A single case of bilateral paralysis (Table 1) in abduction was observed, but it was not life-threatening for the patient and was treated by vocal cord medialisation through reinjection of autologous fat, following the failure of speech and language therapy. We did not find any independent risk factors or protective factors during our study. We were able to determine that visualising the recurrent nerve is not a risk factor for recurrent nerve lesions. In fact, this is in line with recommendations, which call for the need to visualise systematically, during surgery, the 2 recurrent nerves [26]. Hermann *et al*. have shown that visualising the recurrent nerve reduces the risk of intraoperative damage by 50% [27].

Compressive haematoma remains the complication most feared by surgeons because it is potentially life-threatening if emergency evacuation cannot be performed. However, it is also rare, with an estimated rate between 0.2 and 2.7% [28]. The first warning sign is acute dyspnoea. Our study found a 0.94% rate of compressive haematoma that required surgical evacuation in the operating room, without any association with excess mortality. Despite the small number of haemorrhages found in our study, we were able to demonstrate that recurrent dissection was an independent risk factor of compressive haematoma. To the best of our knowledge, this is an unprecedented result. Other risk factors were found, such as pre-existing dyspnoea at the time of surgery and male gender in a retrospective study on a series of 6,830 patients with 70 compressive haematomas [29], as well as an advanced age of the patient and the surgeon's lack of experience [30]. In our study, drainage of the thyroid bed was left to the surgeon's

discretion based on intraoperative observations, and it is therefore not included in the final results. However, it does not seem to be a protective factor for haemorrhages and seems rather to increase the risk of infection [31]. Moreover, a meta-analysis of the Cochrane Library has shown its futility in routine thyroidectomies [32].

There are several limitations to this study. First of all, our rate of recurrent nerve paralysis may be underestimated. Indeed, we did not perform a nasofibroscopy systematically but only in case of dysphonia. Thus some of the paralysies which were not associated with postoperative dysphonia were not taken into account. Secondly, although our data were collected prospectively, we did not show the rate of definitive hypocalcaemia. Our goal was to assess criteria for outpatient management for total thyroidectomy and the rate of immediate postoperative hypocalcaemia seemed more appropriate in such a decision. Some authors consider definitive hypocalcaemia as the only true complication of total thyroidectomy, but immediate postoperative hypocalcaemia, even transient, may compromise outpatient thyroidectomy according to its severity.

In regard of surgery's evolution and the way in which it is approached by the health authorities, outpatient surgery will more and more prevail for physicians. As clinicians, it will be our responsibility to decide which actions are eligible for such management, and if thyroidectomies are to find their place in it, this would not be done without careful attention to the selection of patients and the implementation of validated and consensual protocols to allow an acceptable surgery with minimal risk for patients.

According to our study, surgery duration, female gender, recurrent dissection, and benign adenoma seem to be factors that should be considered when making decisions regarding the potential performance of a total thyroidectomy on an outpatient basis.

Conflicts of interest: The authors declare to have no conflicts of interest.

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Figure 1. Population flow diagram

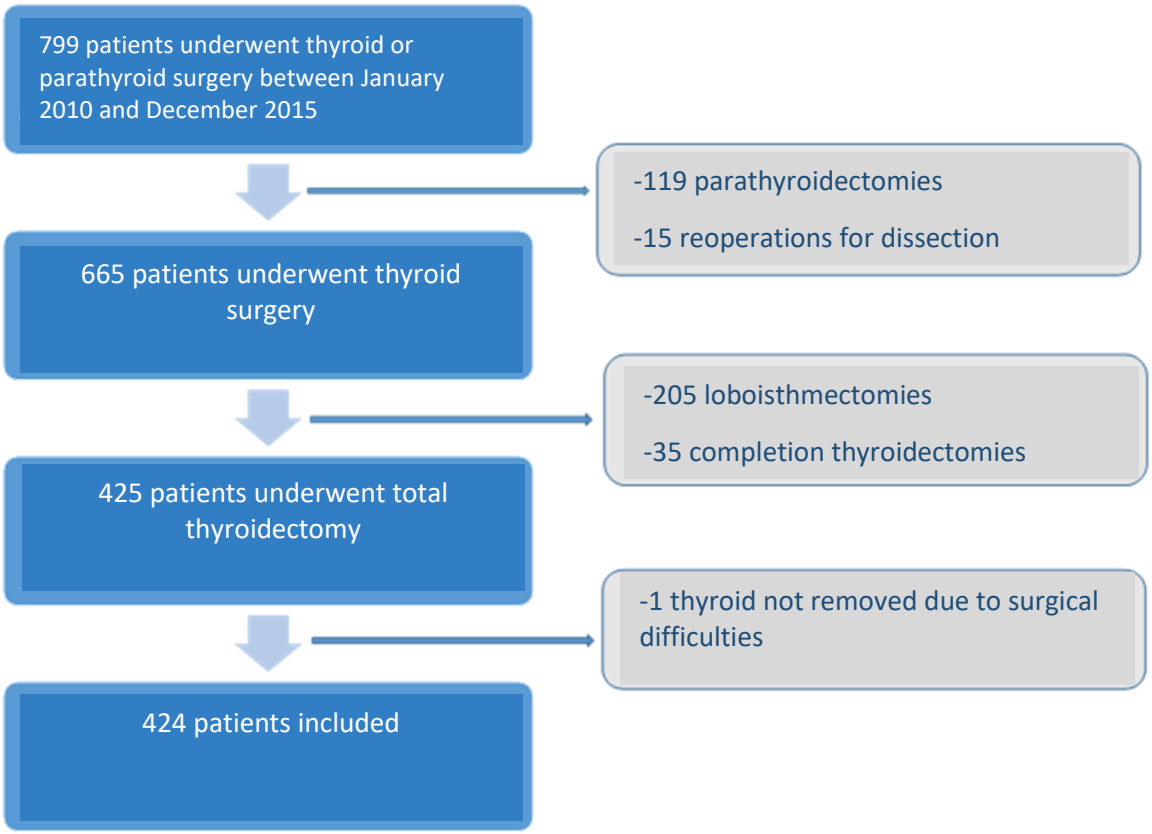


Table 1. Demographic and clinical characteristics of the 424 patients included, Department of Digestive and Endocrine Surgery, Angers University Hospital

	Patients n=424 (%)
Age, years (median)	51
95%CI	49.5-52.5
Sex	
Male	94 (22.17)
Female	330 (77.83)
Body Mass Index (BMI)	
<30	302 (71.23)
>30	122 (28.77)
Past surgery or cervical radiation therapy	11 (2.59)
Antiplatelet and/or anticoagulation treatment	44 (10.38)
Surgeon's experience (total number of thyroidectomies performed)	
<100	43 (10.14)
100-200	98 (23.11)
>200	283 (66.75)
Surgery duration, minutes (median)	90
95%CI	90-90
Recurrent lymph node dissection	27 (6.38)
Recurrent nerves seen	371 (87.50)
Average length of stay, days	2.4
Diagnoses	
Multinodular goitre (MNG)	223 (52.60)
Graves' disease	37 (8.73)
Lymphocytic thyroiditis	48 (11.32)
Benign adenoma	18 (4.25)
Cancer	98 (23.00)
Postoperative hypocalcaemia	85 (20.04)
Recurrent laryngeal nerve lesions	18 (4.25)
Right	4 (22.22)
Left	13 (72.22)
Bilateral	1 (5.56)
Reoperation for haematoma	4 (0.94)
Overall morbidity	102 (24.06)

	Symptomatic and/or subsituted hypocalcaemia		*p*	***Recurrent paralysis***		*p*	***Compressive haematoma***		*p*	***Overall morbidity***		*p*
	Yes N-85	*No N=339*		*Yes N=18*	*No N=406*		*Yes N=4*	*No N=420*		*Yes N=102*	*No N=322*	
Sex			***0.001*****			*0.774*			*0.214*			***0.004*****
M	8	86		3	91		2	92		12	82	
F	77	253		15	315		2	328		90	240	
Obesity (BMI>30)			*0.083*			*0.134*			*0.326*			*0.555*
No	67	235		10	292		2	300		75	227	
Yes	18	67		8	114		2	120		27	95	
Past surgery and/or cervical radiation therapy			*0.701*			*1*			*1*			*0.472*
No	84	329		18	395		4	409		101	312	
Yes	1	10		0	11		0	11		1	10	
Antiplatelet and/or anticoagulation treatment			*0.744*			*0.708*			*0.356*			*0.827*
No	77	303		17	363		3	377		92	288	
Yes	8	36		1	43		1	43		10	34	
Surgical experience			*0.103*			*0.223*			*0.257*			*0.219*
<100 TT	7	36		4	39		1	42		10	33	
100-200 TT	27	71		3	95		0	98		30	68	
>200 TT	51	232		11	272		3	280		62	221	
Recurrent lymph node dissection			*0.198*			*0.618*			*0.232*			*0.244*
No	77	320		18	379		3	394		93	304	
Yes	8	19		0	27		1	26		9	18	
Recurrent nerves seen			***0.039****			*0.146*			*1*			***0.007*****
No	5	48		0	53		0	53		5	48	
Yes	80	291		18	353		4	367		97	274	
Final diagnosis			***0.023****			*0.050*			*0.613*			***0.010****
MNG	39	184		9	214		2	221		46	177	
Graves' disease	10	27		4	33		1	36		14	23	
Thyroiditis	10	38		4	44		0	48		14	34	
Benign adenoma	9	9		0	18		0	18		9	9	
Cancer	17	81		1	97		1	97		19	79	

Table 2. Distribution of complications. Descriptive analysis (Fisher's exact test)

** p<0.05; **p<0.01; ***p<0.001. p-value significant (i.e., <.05) indicated in bold.*

TT: total thyroidectomies

Table 3. Risk factors for postoperative hypocalcaemia. Multivariate analysis.

	Postoperative hypocalcaemia	
	OR (95%IC)	***p***
Female gender	3.2584 (1.5500-7.7515)	***0.0036*** **
Age	0.990.9 (0.9729-1.0090)	*0.3210*
Obesity (BMI>30)	0.05593 (0.2978-1.0044)	*0.0597*
Surgery duration	1.0095 (1.0020-1.0172)	***0.0129*** *
Benign adenoma	5.0642 (1.7768-14.5904)	***0.0022*** **

** p<0.05; **p<0.01; ***p<0.001. p-value significant (i.e., <.05) indicated in bold.*

Table 4. Size of benign adenomas. Comparison of medians. Mann-Witney U test.

	Benign adenoma with postoperative hypocalcaemia n=9 (50%)	**Benign adenoma without hypocalcaemia n=9 (50%)**	***P value***
Adenoma size in cm (median)	1.7	2.5	*0.9283*

Table 5. Risk factors for recurrent laryngeal nerve lesions. Multivariate analysis.

	Recurrent paralysis	
	OR (95%IC)	***P value***
Female gender	1.9424 (0.5899-8.8674)	*0.3215*
Age	0.9947 (0.9610-1.0298)	*0.7630*
Obesity (BMI>30)	1.9538 (0.7072-5.2196)	*0.1823*
Surgery duration	1.0107 (0.9962-1.0240)	*0.1208*
Surgical experience (100 to 200 TT)	0.2283 (0.0390-1.1613)	*0.0766*
Surgical experience (>200 TT)	0.4875 (0.1491-1.9100)	*0.2584*

TT : total thyroidectomies

Table 6. Risk factors for compressive haematoma. Multivariate analysis.

	Compressive haematoma	
	OR (95%IC)	***p***
Female gender	0.1977 (0.0184-1.9888)	*0.1502*
Age	0.9689 (0.8998-1.0446)	*0.3903*
Obesity (BMI>30)	2.6408 (0.2865-6.5611)	*0.3569*
Surgery duration	0.9665 (0.9017-1.0121)	*0.2363*
Surgical experience (100 to 200 TT)	0.0000 (NA-786.8124)	*0.9946*
Surgical experience (>200 TT)	0.1640 (0.0114-4.1076)	*0.1845*
Recurrent lymph node dissection	25.1373 (0.8468-32.2042)	***0.0347 ****

** p<0.05; **p<0.01; ***p<0.001. p-value significant (i.e., <.05) indicated in bold.*

TT: total thyroidectomies