Thyroid Surgery in the Elderly: A Comparative Experience of 400 Patients From an Italian University Hospital

Silvestro Canonico, Gianluca Pellino, Domenico Pameggiani, Guido Sciaudone, Giuseppe Candilio, G Serena De Fatico, Isabella Landino, Rosa Marcellinaro, Federica Rocco, Lucio Selvaggi, Umberto Parmeggiani, Francesco Selvaggi

Department of Medical, Surgical, Neurological, Metabolic and Ageing Sciences, Second University of Naples, Italy

The aim of this study was to compare disease features and surgical complications of patients undergoing surgery under or over 65 years of age. We performed a retrospective review of patients undergoing thyroidectomy or lobectomy from January 1990 through January 2012 in our Institution. Patients aged over 65 years of age were compared with younger patients on a 1:1 ratio.

A total of 2012 patients were operated on during the study period. Two-hundred patients aged > 65 years were compared with 200 patients < 65 years old. In this series, no significant differences were observed concerning surgical complications between groups. At multivariate analysis, masses causing compression, extended approaches and malignant lesions were significant predictors of complications, irrespective of age. Due to longer life expectancy, elderly patients are being operated on more frequently. Safety of thyroid surgery in this population is still debated. We observed no difference in surgical outcomes between elderly and younger patients; however, some features of the diseases impair survival in the former. Age did not increase likeliness of worse outcomes in patients receiving thyroid surgery.

Key words: Thyroidectomy – Lobectomy – Elderly – Thyroid surgery – Complication

The incidence of thyroid cancer is increasing during the last decades, with an annual percentage change of 8.8% between people aged over 65 years,¹ while approximately 6.6% of the U.S.

Corresponding author: Gianluca Pellino, MD, and Silvestro Canonico, MD, Department of Medical, Surgical, Neurological, Metabolic and Ageing Sciences, Second University of Naples, Piazza Miraglia 5, 80138, Naples, Italy.
Tel.: +39-81-5665278; Fax: +39-81-5665278; E-mail: silvestro.canonico@unina2.it

population has a known thyroid disease.² Due to the proven correlation between thyroid nodules and aging, improved disease detection methods, and longer life expectancy, it is likely to expect an increase in demand for thyroid surgical procedures in elderly patients. However, debate exists about the feasibility and safety of thyroid surgery in this subgroup of patients.^{3,4}

The purpose of our study was to review the outcomes of thyroid surgery in our Department to compare features of patients undergoing surgery before or after 65 years of age and to investigate effectiveness and safety of surgery in the elderly population.

Materials and Methods

We performed a retrospective analysis on our prospective database of patients undergoing thyroidectomy or lobectomy for benign as well as malignant lesions from January 1990 through January 2012 in our Institution. Patients with multiple endocrine neoplasia and those with recurrent disease were excluded. To obtain homogeneous data, patients undergoing minimally invasive video-assisted thyroidectomy were also excluded from evaluation. An institutional review board approved the study. All patients underwent clinical examination, routine laboratory tests and ultrasound with biopsy; further examinations were selectively performed (i.e., functional imaging, computed tomography, or magnetic resonance imaging (MRI)). We compared disease characteristics and outcomes of surgery of patients aged over 65 years (Group A) with a control group of <65-year-old patients (Group B) with 1:1 ratio. Patients of the control group were randomly picked from our database of procedures performed in the same interval of time (9 patients for every year). All patients were also included in a multivariate regression analysis to identify risk factors of worse surgical outcomes. The following variables were tested: age (<65 versus >65 years); sex (male versus female); comorbidities (yes versus no); compressive signs/symptoms (yes versus no); duration of symptoms (<3 versus >3 months); hyperthyroidism (yes versus no); substernal goiter (yes versus no); incision length (<8 versus >8 cm); lymphadenectomy (yes versus no); duration of procedure (<30 versus >30 minutes); vessel sealing method (energy devices versus ties); surgical extent (lobectomy versus thyroidectomy); drain placement (yes versus no); hemostatic agents (yes

versus no); and pathology (benign lesions versus cancer).

Surgery

All procedures were performed under general anesthesia by one of the senior authors. There always was at least 1 surgical resident scrubbed in, performing part of the procedure as operating surgeon under direct supervision of the senior surgeon (tutoring). Kocher cervical incision (6–10 cm) was usually performed. Shorter or longer incisions were decided depending on the expected dimension of the specimen and type of approach needed (unilateral versus bilateral exploration), and length also varied according to patient's shape and surgeon's expertise. An optimal thyroid exposure for each patient was always to be achieved. The platysma was incised and subplatysmal flaps elevated superiorly and inferiorly. Sternohyoid and sternothyroid muscles were identified and gently retracted to expose cervical linea alba, and blunt dissection through the identified fascia was performed. Larger goiters or neoplasms sometimes required division of strap muscles. Once the thyroid gland was visualized, the carotid sheath fascia was identified and lateral to superior blunt dissection was carried out, allowing mobilization of the superior poles. Once lateral to medial dissection was completed, by retracting the thyroid inferiorly and medially, the surgeon allowed for visualization of the superior pedicle, divided using either energy devices⁵ or ties, avoiding injuring of the external branch of the superior thyroid nerve. Then parathyroid glands were identified, dissected from the thyroid and left in its bed. It was always observed for the recurrent laryngeal nerve, advocating nerve stimulation in difficult or doubtful cases, allowing for nerve sparing.⁶ Then, Berry's ligament (posterolateral) was transected, the entire specimen was dissected, freed from pretracheal fascia, removed, and inspected. Lymphadenectomy was carried out in selected patients, according to accepted criteria.⁷ In subtotal thyroidectomy a small remnant of tissue (3–4 g) was left in situ on both sides. Hemostasis was achieved by means of cautery and topical hemostatic agents; suction drains were placed according to surgeon's preference.

Postoperative evaluation

Patients were discharged after 4 days at the longest, and were subsequently evaluated in outpatient

Table 1 Clinical and pathologic characteristics of specimens in patients undergoing surgery before and after 65 years of age

	Group A > 65 (n = 200)	Group B < 65 (n = 200)	P value
Male sex	58 (29)	48 (24)	0.31
Cancers any type	42 (21)	38 (19)	0.71
Atypical adenoma	4 (9.5)	7 (18.4)	0.33
Papillary carcinoma	22 (52.4)	25 (65.8)	0.26
Follicular carcinoma	7 (16.7)	4 (10.5)	0.52
Medullary carcinoma	3 (7.1)	2 (5.3)	>0.99
Anaplastic carcinoma	6 (14.3)	0 (0)	0.03
Benign lesions any type	158 (79)	162 (81)	0.71
TUG	19 (12)	84 (51.9)	<0.0001
TMG	131 (82.9)	53 (32.7)	<0.0001
DTG	8 (5.1)	25 (15.4)	0.003
Hyperthyroidism	46 (29.1)	44 (27.2)	0.71
Toxic adenoma	7 (4.4)	28 (17.3)	0.0002
Graves' disease	3 (1.9)	8 (4.9)	0.22
Substernal goiter	41 (25.9)	11 (6.8)	<0.0001

TUG, toxic uninodular goiters; TMG, toxic multinodular goiters; DTG, diffuse toxic goiters.

settings by residents under supervision of a tutor after 7, 14, and 21 days, then at least every 6 months for the first year. All data concerning surgery, pathologic classification, and postoperative complications were accurately gathered.

Statistical analysis

Data were compared using 2-tailed Fisher's exact test. $P < 0.05$ was considered statistically significant. Multiple logistic (binomial) regression analyses were performed, with *complications* as outcome. Data were analyzed by a statistician using the SPSS statistical package (SPSS for MS Windows, version 17.0, Chicago, IL).

Results

Out of 2012 patients operated on, 281 (14%) were >65 years of age. Two hundred >65-year-old patients fitting the criteria were included in Group A and compared with 200 patients aged < 65 years (Group B). Pathologic characterization of removed specimens are depicted in Table 1. Unsurprisingly, anaplastic carcinoma was only found in elderly patients (6 versus 0 patients, $p = 0.03$), but no other significant differences were found concerning thyroid malignancies. Group B patients were more frequently affected with toxic uninodular goiters and toxic adenoma, while elderly patients showed a higher rate of toxic multinodular and substernal goiters. No significant differences were observed between groups concerning type of surgery and major postoperative complications (Table 2). At multivariate analysis, preoperative compressive complaints (HR 2.3, $P = .003$), extended approaches (HR 1.5, $P = 0.02$), and malignant lesions (HR 1.2, $P = 0.04$) were predictors of postoperative complications, while age at surgery did not affect surgical outcome. Significant predictors of postoperative complications and age are reported in Table 3.

Discussion and Comments

In our series, thyroid disease of the elderly has shown peculiar features, distinguishing it from that of young patients. However, if this is evident in benign disease, when looking at malignant diseases the differences are less marked, excluding anaplastic carcinoma, which is a geriatric feature of thyroid disease. Elderly patients were more often operated on for toxic multinodular goiters and often had a

Table 2 Comparison of surgical treatment and postoperative complications between groups

	Group A > 65 (n = 200)	Group B < 65 (n = 200)	P value
Surgery			
Total thyroidectomy	178 (89)	181 (90.5)	0.74
with lymphadenectomy	21 (11.8)	18 (9.9)	0.61
Subtotal thyroidectomy	12 (6)	7 (3.5)	0.35
Lobectomy no (%)	10 (5)	12 (6)	0.83
Major postoperative complications			
Transient RLN injury	8 (4)	6 (3)	0.79
Permanent RLN injury	3 (1.5)	2 (1)	>0.99
Transient hypoparathyroidism	13 (6.5)	11 (5.5)	0.83
Permanent hypoparathyroidism	3 (1.5)	3 (1.5)	>0.99
Hemorrhage	3 (1.5)	1 (0.5)	0.62

RLN, recurrent laryngeal nerve.

Table 3 Multivariate regression to identify significant predictors of postoperative complications in 400 patients (HR > 1 related to higher risk of complications): significant factors and age

	HR	95% CI	P
Age:			
< 65-year-old	1		0.32
> 65-year-old	0.9	0.43, 2.1	
Sign/symptoms of compression:			
N	1		0.003
Y	2.3	1.81, 2.89	
Surgical approach:			
Lobectomy	1		0.02
Thyroidectomy	1.5	1.03, 1.77	
Pathology:			
Benign			0.04
Cancer	1.2	1.04, 1.96	

HR, Hazard Ratio; CI, Confidence Interval; N: No; Y: Yes,

substernal component, while younger individuals were more likely to suffer from toxic uninodular goiter and toxic adenoma. No differences were observed in type of surgical treatment needed, which can be the same in all patients independent of their age.

Several facets of thyroid disease are peculiar in the elderly. These patients often have associated diseases, which may result in clinical variability,³ consequently leading to delayed diagnosis. A diagnostic delay has an important role, if we consider the well-known age-related characteristics of thyroid diseases (degeneration of benign nodule),^{2,3} and also explains the higher incidence of larger and substernal goiters in this subgroup of patients.

In the elderly, there are several factors leading to a worse prognosis. A high incidence of lymphomas and medullary carcinomas is observed,⁸ and anaplastic carcinoma accounts for half of thyroid cancers affecting people older than 80 years.^{9,10} Differentiated carcinomas in the elderly show higher mortality rate and much more aggressive behavior. Compared to patients aged 20 to 60 years, in septuagenarians, papillary carcinomas recur more often and have a higher mortality rate.^{11,12} Overall survival seems to decrease with increasing age.¹⁰ These considerations result in several classification systems including “age” as a risk factor in thyroid disease.⁴

A word of caution about thyroid surgery in the elderly was given by Sosa *et al.*³ Retrospectively analyzing data of 22,848 patients undergoing surgery in a population-based study, the authors found

that diagnosis, extent of surgical intervention, postoperative complications, and endocrine specific complications significantly differed with age. From 45 through >80 years of age, they found an increasing trend of cancer incidence and need for a much-extended surgical approach. Also complications were more frequently observed in >65-year-old patients than in the younger population (6.3% versus 2.3% in people <45 years), reaching 10.2% in patients aged over 80 years.⁴ Hence, the authors argued that surgery may sometimes overtreat elderly patients and may be cost consuming. Our findings are in disagreement with these observations. However, with different diagnoses, elderly patients received surgical treatments similar to and suffered from a rate of complication comparable to those of younger patients (Table 2). Also in a multivariate analysis, age was not itself a risk factor for predicting complications (Table 3).

Limitations of our study include its retrospective fashion and the wide time interval in which geriatric patients were treated; we therefore picked controls trying to obtain a homogenous comparison group.

A growing body of evidence supports the feasibility of surgery in the elderly, including complex and prolonged procedures.^{14–18} This has been possible due to technical^{19,20} and technological advancements^{5,6,17,20,21} in perioperative management of frail patients, who have some peculiarities.^{2,3,14–20} Concerning thyroid surgery, age should not be regarded as a limiting factor *per se*. In experienced hands, and with all needed instrumentations available,^{5,6,21} it can be safely performed also in the elderly. Satisfactory results can be achieved also when residents are included in the operating team, provided that an adequate experience has been acquired and that a high-volume tutor consultant is added to the faculty and supervises the procedure. Actually, age negatively impacts on survival in thyroid disease, due to disease characteristics,⁴ but in light of similar complication rates, emphasis should be laid on early diagnosis and radical surgery encouraged in order to achieve a significant gain in life expectancies.¹³

The findings of our study have to be balanced with several limitations. The sample size may be small. Studies with larger sample sizes³ reported higher rates of complications in the elderly. However, these studies were population-based researches, including patients operated on also in centers with no specific expertise in elderly or thyroid surgery. Furthermore, authors³ also found that surgeons with higher case load had fewer compli-

cations but tended to be more conservative with elderly patients. In our study, carried out in a Department with extensive experience in thyroid surgery and in surgery of an aging population, we showed that a careful patient selection combined with optimal technical skills resulted in excellent results in the elderly. It seems prudent to conclude that when these conditions are met, no difference should be expected in terms of complications between younger and older patients.

Conclusions

In experienced hands, thyroid surgery can be safely offered to elderly and frail patients. No differences in terms of complications should be expected. Age should not be considered exclusion criteria in surgical decision-making. However, the long-term outcomes of elderly patients might be poorer because of the aggressiveness of baseline disease.

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