Turkish Journal of Geriatrics
2013; 16 (4) 365-371

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RESEARCH

EFFECT OF TOTAL THYROIDECTOMY ON MORTALITY AND MORBIDITY IN GERIATRIC PATIENTS: CERRAHPASA EXPERIENCE

ABSTRACT

Introduction: The purpose of this study is to confirm safety of total thyroidectomy and to investigate the effect of age on potential mortality and morbidity in geriatric patients.

Materials and Method: Data from patients older than 64 years who underwent total thyroidectomy in our clinic between January 2009 and May 2012 was collected prospectively and analyzed retrospectively. Patients were divided into two groups where Group 1 included patients between 65–74 years of age and Group 2 patients who were older than 74 years.

Results: One hundred and forty five patients over 64 years old underwent total thyroidectomy. In both groups, the main indication for surgery was multinodular goiter. The rate of thyroid malignity was 19.64% (n=22) and 28.57% (n=8) in Group 1 and Group 2 respectively. The duration of the operation was 39.82±16.12 minutes (range: 16-92 min) in Group 1 and 34.20±7.86 (range: 24-45 min) in Group 2. The rate of temporary and permanent vocal cord paralysis was 1.43% and 0.71% respectively for all patients in this study. Transient hypocalcaemia was observed in 2.68% (n=3) of the patients in Group 1, 7.14% (n=2) of those in Group 2, and 3.57% of all patients and there was no permanent hypocalcaemia.

Conclusion: Total thyroidectomy can be performed safely in patients older than 64 years in experienced centers.

Key Words: Thyroidectomy; Aged; Morbidity; Mortality.

ARAŞTIRMA

YAŞLI HASTALARDA TOTAL TİROİDEKTOMİNİN MORTALİTE VE MORBİDİTEYE ETKİSİ: CERRAHPAŞA DENEYİMİ

ÖZ

Giriş: Bu çalışmanın amacı geriatrik yaş grubundaki hastalarda total tiroidektominin güvenirliğini doğrulamak ve yaşın olası morbidite ve mortalite üzerine etkisini araştırmaktır.

Gereç ve Yöntem: Ocak 2009-Mayıs 2012 tarihleri arasında kliniğimizde total tiroidektomi yapılan 64 yaş üzeri hastaların verileri prospektif toplanıp retrospektif olarak değerlendirildi. Hastalar 65-74 yaş (Grup 1) ve 75 ve üzeri (Grup 2) olmak üzere iki gruba ayrıldı.

Bulgular: Altmış dört yaş üzeri 140 hastaya total tiroidektomi yapıldı. Her iki grup için en sık cerrahi endikasyon multinodüler guatırdır. Grup 1'de tiroit malignite %19.64 (n=22) ve Grup 2'de %28.57 (n=8) idi. Ameliyat süresi Grup 1'de 39.82±16.12 dakika (6-92 dakika aralığında) ve Grup 2'de 34.20±7.86 dakika (aralık: 24-45 dakika). Geçici ve kalıcı vokal kord felci oranı tüm hastalarda sırasıyla %1.43 ve %0,71 idi. Geçici hipokalsemi Grup 1'deki hastaların %2.68'nde (n=3) Grup 2'deki hastaların %7.14'ünde (n=2) ve tüm hastaların %3.57'sinde izlendi ve kalıcı hipokalsemi izlenmedi.

Sonuç: Tecrübeli merkezlerde total tiroidektomi 64 yaş üzeri hastalarda güvenli bir şekilde uygulanabilir.

Anahtar Sözcükler: Tiroidektomi; Yaşlı, Morbidite; Mortalite.

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Geliş Tarihi: 04/10/2012
(Received)

Kabul Tarihi: 05/01/2013
(Accepted)

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Introduction

There is an increase in the life expectancy in accordance with the advances in diagnostic and therapeutic interventions of chronic health problems such as cardiovascular diseases, pulmonary diseases and diabetes mellitus. A chronological age of 65 years is accepted as the definition of elderly by the World Health Organization; and the old age dependency starts around 75. Physiological age is more important than chronological age in geriatric patients (1).

Thyroid diseases are common in the geriatric population (2). Thyroid malignancy, suspicion of malignancy which requires histopathological verification, hyperthyroidism and goiter with locally obstructive symptoms or with retrosternal extension are the most common indications for thyroid surgery. Although surgery is considered to be the first line therapy, there are surgeons and endocrinologists who prefer delaying the surgery and performing conservative treatment with medical and radioactive iodine therapy before considering surgery (3). Timing of the surgery is critical as delaying may have greater risks for the patients. Timing is particularly important for the treatment of differentiated thyroid malignancies since delays may lead to local invasion, distant metastasis and anaplastic transformation (4). Although with the advancements in surgical and anesthetic techniques and the establishment of specialized endocrine surgery centers on thyroid diseases increased the efficacy and safety of the surgical procedures, not many studies concentrated on the efficacy and safety of total thyroidectomy in the geriatric patients.

It has been reported that being older than 70 years is an independent risk factor for complications after general surgery operations. Due to the increase in the life span, organ dysfunctions and diseases have also increased and this is a major factor effecting the outcomes (5).

The purpose of this study is to confirm the safety of total thyroidectomy and to investigate the effect of age on potential mortality and morbidity in geriatric patients.

Materials and Method

The study complied with the declaration of Helsinki and was approved by the local research ethics committee. Data from patients older than 64 years who underwent total thyroidectomy in Istanbul University, Cerrahpaşa Medical Faculty, Department of General Surgery between January 2009 and May 2012 was collected prospectively and analyzed retrospectively. Patients were divided into two groups where Group 1 included patients between 65–74 years of age and Group 2 patients who were older than 74 years.

Age, gender, preoperative diagnosis, preoperative use of levothyroxine (LT4) and anti-thyroid drug, existing co-morbidities, the American Society of Anesthesiologists (ASA) score, duration of operation, cause and duration of stay in the intensive care unit (ICU) if any, duration of hospital stay and histopathological results were recorded.

According to the World Health Organization old age is defined as 65 years and the old age dependency starts 75 years; the patients over 64 years old were included into the study (1). Safety of total thyroidectomy, mortality and morbidity in older patients was investigated among those between 65-74 years of age and those over 74. The same anesthesiologist and endocrinologist assessed all the patients prior to surgery.

The indications for surgery were thyroid malignancy, suspicion of malignancy that requires histopathological verification, hyperthyroidism and goiter with locally obstructive symptoms or with retrosternal extension.

After the operation, symptomatic patients were examined with a laryngoscope. The patients who had a vocal cord dysfunction were re-evaluated on the 1st, 3rd, and 6th month after the surgery. Persisting recurrent laryngeal nerve injury for more than 6 months after the surgery was accepted as permanent.

The patients with clinically apparent hypocalcaemia (numbness in hands, muscular contraction and tetany) were evaluated and serum calcium and serum parathormone (PTH) levels were recorded. If supplementation was needed calcium and/or vitamin D were administered. Serum calcium levels lower than 8.0 mg/dL at any time during 6 months following the surgery was accepted as temporary hypoparathyroidism. After the 6th month the patients taking calcium and/or vitamin-D supplement with non-measurable or inappropriate PTH levels were classified as permanent hypoparathyroidism. LT4 supplementation was started in all patients on the 15th day following the surgery. Post-operative bleeding was described as hematoma that requires re-exploration.

Surgical Technique

Patients were placed in the supine position with the neck extended. A 3-4 cm collar incision was made and the platysma muscle with subplatysmal flaps was raised superiorly and inferiorly. The strap muscles were retracted laterally by dividing vertically in the midline. All the vessels were occluded with a vessel-sealing device. The isthmus was then divided

using a vessel-sealing device. The superior pole of the thyroid gland was dissected free of the overlying strap muscle and then retracted infero-laterally to facilitate entry to the cricothyroid space. The medial and lateral borders of the superior pole were mobilized and the external branch of the superior laryngeal nerve was identified. Where necessary, the nerve was dissected free of the superior pole to avoid thermal injury during vessel ligation. The overlying strap muscles were dissected off the inferior pole of the thyroid and superficial inferior thyroid veins near the midline were divided. The inferior parathyroid was identified when possible in the vicinity of the inferior pole of the thyroid and released. Then, the thyroid gland was retracted medially and elevated out of the wound. The capsule of the thyroid gland was released with scissors, allowing the exposure of the branches of the inferior thyroid artery and tubercle of Zuckerkandl. The recurrent laryngeal nerve was encountered in this region, and the branches of the inferior thyroid artery were ligated close to the thyroid capsule. Further dissection of the gland was carried out with identification of the parathyroid gland, taking care to preserve this in situ with its vascular pedicle which arises as a branch of the inferior thyroid artery. The ligament of Berry can be safely divided using a sutureless approach provided care is taken to avoid thermal injury to the recurrent laryngeal nerve as it enters the cricothyroid muscle. For total thyroidectomy the contralateral lobe is dissected as described above. Before closing the incision, a minivac drain was inserted in to the surgical field. The wound was covered with sterile strips alone after sub-cuticular suturing.

Anesthetic Technique

The same anesthetic technique was used in both groups. All patients were assessed and pre-anesthesia examination was done by the same anesthesiologist on the day before the surgery, and informed about the anesthetic technique. On the day of operation patients were taken to the operation room and a 20 G cannula was inserted on the dorsum of the left hand and infusion of "Isolyte S" at a rate of 5 ml/kg/h was started and 0.02 mg/kg midazolam was given intravenously. Standard monitorisation was applied to all of the patients. Anesthesia induction and intubation were done with 2 mg/kg propofol and 1 µg/kg fentanyl and 0.6 mg/kg rocuronium. Female and male patients were intubated with 7.0 ID and 8.0 ID tubes respectively. Anesthesia was maintained using 1-2% sevoflurane in 40% oxygen / air mixture with tidal volumes. The patients were ventilated in pressure control mode with a respiratory rate of 12 breath/min and tidal volumes adjusted to keep $EtCO_2$ between 35-38 mmHg. Routine monitoring (ECG, systolic and diastolic arterial pressure, SpO_2, body temperature and $ETCO_2$ after intubation) was applied to the patients during the surgery. The parameters were recorded every 15 minutes until extubation.

During the surgery remifentanyl infusion (0.02 µg/kg/min) was used for analgesia and when skin suturing was started at the end of the operation, a 1mg/kg of IV Tramadol was given in 15 minutes for post-operative analgesia. After the end of the surgery, sevoflurane and remifentanyl were discontinued and 1 mg of atropine and 2 mg of neostigmine IV were given when spontaneous respiration returned and patients were extubated when respiration was adequate. The patients who regained consciousness with Glasgow coma scale over 8 were taken to the post anesthesia care unit (PACU). The patients' hemodynamic and respiratory follow-up was performed and when their modified aldrete scores were 9 or higher they were transferred to the surgical ward if their voice was detected, approximately in 45 minutes.

Results

One hundred and forty patients over 64 years of age who underwent total thyroidectomy in our clinic between January 2009 and May 2012 were included to the study. Group 1 and Group 2 consisted of 112 and 28 patients, respectively.

In Group 1 the average age was 64.44±2.81, the female/male ratio was 2.29 (n=78:34), and in Group 2 the oldest patient was 89 years old, the average age was 78.11±3.36, the female-male ratio was 1.8 (n=18:10). There was no significant difference between the groups in terms of gender distribution. (p=0.585).

The indications for surgery for both groups are shown in Figure 1a. The groups were not significantly different from each other and multi-nodular goiter was the most common indication in both groups (p=0.239). In 40 patients fine needle aspiration biopsy was performed (Group 1 n=34, Group 2 n=6). The results of ten patients showed thyroid malignancy, 20 patients had benign cytology, and 10 patients showed suspicious cytology. The comparison between cytological and histological diagnoses is shown in Table 1.

Five patients with toxic goiter in Group 1 were using propylthiouracil, and 2 of these were also using beta-blockers pre-operatively. Levothyroxine use was observed in nine patients in Group 1 and one in Group 2. Ninety-six patients had one or more co-existing diseases with similar distribu-

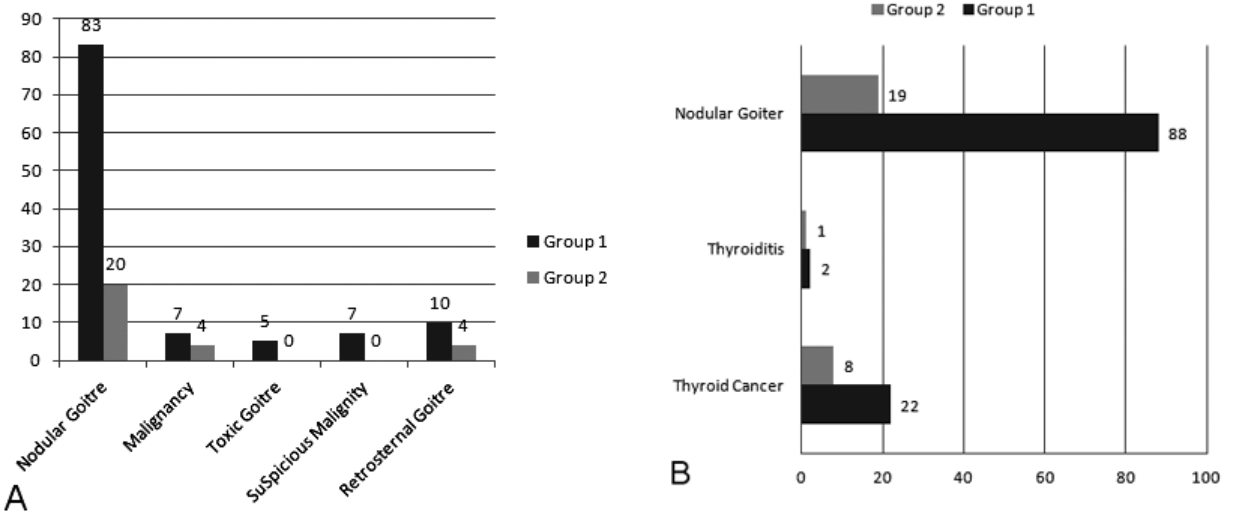

Figure 1— A. The indications of surgery. **B.** Histopathological results.

Table 1— Comparison of Cytological and Histological Diagnoses.

		Histopathological Diagnoses					
		Group1		Group 2		Total	
		Nodular Goiter	Thyroid Cancer	Nodular Goiter	Thyroid Cancer	Nodular Goiter	Thyroid Cancer
Fine needle aspiration biopsy	Benign cytology	13	4	3	-	16	4
	Suspicious cytology	5	5	-	-	5	5
	Malignant cytology	3	4	-	3	3	7

Table 2— Co-morbidities of Elderly Patients

	Group 1	(n= 112)	Group 2	(n= 28)	Total	(n= 140)
Hypertension	68	60.71%	17	60.71%	85	60.71%
Diabetes mellitus	32	28.57%	6	21.43%	38	27.14%
Myocardial infarction	6	5.36%	3	10.71%	9	6.43%
Heart failure	5	4.46%	-	-	5	3.57%
Chronic renal failure	3	2.68%	2	7.14%	5	3.57%

tions in each group as shown in Table 2 (p>0.05). The ASA scoring of each group was also similar and is shown in Table 3 (p=0.587).

Total thyroidectomy was performed for all patients. The duration of the operation was 39.82±16.12 minutes (range: 16-92 min) in Group 1 and 34.20±7.86 minutes (range: 24-45 min) in Group 2. The weight of the specimen was 49.52±45.49 g (3-279 g) in Group 1 and 212.60±326.08 (37-795) in group 2. Both in group 1 and 2 one patient underwent central dissection because of stage T4 disease. Both groups had similar durations of operation (p=0.439) but the specimens in Group 2 were significantly heavier (p<0.001).

After the operation, 4 patients with retrosternal extension (3 patients in Group 1 and 1 patient in Group 2) needed a one day ICU follow-up because of respiratory failure.

The post-operative duration of hospital stay was similar in both groups, 1.09±0.44 days (range:1-4 days) in Group 1 and 1.29±0.81 days (range: 1-5 days) in Group 2 (p=0.082). Post-

Table 3— ASA Classification of Elderly Patients Undergoing Total Thyroidectomy.

	Group 1	(n= 112)	Group 2	(n= 28)	Total	(n= 140)
HASA I	35	31.25%	7	25.00%	42	30.00%
ASA II	60	53.57%	18	64.29%	78	55.71%
ASA III	17	15.18%	3	10.71%	20	14.29%
ASA IV	-	-	-	-	-	-
ASA V	-	-	-	-	-	-

operative complications are shown in Table 4. No mortality was observed for 30 days after the surgery.

Histopathological results are given in Figure 1b. The rate of thyroid malignity was 19.64% (n=22) in Group 1 and 28.57% (n=8) in Group 2, without significant difference (p=0.472).

All the time and weight values were given as mean ± standard deviation. The data was evaluated according to normal distribution and p was accepted as significant when equal to or smaller than 0.005.

Discussion

The prevalence of thyroid disease increases significantly with age (6). Few studies were performed with different results, assessing risks related with thyroid surgery in elderly patients (4,7-9). The patients older than 60 years and undergoing emergent surgery, major vascular, cardiac and colorectal surgery which requires longer hospital stay are under higher risk (8,10,11). Thyroid surgery is the most common surgical procedure among all age groups but particularly in elder patients, but there is no conclusion about chronological age being a risk factor for increased morbidity and mortality in elective cases (3).

In the elderly population radioactive iodine and anti-thyroid drugs are preferred rather than surgery for possible complications (3,12). But total thyroidectomy is the golden standard for patients with suspicious cytology or absolute malignity. Foster (13) reported 2.30% mortality in patients older than 70 years who underwent total thyroidectomy. There is a significant decrease in post-operative morbidity and mortality rates in conjunction with advancements in current anesthesia applications. The most important of these advancements is determining and taking action against perioperative risk factors (14). Bliss et al. (4) among 221 patients over 74 years, and Raffaelli et al. (3) among 320 patients over 69 years reported no mortality. In the current study no mortality was observed in patients over 64. Thyroid surgery can be performed safely in geriatric patients as in young patients after a good pre-operative preparation period (3,4).

The surgical indications for both groups in this study were similar and multi-nodular goiter was the leading indication (p=0.239). Likewise, Bliss et al. (4) and Raffaelli et al. (3) found multi-nodular goiter as the leading indication for surgery. Treatment with LT4 to suppress thyroid stimulating hormone (TSH) production cannot cease the enlargement of thyroid glands and cannot reduce the size of the gland especially in geriatric patients (3). In addition the suppression treatment with LT4 may worsen the cardiovascular diseases and may cause chronic complications such as osteoporosis resulting in an increased risk of bone fracture (15,16).

In this study the percentage of the patients operated for toxic goiter was 3.57% (n=5) while Raffaelli et al. (3) and

Table 4— Observed Complications After Total Thyroidectomy in Elderly Patients.

	Group 1	(n= 112)	Group 2	(n= 28)	Total	(n= 140)
Recurrent nerve palsy (Transient)	2	1.79%	-	-	2	1.43%
Recurrent nerve palsy (Permanent)	1	0.89%	-	-	1	0.71%
Hemorrhage	2	1.79%	-	-	2	1.43%
Hypocalcemia (Transient)	3	2.68%	2	7.14%	5	3.57%
Hypocalcemia (Permanent)	-	-	-	-	-	-
Wound infection	-	-	-	-	-	-

Bliss et al. (4) reported the percentages as 18.4% and 10% respectively. Toxic goiter should be treated by total thyroidectomy particularly if symptoms related to compression are present. On the contrary, some authors suggest radioactive iodine treatment for hyper-functioning solitary nodular goiters and small sized multi-nodular goiters (17). However, the duration of radioactive iodine treatment and a recurrence rate of 10% extends the indication for surgery (18). Furthermore, with the introduction of minimally invasive thyroidectomy, beyond excellent cosmetic outcomes, due to lesser pain and lesser analgesic requirements, the rate of surgical intervention increased (3).

Total thyroidectomy prevents recurrent disease and complications related to secondary surgeries as reported by Delbridge et al. (19). Therefore, in our clinic total thyroidectomy is preferred and can be performed safely through a 3 cm length incision on average, sutureless with vessel sealing devices.

In the study by Raffaelli et al. (3), the rate of temporary vocal cord paralysis and permanent vocal cord paralysis was 2.2% and 0.2% respectively. Bliss et al. (4) and Mekel et al. (9) reported vocal cord dysfunctions at a rate of 1.6% and 1.1% respectively. Rates of temporary and permanent vocal cord paralyses were 1.43% and 0.71% respectively for all patients in this study and complication rates were similar to recent studies (3,4,9).

Transient hypocalcaemia was observed in 2.68% (n=3) of the patients in Group 1, 7.14% (n=2) of the patients in Group 2, and 3.57% of all patients and no permanent hypocalcaemia was observed in our study. Raffaelli et al. (3) reported the rate of temporary hypocalcaemia as 32.5% (n=104) and permanent hypocalcaemia as 1.6% (n=5), Bliss et al. (4) reported the rate of temporary hypocalcaemia as 5.2% (n=37) in patients aged 61–74 years and 3.9% (n=9) in those over 74 years and the rates of permanent hypocalcaemia were 0.1% (n=1) and 0.4% (n=1) respectively. It is important to see whether these rates are similar to that observed in the younger age group. In their series consisting of 526 cases, Bellantone et al. (20) observed a hypoparathyrodism rate of 2.9%, and the rates of transient and permanent vocal cord paralysis were 1.1% and 0.5% respectively. Published studies show similar rates for both younger age groups and geriatric patients.

In this study, hemorrhage was seen in two cases (%1.43). Similarly, Mekel et al. (9) reported this ratio as 1.1% (n=1) among the patients over 69 years.

It has been shown that mortality increases in operations longer than three hours (21). Raffaelli et al. (3) reported the duration of operation for total thyroidectomy as 90.1±45.7 minutes (45-140 minutes). The duration of operation was 39.82±16.12 minutes (16-92 minutes) in Group 1 and 34.20±7.86 minutes (24-45 minutes) for Group 2 which is much shorter than that reported by Raffaelli et al. (3). Complication rates were similar to those reported by Raffaelli et al. (3) and Bliss et al. (4), and the rapidity of the operations did not increase the complication rates. Moreover no mortality was seen during 30 days after surgery.

The average weight of the specimens was significantly higher in Group 2. The recorded weights were 49.52±45.49 g (3 – 279 g) in Group 1 and 212.60±326.08 g (37 – 795) in Group 2 ($p<0.001$). The weight of the specimen had no effect on the duration of the operation and the complication rates.

The role of age in the development of malignant thyroid diseases is so huge that it is accepted as the most important independent prognostic factor for the outcome. Histopathological results were different between the groups as the rate of thyroid malignancy in Group 1 was 19.64% and 28.57% in group 2. The rate of cancer is concurrent with the current publications (3,4,7,9).

The surgical mortality in geriatric patients is associated with co-morbidities and the risk of anesthesia rather than age in many studies (22,23). Systematic complications are seen more in patients with higher ASA scores, but local morbidities are not correlated with ASA scores (24). The age of the patients would not be a deterrent factor to operate or perform curative surgery.

One or more co-morbidities were present in 96 cases. There was no significant difference between the groups. Hypertension was the leading co-morbidity, similar to other studies (3,7).

The post-operative duration of stay was similar in both groups, 1.09±0.44 days (1–4 days) in Group 1 and 1.29±0.81 days (1–5 days) in Group 2 ($p=0.082$). The duration of hospital stay was longer in the study by Passler et al. (7) and Steinau et al. (25) as 9.9 days and 15.7 days respectively. This shows that in this study co-morbidities were less or pre-operative preparation with post-operative follow up was better.

In conclusion, we think that total thyroidectomy can be performed by experienced surgeons safely and effectively with less morbidity and no mortality. Warranty of success is surgical experience, benefit – hazard analysis and good pre-operative preparation in geriatric patients.

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