

# SHOULD WE PREFER TOTAL TO NEAR-TOTAL THYROIDECTOMY IN DIFFUSE THYROID DISORDERS?

Aybala Ağaç Ay MD,<sup>1</sup> Suat Kutun MD,<sup>1</sup> Haluk Ulucanlar MD,<sup>1</sup> Ahmet Ay MD,<sup>2</sup> Oğuz Tarcan MD,<sup>1</sup> Abdullah Demir MD,<sup>1</sup> Abdullah Çetin MD<sup>1</sup>

<sup>1</sup> Ankara Oncology Hospital, Department of 1<sup>st</sup> General Surgery, Ankara

<sup>2</sup> Ankara Training and Research Hospital, Department of 5<sup>th</sup> General Surgery, Ankara

## ABSTRACT

**Objective:** The aim of this study is to investigate the complication rates between thyroidectomy procedures in order to help optimizing the surgical management of malignant and benign thyroid diseases with minimum complication rates.

**Material and Method:** During the period from 2004 to 2009, 417 thyroidectomies were performed in Ankara Oncology Hospital at Department of 1<sup>st</sup> General Surgery. 181 were total and 120 were near-total thyroidectomies. During this same period 116 completion thyroidectomy performed. The complications investigated are tracheostomy performed due to recurrent laryngeal nerve palsy, temporary hypocalcemia, permanent hypocalcemia, temporary vocal cord dysfunction, permanent vocal cord dysfunction, postoperative hematoma and postoperative death.

**Results:** In our study analysis between total ve near-total thyroidectomy groups in respect to tracheostomy (1.10%/0.8%;  $p=0,81$ ), temporary hypocalcemia (8.84%/10%;  $p=0.734$ ), permanent hypocalcemia (0.55%/0.8%;  $p>0.05$ ),

temporary vocal cord dysfunction (9.94%/11.7%;  $p=0.635$ ) and permanent vocal cord dysfunction ( $p>0.05$ ) showed no statistically significant difference. On the other hand, analysis between total and completion thyroidectomy groups in respect to tracheostomy (1.10%/15.5%;  $p<0.001$ ), temporary hypocalcemia (8.84%/46.6%;  $p<0.001$ ), temporary vocal cord dysfunction (9.94%/37.9;  $p<0.001$ ) and permanent vocal cord dysfunction showed statistically significant difference. There was no statistically significant difference between groups in respect to permanent hypocalcemia ( $p>0.05$ ). Evaluation could not be performed in respect to postoperative hematoma and death due to absence of those.

**Conclusion:** This data suggest that total thyroidectomy is a safe procedure in the hands of experienced surgeons. Based on our study we think that it may be safer to prefer total thyroidectomy to near-total thyroidectomy when there is a thyroid disease which effects the whole gland in order to avoid the high complication risk of the reoperative thyroid surgery.

**Key Words:** Thyroidectomy, postoperative complication, thyroid surgery *Nobel Med* 2013; 9(1): 100-105

# DIFFÜZ TİROİD HASTALIKLARINDA NEAR-TOTAL TİROİDEKTOMİ YERİNE TOTAL TİROİDEKTOMİ Mİ TERCİH ETMELİYİZ?

## ÖZET

**Amaç:** Çalışmamızın amacı, benign ve malign tiroid hastalıklarında uygulanan cerrahi prosedürler arasındaki komplikasyon oranlarını karşılaştırarak, diffüz tiroid hastalıklarında uygulanacak optimum tedavi stratejisinin belirlenmesine katkıda bulunmaktır.

**Materyal ve Metod:** 2004-2009 yılları arasında Ankara Onkoloji Hastanesi 1. Genel Cerrahi Kliniğinde 417 tiroidektomi uygulanmıştır. Bu prosedürlerden 181'i total, 120'si near-total; 116'sı ise tamamlayıcı tiroidektomi olarak uygulanmıştır. Bu prosedürlerin komplikasyon oranları kaydedilmiş ve vokal kord disfonksiyonu, kalıcı hipokalsemi, geçici hipokalsemi, kalıcı vokal kord disfonksiyonu, geçici vokal kord disfonksiyonu, postoperatif hematoma ve postoperatif ölüm parametrelerine ayrılarak karşılaştırılmıştır.

**Bulgular:** Çalışmamızda total ve near-total tiroidekto-

mi grupları arasında trakeostomi sıklığı (%1,10/%0,8; p=0,81), geçici hipokalsemi (%8,84/%10; p=0,734), kalıcı hipokalsemi (%0,55/%0,8; p>0,05), geçici vokal kord disfonksiyonu (%9,94/%11,7; p=0,635) ve kalıcı vokal kord disfonksiyonu (p>0,05) açısından istatistiksel olarak anlamlı fark saptanmazken; total ve tamamlayıcı tiroidektomi grupları arasında trakeostomi sıklığı (%1,10/%15,5; p<0,001), geçici hipokalsemi (%8,84/%46,6; p<0,001), geçici vokal kord disfonksiyonu (%9,94/37,9; p<0,001) ve kalıcı vokal kord disfonksiyonu açısından istatistiksel olarak anlamlı fark saptanırken, kalıcı hipokalsemi açısından anlamlı fark saptanmamıştır (p>0,05). Postoperatif hematoma ve exitus gözlenmediğinden değerlendirme yapılamamıştır.

**Sonuç:** Çalışmamız ışığında bizim görüşümüz, özellikle tamamlayıcı tiroidektominin yüksek komplikasyon oranları göz önüne alındığında, tüm glandı etkileyen diffüz tiroid hastalıklarında total tiroidektomi tercih edilmesinin faydalı olacağı yönündedir.

**Anahtar Kelimeler:** Tiroidektomi, tiroidektomi komplikasyonları, tiroid cerrahisi Nobel Med 2013; 9(1): 100-105

## INTRODUCTION

Thyroid gland disorders are the second most common endocrine disease, after diabetes mellitus. Thyroid surgery is one of the most frequently performed surgeries, and thyroidectomy is a commonly performed surgery with very low mortality and acceptable morbidity

Prevention of complications in thyroid surgery requires knowledge of embryology and the anatomy of the cervical district in order to visualize and respect the glands and their vascular pedicle. The patients must be appropriately counseled before surgery regarding potential complications, and they must be well aware of the risks associated with the surgery.<sup>1</sup>

In cases of thyroid disease that have to be treated using surgical procedures, many parameters are considered by surgeons before opting for total thyroidectomy, for example, irradiation of the neck, size of the tumor, and involvement of the lymph nodes. The AMES and AGES prognostic criteria may also help in making the decision regarding surgical treatment. However, we believe that the surgeon's experience is also an important predictor for thyroidectomy-related complications.<sup>1,2</sup>

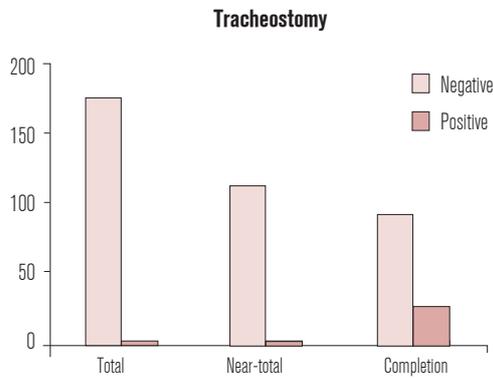
The aim of this study is to investigate the complication rates for different thyroidectomy procedures in order to help optimize the surgical management of

malignant and benign thyroid diseases with minimum complication rates.

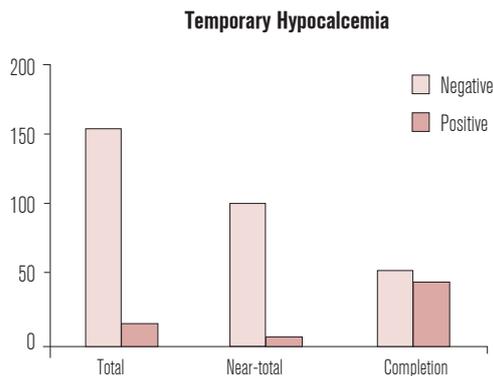
## MATERIAL and METHOD

Between 2004 and 2009, 417 thyroidectomies were performed at Ankara Oncology Hospital 1<sup>st</sup> General Surgery Clinic. Of these, 181 were total thyroidectomies; 120, near-total thyroidectomies; and 116, completion thyroidectomies. The original surgery (bilateral subtotal thyroidectomy) for 112 of these patients had been performed at another center, and the patients had been referred to our clinic because of a histopathologic diagnosis of malignant disease. Of the 417 patients for whom thyroidectomy was performed, 298 patients had multinodular goiter and 119 had malignant thyroid disease. We investigated the difference between the complication ratios for total, near-total, and completion thyroidectomy procedures. The complications investigated were tracheostomy performed due to recurrent laryngeal nerve palsy, temporary hypoparathyroidism, permanent hypoparathyroidism, temporary vocal cord dysfunction, permanent vocal cord dysfunction, postoperative hematoma, and postoperative death. All of the patients were informed about the procedure, possible complications, and results by the surgical team. The patients who had vocal cord dysfunction or hypoparathyroidism before the procedure due to →

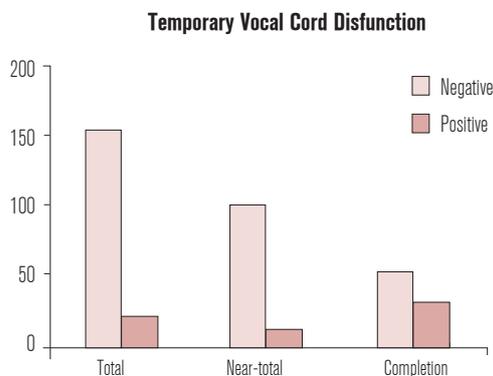
SHOULD WE PREFER TOTAL TO NEAR-TOTAL THYROIDECTOMY IN DIFFUSE THYROID DISORDERS?



**Figure 1:** Tracheostomy incidences between groups



**Figure 2:** Temporary hypocalcemia incidences between groups



**Figure 3:** Temporary vocal cord dysfunction incidences between groups

thyroid or other pathology or who had serious cardiovascular, pulmonary, renal, hepatic, or hematologic disorders were excluded from the study. Patients who had tumors with extracapsular invasion and who had undergone surgery due to malignant disease were also excluded from this study. Preoperative investigations, including thyroid function tests (all of the patients had normal thyroid function tests) and routine biochemistry were performed for all patients. Nuclear and ultrasonographic scanning and fine-needle aspiration biopsy were also performed. Routine assessment of vocal cord function was performed before and after surgery by an independent

otolaryngologist as well as by the anesthetist at the time of intubation. None of the patients included in this study had vocal cord dysfunction before surgery. The status-free serum calcium levels were measured before surgery and on postoperative day 3 and 5. After discharge from the hospital, the patients visited our clinic once a week till the second postoperative month. If the vocal cord dysfunction and hypoparathyroidism lasted for more than 6 months, they were considered to be permanent, and if the vocal cord dysfunction and hypocalcemia lasted for less than 6 months, it was considered that the patient had temporary hypoparathyroidism or vocal cord dysfunction. After the second postoperative month, the patients visited the hospital every 3 months for follow-up.

All information related to these operative procedures and to the pathologic conditions and complications was recorded, and the records were stored in our department.

We performed a retrospective study using the patients' records. The chi square test was used for statistical analysis.

## RESULTS

Between April 2004 and May 2009, 181 total thyroidectomies and 120 near-total thyroidectomies were performed for patients with multinodular goiter and 116 completion thyroidectomies were performed for patients with thyroid carcinomas. We investigated the difference between the complication ratios for total, near-total, and completion thyroidectomy procedures. The complications investigated were tracheostomy performed due to recurrent laryngeal nerve palsy, temporary hypocalcemia, permanent hypocalcemia, temporary vocal cord dysfunction, permanent vocal cord dysfunction, postoperative hematoma, and postoperative death (Table). With respect to tracheostomy performed due to laryngeal nerve palsy, no significant difference was observed between the patients in the total thyroidectomy (2 of 181 patients, 1.10%) and near-total thyroidectomy groups (1 of 120 patients, 0.80%) ( $p=0.816$ ); however, there was a significant difference between the patients in the total thyroidectomy (2 of 181 patients, 1.10%) and completion thyroidectomy groups (18 of 116 patients, 15.5%) ( $p<0.001$ ) (Figure 1). With respect to temporary hypocalcemia, no significant difference was observed between the patients in the total thyroidectomy (16 of 181 patients, 8.84%) and near-total thyroidectomy groups (12 of 120 patients, 10.0%) ( $p=0.734$ ); however, there was a significant difference between the patients in the total thyroidectomy (16 of 181 patients, 8.84%) and completion thyroidectomy groups (54 of 116 patients, 46.6%) ( $p<0.001$ ) (Figure 2). →

| Table: Complication rates between groups |          |             |                 |                 |                               |          |                   |          |                   |                     |
|--|----------|-------------|-----------------|-----------------|-------------------------------|----------|-------------------|----------|-------------------|---------------------|
|  |          | Total Thy.  | Near-total Thy. | Completion Thy. | X <sup>2</sup> test           |          |                   |          |                   |                     |
|  |          |             |                 |                 | Completion, Near-total, Total |          | Completion, Total |          | Near-total, Total |                     |
|  |          |             |                 |                 | X <sup>2</sup>                | p        | X <sup>2</sup>    | p        | X <sup>2</sup>    | p                   |
| Tracheostomy                             | Negative | 179 (98.9%) | 119 (99.2%)     | 98 (84.5%)      | 36.927                        | 0.000*** | 23.380            | 0.000*** | 0,054             | 0,816 <sup>ns</sup> |
|  | Positive | 2 (1.10%)   | 1 (0.80%)       | 18 (15.5%)      |                               |          |                   |          |                   |                     |
| Temporary Hypocalcemia                   | Negative | 165 (91.2%) | 108 (90.0%)     | 62 (53.4%)      | 73.604                        | 0.000*** | 55.812            | 0.000*** | 0,115             | 0,734 <sup>ns</sup> |
|  | Positive | 16 (8.84%)  | 12 (10,0%)      | 54 (46.6%)      |                               |          |                   |          |                   |                     |
| Permanent Hypocalcemia                   | Negative | 180 (99.5%) | 119 (99.2%)     | 115 (99.1%)     | NA                            | NA       | NA                | NA       | NA                | NA                  |
|  | Positive | 1 (0.55%)   | 1 (0.80%)       | 1 (0.90%)       |                               |          |                   |          |                   |                     |
| Temporary vocal cord dysfunction         | Negative | 163 (90.1%) | 106 (88.3%)     | 72 (62.1%)      | 42.014                        | 0.000*** | 33.522            | 0.000*** | 0,225             | 0,635 <sup>ns</sup> |
|  | Positive | 18 (9.94%)  | 14 (11.7%)      | 44 (37.9%)      |                               |          |                   |          |                   |                     |
| Permanent vocal cord dysfunction         | Negative | 181 (100%)  | 120 (100%)      | 110 (94.8%)     | 15.796                        | 0.000*** | 9.555             | 0.002**  | NA                | NA                  |
|  | Positive | 0 (0.00%)   | 0 (0.00%)       | 6 (5.20%)       |                               |          |                   |          |                   |                     |
| Postoperative Hematoma                   | Negative | 181 (100%)  | 120 (100.0%)    | 116 (100.0%)    | NA                            | NA       | NA                | NA       | NA                | NA                  |
|  | Positive | 0 (0.00%)   | 0 (0.00%)       | 0 (0.00%)       |                               |          |                   |          |                   |                     |
| Exitus                                   | Negative | 181 (100%)  | 120 (100%)      | 116 (100%)      | NA                            | NA       | NA                | NA       | NA                | NA                  |
|  | Positive | 0 (0.00%)   | 0 (0.00%)       | 0 (0.00%)       |                               |          |                   |          |                   |                     |
| n  |          | 181         | 120             | 116             |                               |          |                   |          |                   |                     |

\*\*\*: 0.001 ;There is statistically significant difference, \*\*: There is no statistically significant difference, NA: Analyse cannot be performed

No significant difference was observed between the patients in the total thyroidectomy (1 of 181 patients, 0.55%), near-total thyroidectomy (1 of 120 patients, 0.80%), and completion thyroidectomy groups (1 of 116 patients, 0.90%) with respect to permanent hypocalcemia. There was no significant difference between the patients in the total thyroidectomy (18 of 181 patients, 9.94%) and near-total thyroidectomy groups (14 of 120 patients, 11.7%) (p=0.635) with respect to temporary vocal cord dysfunction, but we noted a significant difference between the patients in the total thyroidectomy (18 of 181 patients, 9.94%) and completion thyroidectomy groups (44 of 116 patients, 37.9%) (p<0.001) (Figure 3) with respect to this complication. The patients in the total thyroidectomy and near-total thyroidectomy groups did not exhibit permanent vocal cord dysfunction. We noted a significant difference between the patients in the total thyroidectomy (0 of 181 cases) and completion thyroidectomy groups (6 of 116 cases,

5.20%) (p<0.001) with regard to permanent vocal cord dysfunction. Hematoma and postoperative exitus was not noted in any of the 3 groups.

## DISCUSSION

Thyroid gland disorders are the second most common endocrine disease, after diabetes mellitus. Thyroid surgery is one of the most frequently performed surgeries, and thyroidectomy is a commonly performed surgery with very low mortality and acceptable morbidity rate.<sup>1</sup> Currently, total thyroidectomy is the surgical procedure mainly used for the treatment of thyroid diseases.<sup>2</sup> It is important to demonstrate that these procedures can be performed safely in any surgery center with outcomes equivalent to those obtained in academic hospitals in major metropolitan areas, despite the lack of availability of specific technologies that are being increasingly used for these procedures in tertiary care settings. Specifically, →

SHOULD WE PREFER TOTAL TO NEAR-TOTAL THYROIDECTOMY IN DIFFUSE THYROID DISORDERS?

these procedures include intraoperative parathyroid hormone measurements, intraoperative recurrent laryngeal nerve monitoring, and the use of the gamma probe for the detection of parathyroid adenomas.<sup>3</sup>

Prevention of complications in thyroid surgery requires knowledge of embryology and the anatomy of the cervical district in order to visualize and respect the glands and their vascular pedicle. The patients must be appropriately and preoperatively counseled regarding potential complications, and they must be well aware of the risks involved in surgery. It is possible by the identification of risk factors. Postoperative hypocalcemia is the immediate surgical complication that can arise after total thyroidectomy. The surgical technique used has a great physiopathologic impact on postoperative hypocalcemia, which is a multifactorial phenomenon. Hypoparathyroidism does not appear to be the main cause of hypocalcemia after thyroidectomy, and other parameters such as surgical stress, hungry bone syndrome, and the release of calcitonin during surgical manipulation may be important contributory factors for this condition. The aim of this study is to investigate the complication rates for different thyroidectomy procedures in order to help optimize the surgical management of malignant and benign thyroid diseases with minimum complication rates.

In conclusion, the extent of resection, surgical technique, and the pathological condition of the thyroid gland had a great impact on the incidence rates of postoperative hypoparathyroidism. By developing an understanding of the anatomy of the cervical district and the ways by which each complication can be prevented, the surgeon can minimize the risks involved in surgery and can handle complications in an expedient manner and avoid worse complications. Total thyroidectomy has an important role in the management of malignant and benign thyroid disorders, with minimal complications and rare postoperative mortality. Even though thyroid surgery is very safe, mechanical damage, devascularization, or inadvertent removal of the parathyroid glands is possible.<sup>4</sup>

In contrast, reoperative thyroid surgery is technically more demanding because of the presence of scar tissue and distorted anatomy, which may result in a greater risk of injury to the recurrent laryngeal nerve and parathyroid glands.<sup>5</sup> We also reviewed our experience with completion thyroidectomy cases with respect to complication rates.

Permanent hypoparathyroidism is a devastating and disabling complication that can occur with reoperative thyroid surgery. Revision surgery of the central compartment places the parathyroid glands at an increased risk for devascularization or inadvertent removal. Although permanent injury to the parathyroid glands remains an

uncommon event, several studies involving a large series of patients have reported the occurrence of permanent hypoparathyroidism following reoperative thyroid surgery. Repeat surgery for recurrent or persistent thyroid cancer presents a special challenge even to the most accomplished surgeon.<sup>5</sup>

Total thyroidectomy is generally reserved for the management of differentiated thyroid carcinoma. Over the last decade, there has been an increase in the use of total thyroidectomy, and this procedure is now the preferred option in the authors' unit for the management of multinodular goiter affecting the entire thyroid gland. Total thyroidectomy is an appropriate surgical option in such cases because it precludes the need for further surgery for recurrent disease, with its high associated risks. It must be emphasized, however, that protection of the recurrent laryngeal nerve and parathyroid glands is still paramount while treating benign thyroid disease.<sup>6</sup>

Up to 40% incidence rates of recurrent goiter have been reported in long-term follow-up after subtotal resection of multinodular goiter. Because of the increased morbidity of surgery for recurrent goiter, several studies have evaluated the preconditions that would justify total thyroidectomy as part of the primary therapy concept for benign multinodular goiter.<sup>7</sup>

Many studies suggest that total thyroidectomy is the gold standard for diffuse diseases of the thyroid because without more specific complication than subtotal or near-total thyroidectomy, and use of this procedure ensures the following factors: no recurrence, easy control of postoperative hypothyroidism, removal of microscopic malignant foci, and preventing the occurrence of ophthalmopathy. In particular, while considering the general health condition of patients with thyroid cancer, we also consider total thyroidectomy to be the gold standard for diffuse diseases of the thyroid.<sup>8-14</sup>

## CONCLUSION

In our study, no differences were observed between near-total and total thyroidectomy with respect to complication rates, but there was a significant difference between the complication rates of total thyroidectomy and completion thyroidectomy. These data suggest that total thyroidectomy is a safe procedure when performed by experienced surgeons. To conclude, we think that it is safer to perform total thyroidectomy than near-total thyroidectomy when the thyroid disease affects the entire gland, in order to avoid the high complication risk of reoperative thyroid surgery.



## REFERENCES

1. Erbil Y, Barbaros U, Samaslıoğlu A, et al. The advantage of near-total thyroidectomy to avoid postoperative hypoparathyroidism in benign multinodular goiter. *Langenbecks Arch Surg* 2006; 391: 567-573.
2. Misiakos EP, Liakakos T, Macheras A, et al. Total thyroidectomy for the treatment of thyroid diseases in an endemic area. *South Med J* 2006; 99: 1224-1229.
3. Richmond BK, Eads K, Flaherty S, et al. Complications of thyroidectomy and parathyroidectomy in the rural community hospital setting. *Am Surg* 2007; 73: 332-336.
4. Sciumè C, Geraci G, Pisello F, et al. Complications in thyroid surgery: symptomatic post-operative hypoparathyroidism incidence, surgical technique, and treatment. *Ann Ital Chir* 2006; 77: 115-122.
5. Kim MK, Mandel SH, Baloch Z, et al. Morbidity following central compartment reoperation for recurrent or persistent thyroid cancer. *Arch Otolaryngol Head Neck Surg* 2004; 130: 1214-1216.
6. Reeve TS, Delbridge L, Cohen A, et al. Total thyroidectomy. The preferred option for multinodular goiter. *Ann Surg* 1987; 206: 782-786.
7. Thomusch O, Sekulla C, Dralle H. Is primary total thyroidectomy justified in benign multinodular goiter? Results of a prospective quality assurance study of 45 hospitals offering different levels of care. *Chirurg* 2003; 74: 437-443.
8. Siragusa G, Lanzara P, Di Pace G. Subtotal thyroidectomy or total thyroidectomy in the treatment of benign thyroid disease. Our experience. *Minerva Chir* 1998; 53: 233-238.
9. Tovi F, Noyek AM, Chapnik JS, et al. Safety of total thyroidectomy: review of 100 consecutive cases. *Laryngoscope* 1989; 99: 1233-1237.
10. Clark OH. Total thyroidectomy: the treatment of choice for patients with differentiated thyroid cancer. *Ann Surg* 1982; 196: 361-370.
11. Jacobs JK, Aland JW Jr, Ballinger JF. Total thyroidectomy. A review of 213 patients. *Ann Surg* 1983; 197: 542-549.
12. Lal G, Ituarte P, Kebebew E, et al. Should total thyroidectomy become the preferred procedure for surgical management of Graves' disease? *Thyroid* 2005; 15: 569-574.
13. Sosa JA, Udelsman R. Total thyroidectomy for differentiated thyroid cancer. *J Surg Oncol* 2006; 94: 701-707.
14. Cüre E, Şahin M, Kutlucan A, et al. Onkoloji merkezimizde kanser tanısıyla izlenen hastalarımızın romatolojik yakınma ve bulguları. *Nobel Med* 2008; 4: 22-27.