



The evaluation of the complications observed in patients with bilateral total and bilateral near total thyroidectomy



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The evaluation of the complications observed in patients with bilateral total and bilateral near total thyroidectomy

AIM: The objective was to compare the recurrent laryngeal nerve (RLN) and superior laryngeal nerve (SLN) injuries in patients with bilateral total thyroidectomy (BTT) and bilateral near total thyroidectomy (BNTT) with the frequency of the hypocalcemic complications regarding the operation procedures.

MATERIALS AND METHODS: Patients, who underwent BTT and BNTT in our clinic between January 1999 and January 2011, were included in this retrospective clinical study. Patients' files are evaluated. Demographic information, pre-operative complete blood cell count and biochemical analysis, thyroid function tests, ultrasonographic results, results of the fine needle aspiration biopsy, implemented operative procedures (BTT or BNTT), vocal cord investigation, post-operative calcium levels, postoperative complications were analyzed.

RESULTS: In 328 of 408 (80.4%) patients BTT was the preferred method and 80 underwent BNTT (19.6 %). Post-operative hypocalcemia was observed in 59 patients in the BTT group (17.9 %) and in 11 patients in the BNTT group (13.7 %). Hypocalcemia persisted in 8 patients in BTT group (2.4 %) and in 6 patients in BNTT group (7.5%). Unilateral RLN paralysis was observed in 22 patients in BTT group (6.7 %) and in 13 patients in the BNTT group (16.2 %).

CONCLUSION: In this study, the likelihood of the temporary RLN paralysis and permanent hypoparathyroidism is found to be higher in the patients with BNTT compared to the patients with BTT. BNTT may be the preferred choice of treatment in suitable patients.

KEY WORDS: Complication, Hypocalcemia, Nervus laryngealis recurrens, Nervus laryngealis superior, Thyroidectomy

Introduction

The thyroid gland is one of the important endocrine organs regarding its function in the organism. Thyroid surgery is one of the most frequent surgical interventions among the general surgery practice. Surgical methods

used for the thyroid diseases should spare the patient from redo surgeries, have low complication rates and be capable of treating the patient ¹.

In the post-operative phase of the thyroid surgery, the most frequent and the most unpleasant complications for both the patient and the surgeon are without doubt hypoparathyroidism and laryngeal nerve injuries ^{2,3}. Although these complications may be temporary or permanent, the question "With which surgical method may I face fewer complications?" has occupied the mind of the surgeons within the historical process.

In this retrospective study, our purpose was to compare the recurrent laryngeal nerve (RLN) and superior laryngeal nerve (SLN) injury rates in patients with bilateral total thyroidectomy (BTT) and bilateral near total thyroidectomy (BNTT). Moreover, we evaluated the frequency of the hypocalcemic complications regarding surgical methods.

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Material and Method

408 patients, underwent BTT and BNTT in our clinic between January 1999 and January 2011, were included in this retrospective clinical study. The following data about the patients are obtained from the files of the patients. Demographic information (identity, hospital protocol number, age, gender, country), pre-operative complete blood cell count and biochemical analysis, free T3, free T4, thyroid stimulating hormone levels, ultrasonographic findings, results of the fine needle aspiration biopsy, implemented operative procedures (BTT or BNTT), routine post-operative 3rd day videolaryngoscopy findings, post-operative 24th and 48th hour calcium levels, presence of any postoperative complications (RLN, SLN injuries and hypoparathyroidism) and follow-up data of the complications. The follow-up information of the patients with nerve injury in 6-month periods and monthly calcium levels of the patients with hypocalcemia were collected and recorded.

Patients who underwent lobectomy, subtotal thyroidectomy, redo surgery or lymph node dissections (both central and lateral) were excluded from the study.

The data of the included patients were analyzed with the software SPSS 13.0®. Independent student's t-test was used for the comparison of the quantitative data and Fisher chi-squared test for the comparison of the qualitative data. The results are in the confidence interval of 95% and $p < 0.05$ was accepted as statistically significant.

Results

328 of 408 patients operated due to their thyroid disease have underwent BTT (80.4 %) and 80 have underwent BNTT (19.6 %). The distribution of pathological diagnosis is shown in Table I. 82 of the patients were males (20.1 %) and 326 were females (79.9 %). The average age of the patients was 44.2 (8-88 years). Post-operative hypocalcemia was observed in 59 patients in the BTT group (17.9 %) and in 11 patients in the BNTT group (13.7 %) ($p > 0.05$). Hypocalcemia was persistent in 8 patients in BTT group (2.4 %) and in 6 patients in BNTT group (7.5 %) in the sixth month of surgery. The difference between the groups was statistically significant ($p < 0.05$). Unilateral RLN paralysis was observed in 22 patients in BTT group (6.7 %) and in 13 patients in the BNTT group (16.2 %) ($p < 0.05$). Videolaryngoscopy revealed persisting vocal cord paralysis in 5 patients in the BTT group (1.5 %) and in 3 patients in the BNTT group (3.75 %) ($p > 0.05$). Bilateral RLN paralysis was observed in 8 patients in BTT group (2.4 %) and in 5 patients in BNTT group (6.2 %) ($p > 0.05$). SLN paralysis was observed in 4 patients in BTT group (1.2 %) and in 3 patients in BNTT group (3.7 %) ($p > 0.05$) (Table II). SLN or RLN paralyzes were not persisting in any patients in the sixth month of surgery.

TABLE I - Post-operative diagnosis of the patients with BTT and BNTT.

	BTT	BNTT	Total
Benign multinodular goiter	243	48	291
Graves' Disease	21	11	32
Hashimoto's Thyroiditis	19	9	28
Follicular Adenoma	15	2	17
Hurthle Cell Adenoma	8	1	9
Malign Tumors	15	4	19
Nodular Goiter	7	5	12
Total	328	80	408

BTT: Bilateral Total Thyroidectomy, BNTT: Bilateral Near Total Thyroidectomy.

TABLE II - The distribution of the complications in patients with BTT and BNTT.

	BTT	BNTT	p
Unilateral RLN injury	22 (%6.7)	13 (%16.2)	0.01*
Bilateral RLN injury	8(%2.4)	5(%6.2)	0.16
SLN injury	4 (%1.2)	3 (%3.7)	0.27
Clinic hypocalcemia	59 (%17.9)	11 (%13.7)	0.46
Persistent hypocalcemia	8 (%2.4)	6 (%7.5)	0.04*
Persistent unilateral RLN injury	5(%1.5)	3(%3.7)	0.40

BTT: Bilateral Total Thyroidectomy, BNTT: Bilateral Near Total Thyroidectomy.

RLN: Recurrent Laryngeal Nerve, SLN: Superior Laryngeal Nerve, * $p < 0.05$ is statistically significant.

Discussion

Thyroidectomy is still the most common surgical operation of the endocrine glands. In our country thyroid disorders are one of the most frequent health problems and the reported incidence rates are between 5 to 56 %^{4,5}. Because of this high incidence rate of the disorder various surgical procedures have been described⁵. Rates of different complications of these methods have been reported in detail; however, there is not a consensus yet on the preference of a particular method⁶. Currently, total thyroidectomy and near total thyroidectomy are the most frequently chosen method for the treatment of the thyroid disorders.

The most common complications of the thyroidectomy are hypocalcemia and RLN injuries^{2,3}. SLN injury, infection, injury of larynx and trachea, and bleeding are other complications. Hypocalcemia and nerve injuries may be temporary or permanent.

The reported post-operative hypocalcemia incidence rates vary in a wide range between 6% and 50%)^{7, 8}. Similarly, temporary nerve injury rates are between 50%

and 80%. In other words, the nerve injury recovers within these rates⁹⁻¹¹. Secondary edema caused by the manipulation of the parathyroid glands and nerves, decrease of the blood flow play an important role in the pathophysiology of these temporary conditions.

In our study, regarding all methods, temporary nerve injury rate was 11.5% and temporary hypocalcemia rate was 17.1 %. These rates are lower than the rates reported in the literature. In our clinic, the fact that most of these procedures were carried out by experienced endocrine surgeons may be the reason behind these lower rates.

The complications with the permanent character are the nightmare of the surgeons. In the literature, the rates of the permanent RLN injury after thyroidectomy are 0.3-14 %. The related rate for the experienced surgeons is lower (0.2-0.3 %) ^{12,13}. Therefore, persistent hypocalcemia and vocal cord paralysis rates around 1-2% may be considered as acceptable ¹⁴. In our study, persistent hypocalcemia rate was 2.4% in BTT group and 7.5% in BNTT group, BNTT group had significantly lower rates of persistent hypocalcemia (p=.04). This finding contradicts with common literature. Permanent unilateral RLN injury rate was 1.5% in BTT group and 3.7% in BNTT group. Difference was not noted as significant. These results is in line with the rates reported in the literature.

In their study Acun et al suggested that the risk of hypocalcemia is lower in BNTT compared to BTT and that the risk of nerve injury is similar between the groups ⁵. Although some surgeons claim that the dissection of the RLN causes nerve ischemia and fibrosis, it is reported that detecting the nerve during the operation minimizes the injury of the RLN ¹⁵. In our study, unilateral RLN injury and permanent hypocalcemia rates were significantly higher. In our opinion, in order to decrease the RLN injury rates, the RLN dissection should be done very carefully and the nerve should be identified during the operation. For prevention of the SLN injury, the dissection and the ligature of the upper poles should be close to the thyroid gland. If the surgeon is experienced enough to identify the visual differences between the parathyroid gland and adipose tissue, this type of adverse consequences may be minimized.

Conclusion

In conclusion, the likelihood of the temporary RLN paralysis and persistent hypoparathyroidism is higher in the patients with BNTT compared to the patients with BTT. The fact that BNTT is usually preferred by the less experienced surgeons may be one of the reasons for this result. In experienced hands, BTT is a procedure with low complications.

References

1. Çağlayan K, Çelik A: *Thyroidectomy for benign thyroid diseases: Evaluation of surgical methods and the complications*. Ulus Cerrahi Derg, 2010; 26:141-45.
2. Acun Z, Cihan A, Ulukent SC, Comert M, Ucan B, et al.: *A randomized prospective study of complications between general surgery residents and attending surgeons in near-total thyroidectomies*. Surg Today, 2004; 34:997-1001.
3. Uruno T, Miyauchi A, Shimizu K, Tomoda C, Takamura Y et al.: *A prophylactic infusion of calcium solution reduces the risk of symptomatic hypocalcemia in patients after total thyroidectomy*. World J Surg, 2006; 30:304-08.
4. Hasdemir AO, Türkeli V, Kahramansoy N, Kordon Ö, Erkol H et al.: *Hipertiroidi nedeniyle yapılan tiroidektomi sonrası hipokalsemi*. Endokrinolojide Diyalog, 2009; 6: 33-7.[Article in Turkish.]
5. Acun Z, Comert M, Cihan A, Ulukent SC, Ucan B, et al.: *Near-Total thyroidectomy could be the best treatment for thyroid disease in endemic regions*. Arch Surg, 2004; 139: 444-47.
6. Çelik A, Çağlayan K, Günerhan Y, Uzun MA, Altinli, et al.: *Tiroidektomi sonrası görülen komplikasyonlar ve risk faktörleri*. Haydarpaşa Numune Eğitim ve Araştırma Hastanesi Tıp Dergisi, 2008. 48: 156-60. [Article in Turkish.]
7. Thomusch O, Machens A, Sekulla C, Ukkat J, Lippert H, et al.: *Multivariate analysis of risk factors for postoperative complications in benign goiter surgery: Prospective multicenter study in Germany*. World J Surg, 2000; 24:1335-41.
8. Erbil Y, Barbaros V, Issever H, Borucu I, Salmalıoğlu A, et al.: *Predictive factors for recurrent laryngeal nerve palsy and hypoparathyroidism after thyroid surgery*. Clin Otolaryngol, 2007; 32: 32-7.
9. Martenson H, Terins S: *Recurrent nerve palsy in thyroid gland surgery related to operations and nerves at risk*. Arch Surg, 1985; 120: 475-77.
10. Lacoste L, Gineste D, Karayan J, Montaz N, Lehuède MS, et al.: *Airway complication in thyroid surgery*. Ann Otol Rhinol Laringol, 1993; 102: 441-46.
11. Jatzko GR, Lisborg PH, Müller MG, Wette VM: *Recurrent nerve palsy after thyroid operations-principle nerve identification and a literature review*. Surgery, 1994; 115:39-44.
12. Beahrs OH, Ryan RF, White RA: *Complications of thyroid surgery*. J Clin Endocrinol Metabol, 1956; 16:1456-69.
13. Clark OH: *Total thyroidectomy: The treatment of choice for patients with differentiated thyroid cancer*. Ann Surg, 1982; 196:361-67.
14. Soh EY, Clark OH: *Surgical considerations and approach to thyroid cancer*. Endocrinol Metab Clin North Am, 1996; 25:115-24.
15. Yamaner S: *Is the dissection of the recurrent laryngeal nerve during thyroidectomy mandatory?* Clin Exp Surg, 1998; 6:83-6.

Commento e Commentary

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Il problema trattato in questo articolo è tutt'altro che nuovo, e riguarda i due principali rischi della chirurgia tiroidea. L'interesse della sua pubblicazione è esclusivamente individuabile nella conoscenza che deriva ai lettori dall'audit dell'attività chirurgica e dell'esperienza vissuta in una istituzione pubblica della capitale della Turchia e per ribadire i concetti fondamentali della moderna chirurgia della tiroide.

La BNTT è una tecnica chirurgica che va considerata assolutamente obsoleta e non più degna di far parte del bagaglio tecnico di un endocrinocirurgo, perché non giustificata da particolari scopi terapeutici molto meno che teorici: un piccolo residuo tiroideo non può supplire con l'ipertrofia l'asportazione della massa ghiandolare, e dunque non è evitabile l'opoterapia ormonale postoperatoria senza termini. Inoltre non è certo con la conservazione di un piccolo residuo tiroideo che si protegge il nervo laringeo, mentre qualche ipotesi positiva potrebbe essere teoricamente considerata riguardo la migliore preservazione del tessuto paratiroideo.

L'esperienza degli Autori smentisce anche questa labile ipotesi, e dunque l'articolo rappresenta una pietra tombale sulle tecniche chirurgiche alternative alla lobectomia tiroidea extracapsulare mono- o bilaterale – le sole accettabili – che non prendano in considerazione la ricerca intraoperatoria dei nervi laringei e di almeno una adeguata quota di tessuto paratiroideo.

* * *

The problem discussed in this article is far from new, and it concerns the two main risks of thyroid surgery. The interest of its publication is only detectable in the knowledge that comes to this journal's readers as audit of the surgical research activity and lived experience in a public institution of the main town of Turkey, and to reflect regard the fundamental concepts of modern surgery of the thyroid.

The BNTT is a surgical technique that should be considered totally obsolete and no longer worthy to be part of endocrine surgeon's technical luggage, because not justified by any concrete therapeutic purposes far less than theoretical: a small thyroid remnant cannot compensate with hypertrophy the removal of the glandular mass and therefore is unavoidable to go on without time limits with hormonal postoperative opotherapy. Moreover it is certainly not reliable to obtain the protection of the laryngeal nerves with the preservation of a small residual thyroid, while some positive hypothesis could be theoretically considered for a safer preservation of parathyroid tissue.

The experience of the authors refutes also this fleeting hypothesis, and therefore the article's conclusion is a tombstone on the surgical techniques alternative to the only two actually acceptable and accredited: extracapsular unilateral or bilateral thyroid lobectomy, with search and identification of the laryngeal nerves and adequate preservation of parathyroid tissue.

Reference

Picardi N: *Modern surgical technique for thyroidectomy*. Ann Ital Chir, 1998; 69/1, 1-11.