

Experience of thyroid surgery at tertiary referral centers in Jazan Hospitals, Saudi Arabia

FAHD ALHARBI^{1,2,*}, MOHAMMED RIFAAT AHMED^{2,3}

¹Faculty of Medicine, Department of Otorhinolaryngology–Head and Neck Surgery, Jazan University, Jazan, Saudi Arabia

²Faculty of Medicine, Department of Otorhinolaryngology–Head and Neck Surgery,
Prince Mohammed bin Nasser Hospital, Jazan, Saudi Arabia

³Faculty of Medicine, Department of Otolaryngology–Head & Neck Surgery, Suez University, Ismailia, Egypt

*Corresponding author: Fahd Alharbi, MD; Faculty of Medicine, Department of Otorhinolaryngology–Head and Neck Surgery,
Prince Mohammed bin Nasser Hospital, P.O. Box: 2585, Jazan 45142,
Saudi Arabia; Phone: +966 54 3043452; Fax: +966 17 3334709; E-mail: fahdalharbi3@gmail.com

(Received: April 20, 2018; Revised manuscript received: June 28, 2018; Accepted: July 2, 2018)

Abstract: *Background:* Benign multinodular goiter (BMNG) is a common disease of the thyroid gland with palpable thyroid nodules that may be detected in 0.8%–1.5% of men and 5.3%–6.4% of women. Three major complications could be detected after total thyroidectomy: hemorrhage, recurrent laryngeal paralysis, and hypoparathyroidism. *Aims:* The aim of this study was to review and assess the experience of total thyroidectomy in patients with BMNG at tertiary referral centers in Jazan Hospitals, Saudi Arabia. *Methods:* A retrospective study was conducted on 320 patients diagnosed with BMNG and subjected to primary total thyroidectomy. Operative mortality and major complications [bleeding, recurrent laryngeal nerve (RLN) injury, and hypoparathyroidism] were recorded. *Results:* Postoperative hemorrhage was reported in four patients (1.25%). Bilateral RLN injuries occurred in two patients (0.6%), whereas unilateral RLN injuries occurred in nine patients (2.8%). Permanent hypoparathyroidism was diagnosed in three patients (0.9%), while transient hypoparathyroidism occurred in eight patients (2.5%) and improved after 4 months. *Conclusions:* Total thyroidectomy represents today the treatment of choice for BMNG. Proper preoperative preparations, meticulous surgical dissection with careful follow-up of patients will improve the surgical results and reduce postoperative complications.

Keywords: goiter, thyroid nodule, thyroidectomy, complications, Saudi Arabia

Introduction

Benign multinodular goiter (BMNG) is a common disease of the thyroid gland most often caused by iodine deficiency (endemic goiter) and it is the most prevalent thyroid pathology with palpable thyroid nodules incidence that could be detected in 0.8%–1.5% of men and 5.3%–6.4% of women [1].

Several retrospective studies evaluated the risks and complication rate of thyroid surgery and found that the three major complications could be detected: hemorrhage, recurrent laryngeal paralysis, and hypoparathyroidism with varying rates of incidence [1–3].

Postoperative hemorrhage may occur as a devastating complication from thyroid surgery as an unrecognized or rapidly expanding hematoma that can cause airway compromise and asphyxiation. The incidence of postoperative bleeding varied from 0.4% to 1.1% [2–5].

Temporary and permanent vocal fold paralysis rates were analyzed in several reports and the overall incidences of temporary and permanent vocal paralyses were 5.1% and 0.9%, respectively. When irreversible damage occurred at the recurrent laryngeal nerve (RLN), patients were usually presented with marked voice dysfunction changes [6, 7].

Many authors investigated these complications and found that they range from 0.5% to 5% following total thyroidectomy with increased incidence in both recurrent goiter and thyroid cancer [6].

Hypoparathyroidism is another feared complication from thyroidectomy occurred due to direct trauma to the parathyroid glands, devascularization of the glands, or complete removal of the glands during the thyroid surgery [8]. The reported incidence varies between 0.4% and 13.8% and is directly correlated with the extent of thyroidectomy [9].

This is an open-access article distributed under the terms of the [Creative Commons Attribution-NonCommercial 4.0 International License](https://creativecommons.org/licenses/by-nc/4.0/), which permits unrestricted use, distribution, and reproduction in any medium for non-commercial purposes, provided the original author and source are credited, a link to the CC License is provided, and changes – if any – are indicated.

The aim of this study was to review and assess the experience of total thyroidectomy in patients with BMNG at the tertiary referral centers in Jazan Hospitals, Saudi Arabia.

Patients and Methods

A retrospective study was conducted in Prince Mohammed bin Nasser Hospital and King Fahd Central Hospital, Jazan, Saudi Arabia. A total of 320 patients who were diagnosed with BMNG and undergone total thyroidectomy were included in this study. The indications of surgery were pressure symptoms and huge neck swelling. The patients with previous neck surgery, previous radiation therapy, or having incomplete data were excluded from this study.

Data were collected from database in Prince Mohammed bin Nasser Hospital and King Fahd Central Hospital, Jazan, Saudi Arabia between January 2011 and 2018. The patients' data included in the study were demographic data (age at diagnosis, gender, occupation, and residence), chief complaint (dysphagia, dyspnea and hoarseness), neck examination, ultrasound neck examination, and full blood investigations.

Study plan

1. The vocal cord status for the patients was checked preoperatively by direct rigid laryngoscope (rigid laryngeal endoscope, Storz 70° with video monitor).
2. Investigations: neck ultrasound, determination of free T3, free T4, thyroid stimulating hormone, serum calcium concentration, and fine-needle aspiration cytology.
3. The intraoperative blood loss, operative time, postoperative drainage, and postoperative wound infection were recorded.
4. Postoperative follow-up includes the status of vocal fold function (by direct rigid laryngoscope). The function of parathyroid was checked immediately in the postoperative period by serum calcium concentration and parathyroid hormone level.

Operative technique

Total thyroidectomy is defined as the surgeon's attempt to perform an extracapsular removal of the entire thyroid gland including pyramidal lobe while preserving the parathyroid glands, RLNs, and external branches of the superior laryngeal nerves (SLNs). The internal branches of the superior thyroid artery were identified and dissected meticulously as close to the thyroid capsule as possible

to avoid damaging the SLN. The external branch of the SLN travels inferiorly along the lateral surface of the inferior constrictor muscle until it terminates at the cricothyroid muscle. A delicate surgical technique was performed by identifying and exposing the RLN and its branches and following its course with care until it entered larynx. The main trunk of the inferior thyroid artery was preserved and the branches entering only the thyroid were cut between ligatures to preserve the blood supply of the parathyroid gland and all the parathyroid glands were identified, if possible.

The following parameters were obtained:

1. Operative mortality.
2. Major complications: bleeding, RLN injury, and hypoparathyroidism.

Statistical analysis

Data collected were processed using SPSS version 22 (SPSS Inc., Chicago, IL, USA). Quantitative data were expressed as means \pm standard deviations (SDs), whereas qualitative data were expressed as numbers and percentages.

Ethics

The local ethics committee of Faculty of Medicine, Jazan University, Saudi Arabia approved the study. Written consent was obtained from all patients or first-degree relatives before the management procedure.

Results

A total 320 patients who were diagnosed with BMNG and undergone total thyroidectomy were included in this study. There were 112 (35%) men and 208 (65%) women with mean age of 42.25 ± 9.5 years. The operative time of surgery was between 80 and 110 min with a mean value of 113.21 ± 11.46 min. The amount of intraoperative blood loss using the standard absorptive gauze measuring 30 cm \times 30 cm was 45–70 ml with a mean 61.12 ± 6.12 , whereas the amount of fluid drained was 40–70 ml (54.16 ± 9.21).

The mean \pm SD time of hospitalization was 1.1 ± 0.8 days. The mean weight of the excised thyroid specimens was 51.7 g. No patient died from general anesthesia or operative technique, but postoperative hemorrhage was reported in four patients (1.25%) with mortality occurred in one patient who died of asphyxia due to large wound hematoma, whereas the other three patients needed surgical exploration and evacuation of hematoma.

Both RLNs in all the 320 patients were successfully identified and the external branch of SLN was identified in 317/320 poles (99%). Preoperative evaluation using

direct laryngoscope showed that freely mobile vocal folds during maximum phonation and maximum inspiration ensured intact of both SLN and RLN.

Postoperative evaluation revealed bilateral RLN injuries occurred in two patients (0.6%), who need tracheostomy. Unilateral RLN injuries occurred in nine patients (2.8%), whereas temporary RLN injury was detected in seven patients (2.2%), which improved within 6 months. SLN injury occurred in 12 patients (3.7%), which results in low pitch voice who are subjected to phoniatic therapy.

Both calcium level and the parathyroid hormone serum level were immediately checked in all patients in the postoperative period and during follow-up. Permanent hypoparathyroidism was observed in three patients (0.9%) who needed replacement therapy in the form of both vitamin D and calcium, whereas transient hypoparathyroidism occurred in eight patients (2.5%) and improved on medications after 4 months. The overall complications occurred in 46 patients (14.3%), which were summarized in *Table I*.

Discussion

The mortality rate from thyroid surgery during the 1800s was around 40% as these mortalities were due to infection and hemorrhage, but recently, the incidence of death ranges from 0% to 0.5% [2, 4, 10]. Thyroid surgery in recent years is generally considered quite safe, owing to a better preoperative preparation and improved surgical techniques that kept complications at a minimum level to less than 2%–3% [11]. Our data came in agreement with these figures as we found only one death in 320 patients.

Post-thyroidectomy hematoma leading to airway problem is rare but can be fatal and remains a surgical challenge for the operating team due to the life-threatening acute asphyxia [11, 12]. It was reported that the most common cause of post-thyroidectomy hemorrhage was bleeding from the thyroid lobe stump, and the most dangerous hemorrhage, because of its intensity, was the bleeding from the superior thyroid artery [13, 14].

The rate of postoperative hemorrhage varied from 0.56% to 1.1% as reported in several series [3, 4, 11–13, 15]. While others described their experiences of thyroidectomies with hemorrhage up to 2.5% [14]. In this study, we noticed that postoperative hemorrhage was detected in four patients (1.25%), which is in concordance with many reports, and one patient died of airway obstruction due to large hematoma.

The frequency of RLN injury ranges from 0.5% to 5% in different medical centers and increases in case of both completion of thyroidectomy and total thyroidectomy due to thyroid cancer. The nerve lesion varies from irreversible, persistent, and transient dysfunction with good prognosis of complete recovery from several weeks to 2 years [7, 16–18].

Table I | The all over reported complications occurred in 320 BMNG patients after total thyroidectomy

Complication	No. of patients	Percentage (%)
Death	1	0.3
Hemorrhage	4	1.25
RLN injury	18	5.6
SLN injury	12	3.7
Hypoparathyroidism	11	3.4
Total	46	14.3

BMNG: Benign multinodular goiter; RLN: recurrent laryngeal nerve; SLN: superior laryngeal nerve

In the light of law and medical aspects, we recommended obligatory preoperative laryngological examination with the evaluation of vocal folds mobility and on the third postoperative day in order to identify early RLN lesion. Permanent RLN paralysis may be diagnosed on the basis of multiple laryngological examinations in the period between 3 and 24 months after the surgery [16].

In this study, we noticed that postoperative recurrent nerve injury was detected in 18 patients (5.6%) that came in agreement with several reports. Recovery was observed in seven patients (2.2%) with improved vocal fold function within 6 months.

The incidence of hypocalcemia depends on the type of surgery performed. After performing thyroidectomy for large multinodular goiter, temporary hypocalcemia requiring calcium replacement occurred in 20% of patients. This usually occurs about 36 h postoperatively. Only up to 3% of patients had persistent hypocalcemia [19]. Another study reported postoperative hypocalcemia with rate of 4.7% persists in 1.3% of patients [4]. Chronic hypoparathyroidism with unrecovered normal function after 6 months was reported in 1.4% of cases and found in more extensive type of surgery [19, 20].

In this study, we noticed that postoperative hypocalcemia was observed in 11 patients (3.4%) that came in agreement with several reports. Chronic hypoparathyroidism with unrecovered normal function for more than 4 months was observed in three patients (0.9%) and the rest showed complete recovery after 4 months.

The overall postoperative complications of thyroid surgery occurred up to 14% of patients in many available reports [21, 22], but may be kept at a minimum to less than 2%–3% [11]. In this study, we obtained 46 patients with the three most common complications (14.3%) and this figure is more or less similar to other reported studies.

Conclusions

Total thyroidectomy is recommended to be the treatment of choice for BMNG today. Proper preoperative preparations and meticulous surgical dissection with

Careful follow-up of patients' observation improve the surgical technique outcome aiming to reduce these complications.

* * *

Funding sources: None.

Authors' contribution: The authors made substantial contributions to conception and design, acquisition of data, analysis and interpretation of data, participation in drafting the article, and approval of the final version to be submitted and any revised version.

Conflict of interest: The authors declare no conflict of interest.

References

- Farling PA: Thyroid disease. *Br J Anaes* 85, 15–28 (2000)
- Dener C: Complication rates after operations for benign thyroid disease. *Acta Otolaryngol* 122, 679–683 (2002)
- Benzarti S, Miled I, Bassoumi T, Ben Mrad B, Akkari K, Bacha O, Chebbi MK: Thyroid surgery (356 cases): Risks and complications. *Rev Laryngol Otol Rhinol (Bord)* 123, 33–37 (2002)
- Ignjatovic M, Cuk V, Ozegovic A, Cerović S, Kostić Z, Romić P: Early complications in surgical treatment of thyroid diseases: Analysis of 2100 patients. *Acta Chir Iugosl* 50, 155–175 (2003)
- Pelizzo MR, Toniato A, Piotto A, Bernante P, Pagetta C, Bernardi C: Prevention and treatment of intra- and post-operative complications in thyroid surgery. *Ann Ital Chir* 72, 273–276 (2001)
- Randolph GW, Kobler JB, Wilkins J: Recurrent laryngeal nerve identification and assessment during thyroid surgery: Laryngeal palpation. *World J Surg* 28, 755–760 (2004)
- Chiang FY, Lee KW, Huang YF, Wang LF, Kuo WR: Risk of vocal palsy after thyroidectomy with identification of the recurrent laryngeal nerve. *Kaohsiung J Med Sci* 20, 431–436 (2004)
- Meyer T, Merkel S, Radespiel-Troeger M, Hohenberger W: Dysfunction of calcium metabolism following resection of the thyroid gland. An analysis of important risk factors. *Zentralbl Chir* 127, 429–434 (2002)
- Trupka A, Siel W: Autotransplantation of at least one parathyroid gland during thyroidectomy in benign thyroid disease minimizes the risk of permanent hypoparathyroidism. *Zentralbl Chir* 127, 439–442 (2002)
- Bhansali SK, Chandalia HB: Thyrotoxicosis – Surgical management in the era of evidence-based medicine: Experience in Western India with 752 cases. *Asian J Surg* 25, 291–299 (2002)
- Savargaonkar AP: Post-thyroidectomy haematoma causing total airway obstruction – A case report. *Indian J Anaesth* 48, 483–485 (2004)
- Roher HD, Goretzki PE, Hellmann P, Witte J: Complications in thyroid surgery. Incidence and therapy. *Chirurg* 70, 999–1010 (1999)
- Cichon S, Anielski R, Orlicki P, Krzesiwo-Stempak K: Post-thyroidectomy hemorrhage. *Przegl Lek* 59, 489–492 (2002)
- Agarwal A, Mishra SK: Post-thyroidectomy haemorrhage: An analysis of critical factors in successful management. *J Indian Med Assoc* 95, 418–419, 433 (1997)
- Chen WJ, Deng Y, Liang ZY: Acute respiratory obstruction during thyroid operation: Analysis of 10 cases. *Di Yi Jun Yi Da Xue Xue Bao* 23, 507–509 (2003)
- Jamski J, Jamska A, Graca M, Barczyński M, Włodyka J: Recurrent laryngeal nerve injury following thyroid surgery. *Przegl Lek* 61, 13–16 (2004)
- Otto RA, Cochran CS: Sensitivity and specificity of intraoperative recurrent laryngeal nerve stimulation in predicting postoperative nerve paralysis. *Ann Otol Rhinol Laryngol* 111, 1005–1007 (2002)
- Robertson ML, Steward DL, Gluckman JL, Welge J: Continuous laryngeal nerve integrity monitoring during thyroidectomy: Does it reduce risk of injury? *Otolaryngol Head Neck Surg* 131, 596–600 (2004)
- Debry C, Schmitt E, Senechal G, Silisté CD, Quevauvilliers J, Renou G: Analysis of complications of thyroid surgery: Recurrent paralysis et hypoparathyroidism. On a series of 588 cases. *Ann Otolaryngol Chir Cervicofac* 112, 211–217 (1995)
- Glinoe D, Andry G, Chantrain G, Samil N: Clinical aspects of early and late hypocalcaemia after thyroid surgery. *Eur J Surg Oncol* 26, 571–577 (2000)
- Huang SM, Lee CH, Chou FF, Liaw KY, Wu TC: Characteristics of thyroidectomy in Taiwan. *J Formos Med Assoc* 104, 6–11 (2005)
- Acun Z, Cihan A, Ulukent SC, Comert M, Ucan B, Cakmak GK, Cesur A: A randomized prospective study of complications between general surgery residents and attending surgeons in near-total thyroidectomies. *Surg Today* 34, 997–1001 (2004)