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Review Article

**COMPLICATION OF THYROID SURGERY: SYSTEMATIC
REVIEW IN LITERATURE****Othman Ali Aldhewaile ^{1*}, Amer Fayah Alotaibi ², Bodoor Salmi Almotairi ³, Elham Ali Alqahtani⁴, Hazem Ahmad Alshikh⁵, Jawad Hamad Alnaqaa⁶, Hassan Abdulkareem Al-Abbad⁷, Fatimah Jaffar Ghawwas ⁸, Abdulaziz Saad Alharthi ⁹, Amirah Salem Alatawi ⁹**¹ Université De Rouen, Rouen , France² Batterjee Medical College, Jeddah, Saudi Arabia³ Taibah University, Almadinah Almanwarh, Saudi Arabia⁴ King Khalid University, Abha, Saudi Arabia⁵ Almaarefa University, Riyadh, Saudi Arabia⁶ Alkharj Armed Forces Hospitals, Alkharj, Saudi Arabia⁷ King Faisal University, Hofuf, Saudi Arabia⁸ Abqaiq General Hospital, Abqaiq, Saudi Arabia⁹ Tabuk University, Tabuk, Saudi Arabia**Abstract:**

This review is aiming to discuss the complication of thyroid surgery. The present review was conducted by searching in Medline, Embase, and Web of Science, Science Direct, BMJ journal and Google Scholar for, researches, review articles and reports, published over the past years. Books published on complication of thyroid surgery. If several studies had similar findings, we randomly selected one or two to avoid repetitive results. On the basis of findings and results this review found the new ranking system significantly correlated with complexity of surgery ($P < 0.0001$) as well as with the length of the hospital stay ($P < 0.0001$). The average incidence of temporary RLNP after thyroid operations is 9.8% and the incidence of permanent RLNP is 2.3%. There was no significant increased risk of permanent hypocalcemia or temporary or permanent vocal cord palsy when a central neck dissection was performed in addition to a thyroidectomy. After thyroidectomy, re-bleeding occurred in 2.1% and was associated with older age and male gender. Postoperative infection occurred in 1.6% and associated with lymph node operation. Postoperative unilateral paresis of the recurrent laryngeal nerve was diagnosed 3.9% and bilateral paresis in 0.2%.

Keywords: Total Thyroidectomy Subtotal Thyroidectomy, thyroid surgery**Corresponding author:**

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INTRODUCTION:

A thyroid surgery is an operation that involves the surgical removal of all or part of the thyroid gland. General, Endocrine or Head and Neck Surgeons often perform a thyroidectomy when a patient has thyroid cancer or some other condition of the thyroid gland (such as hyperthyroidism) or goiter. Other indications for surgery include cosmetic (very enlarged thyroid), or symptomatic obstruction (causing difficulties in swallowing or breathing). Thyroidectomy is a common surgical procedure that has several potential complications or sequelae including: temporary or permanent change in voice, temporary or permanently low calcium, need for lifelong thyroid hormone replacement, bleeding, infection, and the remote possibility of airway obstruction due to bilateral vocal cord paralysis. Complications are uncommon when the procedure is performed by an experienced surgeon.¹ The thyroid produces several hormones, such as thyroxine (T4), triiodothyronine (T3), and calcitonin. After the removal of a thyroid, patients usually take a prescribed oral synthetic thyroid hormone—levothyroxine (Synthroid)—to prevent hypothyroidism.²

A "thyroidectomy" should not be confused with a "thyroidotomy" ("thyrotomy"), which is a cutting into (-otomy) the thyroid, not a removal (-ectomy) of it. A thyroidotomy can be performed to get access for a median laryngotomy, or to perform a biopsy. (Although technically a biopsy involves removing some tissue, it is more frequently categorized as an -otomy than an -ectomy because the volume of tissue removed is minuscule.³

Traditionally, the thyroid has been removed through a neck incision that leaves a permanent scar. More recently, minimally invasive and "scarless" approaches such as transoral thyroidectomy have become popular in some parts of the world.

METHODS:

The present review was conducted Jan 2019 in accordance with the preferred reporting items for systematic reviews and meta-analyses (PRISMA) declaration standards for systematic reviews. We reviewed all the topics on Complication of thyroid surgery. To achieve this goal, we searched Medline, EMBASE, Web of Science, Science Direct, and Google Scholar for, researches, review articles and reports, published over the past 15 years. Books published on Complication of thyroid surgery. Our search was completed without language restrictions. Then we extracted data on study year, study design, and key outcome of Complication of thyroid surgery. The selected studies were summarized and

unreproducible studies were excluded. Selected data are shown in the Table 1.

Inclusion criteria

We included studies of consecutive patients representative of the thyroid surgery population. We only included randomized controlled trials in this study. The participants were adults who had undergone thyroid surgery.

Exclusion criteria

thyroid fine needle biopsy populations, and furthermore, it is outside the scope of this review .

Data extraction and analysis

Information relating to each of the systematic review elements was extracted from the studies and collated in qualitative tables. Direct analysis of the studies of complication of thyroid surgery is done with extreme caution, as different sampling techniques can provide bias as an overview of the assemblage.

RESULTS:

We compared the incidence of one or more complications occurred in 16.4% of the patients in the cohort. Grade I complications were recorded in 7.4%, grade II in 4.2%, grade IIIa in 0.8%, grade IIIb in 4.0%, grade IVa complications in 1.6%, and grade IVb in 0.7% of patients. The mortality rate (grade V complications) was 1.2%. Until 2000, there was no policy for early discharge in our hospital, and therefore the length of stay was possibly still a good marker of outcome. We therefore correlated the new grading system with the length of stay in this cohort of patients. The classification of complications (grades I–IV) significantly correlated with the duration of the hospital stay ($P < 0.0001$, Spearman rank correlation test). Median length of hospitalization in patients without complication was 7 days (range 1–28). Hospital stay in patients with complications was, respectively, 14 days (range 1–44 days) when patients developed grade I complications only, 17 days (range 1–68 days) in those with grade II, 20 days (range 5–59 days) in presence of grade IIIa, 23 days (range 4–137 days) in grade IIIb, 26 days (2–74 days) in grade IVa, and finally, 53 days (14–175 days) in grade IVb complications. Length of hospitalization of patients who died due to a complication (grade V) was 18 days (1–81 days). A strong correlation was also found between the complexity of surgery.⁴

A systematic review was undertaken which included 27 articles and 25,000 patients. The average incidence of temporary RLNP after thyroid operations is 9.8% and the incidence of permanent RLNP is 2.3%. The

RLNP rate varied according to the method of examining the larynx and ranged from 26% to 2.3%. Most of the reviewed studies recommend a follow-up period up to 1 year to assess and evaluate RLNP.⁵ Five studies with a total of 1,132 patients were included. For every 7.7 central neck dissections performed with thyroidectomy, there was one extra case of temporary hypocalcemia when compared to thyroidectomy alone. There was no significant increased risk of permanent hypocalcemia or temporary or permanent vocal cord palsy when a central neck dissection was performed in addition to a thyroidectomy.⁶

Postoperative data from 14,934 patients subjected to a follow-up of 5 years. Among them, 3130 (20.9%) underwent total lobectomy (TL), 9599 (64.3%) total thyroidectomy (TT), 1448 (9.7%) subtotal thyroidectomy with a monolateral remnant (MRST), and 757 (5.1%) subtotal thyroidectomy with bilateral remnants (BRST). A total of 6% of the patients had already been operated on. Persistent hypoparathyroidism occurred after 1.7% of all the operations, and temporary hypoparathyroidism was noted in 8.3%. Permanent palsy of the laryngeal

recurrent nerve (LRN) occurred in 1.0% of patients, transient palsy in 2.0%, and diplegia in 0.4%. The superior laryngeal nerve was damaged in 3.7%; dysphagia occurred in 1.4% of cases, hemorrhage in 1.2%, and wound infection in 0.3%. No deaths were reported. A significant rate of LRN damage was noted, which has an important impact on the patient's social life.⁷

After thyroidectomy, re-bleeding occurred in 2.1% and was associated with older age (OR 1.04; $p < 0.0001$) and male gender (OR 1.90; $p = 0.014$). Postoperative infection occurred in 1.6% and associated with lymph node operation (OR 8.18; $p < 0.0001$). Postoperative unilateral paresis of the recurrent laryngeal nerve was diagnosed 3.9% and bilateral paresis in 0.2%. Unilateral paresis was associated with older age, intrathoracic goiter, thyrotoxicosis, and if routine laryngoscopy was practiced (OR 1.92; $p = 0.0002$). After 6 months, the incidence of nerve paresis was 0.97%. After bilateral thyroid surgery ($n = 1,648$), hypocalcaemia treated with vitamin D analogue occurred in 9.9% of the patients at the first follow-up and in 4.4% after 6 months.⁸

Table (1) Results from Sequencing Studies.

Authors	Design	Population	Main Results
Daniel et al (2004) ⁴	Cohort	6336 patients who underwent elective general surgery	The new ranking system significantly correlated with complexity of surgery ($P < 0.0001$) as well as with the length of the hospital stay ($P < 0.0001$). A total of 144 surgeons from 10 different centers around the world and at different levels of training returned the survey. Ninety percent of the case presentations were correctly graded. The classification was considered to be simple (92% of the respondents), reproducible (91%), logical (92%), useful (90%), and comprehensive (89%). The answers of both questionnaires were not dependent on the origin of the reply and the level of training of the surgeons.
Jeannon et al (2009) ⁵	A systematic review was undertaken	27 articles and 25,000 patients.	The average incidence of temporary RLNP after thyroid operations is 9.8% and the incidence of permanent RLNP is 2.3%. The RLNP rate varied according to the method of examining the larynx and ranged from 26% to 2.3%. Most of the reviewed studies recommend a follow-up period up to 1 year to assess and evaluate RLNP.

Edward et al (2009)⁶	Systematic review and meta-analysis.	Five studies with a total of 1,132 patients were included.	For every 7.7 central neck dissections performed with thyroidectomy, there was one extra case of temporary hypocalcemia when compared to thyroidectomy alone. There was no significant increased risk of permanent hypocalcemia or temporary or permanent vocal cord palsy when a central neck dissection was performed in addition to a thyroidectomy.
Lodovico et al (2004)⁷	case studies and follow-up data	14,934 patients subjected to a follow-up of 5 years	Among them, 3130 (20.9%) underwent total lobectomy (TL), 9599 (64.3%) total thyroidectomy (TT), 1448 (9.7%) subtotal thyroidectomy with a monolateral remnant (MRST), and 757 (5.1%) subtotal thyroidectomy with bilateral remnants (BRST). A total of 6% of the patients had already been operated on. Persistent hypoparathyroidism occurred after 1.7% of all the operations, and temporary hypoparathyroidism was noted in 8.3%. Permanent palsy of the laryngeal recurrent nerve (LRN) occurred in 1.0% of patients, transient palsy in 2.0%, and diplegia in 0.4%. The superior laryngeal nerve was damaged in 3.7%; dysphagia occurred in 1.4% of cases, hemorrhage in 1.2%, and wound infection in 0.3%. No deaths were reported. A significant rate of LRN damage was noted, which has an important impact on the patient's social life.
Bergenfelz et al (2008)⁸	From 2004 to 2006, 26 Scandinavian Departments registered a database.	3,660 thyroid operations in a database	After thyroidectomy, re-bleeding occurred in 2.1% and was associated with older age (OR 1.04; $p < 0.0001$) and male gender (OR 1.90; $p = 0.014$). Postoperative infection occurred in 1.6% and associated with lymph node operation (OR 8.18; $p < 0.0001$). Postoperative unilateral paresis of the recurrent laryngeal nerve was diagnosed 3.9% and bilateral paresis in 0.2%. Unilateral paresis was associated with older age, intrathoracic goiter, thyreotoxicosis, and if routine laryngoscopy was practiced (OR 1.92; $p = 0.0002$). After 6 months, the incidence of nerve paresis was 0.97%. After bilateral thyroid surgery ($n = 1,648$), hypocalcaemia treated with vitamin D analogue occurred in 9.9% of the patients at the first follow-up and in 4.4% after 6 months.

DISCUSSION:

The ranking of complications by severity depends on the perspective considered. A classification integrating medical, payer, and patient perspectives is not feasible, as correlation between these different perspectives is poor. This approach is particularly important in retrospective studies where postoperative problems are often poorly reported, whereas the therapy to treat a complication is well documented in both physician and nursing reports. The benefits of prophylactic central neck dissection in differentiated thyroid carcinoma may be debated but there is no increased permanent morbidity by performing the procedure at the same time as

thyroidectomy.

Hypoparathyroidism after total thyroidectomy is an important complication that can be successfully treated by therapy, although it is not always easily managed in special circumstances such as in young persons or pregnant women. The complications associated with thyroid surgery must be kept in mind so the surgeon can carefully evaluate the surgical and medical therapeutic options, have more precise surgical indications, and be able to give the patient adequate information. Complications to thyroid surgery are not uncommon. The high frequency of

hypocalcaemia treated with vitamin D after 6 months is a cause of concern.⁹

CONCLUSIONS:

We conclude that the proposed morbidity scale based on the therapeutic consequences of complications constitutes a simple, objective, and reproducible approach for comprehensive surgical outcome assessment. Different methods are used to diagnose RLNP and that a wide variety of reported RLNP rates exist. We propose establishment of a 'gold standard' for assessing the voice after thyroidectomy to reduce reporting bias.

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