

Complications of Total, Near Total and Subtotal Thyroidectomy in Saudi Arabia: Review Article

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Abstract

Thyroidectomy is a surgical practice that is accomplished for the treatment of many thyroid ailments in which we remove the thyroid gland. In this review, we were looking into the history and complications of thyroidectomy. The review is a comprehensive research of PUBMED since and EBSCO Information Services. Topics concerning complications of the total, near whole, and subtotal thyroidectomy were used in the making of the article. Post-operative problems reduced as the surgeons' skills increase. So, total thyroidectomy is nowadays broadly established for managing thyroid disorders, whether it was benign or malignant. Our data also suggest the presence of increased risk for malignancy among patients with benign thyroid conditions, although the risk is low. In such patients, total thyroidectomy offers definite management of thyroid cancer. No substantial discrepancy in the acute postoperative complications in total and subtotal thyroidectomy. However, in the total thyroidectomy, we avoid the problem of recurrence of the disorder and reoperation and prevent any following possibility of malignant changes, as the thyroid is removed.

Keywords: thyroidectomy, total thyroidectomy, near-total thyroidectomy, subtotal thyroidectomy, complications

INTRODUCTION

The thyroid gland is an endocrine small gland that secretes hormones that control numerous body metabolic activities [1-5]. Recently, the prevalence of thyroid ailments, and thyroid tumors, has been rapidly increased. Thyroid disorders were classified into benign and malignant conditions. The commonest benign disorder is thyroiditis (commonly Hashimoto disease), goiter, thyroid adenoma, and so on [6].

Surgical management is applied when all other management options failed, and signifies a final treatment, as the causes of surgical treatment are numerous [7]. Recent thyroid surgery, which we know nowadays, started in the 1860s [8]. Thyroidectomy treats many thyroid disorders. But total thyroidectomy is considered a dangerous procedure and carries numerous postoperative complications [6]. The most important complications are recurrent laryngeal nerve injury (RLN) palsy, transitory hypocalcemia, long-lasting hypocalcemia, and wound complications like hematoma, and infection. Nevertheless, new developments in surgical procedures must decrease the frequency of the complication [9].

A randomized prospective study was carried out to evaluate the advantages of total thyroidectomy in benign thyroid conditions reported that the majority of the cases were adult females, total thyroidectomy was done for 116 cases, most of them were multinodular goiter. Postoperative hypocalcemia was found in 16.37%, wound infection in 2.58%, and the

development of seroma in 2.58%. no cases of hematoma or RLN palsy was reported. Incidental malignancy was found in 11.20% of cases [10].

Another previous study conducted to assess the benefit of complete thyroidectomy for thyroid conditions and summarize the management practice in a less-developed area reported that in 4632 cases experienced total thyroidectomy for prime surgical dealing and 189 cases with a history of incomplete thyroidectomy. There was 56.2 % of cases had a multinodular goiter, of home 12.2% were thyrotoxic. Graves' disease and Hashimoto's disease in 2.8 and 7.2 % correspondingly. The incidence of lasting problems of primary and repeated operations was 0.35 and 7.41 %, correspondingly. Through surgery, 945 cases experienced parathyroid auto-transplantation [11].

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Objective:

The purpose of this review was to explore the complications of the total, near-total and subtotal thyroidectomy in Saudi Arabia

METHODS AND MATERIALS

Sample & study groups

PubMed and EBSCO Information Services were chosen as the search databases for the publications used within the study, as they are high-quality sources. Topics concerning complications of the total, near-total, and subtotal thyroidectomy was used in the making of the article. Restriction to the English language due to unavailable resources for translation was used. The founded articles were screened by titles and reviewing the abstracts. References list of each included study will be searched for further supportive data.

Inclusion criteria: the articles were selected based on the relevance to the project which should include one of the following topics; complications of the total, near-total and subtotal thyroidectomy in Saudi Arabia, epidemiology of total, near-total and subtotal thyroidectomy in Saudi Arabia, and risks of thyroidectomy in Saudi Arabia.

Exclusion criteria: all other articles which did not have one of these topics as their primary end of repeated studies, and review studies have been excluded.

Statistical analysis

No software was utilized to analyze the data. The was reviewed by the group members to determine the initial findings. Double revision of each member's outcomes was applied to ensure the validity and minimize the mistakes.

History of Thyroidectomy:

Around 2700 BC, 'goiter' was valued in China, and as first as 1600 BC, the Chinese recycled burnt scrubber and seaweed in the treatment of goiters. Pliny the Elder noted goiter epidemics in the Alps similarly stated its use [12].

Exophthalmic goiter was primarily selected by Caleb Hiltier Parry of Bath in 1768 in his write-up in 'Enlargement of the Thyroid Gland in Connection with Enlargement or Palpitation of the Heart' One of thyroid surgery's first situations arises in the seventh century as a traditional Byzantine surgeon, Paul of Aegina, defined struma and its procedure, but it is not sure whether what was struma regarding him was a goiter of the current day. In the middle ages, surgery was invigorated with the hard work of Guy de Chauliac and others. They benefit from the experiences of Albucasis and Roger Frugardii, nonetheless, there were no mentions of the thyroid operations accomplished by them. In 1791, Pierre Joseph Desault accomplished a milestone in thyroid operations by accomplishing the first subtotal thyroidectomy [13, 14].

Surgeons as Dupuytren in 1808, William Blizard in 1811, or Henry Earle in 1823 tracked him carefully. Surgery proceeded extra with new approaches of prophylaxis from wound infection, by methods like using carbolic acid in sterilization by Joseph Lister of Glasgow in 1867. By using different approaches of sterilization and hemostasis between 1877 to 1881, Billroth achieved 48 thyroidectomies decreases the death rate to 8.3 %. By 1895, the death rate upgraded to around 1 %. In 1909, Kocher has gifted the Nobel Prize for his effort in the development of thyroid surgical procedures [15, 16].

In 1923, Plummer issued outcomes of the 600 thyrotoxicosis cases, he treated them surgically by Lugol's iodine in the preoperative period. He established that the operational death rate has fallen from 4 to 1 % by using Lugol's iodine [17].

Laterally with developments in other restraints of medical science, viz., anesthesia, physiology, and radiology, surgical management of thyroid disorders enhanced considerably. Till 2002, thyroid cancers were reflected inappropriate for endoscopic operations, nonetheless formerly, Miccoli et al. revealed his successions of endoscopic surgery done in papillary thyroid cancer patients [18].

Complications of Thyroidectomy:

Total thyroidectomy: Historically, the risks related to major surgical procedures for handling thyroid illnesses and the complications of insufficient hormonal alternatives has discouraged surgeons from carrying out complete thyroidectomies. Most surgeons avoid the procedure due to the likely complications like lasting recurrent laryngeal nerve paralysis and long-lasting hypoparathyroidism [19, 20]. The chief complications after thyroid operations comprise hoarseness of voice caused by RLN paralysis, hypocalcemia, and bleeding after the operation.

Total thyroidectomy is well accepted as the treatment for well-differentiated thyroid carcinoma. This approach has also been indicated for patients with hyperthyroidism, especially in patients who have nodules with suspicious cytology. In huge goiter is with pressure symptoms or in cases of unlikely to consent a wholly regular thyroid residue tissue due to the site of its possible nodules, total thyroidectomy is also recommended [21].

Hypoparathyroidism is a common problem of thyroid surgery. In a total thyroidectomy, all the soft tissue of the thyroid gland is detached. Because the danger of hypoparathyroidism is augmented in total thyroidectomy as the parathyroid glands may completely be removed by surgeon mistake. Thus, operations as a total thyroidectomy that comprises great risk necessitate super skills, operating teaching, and expertise to diminish the related complications [22].

In a previous study conducted by Pradeep et al., occurrences of complications of thyroidectomy were transitory

hypocalcemia (24%), everlasting hypocalcemia (3%), and everlasting vocal cord paralysis (1%)^[22].

The occurrence of postoperative hypocalcemia after thyroidectomy whether impermanent or everlasting ranges between 0% and 83%, mainly in cases submitted to total thyroidectomy for malignancy (28%) and in cases of subtotal thyroidectomy due to thyrotoxicosis (23%). On the other hand, the rate of hypocalcemia lower in cases of subtotal thyroidectomy due to additional diseases (1.5%) and (0%) in lobectomy^[23].

In a previous study conducted by Veyseller *et al.*^[24] on total thyroidectomy technique, the occurrence of postoperative perpetual hypocalcemia and everlasting RLN paralysis were 0.6 and 1.86 % while we had no patients with these problems. Similar, Bauer *et al.*^[25] revealed that while the level of total problems is greater for cases submitted to total thyroidectomy procedure, the frequency of perpetual complications in these cases is comparable to those submitted to one-sided resection. The efficacy of FNA in multi-nodular goiter is debated.

Signs and symptoms of hypocalcemia are paresthesia, numbness around the mouth and fingertips, tetany, carpopedal spasm, positive Chvostek's sign, positive Trousseau's sign, convulsion, laryngospasm, prolonged QT interval on the electrocardiogram, coma, and death. Hypocalcemia has mostly occurred on the first and second days postoperatively and utmost surgeons take successive serum calcium quantities postoperative to identify and accomplish properly the small levels of calcium^[26]. Suwannasarn *et al.* stated instantaneous hypocalcemia was detected in 38.5% of cases^[27].

Again, primary postoperative hypocalcemia was found in 42% in Seo *et al.*^[28].

Additional impediments in this study were voice hoarseness, dysphagia to solids, hematoma, and infection of the wound site. Additionally, preceding studies have stated RLN damage, temporary hypocalcemia, and hypoparathyroidism were communal problems of thyroidectomy, though additional complications like cellulitis, infection, and carotid artery injuries, jugular vein, and esophagus injuries were rare. It was deliberated that the occurrence of postoperative complications could be affected by the degree of surgical procedure and the skills of the physician^[29, 30].

Subtotal thyroidectomy: Bilateral subtotal thyroidectomy has been recommended as the preferred surgical treatment for multinodular goiter, and it was claimed that total thyroidectomy added an unnecessary risk of complications to patients with BMNG^[31].

The drawbacks of subtotal thyroidectomy to manage multinodular goiter are that the technique does not decrease the danger of persevering symptoms and there is a great

relapse rate (30%–50%) due to gland fragments, even under conquest hormonal therapy with L-thyroxine. Ailment return typically needs a recurrent operation, which significantly upsurges the risk (up to 20 times) of injury to parathyroid glands and laryngeal nerves^[20]. Subtotal thyroidectomy in cases with BMNG causes the second operation for reappearance in 13–20% of cases, attainment a top frequency 13 years afterward the prime surgery^[32]. Subtotal thyroidectomy lets a reasonable degree for malicious conversion, while in TT it does not. The presence of malignant tumors in residual tissue has not yet been extensively studied. Some reports suggest that cancer will occur in 22% of patients who initially had benign lesions^[33].

Hypoparathyroidism is likewise reflected as a common complication connected to thyroid surgery. In a subtotal thyroidectomy, the physician does not work close to the recurrent laryngeal nerve^[22].

However, it is broadly stated that in continuing follow-up afterward subtotal thyroidectomy in multinodular disease, a growing reappearance frequency of up to 78% must be anticipated. For the time being, additional surgery for recurring nodules is fine supposed to cause a rise in the probability of laryngeal nerve and parathyroid injury, more than the preliminary method^[34].

Partial thyroidectomy: The risk of recurrence after partial thyroidectomy for MNG can be as high as 60%^[35], but even the frequently discussed levels of 15%–30% are quite alarming. The comparatively greater frequency of achievement of thyroidectomy and the related high frequency of complications is a further quarrel supporting the performance of total thyroidectomy in MNG. The most alarming fact is the appearance of malignant neoplasms in the remaining tissue.

CONCLUSION:

Complication rates are reduced when the surgeons' skills increase. So, total thyroidectomy is nowadays broadly acknowledged for the treatment of cancers and benign thyroid disorders. Our documents also suggest that there is an increased risk for malignancy among patients with benign thyroid conditions, although the risk is low.

In such patients, total thyroidectomy offers definite management of thyroid cancer. There is no important difference concerning the acute postoperative complications of total thyroidectomy in comparison to sub-total thyroidectomy. Though, total thyroidectomy has the benefit of evading the hazard of recurrence and secondary operation and removes any consequent risk of malignant transformation in emitted thyroid glands.

REFERENCES

1. Kochupillai N. Clinical endocrinology in India. *Current Science*. 2000;79(8):1061–1067.
2. El-Kordy M, Attia SG, Anwar HW, Mohamed IA, Elgamel ER, Shalamesh MI, Moghazy AB, Elewasy EA. Lateral backdoor approach versus conventional anterior approach in recurrent Thyroid surgery. *J. Adv. Pharm. Educ. Res.* 2019;9(1):6-10.
3. Abbas MA, El Badrey SM, ElDeeb AM, Sayed AM. Effect of aerobic exercises on the thyroid hormones in treated hypothyroid pregnant women. *J. Adv. Pharm. Educ. Res.* 2019;9(4):49-53
4. Tadayon S, Raisi Dehkordi Z, Jafarzadeh L. Study of the effect of secondhand smoke exposure on level of maternal thyroid hormones by women's self-report and urinary cotinine level at delivery. *Int. J. Pharm. Phytopharm. Res.* 2018;8(5): 53-58.
5. Al-Maathidy A, Alzyoud JA, Al-Dalaen S, Al-Qtaitat A. Histological alterations in the Thyroid Follicular cells induced by lead acetate toxicity in adult male albino rats. *Int. J. Pharm. Phytopharm. Res.* 2019;9(5):19-26.
6. Bellantone R, Lombardi CP, Bossola M, Boscherini M, De Crea C, Alesina P, Traini E, Princi P, Raffaelli M. Total thyroidectomy for management of benign thyroid disease: review of 526 cases. *World journal of surgery*. 2002 Dec 1;26(12):1468-71. doi: 10.1007/s00268-002-6426-1. Halsted WS: The operative story of goitre. *Johns Hopkins Hosp Rep* 19:71, 1920.
7. Witte J, Goretzki PE, Dotzenrath C, Simon D, Felis P, Neubauer M, Röher HD. Surgery for Graves' disease: total versus subtotal thyroidectomy—results of a prospective randomized trial. *World journal of surgery*. 2000 Nov 1;24(11):1303-11. doi: 10.1007/s002680010216
8. Halsted WS: The operative story of goitre. *Johns Hopkins Hosp Rep* 19:71, 1920.
9. Sena G, Gallo G, Innaro N, Laquatra N, Tolone M, Sacco R, Sammarco G. Total thyroidectomy vs completion thyroidectomy for thyroid nodules with indeterminate cytology/follicular proliferation: a single-centre experience. *BMC surgery*. 2019 Dec;19(1):87. Published 2019 Jul 10. doi:10.1186/s12893-019-0552-2
10. Gangappa RB, Kenchannavar MB, Chowdary PB, Patanki AM, Ishwar M. Total Thyroidectomy for Benign Thyroid Diseases: What is the Price to be Paid?. *J Clin Diagn Res*. 2016;10(6): PC04–PC7. doi:10.7860/JCDR/2016/18733.7991
11. Hu J, Zhao N, Kong R, Wang D, Sun B, Wu L. Total thyroidectomy as primary surgical management for thyroid disease: surgical therapy experience from 5559 thyroidectomies in a less-developed region. *World J Surg Oncol*. 2016;14(1):20. Published 2016 Jan 22. doi:10.1186/s12957-016-0772-1.
12. O'Malley CD. Leonardo on the human body. New York: Dover; 1925.
13. Parry CH. Collections from the unpublished papers of the late Caleb Hillier Parry. London: Underwood Fleetstreet Press; 1825.
14. Von Basedow CA. Exophthalmus durch Hypertrophie des Zellgewebes in der Augenhöhle. *Wschr ges Heilk*. 1840;6:197–220.
15. Dorairajan N, Pradeep PV. Vignette thyroid surgery: a glimpse into its history. *Int Surg*. 2013;98(1):70-75. doi:10.9738/CC185.1.
16. Becker WF. Presidential address: pioneers in thyroid surgery. *Ann Surg*. 1977;185:493–504. doi: 10.1097/0000658-197705000-00001
17. Plummer HS. Results of administering iodine to patients having exophthalmic goiter. *JAMA*. 1923;80:1955.
18. Miccoli P, Elisei R, Materazzi G, Capezzone M, Galleri D, Pacini F, Berti P, Pinchera A. Minimally invasive video-assisted thyroidectomy for papillary carcinoma: a prospective study of its completeness. *Surgery*. 2002 Dec 1;132(6):1070-4. doi: 10.1067/msy.2002.128694.
19. Gough IR, Wilkinson D. Total thyroidectomy for management of thyroid disease. *World J Surg* 2000;24:962-5.
20. Bellantone R, Lombardi CP, Bossola M, Boscherini M, De Crea C, Alesina P, Traini E, Princi P, Raffaelli M. Total thyroidectomy for management of benign thyroid disease: review of 526 cases. *World journal of surgery*. 2002 Dec 1;26(12):1468-71.
21. Liu Q, Djuricin G, Prinz RA. Total thyroidectomy for benign thyroid disease. *Surgery*, 1998; 123:2–7
22. Padur AA, Kumar N, Guru A, Badagabettu SN, Shanthakumar SR, Virupakshamurthy MB, Patil J. Safety and effectiveness of total thyroidectomy and its comparison with subtotal thyroidectomy and other thyroid surgeries: a systematic review. *Journal of thyroid research*. 2016 Jan 1;2016. doi:10.1155/2016/7594615
23. Thomusch O., Machens A., Sekulla C., Ukkat J., Brauckhoff M., Dralle H. The impact of surgical technique on postoperative hypoparathyroidism in bilateral thyroid surgery: a multivariate analysis of 5846 consecutive patients. *Surgery*. 2003;133(2):180–185. doi: 10.1067/msy.2003.61.
24. Veyseller B, Aksoy F, Demirhan H, Yildirim YS, Ertaş B, Açikalin RM, Kumral TL, Bayraktar Gİ. Total thyroidectomy in benign thyroid diseases. *Kulak burun bogaz ihtisas dergisi: KBB= Journal of ear, nose, and throat*. 2009;19(6):299.
25. Bauer P, Murray S, Clark N, Pontes DS, Sippel RS, Chen H. Unilateral thyroidectomy for the treatment of benign multinodular goiter. *J Surg Res*. 2013;184(1):514–518. doi: 10.1016/j.jss.2013.04.045.
26. Reeve T, Thompson NW. Complications of thyroid surgery: How to avoid them, how to manage them, and observations on their possible effect on the whole patient. *World J Surg*. 2000;24:971–5.
27. Suwannasarn M, Jongjaroenprasert W, Chayangsu P, Suvikapakornkul R, Sriphrapradang C. Single measurement of intact parathyroid hormone after thyroidectomy can predict transient and permanent hypoparathyroidism: A prospective study. *Asian J Surg*. 2017;40:350–6.
28. Seo ST, Chang JW, Jin J, Lim YC, Rha KS, Koo BS. Transient and permanent hypocalcemia after total thyroidectomy: Early predictive factors and long-term follow-up results. *Surgery*. 2015;158:1492–9.
29. Berri T, Houari R. Complications of thyroidectomy for large goiter. *Pan Afr Med J*. 2013;16:138.
30. Kandil E, Noureldine SI, Abbas A, Tufano RP. The impact of surgical volume on patient outcomes following thyroid surgery. *Surgery*. 2013;154:1346–52.
31. Anderson PE, Hurley PR, Rosswick P. Conservative treatment and long term prophylactic thyroxine in the prevention of recurrence of multinodular goiter. *Surg Gynecol Obstet*, 1990; 171:309–314.
32. Delbridge L, Guinea AI, Reeve TS. Total thyroidectomy for bilateral benign multinodular goiter: effect of changing practice. *Arch Surg*. 1999; 134:1389–1393
33. Levin KE, Clark AH, Duh QY, Demeure M, Siperstein AE, Clark OH. Reoperative thyroid surgery. *Surgery*. 1992 Jun;111(6):604.
34. Miccoli P, Antonelli A, Iacconi P, Alberti B, Gambuzza C, Baschieri L. Prospective, randomized, double-blind study about effectiveness of levothyroxine suppressive therapy in prevention of recurrence after operation: result at the third year of follow-up. *Surgery*. 1993;114(6):1097–1101.
35. Liu Q, Djuricin G, Prinz RA. Total thyroidectomy for benign thyroid disease. *Surgery*, 1998; 123:2–7.