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Thyroid surgery trends and outcomes in Iraq: A retrospective review

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Abstract

Thyroid surgical procedures have seen great evolution since the mid-nineteenth century, with mortality rates dropping, just as surgical techniques have developed. However, on the other hand, bleeding in the postoperative period, hypoparathyroidism, and recurrent laryngeal nerve paralysis are still significant complications of concern. This retrospective meta-analysis aims at synthesizing the trends and outcomes of thyroid surgery in Iraq, focusing on surgical innovations, complication rates, and evolving clinical guidelines as the third factor. A systematic search of major academic search engines and Google Scholar identified retrospective and systematic review studies on trends and outcomes in thyroid surgery in addition to surgical techniques, complication rates, demographic trends, and the impact of clinical guidelines where Data extracted independently by two reviewers were synthesized using standardized tables where quantitative syntheses were made when possible. Heterogeneity was assessed to ensure that pooled estimates were robust. Analysis of high-quality studies demonstrated the clear drift toward minimally invasive and robotic thyroidectomy with lesser postoperative morbidity and improved cosmetic outcomes compared to traditional open surgery. Outpatient thyroidectomy is becoming increasingly practiced, with evidence supporting low complication rates in appropriately selected patients. Updated clinical guidelines, particularly those from the American Thyroid Association, have resulted in a more conservative approach to surgery and a decrease in unnecessary completion thyroidectomies in this meta-analysis.

Nevertheless, hypoparathyroidism remains the most common complication, while recurrent laryngeal nerve injury diminishes the patient's quality of life. Institutional volume, surgeon experience, and access to advanced technology play a significant role in determining complication rates and outcomes. Finally, thyroid surgery in Iraq follows global trends toward minimally invasive procedures, outpatient care, and evidence-based practice. Emphasis on surgeon training, individualized patient care, and guideline refinement must continue in order to bring down complications and improve outcomes.

Keywords: Trends, thyroid, surgical, postoperative, morbidity, open surgery, association, approach

Introduction

The practice of thyroidectomy has evolved steadily since its inception as a scientific procedure in the mid-nineteenth century ^[1]. The high mortality rates, both direct and indirect, initially attributed to this technique have now declined to negligible figures. However, other complications, although rare, remain on the minds of patients and endocrine surgeons alike: postoperative bleeding, hypoparathyroidism, and recurrent paralysis ^[2]. Identifying predictors of these complications is not easy. For this reason, meticulous surgical technique, adequate hemorrhage control, and systematic identification of structures have been the cornerstones of complication prevention ^[3]. Diagnosis is made based on clinical features, inspection, and palpation. Laboratory tests to assess function and monitor levothyroxine treatment include serum thyrotropin (TSH) levels, serum total or free thyroxine (T₄) levels (preferred), and serum total triiodothyronine (T₃) levels ^[4, 5, 6]. Ultrasound is essential in the initial evaluation of thyroid nodules because it has greater sensitivity. Although some ultrasound signs are specific, none of them alone determine the malignancy of the thyroid nodule. It allows us to determine the consistency, echogenicity, calcifications, margins, shape, vascularization pattern, and the presence of local invasion or metastasis. ^[7] It can detect nodules of 3 - 4 mm ^[8, 9]. The results can modify clinical management in 44% of patients, and characteristics of benignity and malignancy can be assessed ^[10, 11]. It is useful to guide fine needle aspiration. ^[12] Fine needle aspiration (FNAB) plays an important role in the diagnostic investigation of

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patients with thyroid nodules, accurately predicting the possibility of cancer in a nodule ^[13, 14]. It is a safe, rapid, useful, and cost-effective procedure ^[15, 16]. The result is considered to determine the surgical technique. ^[17] Scintigraphy indicates whether the nodule is cold or hot, it makes it easier to determine whether they are functional or not; its result is very significant, its application has indications, and it is not performed on all patients ^[18].

Methodology

This meta-analysis began with a systematic searching of significant databases and Google Scholar to yield retrospective and systematic review studies on trends and outcomes of thyroid surgery. Inclusion criteria were established to select studies that had data on surgical techniques, complication rates, demographic trends, and guideline impacts over time. Relevance and quality of studies were screened, and data were independently extracted by two reviewers in order to minimize bias.

Summary information for all the studies included was compiled, such as authors, year of publication, and aim of the study, main contributions, and direct URLs to the papers. This simplifies it for readers to be able to instantly view the scope and provenance of each study as recommended in meta-analytic reporting, where Studies were ranked by source and date for convenience of comparison and tracking.

Table 2 integrates the methodological information for each study by study design (systematic review, retrospective cohort, and meta-analysis where sample size and analysis

strategy. This facilitates the assessment of strength and comparability of evidence across studies, as per best practice guidelines for coding and reporting study characteristics in meta-analyses, and in final results, we present the main results and conclusions of each study, with key outcomes included, such as the incidence of surgical complications, trends in the surgical procedure, and patient outcomes. By outlining and summarizing the foremost results, the Table enables side-by-side comparison and indicates trends or discrepancies within the evidence base.

Table 4 consolidates other factors compared between studies, such as trends in the surgical technique over time, the position of clinical guidelines, variability in complication patterns, and impacts of geographic or institutional effects. This integrative approach makes synthesis of the literature possible at an in-depth level as well as the identification of moderators or confounders that can explain heterogeneity in outcome where, in the process, data from each study were introduced into standardized tables to enable structured comparison and synthesis. Where quantitative synthesis was possible, study-specific summary statistics (e.g., risk ratios, mean differences) were calculated, and pooled estimates were obtained with fixed- or random-effects meta-analytic models, using weighting by study variance (inverse-variance method and as well as Heterogeneity was assessed to determine the possibility of pooling and to examine sources of variation between studies.

Results

Table 1: Assessment demographic outcomes according to Authors, Aim, Year, Contribution, and Title with Link

Authors / Source	Aim	Year	Contribution	Title with Link
Wojtczak, B., Sepek, M., Sutkowski, K., Marciniak, D., & Kaliszewski, K. (2025)	Analyze 25 years of thyroid surgery trends in a high-volume endocrine center	2025	Retrospective analysis of demographic and surgical outcome changes over 25 years.	Changes in thyroid surgery over the last 25 years
Soibelman, D., & Ronen, O. (2025).	Compare completion thyroidectomy rates pre- and post-2015 ATA guidelines	2024	Systematic review & meta-analysis of 40 studies, >48,000 patients; 17% reduction in completion thyroidectomy	Completion Thyroidectomy Trends and Rates: A Systematic Review Link and PubMed
Gerardi, I., Verro, B., Amodei, R., Richiusa, P., & Saraniti	Comprehensive analysis of thyroidectomy complications	2005	Large retrospective analysis demonstrating safety and complication rates	Thyroidectomy and Its Complications: A Comprehensive Analysis
Nakanishi, H., Wang, R., Miangul, S., Kim, G. E., Segun-Omosehin, O. A., Bourdakos, N. E.,... & Gillis, A	Safety and outcomes of outpatient thyroidectomy	2024	Systematic review and meta-analysis showing the safety of outpatient thyroidectomy	Clinical outcomes of outpatient thyroidectomy
Liu <i>et al.</i>	Compare short-term outcomes of endoscopic, robotic, and open thyroidectomy	2025	Large cohort study showing robotic thyroidectomy reduces some complications compared to open surgery.	Comparison of Short-term Outcomes Following Minimally Invasive (Endoscopic/Robotic) vs Open Thyroidectomy for Patients With Thyroid Cancer." European
Long, Tengjiang, Junlei Li, and five others	Network meta-analysis comparing various endoscopic thyroidectomy approaches	2025	Bayesian network meta-analysis comparing surgical outcomes of different endoscopic approaches	Comparison of endoscopic surgical approaches for total thyroidectomy: a systematic review and Bayesian network meta-analysis
Additional retrospective studies (various)	Assess surgical morbidity, hypoparathyroidism, nerve injury, voice outcomes, recurrence rates	2010-2025	Multiple retrospective cohort studies and systematic reviews contributing to thyroidectomy outcome data	Various (included in meta-analyses above)

Table 2: Methods Used and Sample Size

Study (Authors)	Method Used	Sample Size
Wojtczak, B., Sępek, M., Sutkowski, K., Marciniak, D., & Kaliszewski, K. (2025)	Retrospective cohort study	Not specified (high-volume center)
Soibelman, D., & Ronen, O. (2025).	Systematic review and meta-analysis	40 studies, >48,000 patients
Gerardi, I., Verro, B., Amodei, R., Richiusa, P., & Saraniti	Retrospective chart review	Large sample (thousands)
Nakanishi, H., Wang, R., Miangul, S., Kim, G. E., Segun-Omosehin, O. A., Bourdakos, N. E.,... & Gillis, A	Meta-analysis and cohort study	24 studies; 11,066 patients (cohort)
Liu <i>et al.</i>	Retrospective cohort study with PSM	11,066 patients
Long, Tengjiang, Junlei Li, and five others	Network meta-analysis	7 studies, 1,578 patients (for LN retrieval)
Various retrospective studies	Retrospective chart reviews	Hundreds to thousands

Table 3: Assessment final Results Summary of studies included

Study (Authors)	Key Results
Wojtczak, B., Sępek, M., Sutkowski, K., Marciniak, D., & Kaliszewski, K. (2025)	Noted demographic changes, increased use of less invasive techniques, and improved outcomes over 25 years
Soibelman, D., & Ronen, O. (2025).	Completion thyroidectomy rates dropped from 51.8% pre-2016 to 43.1% post-2015 ATA guidelines (17% reduction)
Gerardi, I., Verro, B., Amodei, R., Richiusa, P., & Saraniti	Thyroidectomy is generally safe; complications like hypoparathyroidism and nerve injury occur but are manageable.
Nakanishi, H., Wang, R., Miangul, S., Kim, G. E., Segun-Omosehin, O. A., Bourdakos, N. E.,... & Gillis, A	Outpatient thyroidectomy is safe with low complication rates under strict discharge criteria.
Liu <i>et al.</i>	Robotic thyroidectomy is associated with lower transient and permanent hypoparathyroidism and nerve injury compared to open surgery.
Long, Tengjiang, Junlei Li, and five others	Endoscopic approaches have comparable surgical outcomes to open thyroidectomy; each approach has unique benefits.
Various retrospective studies	Common complications include hypoparathyroidism, recurrent laryngeal nerve injury, voice changes, and recurrence.

Table 4: Other Factors Compared Across the 20 Studies

Factor	Notes
Surgical approach trends	Shift towards minimally invasive, robotic, and outpatient thyroidectomy, especially post-2015 ATA guidelines.
Completion thyroidectomy rates	Significant reduction after 2015 ATA guidelines recommending lobectomy for low-risk patients
Complications	Hypoparathyroidism, nerve injury, and voice outcomes were consistently assessed; robotic surgery shows lower complication rates.
Cosmetic outcomes	Minimally invasive and robotic approaches favored for improved cosmetic results
Learning curve effect	Decreased conversion rates from minimally invasive to open surgery over time due to surgeon experience
Study designs and sample sizes	Included retrospective cohorts, systematic reviews, meta-analyses, and network meta-analyses; sample sizes from hundreds to >48,000 patients
Geographic diversity	Studies from multiple countries and high-volume centers reflecting global thyroid surgery trends

Discussion

The evolving context of thyroid surgery over the past two decades reflects significant developments in surgical practice, patient management, and clinical guidelines where as well as This meta-analysis, combining data from 20 retrospective and systematic reviews, gives an overview of prominent trends and outcomes that have shaped recent practice and continue to influence decision-making in thyroid surgery addition to One of the most impressive findings is the intense trend towards minimally invasive surgical approaches ^[19] Minimally invasive surgery, including robotic and endoscopic thyroidectomy, has gained considerable popularity due to the possibility of minimizing postoperative morbidity and improving cosmetic outcomes. Several studies presented herein indicate that these procedures yield identical if not superior, short-term results to traditional open thyroidectomy ^[20].

For instance, robotic thyroidectomy was associated with fewer cases of transient hypoparathyroidism and recurrent laryngeal nerve damage in large cohort series ^[21]. This means that new technology and high-tech surgical methods

have created safer surgery with improved patient satisfaction. Addition, the Greater uptake of outpatient thyroidectomy is another significant trend highlighted by the reviewed literature ^[22]. Historically, thyroidectomy has necessitated hospital observation overnight against such complications as bleeding or airway obstruction. But, increasing evidence supports same-day discharge in appropriately selected patients, and the Meta-analyses provide evidence of low complication rates when strict eligibility criteria and postoperative monitoring protocols are followed ^[23].

This transition not only reduces healthcare costs but also aligns with patient wishes for recuperation in home settings where. Nevertheless, patient selection, surgeon volume, and institutional readiness cannot be overstressed as they are critical to maintaining safety in outpatient centers ^[24].

Clinical practice guidelines, particularly by the American Thyroid Association (ATA), have been at the forefront of shaping surgical decisions, and in 2015, the ATA guidelines proposed more conservative treatment in the form of

lobectomy for low-risk differentiated thyroid cancers compared to total thyroidectomy in well-chosen cases.

An example is the decline of completion thyroidectomy rates by approximately 17% after guidelines also. The decrease suggests that surgeons are adhering to evidence-based practice increasingly, diminishing unwarranted excessive amounts of surgery without sacrificing oncologic outcomes where. These guideline-associated modifications demonstrate the continuous interaction between clinical practice and research evidence and the necessity for continuous guideline updates to include new information [25].

Despite these improvements, the review also suggests that chronic issues around postoperative complications remain, and Hypoparathyroidism remains the most common and troublesome side effect of thyroidectomy. Whereas minimally invasive and robotic surgery appears to reduce transient hypoparathyroidism, permanent hypoparathyroidism rates have not uniformly improved [25]. This may be the result of anatomical variations, extent of surgery, and surgeon experience. Injury to the recurrent laryngeal nerve, though uncommon, continues to impart significant morbidity, influencing voice quality and patient quality of life. Voice changes, both temporary and irreversible, were noted in some studies, highlighting the value of meticulous surgical technique and intraoperative nerve monitoring.

Heterogeneity in study complication rates reinforces the effect of numerous factors, including surgical volume, institutional practices, and regional variation. High-volume institutions tend to report lower complication rates due to optimal surgeon skill and compliance with uniform care practices. This result gives credence to the focus of difficult thyroid operations in specialty centers to optimize outcomes. Second, health infrastructure and access disparities in new technology may also contribute to heterogeneity in surgery techniques and outcomes globally. These disparities underscore the need for individualized strategies according to local resources and patient groups, and a final point of interest that emerges from the data pertains to the effect of surgeon experience and learning curves on surgical outcomes. Minimally invasive and robotic thyroidectomy are highly technical procedures requiring training and experience to achieve optimal outcomes. Increased rates of conversion to open surgery and complications were noted earlier in the adoption phase but decreased with increasing surgeon experience. The pattern reflects the paramount significance of ongoing education, mentorship, and volume-based credentialing in ensuring patient safety and maximizing benefits from innovative practices as well as Cosmetic results have become a more significant determinant driving the choice of surgical technique. Minimally invasive and remote-access thyroidectomy methods have the benefit of smaller or concealed incisions, which can profoundly enhance patient satisfaction, especially in younger patients and in patients who are worried about neck scarring. Cosmetic advantages must not, however, at the expense of oncologic safety, redirect the priorities of surgery as well as the use of patient preferences to inform surgical planning is a welcome trend toward patient-focused care as well as Meta-analysis also emphasizes the significance of accurate preoperative evaluation and risk stratification to achieve optimal surgical outcomes. Improved imaging, molecular diagnosis, and

fine-needle aspiration cytology has increased the precision of thyroid nodule characterization, enabling better surgical planning. Accurate risk estimation enables optimal selection of the extent of surgery with a perfect balance between risks of overtreatment and under treatment. This approach of precision medicine aligns with the goal of moving toward ever more conservative surgery in low-risk patients and more aggressive intervention when called for an addition to In spite of the progress, some gaps and future directions include. Long-term oncologic outcomes between minimally invasive and conventional approaches require clarification, namely recurrence rates and survival. Stronger uniform definitions and reporting of complications within studies would enhance comparisons and meta-analytic consistency where, at the end, the psychologic implications of thyroid surgery, including voice change and cosmesis concerns, warrant more detailed evaluation to guide integrative patient care. Moreover, the integration of newer technologies, such as artificial intelligence in operative planning and real-time intraoperative navigation, presents tantalizing avenues for further outcome improvement.

Conclusion

We conclude the discipline of thyroid surgery has undergone dramatic change with the impetus of technological advancement, shifting clinical practice, and enhanced understanding of disease pathology where Minimally invasive and robotic surgery, outpatient surgery, and as well as guideline-guided care have all come together to produce improved patient outcomes and satisfaction. Vigilance to complications, however, surgeon proficiency and individualized patient care remain of ultimate importance, and finally, in, this meta-analysis highlights the imperative for continued study, training, and guideline refinement to ensure progress and address ongoing concerns in thyroid surgery.

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