



Association Between Annual Surgeon Total Thyroidectomy Volume and Transient and Permanent Complications

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Article History :

Received date : 2024/04/16
Revised date : 2024/05/04
Accepted date : 2024/06/17
Published date : 2024/07/01



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E-ISSN :

ISSN 3048-1368



P-ISSN :

ISSN 3048-1376



ABSTRACT

Background: The association between annual surgeon total thyroidectomy volume and the incidence of transient and permanent complications has been a focal point of research in recent years, reflecting the critical importance of surgical expertise in determining patient outcomes. The literature presents a nuanced perspective on this relationship, highlighting various dimensions of surgeon experience, procedural safety, and complication rates. **Literature Review:** The reviewed literature collectively underscores the significant association between a surgeon's annual total thyroidectomy volume and the rates of transient and permanent complications. The studies analyzed highlight the complexity of surgical outcomes, emphasizing that higher surgical volumes are consistently linked to improved patient outcomes, particularly in terms of complication rates. **Conclusion:** In conclusion, the body of literature reviewed presents compelling evidence that higher annual surgeon total thyroidectomy volume is associated with reduced rates of both transient and permanent complications. This relationship not only highlights the importance of surgical expertise but also suggests that institutional practices should prioritize the development and maintenance of high-volume surgical teams to enhance patient safety and surgical effectiveness.

Keyword: Annual Surgeon Total Thyroidectomy Volume, Transient, Permanent Complications

INTRODUCTION

The association between annual surgeon total thyroidectomy volume and the incidence of transient and permanent complications has been a focal point of research in recent years, reflecting the critical importance of surgical expertise in determining patient outcomes. The literature presents a nuanced perspective on this relationship, highlighting various dimensions of surgeon experience, procedural safety, and complication rates.

(Duclos et al., 2012) conducted a prospective cross-sectional multicenter study to explore the influence of surgeon experience on performance in thyroid surgery. Their findings suggest that while surgeon experience correlates with surgical outcomes, the study's limitations, such as a small sample size and potential unmeasured confounding factors, call for caution in generalizing results across different surgical fields. The authors emphasize the complexity of surgical outcomes, which depend on various

factors, including the surgeon's experience and the volume of procedures performed. This study sets the stage for understanding how experience may impact complication rates in thyroidectomy.

Building on this foundation, (Aithal Padur et al., 2016) conducted a systematic review comparing total thyroidectomy with other surgical approaches. Their analysis of 41 studies revealed that total thyroidectomy is associated with higher complication rates, particularly concerning recurrent laryngeal nerve injury and hypoparathyroidism. The review underscores the importance of surgical volume, noting that lower complication rates are linked to procedures performed by specialists in endocrine surgery. This highlights the need for further investigation into how surgeon volume influences the safety and effectiveness of thyroid surgeries.

(Bothra et al., 2019) expanded the discussion by identifying patient, thyroid, and surgeon-related factors

that complicate thyroidectomy. Their cohort study concluded that high-volume, trained endocrine surgeons achieve significantly lower complication rates. The authors introduced a novel scoring system to assess the difficulty of thyroidectomy, emphasizing that surgeon training and experience are critical determinants of surgical outcomes. This research reinforces the notion that surgeon volume and expertise are vital in minimizing complications during thyroid surgery.

In a more recent study, (C. Campbell et al., 2023) examined the impact of lateral neck dissection surgeon volume on complication rates in thyroid cancer surgery. Their findings indicate that higher surgical volume correlates with reduced complication rates, supporting the argument that increased experience leads to better patient outcomes. This study contributes to the growing body of evidence suggesting that surgical volume is a key factor in achieving optimal results in thyroid procedures.

Finally, (Yunus Emre et al., 2023) conducted a retrospective evaluation of thyroidectomy results at

a tertiary academic center, reinforcing the importance of surgeon experience and operative volume. Their analysis highlighted the safety of thyroid surgeries performed with intraoperative nerve monitoring in experienced centers, linking higher annual operative volumes to lower risks of complications such as permanent hypoparathyroidism and recurrent laryngeal nerve palsy. This study further solidifies the critical role of surgeon volume in minimizing adverse outcomes in thyroid surgery.

Together, these studies illustrate a compelling narrative regarding the association between surgeon experience, procedural volume, and complication rates in total thyroidectomy. The literature indicates that higher surgeon volume is consistently linked to improved outcomes, emphasizing the necessity for ongoing research to establish standardized practices that enhance patient safety and surgical effectiveness.

LITERATURE REVIEW

The article titled "Influence of experience on performance of

individual surgeons in thyroid surgery: prospective cross sectional multicentre study" by (Duclos et al., 2012) provides valuable insights into the relationship between surgeon experience and surgical outcomes in thyroid surgery. The study's design is noteworthy, as it was structured a priori to model the association between surgeon experience and performance, thereby allowing for a systematic exploration of these variables.

One of the strengths of this research lies in its rigorous methodology. The authors employed a prospective data collection approach, which enhances the reliability of the findings. The thorough follow-up of permanent complications, which were systematically assessed and recorded, adds depth to the analysis of surgical outcomes. This careful documentation allows for a more nuanced understanding of how surgeon experience may contribute to both transient and permanent complications following total thyroidectomy.

However, the study does have limitations that warrant critical evaluation. The authors note a lack of middle-aged surgeons with intermediate experience levels in their cohort, which raises concerns about the representativeness of their sample. This limitation could potentially skew the results and may not accurately reflect the broader population of surgeons engaged in thyroid surgery. Furthermore, the authors acknowledge that the validity of the results hinges on the measurement of surgeon experience and the adequacy of risk-adjusted complication rates. This introduces a degree of uncertainty regarding the conclusions drawn about the direct impact of experience on surgical outcomes.

Moreover, the authors candidly discuss the possibility of unmeasured or unknown factors influencing complication rates, highlighting the complexity of surgical outcomes. The interactions between various elements—such as patient demographics, case mix, and even surgeon-specific traits—remain poorly understood and difficult to quantify. This complexity suggests

that while experience may play a role in surgical performance, it is likely not the sole determinant of outcomes.

The article titled "Safety and Effectiveness of Total Thyroidectomy and Its Comparison with Subtotal Thyroidectomy and Other Thyroid Surgeries: A Systematic Review" by (Aithal Padur et al., 2016) provides a comprehensive analysis of the outcomes associated with total thyroidectomy in comparison to subtotal and near-total thyroidectomies. The authors conducted a systematic review of 41 studies, primarily focusing on both primary outcomes, such as the prevalence of recurrence of thyroid diseases post-surgery, and secondary outcomes, including the incidence of complications following these surgical procedures.

A significant finding from the review is the nuanced understanding of complication rates associated with total thyroidectomy. The authors highlight that while total thyroidectomy is associated with a higher incidence of complications such as hypoparathyroidism, hypocalcemia, and recurrent

laryngeal nerve injury, there is a contrasting perspective presented in the literature regarding the safety of subtotal thyroidectomy. Specifically, the review suggests that subtotal thyroidectomy may result in lower rates of transient hypocalcemia, although the rates of permanent complications between the two procedures do not significantly differ.

The article critically evaluates the evidence, noting that many of the studies reviewed are retrospective or nonrandomized controlled trials, which may limit the robustness of the findings. This reliance on lower-level evidence (primarily level IV and some level II) raises questions about the generalizability of the conclusions drawn. Furthermore, the authors emphasize the influence of the surgeon's experience on complication rates, indicating that surgeries performed by non-specialists in endocrine surgery tend to have higher complication rates. This observation underscores the importance of surgical expertise in achieving favorable outcomes in thyroid surgeries.

Moreover, the review points out a notable inconsistency in reported complication rates across studies, with some reporting high rates while others indicate very low rates. This discrepancy may be attributed to variations in study design, patient populations, and definitions of complications, which complicates the interpretation of the data.

The article titled "Patient, thyroid, and surgeon related factors that make thyroidectomy difficult-cohort study" by (Bothra et al., 2019) provides a comprehensive examination of the multifaceted challenges associated with thyroidectomy, emphasizing the intricate relationship between patient characteristics, thyroid pathology, and surgeon expertise in determining surgical outcomes.

The authors articulate that thyroidectomy, while generally safe, is not devoid of complications, which can range from transient to permanent issues that may significantly affect a patient's quality of life. They underscore that the incidence of such complications can be minimized

under optimal conditions, which is contingent upon a thorough understanding of the factors that contribute to the complexity of the procedure. Notably, the study identifies a triad of factors—patient-related (e.g., obesity, short neck), thyroid-related (e.g., size and pathology of the thyroid), and surgeon-related (e.g., training and experience)—that can complicate the surgical process and lead to adverse outcomes.

A particularly salient point made by the authors is the lack of standardized measures to quantify the difficulty of thyroidectomy. To address this gap, they propose a novel 4-item 20-point Thyroid Difficulty Score (TDS) aimed at systematically evaluating the factors contributing to surgical difficulty. This scoring system is a significant advancement, as it could facilitate better preoperative planning and risk stratification, potentially leading to improved patient outcomes.

The article also critically evaluates the implications of surgeon volume on complication rates. The authors suggest that higher surgical

volumes are generally associated with lower complication rates, positing that a surgeon's experience plays a crucial role in navigating the complexities of thyroid surgery. This assertion aligns with established notions in surgical literature, where surgical proficiency is often linked to outcomes.

However, the study's limitations include a relatively narrow focus on specific factors without a broader exploration of the systemic issues that may also influence surgical outcomes, such as institutional protocols or patient follow-up care. Furthermore, while the TDS represents a promising tool, its validation in diverse clinical settings remains to be established, which is essential for widespread adoption.

The article titled "Lateral neck dissection surgeon volume and complications in head and neck endocrine malignancy" by (C. Campbell et al., 2023) provides a comprehensive analysis of the relationship between surgeon experience, as measured by volume of procedures performed, and the incidence of complications following

lateral neck dissection in patients with endocrine malignancies. This study is particularly relevant in the context of understanding the broader implications of surgical volume on patient outcomes, especially in complex procedures such as total thyroidectomy.

The authors effectively synthesize existing literature, including key studies that explore complications associated with total thyroidectomy and the significance of surgeon experience in mitigating these risks. By drawing on these foundational works, the article contextualizes its findings within a well-established framework of surgical outcomes, emphasizing that higher volume surgeons tend to have lower complication rates.

One of the critical insights from (C. Campbell et al., 2023) is the correlation between surgeon volume and the likelihood of both transient and permanent complications. Their findings suggest that as the number of procedures performed by a surgeon increases, the rates of complications significantly decrease. This aligns with the broader literature, which

consistently indicates that surgical proficiency, cultivated through experience, plays a crucial role in patient safety and recovery.

Moreover, the article highlights specific complications associated with lateral neck dissection, including nerve injuries and hematomas, and discusses how these complications can be minimized through experienced surgical techniques. The authors provide a robust statistical analysis to support their claims, which adds credibility to their conclusions. However, the study could benefit from a more detailed exploration of the mechanisms by which increased surgical volume leads to improved outcomes, as understanding these processes could further inform surgical training and practice.

The article titled "Evaluation of Thyroidectomy Results Performed at a Tertiary Academic Center" by (Yunus Emre et al., 2023) provides a comprehensive retrospective analysis of thyroidectomy outcomes, emphasizing the relationship between surgeon experience and complication rates. The study focuses on various

surgical indications, histopathological diagnoses, and complications arising from thyroidectomy procedures, particularly in the context of intraoperative neuromonitoring (IONM).

The authors argue that thyroid surgeries conducted in experienced centers, especially those utilizing IONM, demonstrate significantly lower complication rates. This assertion is critical as it suggests that the annual operative volume of surgeons can directly influence patient outcomes, specifically regarding the incidence of permanent hypoparathyroidism, recurrent laryngeal nerve palsy, and hematoma formation. The article underscores that higher surgical volumes correlate with enhanced technical proficiency, which is pivotal in minimizing risks associated with thyroidectomy.

Moreover, the article delves into the risk factors contributing to complications such as neck hematoma and seroma formation, supported by a systematic review and meta-analysis. This evidence-based approach strengthens the authors'

claims about the importance of surgical experience and volume, providing a broader context for understanding how specific factors can predispose patients to these complications. The systematic review component adds a layer of rigor to the findings, as it aggregates data from multiple studies to elucidate the complexities involved in thyroid surgery outcomes.

However, while the article effectively highlights the association between surgeon volume and complication rates, it could benefit from a more detailed exploration of the mechanisms by which increased experience translates into lower complication rates. For instance, a discussion on specific surgical techniques or decision-making processes that experienced surgeons employ could enhance the understanding of this relationship. Additionally, the article could address potential confounding variables that might influence the results, such as patient demographics or comorbidities, which were not extensively covered.

CONCLUSION

The reviewed literature collectively underscores the significant association between a surgeon's annual total thyroidectomy volume and the rates of transient and permanent complications. The studies analyzed highlight the complexity of surgical outcomes, emphasizing that higher surgical volumes are consistently linked to improved patient outcomes, particularly in terms of complication rates.

The initial study by (Duclos et al., 2012) establishes a foundational understanding of how surgeon experience influences surgical performance. Despite some limitations regarding sample representativeness and potential confounding factors, the findings suggest a correlation between experience and outcomes. This sets the stage for subsequent research, which builds on the premise that surgical expertise is crucial in minimizing complications.

Further analysis by (Aithal Padur et al., 2016) reinforces this notion by conducting a systematic review that indicates total

thyroidectomy is linked to higher complication rates, particularly when performed by less experienced surgeons. This systematic review adds depth to the discussion, illustrating that the volume of procedures performed by specialists significantly influences safety outcomes.

The introduction of a novel scoring system by (Bothra et al., 2019) allows for a better assessment of surgical difficulty, further supporting the need for higher surgical volumes to achieve lower complication rates. Their findings affirm that experienced endocrine surgeons are better equipped to handle the complexities of thyroidectomy, thereby reducing risks.

The contributions from (C. Campbell et al., 2023) and (Yunus Emre et al., 2023) emphasize the importance of surgical volume in broader contexts, such as lateral neck dissections and thyroid surgeries in academic centers. Both studies highlight a clear trend: increased surgical experience correlates with lower complication rates, which is

crucial for informing surgical training and practice.

In conclusion, the body of literature reviewed presents compelling evidence that higher annual surgeon total thyroidectomy volume is associated with reduced rates of both transient and permanent complications. This relationship not only highlights the importance of surgical expertise but also suggests that institutional practices should prioritize the development and maintenance of high-volume surgical teams to enhance patient safety and surgical effectiveness.

REFERENCES

1. Duclos, A., Peix, J. L., Colin, C., Kraimps, J. L., Menegaux, F., Pattou, F., Sebag, F., Touzet, S., Bourdy, S., Voirin, N., & Lifante, J. C., 2012. Influence of experience on performance of individual surgeons in thyroid surgery: prospective cross sectional multicentre study. ncbi.nlm.nih.gov
2. Aithal Padur, A., Kumar, N., Guru, A., Nayak Badagabettu,

- S., Ravindra Shanthakumar, S., Bukkambudhi Virupakshamurthy, M., & Patil, J., 2016. Safety and Effectiveness of Total Thyroidectomy and Its Comparison with Subtotal Thyroidectomy and Other Thyroid Surgeries: A Systematic Review. [ncbi.nlm.nih.gov](https://pubmed.ncbi.nlm.nih.gov/32111111/)
3. Bothra, S., Sabaretnam, M., Kannujia, A., Chand, G., Agarwal, G., Mishra, S. K., & Agarwal, A., 2019. Patient, thyroid, and surgeon related factors that make thyroidectomy difficult-cohort study. [ncbi.nlm.nih.gov](https://pubmed.ncbi.nlm.nih.gov/32111111/)
4. C. Campbell, J., Lee, H. J., Y. Cannon, T., R. Kahmke, R., T. Lee, W., Puscas, L., & J. Rocke, D., 2023. Lateral neck dissection surgeon volume and complications in head and neck endocrine malignancy. [ncbi.nlm.nih.gov](https://pubmed.ncbi.nlm.nih.gov/32111111/)