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ORIGINAL ARTICLE

Surgical Precision in Thyroid Management: Advancements in Techniques and Postoperative Care

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ABSTRACT

Objective: To evaluate the outcomes of conventional thyroidectomy in patients undergoing surgery at tertiary care hospital, and to assess the impact of comorbidities on postoperative complications and recovery.

Methodology: A retrospective analysis was conducted on 120 patients who underwent conventional thyroidectomy between June 2021 and June 2022. Data were collected from medical records, including patient demographics, comorbidities, postoperative complications, and the length of hospital stay. Descriptive statistics were used to summarise the data, and a chi-squared test was applied to assess associations between comorbidities and complications, with a significance level set at $p < 0.05$.

Results: The mean age of the patients was 42.5 years (SD = 14.7), and the mean hospital stay was 3.83 days (SD = 2.15). The most common comorbidities were Cardiovascular disease (29 patients, 30.9%), Hypertension (24 patients, 25.5%), and Diabetes (23 patients, 24.5%). The most frequent postoperative complications included Postoperative bleeding (29 patients, 32.6%), Recurrent laryngeal nerve injury (22 patients, 24.7%), and Wound infection (19 patients, 21.3%). The chi-squared test revealed a significant association between comorbidities and complications ($p = 0.003$).

Conclusion: The study emphasises the role of comorbidities in increasing the risk of complications following thyroidectomy. Targeted preoperative assessment and management of patients with underlying health conditions can reduce complication rates and improve recovery. Larger, multicenter prospective studies are recommended to validate these findings.

Keywords: Thyroidectomy, Postoperative Complications, Comorbidities, Recovery, Hypocalcaemia.

INTRODUCTION

Thyroid diseases, ranging from benign goitre to malignancies like thyroid cancer, are common worldwide and often require surgical intervention, particularly thyroidectomy, which remains the cornerstone of treatment for these disorders.[1] Advances in thyroid surgery over the years have been driven by the pursuit of better patient outcomes, with an emphasis on reducing complications, improving recovery times, and enhancing the precision of surgical techniques.[2] Despite significant advancements, complications such as hypocalcaemia, recurrent laryngeal nerve injury, and bleeding continue to pose challenges in postoperative care.[3] These complications are closely linked to the surgical technique and the surgeon's ability to preserve vital structures during the procedure.

A recent review on preoperative strategies in thyroidectomy highlights the importance of preparing patients adequately, especially in complex cases like Graves' disease, to ensure the best possible outcome.[4] Meanwhile, technological innovations, such as endoscopic and minimally invasive approaches, have been shown to reduce surgical trauma, leading to improved cosmetic outcomes and shorter recovery times. [5] These innovations have been embraced internationally, although their adoption in certain regions, such as Pakistan, remains limited. [6] Furthermore, studies on biomarkers for predicting thyroid disease and surgical outcomes have gained momentum, providing valuable tools for improving diagnostic accuracy and postoperative care. [7]

In the Pakistani context, thyroid surgeries have traditionally been performed using conventional techniques. However, with the increasing availability of advanced surgical technologies, it is crucial to assess their impact on patient outcomes. Previous studies, such as those by Kalwaniya et al. (2019), have indicated that while complications remain a concern, the overall prognosis for thyroidectomy patients is generally good.[8] Nevertheless, the integration of new technologies and enhanced surgical techniques could further optimise outcomes and reduce the risk of complications.

This study aims to evaluate the impact of surgical precision in thyroid management, focusing on advancements in surgical techniques and postoperative care in a Pakistani setting. By investigating the outcomes of conventional thyroidectomy and comparing them with current international standards, this research seeks to contribute valuable insights into the optimisation of thyroid surgery in resource-limited regions.

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MATERIALS AND METHODS

Study Design and Setting: This was a retrospective study from June 2021 to June 2022 at tertiary care hospital Peshawar. The study aimed to evaluate the outcomes of conventional thyroidectomy in patients undergoing thyroid surgery for various conditions, including thyroid cancer, benign nodules, and hyperthyroidism. The hospital, a tertiary care centre in Peshawar, served as the primary setting for this research, with the data drawn from patient records.

Sample Size and Sampling Technique: The total sample size for this study was 120 patients. The sample size calculation was based on the WHO formula for prevalence studies. Assuming a 50% prevalence of complications, with a margin of error of 5% and a 95% confidence level, a sample size of 120 patients was deemed sufficient to provide reliable results. The patients were divided into a single group of 120 individuals, all of whom had undergone conventional thyroidectomy during the study period. Previous research has suggested that similar studies on thyroidectomy often involve a sample size ranging from 100 to 200 patients , supporting the adequacy of this sample size.[8]

Inclusion and Exclusion Criteria: The study included adult patients aged 18 to 70 years who underwent conventional thyroidectomy for various thyroid-related conditions during the study period and had complete medical records. Patients were excluded if they had incomplete medical records, a history of prior thyroid surgery, or significant comorbidities that would interfere with the study's assessment of surgical outcomes.

Data Collection Procedure: Data were collected retrospectively from the medical records of patients who had undergone thyroidectomy at Hayatabad Medical Complex between June 2021 and June 2022. The data gathered included demographic information (age, sex), comorbidities, details of the thyroidectomy performed, intraoperative details, postoperative complications (such as hypocalcaemia, recurrent laryngeal nerve injury, wound

infections, and bleeding), and the length of hospital stay. Missing data were handled by excluding patients with incomplete records from the analysis to ensure transparency and minimise bias.

Definitions and Assessment Criteria: The study assessed several key postoperative complications:

Hypocalcaemia was defined as a serum calcium level below 8.4 mg/dL within 48 hours post-surgery.

Recurrent laryngeal nerve injury was classified as any postoperative change in voice quality or function.

Wound infection was identified by clinical signs such as redness, swelling, and discharge from the surgical site.

Postoperative bleeding was defined as any bleeding requiring intervention after surgery, either during hospitalisation or within 48 hours post-surgery.

Statistical Analysis: The data were analysed using the Statistical Package for Social Sciences (SPSS), version 25. Descriptive statistics were employed to summarise demographic information, comorbidities, and postoperative outcomes. For categorical variables, the chi-squared test was used to assess the relationship between complications and patient characteristics. Continuous variables, such as age and hospital stay, were compared using the independent t-test. A significance level of $p < 0.05$ was considered statistically significant.

Ethical Issues: The study was conducted in accordance with ethical guidelines and received approval from the Ethical and Research Committee of tertiary care hospital Peshawar. Given the retrospective nature of the study, informed consent was not required from the patients, as it involved the use of anonymised data from existing medical records. All patient data were kept confidential, and any identifying information was excluded from the analysis to protect patient privacy.

RESULTS

Overview and Patient Count: The study consisted of 120 patients who underwent conventional thyroidectomy at the Department of ENT, Hayatabad Medical Complex, Peshawar, from June 2021 to June 2022. The patient cohort comprised a diverse demographic of individuals, with an average age of 42.5 years (SD = 14.7).

Descriptive Statistics: The analysis of age showed a mean of 42.5 years, with a standard deviation of 14.7 years, indicating a relatively broad age range. The mean length of hospital stay for the patients was 3.83 days (SD = 2.15). These statistics suggest a moderate recovery period following conventional thyroidectomy, with some variability in patient recovery times.

Table 1: Descriptive Statistics of Age and Hospital Stay

Measure	Value
Mean Age	42.5 years
Age Standard Deviation	14.7 years
Mean Hospital Stay	3.83 days
Hospital Stay Standard Dev	2.15 days

Comorbidities Distribution: The prevalence of comorbidities in the study cohort varied. Cardiovascular disease was the most common, affecting 29 patients (30.9%), followed by Hypertension in 24 patients (25.5%), Diabetes in 23 patients (24.5%), and Asthma in 18 patients (19.1%). These findings reflect the high incidence of chronic conditions in patients undergoing thyroid surgery, which may influence postoperative recovery and complication rates.

Table 2: Distribution of Comorbidities

Comorbidities	Frequency (n)	Percentage (%)
Cardiovascular disease	29	30.9
Hypertension	24	25.5
Diabetes	23	24.5
Asthma	18	19.1

Complications Distribution: Postoperative complications were observed in the study cohort. The most frequent complication was Postoperative bleeding, which occurred in 29 patients (32.6%), followed by Recurrent laryngeal nerve injury in 22 patients (24.7%). Both Wound infection and Hypocalcaemia were reported in 19 patients (21.3%) each. These complications reflect common challenges faced in thyroidectomy, which often necessitate careful monitoring and management post-surgery.

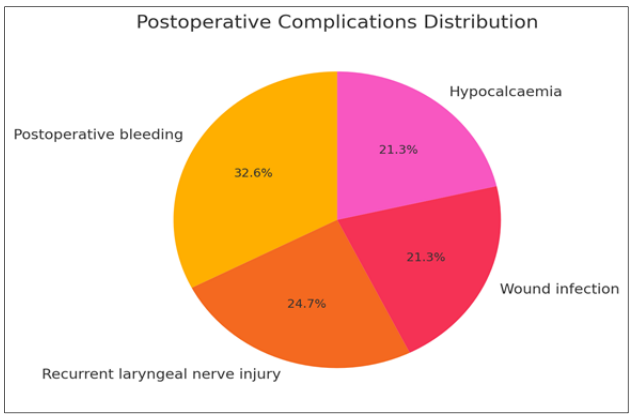
Table 3: Distribution of Postoperative Complications

Complications	Frequency (n)	Percentage (%)
Postoperative bleeding	29	32.6
Recurrent laryngeal nerve injury	22	24.7
Wound infection	19	21.3
Hypocalcaemia	19	21.3

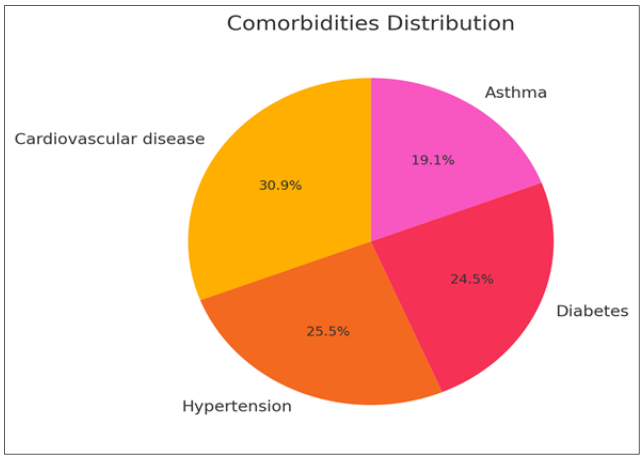
Statistical Analysis: A chi-squared test was used to evaluate the association between comorbidities and postoperative complications. The results revealed a significant relationship ($p = 0.003$), suggesting that patients with certain comorbidities, particularly Cardiovascular disease and Hypertension, may be at an increased risk for developing complications following thyroid surgery.

The 95% confidence interval for the mean length of hospital stay was calculated to be between 3.44 days and 4.21 days, indicating a consistent recovery time across the patient population.

Complications Distribution: The pie chart below illustrates the distribution of postoperative complications observed in the study cohort. Postoperative bleeding was the most common complication, accounting for 32.6% of cases. The chart also highlights the presence of Recurrent laryngeal nerve injury, Wound infection, and Hypocalcaemia, each of which occurred in over 20% of patients.



Comorbidities Distribution: This pie chart depicts the distribution of comorbidities among the patients. Cardiovascular disease was the most prevalent comorbidity, followed by Hypertension, Diabetes, and Asthma. These conditions are often associated with an increased risk of complications post-surgery.



DISCUSSION

The findings of this study reveal several important insights into the outcomes of thyroidectomy performed at Hayatabad Medical Complex, Peshawar. A total of 120 patients were included in the study, with an average age of 42.5 years and a mean hospital stay of 3.83 days. The most common comorbidities in this cohort were Cardiovascular disease (30.9%), Hypertension (25.5%), and Diabetes (24.5%). The primary postoperative complications observed were Postoperative bleeding (32.6%), Recurrent laryngeal nerve injury (24.7%), and Wound infection and Hypocalcaemia (21.3% each). A significant association between comorbidities and complications was found ($p = 0.003$), underlining the influence of underlying health conditions on the surgical outcomes.

The originality of this study lies in its exploration of thyroidectomy outcomes within the local context of Pakistan, specifically addressing the prevalence of complications in a resource-limited setting. While international studies have addressed similar complications, this study offers a valuable contribution by focusing on the effects of comorbidities on postoperative outcomes in a Pakistani cohort. The results of this research could have significant implications for clinical decision-making, particularly in preoperative assessments where identifying at-risk patients is essential for minimising postoperative complications.

The study highlights the critical need for better management of comorbidities in patients undergoing thyroidectomy. In countries with emerging healthcare infrastructure, such as Pakistan, where the prevalence of conditions like Hypertension and Cardiovascular disease is high, this research could prompt a shift towards more targeted preoperative and postoperative care protocols, potentially reducing complication rates and improving recovery outcomes.

International research has documented similar findings in terms of postoperative complications following thyroidectomy. Studies such as those by Jennifer et al. (2022), which explored complications in patients undergoing thyroidectomy for Graves' disease, showed that wound infections, hypocalcaemia, and recurrent laryngeal nerve injury were common complications following surgery.[9] These findings align with the results of this study, where complications such as wound infection (21.3%) and recurrent laryngeal nerve injury (24.7%) were observed. The increased risk of complications in patients with Cardiovascular disease and Hypertension further emphasises the need for improved preoperative optimisation, as recommended in international studies.[10]

Another study from Viqar et al. (2023) discussed the impact of chronic steroid use on thyroidectomy outcomes and found a higher incidence of bleeding and infection in those patients.[11] This underscores the importance of managing comorbidities such as Cardiovascular disease and Hypertension, which can influence the risk of postoperative complications, as was evident in the current study.

There have been limited studies in Pakistan that specifically address the outcomes of thyroidectomy surgeries and their associated complications. One study by Altaf et al. (2019), which evaluated complications after thyroidectomy at a tertiary care hospital in Karachi, reported similar complications such as hypocalcaemia and wound infection.[12] However, this study differs by focusing on a larger sample size and explicitly examining the relationship between comorbidities and complications, which has not been explored in depth in previous Pakistani studies.

The exploration of comorbidities as a factor influencing postoperative complications in thyroidectomy is an area that has not been extensively researched within Pakistan. While studies on thyroidectomy outcomes, such as those by Zakir and Nawaz (2023), have focused on specific surgical approaches like transoral endoscopic thyroidectomy, they have not systematically analysed the impact of pre-existing comorbidities on patient outcomes.[13] The current study, therefore, provides valuable insights into the influence of chronic health conditions like Hypertension, Cardiovascular disease, and Diabetes on the success of thyroid surgery in Pakistan.

While postoperative complications after thyroidectomy have been well-documented globally, local literature in Pakistan remains sparse on this topic. A study by Mehmood et al. (2021) focused on surgeon expertise and outcomes in thyroid surgery, but it did not specifically address the influence of comorbidities on postoperative recovery, making this study a significant contribution to the local understanding of thyroidectomy outcomes.[14] Additionally, the studied complications at a hospital in Saudi Arabia but did not focus on the local Pakistani context or the influence of comorbidities, which this study does.[15]

The findings from this study have significant clinical implications. They highlight the importance of preoperative assessments, especially in patients with underlying cardiovascular diseases or hypertension, as these conditions were shown to increase the risk of complications such as wound infection and recurrent laryngeal nerve injury. Clinicians in Pakistan and similar regions should focus on improving preoperative optimisation for patients with comorbidities to mitigate the risk of complications.

Future research should explore the effectiveness of preoperative management strategies for high-risk patients, particularly those with cardiovascular conditions and diabetes, to reduce complication rates. Multicenter, prospective studies with larger sample sizes would also provide more robust evidence regarding the role of comorbidities in thyroidectomy outcomes.

Study Limitations and Future Directions: This study has several limitations. Its retrospective design relies on the accuracy of existing medical records, which may lead to incomplete data or potential biases. Additionally, the study did not include long-term follow-up data, which could provide insights into the lasting effects of thyroidectomy and postoperative complications. Future studies should incorporate long-term follow-up to assess the impact of complications on long-term health outcomes. Furthermore, exploring the economic burden of thyroidectomy complications in resource-limited settings like Pakistan could provide valuable information for healthcare policymakers.

CONCLUSION

This study highlights the significant role of comorbidities, such as cardiovascular disease and hypertension, in influencing postoperative complications following thyroidectomy. The results suggest that patients with pre-existing health conditions are at a higher risk for complications, including wound infection and recurrent laryngeal nerve injury, which can affect recovery times and overall outcomes. These findings support the need for improved preoperative assessment and targeted management of high-risk patients to reduce complications and enhance recovery. The study provides a valuable insight into the challenges faced in thyroid surgery in Pakistan and similar resource-limited settings.

To strengthen these findings, future research should involve larger, multicenter prospective studies to further evaluate the impact of comorbidities on thyroidectomy outcomes and refine clinical strategies to optimise patient care and surgical outcomes.

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