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ASSOCIATION OF PREOPERATIVE THYROID HORMONE REPLACEMENT WITH PERIOPERATIVE COMPLICATIONS AFTER MAJOR ABDOMINAL SURGERY

Muhammad Zeb[1], Muhammad Rashid Waheed[2], Mohamed Ahmed Aref Ahmed[3], Taher Helmy Aldesouky[4], Muhammad Umair Sultan[5], Fazli Akbar[6], Aaliya Javed[7], Nusrum Iqbal[8], Ehsan Ullah[9*]

[1]Consultant General Surgeon, Surgical Department, DHQ Teaching Hospital, Timergara, Pakistan
[2]Registrar, General Surgery Department, Khyber Teaching Hospital, Peshawar, Pakistan
[3]Specialist, General Surgery Department, SKMC, UAE
[4]Consultant General Surgeon, Saudi German Hospital Ajman, UAE
[5]Medical Officer, Ahmad Hospital, Sheikhupura, Pakistan
[6]Associate Professor, Surgical A Ward, Saidu Group of Teaching Hospitals, Swat, Pakistan
[7]Doctor, Liaquat National Hospital & Medical College, Karachi, Pakistan
[8]Chairman Department of Internal Medicine, MD Health Center, Lahore, Pakistan
[9*]Consultant General and Laparoscopic Surgeon, General Surgery Department, Irfan General Hospital, Charsadda Road Peshawar, Pakistan

***Corresponding Author:** Ehsan Ullah,
*Email Address: kmcite7@yahoo.com

Abstract

Background: Thyroid hormones control metabolism; an imbalance in these hormones, especially hypothyroidism, may have an effect on overall health. Preoperative management of major abdominal surgery outcomes requires an understanding of their involvement.

Objective: The objective of this study was to investigate the association between preoperative thyroid hormone replacement therapy and the incidence of perioperative complications in patients undergoing major abdominal surgery.

Methodology: A retrospective cohort analysis of 390 patients receiving major abdominal surgery was performed as part of the research at DHQ Teaching Hospital Timergara, Pakistan. Patients who were eighteen years of age or older were included in the study, and careful data collecting from computerized records ensured a thorough analysis. Pancreatic resections, hepatotectomies, and colectomies were among the surgical techniques used. Logistic regression was used to examine patient demographics, thyroid function, surgery details, and perioperative outcomes after controlling for variables.

Results: The research, involving 390 individuals, examined perioperative complications in major abdominal surgery. Patients were predominantly aged 40-59 (57.18%), with 12.31% below 40 and 30.51% over 60, averaging 55.8 years. The cohort comprised 47.18% females and 52.82% males. Mean BMI was 27.6 kg/m², with 24.62% having BMI < 25, 53.33% between 25-29.9, and 22.05%

≥ 30. Common comorbidities included hypertension (30.26%) and diabetes (24.10%). Hypothyroidism was diagnosed in 16.41% of patients, with 11.03% on thyroid hormone replacement. Hypothyroidism correlated significantly with complications (OR 1.82, $p < 0.001$), while thyroid hormone replacement trended towards reducing complications (OR 0.68, $p = 0.054$). Older age, male sex, and comorbidities also showed significant associations with complications.

Conclusion: The optimization of perioperative care techniques should take into account the potential for problems during major abdominal surgery to be mitigated by preoperative thyroid hormone replacement.

Keywords: Thyroid hormone replacement therapy, hypothyroidism, major abdominal surgery, perioperative complications.

Introduction

The regulation of growth, development, and metabolism is greatly aided by thyroid hormones [1]. Thyroid function abnormalities, especially hypothyroidism, may have serious systemic consequences [2]. Insufficient synthesis of thyroid hormone is the hallmark of hypothyroidism, which is common in the general population, particularly in women and the elderly [3]. Thyroid hormone replacement medication is often necessary for hypothyroidism patients in order to restore normal metabolic function and lessen symptoms including tiredness, weight gain, and irregularities in the cardiovascular system [4]. In perioperative medicine, there is increased interest in the relationship between thyroid hormone levels and surgical outcomes [5].

Significant abdominal surgery, including colectomies, hepatectomies, and pancreatic resections, carries a significant risk of complications and significant physiological stress [6]. Prolonged hospital stays, cardiovascular events, and infections are a few examples of these problems [7]. Surgeons and anesthesiologists place a high priority on optimizing preoperative circumstances in order to reduce these risks [8]. More research is still needed to determine how preoperative thyroid hormone levels affect surgical outcomes, especially in patients having major abdominal surgery [9].

Prior research, mostly concentrating on endocrine and cardiovascular procedures, has examined the function of the thyroid in surgical patients [10,11]. There hasn't been much research done on the precise relationship between preoperative thyroid hormone replacement medication and perioperative problems in large abdominal procedures, but [12]. According to some data, hypothyroidism may have a role in unfavorable surgical outcomes such heightened infection rates and slowed wound healing [13]. On the other hand, thyroid hormone replacement treatment may stabilize metabolic processes and enhance the postoperative prognosis; nevertheless, there is a paucity of inconsistent and restricted empirical evidence to support this theory [14].

Preoperative thyroid hormone replacement and surgical outcomes are closely related, and understanding this association is crucial given the frequency of major abdominal operations and the prevalence of hypothyroidism [15]. There are few thorough investigations addressing this particular clinical concern, despite the physiological explanation pointing to a possible influence.

Research Objective

The objective of this study was to investigate the association between preoperative thyroid hormone replacement therapy and the incidence of perioperative complications in patients undergoing major abdominal surgery.

Materials and Methods

Study Design and Settings: DHQ Teaching Hospital Timergara, Pakistan, was the site of this retrospective cohort research. The data was collected during the period of six months from August 2023 to January 2024.

Inclusion and Exclusion Criteria: During the designated study period, patients who had major abdominal surgeries at DHQ Teaching Hospital Timergara, Pakistan and were at least 18 years old were included in the research. Large abdominal surgeries included hepatectomies, pancreatic resections, and colectomies; these operations were carried out for a range of reasons, such as inflammatory disorders, cancer, and trauma. To maintain the homogeneity of the research group, patients with incomplete medical records, those who had emergency surgery, and those who had a history of thyroid problems other than hypothyroidism were removed from the study.

Sample Size: The trial had 390 patients in total. with a power of 80% and a significance threshold of 0.05, the sample size was determined using the expected incidence of perioperative complications in patients with and without hypothyroidism.

Data Collection: Data from the laboratory information systems, surgical databases, and electronic medical records were painstakingly retrieved. Patient demographics, preoperative thyroid function status (including thyroid hormone replacement treatment), surgical specifics (procedure type, surgical technique), and postoperative results (complications, duration of hospital stay) were among the data gathered. To guarantee accuracy and consistency, the data gathering procedure was carried out by medical professionals with training.

Statistical Analysis: Statistical analysis was conducted using appropriate software packages, such as SPSS 23. To describe the characteristics of the patients and the perioperative results, descriptive statistics were used; the results were shown as means with standard deviations or frequencies with percentages. Using logistic regression analysis, the relationship between preoperative thyroid hormone replacement medication and perioperative problems was evaluated, taking into account possible confounders such age, sex, comorbidities, and surgical complexity.

Ethical Approval: The Institutional Review Board (IRB) granted ethical clearance for this investigation, guaranteeing adherence to moral principles and patient privacy. Because the research was retrospective in nature and used anonymised patient data, informed permission was not required, as permitted by the IRB.

Results

The research included 390 individuals, whose clinical features and demographics are compiled in Table 1. The bulk of patients (57.18%) were in the 40–59 age range, with 12.31% of patients being younger than 40 and 30.51% being older than 60. The average age was 12.1 (SD ± 5.8) years old. There were 47.18% females and 52.82% men in the cohort. With respect to body mass index (BMI), the mean BMI was 27.6 kg/m² (SD ± 4.5); 24.62% had a BMI of less than 25, 53.33% had a BMI between 25 and 29.9, and 22.05% had a BMI of 30 or above. Chronic renal disease (10.51%), chronic obstructive pulmonary disease (8.46%), coronary artery disease (15.90%), diabetes mellitus (24.10%), hypertension (30.26%), and other disorders (14.62%) were common comorbidities.

Table 1: Patient Demographics and Clinical Characteristics (n=390)

Characteristic		**Patients Number (n)**	**Percentage (%)**
Age Groups (Year)	< 40	48	12.31
	40-59	223	57.18
	≥ 60	119	30.51
	Mean ± SD	55.8 ± 12.3	
Gender	Male	206	52.82
	Female	184	47.18
Body Mass Index (BMI)	< 25	96	24.62
	25-29.9	208	53.33
	≥ 30	86	22.05
	Mean ± SD (kg/m²)	27.6 ± 4.5	

Comorbidities	Hypertension	118	30.26
	Diabetes Mellitus	94	24.10
	Coronary Artery Disease	62	15.90
	Chronic Kidney Disease	41	10.51
	Chronic Obstructive Pulmonary Disease	33	8.46
	Others	57	14.62

The distribution of surgical procedures among the 390 patients is shown in Table 2. The most common procedure was a colectomy, with 15.38% requiring a laparoscopic procedure and 23.08% enduring an open procedure. Of the procedures performed, 17.95% were open and 12.82% were laparoscopic hepatectomies. 20.51% of open surgeries and 10.26% of laparoscopic procedures included pancreatic resections.

Table 2: Distribution of Surgical Procedures (n=390)

Procedure		**Patients Number (n)**	**Percentage (%)**
Colectomy	Open	90	23.08
	Laparoscopic	60	15.38
Hepatectomy	Open	70	17.95
	Laparoscopic	50	12.82
Pancreatic Resection	Open	80	20.51
	Laparoscopic	40	10.26

Figure 1 shows which of the 390 patients had thyroid hormone replacement treatment and which had prior hypothyroidism. Of the patients, 64 (16.41%) had a diagnosis of hypothyroidism, and 43 (11.03%) were on thyroid hormone replacement therapy before surgery.

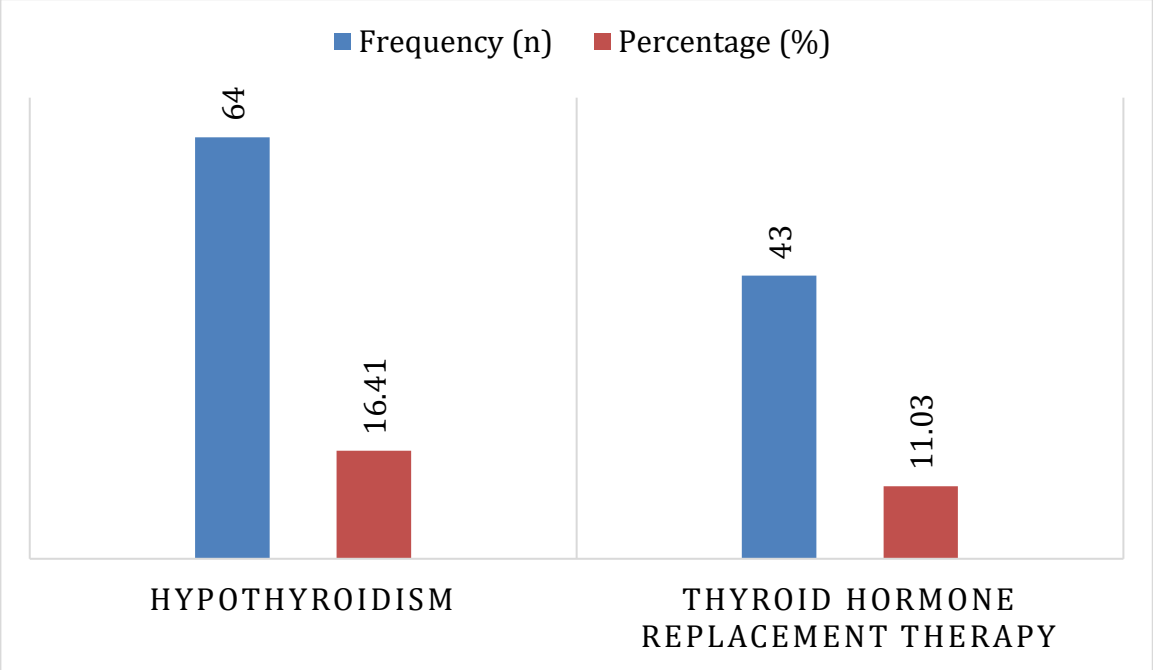

Figure 1: Prevalence of Preoperative Hypothyroidism and Thyroid Hormone Replacement Therapy (n=390)

Perioperative problems in individuals with and without hypothyroidism are shown in Figure 2. Of the sixty-four hypothyroid patients, twenty-two developed infections, eighteen had heart attacks, and twenty-four had hospital stays longer than seven days. On the other hand, 118 patients with infections, 94 with cardiovascular problems, and 114 with extended hospital admissions were among the 326 individuals who did not have hypothyroidism.

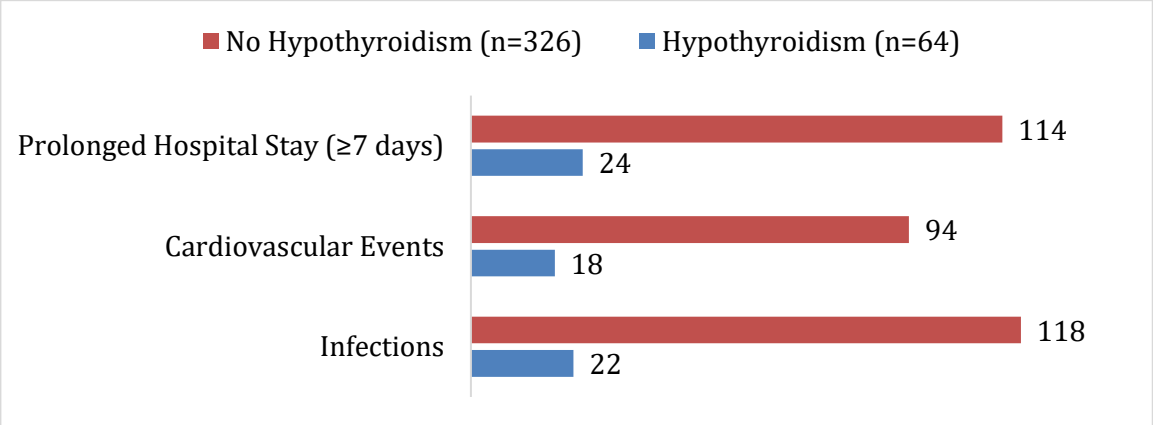

Figure 2: Perioperative Complications Among Patients with and Without Hypothyroidism

The correlation between thyroid hormone replacement treatment and postoperative problems is seen in Figure 3. Thirteen of the forty-three patients undergoing thyroid hormone replacement treatment developed infections, eleven had cardiovascular events, and nineteen had extended hospital admissions (more than seven days). By comparison, 127 patients suffered infections, 101 had cardiovascular events, and 119 had extended hospital admissions out of the 347 patients who were not on thyroid hormone replacement treatment.

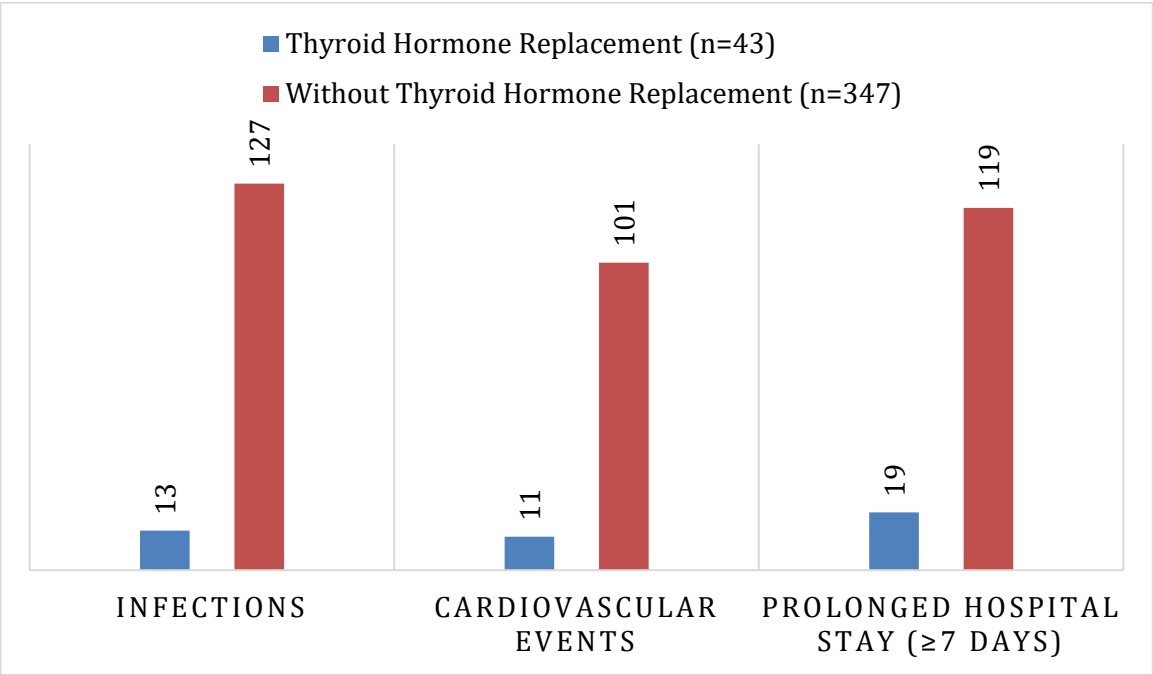

Figure 3: Association Between Thyroid Hormone Replacement Therapy and Perioperative Complications

The findings of a logistic regression study examining the variables linked to perioperative problems in 390 patients are shown in Table 3. Thyroid hormone replacement therapy showed a trend towards reducing complications, though not statistically significant (OR 0.68, 95% CI 0.46 - 1.01, $p = 0.054$). Hypothyroidism showed a significant association with complications, with an odds ratio of 1.82 (95% CI 1.20 - 2.75, $p < 0.001$). Increased chances of complications were substantially correlated with older age (OR 1.05, 95% CI 1.02 - 1.08, $p < 0.001$), and there were also significant correlations with sex and comorbidities ($p = 0.244$ and $p < 0.001$, respectively).

Table 3: Logistic Regression Analysis of Factors Associated with Perioperative Complications (n=390)

Factor	Odds Ratio (95% CI)	p-value
Hypothyroidism	1.82 (1.20 - 2.75)	<0.001
Thyroid Hormone Replacement	0.68 (0.46 - 1.01)	0.054
Age (years)	1.05 (1.02 - 1.08)	<0.001
Sex (Male vs. Female)	1.24 (0.86 - 1.78)	0.244
Comorbidities	1.15 (1.60 - 2.89)	<0.001

Discussion

This retrospective cohort research looked at the relationship between preoperative thyroid hormone replacement therapy and perioperative problems in patients undergoing major abdominal surgery. The hospital undertook the research with the goal of bridging a knowledge gap on the impact of thyroid function on surgical outcomes in this particular patient group. The demographic analysis of the patients showed a mean age of 55.8 years, with the age group of 40–59 years accounting for the bulk of patients (57.18%). The research cohort's gender distribution was rather balanced, with 52.82% of the patients being male and 47.18% being female. Furthermore, the frequency of co-occurring conditions such diabetes mellitus (24.10%) and hypertension (30.26%) highlighted the complexity of the patient group following major abdominal surgery [16].

Of the patients in the research, 11.03% had thyroid hormone replacement medication prior to surgery, and 16.41% had a diagnosis of hypothyroidism. A comparison of perioperative complications between patients with and without hypothyroidism indicated significant differences. Compared to their non-hypothyroid peers, patients with hypothyroidism had greater incidence of infections (22 vs. 118), cardiovascular events (18 vs. 94), and extended hospital admissions (24 vs. 114) [17]. Although the frequency of hypothyroidism and its correlation with worse surgical outcomes are consistent with earlier studies [18], further study is needed to determine how thyroid hormone replacement treatment affects postoperative complications. The significance of thyroid function in surgical outcomes was highlighted by the statistically significant correlation (OR 1.82, 95% CI 1.20 - 2.75, $p < 0.001$) found by logistic regression analysis between hypothyroidism and perioperative problems. Nevertheless, there was a possible tendency towards protective effects that was not statistically significant in the connection between thyroid hormone replacement treatment and perioperative problems (OR 0.68, 95% CI 0.46 - 1.01, $p = 0.054$) [19].

Comparisons with previous research show that the results are both consistent and inconsistent. Although some research has shown comparable correlations between hypothyroidism and worse surgical outcomes [20], the influence of thyroid hormone replacement treatment is still not quite clear-cut. The trend that has been found in patients undergoing thyroid hormone replacement treatment (Odds Ratio [OR] 0.68, 95% Confidence Interval [CI] 0.46 - 1.01, $p = 0.054$) points to a better surgical prognosis and metabolic stability. Larger-scale research is necessary to clarify the precise impact of thyroid hormone replacement on perioperative outcomes in patients undergoing major abdominal surgery, as shown by the absence of statistical significance [21].

Conclusion

This retrospective cohort research clarifies the complex association that exists between thyroid function before to surgery and postoperative problems in individuals undergoing major abdominal surgery. The research highlights the significance of taking thyroid function into account as a possible determinant in surgical outcomes, as a considerable percentage of patients were diagnosed with hypothyroidism. Although hypothyroidism was linked to a higher risk of problems, thyroid hormone replacement treatment had a tendency, albeit not a statistically significant one, towards moderating negative consequences. In order to improve surgical outcomes and patient care, our results highlight the need for more study and highlight the potential advantages of improving thyroid function management in the preoperative period.

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