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THE IMPACT OF IMMEDIATE PREOPERATIVE THROMBOTIC CHEMOPROPHYLAXIS FOR BARIATRIC SURGERY, RETROSPECTIVE STUDY AT KING HUSSEIN MEDICAL CENTER

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ABSTRACT

Background: Obesity is a global public health concern with substantial impacts on morbidity, mortality, and the economy. Bariatric surgery has emerged as an effective solution for addressing obesity-related challenges. However, patients undergoing such surgeries face an increased risk of venous thromboembolism event. Tinzaparin sodium (Innohep), has shown efficacy in the management of VTE. We intend to study the effect of preoperative Innohep in bariatric surgery. **Methods**: This retrospective, single-center, comparative study, conducted at King Hussien Medical Hospital in Jordan, aimed to assess the impact of immediate pre-operative administration of Tinzaparin sodium on postoperative outcomes in bariatric surgery. Data from 230 patients were analyzed, with 110 not receiving pre-operative chemoprophylaxis (Group A) and 120 receiving 4500 IU Innohep at induction (Group B). Demographic, clinical, and operative variables were collected, and statistical analyses were performed using R software. **Results**: Patients in the study had a mean age of 35.0, and the majority were female (77%). Group B, receiving Tinzaparin, showed a significant difference in the type of bariatric surgery, with fewer Laparoscopic Sleeve Gastrectomy (LSG) procedures. Post-operative complications were significantly higher in Group B, particularly bleeding (9.2%). The study emphasized BMI and postoperative WBC levels as potential risk factors for postoperative bleeding. **Conclusion**: The study recommends cautious consideration of BMI and postoperative WBC levels in preoperative assessments to mitigate the risk of bleeding. Tinzaparin sodium's role in preventing postoperative bleeding requires further investigation, addressing study limitations, and incorporating long-term follow-up to enhance patient outcomes in bariatric surgery.

KEYWORDS: preoperative; anti-thrombotic; bariatric surgery; obesity.

INTRODUCTION

Obesity poses a significant worldwide public health challenge, impacting morbidity, and mortality, and imposing a substantial economic burden. In 2014, 5.0% of global deaths were linked to obesity, contributing to an estimated economic impact of around 2.8% of the total global gross domestic product.[1,2] The prevalence of obesity, as defined by the International Diabetes Federation (IDF) criteria, was observed to be 67.3% for men and 77.8% for women.[3] Bariatric surgery has gained significant recognition as an effective approach to combat obesity, offering a long-term solution to this global health challenge.

Patients undergoing bariatric surgery face a heightened risk of venous thromboembolism events. Obesity, being a hypercoagulable condition, is often linked to hypertension, obstructive sleep apnea, and venous stasis, all recognized as risk factors contributing to complications associated with venous thromboembolism.[4,5] Tinzaparin sodium, known as tinzaparin or Innohep, is a low molecular weight heparin (LMWH) derived through the enzymatic breakdown of porcine unfractionated heparin (UFH). In clinical trials, the once-daily subcutaneous administration of tinzaparin demonstrated effectiveness and generally favorable tolerability in both prophylaxis and treatment of thromboembolic disease.[6]

Gastrointestinal bleeding post-bariatric surgery is an infrequent yet substantial adverse occurrence that contributes significantly to morbidity. Timely recognition, early diagnosis, and swift management are crucial due to the potential for rapid deterioration and mortality associated with this condition.[7,8] Studies evaluating prophylaxis using LMWH post-bariatric surgery reveal varying rates of venous thromboembolism ranging from 0% to 5.4%. This fluctuation in

thromboembolism rates likely stems from differences in LMWH dosage regimens, the duration of prophylaxis (inpatient versus extended outpatient), and the criteria used to assess outcomes (asymptomatic versus symptomatic).[9,10]

However, the role of anti-thrombotic prophylaxis therapy in post-operative bleeding and thrombosis remains unclear. In this single-center, retrospective, comparative study, we aim to evaluate the effect of immediate administration of pre-operative thrombotic chemoprophylaxis (Tinzaparin sodium) on the postoperative outcomes of bariatric surgery in the Jordanian population.

METHODS

Study Design

A retrospective, single-center, comparative study was conducted at King Hussien Medical Hospital in Jordan during the period between January 2021 and January 2023. The study aimed to recruit patients who had undergone bariatric procedures to investigate the clinical, demographic, and prognostic features associated with the preoperative immediate administration of anti-thrombotic medication in bariatric surgery. A total of 230 patients were enrolled, of which 110 did not receive pre-operative chemoprophylaxis (group A), and 120 patients received 4500 UI Innohip at induction.

Data Collection

Retrospective data collection was performed by reviewing patients' hospital records. The study retrieved the following demographic and clinical variables: age at the time of the operation, gender, body mass index (BMI), height (in centimeters), weight (in kilograms), post-operative packed cell volume levels (PCV) at 6-hours and 24-hours after surgery, post-operative white blood cell (WBC) levels at 6-hours and 24-hours after surgery, the use of drains, the type of surgery (gastric band, Roux-en-Y gastric bypass, or sleeve gastrectomy), and post-operative bleeding as the study outcomes.

Statistical Analysis

Continuous variables were presented as means along with their corresponding standard deviations (SD), while categorical variables were summarized through frequencies and percentages. To explore the connection between demographic, clinical, and operative variables and the risk of mortality, we employed the Wilcoxon (Mann-Whitney U) test for continuous variables. For categorical variables with a category count of less than 5, we used either the chi-squared (X2) test or Fisher's exact test. Statistical significance was established when the p-value was less than 0.05. All statistical analyses were carried out using R software (version 4.2.3, Vienna, Austria).

RESULTS

A total of 230 individuals who underwent bariatric surgeries were included in the study. The mean age was 35.0 (9.0), and most patients were female, accounting for 77% (n=176), while 23% (n=54) were males. The mean BMI was 43.0 (4.4), with a mean height of 164.0 (8.0) cm and a mean weight of 117.0 (16) kg. The mean PCV 6 hours post-surgery was 39.6 (4.9), and the mean WBC 6 hours post-surgery was 10.3 (3.3). The mean PCV 24-hour post-surgery was 38.4 (5.2), and the mean WBC 24 hours post-surgery was 12.7 (3.9) as shown in **Table 1**. Drains were observed in 78% (n=180) of patients. Laparoscopic sleeve gastrectomy (LSG) was performed on 46% (n=105) of patients, while 54% (n=125) underwent Roux-en-Y Gastric Bypass (RYGB). A total of 14 patients (6.1%) experienced postoperative complications, including 5 patients (2.2%) with postoperative bleeding, 1 patient (0.4%) with deep venous thrombosis (DVT), 2 patients (0.9%) with general weakness, 2 patients (0.9%) with hiatal hernia, 2 patients (0.9%) with intestinal obstruction, 1 patient (0.4%) with an intra-abdominal abscess, and 1 patient (0.4%) with multiple complications of bleeding, hiatal hernia, and a leak. **Table 1** displays the demographic and clinical characteristics of the patients included.

When comparing patients who received pre-operative Tinzaparin (Innohep 4500 IU) (Group B, n = 120) with those who did not receive and served as controls (Group A, n = 110), a significant difference in type of bariatric surgery was seen, in which LSG was significantly higher in Group A (53% vs. 39%, p-value=0.039). In addition, post-operative complications were significantly higher in group B with 11 (9.2%) of group B having post-operative complications of bleeding (n=4), hiatal hernia, intestinal obstruction, and general weakness (p-value=0.041) as shown in **Table 1**.

Table 1: Demographic and clinical characteristics of all included patients.

Characteristic	N = 230	Group A, N = 110	Group B, N = 120	p-value
Age (Years), Mean (SD)	35 (9)	34 (9)	35 (9)	0.3
Sex, n (%)				0.8
Female	176 (77%)	85 (77%)	91 (76%)	
Male	54 (23%)	25 (23%)	29 (24%)	
BMI (Kg/m^2), Mean (SD)	43.0 (4.4)	43.2 (3.4)	42.8 (5.2)	0.12
Height (cm), Mean (SD)	164 (8)	164 (8)	165 (9)	>0.9
Weight (Kg), Mean (SD)	117 (16)	117 (14)	116 (18)	0.4
6-hours post-operative PCV	39.6 (4.9)	39.5 (4.9)	39.7 (4.9)	0.8
24-hours post-operative PCV	38.4 (5.2)	38.3 (5.6)	38.6 (4.7)	0.5
6-hours post-operative WBC	10.3 (3.3)	10.2 (3.4)	10.3 (3.2)	0.4
24-hours post-operative WBC	12.7 (3.9)	13.0 (3.9)	12.4 (3.8)	0.3
Drains, n (%)	180 (78%)	87 (79%)	93 (78%)	0.8
Surgery, n (%)				**0.039**
LRYGB	125 (54%)	52 (47%)	73 (61%)	
LSG	105 (46%)	58 (53%)	47 (39%)	
Complications, n (%)	14 (6.1%)	4 (3.6%)	10 (8.3%)	**0.041**
Type of Complication, n (%)				0.3
Bleeding	5 (2.2%)	1 (0.9%)	4 (3.3%)	
DVT	1 (0.4%)	1 (0.9%)	0 (0%)	
General Weakness	2 (0.9%)	1 (0.9%)	1 (0.8%)	
Hiatal Hernia	2 (0.9%)	0 (0%)	2 (1.7%)	
Intestinal Obstruction	2 (0.9%)	0 (0%)	2 (1.7%)	
Intra-abdominal Abscess	1 (0.4%)	1 (0.9%)	0 (0%)	
Multiple	1 (0.4%)	0 (0%)	1 (0.8%)	
No	216 (94%)	107 (97%)	109 (91%)	
Bleeding	5 (2.2%)	1 (0.9%)	4 (3.3%)	0.4

Abbreviations: PCV, packed cell volume, WBC, white blood cells, DVT, deep venous thrombosis, BMI, body-mass index.

DISCUSSION

Obesity is associated with a variety of substantial coexisting health conditions, including type 2 diabetes, hypertension, elevated lipid levels, and coronary artery disease.[11,12] The most significant complication associated with bariatric surgeries is the development of postoperative bleeding.[13] Consequently, the objective of this study is to evaluate immediate anti-thrombotic chemoprophylaxis to prevent post-operative bleeding following bariatric surgery within the Jordanian population.

Our study involved 230 individuals who underwent bariatric surgeries with a notable predominance of female patients (77%). Previous studies showed a significant gender disparity with 80% of individuals undergoing bariatric surgery being women, despite similar obesity rates between the genders.[14]

Low-molecular-weight heparin and unfractionated heparin serve as effective prophylactic medications for preventing thromboembolic complications following surgery. Meta-analysis confirms the reduction of incidence of DVT and PE by low-dose heparin,[15] Also, LMWH has similar efficacy to unfractionated heparin for thromboprophylaxis.[16] LMWH was used in our study for its numerous advantages. Compared to unfractionated heparin, LMWH has a more predictable anticoagulant activity and superior bioavailability.[17]

In our study, group A reported 1 episode of DVT while none in group B. However, group A reported 4 episodes of bleeding but were statistically insignificant. A recent randomized controlled trial showed preoperative thromboprophylaxis using LMWH is recommended to prevent perioperative VTE and there was an insignificant increase in postoperative bleeding in patients who received preoperative prophylactic anticoagulants.[18] Perioperative prophylaxis is necessary in the bariatric population, as evidenced by the PROBE trial, which also demonstrated a greater rate of thromboembolic events when prophylaxis was delayed until hospital discharge.[19]

In a recent meta-analysis, it's reported that starting prophylaxis with heparin 12 hours before or after bariatric surgery may make little or no difference to venous thromboembolism. Also, it reported that no conclusions can be made about the effects of heparin started before versus after surgery on major bleeding.[20,21] Another study by Feras et al. showed that an extended period of thromboprophylaxis might be more efficacious and safer compared to in-hospital thromboprophylaxis.[22] In a prospective study, 735 patients who underwent bariatric surgery and received

extended duration (1–3 weeks) thromboprophylaxis with LMWH demonstrated a 0% rate of postoperative VTE and bleeding.[10]

Our study presents several advantages. First, it addresses the urgent matter of the rising global obesity rates, underscoring the significance of bariatric surgery as a viable solution. Furthermore, our research is distinctive in its emphasis on the Jordanian population, contributing to the diversity of available data in this field. However, our results should be interpreted with caution in the context of several limitations. First, the study's retrospective, single-center design limits its generalizability. Findings may not represent the broader population, and the data collection relies on records, potentially introducing bias and incomplete data. Expanding the research to include multiple centers can enhance the generalizability of the findings and allow for a more diverse patient population. In addition, assessing patient outcomes over an extended period can offer insights into the persistence of complications and the effectiveness of anti-thrombotic interventions in the long term.

CONCLUSION

Our study provides a comprehensive overview of bariatric surgeries in Jordan. Post-surgery complications, although relatively rare, were observed, with post-operative bleeding being the most prevalent. Our findings contribute to the understanding of postoperative outcomes in bariatric surgery, highlighting the potential impact of pre-operative Tinzaparin administration. The observed differences in surgical types and complication rates warrant further investigation to delineate causation and assess the overall safety and efficacy of Tinzaparin in this context. Future research with larger, diverse cohorts and prospective designs will be instrumental in enhancing the validity and generalizability of these findings.

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