Outcome of Anticoagulant Therapy Following Bariatric Surgery

Thesis

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George Mamdouh Aziz

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List of Abbreviations

A.T : Anti Thrombin

aPTT : Activated Partial Thrombin Time

BMI : Body Mass Index

DOAC : Direct Oral Anticoagulant

DTI : Direct Thrombin Inhibitor

DVT : Deep Venous Thrombosis

EPCR : Endothelial Protein C Receptor

GB : Gastric Bypass

GCS : Graduated Compression Stocking

H.I.T : Heparin Induced Thrombocytopenia

Hct : Hematocrit

Hg : Hemoglobin

I.N.R : International Normalized Ratio

IPC : Intermittent Pneumatic Compression

IVCF : Inferior Vena Cava Filters

LAGB : Laparoscopic Adjustable Gastric Banding

LDUH : Low Dose Un-fractioned Heparin

LMWH : Low Molecular Weight of Heparin

LSG : Laparoscopic Sleeve Gastrectomy

NOAC : New Oral Anticoagulant

NSTEMI : Non-ST Elevation Myocardial Infarction

P.E : Pulmonary Embolism

P.T : Prothrombin Time

PCC : Prothrombin Complex Concentration

PCI : Percutaneous Coronary Intervention

Plt : Platelets

PMVT : Porto Mesenteric Vascular Thrombosis

rFVIIa : Recombinant Factor VIIa

S.D : Standard Deviation

SMVT : Superior Mesenteric Vascular Thrombosis

SPSS : Statistical Package for Social Sciences

STEMI : ST-Elevation Myocardial Infarction

tPA : Tissue Plasminogen Activator

UFH : Un-fractioned Heparin

VTE : Venous Thromboembolism

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Introduction

Deep Venous Thrombosis (DVT) and Pulmonary Embolism (PE) constitute clinical presentations of the same vascular disease, known as Venous Thromboembolism (VTE). VTE is responsible for hospitalization of >250000 Americans annually. It is associated with high Morbidity and Mortality and represents a primary cause of preventable death. There is strong evidence that obesity is an independent risk factor for DVT and PE **(Weinberg et al., 2014).**

Bariatric surgery is proven to be an effective means in the therapy of morbid obesity and its related Comorbidities, thus its prevalence is rapidly increasing. Well established and widely performed procedures include Laparoscopic Adjustable Gastric Band (LAGB), Roux-en-Y Gastric Bypass (RYGBP), Biliopancreatic Diversion (BPD, with or without Duodenal Switch) and Sleeve Gastrectomy (SG). LAGB is a purely restrictive method, while RYGBP and BPD are considered as mainly malabsorbptive procedures. SG was performed as a bridge to further Bypass Surgery, However nowadays is performed as a single stage procedure. The risk of VTE in patients undergoing elective bariatric surgery is high, attributable to obesity, Intraoperative factors and the lack of an established guidance describing optimal VTE prophylaxis. Overall incidence of VTE in this population is reported to be 1-3% **(Ponce et al., 2015*).***

Diagnosis of PE postoperatively in obese patients can be difficult due to physical limitations and consequently may be underdiagnosed. Furthermore, although VTE is usually diagnosed as immediate postoperative complication. PE can occur in non-hospitalized patients, within the first month after surgery, despite pharmacologic prophylaxis **(Donahue et al., 2005).**

The management of Anticoagulation in patients undergoing surgical procedures is challenging because interrupting Anticoagulation for a procedure transiently increases the risk of Thromboembolism. At the same time, surgery and invasive procedures have associated bleeding risks that are increased by the Anticoagulant(s) administered for Thromboembolism prevention. If the patient bleeds from the procedure, their Anticoagulant may need to be discontinued for a longer period, resulting in a longer period of increased Thromboembolic risk. A balance between reducing the risk of Thromboembolism and preventing excessive bleeding must be reached for each patient, Hemorrhage while also minimizing the risk of Thrombotic event that could occur by allowing Hypercoagulability (tendency to clot too quickly) **(Weinberg et al., 2014).**

TYPES OF Anticoagulant: **(Acosta et al., 2016)**

LMWH:

(Lovenox, Enoxaparin)

Factor Xa Inhibitor:

(Rivaroxaban, Apixaban, Endoxaban and Betrixaban)

Heparins:

(Dalteparin, tinzaparin and danaparoid)

Thrombin Inhibitors:

(Bivalirdin, Dabigatran, Argatroba and Desirudin)

Coumarins and indandiones:

(warafarin)

Aim of the Work

The Aim of This Study is to asses the Outcome of Anticoagulant during Bariatric Surgery and Relation of Bariatric Surgery to Coagulopathy Disease.

Overview of Vein Thromboembolism (V.T.E)

Deep Venous Thrombosis (DVT) or Venous Thromboembolism (V.T.E) is one of the common postoperative complications observed among the African population. During the acute phase of DVT, 10 to 40% of patients may develop PE (Pulmonary Embolism), having a mortality rate as high as 10 to 20% ***(Stein et al., 2012).***

However, the mortality rate for PE has been stated to be as high as 30% in studies that included autopsy-based diagnosis of PE. In fact, autopsy studies document that 50% of all patients dying in hospital have some form of DVT, pointing out that many episodes of PE may go unrecognized clinically before death ***(Bergqvist et al., 2015).***

Surgical removal of malignant tumors and abdominal surgeries are supposed to be the high risk factors for development of DVT ***(Akl et al., 2011)***

The high incidence of DVT in postoperative patients is due to the multiple risk factors that exist in patients admitted to hospitals, the most important being malignancies, vascular

disease, trauma, and surgery, as well as other conditions that lead to prolonged hospitalization. In the process leading to thrombosis, the damage to vascular endothelial cells caused by abdominal surgery and tissue injury, and underlying coagulation disorders are all interrelated ***(Tufano et al., 2011)***

B. Epidemiology of VTE:

Venous Thromboembolism (VTE) is among the three leading causes of cardiovascular disease worldwide. Despite its high burden, there has been no previous study summarizing the epidemiology of VTE in African populations (**Mensah et al., 2013).**

The prevalence of Deep Vein Thrombosis (DVT) varied between 2.4% and 9.6% in postoperative patients, and between 380 and 448 per 100 000 births per-year in pregnant and postpartum women **(Danwang et al., 2017)**

The prevalence of Pulmonary Embolism (PE) in medical patients, varied between 0.14% and 61.5%, with a mortality rate of PE between 40% and 69.5%. The case-fatality rate after surgery was 60%. Overall, 31.7–75% of the patients were at risk of VTE, and between 34.2% and 96.5% of these received VTE prophylaxis. The prevalence of VTE and associated mortality are high following surgery, and in pregnant and postpartum women in Africa. At least one-

quarter of patients who are at risk for VTE in Africa are not receiving prophylaxis **(Heit, 2015).**

Classification

Venous Thromboembolism (VTE) refers to both DVTs and PEs.

Superficial Venous Thrombosis cause discomfort but generally not serious consequences, as do the Deep Vein Thrombosis (DVT) that form in the Deep Veins of the legs or in the Pelvic Veins **(Goldhaber et al., 2013).**

Since the Veins return Blood to the Heart, if a piece of a Blood clot formed in a vein breaks off it can be transport to the right side of the Heart, and from there into the lungs. A piece of Thrombus that transported in this way is an *Embolus*: the process of forming a Thrombus that becomes Embolic called a *Thromboembolism*. An Embolism that lodges in the lungs is a *Pulmonary Embolism* (PE). A Pulmonary Embolism is a very serious condition that can be fatal depending on the dimensions of the Embolus **(Goldhaber et al., 2013).**

Causes:

Venous Thrombi had caused mainly by a combination of Venous Stasis and Hypercoagulability—but to a lesser extent endothelial damage and activation ***(Martinelli et al., 2010).*** The

Three factors of Stasis, Hyper-coagulability, and alterations in the Blood Vessel wall represent Virchow's triad, ***(Bovill et al., 2011).***

Risk factors:

Acquired

1. Older age ***(Bovill et al., 2011).***
2. Major surgery ***(Khan et al., 2018).***
3. Cancers, ***(Stein et al., 2006).***
4. Trauma ***(Varga et al., 2012)***
5. Obesity ***(Rosendaal et al., 2009)***
6. Heart failure ***(Tang et al., 2016)***

Inherited

1. The factor V protein is mutated in carriers of factor V Leiden, ***(Rosendaal, 2005)***

2. Anti-Thrombin deficiency ***(Martinelli et al., 2010)***

3. Protein C and S deficiency (type I) ***(Martinelli et al., 2010).***

4. Prothrombin G20210A ***(Martinelli et al., 2010)***

5. Dysfibrinogenemia **(*Rosendaal et al., 2009*).**

Mixed:

1. Activated protein C resistance **(Jenkins et al., 2012)**

2. High factor VIII levels (***Jenkins et al., 2012*****)**

3. Hyper-homocysteinemia ***(Martinelli et al., 2010)***