



Contents lists available at ScienceDirect

## International Journal of Surgery Case Reports

journal homepage: [www.casereports.com](http://www.casereports.com)

## Systemic thrombolysis for acute submassive pulmonary embolism after laparoscopic Roux-en-Y bypass: A case report

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## ARTICLE INFO

## Article history:

Received 30 August 2018

Received in revised form

23 December 2018

Accepted 15 January 2019

Available online 19 January 2019

## Keywords:

Laparoscopic Roux-en-Y gastric bypass

Pulmonary embolism

Venous thromboembolism

Thrombolysis

Case report

## ABSTRACT

**INTRODUCTION:** Venous thromboembolism (VTE) in bariatric surgery is a low incidence disease; however, it is the first cause of morbimortality in this group of patients.

**PRESENTATION OF THE CASE:** We present the case of a female patient with morbid obesity who was readmitted due to an acute submassive bilateral pulmonary embolism (PE) nineteen days after a laparoscopic Roux-en-Y gastric bypass (RYGB). After diagnosis, anticoagulation was initiated, and decision to add mechanical and pharmacological thrombolysis was made with the patient been successfully treated, as shown by normalization of pulmonary hypertension.

**DISCUSSION:** VTE in bariatric surgery is rare but contributes to significant morbidity and mortality in patients undergoing bariatric surgery.

**CONCLUSION:** It is necessary to have a high index of suspicion to make a timely diagnosis and initiate an early treatment. In selected cases, adding mechanical and pharmacological thrombolysis could increase chance of reverse pulmonary hypertension.

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## 1. Introduction

Venous thromboembolism (VTE) encompasses deep venous thrombosis (DVT) and pulmonary embolism (PE), which are among the leading causes of morbidity and mortality among patients undergoing bariatric surgery. After bariatric surgery, the prevalence of symptomatic DVT and PE ranges from 0 to 5.4% [1,2] and 0–6.4%, respectively [3,4]. Patients undergoing bariatric surgery, concentrates a number of risk factors for VTE events such as obesity, recent surgery, and chronic venous insufficiency among other conditions that increases the risk of DVT and/or PE. Diagnosis of PE is difficult, due to its highly variable clinical presentation in which PE symptoms can be misleading and confused with symptoms of intraabdominal complications like stapler line bleeding or leakage, thus delaying the diagnosis and treatment initiation. Despite the low incidence rate of VTE, it remains the most important cause of mortality after bariatric surgery [5,6]. Here, we present the first case reported in literature of a patient with a submassive PE successfully treated with anticoagulation and thrombolysis in a university hospital according with the SCARE criteria [7].

## 2. Presentation of case

A 66-year-old female patient with a past medical history of class II obesity (BMI 37), gastroesophageal reflux disease with esophagitis, hiatal hernia, fatty liver disease and osteoporosis, without previous episodes of VTE, was admitted to our hospital and a laparoscopic RYGB plus hiatal hernia repair was performed. During surgery, DVT/PE prophylaxis was conducted with compression stockings and intermittent pneumatic compressions. After 8 h of surgery low molecular weight heparin (LMWH, enoxaparin 40 mg/day) was initiated and maintained during the three-day hospitalization. Intermittent pneumatic compression was suspended after the first 24 h when the patient reassumed ambulation, while compression stockings were maintained until discharge along with LMWH. Patient was discharged at post-operative (PO) day 3, and a routine follow-up was done 10 days after discharge with the patient recovering from surgery uneventfully. At PO day 19 the patient contacted her treating surgeon reporting a two-day history of progressive dyspnea and right chest pain. At the Emergency Department she presented with tachycardia (122 bpm), tachypnea (28 bpm), 92% oxygen saturation, and without evidence of hemodynamic compromise. CT pulmonary angiography showed a saddle PE (Fig. 1) with extension to the right pulmonary artery (Fig. 2), without right ventricular overload signs, small right pulmonary infarctions, and a distal DVT on the right infrapopliteal vein. No elevation in high-sensitive cardiac troponin T was detected. Anticoagulation with unfractionated heparin (UFH) was immedi-

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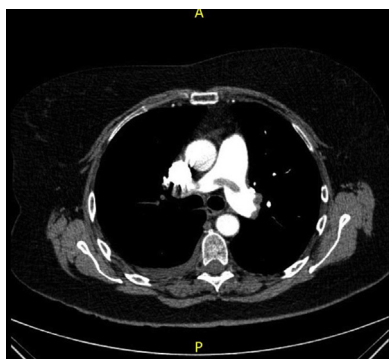


Fig. 1. CT Pulmonary angiography shows a saddle pulmonary embolism.

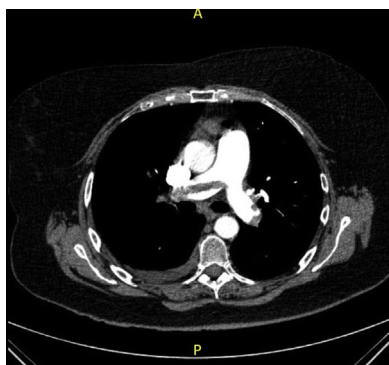


Fig. 2. CT Pulmonary angiography shows extension of the saddle pulmonary embolism into the right pulmonary artery.

ately initiated. A transthoracic echocardiogram was performed, which showed pulmonary hypertension (90 mmHg) with a mild right ventricle dilation (RV/LV index=0.97) without dysfunction. Mechanical and pharmacological thrombolysis with 10 mg bolus and 1 mg/h infusion of rt-PA (recombinant tissue plasminogen activator) was performed, with a new 5 mg bolus administered after 12 h. At the end of the procedure the pulmonary artery pressure had reduced to 58 mmHg. The patient tolerated the procedure without complications. Post procedure transthoracic echocardiogram showed a pulmonary artery pressure of 35 mmHg. Patient was discharged after 12 days of readmission asymptomatic and with oral anticoagulation therapy with Rivaroxaban.

### 3. Discussion

VTE is the most common cause of death in patients with obesity undergoing bariatric surgery with an estimated incidence of 0.34% [8]. The 90-day postoperative risk of presenting a VTE (DVT or PE) reaches 0.42%, most cases presenting during the first 30 days after surgery [9]. Identified risk factors are BMI > 60, chronic venous insufficiency, central obesity, and obesity hypoventilation syndrome [6]. Obese patients have an increased risk of suffering a VTE due to the thrombogenic effect proper of obesity [10], an elevated intraabdominal and intrathoracic pressure, and immobility secondary to surgery [11].

Signs and symptoms of PE are not specific and its clinical presentation is highly variable ranging from asymptomatic cases to sudden death. The most frequent symptoms and signs are dyspnea, pleuritic chest pain, cough, tachypnea and tachycardia [12]. These symptoms can be confused with symptoms of other intraabdominal complications such as postoperative bleeding and/or anastomotic or staple line leakage. This could help to explain the delay in diagnosis with unfortunately is not uncommon. Moreover, it has been

reported that these clinical scenarios can be so confusing that patients have undergone an exploratory laparoscopy looking for an intraabdominal complication, which increases the mortality risk in a patient with PE [13]. The best method of diagnosis is a CT pulmonary angiography.

Considering the potentially fatal risk outcome of a PE in a patient undergoing a bariatric surgery, VTE prophylaxis is of extreme importance. Unfortunately, currently there is not an ideal method for VTE prophylaxis and guidelines for prevention of perioperative VTE vary significantly. Patients undergoing bariatric surgery are considered at moderate to high risk for developing thrombotic complications, thus all patients should receive VTE prophylaxis. At our center, VTE prophylaxis consists of mechanical (compression stockings and intermittent pneumatic compressions starting at the time of surgery) and chemopreventive LMWH 4–6 h after surgery which is maintained along with the compressive stockings until the day of discharge, usually 2–3 days after surgery. LMWH dosage in obese patients is a controversial topic, but some centers prefer to use weight-based dosing protocols. For high risk patients, such as those with a prior DVT, prophylaxis is continued after discharge. ASMBS clinical guidelines recommend the combined use of mechanical and chemoprophylaxis measures, favoring the use of LMWH without an increased risk of bleeding, which should be initiated within 24 h of surgery and maintained during the in-hospital stay. Even though the risk of VTE is higher within the first 30 postoperative days, there is insufficient data to recommend dose or duration of extended post discharge prophylaxis, but it is recommended in high risk patients (e.g: prior VTE, prior PE) [14,15].

With respect to VTE treatment, it will depend on the degree of severity. Patients with DVT and low risk PE (without hemodynamic compromise or right ventricle dysfunction, distal DVT) or submassive PE (without hemodynamic compromise, but with right ventricle dysfunction or myocardial necrosis) treatment recommendations are to immediately start with systemic anticoagulation. Patients with massive PE (systolic arterial pressure <90 mmHg) require anticoagulation and emergency thrombolysis with a recombinant tissue plasminogen activator, such as Alteplase, Reteplase, or Tenecteplase. In patients with submassive PE the use of thrombolysis is controversial and should be decided case by case, playing a role in patients with persistent right ventricle dysfunction and chronic pulmonary hypertension [16].

In this patient with a BMI of 37 the cause of PE was probably an underdosage of LMWH, which reflects the importance of the application of a weight-based dosing protocol. In this case of acute submassive PE, we decided to include thrombolysis therapy in order to reduce the risk of future decreased functional capacity secondary to pulmonary hypertension, which would have had a dramatic negative impact on the patient's quality of life.

### 4. Conclusion

VTE events in patients undergoing bariatric surgery are infrequent but potentially lethal if not treated promptly. Prophylaxis using mechanical and pharmacological measures during the perioperative period is critical to decrease the risk of VTE. Once diagnosed, treatment should be initiated immediately. Anticoagulation with LMWH is the treatment of choice and thrombolysis should be reserved for severe cases. The use of thrombolysis in patients without a massive PE should be decided case by case, with the objective of reducing the long-term sequelae of pulmonary hypertension.

### Conflict of interest

No conflict of interests to declare.

**Sources of funding**

No sources of funding to declare.

**Ethical approval**

No ethical approval required.

Our institution does not demand ethical approval for case reports, as these projects are not investigational.

**Consent**

Written informed consent was obtained from the patient for publication of this case report and accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal on request.

**Author contribution**

Alejandro Brañes: conceptualization, data curation, writing – original draft.

Matias Orellana: conceptualization, data curation, writing – original draft.

Rodrigo Muñoz: conceptualization, supervision, writing – review & editing.

**Registration of research studies**

Not applicable.

**Guarantor**

Alejandro Brañes.

Matias Orellana.

Rodrigo Muñoz.

**Provenance and peer review**

Not commissioned, externally peer-reviewed.

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