

## CASE STUDY

## Portomesenteric Venous Thrombosis in a Prophylactically Anticoagulated Obese Patient After Laparoscopic Sleeve Gastrectomy

### Introduction

Severe obesity (body mass index [BMI] greater than or equal to 40 kg/m<sup>2</sup>)<sup>1</sup> is associated with approximately a two-fold increase in total mortality.<sup>2</sup> Bariatric surgery is one of the most effective and sustainable treatments for obesity and contributes to reducing the mortality rates in obese patients.<sup>3</sup> Laparoscopic sleeve gastrectomy is the standard procedure performed in the modern era.<sup>4</sup> Portomesenteric thrombosis is a potential complication of this surgery, especially due to the procoagulant obese state of the patient and manipulation of the portomesenteric venous system during surgery.<sup>5</sup>

The following case study shows portomesenteric venous thrombosis in a prophylactically anticoagulated obese patient after laparoscopic sleeve gastrectomy.

### Case Study

#### Case presentation

A 60-year-old woman presented to the surgical outpatient department with morbid obesity and uncontrolled diabetes mellitus.



## History

- ◆ The patient was diagnosed with hypertension and type 2 diabetes mellitus 4 years ago and was on regular follow-ups.
- ◆ The patient also had sleep apnea and osteoarthritis for 2 years.
- ◆ The present medications included amlodipine 10 mg, metformin 1,000 mg twice daily before meals (breakfast and dinner), atorvastatin 20 mg once daily, and aspirin 325 mg once daily.
- ◆ There was no history of antidepressants or steroids intake.
- ◆ There was no history of addictions or allergies.

## Physical examination

- ◆ Weight: 100 kg
- ◆ Height: 160 cm
- ◆ BMI: 39.1 kg/m<sup>2</sup>
- ◆ Blood pressure (BP): 140/90 mmHg
- ◆ Pulse: 88 beats per minute
- ◆ Respiratory rate: 22 breaths per minute
- ◆ Temperature: Afebrile
- ◆ Pallor, icterus, cyanosis, clubbing, lymphadenopathy, or edema: Absent

## Laboratory evaluation

- ◆ Complete blood count: Hemoglobin of 12 g/dL, white blood cell count of 11,000/ $\mu$ L, and platelets of 290,000/ $\mu$ L
- ◆ Blood glucose levels: Fasting blood glucose of 210 mg/dL and postprandial blood glucose of 300 mg/dL
- ◆ Lipid profile: Low-density lipoprotein (LDL) cholesterol of 160 mg/dL, high-density lipoprotein (HDL) cholesterol of 20 mg/dL, triglycerides of 220 mg/dL
- ◆ Renal function test and liver function test: Within normal limits
- ◆ Chest X-ray and electrocardiogram: Unremarkable

## Treatment

Despite the current medications, the patient was not able to achieve the BP, lipid, and blood glucose goals. Hence, the patient was advised a new treatment plan with a higher dosage, i.e., amlodipine 10 mg and telmisartan 40 mg once daily, metformin 1,000 mg twice daily before meals (breakfast and dinner) with insulin once daily, and atorvastatin 40 mg once daily. Weight loss would also largely help achieve euglycemia and BP levels; therefore, lifestyle changes with diet and physical activity were suggested and employed for 3 months. However, the patient was unable to adopt them, and there was no weight loss. Hence, the decision was taken to consider bariatric surgery in the form of vertical sleeve gastrectomy. The procedure was performed using a cutting/sealing tissue stapler to create a long stomach tube that resembles a “sleeve”. This irreversibly removed the greater curvature of the stomach. In addition, vertical sleeve gastrectomy promotes appetite suppression since a site of secretion for ghrelin and other gastrointestinal hormones is removed.

The patient was discharged 3 days after the surgery. As a preventive measure against the risk of thromboembolism, the patient was administered pharmacological thromboprophylaxis with low molecular weight heparin (LMWH) (injection enoxaparin 40 mg) once daily during the postoperative period of 3 days, i.e., until the patient was discharged.

### Post-surgery

The patient was brought to the emergency department with severe central abdominal pain, nausea, and vomiting 15 days after the surgery. There was no history of fever with chills, jaundice, hematemesis, or hematochezia at the time of presentation. In addition, the patient did not have a history of a hereditary hypercoagulable state.

Per abdominal examination revealed generalized tenderness without guarding or rigidity. There was no organomegaly. Surgical sites were well-healing, clean, dry, and without any discharge or tenderness.

Computed tomography (CT) with intravenous (IV) contrast of the abdomen and pelvis (Figure 1 and Figure 2) revealed non-enhancement of the splenic vein with complete thrombosis of the portal venous system, including main, right, and left portal veins, splenic vein with extension into the superior mesenteric vein and associated branches. Doppler ultrasound of the abdomen and pelvis reconfirmed contrast-enhanced CT results.

### Diagnosis

Portomesenteric venous thrombosis

### Treatment for portomesenteric venous thrombosis

After the diagnosis, the patient was started on immediate anticoagulant therapy of LMWH (injection enoxaparin 1 mg/kg) subcutaneously twice daily. In addition, anti-Xa levels were monitored.

**Figure 1: CT with contrast coronal images showing non-enhancement of the portal venous system consistent with complete thrombosis of the portal venous system (black arrow)**



**Figure 2: CT with contrast transverse images showing non-enhancement of the portal venous system consistent with complete thrombosis of the portal venous system (black arrow)**





The patient recovered well, and portal vein thrombosis was recanalized with anticoagulation with LMWH. On discharge, the patient was started on oral warfarin (5 mg). Prothrombin time (PT) was monitored, and an international normalized ratio (INR) of 2–3 was targeted for maintenance throughout the anticoagulation, which was intended to continue for 6 months.

### Follow-up

The patient remained asymptomatic and completed a 6-month course of oral anticoagulation along with PT-INR monitoring. The follow-up contrast-enhanced CT scan at 3 months revealed no thrombosis in the portal venous system.

### Discussion

Weight loss strategies mainly include lifestyle modifications and pharmacological and surgical interventions. Portal vein thrombosis has been reported as a complication in patients after laparoscopic sleeve gastrectomy and is a serious problem with high morbidity and mortality.<sup>6</sup>

Portal vein thrombosis requires a high index of suspicion and may present as non-specific abdominal pain, nausea, vomiting, fever, ascites, or larger than expected wound drainage. If associated with bowel ischemia, patients could present with peritonitis and septic shock. Laboratory values may be unremarkable, with the exception of a mildly elevated liver function test.<sup>7</sup> These symptoms usually present within 3-42 days of the surgery.<sup>8</sup> The diagnosis of portal vein thrombosis is usually made based on contrast-enhanced CT or color Doppler ultrasonography.<sup>9</sup>

The etiology includes local (intra-abdominal inflammatory or neoplastic disease, diminished flow in cirrhosis, or portal hypertension) and systemic (inherited hypercoagulable or acquired prothrombotic condition) factors.<sup>7</sup>

Laparoscopy causes a thrombogenic effect due to increased intra-abdominal pressure with the reduction in venous return from the extremities and splanchnic system. Obesity is considered a hypercoagulable state, contributing to the systemic predisposition of portal vein thrombosis.<sup>7</sup>

Studies have shown that extended-duration thromboprophylaxis may help prevent venous thromboembolism (VTE) after bariatric surgery. A fixed dose of enoxaparin 40 mg twice daily for 10-14 days must be given.<sup>10</sup>

**The NICE Guidelines (2018) for VTE prophylaxis in patients undergoing bariatric surgery are as follows<sup>11</sup>:**

- ◆ VTE prophylaxis should be offered to people undergoing bariatric surgery.
- ◆ Mechanical VTE prophylaxis on admission for people undergoing bariatric surgery should be started, either in the form of anti-embolism stockings or intermittent pneumatic compression. This should be continued until the person no longer has significantly reduced mobility relative to their normal or anticipated mobility.
- ◆ Patients undergoing bariatric surgery should receive pharmacological VTE prophylaxis whose risk of VTE outweighs their risk of bleeding. These patients should be given LMWH or fondaparinux for a minimum of 7 days.

**Suggested doses of enoxaparin for prophylaxis in adult patients with a high BMI are as follows<sup>12</sup>:**

- ◆ BMI 30 to 39 kg/m<sup>2</sup>: Standard prophylaxis dosing (30 mg every 12 hours or 40 mg once daily) or weight-based dosing (0.5 mg/kg once or twice daily, depending upon the level of VTE risk)
- ◆ BMI ≥40 kg/m<sup>2</sup>: Empirically increase standard prophylaxis dose by 30% (from 30 mg every 12 hours to 40 mg every 12 hours) or weight-based dosing (0.5 mg/kg once or twice daily, depending upon the level of VTE risk)
- ◆ High VTE-risk bariatric surgery with BMI ≤50 kg/m<sup>2</sup>: 40 mg every 12 hours
- ◆ High VTE-risk bariatric surgery with BMI >50 kg/m<sup>2</sup>: 60 mg every 12 hours

Another anticoagulant that can be used is unfractionated heparin. However, a 74% lower risk of VTE was found among patients receiving enoxaparin prophylaxis versus those receiving prophylaxis with unfractionated heparin.<sup>13</sup>

Thromboprophylaxis in such patients is advised for 7 to 10 days. However, despite adequate thromboprophylaxis, an ample number of patients might still have VTE, similar to the case presented above. Therefore, along with the recommended duration of thromboprophylaxis, mechanical methods of VTE prophylaxis must also be used. Intermittent pneumatic compression is preferred since studies have shown that its use leads to a lower incidence of VTE than the use of graduated compression stockings.<sup>14</sup> This might have led to portomesenteric vein thrombosis in the patient.

Prophylaxis for VTE must be given to patients undergoing bariatric surgery, and this is proven by various studies. In a study conducted in New York on 11,860 patients who underwent different bariatric surgeries, it was found that patients without chemoprophylaxis had a higher rate of deep vein thrombosis than patients who were given chemoprophylaxis. However, there was no difference in pulmonary embolism rate in both groups.<sup>15</sup>

Treatment depends on the severity of the disease. Anticoagulation with subcutaneous LMWH (1 mg/kg, administered twice daily) is recommended. Regular monitoring of PT-INR values should be continued after the subcutaneous therapy is stopped.<sup>16</sup> Routine doppler ultrasound or CT with IV contrast should be performed at 3- and 6-month intervals.<sup>10</sup>

## Conclusion

Portomesenteric venous thrombosis is a common complication of bariatric surgeries. This may be prevented if the patient has been given anticoagulant prophylaxis in the form of LMWH post-surgery for a minimum of 7 days. The presenting symptoms may be non-specific and require a high index of suspicion. Laboratory findings are usually unremarkable, and the diagnosis is made on CT with IV contrast or doppler ultrasound. Treatment varies depending on the severity, and patients require prompt anticoagulation with LMWH.

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MMAT-IN-2203073-1.0-11/22

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