

Portomesenteric vein thrombosis after bariatric surgery: a case series

Trombose venosa portomesentérica após cirurgia bariátrica: série de casos

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ABSTRACT

Portomesenteric vein thrombosis (PMVT) is a potentially severe complication that can occur after bariatric surgery. PMVT has gained importance because of the increasing number of bariatric surgeries being performed. **Objective:** to report a rare and severe complication after bariatric surgery, which is difficult to manage. To try to identify common characteristics among the cases and discuss potential causes comparing our data to the available literature. **Methods:** We describe six cases of PMVT in young women with different presentations. **Results:** All six cases occurred in young women 29-41 years old with obesity - body mass index - BMI: 36-39) and weighing 105-121 kg. The patients had few comorbidities (all of which were related to metabolic syndrome) and moderate hepatic steatosis with no sign of cirrhosis. Five patients used oral contraceptives until a few days before the operation. One patient tested positive for thrombophilia. Five patients underwent a laparoscopic sleeve gastrectomy and one underwent a gastric bypass with no complications during the operation (median operating time: 61.3 min, range 52-91 min). The mean duration of follow-up after hospitalization was 12.3 months (range: 7-18 months) and to-date only one patient has had no recanalization. **Conclusion:** The frequency of PMVT appears to be increased in woman and after sleeve gastrectomy. Our findings indicate that patients with abdominal pain weeks after bariatric surgery must be investigated.

Keywords: Obesity. Bariatric Surgery. Sleeve Gastrectomy. Gastric Bypass. Portal Vein.

INTRODUCTION

Metabolic and bariatric interventions are currently the most commonly performed gastrointestinal procedures in the United States¹. Although the Roux-en-Y gastric bypass is still the most frequent procedure reported in scientific publications, the sleeve gastrectomy is probably currently the most frequent bariatric operation carried out worldwide, and certainly the method that has shown the highest increase in recent years^{2,3}. Obese patient present with an increased risk of venous thromboembolism at baseline for a variety of reasons, including obesity, venous stasis, the operation per se, chronic inflammation and the use of tobacco or oral contraceptives.

Portomesenteric vein thrombosis (PMVT) is a rare complication after bariatric surgery (involving <0.3% of cases), and is most frequent after sleeve

gastrectomy⁴. The unknown number of subclinical and misdiagnosed cases, combined with the relatively low frequency of PMVT and its unpredictable presentation, preclude the adequate planning of randomized control trials⁵. Most of the experiences associated with PMVT reported in the literature are based on case series that can be of utmost importance to elucidate some common aspects.

Abdominal pain is the most frequent symptom associated with PMVT and can appear days, weeks or even months after the operation, although many patients are asymptomatic⁶. Nausea, vomiting, fever and tachycardia can occur. The different patients' symptoms/signs and the lack of specificity sometimes may justify the late diagnosis. A hematological investigation is mandatory because in almost 43% of cases a genetic predisposition for thrombophilia or other hypercoagulable state is present⁷.

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The portal vein is most frequently affected, followed by the mesenteric vein and, lastly, the splenic vein⁵. Most cases of PMVT occur in the first days after the operation, and are generally diagnosed after discharge⁸. The primary treatment is long-term anticoagulation and can yield good results^{5,9}.

OBJECTIVE

The objective of this retrospective study is to report some cases of a rare complication after bariatric surgery, the PMVT. However rare, this complication is very serious and difficult to manage. There is no high evidence in the literature, so we tried to identify some common characteristics in our cases, and discuss potential causes by comparing with the available literature.

METHODS

We undertook a retrospective analysis of six cases of PMVT with different presentations.

All patients were seen and thoroughly assessed by the interdisciplinary team before the operation. We routinely used an advanced bipolar energy source and electronic stapler without load reinforcement material or suture for both procedures (sleeve gastrectomy and gastric bypass). The patients underwent bariatric surgery by the same surgeon. The diet was allowed 8 hours after the operation with 50mL clear liquids every 30 minutes. We routinely prescribe 1500mL of saline after the operation to all the patients, who are discharged home on the first postoperative day. As a routine standard procedure, all patients start walking within 8h after the operation, and they are kept on enoxaparin after 12h (40 mg/day for 10 days). All PMVT diagnosis was made by a CT scan (Figure 1).

RESULTS

Table 1 summarizes the patients' information.

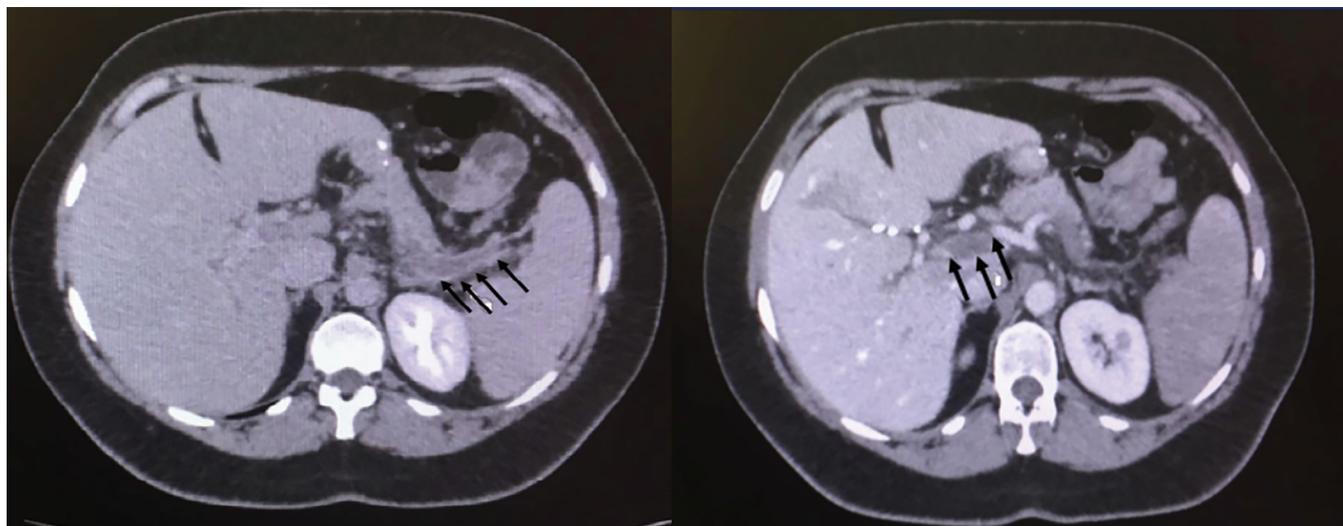


Figure 1. A- Splenic vein thrombosis. B - Portal vein thrombosis.

Table 1. Characteristics of the patients included in this study.

PATIENT	SEX	AGE (Y)	WEIGHT (K)	BMI	COMORBILITY	OC	SURGERY (H)	OT SYMPTOM (D)	DAY (D)	VEIN (D)	LIQUID INFUSION DURING SURGERY (ML)	COAG.	CLEAXANE AFTER DISCHARGED	FOLLOW UP (M)		
A	F	31	112	37	Insulin resistance, NASH	Yes	Sleeve	61 Abdominal pain, vomit	6	18	Porta, mesenteric, splenic	700	No	Yes	12	
B	F	33	121	36	Dyslipidemia, NASH	Yes	Sleeve	64 Abdominal pain	2	14	15	Porta, splenic	950	No	No	18
C	F	34	115	39	Hypertension, NASH	No	Sleeve	55 Abdominal pain	9	1	10	Porta, splenic	650	No	Yes	15
D	F	38	113	38	Sleep apnea, NASH	Yes	Sleeve	45 Abdominal pain, vomit	8	7	Porta, mesenteric	700	No	No	7	
E	F	29	105	39	Sleep apnea, T2DM, NASH	Yes	Gastric bypass	91 Abdominal pain, nausea	10	13	Porta, mesenteric, splenic	1100	No	No	13	
F	F	41	105	36	Sleep apnea, hypertension, NASH	Yes	Sleeve	52 Abdominal pain, nausea, vomit	7	31	Porta, mesenteric, splenic	700	Factor V	Yes	9	

BMI – Body Mass Index; Coag. – Coagulopathy; LS – Length of Stay; NASH – No Alcoholic Hepatic Steatosis; OC – Oral Contraceptive; OT – Operation Time.

Patient A

A 31-year-old female patient weighing 112 kg with a BMI of 37 kg/m² who had insulin resistance, moderate steatosis and was on oral contraceptives underwent a sleeve gastrectomy that lasted 61 minutes. The patient started to complain of abdominal pain and to vomit on the sixth post-operative day. The abdominal pain persisted for 10 days. A CT scan revealed PMVT, with slight bowel edema, and a small area of ischemia in segment VII of the liver and in the lower pole of the spleen. Doppler screening of the portal system revealed no flow in any of the veins (porta, mesenteric and splenic). The patient started treatment with low molecular weight heparin (enoxaparin, 160 mg/day), and after two days of medication the abdominal pain ceased. Endoscopy revealed no signs of portal hypertension and the patient was discharged asymptomatic after 18 days of hospitalization. Currently (12 months post-surgery), she is doing well, with 80% of recanalization of the portal flow and no systemic hypertension.

Patient B

Patient B was also a young woman (33 years old, 121 kg, BMI of 36 kg/m²). Before the operation, she had dyslipidemia (on statins), moderate steatosis and was on oral contraceptives. The patient underwent sleeve gastrectomy, with an uneventful procedure that lasted 64 minutes. After discharge, for economic reasons, the patient did not continue the post-surgical use of enoxaparin. She had an adequate weight loss and good follow-up work-ups until six months post-surgery. Seven months after the operation, she started to complain of mild back pain and was taken to the emergency room. A CT scan showed partial occlusion of the portal and splenic veins (60% and 70%, respectively) (Figure 1).

The patient was hospitalized for 15 days on full anticoagulation (enoxaparin 80 mg 12/12h), and she was discharged after endoscopy showed no signs of hypertension or thrombophilia. Currently, 18 months post-surgery, the patient has no symptoms, no signs of portal hypertension, is managing well without medications and has recanalized 75% of the portal flow.

Patient C

A 35-year-old female patient, weighing 115 kg, with a BMI of 39 kg/m² presented with hypertension and moderate steatosis. She was not on oral contraceptives but was on a single medication for hypertension (atenolol). The patient underwent a sleeve gastrectomy that lasted 55 min. After hospital discharge, the patient used enoxaparin (40 mg/day) for 10 days. Three months after the operation, the patient started to complain of abdominal pain, and a CT scan revealed portal thrombosis. The patient was hospitalized for 10 days with full anticoagulation and was discharged asymptomatic with enoxaparin (160 mg/day). The patient has regularly attended follow-up visits for 15 months – she is asymptomatic and has recanalized 75% of the portal flow.

Patient D

A 38-year-old female patient, weighing 113 kg, with a BMI of 38 kg/m² who was not on any medication other than an oral contraceptive. She also regularly used CPAP for sleep apnea. At laparoscopy, moderate steatosis was seen which had not been preoperatively diagnosed by ultrasonography. A sleeve gastrectomy was done (duration of the operation: 45 minutes, without complications) and the patient was discharged home with enoxaparin; however, for economic reasons, she did not use the medication. Eight days later she started to complain of postprandial abdominal pain and vomiting, and was diagnosed with PMVT based on a CT scan.

The patient was hospitalized for seven days and, after the symptoms had disappeared, was sent home with enoxaparin (160 mg/day). After seven months of follow-up, she is not on any medication, and has achieved 90% recanalization of the portal flow, with no signs of portal hypertension.

Patient E

A 29-year-old female patient, weighing 105 kg, with a BMI of 39 kg/m², with mild sleep apnea, type 2 diabetes (T2D) and moderate steatosis at the time of surgery. The only medication in use was oral contraceptives. This was the only patient in the series who underwent a gastric bypass (surgical time: 91 minutes). For economic reasons, the patient did not use unfractionated heparin after discharge. The onset of symptoms (abdominal pain and nausea) occurred on the 10th postoperative day. The intensity of the pain suggested the diagnosis of internal hernia, but this was discarded by an abdominal CT scan showing a large thrombosis of the portal, splenic and mesenteric veins. The patient was hospitalized for 13 days, and the pain persisted for 11 days. She was sent home on enoxaparin (160 mg/day). This patient developed a cavernous transformation of the portal vein with systemic hypertension and gastric fundal varices. Similarly to the other cases, the patient used enoxaparin for six months and is currently on rivaroxabana (10 mg/day).

Patient F

An older patient than the others in this series, is a 41-year-old female patient, weighing 105 kg, and with a BMI of 36 kg/m². She had hypertension, sleep apnea and moderate steatosis.

She was only on oral contraceptives. The patient underwent a sleeve gastrectomy (duration of the operation: 52 minutes), was discharged the day after, and took enoxaparin for 10 days. Her symptoms of PMVT began seven days after the operation. A CT scan showed a large PMVT, and Doppler imaging indicated no portal system flow. The patient had abdominal pain throughout almost her entire hospital stay (31 days; longer than the others). The patient tested positive for Factor V Leiden thrombophilia, and has since been kept on enoxaparin. She has had 60% recanalization and so far, is asymptomatic.

DISCUSSION

PMVT is a rare complication after bariatric surgery. Shoar et al.¹⁰, in a meta-analysis, evaluated 41 studies enrolling 110 cases of PMVT. Thirteen studies reported the number of cases of this complication in 16,137 bariatric operations with an incidence of 0.4% (68 patients). However, with the increase in the number of sleeve gastrectomies being performed, this type of complication has become more frequent, and probably, there are many undiagnosed cases. We believe that some factors that reduce the blood flow in the portal vein system are likely to be the major problem, e.g., dehydration, pneumoperitoneum (>15 mmHg), liver retraction, the duration of the operation and the gastrectomy itself. Many pre-operative risk factors for thrombosis can also be present, including severe obesity, metabolic syndrome, smoking, multiple abdominal operations, use of oral contraceptives and undiagnosed inherited thrombophilia^{11,12}. The thrombus can extend to the portal branches, the splenic veins and/or the mesenteric veins³, with different clinical manifestations, depending on the degree, site and extent of the obstruction.

An increase in the inflammatory status and hypercoagulability of the portal vein after multiple stapling of the gastric muscle and mucosa, together with resectioning of $\geq 80\%$ of the stomach could alter the circulatory stasis of the portal vein system, thereby predisposing to PMVT. We routinely staple the stomach first and then, using an advanced bipolar energy source, we disconnect the vessels of the great curvature, always avoiding the proximity of the pancreas and the spleen vascularization, thereby minimizing the heat transfer.

In a recent systematic review, Shaheen et al.⁶ detected inherited and acquired thrombophilia in at least 56% of the cases of PMVT. Shoar et al.¹⁰ reported an incidence of 43% for coagulation disorders in 68 patients with PMVT, being the most common disorders of natural anticoagulants such as proteins S and C and mutations in the prothrombin gene. High levels of factor VIII were observed in 76% of 40 cases of PMVT after laparoscopic sleeve gastrectomy in a study by Parikh et al.¹³, but this was not reported by other authors. We screened our patients for coagulation disorders and only one had thrombophilia – Factor V Leiden.

The close relationship between obesity and steatohepatitis makes it difficult to believe in a cause-and-effect relationship, but some authors advocate that patients who have these conditions may be more likely to develop portal vein thrombosis¹⁴. Verrikjen et al.¹⁵ found elevated levels of plasminogen activator inhibitor (PAI-1) in patients with non-alcoholic fatty liver disease, mainly in those with severe disease. Our six patients had moderate steatosis and no important fibrosis.

PMVT has either with silent clinical presentation with an ultimately benign outcome, or it can acutely be more severe, leading to increased risk

of death. Despite the wide range onset symptoms, the problem usually occurs on the first few days after bariatric surgery. One of our patients experienced the first symptom (involving complete obstruction of the portal system with no blood flow) on the sixth post-operative day, while in another, the abdominal pain started after nine months and was associated to a partial occlusion of the portal system. A later investigation with Doppler ultrasonography is recommended to diagnose the silent portal thrombosis that may insidiously evolve to portal hypertension. Recanalization of the thrombotic portal vein can lead to cavernous transformation with late sequelae, as seen in patient E. Thus, we suggest that long-term follow-up after bariatric surgery should include Doppler ultrasonography, every six months.

Unfractionated heparin, vitamin K antagonists, and low-molecular weight heparin are currently the most common treatment options for PMVT after bariatric surgery, as suggested by a recent metanalysis¹⁰. Anticoagulation therapy should be started after the diagnosis of thrombosis, which can improve the chances of recanalization thus avoiding future recurrence¹⁶. All our cases were on enoxaparin (160 mg/day for six months) and only one had a cavernous transformation after this period. For this patient, we initiated treatment with rivaroxabana (10 mg/day).

The rarity of PMVT means that there have been no randomized clinical trials to identify patients at high risk. Since randomized controlled trials with statistically significant analyses are extremely difficult for uncommon diseases, pooling the data from several studies may increase the statistical power of the analysis. In this regard, serial case reports provide an important aspects that may help elucidate the potential causal factors.

CONCLUSION

PMVT, after bariatric surgery, is rare and for many patients may go undiagnosed. The degree of occlusion can determine the onset and severity of the

symptoms. PMVT appears to be correlated with sleeve gastrectomy, although the reasons for this are still unknown. Prospective studies with routine screening for known risk factors and the implementation of surgical measures to prevent PMVT should be encouraged.

R E S U M O

A trombose portomesentérica (TPM) é uma complicação potencialmente grave que pode ocorrer após a cirurgia bariátrica. A TPM ganhou importância devido ao crescente número de cirurgias bariátricas sendo realizadas. **Objetivo:** Relatar complicação rara após cirurgia bariátrica, porém grave e de difícil manejo. Tentar identificar algumas características comuns aos pacientes e discutir possíveis causas, comparando a pouca literatura disponível. **Métodos:** Descrevemos seis casos de TPM em mulheres jovens com diferentes apresentações. **Resultados:** Todos os seis casos ocorreram em mulheres jovens de 29 a 41 anos sem obesidade grave - índice de massa corporal - IMC: 36 a 39 e com peso que variou de 105 a 121 kg. As pacientes apresentavam poucas comorbidades (todas relacionadas à síndrome metabólica) e esteatose hepática moderada, sem sinais de cirrose. Cinco pacientes usavam contraceptivos orais até dias antes da cirurgia. Uma paciente apresentou resultado positivo para trombofilia. Cinco pacientes foram submetidas a gastrectomia vertical e apenas uma submetida ao *bypass* gástrico sem complicações durante a cirurgia (tempo médio de operação: 61,3 min, variando de 52 a 91 min). A duração média do seguimento após a hospitalização foi de 12,3 meses (variação: 7 a 18 meses) e até o momento apenas uma paciente não teve recanalização. **Conclusão:** A frequência da TPM parece ser maior em mulheres e após gastrectomia vertical. Nossos achados indicam que pacientes com dor abdominal semanas após a cirurgia bariátrica devem ser investigados.

Palavras-chave: Obesidade. Cirurgia Bariátrica. Gastrectomia. Derivação Gástrica. Veia Porta.

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