

# QUANDO O TRABALHO SINÉRGICO ENTRE CIRURGIÕES GERAIS E VASCULARES FAZ A DIFERENÇA

## WHEN SYNERGIC WORK BETWEEN GENERAL AND VASCULAR SURGEONS MAKES THE DIFFERENCE

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### RESUMO

**Introdução:** A isquemia mesentérica crônica como resultado de uma disfunção do fluxo sanguíneo nos órgãos viscerais é caracterizada por um curso clínico insidioso e, portanto, é frequentemente uma doença subestimada e subtratada. A história natural é progressiva, causada pelo desenvolvimento da aterosclerose numa população envelhecida e com múltiplas comorbilidades. Devido à extensa colateralidade, as lesões estenóticas difusas podem permanecer assintomáticas por muito tempo e manifestarem-se apenas quando ocorre um evento clínico ou cirúrgico agudo. Nestes casos, a suspeita clínica é fundamental para se chegar a um diagnóstico atempado de forma a preservar a qualidade de vida do doente e, principalmente, assegurar a sua sobrevivência.

**Caso-clínico 1:** Mulher de 48 anos de idade com antecedentes de tabagismo recorre ao serviço de urgência por dor abdominal hipogástrica, náuseas e vômitos. Foi realizado estudo por angio-tomografia computadorizada (ATC) que demonstrou oclusão da artéria mesentérica superior, e estenose significativa do tronco celíaco e espessamento de ansas do intestino delgado sugestivo de sofrimento isquémico. Foi realizado uma trombectomia da artéria mesentérica superior (AMS) e *stenting* retrógrado do seu ostio seguido posteriormente de enterectomia extensa na laparotomia das 24 horas. Após alta hospitalar, a doente apresentou novo quadro abdominal tendo sido documentada a oclusão do *stent* na AMS. Foi submetida a um *bypass* ílio-hepático com bom resultado.

**Caso-clínico 2:** Homem de 76 anos de idade previamente submetido a um *bypass* sequencial axilo-femoral e femoro-poplíteo direitos para tratamento de isquemia crônica com ameaça de membro. O doente recorreu ao serviço de urgência com dor abdominal, vômitos e obstipação. Foi realizado o diagnóstico de um quadro suboclusivo tendo realizado estudo por tomografia computadorizada (TC) onde se observou aderência de ansas do íleon ao cego que se encontrava espessado; o tronco celíaco e AMS apresentavam estenoses suboclusivas. O doente foi submetido a um *stenting* primário do tronco celíaco com *stent* expansível em balão. Após a revascularização celíaca foi realizada uma colectomia direita com duas enterectomias segmentares.

**Conclusão:** A isquemia mesentérica é uma patologia grave muitas vezes subdiagnosticada por falta de atenção para a doença por parte da generalidade dos médicos bem como pelos sintomas inespecíficos. A intervenção vascular visa impedir a necrose intestinal que pode mesmo levar à morte do doente. O diagnóstico atempado é assim fundamental e a revascularização deve ser realizada antes ou no mesmo tempo da cirurgia intestinal. A estreita colaboração entre as equipas de cirurgia geral e vascular é de essencial importância para o sucesso destes casos.

### Palavras-chave

Aterosclerose; Isquemia mesentérica aguda; Isquemia mesentérica crônica; Revascularização da artéria mesentérica

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## ABSTRACT

**Introduction:** Chronic Mesenteric Ischemia (CMI) resulting from an impaired blood flow of the splanchnic organs is characterized by an insidious clinical course and is often an underestimated and undertreated disease. The natural history is progressive, caused by atherosclerosis progression in a polymorbidity and aging society. Due to collateralization, diffuse stenotic lesions can remain asymptomatic for a long time and usually manifests when an acute medical or surgical event occurs. In those cases, the clinical suspicion is crucial to reach the diagnosis promptly, allowing to preserve the patients' quality of life and, above all, the patients' life.

**Clinical case 1:** A 48-year-old woman with a history of smoking goes to the emergency department for hypogastric abdominal pain, nausea, and vomiting. A study was performed by computed tomography angiography (CTA) that demonstrated occlusion of the superior mesenteric artery (SMA) and significant stenosis of the celiac trunk associated with thickening of small bowel suggestive of ischemia. A thrombectomy of the superior mesenteric artery and retrograde stenting of the artery ostium was performed, followed by extensive enterectomy on 24-hour laparotomy. After hospital discharge, the patient had new abdominal complaints, and stent occlusion was documented in the SMA. She underwent an iliohepatic bypass with good results.

**Clinical case 2:** A 76-year-old man previously submitted to a right axillofemoral and femoropopliteal sequential bypass to treat chronic limb-threatening ischemia (CLTI), went to the emergency department with complaints of abdominal pain, vomiting, and constipation. The diagnosis of a subocclusive intestinal syndrome was made, having performed a computed tomography (CT) scan where it was observed the ileum adhered to the cecum, which was thickened; the celiac trunk and SMA had subocclusive stenosis. The patient underwent primary celiac trunk stenting with a balloon-expandable stent. After celiac artery revascularization, a right colectomy was performed with two segmental enterectomies.

**Conclusion:** Mesenteric ischemia is a severe condition that is often underdiagnosed due to the lack of awareness of most physicians and nonspecific symptoms. The vascular intervention aims to prevent intestinal necrosis, which can lead to the patient's death. Timely diagnosis is therefore essential, and revascularization must be performed before or at the same time as intestinal surgery. The close collaboration between the general and vascular surgery teams is essential to the success of these cases.

### Keywords

Atherosclerosis, Acute mesenteric ischemia, Chronic mesenteric ischemia, Mesenteric artery revascularization

## INTRODUCTION

Underlying atherosclerosis in abdominal arteries is a common situation in aging patients with polymorbidities. However, it also occurs in younger people with other etiologies such as prothrombotic coagulation abnormalities or arterial dissection<sup>(1)</sup>.

Atherosclerosis of the mesenteric arteries can remain asymptomatic for a long time and manifests when an acute medical or surgical event occurs. This insidious natural history happens because the organism adapts itself by collateral circulation, and symptoms only become evident if a precipitating factor befalls<sup>(2)</sup>. Examples of precipitating factors are low arterial blood flow resulting from heart failure, dehydration, or complete arterial occlusion by in situ thrombosis or embolization. When intestinal surgery is needed, the suspicion and confirmation of poor visceral irrigation preclude a different treatment schedule that includes arterial revascularization before the gastrointestinal procedure<sup>(3)</sup>.

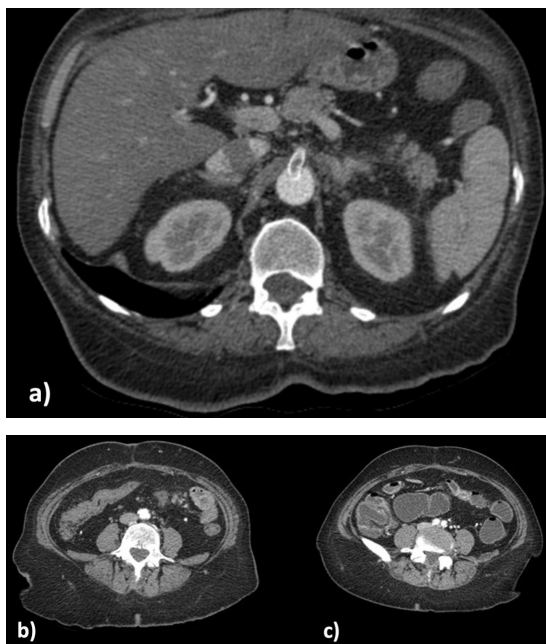
By this way, we can provide the ideal therapy with excellent surgical results and good patient quality of life.

On this subject, two cases are presented in which the close collaboration between general surgery and vascular surgery have led to successful therapy outcome.

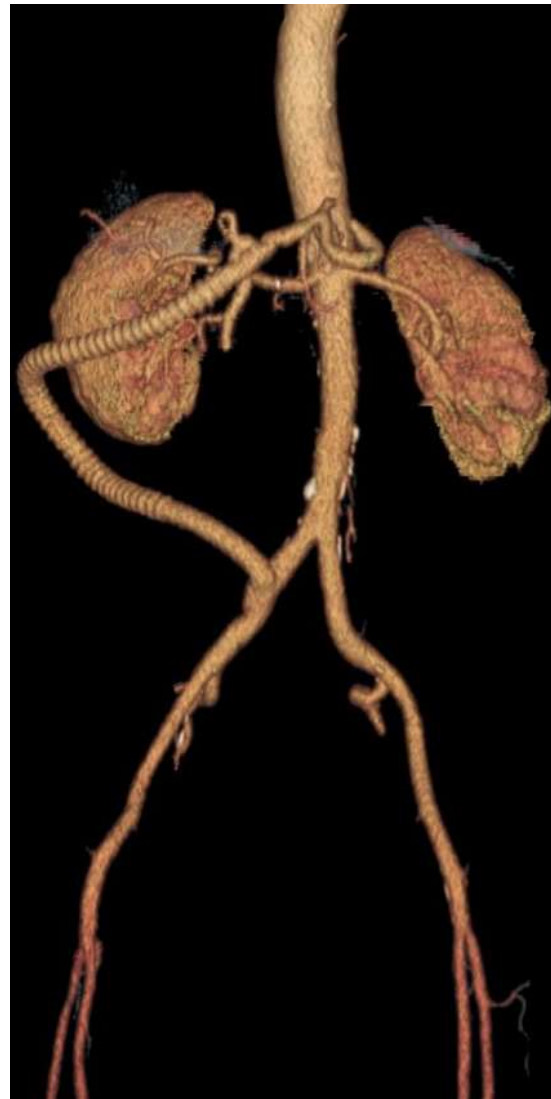
### CLINICAL-CASE 1

A 48-year-old female patient was admitted to the emergency department with hypogastric abdominal pain accompanied by nausea and postprandial vomiting. These complaints arose in the past year with a gradual increase of severity in the last 15 days before resorting to the hospital. In her history, she mentioned cardiovascular risk factors (smoking, hypertension, hyperlipidemia). The workup performed revealed leukocytosis, elevated lactate, and Computed Tomography (CT) images compatible with occlusion of the superior mesenteric artery (SMA) and stenosis of the

celiac trunk associated with thickening of the intestinal walls, without signs of pneumatosis. She underwent exploratory laparotomy with SMA thrombectomy, retrograde open mesenteric stenting (ROMS) at the artery ostium, and closure of the SMA arteriotomy with the saphenous vein. Intraoperative, 40 cm of proximal jejunum and 20 cm of distal ileum were viable, and the remaining intestine overall showed signs of poor perfusion but without evidence of necrosis. For that reason, a second-look laparotomy was scheduled for the following day. In the postoperative period, the patient started an infusion of unfractionated heparin. On relaparotomy, ischemia progression was visible, which required extensive enterectomy with jejunoleal anastomosis (preserving 60 cm of the jejunum and 20 cm of the ileum). She maintained the heparin, which was later changed to low molecular weight heparin. The postoperative period was initially performed in an intensive care unit. It was necessary to control renal dysfunction, hypertension, acute intestinal failure, and central venous catheter sepsis. She was discharged 51 days after the operation. In the following three months, she tolerated food well. However, she needed to resort to the hospital again due to a one-month history of postprandial vomiting and abdominal pain worsening in the last 15 days. A CT angiography (CTA) was performed, showing a SMA stent thrombosis, compromised distal flow, and thickening of the small bowel with a stenosis in the previous entero-enteric anastomosis (figure1).



**Figure 1** a) SMA stent thrombosis; b) inflammation and edema of intestinal wall; c) stenosis of 5 cm ileon extension.



**Figure 2** CT scan 3D reconstruction after ileohepatic bypass: final result.

She underwent an ileohepatic bypass with an 8 mm PTFE graft (FIGURE 2). Postoperatively, there was a suspicion of vascular prosthesis infection; however, the patient fully recovered under antibiotic treatment. She was discharged after 51 postoperatively days. A study of prothrombotic factors was performed only with the JAK2 V617F mutation being identified. At one-year follow-up, she was asymptomatic without ileal stenosis identified in the CT scan.

## CLINICAL-CASE 2

A 76-year-old-man was proposed for revascularization due to chronic limb-threatening ischemia (CLTI) with rest pain on the right foot. CTA showed significant aortoiliac and femoropopliteal disease. The patient did not have clinical conditions for major aortic surgery or anatomical conditions for endovascular treatment. He was submitted to a right axillofemoral bypass with a sequential popliteal bypass. He needed two blood transfusion units (one during the procedure). Due to the suspicion of nosocomial respiratory infection, the patient completed one week of antibiotic therapy with piperacillin + tazobactam. At the time of discharge (26 days after the admission), he was clinically stable, afebrile with decreasing inflammatory markers, and surgical wounds with good healing without inflammatory signs. He was readmitted to the hospital 32 days after the discharge with abdominal pain, vomits, and constipation. Physical examination revealed abdominal pain and tenderness to palpation. CT scan showed ileum adhesion to a thickened cecum; the celiac trunk had a severe degree of stenosis, and the SMA was occluded. Analytically presented leukocytosis and an elevated c-reactive protein. He initiated antibiotic therapy (piperacillin + tazobactam) and parenteral nutrition. Seven days later, he was submitted to a celiac trunk primary stenting with a balloon-expandable stent (FIGURES 3 AND 4). Five days after the vascular procedure he was submitted to a right colectomy with segmental enterectomy by colorectal surgeons (FIGURE 5). The post-operative period was uneventful, and he was discharged on the ninth day after the surgical procedure. At a 6-month follow-up, the patient remains without any gastrointestinal symptoms.

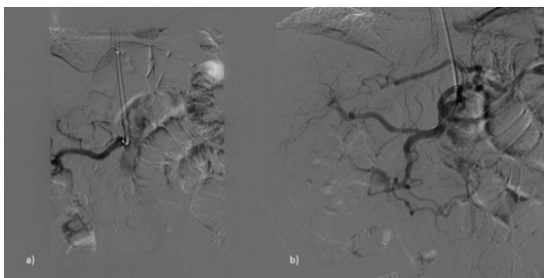


Figure 3 Angiography: CT stent placement.

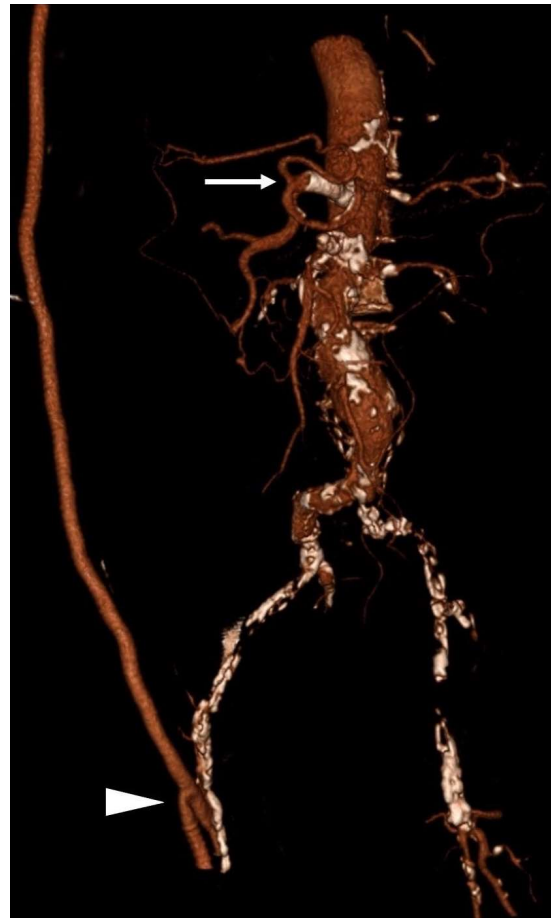


Figure 4 CT angiography 3D reconstruction showing a patent celiac artery stent and perfusion of the arterial branches (arrow) as well as the patency of revascularization of the right lower limb with an axillofemoral and femoropopliteal sequential bypass (arrowhead)

## DISCUSSION

Atherosclerosis in splanchnic arteries (the celiac trunk, superior mesenteric artery, or the inferior mesenteric artery) is relatively common in older age groups<sup>(4)</sup>. Due to the redundancy of the blood supply in the mesenteric territories and the fact that atherosclerosis usually has a slow progression with the development of an extensive network of collateral arteries, the patient can be asymptomatic for a long time. In severe cases, usually when two or more of the mesenteric vessels are affecting the patient can present with postprandial abdominal pain and severe malnutrition. When an acute medical or surgical event occurs (i.e., heart failure, dehydration, or complete arterial occlusion by in situ thrombosis or embolization), the patient can present with acute or acute-on-chronic mesenteric ischemia a much dreaded, and often lethal complication usually associated with bowel infarction<sup>(1,2,5)</sup>.





**Figure 5** Resected specimen : cecum wall necrosis.

The suspicion of underlying atherosclerosis in the splanchnic arteries is fundamental for planning and resolving the present clinical cases.

Symptomatic patients with CMI should be treated without much delay because of the higher risk of progression to acute mesenteric ischemia. It is estimated that symptoms of CMI are previous present in 43% of patients who develop acute mesenteric ischemia (AMI)<sup>(6)</sup>. This aspect was illustrated in our first case. The diagnosis of chronic mesenteric ischemia is made belatedly, although the patient was symptomatic, leading to an acute and severe event. The patient already manifested symptoms of chronic mesenteric ischemia such as abdominal pain and vomiting that worsen and lead to dehydration and complete arterial occlusion by vascular thrombosis. In the second event of this patient, the diagnosis of mesenteric vascular insufficiency and SMA occlusion was timelier, which allowed an effective vascular procedure without the need for an extensive enterectomy.

On the other hand, in asymptomatic patients with colorectal surgery planned, the need for prior revascularization must also be considered. This clinical scenario is what happened in the second case. The patient was asymptomatic, but the low arterial blood flow leads to an intestinal obstruction caused by cecum wall ischemia. In this case, the diagnosis of intestinal obstruction provoked by cecum wall ischemia was also not the first hypothesis. However, it helped the suspicion of severe atherosclerosis and lower limb revascularization, which led to planning celiac artery revascularization before right colectomy with two enterectomies. It is estimated that 25% of patients admitted for lower extremity arteriography have significant stenosis of the mesenteric arteries<sup>(7)</sup>. Vascular surgery is a crucial point in the treatment plan of these two patients with mesenteric ischemia. Despite the growing bibliography on this subject, many controversies persist regarding the optimal vascular treatment<sup>(8,9)</sup>. These controversies include the type of surgical repair endovascular vs. open bypass (antegrade/ retrograde) and the number of arteries that should be treated (single- vs. multiple-vessel reconstruction)<sup>(10)</sup>. Regardless of the complexity of the vascular intervention, the mesenteric revascularization was essential in both cases.

The procedure was made in the emergency room by an open approach in the female patient: superior mesenteric artery (SMA) thrombectomy and retrograde stent placement at the occlusion site. The procedure was only partially effective, and four months later, she presented SMA thrombosis at the stent level. Maybe the presence of the JAK2 V617F mutation contributed to the new thrombotic event<sup>(11)</sup>. In this phase, the solution to the problem was made with an open ileohepatic bypass. A resolution of ischemic ileal stenosis occurs without the need for enterectomy. This way, it was possible to avoid another intestinal surgery and the risk of short bowel syndrome. In the man patient submitted to a right axillofemoral bypass with a sequential popliteal bypass already with CMI and the need for gastrointestinal revascularization before colorectal surgery; the option was the celiac trunk primary stenting. This solution allowed a safe and effective elective colorectal intervention.

## CONCLUSION

Chronic mesenteric ischemia associated with atherosclerosis of splanchnic arteries can be a considerable problem with harmful consequences, especially if its existence is not suspected. This pathology is

often underdiagnosed by the lack of attention from attending physicians, given that the symptoms progress slowly. An active investigation must be performed whenever the patient has symptoms or has several risk factors and needs gastrointestinal surgery. When severe atherosclerosis is diagnosed, the revascularization before gastrointestinal surgery may provide excellent results. Two cases on this subject are reported showing that close collaboration between general surgery and vascular surgery is essential for a successful therapy outcome.

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