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Superior mesenteric vein thrombosis following open right hemicolectomy and cholecystectomy.

Casr report

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AIM: Superior mesenteric vein thrombosis (SMVT) is an uncommon but potentially life-threatening postoperative complication of colorectal surgery. Risk factors and prognosis of SMVT have been poorly described and data to create gold standard criteria for diagnosis and management are lacking. SMVT has a wide spectrum of clinical presentation, hence, its early identification may be a diagnostic challenge.

CASE REPORT: 56 year old obese female patient with inherited prothrombotic condition underwent an open right hemicolectomy plus cholecystectomy; the immediate postoperative course was uneventful but on postoperative day 8, already at home, she experienced post-prandial abdominal pain without any other local or systemic signs or symptoms. The CT scan showed a complete thrombosis of the superior mesenteric vein without any bowel complications. Immediately submitted to systemic subcutaneous anticoagulation bridge therapy to a lifelong oral anticoagulation she had a complete clinical recovery on postoperative day 17, despite the persistence at CT scan of complete SMVT without any intestinal suffering.

DISCUSSION: SMVT is a multifactorial event where both local and general factors are involved. Conclusive data about comparison of SMVT incidence in laparoscopic vs open colorectal surgery and those about its incidence in cancer vs non cancer groups of patients in relation to the surgical technique are missing. Variability of clinical course and the absence of specific signs, symptoms and laboratory findings make diagnosis of SMVT challenging, therefore it is crucial to have high suspicion. As for the treatment, first line approach is systemic anticoagulation therapy with LMWH for at least 6 months, followed by oral anticoagulation, the earlier we initiate the therapy the greater rate of recanalization we will get.

CONCLUSION: prompt diagnosis and more aggressive thromboprophylaxis in patients with inherited or acquired risk factors may prevent the negative evolution towards bowel necrosis of SMVT.

KEY WORDS: Colorectal surgery, Superior mesenteric vein thrombosis, Hypercoagulable disorders, Thromboprophylaxis.

Introduction

Superior mesenteric vein thrombosis (SMVT) is an uncommon but potentially life-threatening postoperative complication ¹ of both open and laparoscopic colorectal surgery ². SMVT is seen in approximately one in ten

thousand abdominal surgery within 30 days of surgery ¹ and it accounts from 5% to 15% of all mesenteric ischemic events ³ causing longer hospital stay and higher readmission rates ¹. SMVT has been previously described after procedures involving the ligation of major portal tributaries or directly the portal venous system, but rarely after surgery without injuries to the portal system ⁴. Risk factors and prognosis of SMVT have been poorly described ² and data in the broader surgical population are lacking ⁵, leading to an absence of gold standard criteria for diagnosis and management for SMVT ⁶. Several factors may contribute to the development of SMVT after colorectal surgery, including the type of procedure, intraoperative manipulation of mesenteric vessels,

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intraabdominal overpressure pneumoperitoneum-induced in laparoscopic procedures, postoperative abdominal septic complication, inherited prothrombotic conditions, cirrhosis, pancreatic cephalic adenocarcinomas, secondary to its vessels invasion⁷, hepatocellular carcinoma¹, oral contraceptives use⁸ and the underlying disease leading to surgery, such as above all cancer or inflammatory bowel diseases (IBD)². Moreover, as it has a wide spectrum of clinical presentation, its early identification may prove to be a diagnostic challenge, this for remains crucial to have a high index of suspicion for this uncommon complication⁶.

Nowadays, reported case mainly involve laparoscopic splenectomy, Nissen funduplication surgery, bariatric surgery and colonic resection⁹, especially for IBD¹⁰. So that, the limited data available so far especially concern laparoscopic colorectal surgery or at least hand assisted laparoscopic surgery, described since 1991⁴, but those concerning open colorectal surgery are lacking.

Case Report

We present the case of a 56 years old female patient, with BMI of 39 kg/m², presenting abdominal pain in the right quadrants, accompanied occasionally by post-prandial nausea and vomiting, for which underwent US and routinary colonoscopy for work up; the patient was found to have adenocarcinoma of the ascending colon along with chronic lithiasic cholecystitis. Past medical history was significant for hereditary thrombophilia (mutation of factor II and PAI-1), for which she was under oral anticoagulation therapy with warfarin, iron deficiency anemia, hypertension, acute myocardial infarction with clean coronary arteries at the PTCA, acute ischemia of the left lower limb, for which she underwent amputation of the left lower limb, and fibromyalgia.

A comprehensive preoperative work up was undertaken, including CT scan with intravenous contrast injection of the abdomen and chest for correct staging of the tumor along with cardiology, oncology consultation according to which surgery was recommended. Also, an hematologic consultation was obtained and it recommended to stop taking warfarin with a subcutaneous low molecular weight heparin (LMWH) bridge at a prophylactic dose of 6000 UI once a day.

Subsequently, we admitted the patient to our surgical division; she underwent 2 fresh blood transfusion to treat the anemia and reach the best conditions for the surgery; institutional deep venous thrombosis perioperative prophylaxis was established, with subcutaneous LMWH and compression stockings, along with institutional antibiotic prophylaxis (metronidazole and cephalosporin). Hence, she underwent an open right hemicolectomy plus cholecystectomy; the specimen, sent for pathologic examination, revealed a poorly differentiated adenocarcinoma (G3) of the ascending colon with pericolic tumor deposit and perineural and vascular infiltration along with appendix invasion and no regional node localization (T4 N0, Mx, Dukes Stage 2C). The immediate postoperative course was uneventful, she was started on a liquid diet on postoperative day 2 and on a general diet the following day stopping supportive liquid and antibiotic infusion therapy. After 72h from the surgery, with the reduction of the bleeding risk, we stopped subcutaneous LMWH and switched to her previous oral anticoagulation therapy. We removed the abdominal drain on postoperative day 4. We discharged the patient on post-operative day 5 in apparently good general conditions, physical examination was unremarkable, no venous thrombosis was reported and laboratory findings were normal.

On post-operative day 8 the patient experienced a persistent post-prandial abdominal pain to the right lower quadrant, even if the diet was still tolerated and no other

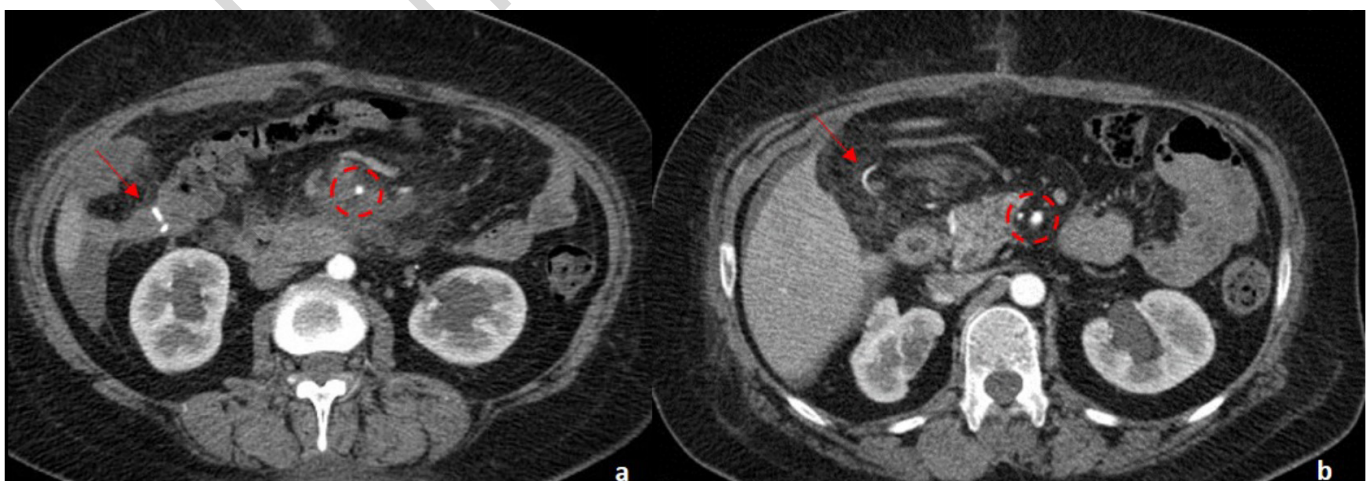


Fig. 1: CT scan acquired on postoperative day 7: A) complete thrombosis of the superior mesenteric vein (red circle), with no signs of visceral damage (red arrow); B) n.

gastrointestinal symptoms appeared; so she was readmitted to our division, she underwent physical examination, laboratory studies and CT scan. She was hemodynamically stable and afebrile, the physical examination showed inappropriate abdominal pain to the right lower abdominal quadrant, without tenderness or distension of the abdomen, there was no ileus or vomiting and no alterations of laboratory tests were reported.

The CT scan with intravenous contrast injection showed a complete thrombosis of the superior mesenteric vein without any signs of secondary bowel complication such as infarction (Fig. 1 A,B).

A new hematologic consultation was obtained according to which we started immediately a systemic subcutaneous anticoagulation therapy at a therapeutic dose of 100UI/kg twice a day (10.000 UI twice a day); we also put the patient on fasting and initiated a supportive infusion and antibiotic therapy.

On post-operative day 11 the physical examination of the abdomen turned out to be unremarkable, we still did not notice any laboratory tests alteration nor other gastrointestinal and systemic signs or symptoms and on post-operative day 11 the patient was restarted on a general diet, ending the supportive and antibiotic infusion therapy. We got a second hematologic consultation which recommended subcutaneous anticoagulation therapy (10.000 UI twice a day) for 6 months followed by a switch to lifelong oral anticoagulation therapy.

We discharged the patient on postoperative day 17 in good general conditions, tolerating the general diet, with normal laboratory findings and without any gastrointestinal complains, even in persistence of a complete superior mesenteric vein thrombosis has shown by the last CT scan obtained on postoperative day 16 (Fig. 2).

She followed an adjuvant chemotherapy protocol. We performed a CT scan control after 6 months that showed

a reduction of the thrombus involving the superior mesenteric vein and another one after 12 months showing a complete revascularization of the SMV and no progression of the underlying neoplastic disease.

We could not avail ourselves of Color Doppler US as follow up imaging method, due to the patient's BMI and to its operator dependency.

Discussion

SMVT is condition caused by the development of pathological clot in the portomesenteric venous (PMV) system [6]. This life threatening uncommon complication after abdominal surgery has been recognized and treated since the late 19th century and although large series are few its incidence in the post-operative period appears to be low ⁵. This is a multifactorial event where both local and general factors are involved in placing an individual risk ¹¹. We point out that even if in the general population, inherited thrombophilia is diagnosed in 33%-75% of patients with porto-mesenteric venous thrombosis PMVT⁵

Moreover, we must underline that locoregional factors particular to laparoscopic surgery may lead to the development of SMVT in both animal and human studies⁴; those include: insufflation of the abdomen, increased intra-abdominal pressure and hypercapnia with consequent decreased mesenteric and portal venous flow and mesenteric vasoconstriction; reverse Trendelenburg position necessary for various laparoscopic procedures; intra-surgical manipulation of portal and mesenteric vessels with endothelium damaging ⁴. Nevertheless, conclusive data about comparison of SMVT incidence in laparoscopic vs open colorectal surgery are missing, like those about its incidence in cancer vs non cancer groups of patients in relation to the surgical technique (open vs laparoscopic) ^{1,2,5}.

SMVT sequelae range from asymptomatic incidental postoperative finding to non specific abdominal pain or even life threatening complications as a result of venous congestion and subsequent intestinal ischemia ⁵. Clinical features are determined by the location and timing of the thrombus formation within the splanchnic ¹¹; signs and symptoms may be absent or include fever, inappropriate abdominal pain, ileus, hypotension, peritonitis, distension or abdominal tenderness; laboratory tests are usually normal and not useful to reach a correct diagnosis ⁶.

Acute MVT is characterized by symptomatic presentation within 24 to 72 hours of thrombus formation with sudden onset of symptoms, which accounts for 60% to 80% of MVT, whereas subacute MVT presents during days to weeks of nonspecific symptoms ¹³.

CT scan with intravenous contrast injection is the most sensitive diagnostic method, as it can evaluate the extent of the thrombus and its secondary bowel complications,



Fig. 2: CT scan acquired on postoperative day 16: persistence of the thrombus in the superior mesenteric vein (red circle) without any intestinal suffering (red arrow).

such as ischemia or necrosis²; other imaging diagnostic methods have high sensitivity and specificity, including MRI and color Doppler US, but expense, availability, operator dependency and time required have limited their⁶, even if color Doppler US is most often used to assess the evolution of PMVT during the follow up². In our case report we observed the clinical features of a superior mesenteric vein thrombosis (SMVT), the patient had non specific postoperative abdominal pain in the right lower quadrants, appeared few days after surgery, in the absence of signs of bowel ischemia or laboratory tests alteration. Our patient also had several individual prothrombotic factors such as obesity, inherited hypercoagulable state and advanced neoplastic colon disease, but also strictly surgical factor, as direct surgical trauma to the middle colic veins, with resulting thrombosis, is likely to be the precipitating factor in a borderline intrinsically hypercoagulable environment¹⁰.

Pathophysiology of this entity has been explained by the extension of the thrombus in the superior mesenteric vein at a rate fast enough to cause pain but slow enough to allow collaterals to form, determining unremarkable physical examination or laboratory findings¹².

Variability of clinical course and the absence of specific signs, symptoms and laboratory findings make diagnosis of SMVT very challenging¹², therefore it is crucial to have high suspicion for this uncommon complications¹¹ especially if new onset postoperative non specific abdominal pain is present, which should require an immediate CT scan². So that SMVT should be taken into consideration among the differential diagnoses in patients experiencing unexplained abdominal pain and/or ileus after surgery with or without other synchronous signs, symptoms or laboratory findings¹, mainly in the presence of individual risk factors for SMVT of which surgeons and physician must be aware⁵.

As for the treatment, not enough data are available to create gold standard criteria for the management of this condition, hence the therapy remains individualized on a case by case basis depending on the extension of the thrombus, patient's clinical status and condition of the affected bowel⁶. In the past the standard treatment was laparotomy, it allowed also a correct diagnosis as imaging diagnostic methods were lacking, nowadays we prefer non surgical approach if secondary bowel complications are not reported¹². First line approach is systemic anticoagulation therapy with LMW Heparin for at least 6 months, followed by an heparin to oral anticoagulation bridge⁶, the earlier we initiate the therapy the greater rate of recanalization we are able to get³. Initiating the therapy within a week from the diagnosis we get up to 40%-50% rate of recanalization after 6 months²; current evidence suggests that 6 months of anticoagulation therapy is appropriate if no prothrombotic disorders are identified, otherwise lifelong treatment is strongly recommended². Nevertheless we observe a 10% rate of failure, in those non responders to anti-

coagulation therapy patients other therapeutic methods are available such as transcatheter thrombolysis or mechanical thrombectomy¹¹, reaching a 85% rate of success⁶; these alternative methods have a high haemorrhagic risk so that only symptomatic patients with severe SMVT in which an inadequate response or recurrence under optimal anticoagulation therapy is observed should be considered suitable for them¹¹. Furthermore, surgery must not be delayed in patients with signs of intestinal necrosis or perforation, preferring an open approach¹¹.

Conclusion

SMVT remains an uncommon complication after colorectal surgery, which can lead to life threatening events and it has been seen to be associated to longer hospital stay and higher rates of readmission.

SMVT can occur despite the preoperative thromboprophylaxis hence, more aggressive prophylaxis in general population is not indicated given the low rate of this complication and lack of serious long term sequelae.

In addition to this, we must stress that clinical presentation could be extremely unspecific and diagnosis very challenging, besides, the value of routine CT imaging for asymptomatic patients remains questionable and might be difficult to justify, as for its cost effectiveness. In light of our experience we feel to state that a more aggressive anticoagulation prophylaxis with LMWH at therapeutic dose instead of prophylactic one, in patients with specific individual risk factors for PMVT, such as prothrombotic inherited state, along with a prompt diagnosis based on high index of suspicion for this uncommon complication, may lead to a better management of postoperative SMVT and prevent its negative evolution. Nowadays, further studies are necessary to confirm our hypothesis.

Riassunto

INTRODUZIONE: La SMVT è una seria, rara complicanza della chirurgia addominale. I fattori di rischio sono molteplici, ma scarsamente descritti tanto che i dati sono insufficienti per creare gold standard per la diagnosi e trattamento. La SMVT ha un ampio spettro di presentazioni cliniche, così che spesso la sua diagnosi precoce può essere complessa.

CASE REPORT: Una donna obesa di 56 anni con un disordine protrombotico ereditario è stata sottoposta ad emicolectomia destra e colecistectomia open; l'immediato decorso post-operatorio è stato regolare e la paziente è stata dimessa in quinta giornata post-operatoria. In ottava giornata post-operatoria la paziente ha presentato dolore addominale diffuso post-prandiale, in assenza di altri segni o sintomi. La CT ha mostrato una trombosi completa della vena mesenterica superiore senza soffe-

renza intestinale. La paziente è stata quindi immediatamente sottoposta a terapia sistemica anticoagulante sottocutanea convertita successivamente ad anticoagulanti orali sine die, con completa risoluzione clinica in diciassettesima giornata post-operatoria, nonostante la persistenza radiologica della completa trombosi della vena mesenterica superiore in assenza di segni di sofferenza colica.

DISCUSSIONE: La trombosi della vena mesenterica superiore è una condizione ad eziologia multifattoriale. Attualmente mancano dati conclusivi riguardo il confronto della sua incidenza nella chirurgia open o laparoscopica e, in gruppi di pazienti oncologici e non in relazione alla tecnica chirurgica. La diagnosi è resa difficile dalla variabilità di presentazione clinica e dall'assenza di sintomi, segni e alterazioni di laboratorio specifiche, così che per la diagnosi, è necessario avere un alto indice di sospetto. Per quanto riguarda la terapia, l'approccio di prima linea prevede una terapia anticoagulante sistemica con EBPM per almeno 6 mesi con un successivo passaggio alla terapia anticoagulante orale; prima si inizia la terapia più alto sarà il tasso di rivascolarizzazione.

CONCLUSIONI: Una diagnosi precoce e una più aggressiva profilassi antitrombotica in pazienti con fattori di rischio congeniti o acquisiti possono prevenire una evoluzione negativa della SMVT.

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