Clinical cases

Chirurgia (2013) 108: 256-258
No. 2, March - April

3D for D3: Role of Imaging for Right Colectomy in a Case with Congenital Superior Mesenteric Vein Aneurysm and Co-Existing Anomalous Irrigation

S. Kiil[1], B.V. Stimec[2], M. Spasojevic[3], J.H.D. Fasel[2], D. Ignjatovic[3,4]

[1]Department of Vascular Surgery, Vestfold Hospital, Tonsberg, Norway
[2]Faculty of Medicine, Department of Cellular Physiology and Metabolism, Anatomy Sector, University of Geneva, Switzerland
[3]Department of Gastrointestinal Surgery, Vestfold Hospital, Tonsberg, Norway
[4]Department of Digestive Surgery, Akershus University Hospital, University of Oslo, Lørenskog, Norway

Rezumat

3D pentru D3. Rolul imagisticii pentru colectomia dreaptă într-un caz de anevrism congenital de venă mezenterică superioară cu coexistența unei anomalii de vascularizare

Premize: Colectomia dreaptă D3 pentru cancer presupune disecția în proximitatea vaselor mezenterice superioare, ceea ce necesită evaluare imagistică 3D a acestor pacienți.
Prezentare de caz: Prezentăm cazul unui pacient cu adenocarcinom cecal, la care s-a efectuat o rezecție 3D a colonului drept, precedată de MDCT preoperator cu reconstrucție multiplan 2D şi volumetrie 3D.
Rezultate: Analiza datelor obținute a relevat un anevrism congenital rar a venei mezenterice superioare inferior de confluența splenomezenterică şi coexistența unei anomalii de vascularizare sub forma unui trunchi ileo-mezenteric. Intervenția chirurgicală a fost efectuată conform planului iar pacientul nu prezintă semne de recurență a bolii la 1 an postoperator.
Concluzie: Cazul prezentat - cu o configurație vasculară rară şi complicată - ilustrează foarte bine că post-procesarea multimodală a datelor imagistice obținute prin examenul computer tomografic pentru determinări volumetrice permite evaluarea corectă a configurației vaselor de sânge cu flux normal şi în consecință planificarea, pregătirea şi efectuarea unei intervenții chirurgicale delicate, evitând capcanele chirurgicale şi leziunile iatrogene.

Cuvinte cheie: colectomie, venele mezenterice, anevrism, tomografie computerizată, trunchiul gastrocolic

Abstract

Background: The D3 right colectomy for cancer requires dissection in the vicinity of the superior mesenteric vessels, which requires preoperative 3D imaging in these patients.
Case report: We present a patient with a caecum adenocarcinoma cancer which underwent D3 resection of the right colon, preceded by pre-operative MDCT with 2D multiplanar reconstruction and 3D volume rendering.
Results: The dataset analysis revealed a rare congenital aneurysm of the superior mesenteric vein below the splenomesenteric confluence and a co-existing anomalous irrigation in the form of an ileo-mesenteric trunk. The surgical procedure was carried out as planned and the patient presents no signs of recurrence of the disease one year after the intervention.
Conclusions: The case presented – with a rare and complicated vascular situs – illustrates particularly well that multimodal post-processing of the CT dataset for volume rendering allows proper assessment of the arrangement of pertinent blood

Corresponding author: Bojan V Stimec, MD, PhD
Faculty of Medicine, Department of Cellular Physiology and Metabolism, Anatomy Sector, University of Geneva, Rue Michel-Servet 1, 1211 Geneva, Switzerland
Tel.: +41-22-3795320; Fax: +41-22-3795260
E-mail: bojan.stimec@unige.ch

vessels, and, consequently in the planning, setup and accomplishing the delicate operation, avoiding the surgical pitfalls and iatrogenic injuries.

Key words: colectomy, mesenteric veins, aneurysm, computerized tomography, gastrocolic trunk

Introduction

Surgical treatment of right colon can imply D3 resection. This procedure requires dissection in the vicinity of the superior mesenteric vessels (1,2). The complexity of the mesenteric vasculature is what makes preoperative 3D imaging extremely valuable in these patients (3).

We present a D3 right colectomy in a patient where preoperative 3D imaging provided data on a rare case of a superior mesenteric vein (SMV) aneurysm and co-existing anomalous irrigation. Postprocessing of the dataset allowed for a safe and effective surgical procedure.

Case report

A 78-year old female was diagnosed with caecum adenocarcinoma at colonoscopy. A routine preoperative MDCT angiography was performed and presented an aneurysm of the SMV with a co-existing anomalous ileo-mesenteric trunk. The patient underwent a D3 resection of the right colon as previously described (4) and was discharged after 7 days. She presents no signs of recurrence of the disease one year after the intervention.

The CT dataset was analyzed through 2D multiplanar reconstruction with maximum intensity projection and a 3D volume rendering technique, using open-source Osirix v.3.9 64-bit image processing software (for Macintosh) (Fig. 1). A SMV aneurysm without intravascular thrombosis (1.8 cm x 2.1 cm) was detected at the level L3, 2.2 cm below the splenomesenteric confluence. A spirally formed gastrocolic trunk of Henle (GTH) had its confluence with this aneurysm. A large jejunal branch and a narrow short common trunk for the ileocolic (ICV) and ileal vein created the SMV. Jejunal arteries did not accurately follow their venous counterparts. An ileo-mesenteric trunk (IMT) emerged just below the confluence of the portal vein (at the same site as the inferior mesenteric vein) and passed in front of the SMA and the jejunal arteries, supplying the proximal ileum. The mesenteric vascular syntopy and morphometry were as follows: both the middle colic artery (MCA) and the ileocolic artery (ICA) crossed the SMV anteriorly, with the length of the presumed stump (course between the origin and the right border of the SMV) 6.6 cm and 2.5 cm, respectively; the distance ICA-GTH along the right border of the SMV was 1.3 cm, and the MCA-ICA origin distance was 1.8 cm. These parameters and vascular syntopy were confirmed to be precise at surgery (Fig. 2).

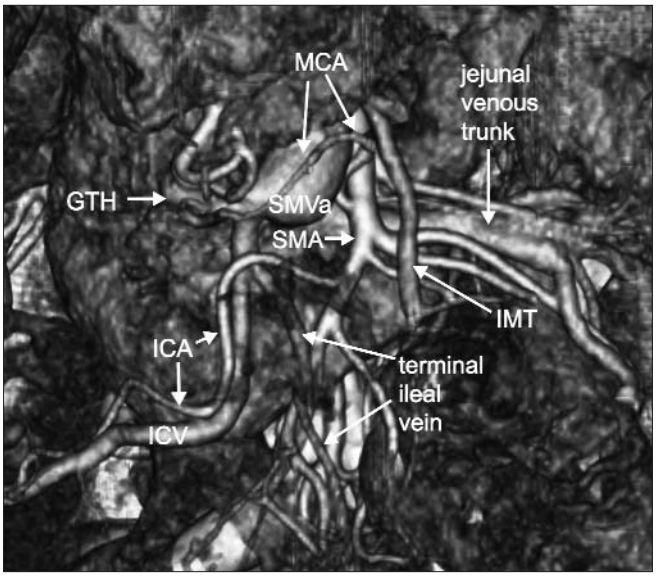

Figure 1. *3D volume rendering accomplished by means of OsiriX® v.3.9. 64-bit software. Captions: SMA – superior mesenteric artery, GTH – gastrocolic trunk of Henle, ICA – ileocolic artery, ICV – ileocolic vein, MCA – middle colic artery, SMVa - superior mesenteric vein aneurysm, IMT – ileo-mesenteric trunk*

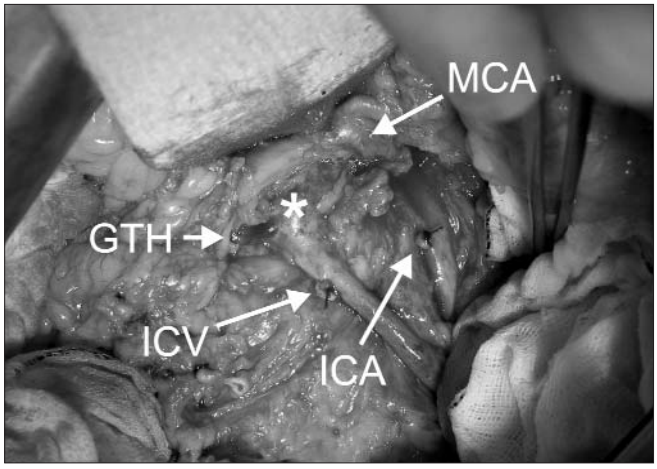

Figure 2. *D3 right colectomy - intraoperative view. The ileocolic vessels are tied off and divided at their root. Superior mesenteric vein aneurysm (asterisk). Captions as in Fig. 1*

The specimen was divided into 2 parts after removal through a line that ran 1 cm to the right from the SMV (5), into the D3 and D2 specimen. Histology showed moderately differentiated adenocarcinoma T3N0, 28 lymph nodes harvested, 15 in the D3 region.

Discussion

It has been proposed that a SMV exceeding 1.4 cm in diameter together with the loss of wall parallelism should be considered aneurysmatic (6). The GTH confluence into the aneurysm is significant because the avulsion of the GTH

during right colectomy has been reported as reason for troublesome bleedings (7). In addition, an ileo-mesenteric trunk running parallel and anterior to the SMA represents a specific problem when accessing the central lymph nodes in this patient, requiring it to be mobilized to the left prior to lymphadenectomy.

Aneurysms of the SMV are a rare finding - only 10 cases have been reported up to date, not one in context to right colectomy for cancer (8). On the other hand, these aneurysms tend to be located at the confluence with the splenic vein making this case even more unusual (9). An overview of the literature (6,8,10-13) shows that the aneurysm diameter ranges from 18-60 mm and that diagnosis is obtained due to new imaging techniques and postprocessing procedures.

These aneurysms can be congenital or acquired. Incomplete regression of the caudal part of the right vitelline vein at embryological stage 13 (28th postcoital day) leaves a venous bud that is a nucleus for the future ectasia (14). An inherited weakness of the vein has also been proposed in the pathogenesis;, as such vessels may dilate even under normal pressure (13,15). The acquired factors include portal hypertension, acute pancreatitis (fragilization by pancreatic enzymes), venous sclerosis, hypercoagulability with clot formation, A-V fistulas, and abdominal trauma to the vascular wall giving rise to a pseudoaneurysm (12,15). Our patient had a SMV aneurysm without any of these contributing factors, suggesting a congenital origin.

The SMV is usually composed of a single trunk that is formed by two main branches (right and left) that receive blood from the right colon and the small bowel. Alternatively, a main trunk may be absent, with two large intestinal branches, left and right, draining directly into the splenic vein (3). In our case, an ileo-mesenteric trunk (IMT) passed parallel and anterior to the SMA and the jejunal arteries on its way to its termination in the SMV, significantly complicating the surgical procedure. Although it has been noted that ileal veins typically drain into the right intestinal branch (3), in our case the anomalous IMT constituted the left one.

Conclusion

This patient had a preoperative MDCT angiography within the framework of a randomized controlled trial (ClinicalTrials.gov) to perform safe D3 resection in right sided colon cancer. In this case the SMV aneurysm and co-existing anomalous irrigation was incidental, but vital for the performance of the procedure. The principal gain was depicting multiaxial spatial relations between mesenteric arteries and portal system veins, thus creating the basis for a safe and efficient abdominal navigation during D3 colectomy.

Disclosures

The authors have no conflict of interest.

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