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Superior mesenteric vein thrombosis – unusual management of unusual complication of Whipple procedure



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ABSTRACT

INTRODUCTION: Pancreatoduodenectomy is an extensive procedure carrying risk of a number of post-operative complications. Of these the most common are surgical site infections (SSI), bleeding, delayed gastric emptying, and anastomotic leakage. However, the most serious complications are ones, that are rare, clinically hardly diagnosed, and if untreated, leading to the death of a patient. Among the latter complications is thrombosis of superior mesenteric vein. Its clinical signs are unspecific and diagnostics complicated. Treatment requires aggressive approach. If this is absent, intestinal necrosis with septic state, Multiple Organ Dysfunction Syndrome (MODS) and Multiple Organ Failure (MOF) lead to a death of a patient.

PRESENTATION OF CASE: Authors present a case of a patient after pancreatoduodenectomy, complicated by the thrombosis of superior mesenteric vein. Patient was managed by resection of the necrotic bowel, venous decompression by venous bypass from superior mesenteric vein to the right ovarian vein, and open abdomen with negative pressure wound therapy (NPWT). Patient suffered severe abdominal sepsis with need for intensive organ support. Abdomen was definitely closed on fourth NPWT redress. Patient healed without any further complications, is well and was released to the ambulatory setting.

DISCUSSION: Superior mesenteric vein (VMS) thrombosis is a rare complication. Its diagnosis requires high level of vigilance and once diagnosed, aggressive therapy is essential. Two goals of surgical treatment exist: resection of the necrotic bowel and facilitation of the blood outflow.

CONCLUSION: Mesenteroovarian anastomosis is one of the options in treatment of thrombosis of VMS if thrombectomy is not feasible.

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1. Introduction

Pancreatoduodenectomy is primarily indicated in two cases: tumor of periampullary area (carcinoma of the head of the pancreas, ampulla of Vater, distal common bile duct, and duodenum) or chronic pancreatitis with pathological changes in the head of the pancreas or the uncinate process of the pancreas. Taking into account the extent of the procedure (mobilization of the

duodenum, dissection and manipulation in the area of superior mesenteric vessels and the portal vein, dissection of hepatoduodenal ligamentum with transection of the common bile duct, resection of the distal stomach, resection of the head of the pancreas, and construction of anastomoses on the common bile duct and the pancreatic duct) and the state of the patient with underlying diseases (malnutrition, cardiovascular and metabolic diseases), the risk of serious complications is elevated.

Most common complications of pancreatoduodenectomy can be divided in four groups: SSI, delayed gastric emptying, bleeding, and anastomotic leakage.¹ Nevertheless, other complications, much less frequent, exist. Their identification in early postoperative course is complicated and if left untreated, leading to the death of a patient.

Among such complications is superior mesenteric vein (SMV) thrombosis with subsequent ischemia of the tributary area. Clinical symptoms of SMV thrombosis are untypical, obscure and characterized by slow progress, all this covered by early postoperative period.² Because of these obscure symptoms, it was not

Abbreviations: CRP, C-reactive protein; CT, Computer Tomography; ERCP, Endoscopic Retrograde Cholangiopancreatography; IPP, Proton Pump Inhibitor; IU, International Units; LMWH, Low molecular weight heparin; MODS, Multiple Organ Dysfunction Syndrome; MOF, Multiple Organ Failure; NPWT, Negative Pressure Wound Therapy; PCT, Procalcitonine; SSI, Surgical Site Infection; SMV, Superior mesenteric vein; UFH, Unfractionated heparin; WBC, White blood cell count.

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until 1935, that thrombosis of SMV was identified as a nosology entity.^{3,4} This complication was described in the literature not only after pancreatoduodenectomy,⁵ but also after surgery for inflammatory bowel disease,⁶ fundoplication,⁷ acute appendicitis,⁸ and splenectomy.⁹ All papers are case files describing this rare complication.

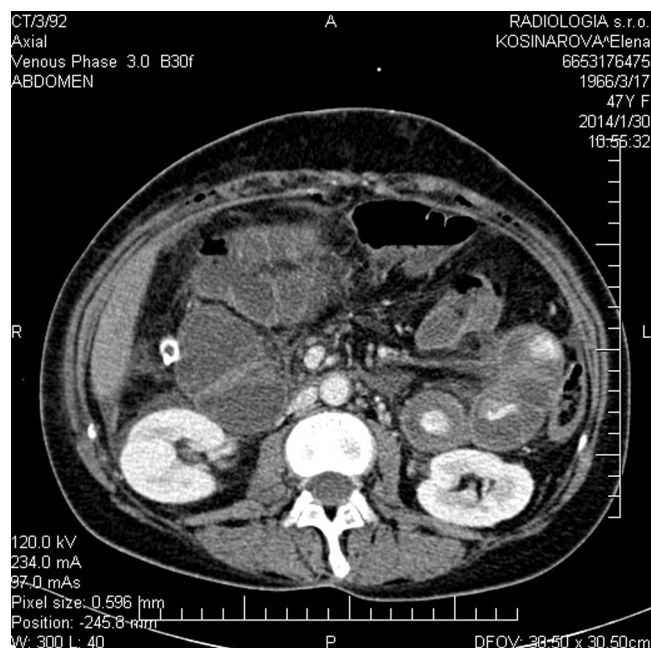
Therapy of thrombosis of SMV is divided into conservative, endovascular, and surgical treatment. Basis of the conservative treatment was stated by the classical paper by Barrit and Jordan in 1960. In this work authors present acute heparinization of the patient as a fundamental therapy of thromboembolic complications.¹⁰ Treatment of the thrombosis of SMV does not differ from the treatment of the thrombosis in any other localization. Initial treatment goal is cessation of thrombotisation and enabling of body's fibrinolytic activity for destruction of the thrombus. Administration of the therapeutic dosage of heparin provides immediate effect. Another possibility is thrombolysis, either administered systemically or locally. One of the possibilities described in the literature is transfemoral introduction and application of alteplase in superior mesenteric artery (SMA).¹¹ Another interesting possibility described in the literature is direct aspiration thrombectomy from SMV without use of thrombolysis.¹² Surgical therapy is indicated on the basis of clinical state and has two goals. First goal is facilitation of venous outflow (usually by thrombectomy) and second one is assessment of the vitality of the bowel with resection of necrotic segments. In contrast to arterial ischemia, the border between ischemic and livid bowel is less visible and identifiable, and second look laparotomy is indicated if in doubt.¹³

Prognosis of the patient depends on the clinical state, early identification of this complication, and aggressive treatment. Mortality of the patients with necrotic bowel, after extensive operation, and with developed abdominal sepsis is high; the treatment is multidisciplinary (surgeon, anesthesiologist, internal medicine specialist, radiologist, clinical microbiologist, and gastroenterologist), complicated, timely and financially demanding.

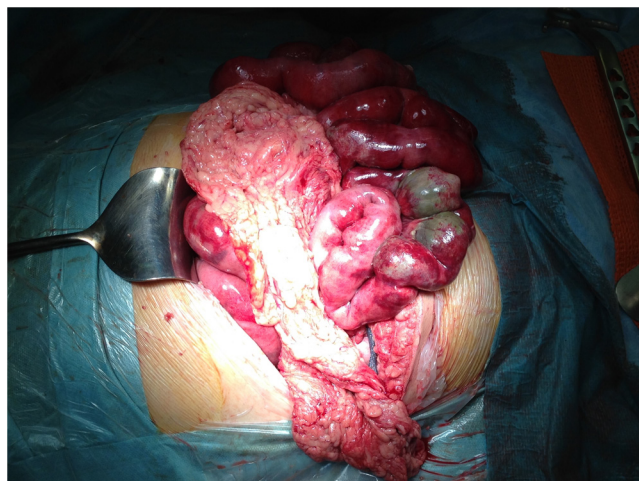
2. Case file

A 38-year-old female patient, with cystic tumor in the head of the pancreas, with compression of the common bile duct and pancreatic duct, after unsuccessful ERCP (endoluminal cholangiopancreatography), with persistent pain, was admitted to our department for elective operation. Patient's history had heroin abuse, syphilis, chronic pancreatitis; currently the patient free from drugs for the past eight years. Patient had no hematologic diseases or disorders. During the operation, we encountered difficult preparation of the head of the pancreas, which was in a fibrotic terrain. Cystic formation with pancreatocolitis was present in the head of the pancreas, without connection to Wirsung duct. Cephalic pancreatoduodenectomy was performed, with reconstruction by pancreatojejunostomy, then choledochojejunostomy and gastrojejunostomy on one intestinal loop. Preoperatively medical treatment included prophylactic antibiotics (1st generation cephalosporins), later changed to therapeutic antibiotics (carbapenems), postoperative therapy included prophylactic dosage of LMWH (Fraxiparine 0.3 ml s.c. 1 d, Glaxo Group LTD, Great Britain), PPI (proton pump inhibitor), analgesia, all-in-one nutrition.

High production in Tygon drains was present in early postoperative period (1200 ml, 800 ml, and 700 ml, respectively). No signs of elevated levels of bilirubin or amylases were found in exudate from the drains. Clinically, the abdomen was without peritoneal signs, audibly with weak but present peristaltic movements. On the third postoperative day, we performed CT with per oral and intravenous administration of contrast, without finding leakage from the hollow tube of gastrointestinal tract, without free fluid in the



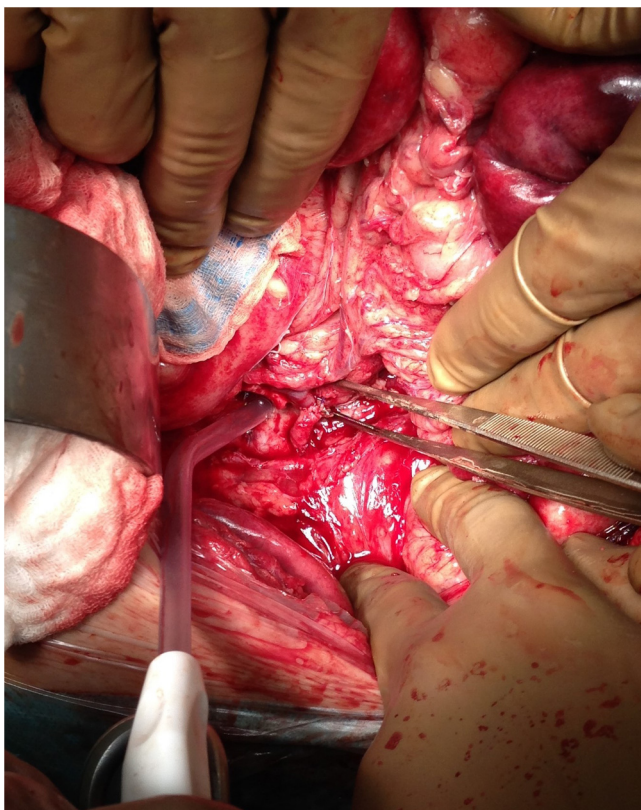
Picture 1. CT on third postoperative day showing venostatic jejunum with thickened intestinal wall.



Picture 2. Perioperative finding of ischemic and necrotic bowel during surgical revision on fourth postoperative day.

abdominal cavity, without signs of thrombosis of SMV, portal vein or splenic vein. Edematous efferent loop of jejunum was the dominating finding on the CT, with intestinal wall being thickened to 20 mm (**Picture 1**). On the fourth postoperative day, while considering worsening clinical state, elevation of inflammatory parameters (WBC, CRP, PCT – white blood cell count, C-reactive protein, procalcitonine) and suspicion for venous ischemia of the bowel we indicated the patient for surgical revision.

During the surgery, we found severe venous congestion of the small intestine and caecum, with ischemic and necrotic areas on distal ileum (**Picture 2**). The cause of this congestion was palpable thrombosis of SMV passing on to portal vein. Vascular surgeon was called to the operation theater and decision was made for venous derivation of SMV by means of mesentericocaval bypass. Based on local anatomical conditions, bypass was performed between the most proximal branch of SMV and the right ovarian vein, with end-to-end anastomosis (**Picture 3**). Because of the necrotic areas on the bowel the resection of the distal ileum (approximately 40–50 cm)



Picture 3. Constructed anastomosis between proximal branch of SMV and right ovarian vein.

and caecum was performed, and the terminal ileostomy was constructed, patient was left with the open abdomen with NPWT – negative pressure wound therapy (Vivanomed, Paul Hartmann AG, Germany) (Picture 4). During the operation the treatment with UFH 3×5000 IU was initiated, LMWH was discontinued. Postoperatively the patient required intensive organ support in terms of artificial ventilation, vasopressor and diuretic support, and antibiotic therapy. On sixth day, ninth day, and eleventh day, the redress of the open abdomen was done, on the last day the suture of the abdominal wall was performed. No additional bowel needed to be resected, venostasis of the bowel diminished. Patient resolved from abdominal sepsis without further complications. After resuming the oral intake, without the need for further intervention, the patient was on 24th postoperative day after primary operation released from the hospital. Further anticoagulant therapy will be directed by hematologist in out-patient setting.

Definite histological finding was chronic pancreatitis, without signs of malignancy.

3. Discussion

Identification of the thrombosis of SMV in early postoperative course is complicated by fact that clinical symptoms are non-specific and covered by postoperative paralysis of gastrointestinal tract and modified pain reaction by the administration of the analgetics. Currently, no plasma biomarkers specific for intestinal ischemia exist. Use of D dimer as a marker of fibrinolysis has high sensitivity, but low specificity,¹⁴ and can be used for exclusion of diagnosis at best. Imaging techniques might show secondary consequences of thrombosis, but will not rule out thrombosis itself.

If suspicion for thrombosis of SMV is raised, together with clinical deterioration of the patient, with present signs of peritoneal bounding, or bowel paralysis of unclear origin, laparotomy revision



Picture 4. Open abdomen with intraabdominal NPWT applied.

should be considered. Goal of laparotomy is exclusion or affirmation of thrombosis, facilitation of venous drainage, and resection of the necrotic parts of the bowel. Considering complicated assessment of the bowel vitality in venous congestion, recommended practice is planned relaparotomy 24–48 h after revision.

Mechanical injury to VSM can be considered as the most common cause of postoperative thrombosis of SMV. This is especially true in patients, where the pancreas and its surroundings are changed by chronic pancreatitis to fibrotic, hard-to-dissect tissue. It is difficult to state, though, where the thrombosis did originate in our patient, since by lowering of blood flow the thrombosis progressed to palpable thrombosis of the main trunk of the superior mesenteric vein passing on to portal vein. Interesting is the extent of thrombosis in this patient, that had no systemic hematologic disorders.

Management of the patient is multidisciplinary, usually requiring intensive organ support guided by anesthesiologist or surgeon with interest in intensive therapy. Anticoagulation therapy with heparin should be initiated, either by continuous or bolus administration of UFH. Experiences with use of LMWH in this indication are absent, but no logical reason exist, that LMWH would be inferior in efficiency.¹⁵

Management of patient in-between surgical revisions by use of open abdomen with NPWT has substantial advantages over using temporary abdominal coverage without use of negative pressure. Its advantage is elimination of possible compartment syndrome as well as direct local therapy and evacuation of septic burden.¹⁶

4. Conclusion

Pancreatoduodenectomy is an extensive surgical procedure, which has specifically given indications. Possible complications of

this procedure are grave and may lead to the death of a patient. The most dangerous complications are ones, which have vague, non-specific symptoms. Among these complications is thrombosis of SMV that, although rare, if left untreated leads to abdominal sepsis and death of a patient. Diagnostics has to be brisk and therapy aggressive, treatment being multidisciplinary under the lead of a surgeon. Mesenteroovarian anastomosis is one of the options in treatment of thrombosis of VMS if thrombectomy is not feasible. Use of open abdomen with use of NPWT should be a part of a management of planned relaparotomy.

Conflict of interest

None of the authors have conflicts of interest.

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Ethical approval

Written informed consent was obtained from the patient for publication of this case report and accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal on request.

Author Contributions

Martin Hutan contributed in drafting document and data collection; Christian Bartko was the operating surgeon and contributed in information support; Roman Slysco was the operating vascular surgeon; Jaroslav Sekac contributed in information support and in the correction of the manuscript; Augustin Prochotsky provided information support and involved in the correction of the manuscripts; Ivan Majesky was the operating surgeon of the patient and Jan

Skultety, the chief of department, contributed in the information support.

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