

# Peritoneal Conduit for Superior Mesenteric Vein Defect during Colon Cancer Surgery for Krukenberg Tumor: A Case Report

**Mohammad Raeeszadeh**

Baqiyatallah University of Medical Sciences

**Seyedeh Razieh Hashemi**

Baqiyatallah University of Medical Sciences

**Arezoo Esmailzadeh**

Baqiyatallah University of Medical Sciences

**Houshyar Maghsoudi**

Baqiyatallah University of Medical Sciences

**Samaneh Rokhgireh**

Iran University of Medical Sciences

**Mahdi Morshedi** (✉ [Dr.mahdimorshedi@gmail.com](mailto:Dr.mahdimorshedi@gmail.com))

Baqiyatallah University of Medical Sciences

---

## Case report

**Keywords:** Peritoneal conduit, Superior mesenteric vein, Colon cancer, Krukenberg tumor

**Posted Date:** July 20th, 2020

**DOI:** <https://doi.org/10.21203/rs.3.rs-42730/v1>

**License:** © ⓘ This work is licensed under a Creative Commons Attribution 4.0 International License.

[Read Full License](#)

---

# Abstract

**Background:** Venous resection and reconstruction are common during pancreaticoduodenectomy due to pancreatic adenocarcinoma. Multiple treatment options have been offered for venous repair. In this regard, the present study used the peritoneum as a conduit for the superior mesenteric vein (SMV) reconstruction during colon cancer surgery.

**Case presentation:** The case was a 55-year-old woman with colon adenocarcinoma. The SMV damage was 6 cm in length. The defect was replaced with peritoneal conduit originated from parietal peritoneum of the abdominal wall. Coalition and flow of the SMV were confirmed by contrast-enhanced computed tomography. The patient had a good condition during a 6 months follow-up.

**Conclusions:** Due to its availability and lower overall costs, peritoneal conduit might be a promising choice for SMV defects, in emergent conditions.

## Introduction

Vascular reconstructions are declared in great venous damage due to cancer or trauma-related defects [1]. In case of tumor invasion or adhesion, en bloc venous resection might be needed for complete extraction of tumor [2]. Venous resection in malignant periampullary tumors, during pancreaticoduodenectomy, is the most effective treatment [3].

Venous can be repaired primarily by the end to end anastomosis, or through synthetic grafts, autologous veins, and cryopreserved homologous vascular grafts as interposition grafts. Miscellaneous grafts include a saphenous vein, femoral vein, external iliac vein, left renal vein, parietal peritoneum, allogenic vein, and polytetrafluoroethylene (PTFE) [2, 3]. Selection of the various options should be individualized by the surgeons' experiments, accessible grafts, and patient conditions [2]. The present study reports a novel technique through which conduit is made from parietal peritoneum of wall abdomen.

## Case Presentation

A 55-year-old woman was referred to our hospital with pelvic mass. She had no ascites but had abdominal bulging, pain, and 10 kg weight loss in 2 months. Trans abdominal hysterectomy and left salpingo-oophorectomy (TAH + LSO) had been performed 20 years ago due to myomatous uterus and left benign ovarian Cyst.

At the referring time, abdominal sonography declared an 11 × 9 cm solid cystic mass in right ovary with vascular pattern increase in Doppler sonography that was confirmed in computed tomography (CT scan). In addition, contrast-enhanced computed tomography CT scan revealed a large para aortic mass. In computed tomography (pet-CT scan), a hyper metabolic mass with 32 × 27 mm in diameter and SUV = 24 mm was found in para aortic region or renal level vein. There was also a thickening of transverse

colon adjacent to the mass. Ovarian mass was 15 cm in diameter and SUV = 4/8 with slight ascites (Figure- 1).

Tumor markers included CEA = 220 ng/ml (NL < 5), CA 19 - 9 = 86u/ml (NL < 37), and CA125 = 51u/ml (NC < 35).

Upper gastro intestinal endoscopy and colonoscopy were performed. Upper endoscopy was normal. In colonoscopy, a polypoid mass was shown in transverse colon. Cold forceps biopsy was done and a high-grade dysplasia was reported in pathology, therefore debulking surgery was planned.

The surgery started with midline incision. Right salpingo-oophorectomy and transverse colectomy were performed. Frozen pathology reported high grade adeno carcinoma in both sides of right ovary and colon (Fig. 2A, B).

Unexpected small bowel congestion was seen due to SMV damage. It was located in base of SMV, in juxtaposition to the neck of pancreas, by 6 cm in length and 18 mm in diameter. Therefore, a 5 × 15 cm section of the parietal peritoneum was removed from the left abdominal wall and used to repair the damage site. An inter position graft as a conduit made from an 8 × 4 cm parietal peritoneum was rolled into a cylindrical shape over a suction tube with a running 6/0 polypropylene suture (Fig. 3). Ultimately, peritoneal conduit was anastomosed to both stumps of damage site in an end to end fashion (Fig. 4). Synchronous anticoagulant therapy was started during reconstructive vessel surgery and continued for 4weeks.

Blood flow into conduit was without any leakage by direct vision during the surgery and small bowel congestion was improved at once. Ultimately, arrangement of colostomy in right colon was done. Conduit flow was good and patency was observed in Doppler ultrasound examination in short-term follow-up after 2 weeks. Subsequently, there was a narrow flow after 3 months with normal SMV patency in computed tomography (Fig. 5).

## Discussion

Various conditions lead to requirement for vascular repair such as malignancy or trauma. The surgeon should choose a surgical plan considering multiple factors including medical condition as well as institutional, patient, and surgeon factors. Thereafter, the best decision on surgical planning should be made based on advantages and disadvantages of the selected choices [1, 2].

Restoring patency of SMV is a vital issue that can be achieved through end to end anastomosis in most patients [2, 3].

Variegated interposition grafts are available with their advantages and disadvantages. Autogenic vessels, such as great saphenous vein, can be too small in diameter and size for SMV flow drainage, especially in cancer cases. Femoral vein might lead to leg edema after operation. The internal jugular vein can be appropriate in terms of capacity, diameter, and length but similar morbidity in donor site resembles other

allogenic vessels. However, Autologous grafts might suffer endothelial damage due to fibrosis, varicosis, and atherosclerosis [1, 2]. Sometimes, right great saphenous might have been used previously in coronary bypass surgery. Also, preparing autologous grafts may lead to morbidity of donation site and prolong the main surgery [1–6].

Cold – stored allogeneic vessels are at high risk for infection and rejection. Also, as all centers do not possess cryopreserved vascular graft bank, this option is not possible for all surgeons [2–4].

Synthetic grafts, such as polytetrafluoroethylene (PTFE) grafts, are more at risk of infection and thrombosis [1–4]. Suturing PTFE grafts is difficult due to their narrow and pliable walls, and high cost [3].

For the first time, successful peritoneal repair of vascular defect was performed by a French surgeon, Alexis Carrel, in 1910 [3]. Later, Yoshioka demonstrated peritoneum grafts in a porcine model in 2001 for the reconstruction of portomesenteric vein [3].

Peritoneum grafts are safe, effective, available under emergency conditions, cost effective, and at low risk for infection, thrombosis, and blood loss. Besides, use of peritoneum grafts can shorten the time of operation compared to other methods [1–3].

Furthermore, some studies have reported no additional risk for thrombosis in peritoneal grafts in spite of not receiving antithrombotic agents. It should also be noted that the peritoneal mesothelium is capable of operating in compliance with native vasculature and cells [1–5].

In our case, due to the presence of tumor, SMV was enlarged and dilated. Therefore, there was size mismatch between saphenous veins with 3.4 mm in caliber versus SMV vein with 18 mm in caliber.

With due attention to multiple procedures including colectomy, salpingo – oophorectomy, and arrangement of colostomy, we had to shorten the time of operation. On the other hand, synthetic grafts were contraindicated due to full-blown colon. We did not have cryopreserved vascular graft bank in our center. Thus, peritoneal conduit was the best choice for our case.

In long-term follow-up after 3 months, despite a narrow flow in CT scan, bowel condition was good which could be the reason for the formation of collateral circulation.

## Conclusion

In conclusion, peritoneal conduit would be an effective treatment in SMV reconstruction, however further studies are required in this regard.

## Abbreviations

SMV  
Superior mesenteric vein,

PTFE  
Polytetrafluoroethylene  
TAH  
Trans abdominal hysterectomy  
LSO  
Left salpingo-oophorectomy

## Declarations

**Conflict of interest:** The authors declare no conflicts of interest.

**Acknowledgements:** Not applicable.

**Funding:** Not applicable.

**Availability of data and materials:** The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

## Authors' contributions

MR, MM, SRH, HM, AE and SR were responsible for the conception, design, content and writing of the manuscript. AE, HM and MM was responsible for acquisition, analysis and interpretation of the images. All authors made substantial contributions to drafting and revising the manuscript. All authors have read and approved the final manuscript

**Ethics approval and consent to participate:** Informed consent was obtained from the patient.

**Patient consent for publication:** The patient provided written informed consent for publication of the present case report.

**Competing interests:** The authors declare that they have no competing interests.

## References

1. Oruç MT, Çakır T, Aslaner A, Yardımcı EC, Sakar A: **Peritoneal Patch Used for Vascular Reconstruction of the Superior Mesenteric Vein Invaded by Locally Advanced Pancreatic Tumour.***Surg Gastroenterol* 2017, **22**:132-135.
2. Zhiying Y, Haidong T, Xiaolei L, Yongliang S, Shuang S, Liguang L, Li X, Atyah M: **The falciform ligament as a graft for portal–superior mesenteric vein reconstruction in pancreatectomy.***Journal of Surgical Research* 2017, **218**:226-231.
3. Kayaalp C, Sumer F, Polat Y, Kutlu R: **Autologous peritoneum graft repair of a superior mesenteric vein defect during pancreaticoduodenectomy.***Cureus* 2015, **7**.

4. Smoot RL, Christein JD, Farnell MB: **An innovative option for venous reconstruction after pancreaticoduodenectomy: the left renal vein.***Journal of Gastrointestinal Surgery* 2007, **11**:425-431.
5. Dua MM, Tran TB, Klausner J, Hwa KJ, Poultsides GA, Norton JA, Visser BC: **Pancreatectomy with vein reconstruction: technique matters.***HPB* 2015, **17**:824-831.
6. Kim SM, Min S-K, Park D, Min S-I, Jang J-Y, Kim S-W, Ha J, Kim SJ: **Reconstruction of portal vein and superior mesenteric vein after extensive resection for pancreatic cancer.***Journal of the Korean Surgical Society* 2013, **84**:346-352.

## Figures

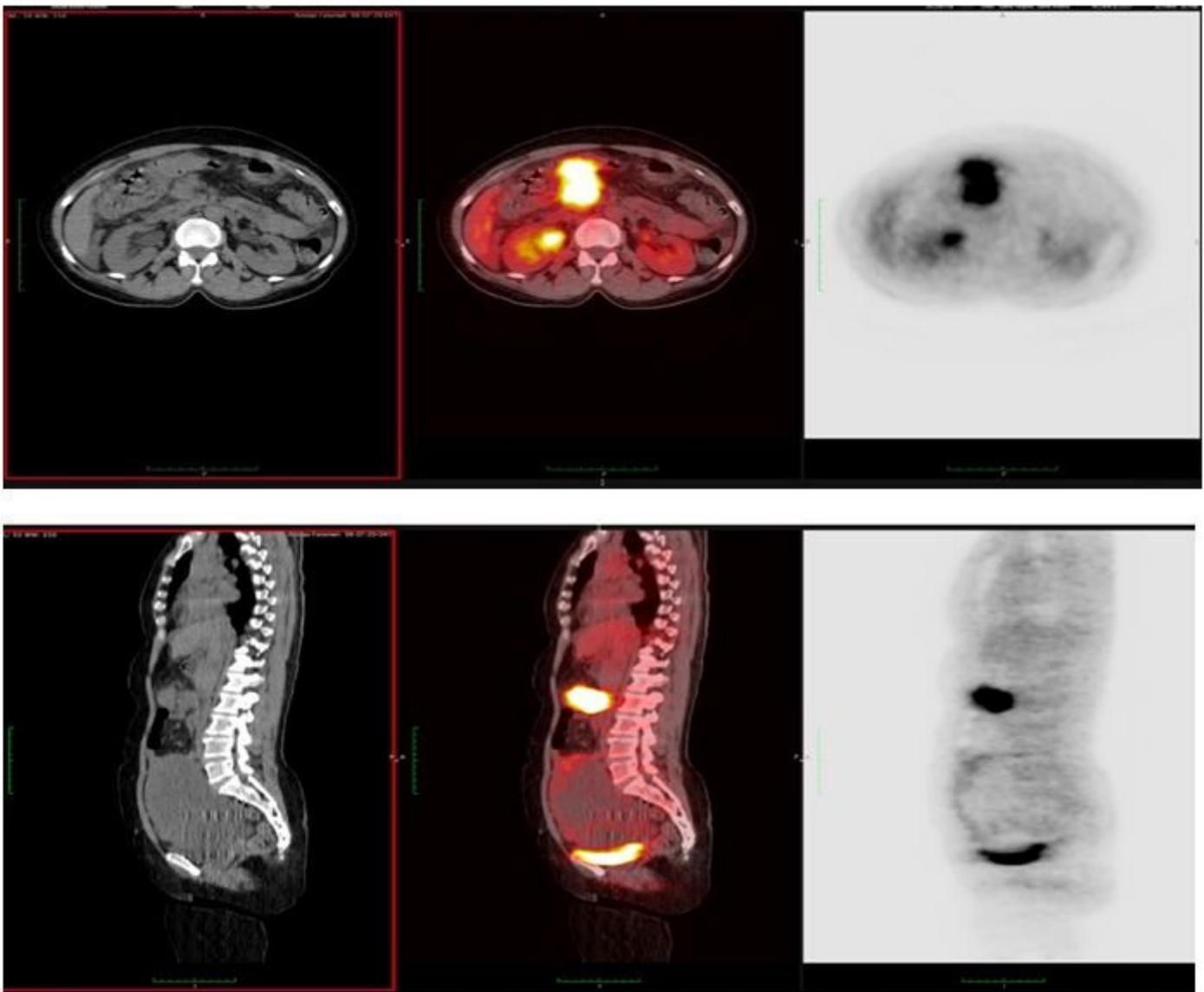
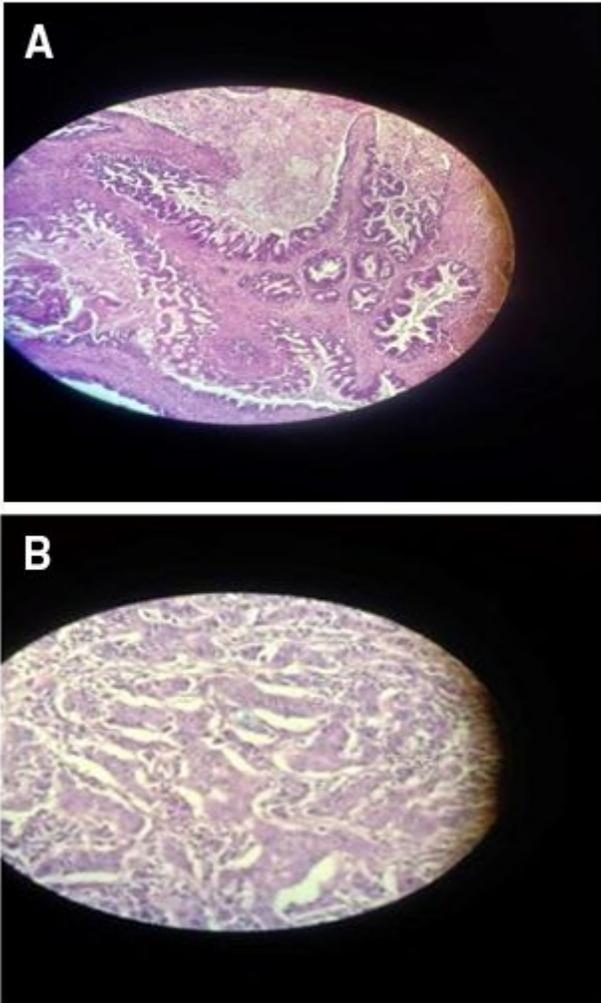


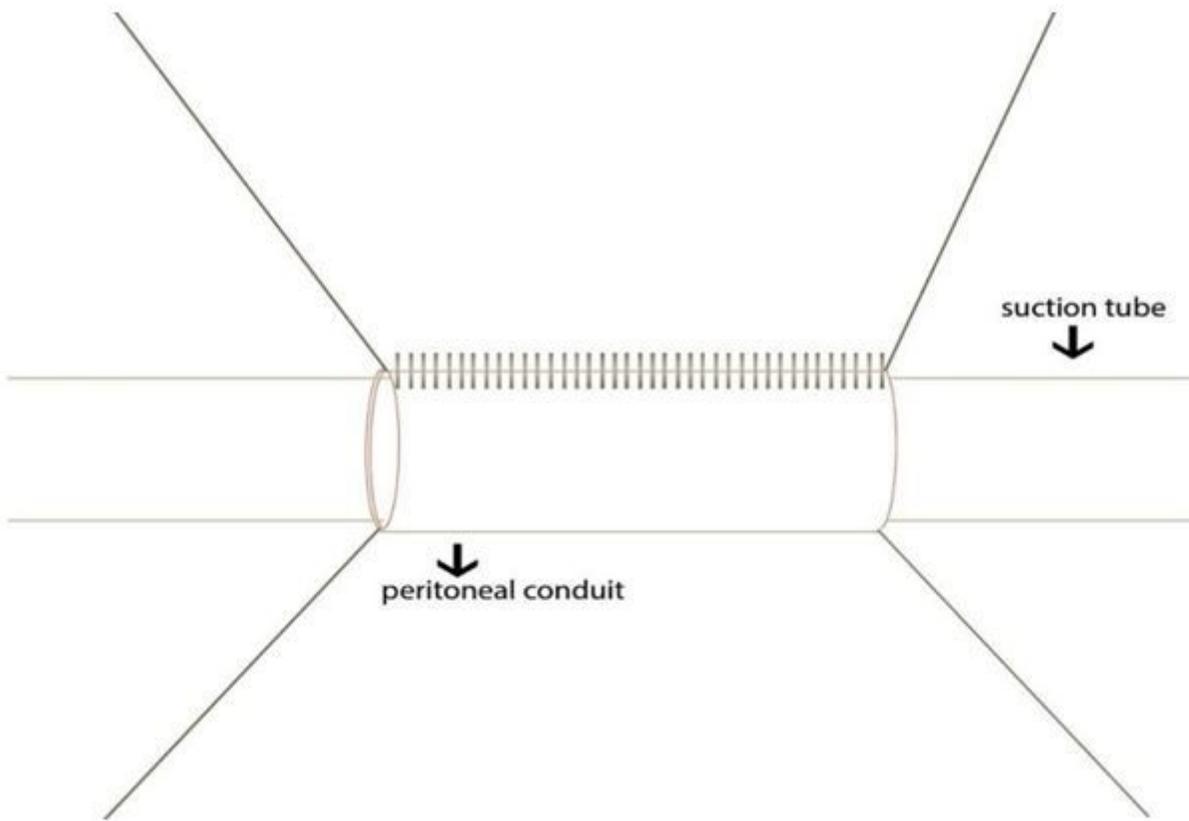
Figure 1

Ovarian mass and a large para aortic mass.



**Figure 2**

A: High grade adenocarcinoma in ovary. B: High grade adenocarcinoma in transvers colon.



**Figure 3**

Peritoneal conduit.

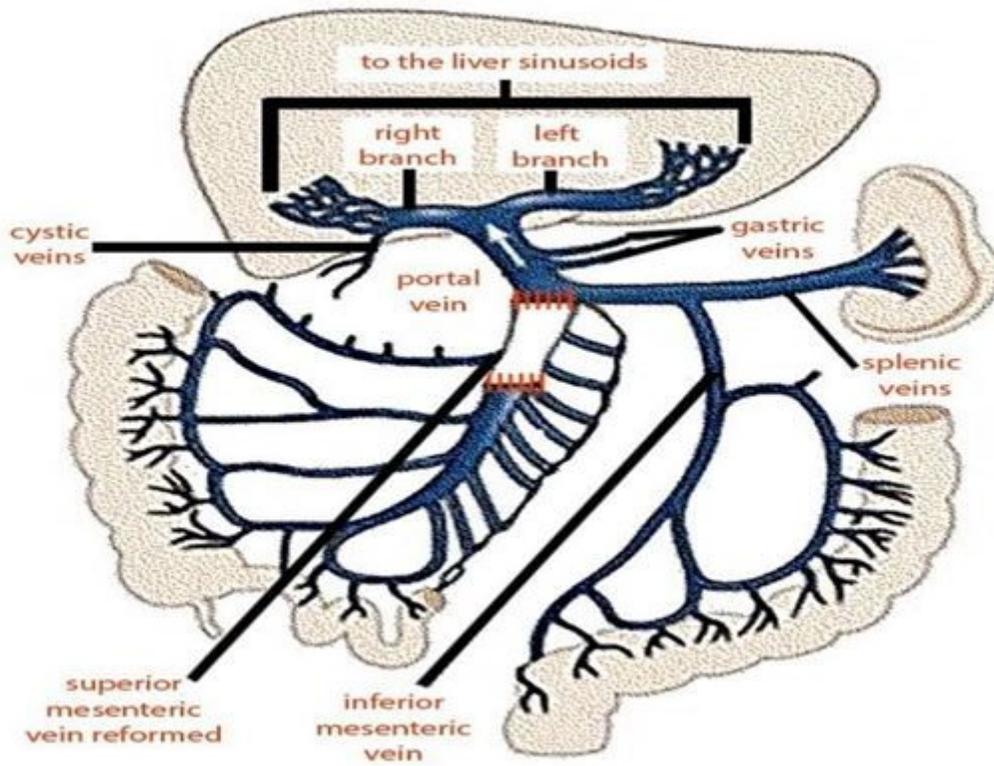


Figure 4

Reformation image of superior mesenteric vein.



**Figure 5**

SMV in follow-up computed tomography.