

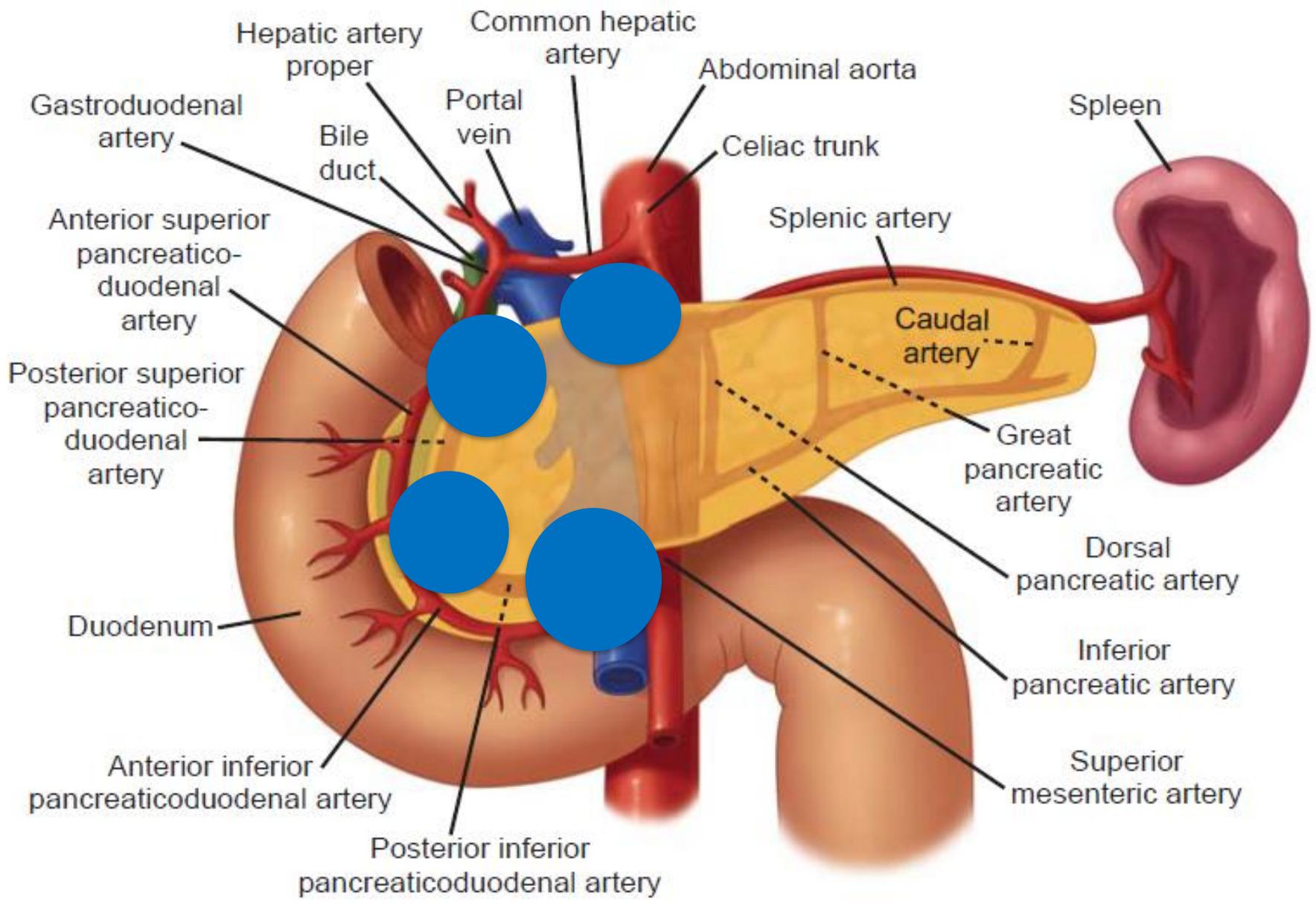
RESSECÇÃO VASCULAR EM DUODENOPANCREATECTOMIA



Orlando Jorge M. Torres
Department of Gastrointestinal Surgery
Hepatopancreatobiliary and Liver Transplant Unit
Universidade Federal do Maranhão - Brazil



ANATOMY





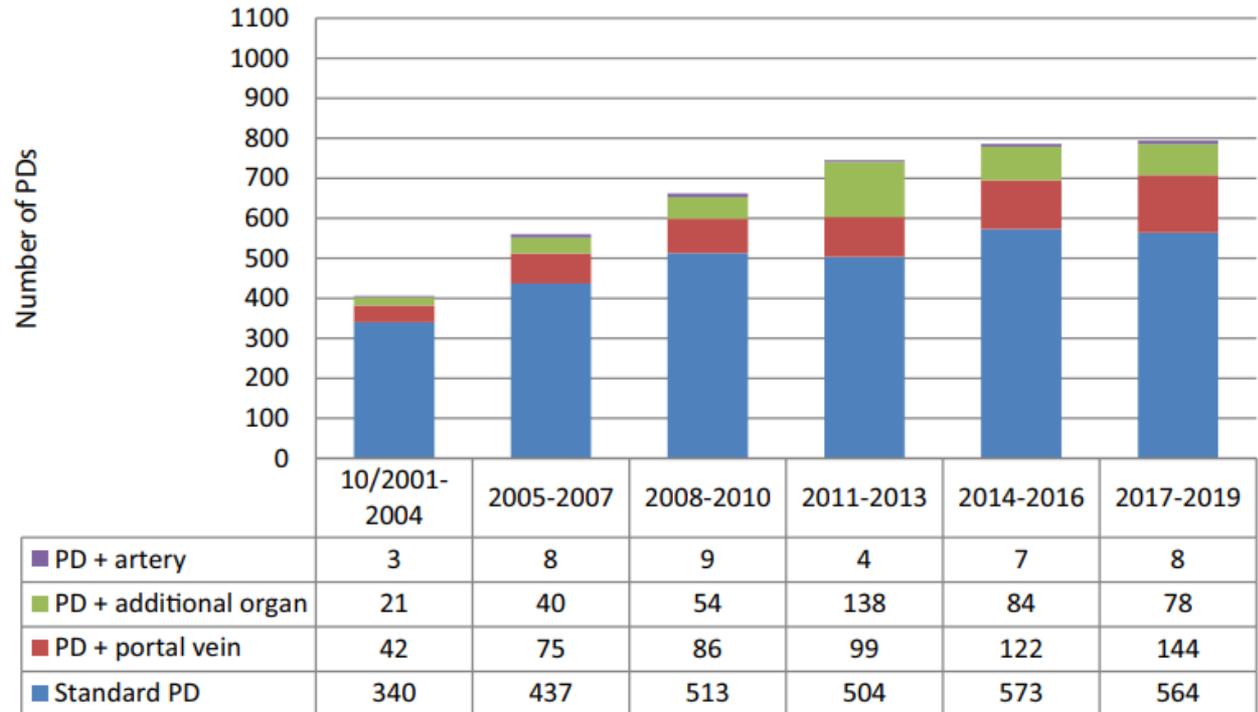
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Not all Whipple procedures are equal: Proposal for a classification of pancreatoduodenectomies



Tipo 1 Ressecção Padrão	(74,1%)
Tipo 2 Ressecção porta-mesentérica	(14,4%)
Tipo 3 Ressecção multivisceral	(10,5%)
Tipo 4 Ressecção arterial	(1,0%)

RESSECÇÃO VENOSA PORTO-MESENTÉRICA

Surgery xxx (2020) 1–7



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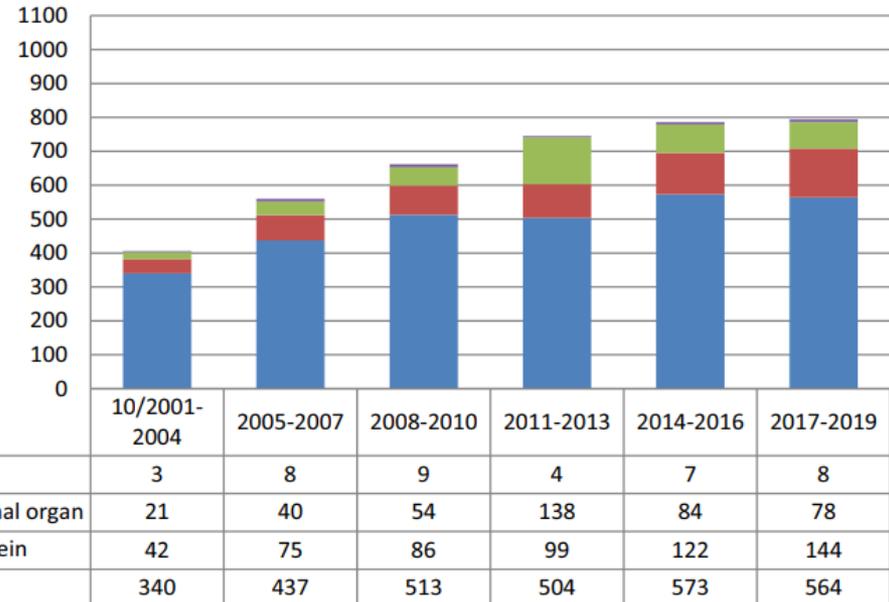
Surgery

journal homepage: www.elsevier.com/locate/surg



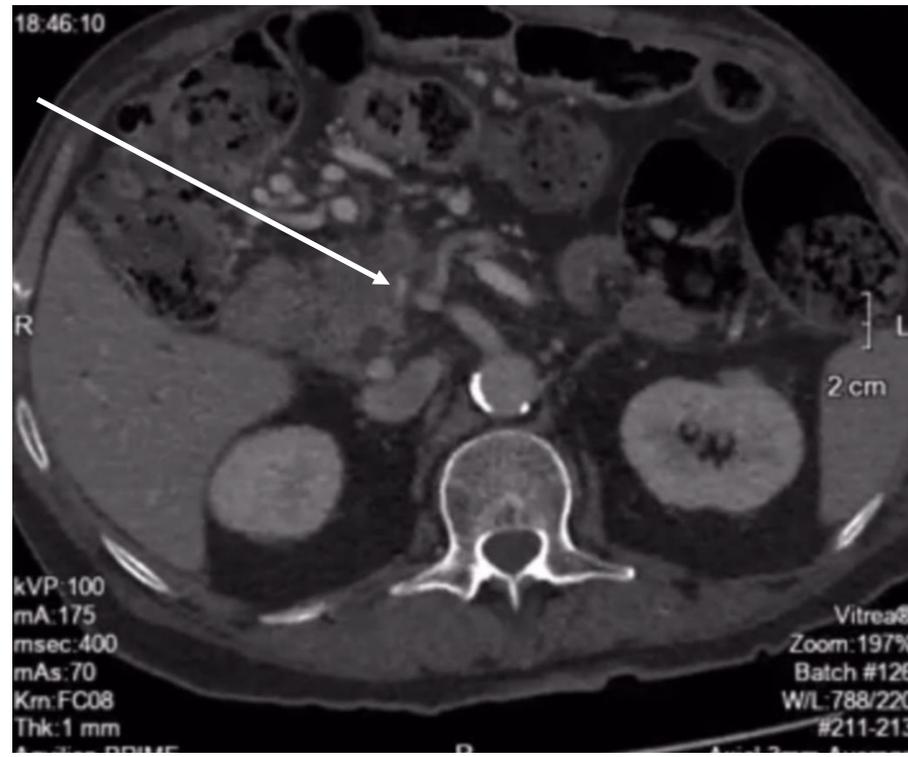
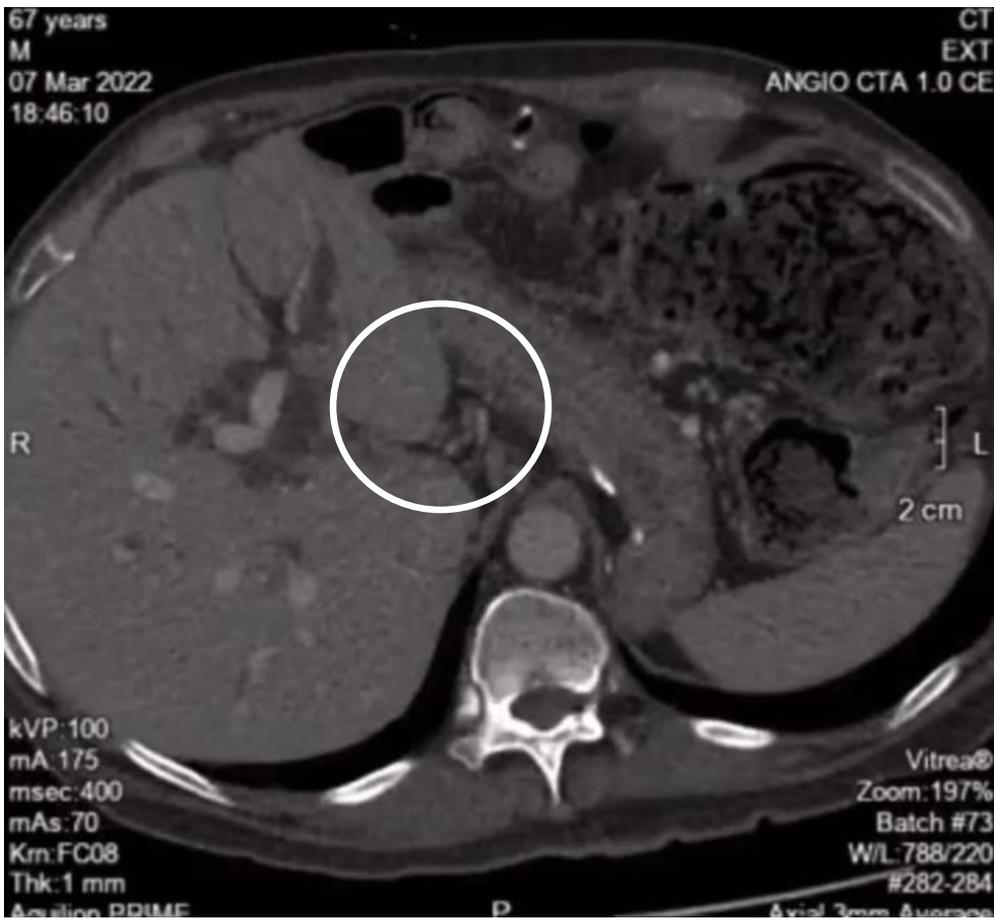
Not all Whipple procedures are equal: Proposal for a classification of pancreatoduodenectomies

Number of PDs

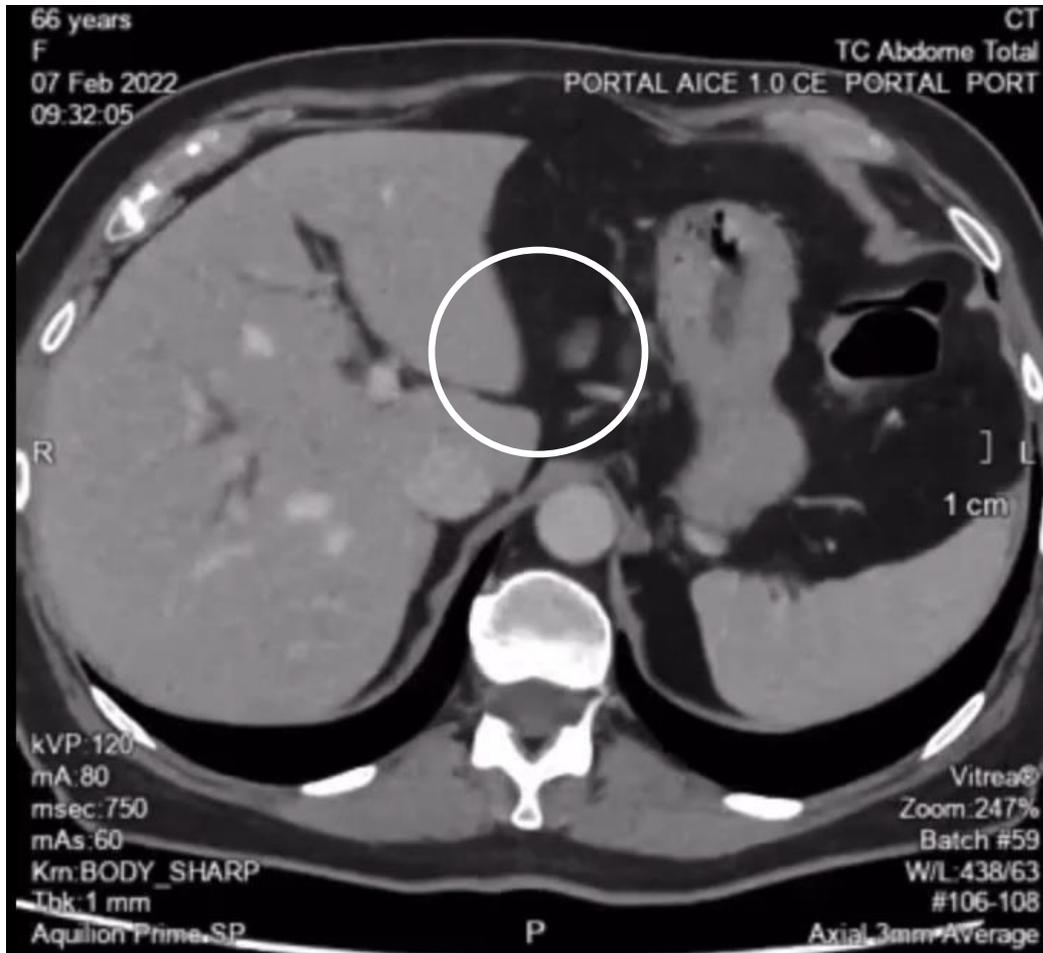


Tipo 1	Ressecção Padrão	(74,1%)
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RESSECÇÃO VENOSA PORTO-MESENTÉRICA



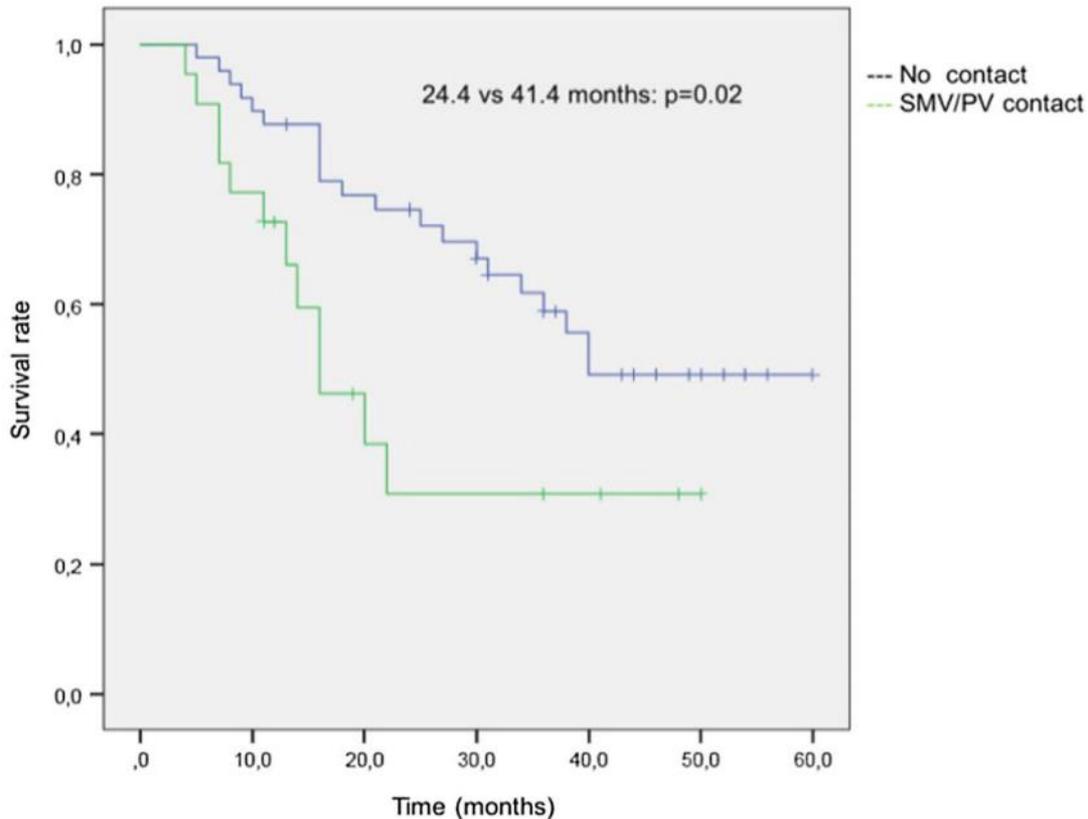
RESSECÇÃO VENOSA PORTO-MESENTÉRICA



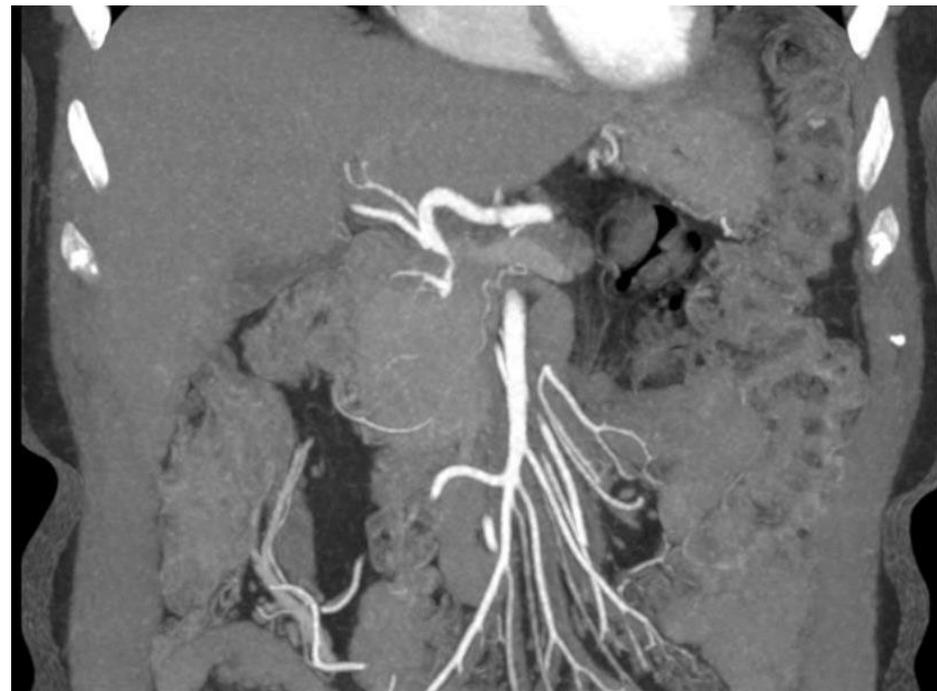


Clinical impact of preoperative tumour contact with superior mesenteric-portal vein in patients with resectable pancreatic head cancer

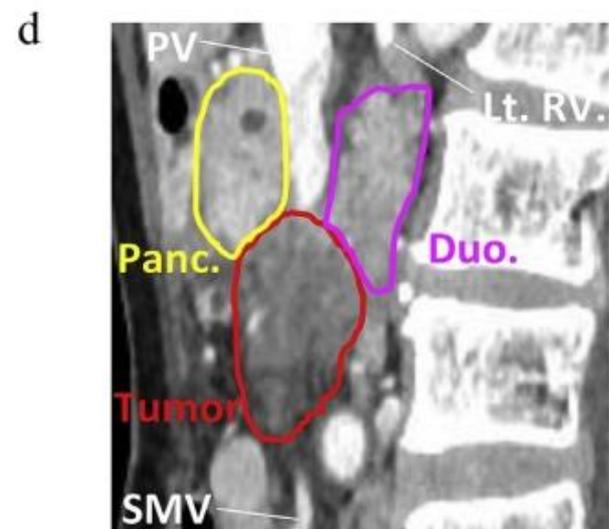
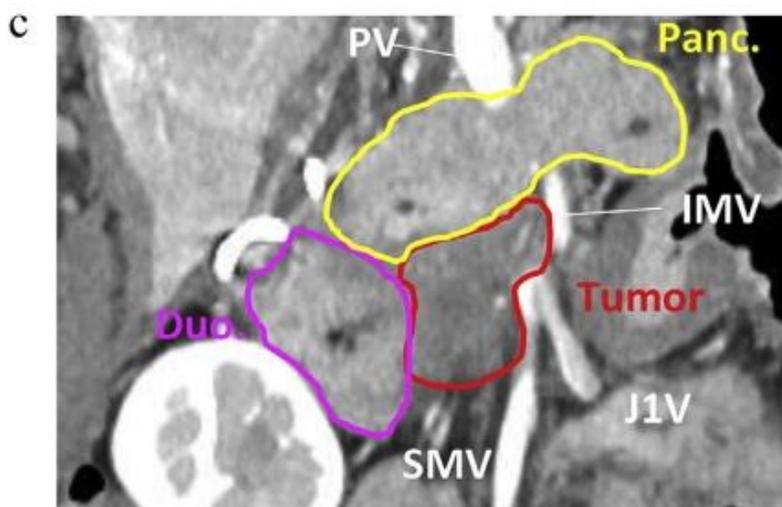
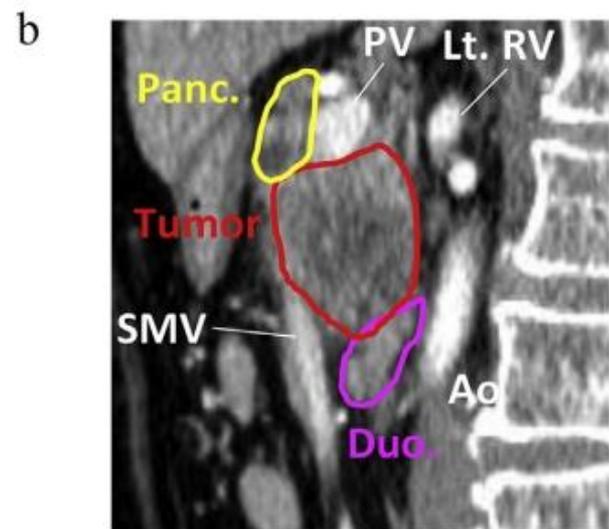
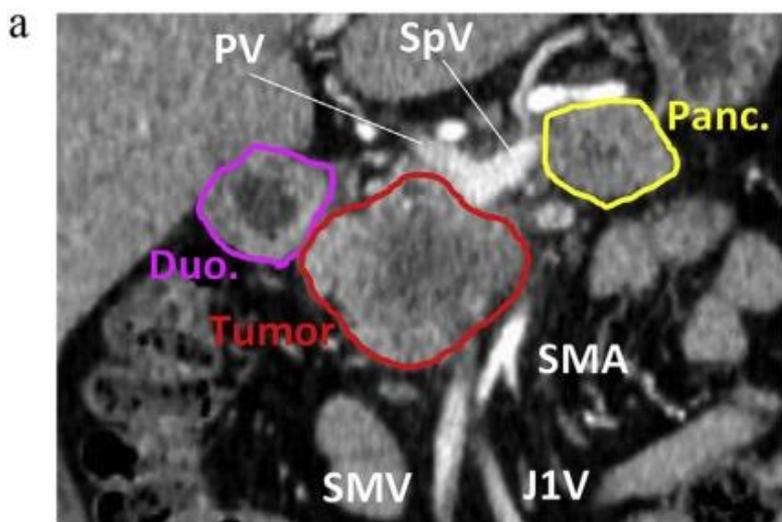
Contato do tumor com a veia



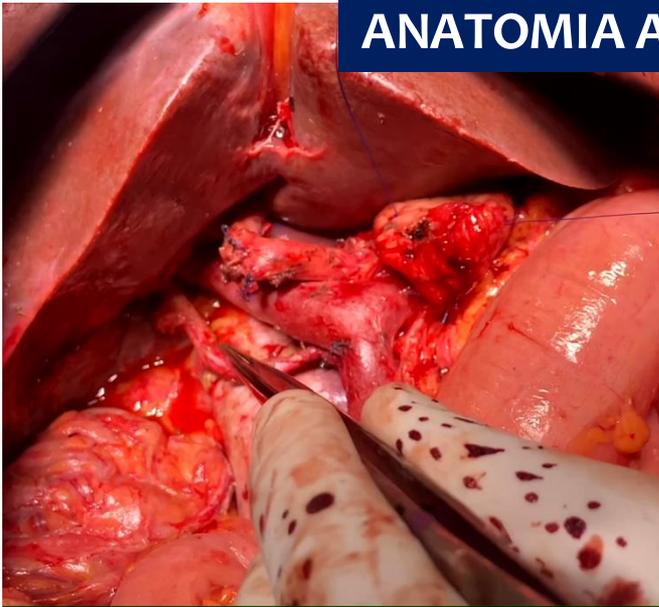
COMPLETA AVALIAÇÃO PRÉ-OPERATÓRIA



Proximal-Distal
Extensão
Confluência esplênica
Circunferência
Ramos jejunais



ANATOMIA ABERRANTE DA ARTÉRIA HEPÁTICA



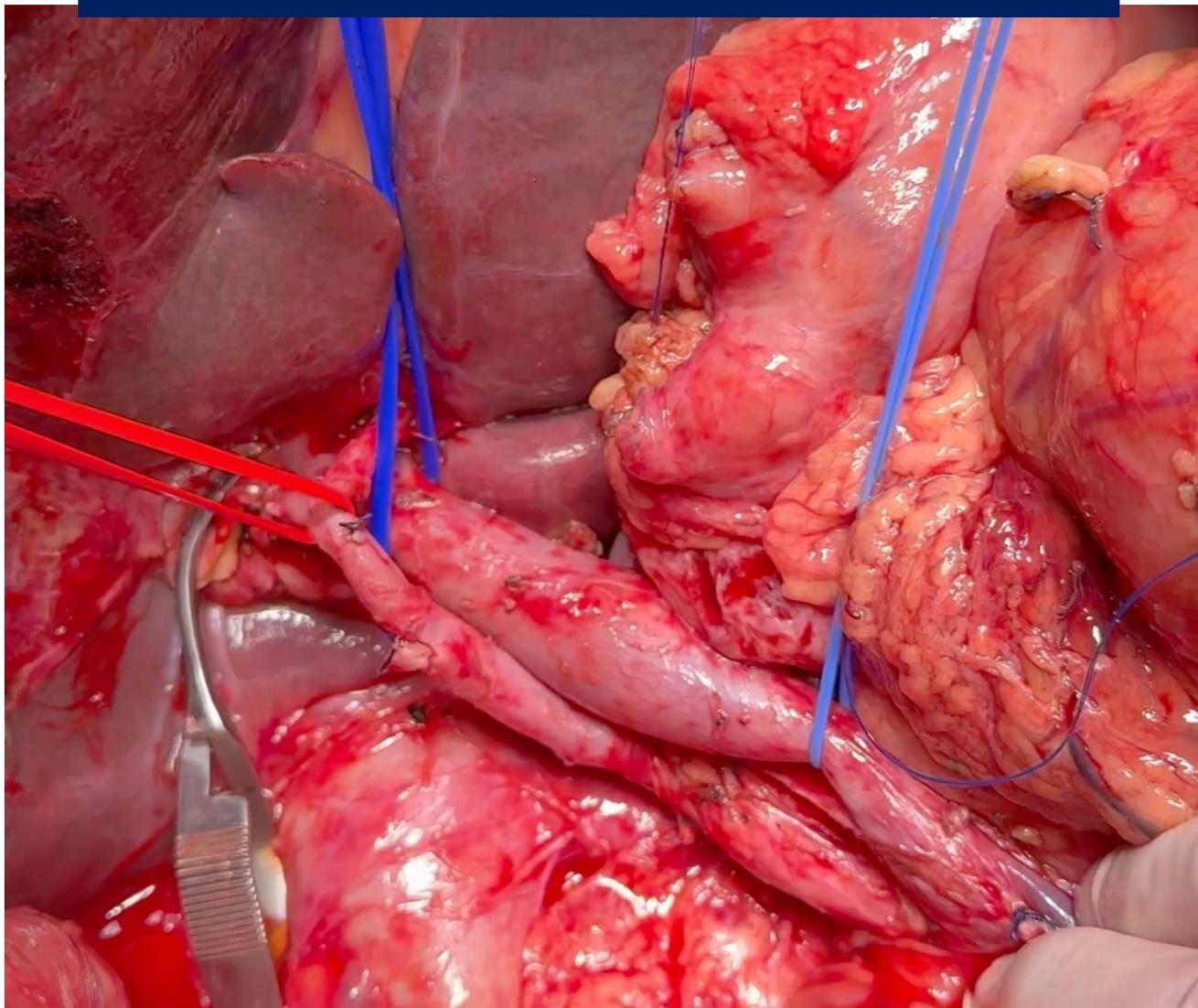
NÃO PODE SER UM ACHADO INESPERADO NA CIRURGIA

ANATOMIA ABERRANTE DA ARTÉRIA HEPÁTICA

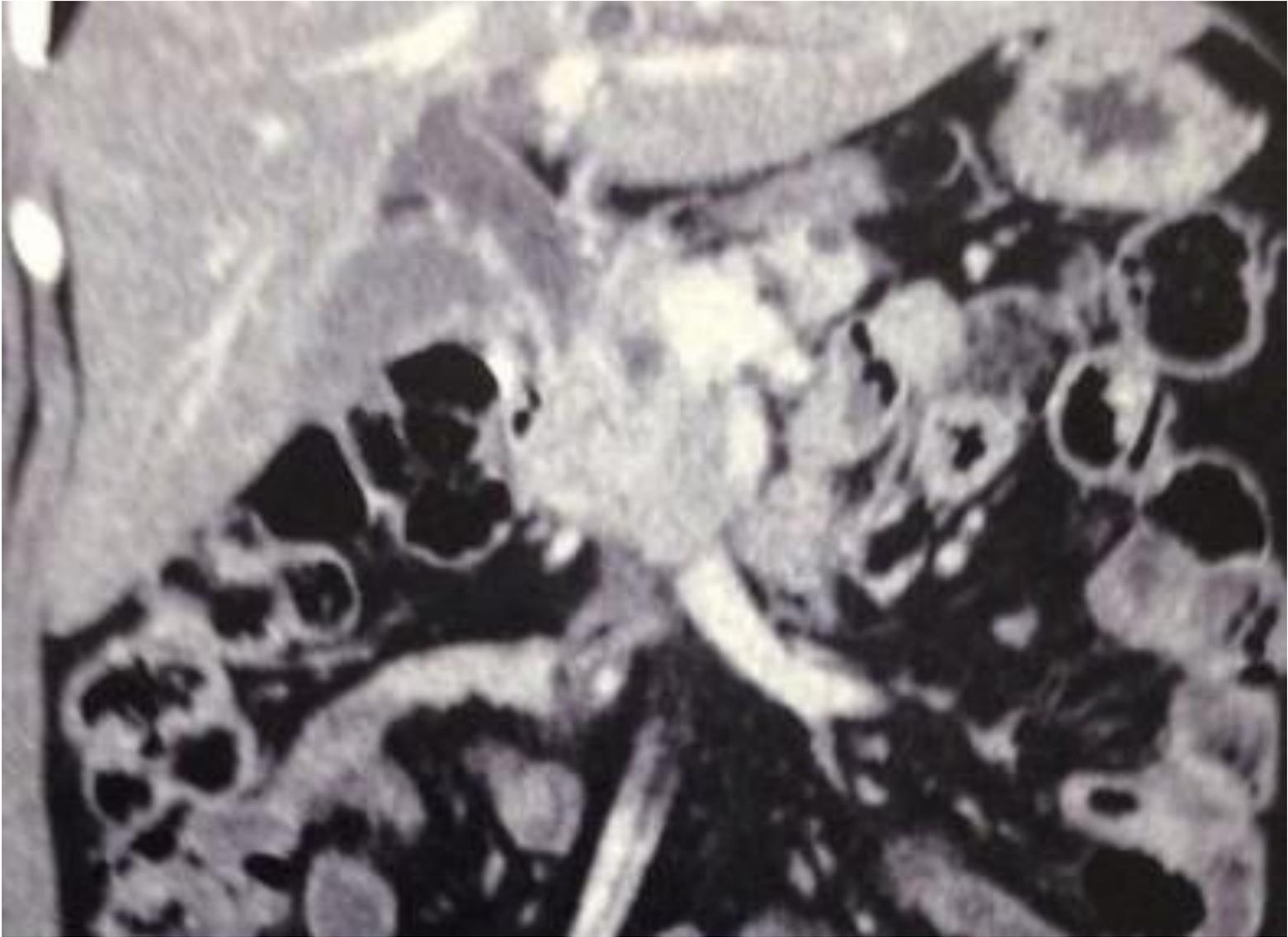


NÃO PODE SER UM ACHADO INESPERADO NA CIRURGIA

ANATOMIA ABERRANTE DA ARTÉRIA HEPÁTICA



NÃO PODE SER UM ACHADO INESPERADO NA CIRURGIA



EXTENSÃO DO ENVOLVIMENTO

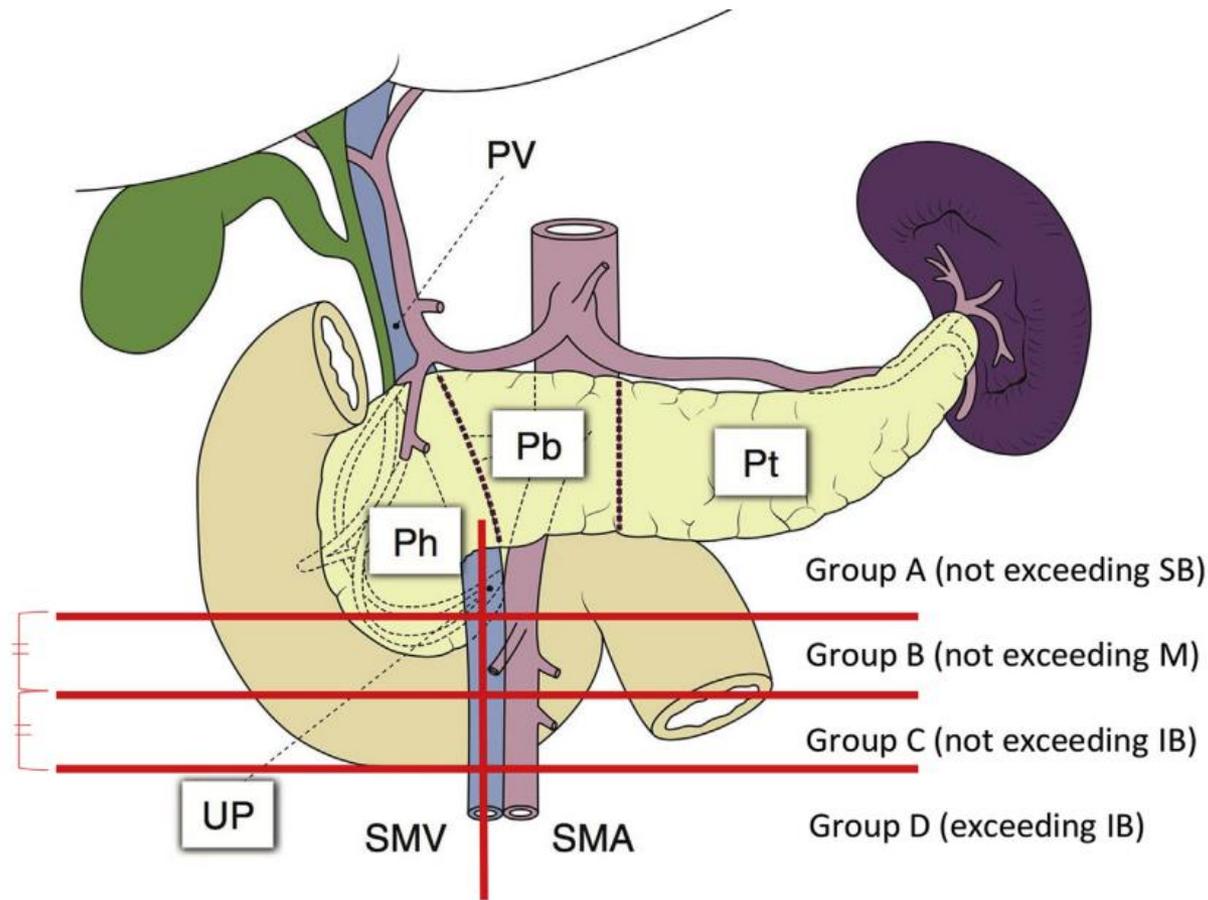


Fig. 2. Classification of the duodenal margin of SMV invasion. Group A: SMV invasion not exceeding the superior border of the duodenum (SB), Group B: SMV invasion not exceeding the middle of the duodenum (M), Group C: SMV invasion not exceeding the inferior border of the duodenum (IB), and Group D: SMV invasion exceeding the inferior border of the duodenum (IB). SMV: superior mesenteric vein, PV: portal vein, SMA: superior mesenteric artery, UP: uncinus process, Ph: pancreatic head, Pb: pancreatic body, Pt: pancreatic tail. Anatomical scheme of the pancreas in Japanese classification of pancreatic cancer 7th edition with modifications. (permission from Kanehara & Co., Ltd., Tokyo, Japan).

QUIMIOTERAPIA NEOADJUVANTE

Table 2
International consensus of classification of BR PDAC based on anatomical definition using CT imagings including coronal and sagittal sections.

Resectable: R	<ul style="list-style-type: none"> • SMV/PV: no tumor contact or unilateral narrowing • SMA, CA, CHA: no tumor contact
Borderline resectable: BR	Subclassified according to SMV/PV involvement alone or arterial invasion.
BR-PV (SMV/PV involvement alone)	<ul style="list-style-type: none"> • SMV/PV: tumor contact 180° or greater or bilateral narrowing/occlusion, not exceeding the inferior border of the duodenum. • SMA, CA, CHA: no tumor contact/invasion
BR-A (arterial involvement)	<ul style="list-style-type: none"> • SMA, CA: tumor contact of less than 180° without showing deformity/stenosis. • CHA: tumor contact without showing tumor contact of the PHA and/or CA. <p>(The involvement of the aorta is categorized as unresectable. Presence of variant arterial anatomy is not taken into consideration)</p>
Unresectable: UR	Subclassified according to the status of distant metastasis
Locally advanced: LA	<ul style="list-style-type: none"> • SMV/PV: bilateral narrowing/occlusion, exceeding the inferior border of the duodenum. • SMA, CA: tumor contact/invasion of 180 or more degree[#]. • CHA: tumor contact/invasion showing tumor contact/invasion of the PHA and/or CA. • AO: tumor contact or invasion
Metastatic: M	<ul style="list-style-type: none"> • Distant metastasis \$.

SMV: superior mesenteric vein, PV: portal vein, SMA: superior mesenteric artery, CA: celiac artery, CHA: common hepatic artery, PHA: proper hepatic artery, #: In the cases with CA invasion of 180° or more without involvement of the aorta and with intact and uninvolved gastroduodenal artery thereby permitting a distal pancreatectomy with enbloc celiac axis resection (DP-CAR) [21], some members prefer this criteria to be in the BR-A category. \$: including macroscopic para aortic and extra abdominal lymph node metastasis.

ORIGINAL ARTICLE – PANCREATIC TUMORS

Pancreatic Adenocarcinoma with Venous Involvement: Is Up-Front Synchronous Portal-Superior Mesenteric Vein Resection Still Justified? A Survey of the Association Française de Chirurgie

- Morbidade e mortalidade igual $p= 0,16$**
- Sobrevida média: 21 meses (VR) e 29 meses (RP)**
- Sobrevida em 3 anos: 31% (VR) e 44% (RP)**
- Tumores maiores, menos diferenciados**
- Mais linfonodos positivos, mais margem positiva**
- Quimioterapia esteve associada com melhor sobrevida a longo prazo**

QUIMIOTERAPIA NEOADJUVANTE

RESSECÇÃO SEM RECONSTRUÇÃO DA VMS

W J G World Journal of
Gastroenterology

Submit a Manuscript: <http://www.wjgnet.com/esps/>
Help Desk: <http://www.wjgnet.com/esps/helpdesk.aspx>
DOI: 10.3748/wjg.v21.i24.7604

World J Gastroenterol 2015 June 28; 21(24): 7604-7607
ISSN 1007-9327 (print) ISSN 2219-2840 (online)
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CASE REPORT

Resection of the main trunk of the superior mesenteric vein without reconstruction during surgery for giant pancreatic mucinous cystadenoma: A case report

Chen YT, et al. World J Gastroenterol 2015

W J C C World Journal of
Clinical Cases

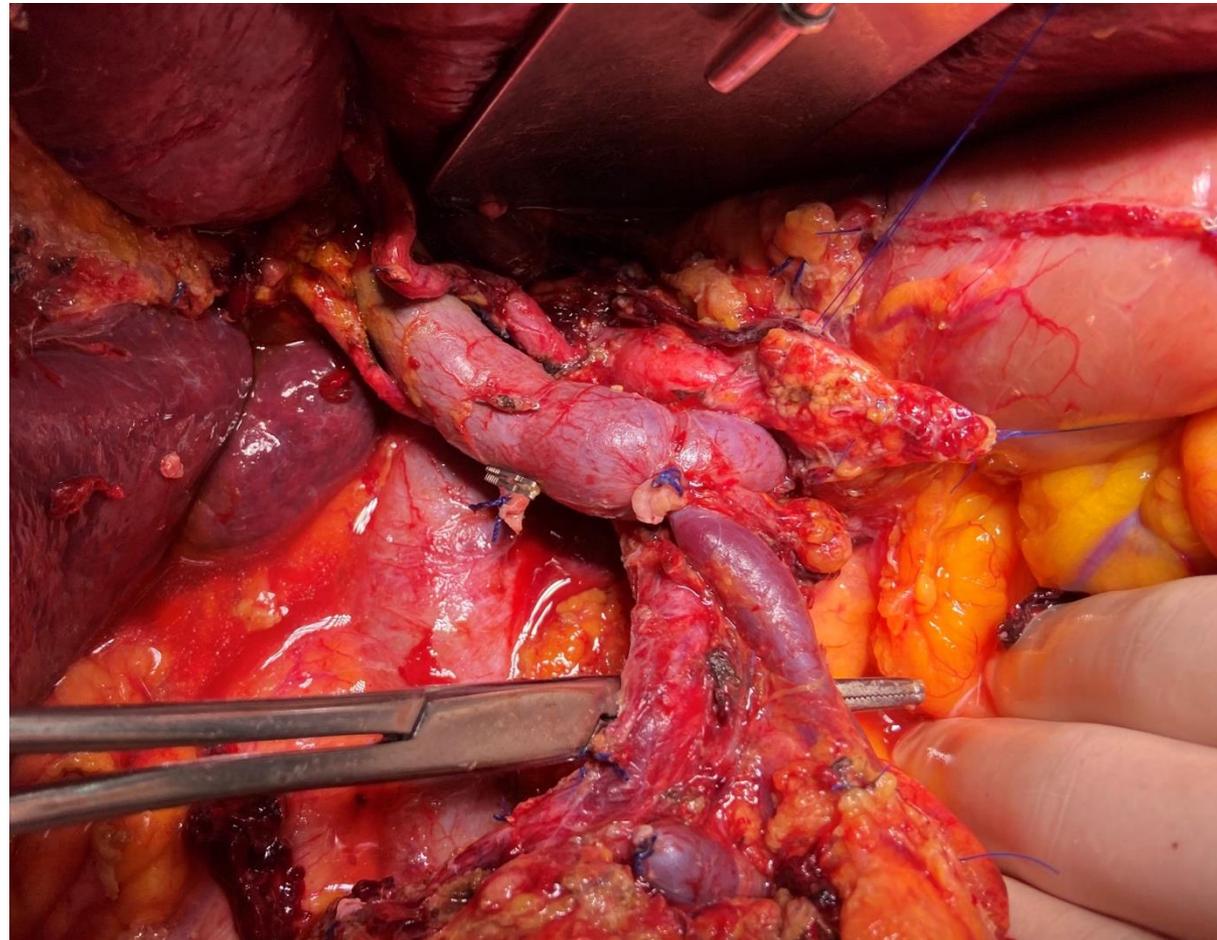
Submit a Manuscript: <http://www.fapublishing.com>
DOI: 10.12998/wjcc.v6.i8.214

World J Clin Cases 2018 August 16; 6(8): 214-218
ISSN 2307-8960 (online)

CASE REPORT

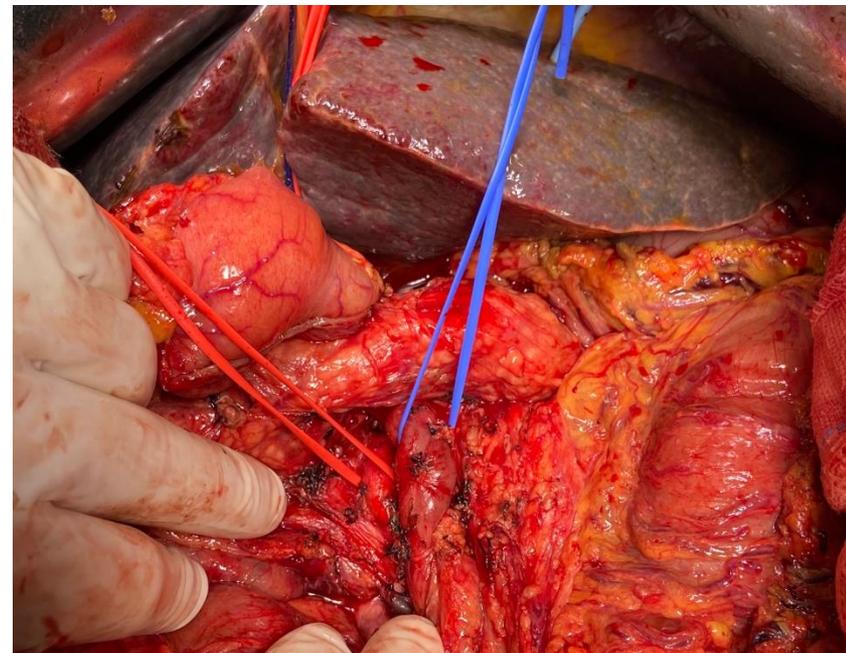
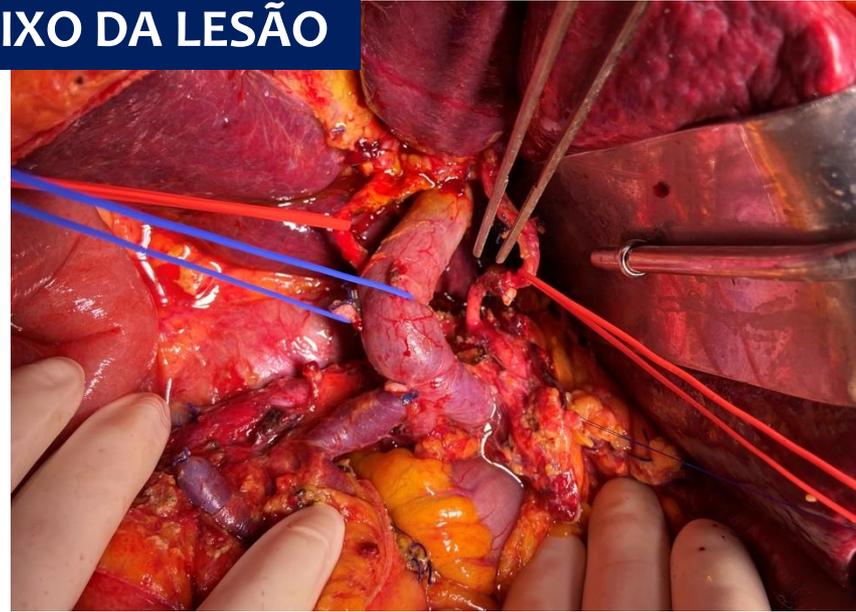
Pancreaticoduodenectomy with combined superior mesenteric vein resection without reconstruction is possible: A case report and review of the literature

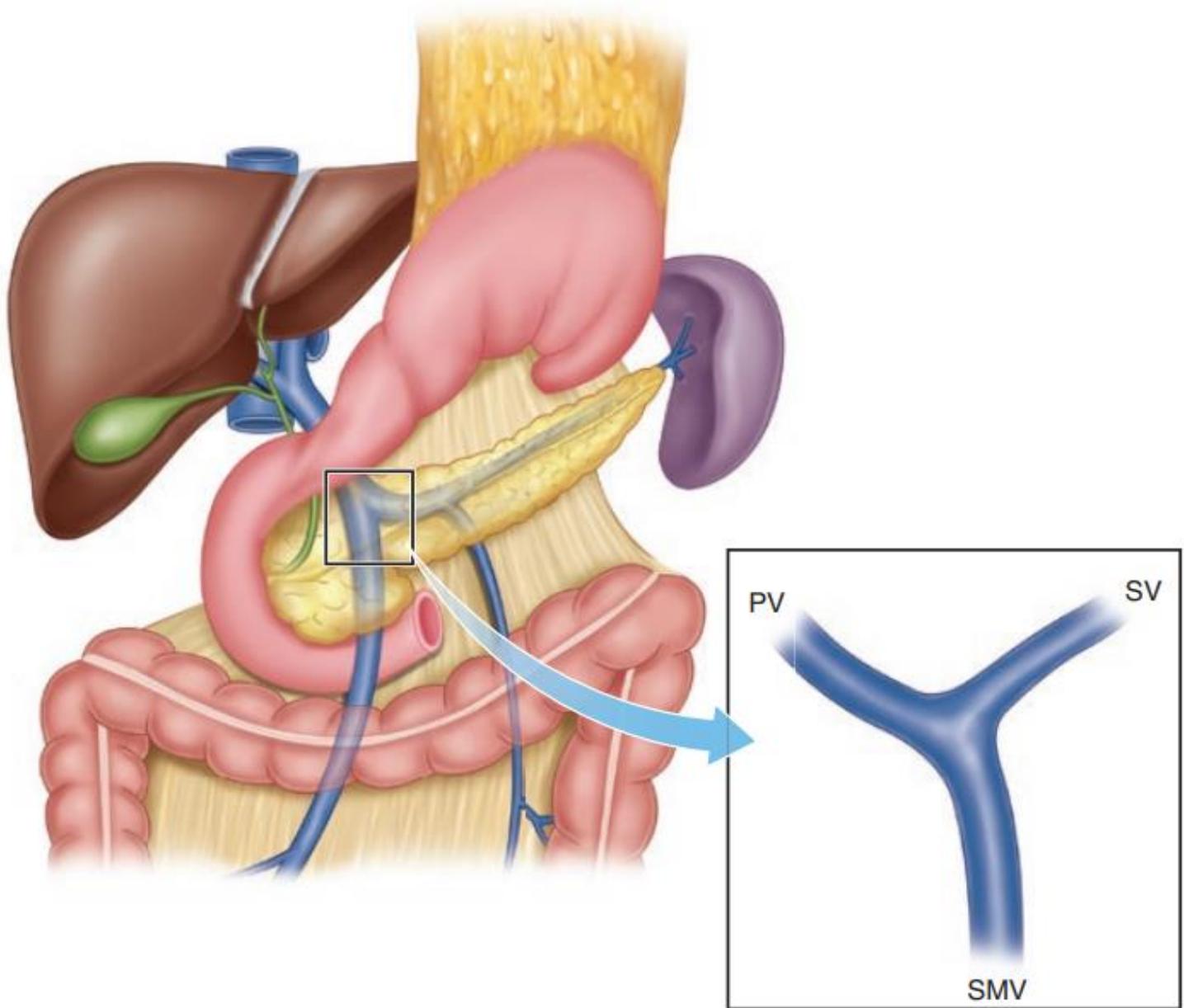
Jouffret L, et al. World J Clin Cases 2018



EXTENSÃO DA MOBILIZAÇÃO ACIMA E ABAIXO DA LESÃO

- Tipo 1 Ressecção Padrão (74,1%)
- Tipo 2 Ressecção porta-mesentérica (14,4%)
- Tipo 3 Ressecção multivisceral (10,5%)
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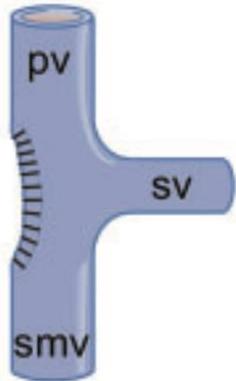




RESSECÇÃO VENOSA PORTO-MESENTÉRICA

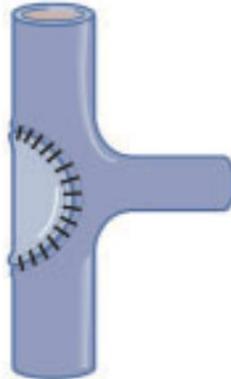
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Type 1



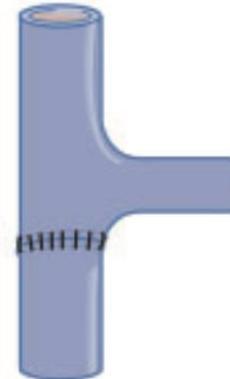
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c

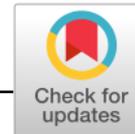
Type 3



d

Type 4

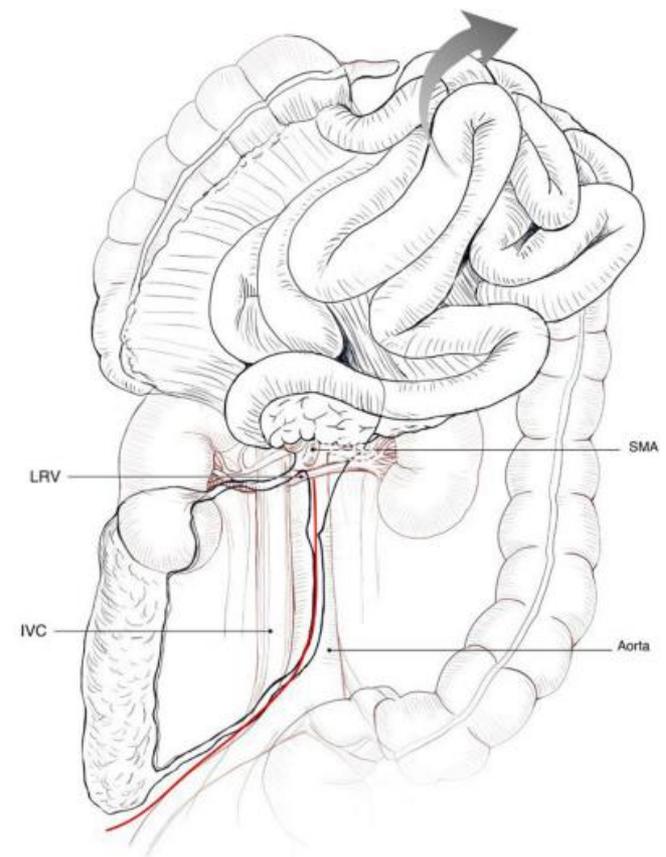
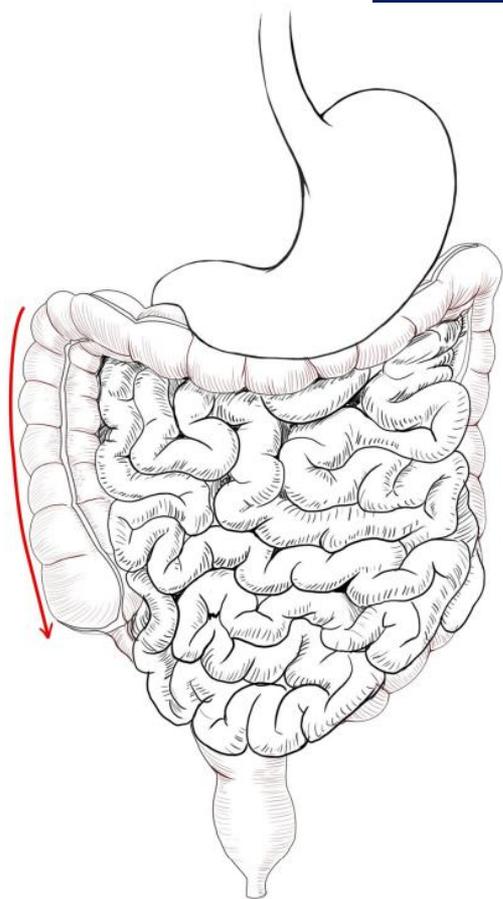




HOW I DO IT

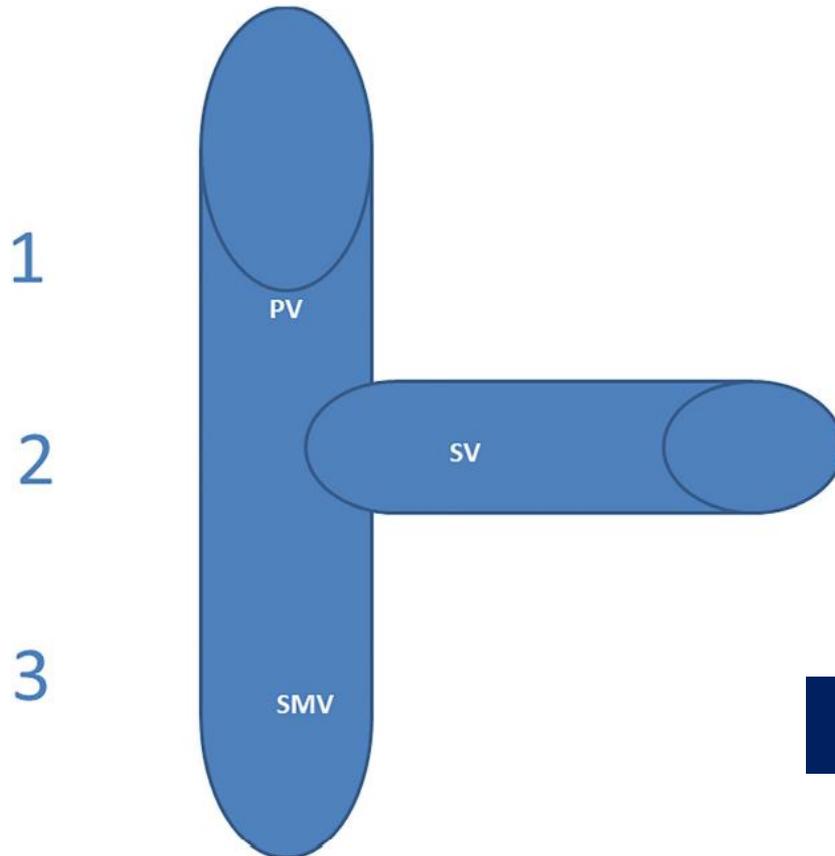
Cattell-Braasch maneuver in pancreatic surgery. No need of venous graft for vascular resection

REDUZIR A NECESSIDADE DE ENXERTO



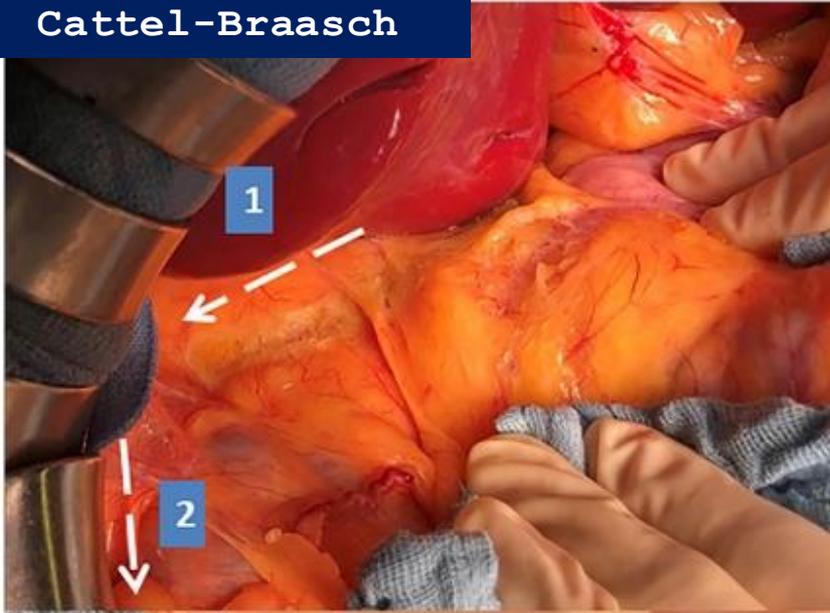


Pancreaticoduodenectomy with Segmental Venous Resection: a Standardized Technique Avoiding Graft Interposition

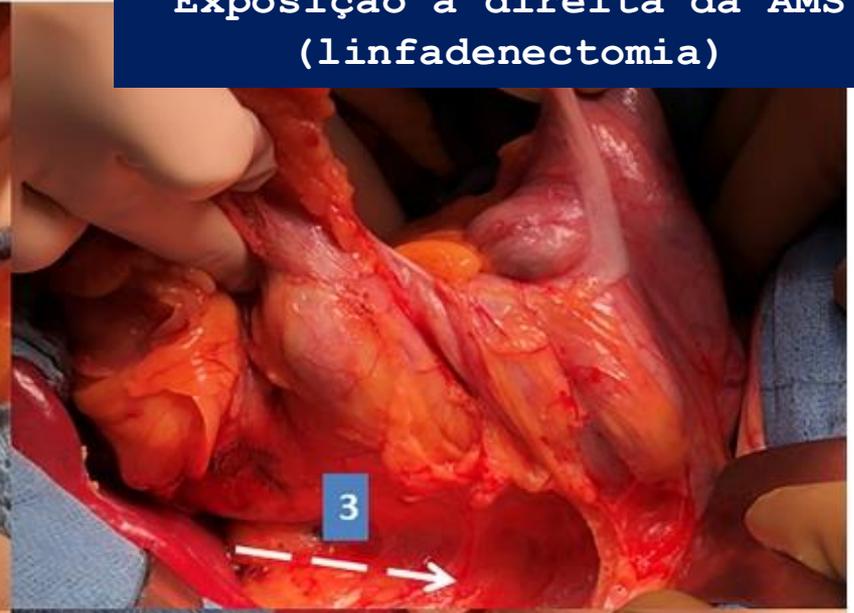


VEIA PORTA-MESENTÉRICA

Cattel-Braasch



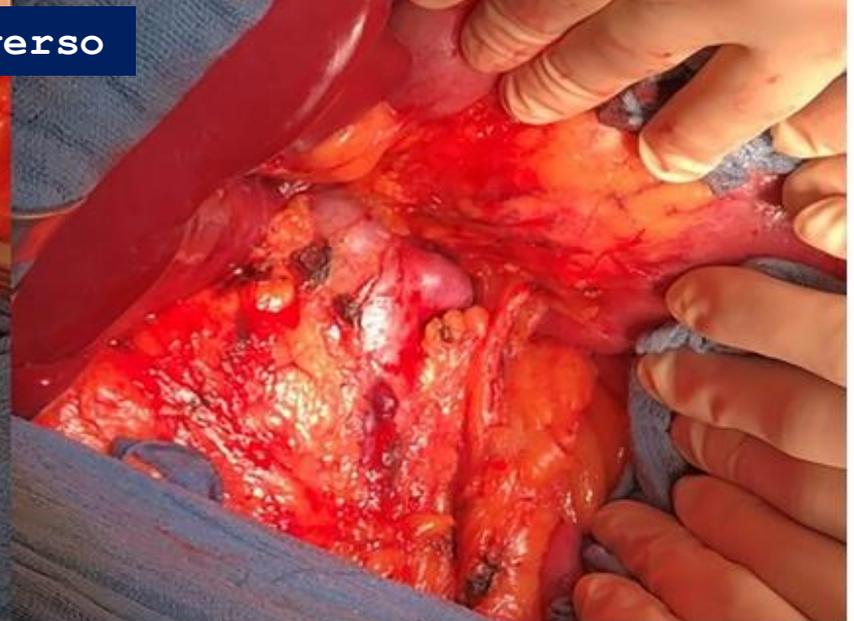
**Exposição à direita da AMS
(linfadenectomia)**



Transecção do mesocolon transverso



Transecção da veia esplênica



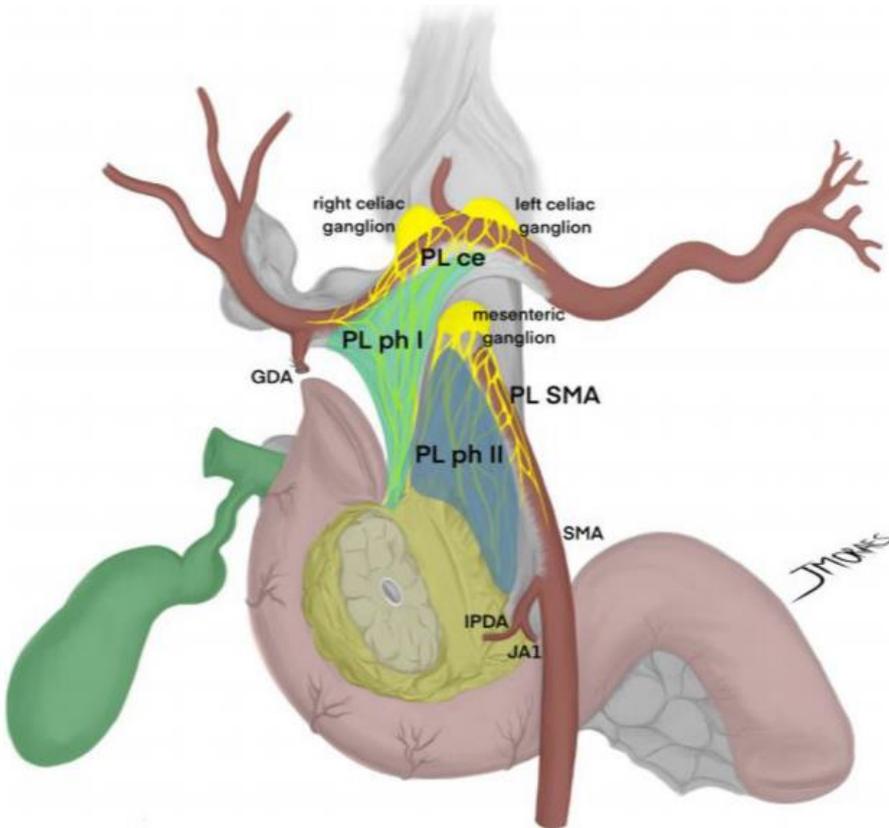


What do surgeons need to know about the mesopancreas

Eduardo de Souza M. Fernandes^{1,2} · Oliver Strobel^{3,4} · Camila Girão^{1,2} · Jose Maria A. Moraes-Junior^{5,6} · Orlando Jorge M. Torres^{5,6} 

Table 3 Advantages of the artery-first approach (SHARMA) [35]

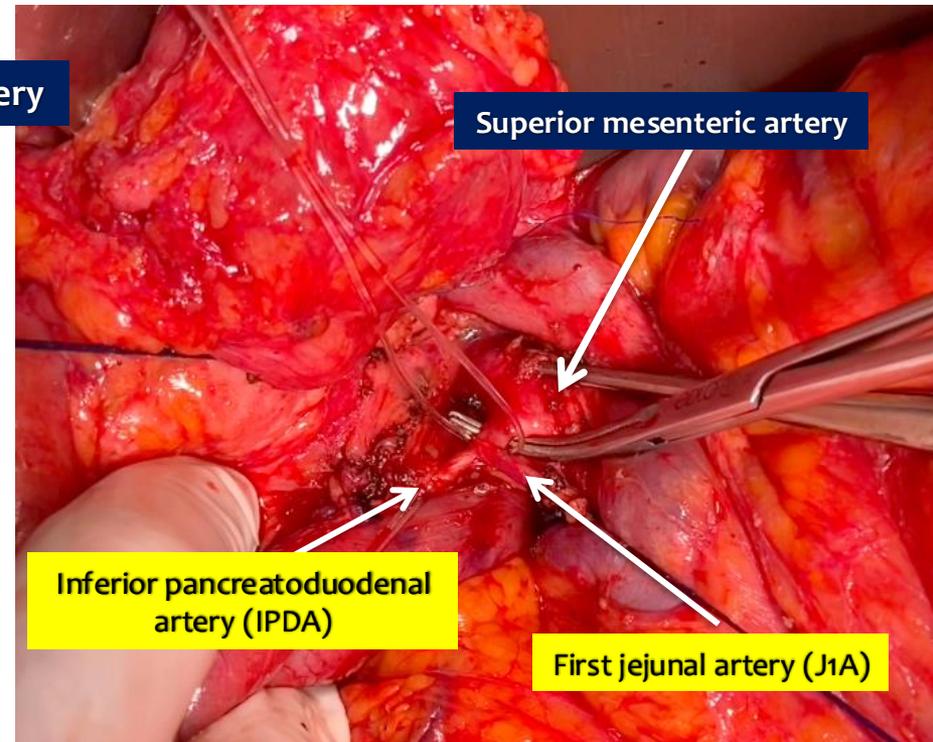
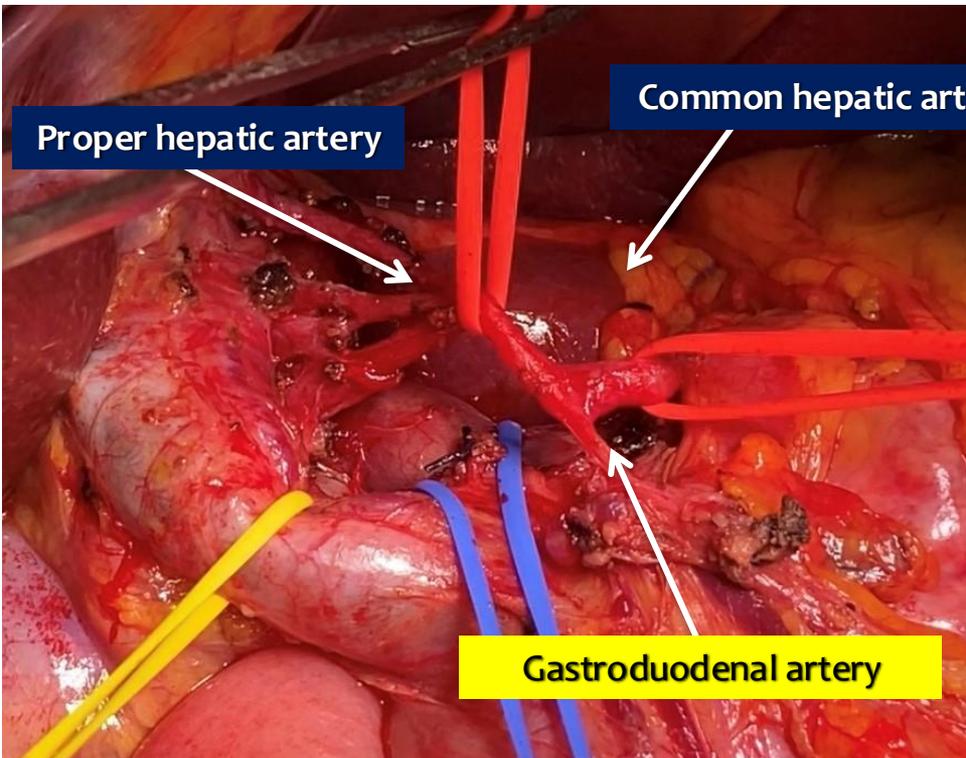
1. Resection without breaching the tumor extension plane, thereby minimizing cell spillage
2. Increases curative (R0) resection, decreases local recurrence
3. Complete resection of peripancreatic retroperitoneal tissue around the plexuses
4. Increased lymph nodal clearance
5. Early assessment of non-resectability (SMA involvement), avoiding useless R2 resections
6. Better delineation of SMA and identification of RHA anomalies
7. Easier en bloc resection and reconstruction of SMV-PV by “no touch” technique
8. Reduced need for graft substitutions
9. Reduced operative time and blood loss (early ligation of IPDA/JA1)



ARTERY FIRST APPROACH

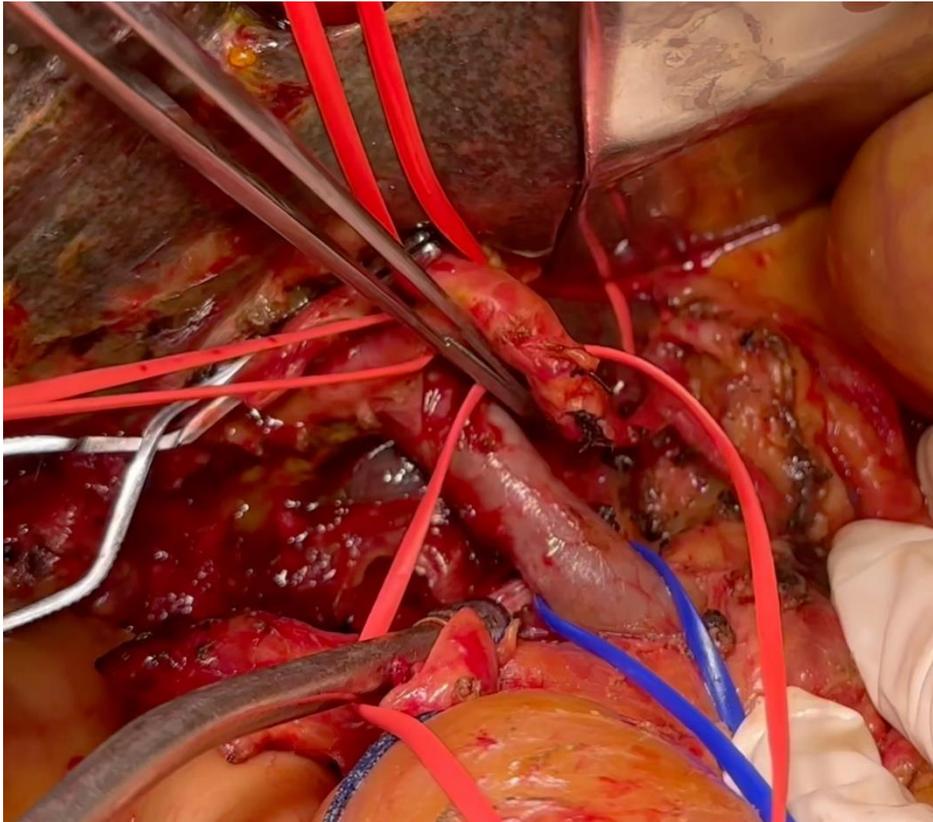
CONTROLE ARTERIAL

- Sangramento
- Fístula pancreática
- Gastroparesia
- Padrão oncológico

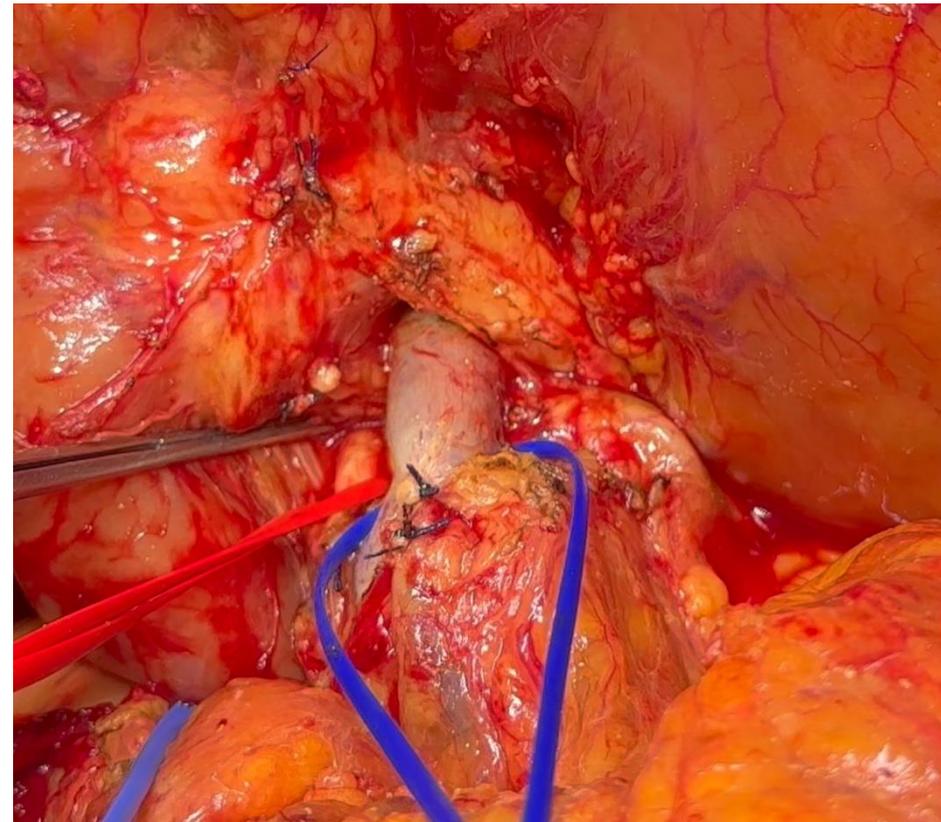


CONTROLE VENOSO

- Sangramento
- Fístula pancreática
- Gastroparesia
- Padrão oncológico

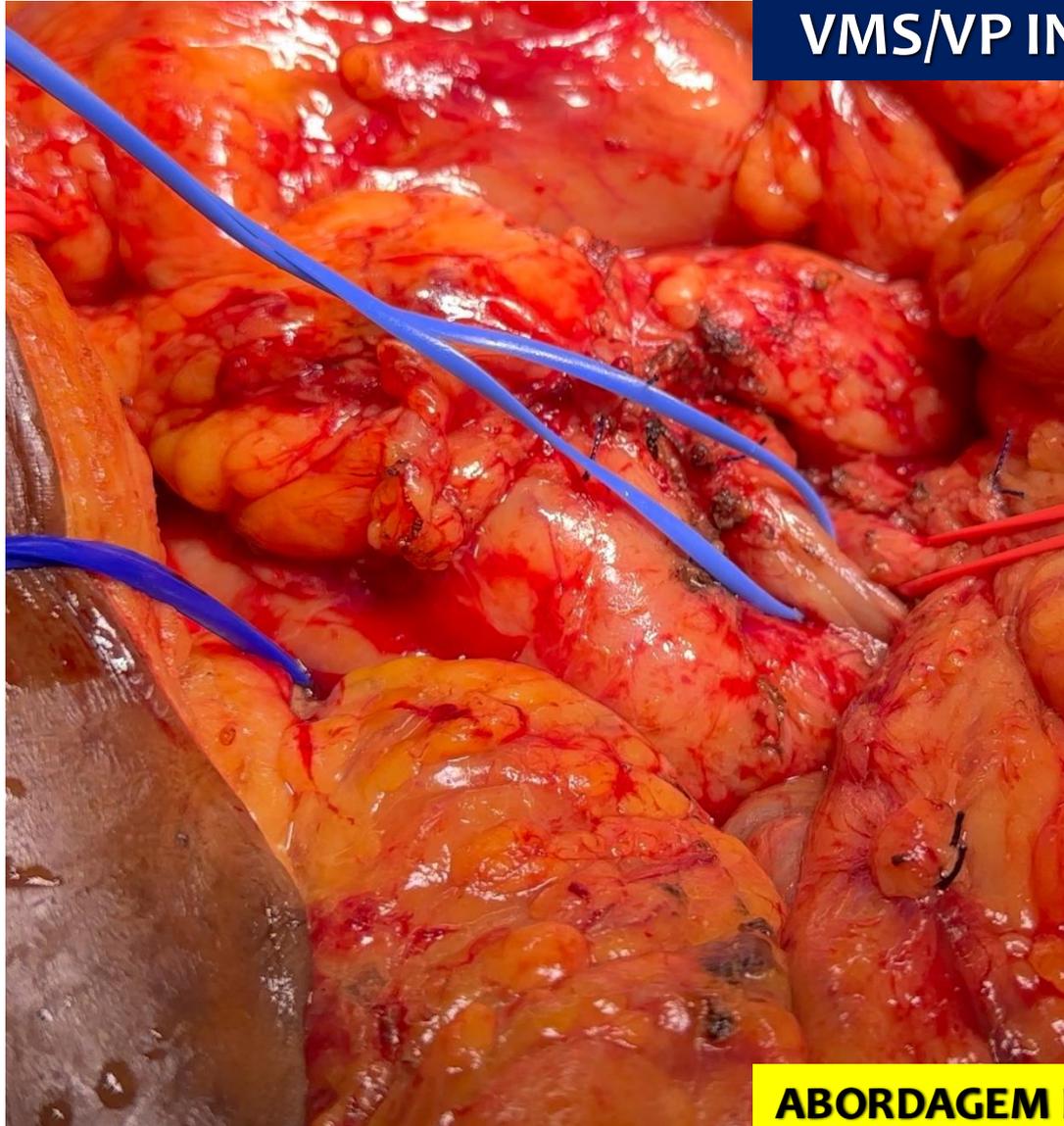


PORTAL VEIN CONTROL



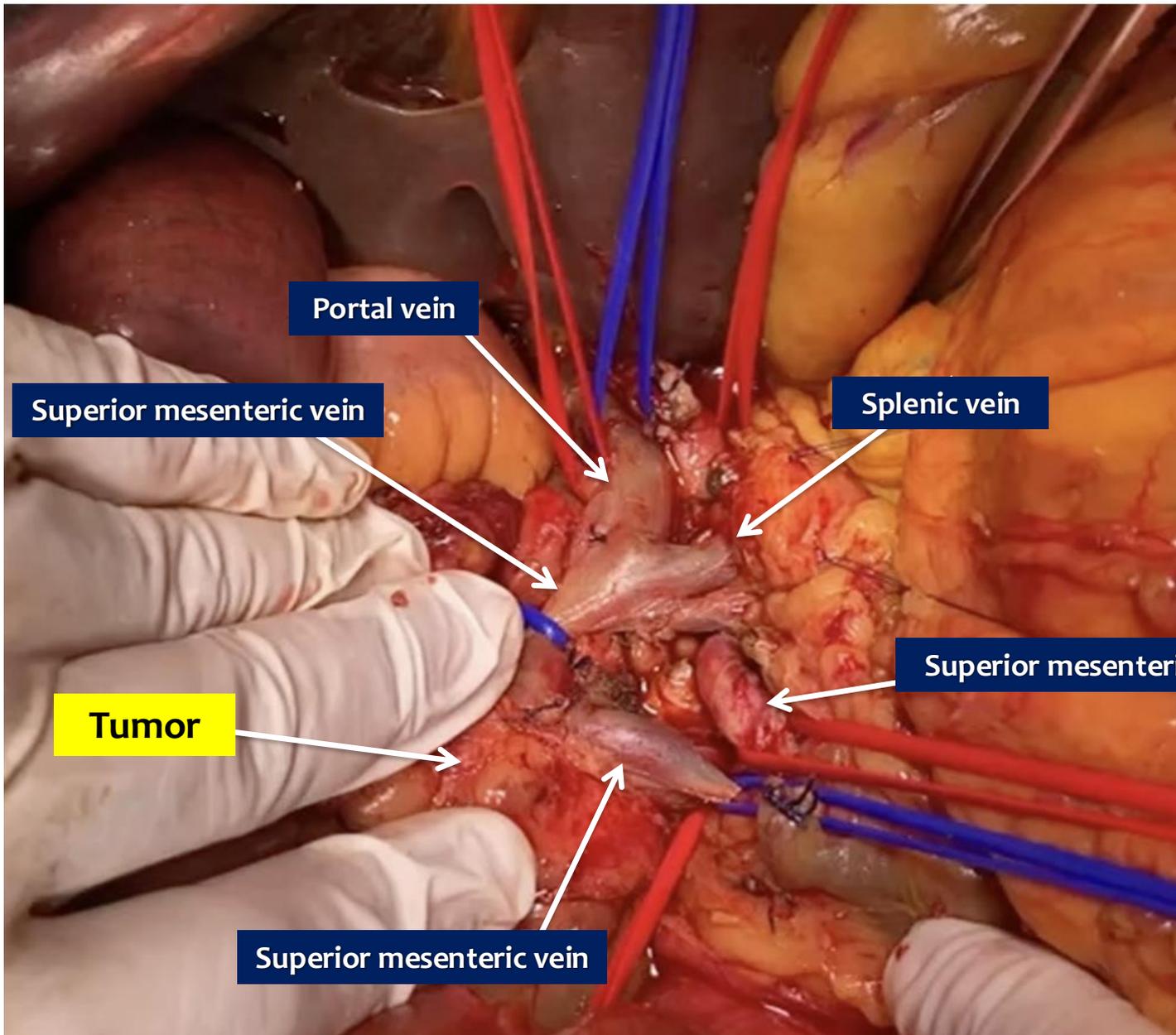
SUPERIOR MESENTERIC VEIN CONTROL

VMS/VP INVADIDA



ABORDAGEM PELO UNCINADO

- Os diâmetros dos cotos da veia (após a ressecção) são apropriados para a anastomose, permitindo fluxo do intestino para o fígado?
- A veia esplênica pode ser preservada?
- Existe possibilidade da veia esplênica não ser reconstruída?
- Há necessidade de interposição de enxerto (ou patch), ou é possível fazer término-terminal sem interposição?
- Qual enxerto (ou patch), se necessário, é o mais
- apropriado nessa situação individual?



Portal vein

Superior mesenteric vein

Splenic vein

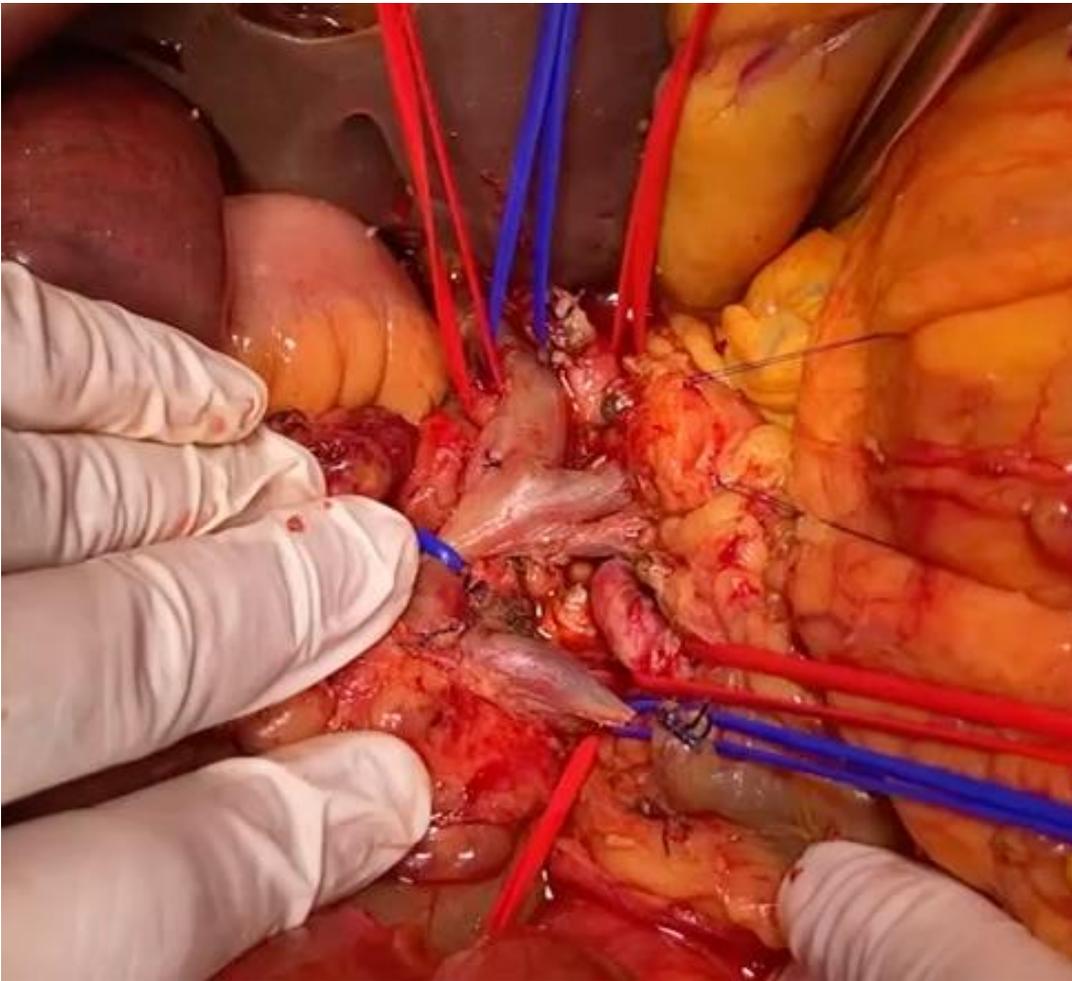
Superior mesenteric artery

Tumor

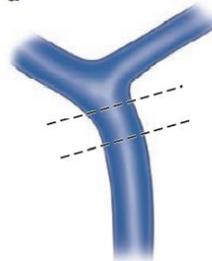
Superior mesenteric vein

VMS INVADIDA

ABORDAGEM PELO UNCINADO



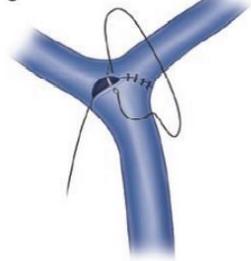
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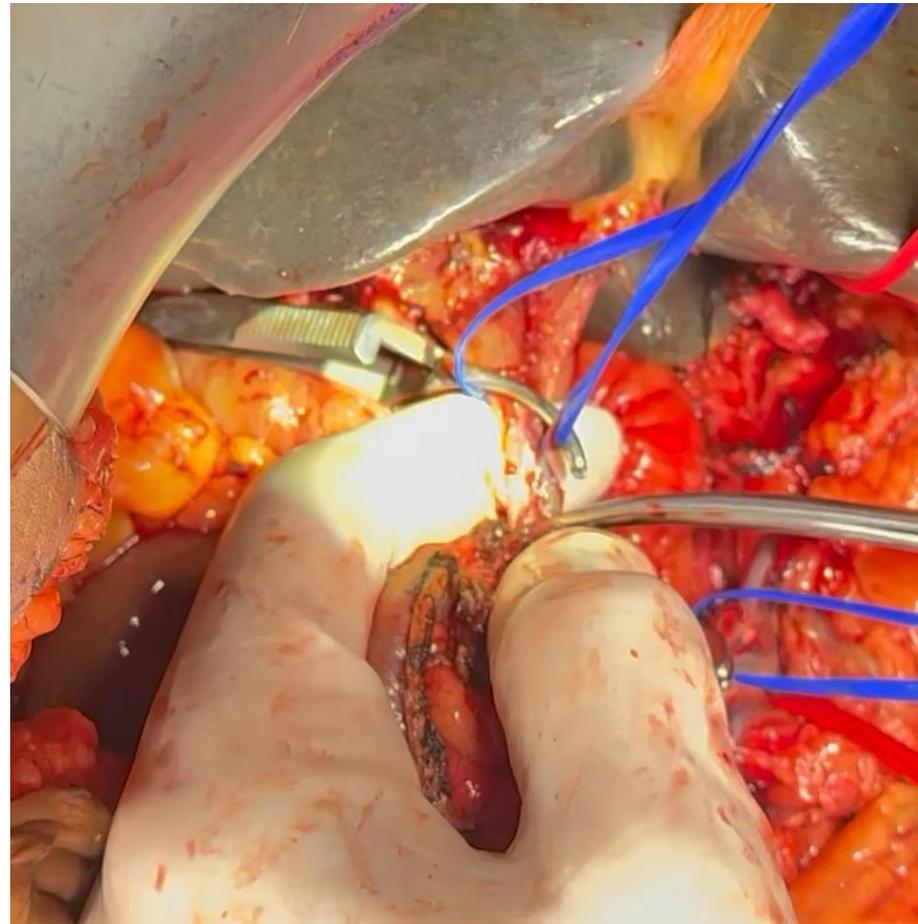
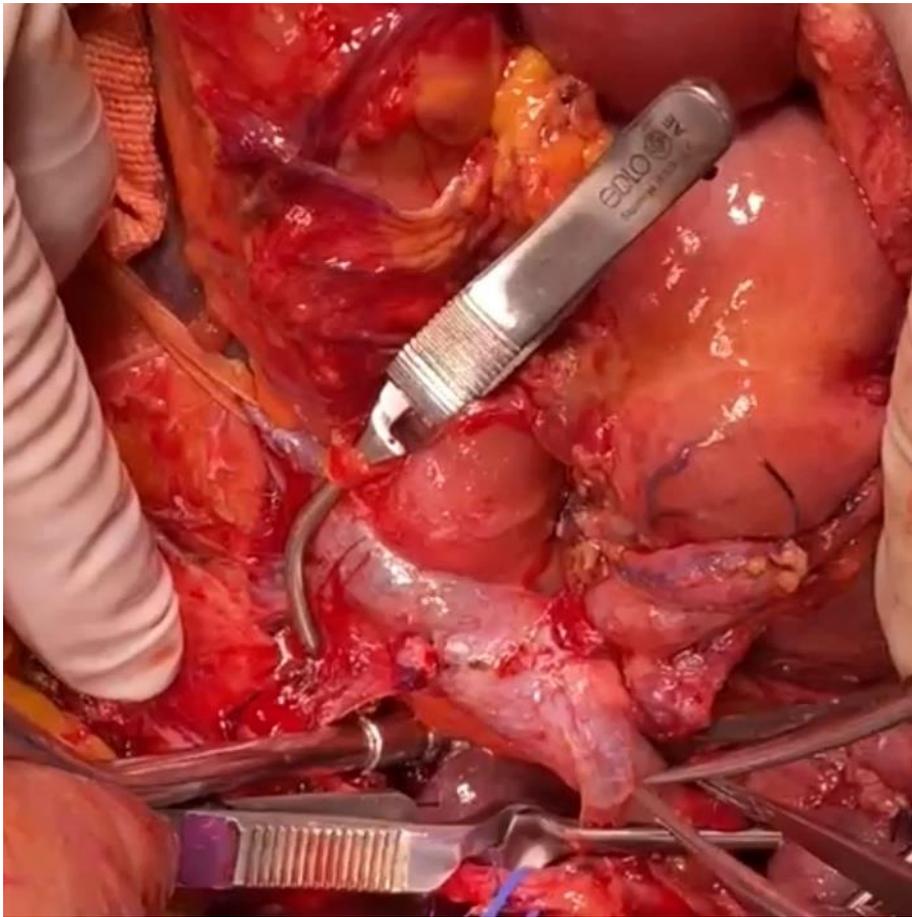


c

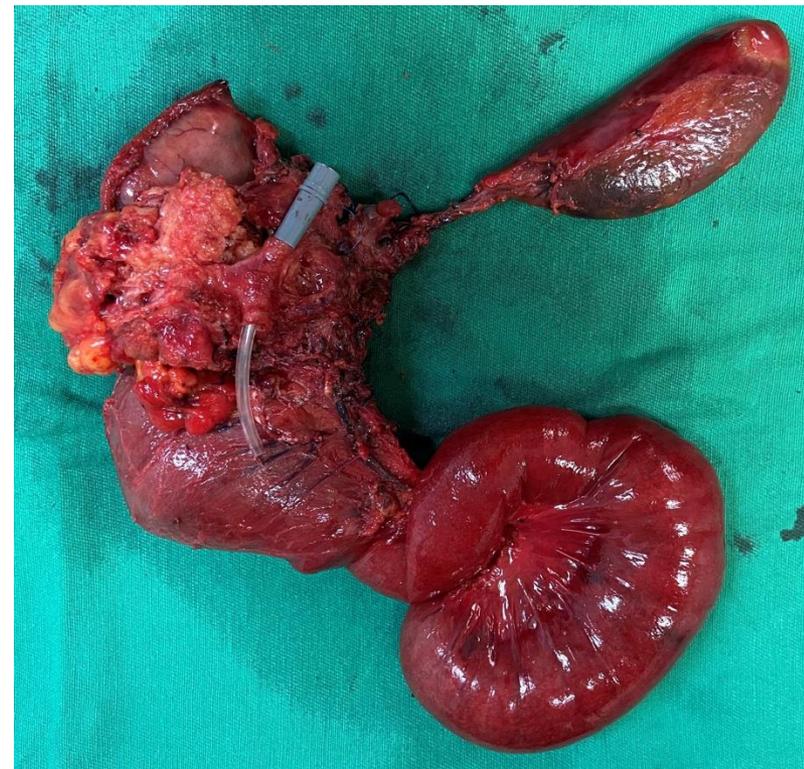
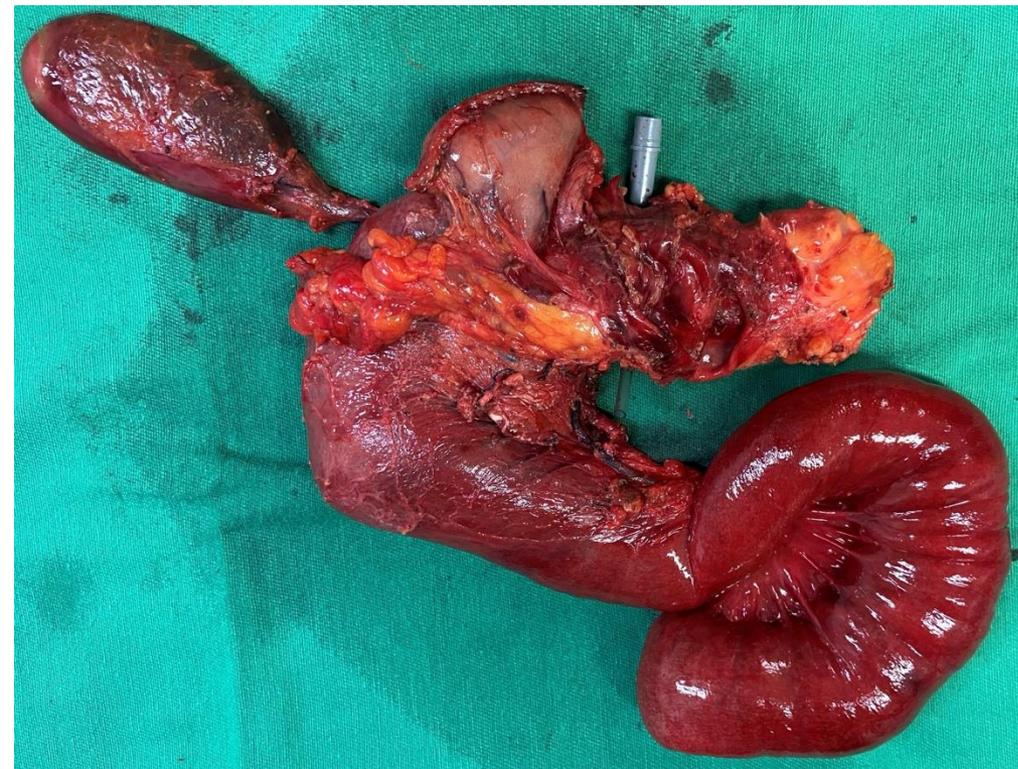


□ Ressecção como último procedimento

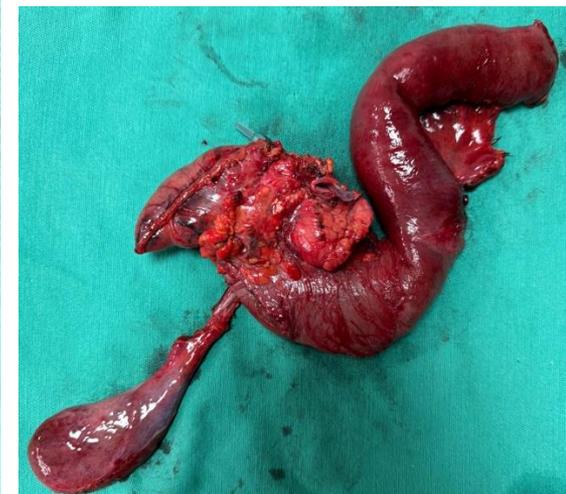
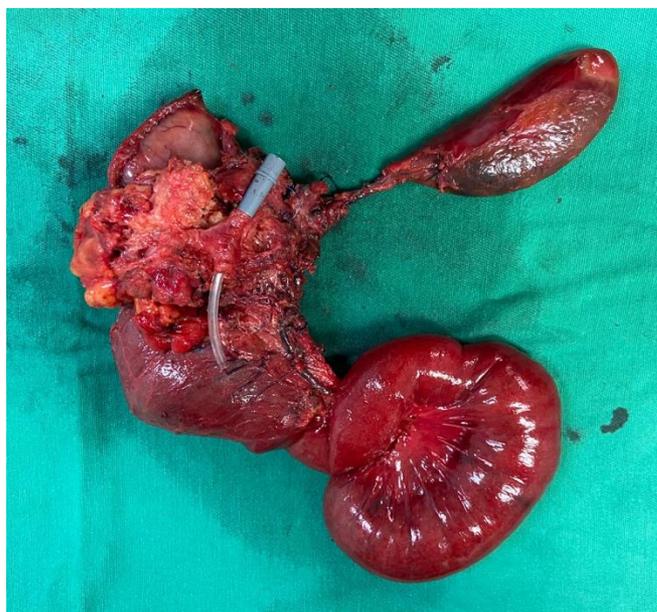
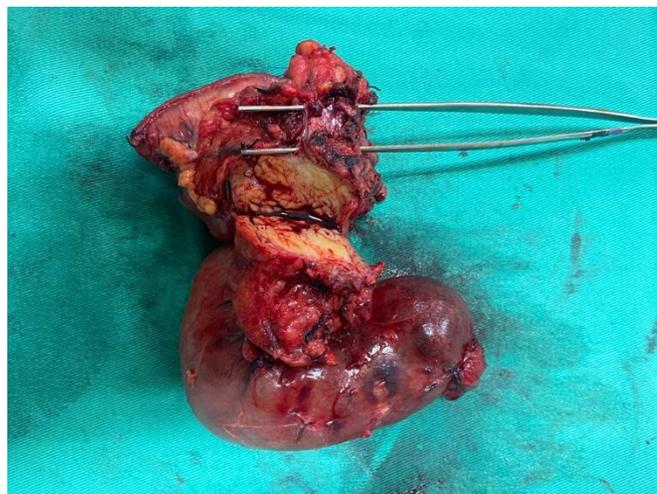
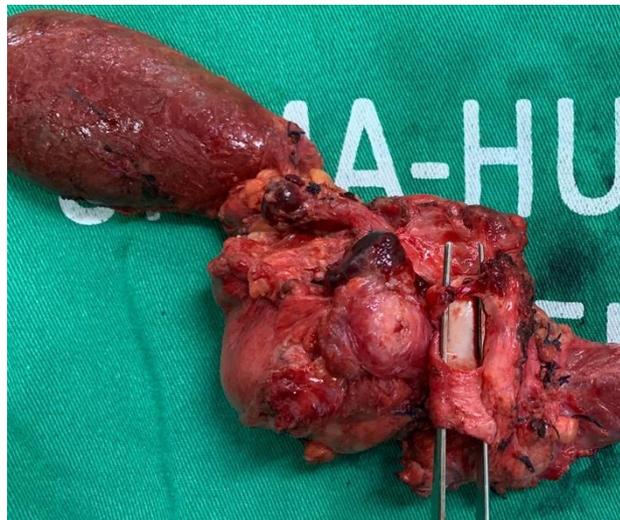
ASPECTOS TÉCNICOS



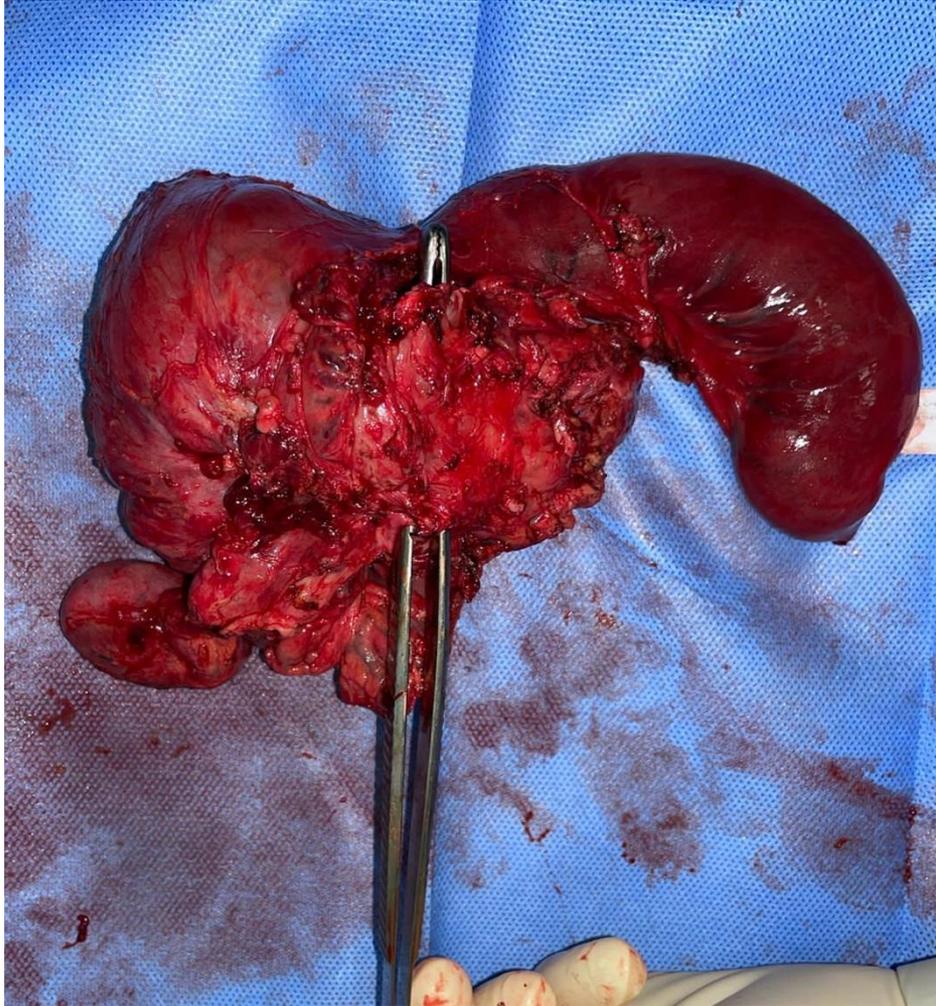
- ❑ Ressecção como último procedimento
- ❑ Sempre a peça toda



RESSECÇÃO VENOSA PORTO-MESENTÉRICA



RESSECÇÃO VENOSA PORTO-MESENTÉRICA



Portal vein resection



Jakarta - Indonesia

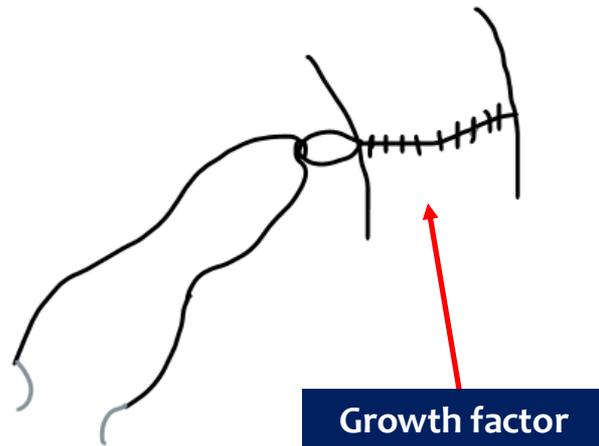
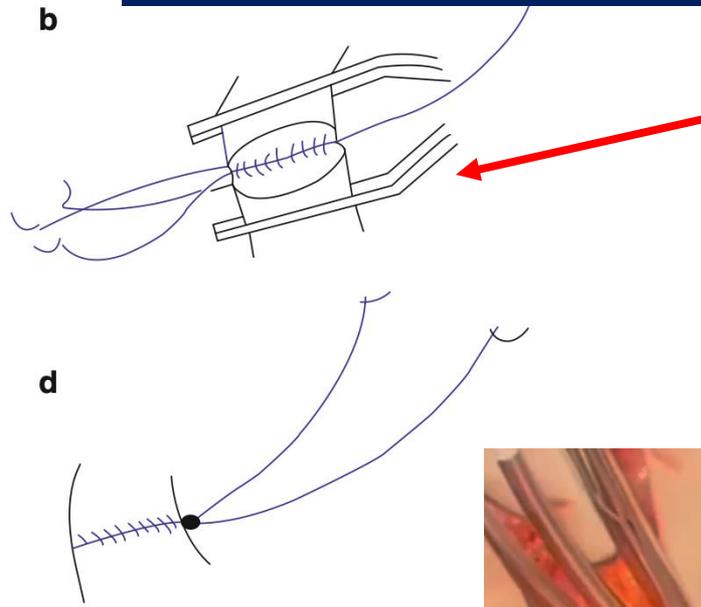
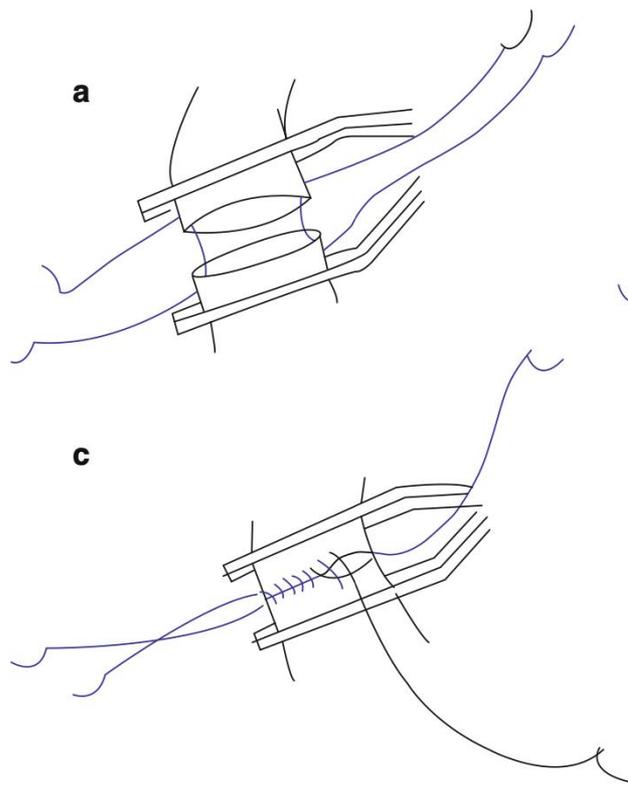
September 2022

RECONSTRUÇÃO



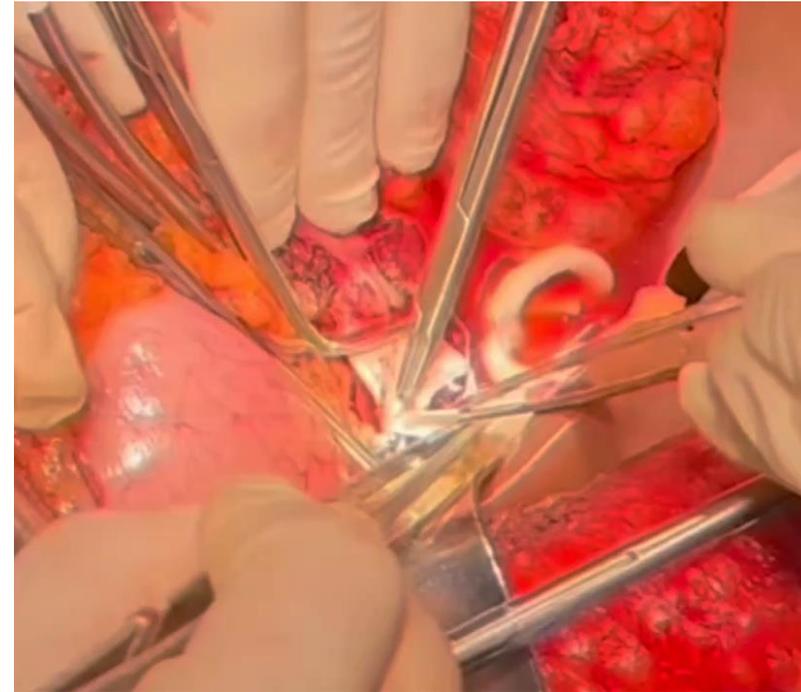
ASPECTOS TÉCNICOS

RECONSTRUÇÃO

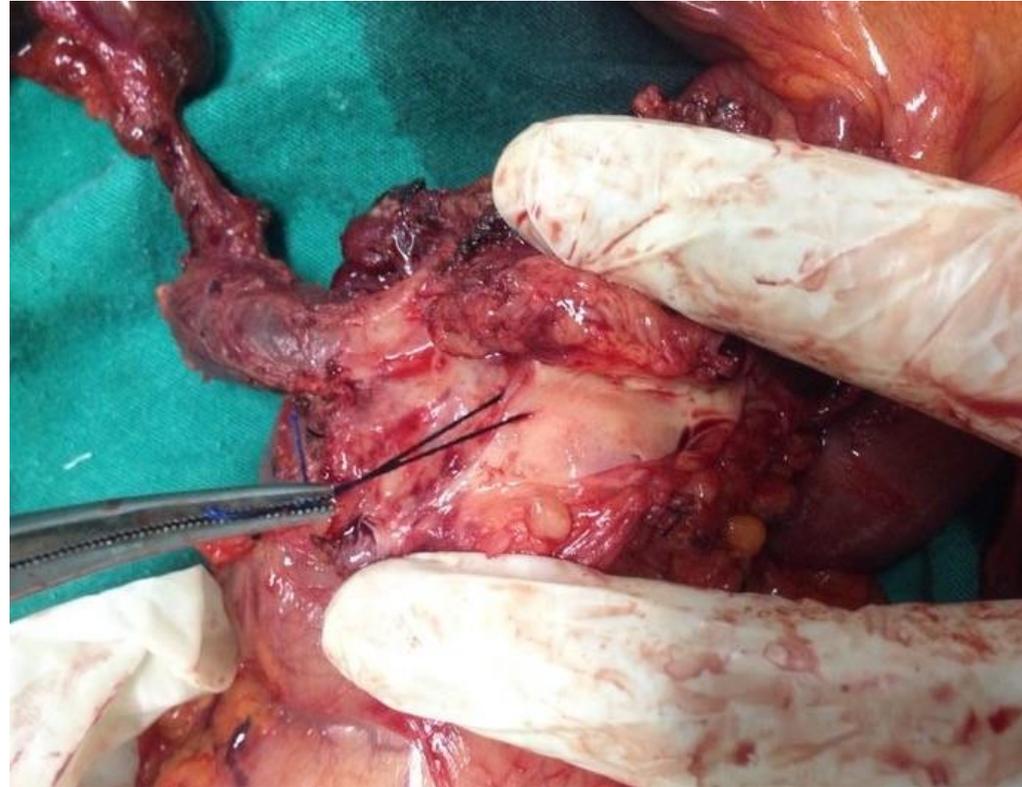


Growth factor

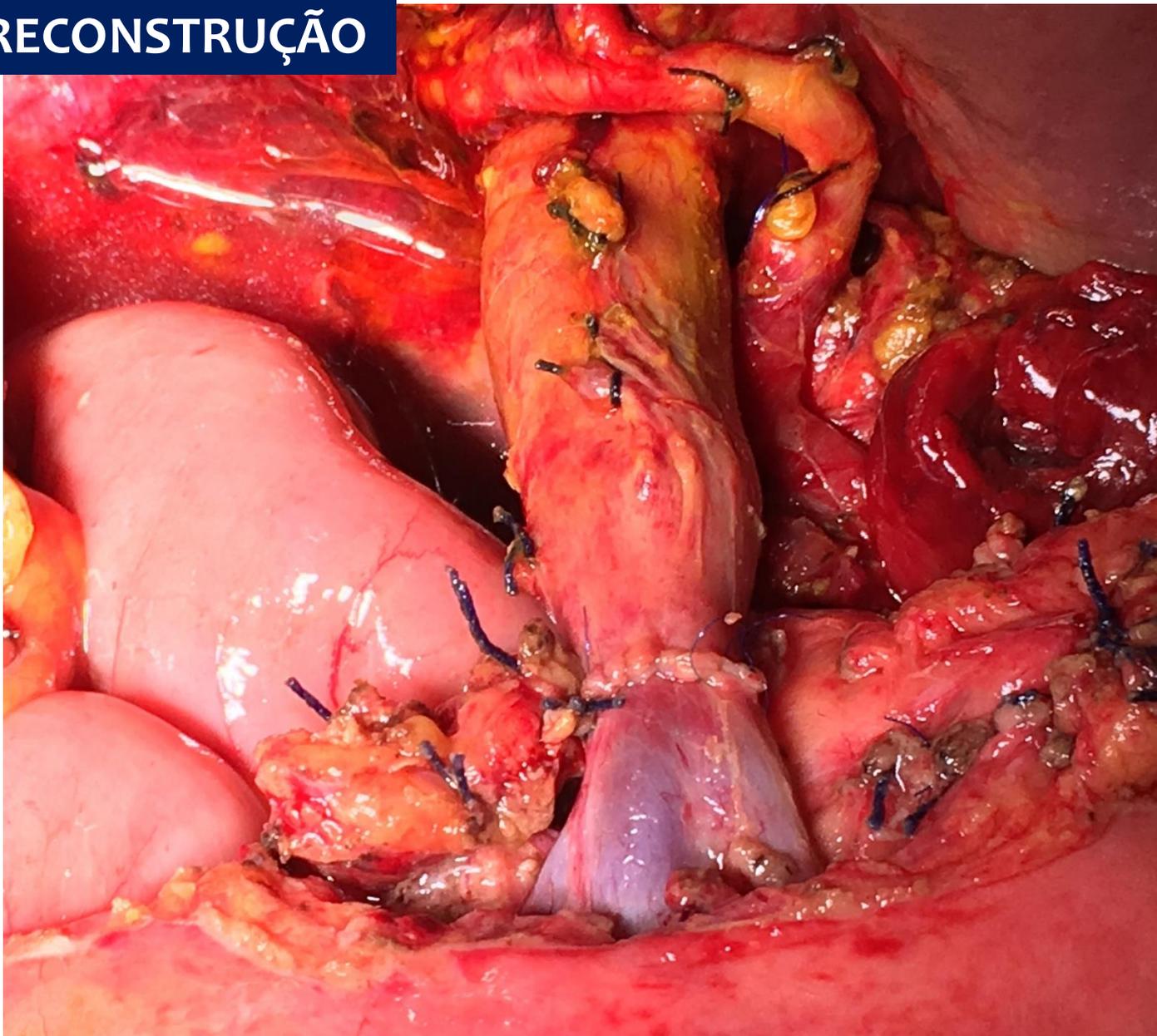
- Prolene 6.0
- Duas agulhas
- Duplo reparo
- Sutura contínua
- Início posterior
- Longe para perto
- Flushing
- Heparina
- Growth factor



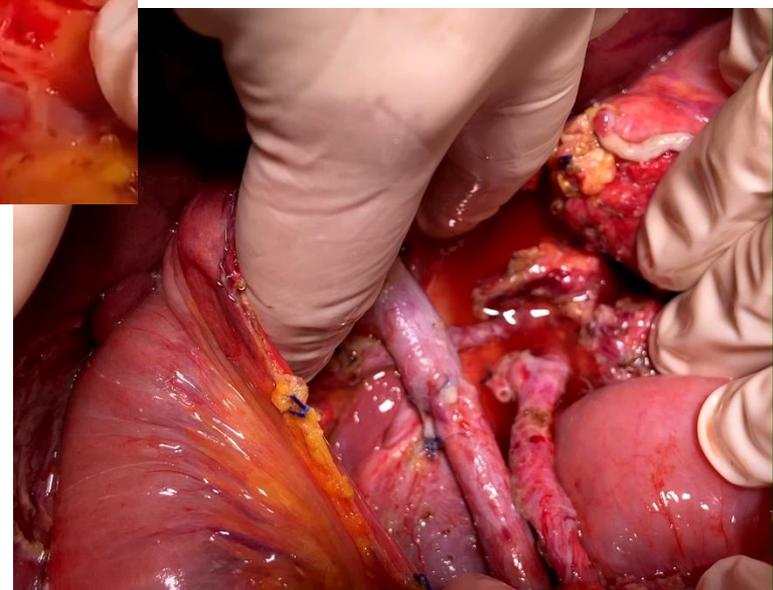
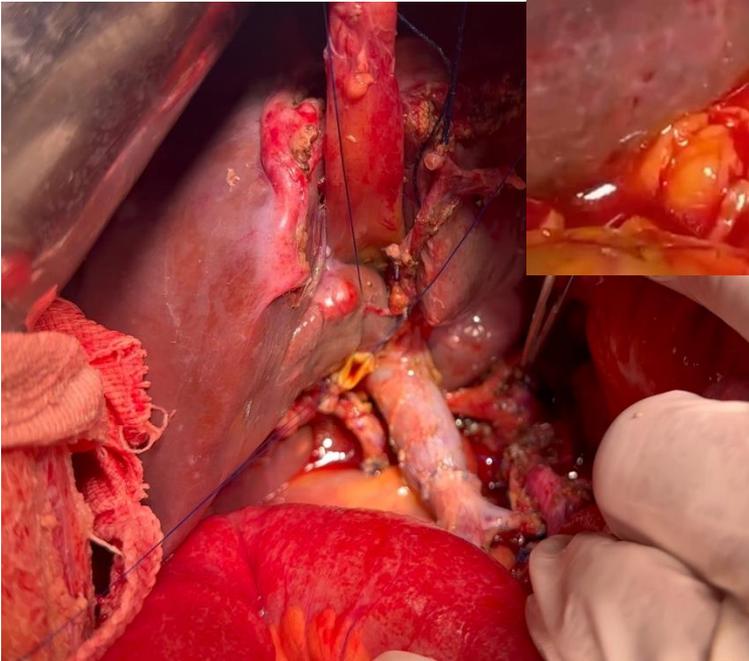
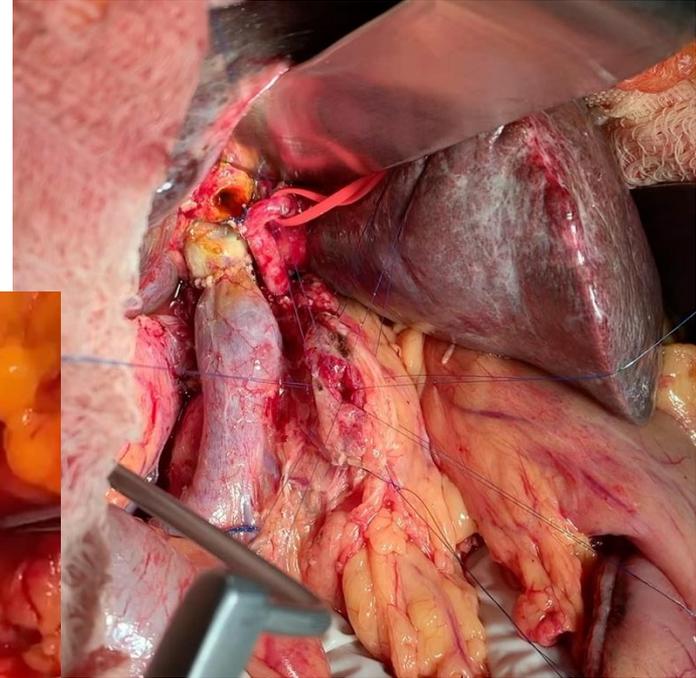
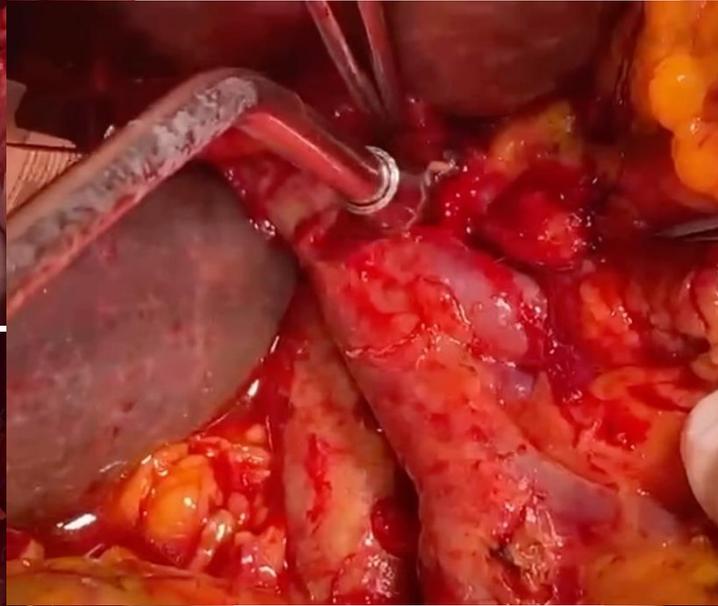
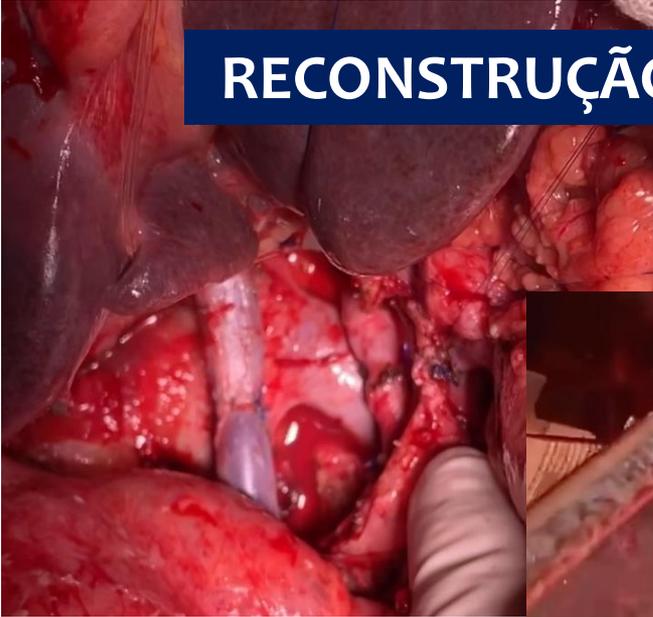
RESSECÇÃO VENOSA PORTO-MESENTÉRICA



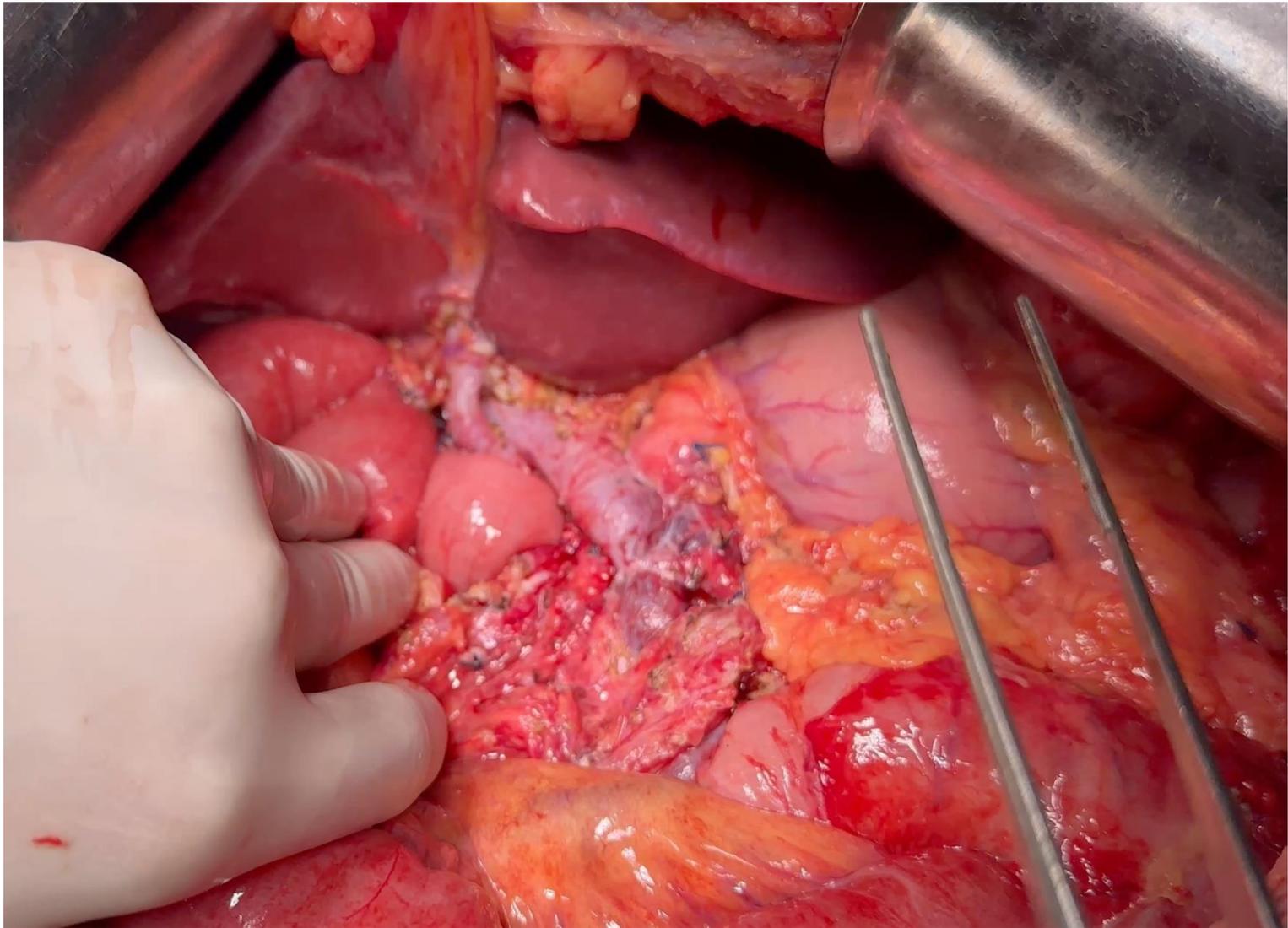
RECONSTRUÇÃO



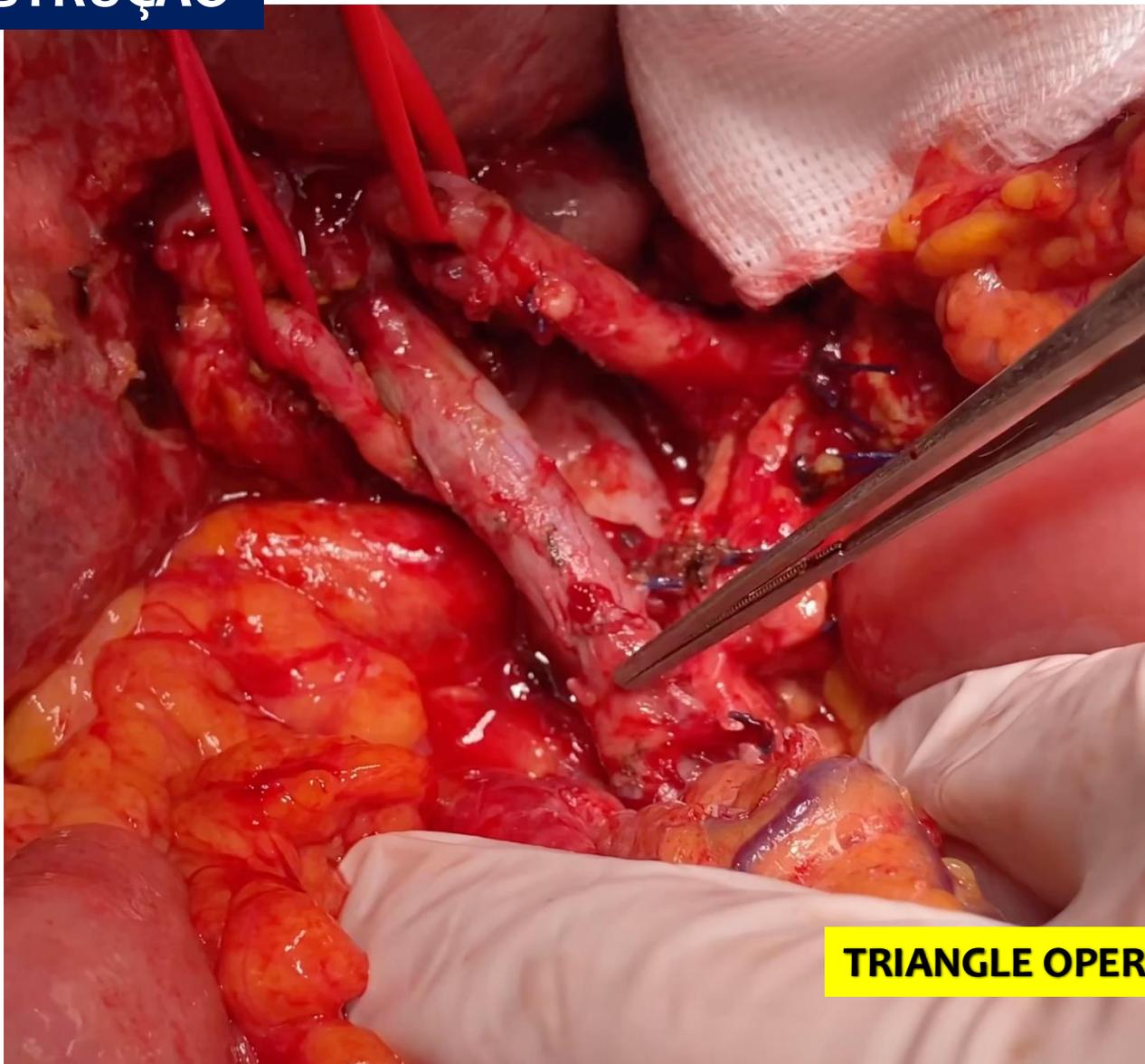
RECONSTRUÇÃO



RECONSTRUÇÃO

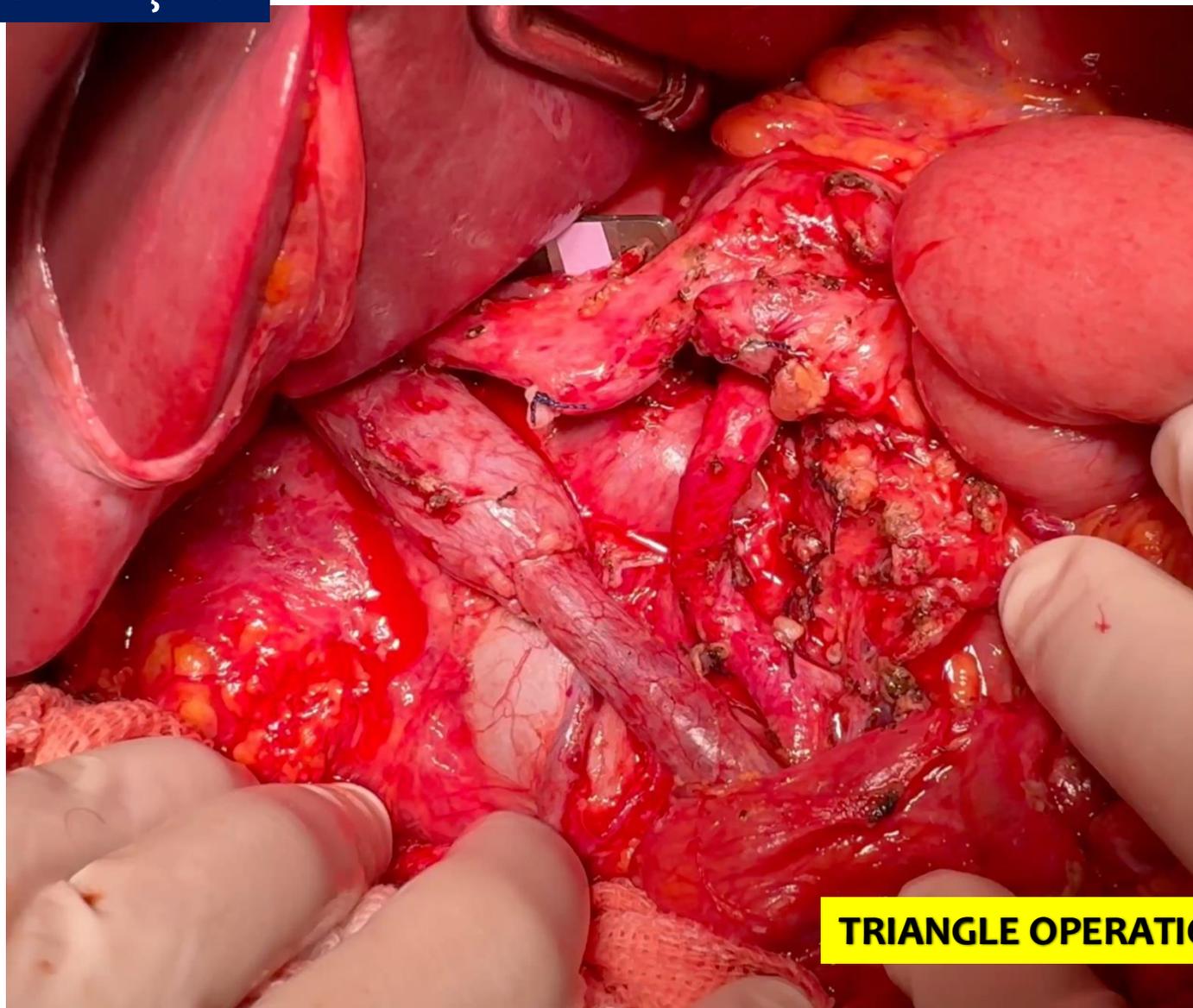


RECONSTRUÇÃO



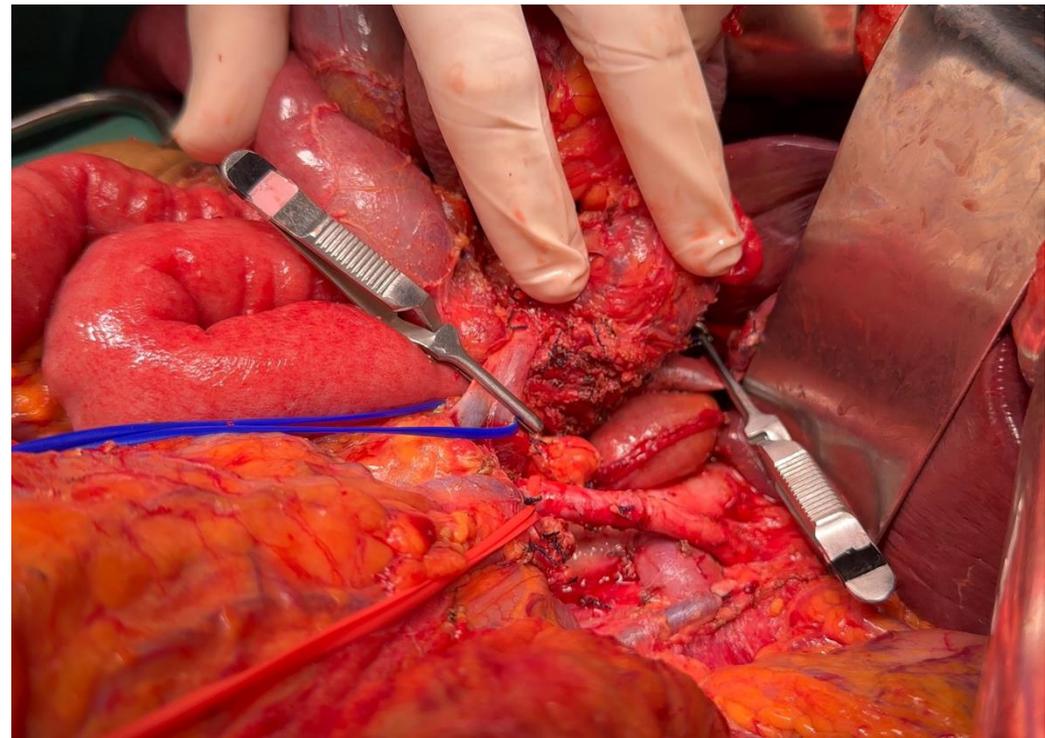
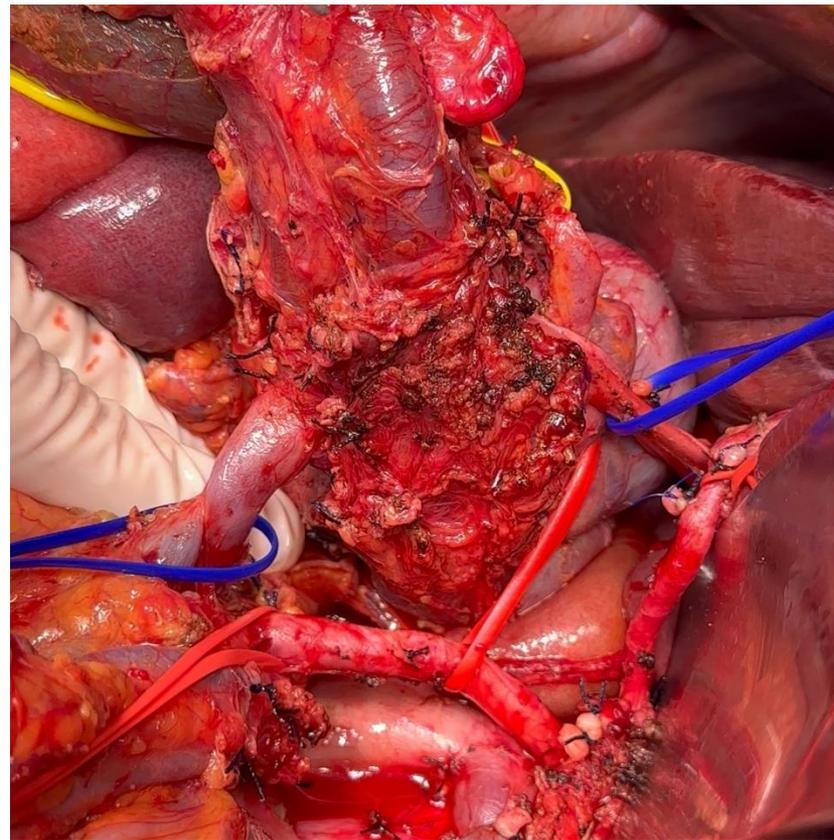
TRIANGLE OPERATION

RECONSTRUÇÃO



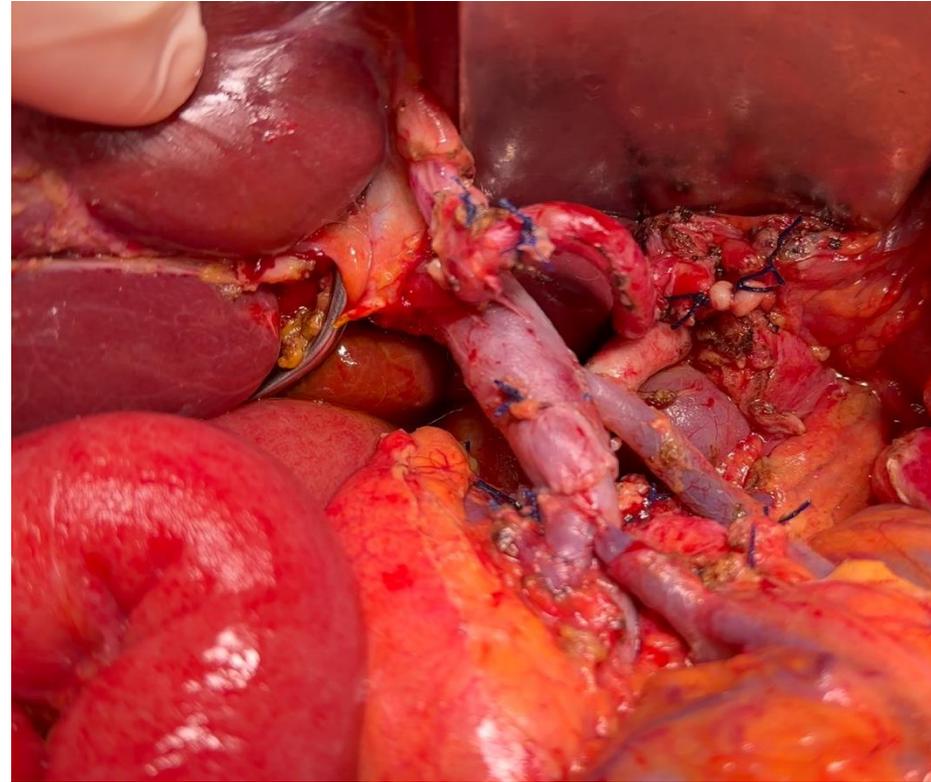
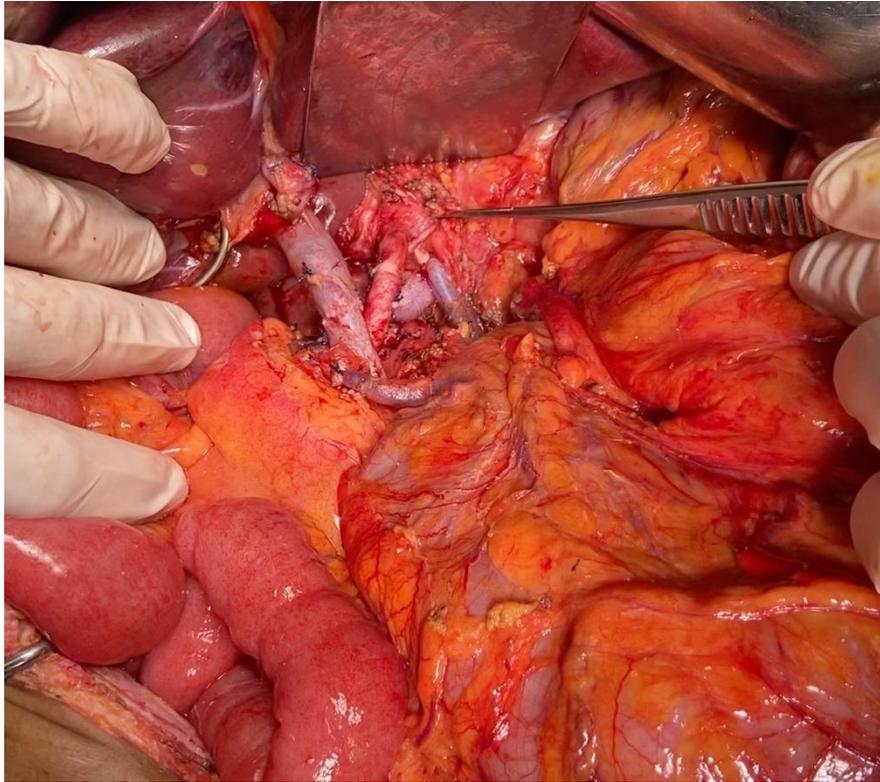
TRIANGLE OPERATION

RESSECÇÃO VENOSA PORTO-MESENTÉRICA



Pancreatectomia total

RESSECÇÃO VENOSA PORTO-MESENTÉRICA



Pancreatectomia total

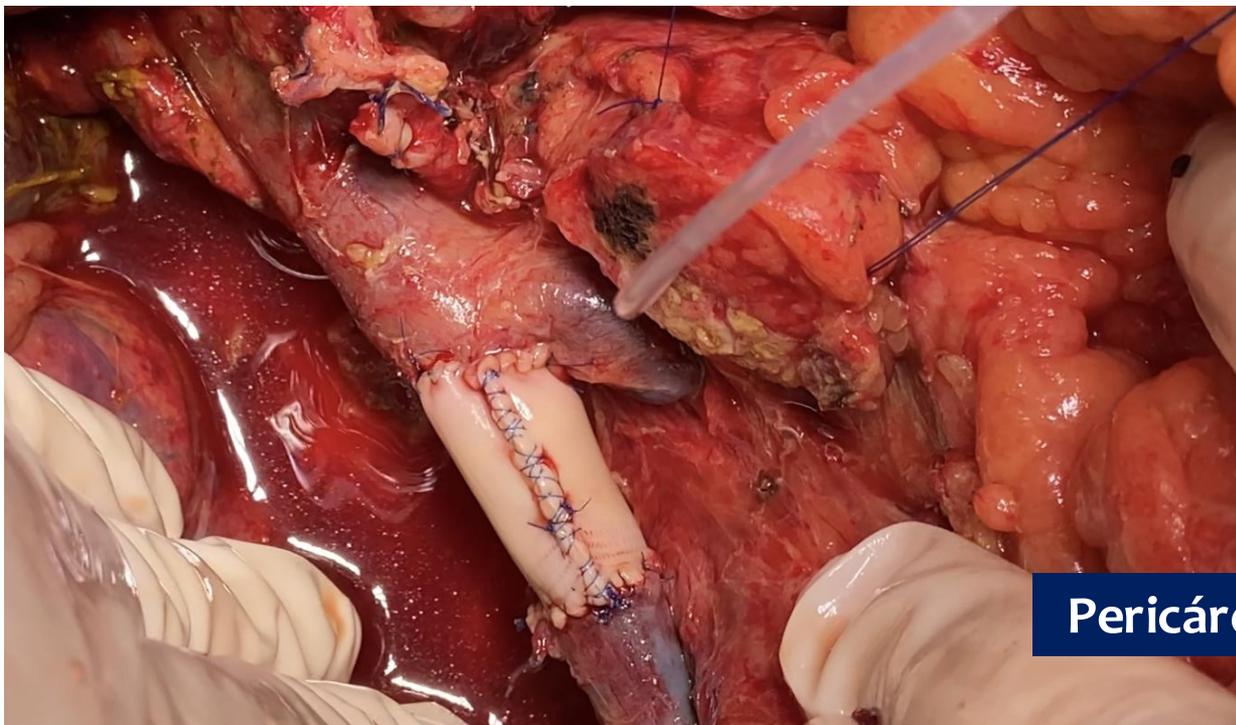
QUAL A MELHOR RECONSTRUÇÃO

Table 4. Postoperative complications according to vein reconstruction techniques in all patients with venous resection and reconstruction

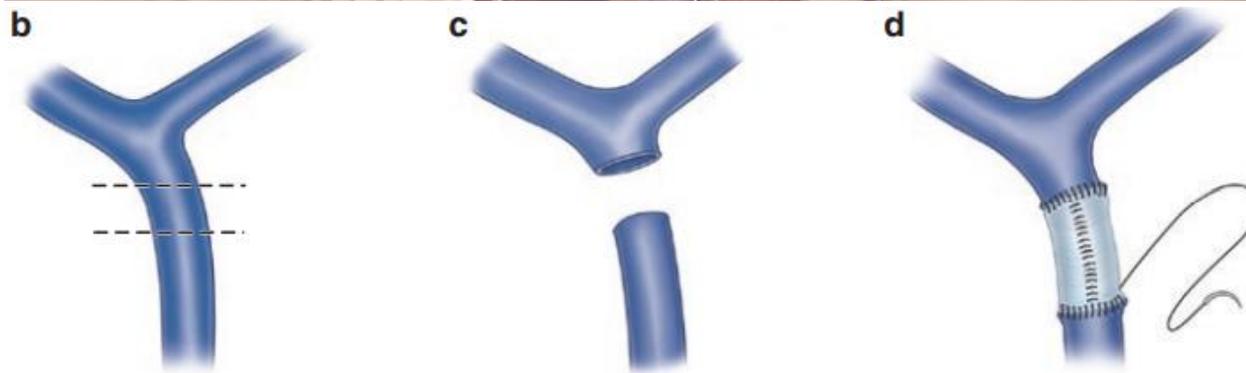
	All (%)	Spiral graft (%)	End-to-end (%)	Tang/patch (%)	<i>p</i> -value
PV/SMV thrombosis	8 (4)	2 (3)	4 (5)	2 (4)	.781
PPH					
None	102 (52)	32 (46)	45 (48)	25 (50)	
A	49 (25)	20 (29)	13 (17)	16 (31)	
B	43 (22)	16 (23)	16 (21)	11 (21)	
C	4 (2)	1 (1)	3 (4)	0	.341
Re-operation*	14 (7)	5 (7)	8 (10)	1 (2)	.176

*See detailed information in the results section. Tang = tangential; PV = portal vein; SMV = superior mesenteric vein; PPH = postpancreatectomy haemorrhage.

- Veia safena
- Veia jugular interna esquerda
- Veia renal esquerda (próximo da veia cava)
- Veia ilíaca externa
- Veia gonadal
- Veia femoral
- Veia de cadáver
- Patch peritoneal
- Pericárdio bovino
- Enxerto de PTFE

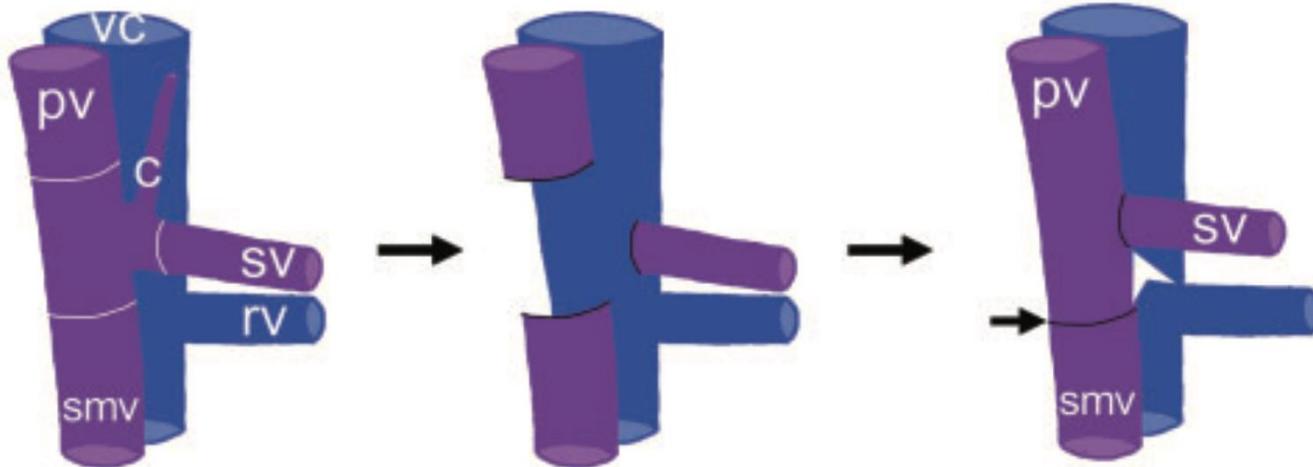


Pericárdio bovino

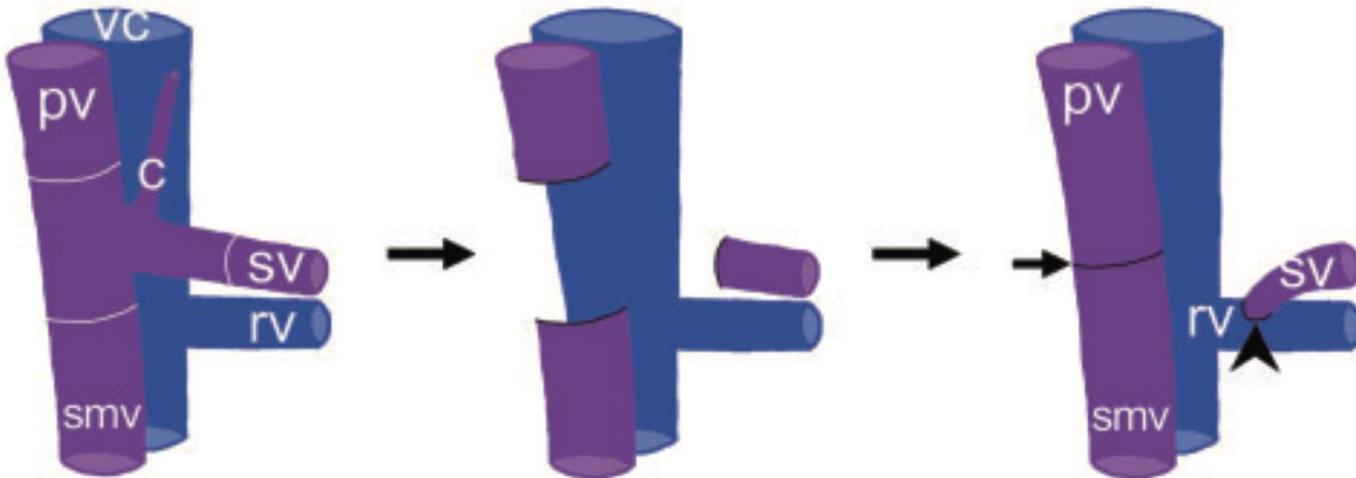


REMANESCENTE DA VEIA ESPLÊNICA

a Splenic vein inserted into portal vein

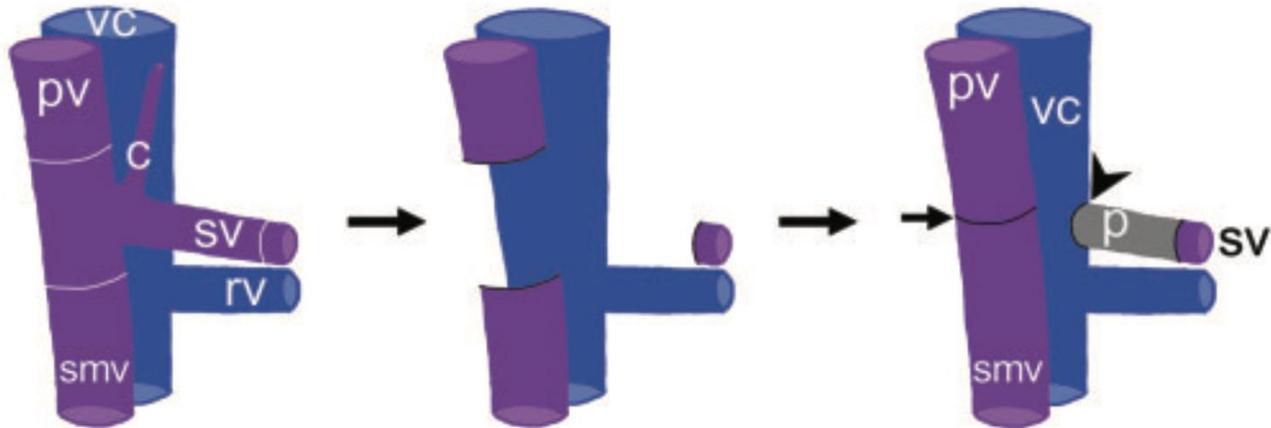


b Splenic vein inserted into left renal vein

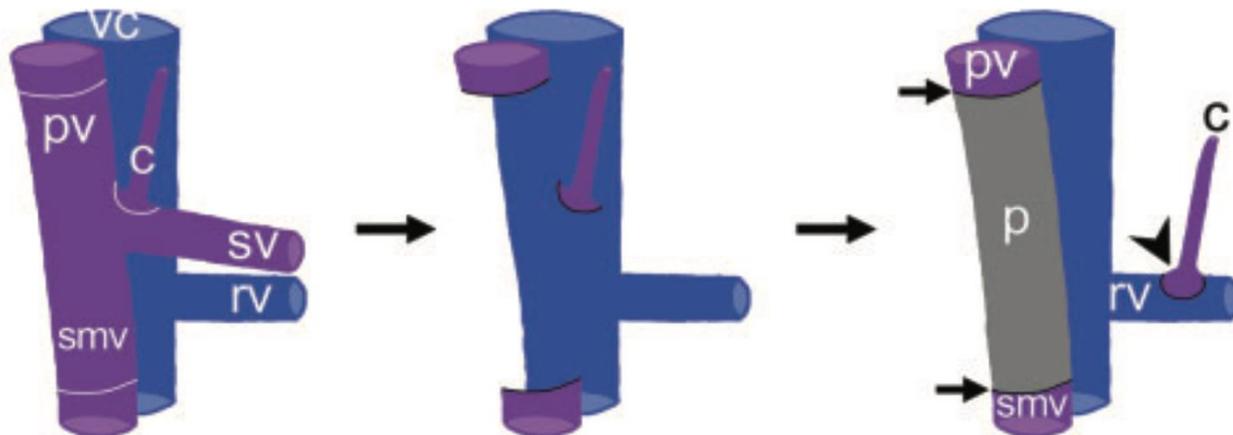


REMANESCENTE DA VEIA ESPLÊNICA

c Prosthesis bridging splenic vein and vena cava



d Coronary vein inserted into left renal vein



REMANESCENTE DA VEIA ESPLÊNICA

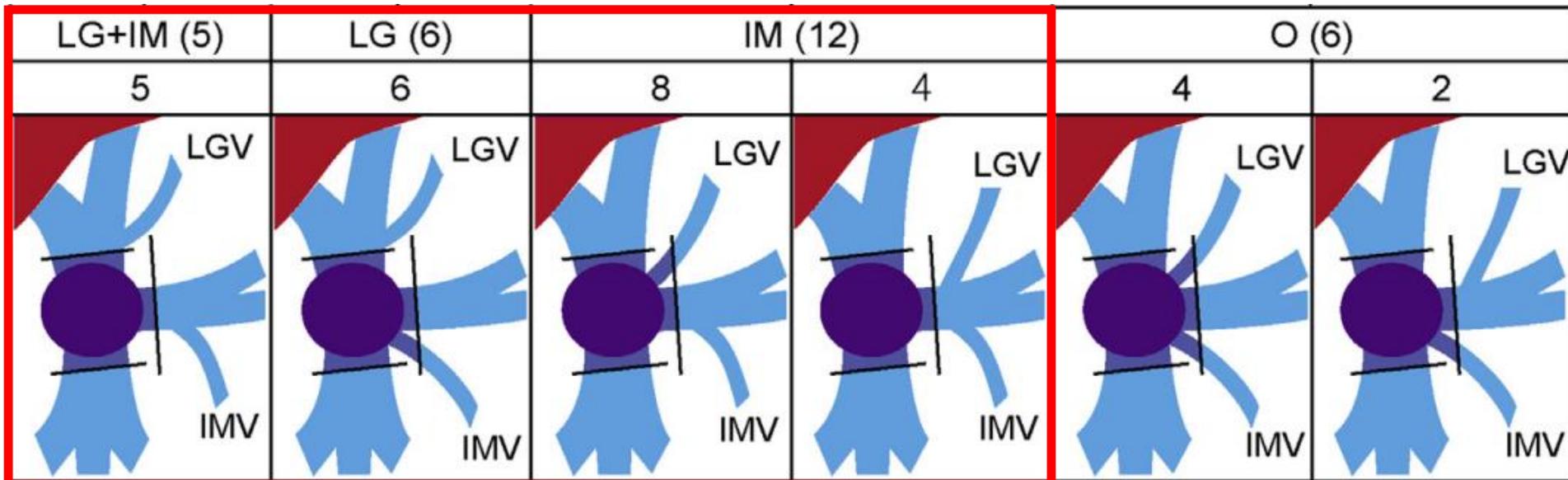
<http://dx.doi.org/10.1016/j.hpb.2017.02.438>

HPB

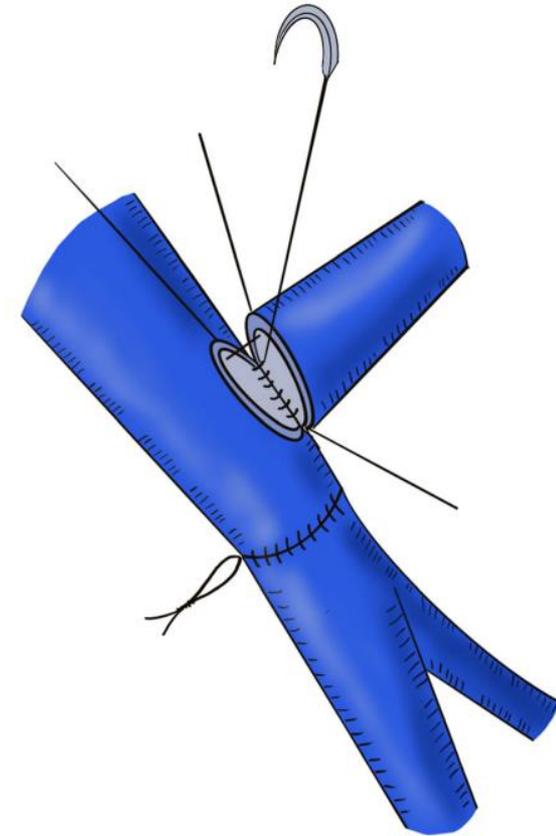
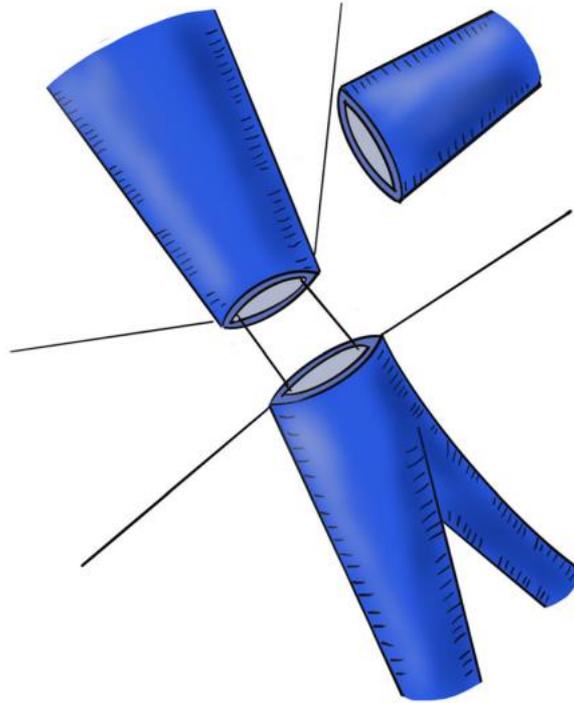
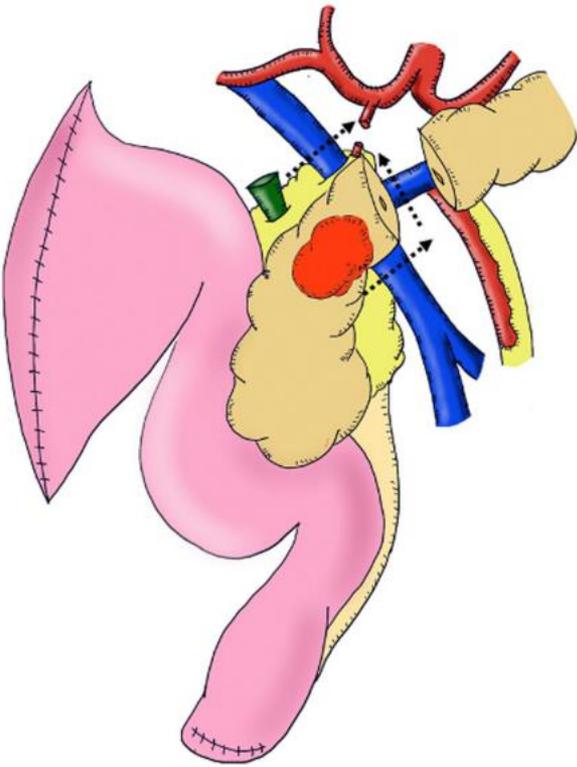
ORIGINAL ARTICLE

Splenic vein reconstruction is unnecessary in pancreatoduodenectomy combined with resection of the superior mesenteric vein–portal vein confluence according to short-term outcomes

- Veia gástrica esquerda
- Veia mesentérica inferior



REMANESCENTE DA VEIA ESPLÊNICA



Reimplantar

REMANESCENTE DA VEIA ESPLÊNICA

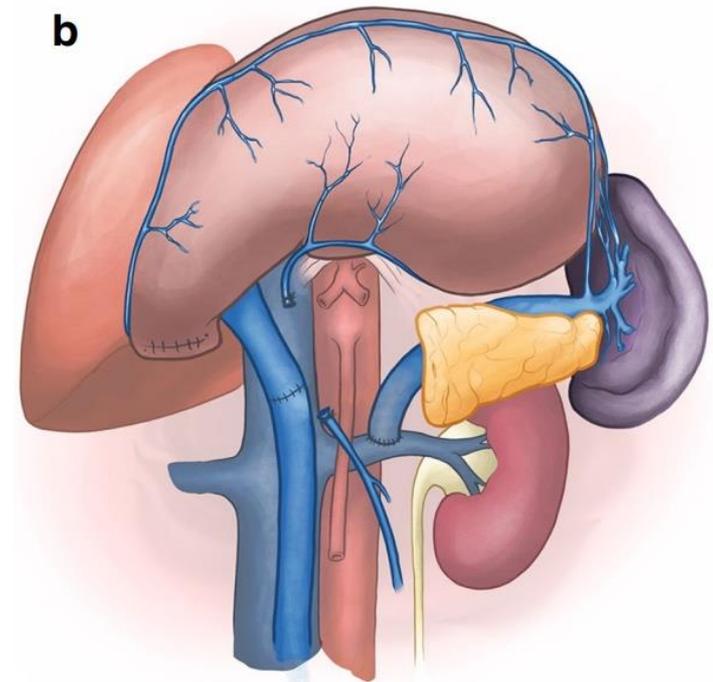
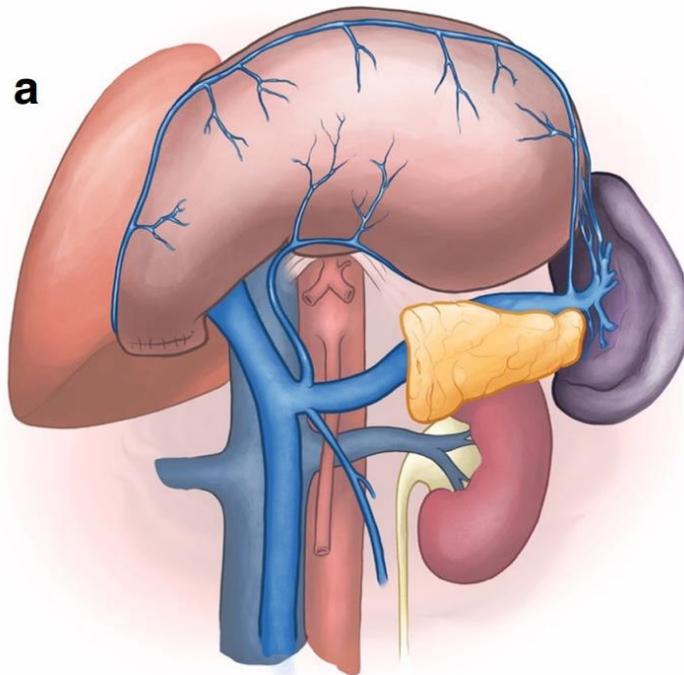
Langenbeck's Archives of Surgery

<https://doi.org/10.1007/s00423-021-02318-2>

HOW-I-DO-IT ARTICLES

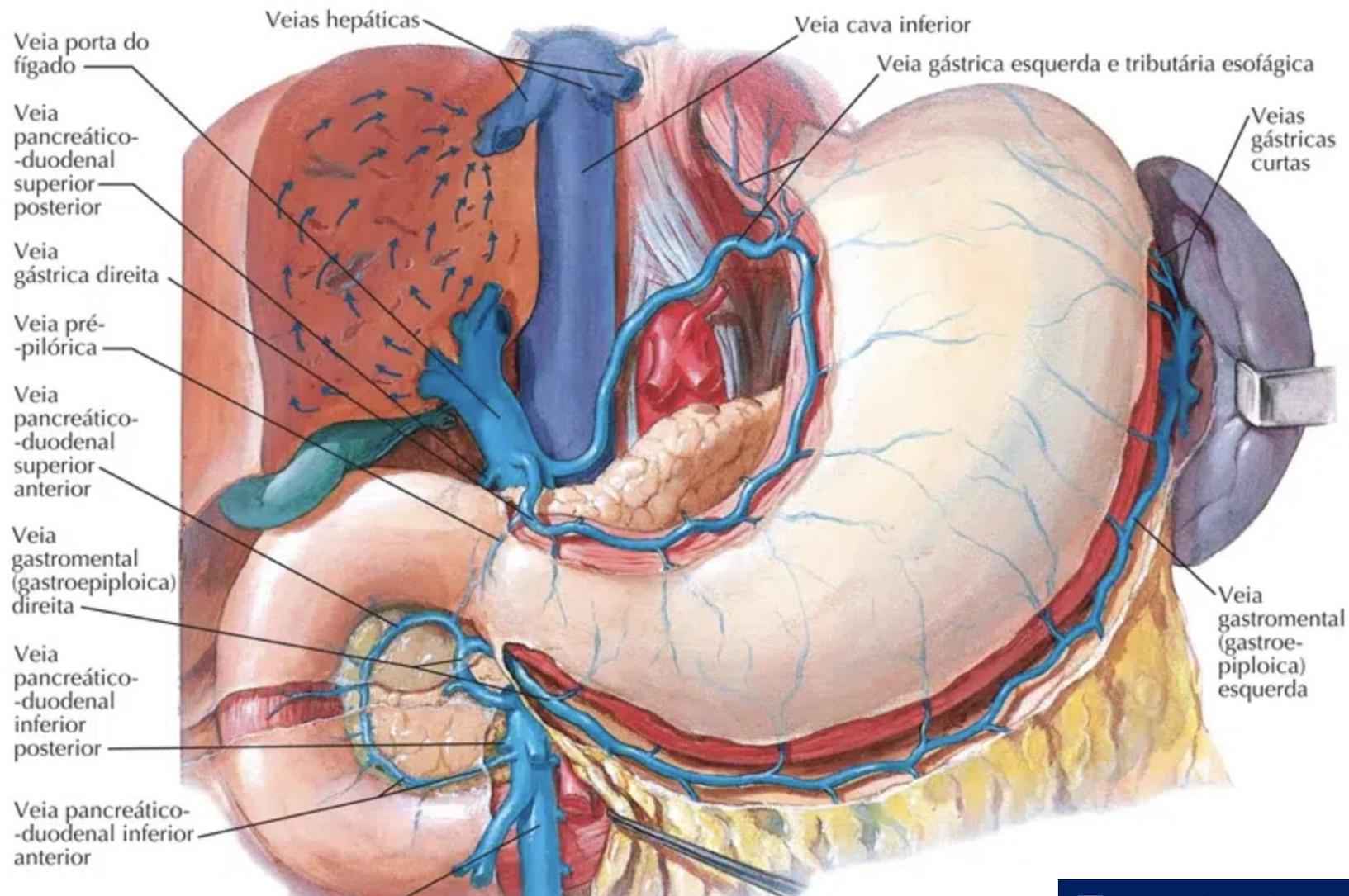


Splenorenal shunt for reconstruction of the gastric and splenic venous drainage during pancreatoduodenectomy with resection of the portal venous confluence

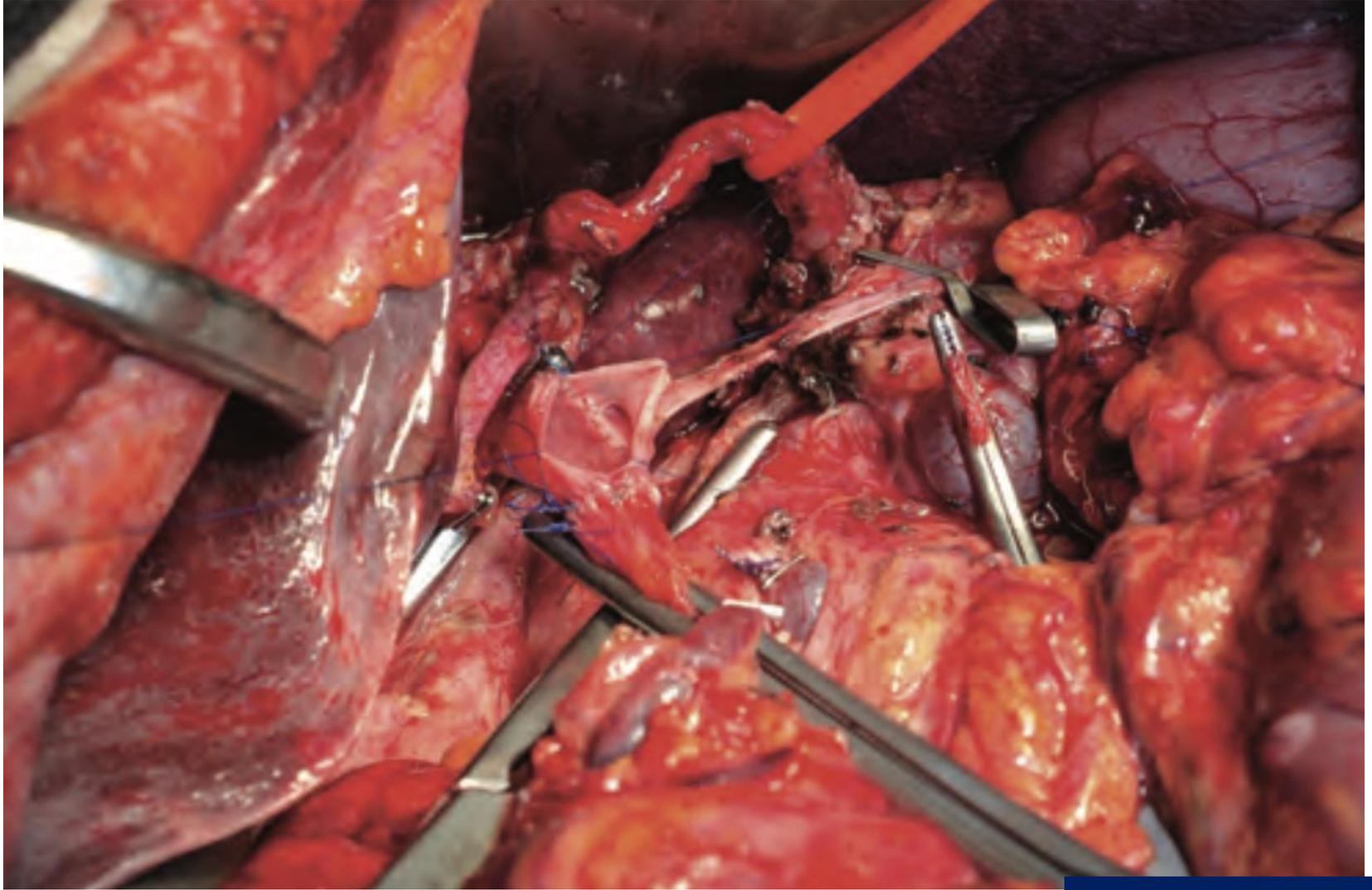


Veia renal esquerda

VEIA GÁSTRICA ESQUERDA



VEIA GÁSTRICA ESQUERDA



Reimplantar

RESSECÇÃO ARTERIAL

Surgery xxx (2020) 1–7



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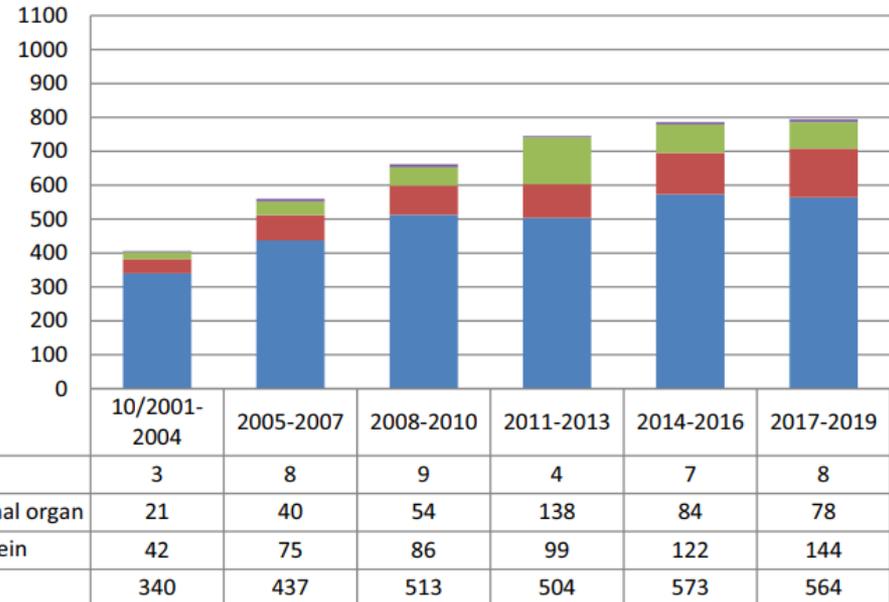
Surgery

journal homepage: www.elsevier.com/locate/surg



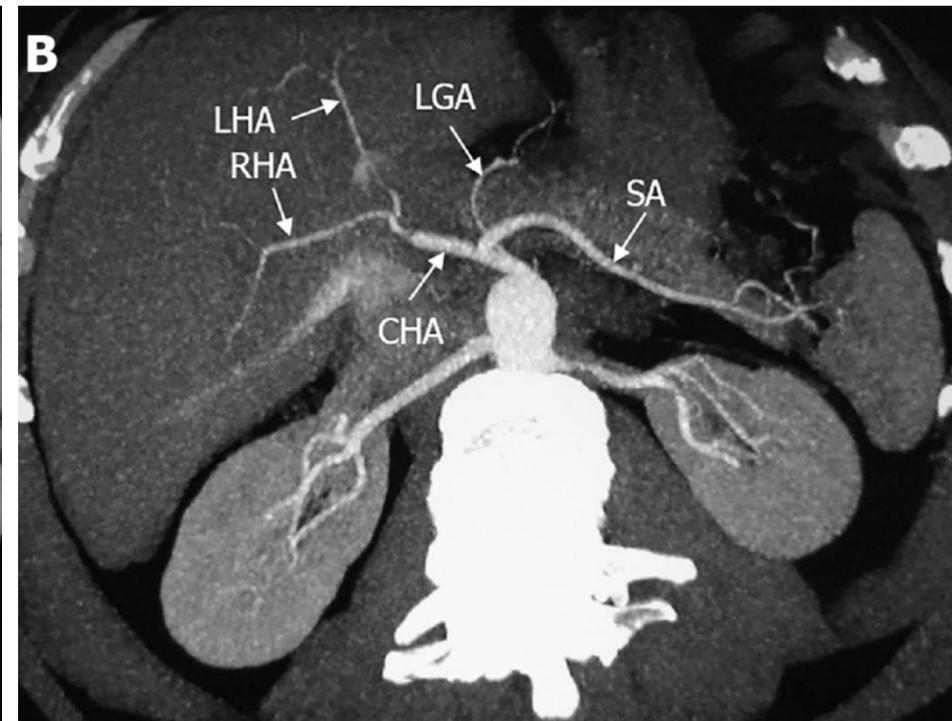
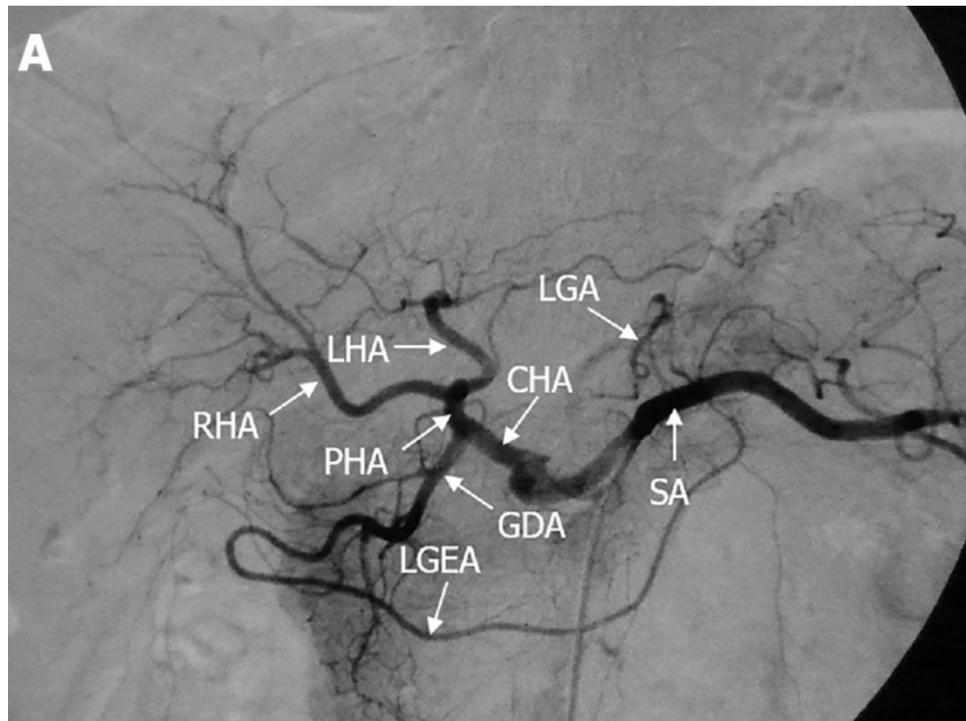
Not all Whipple procedures are equal: Proposal for a classification of pancreatoduodenectomies

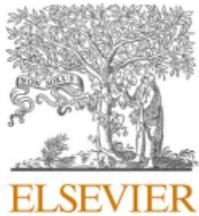
Number of PDs



- Tipo 1 Ressecção Padrão (74,1%)
- Tipo 2 Ressecção porta-mesentérica (14,4%)
- Tipo 3 Ressecção multivisceral (10,5%)
- Tipo 4 Ressecção arterial (1,0%)**

RESSECÇÃO ARTERIAL





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European Journal of Radiology

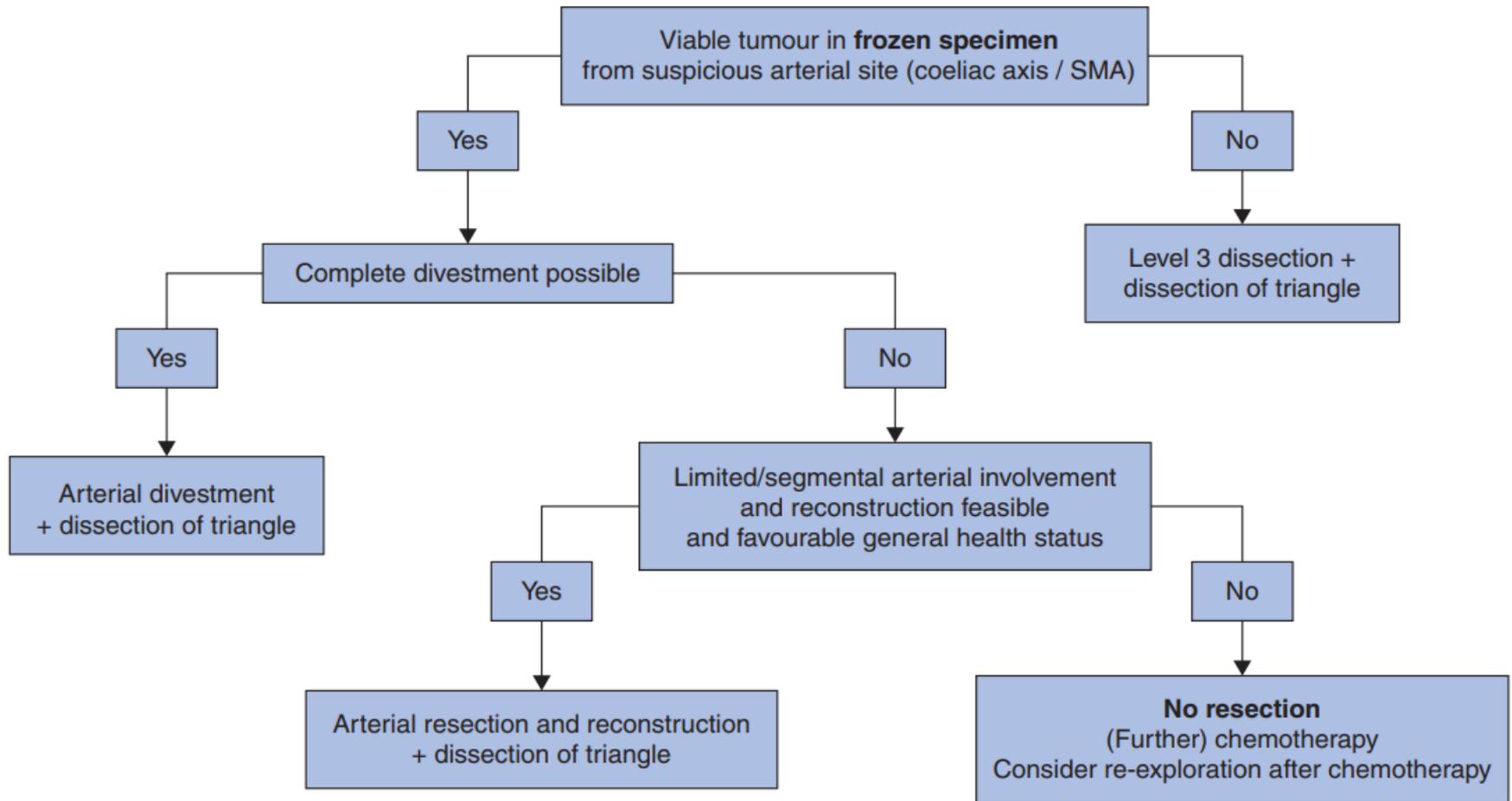
journal homepage: www.elsevier.com/locate/ejrad



Radiological evaluation of pancreatic cancer: What is the significance of arterial encasement $>180^\circ$ after neoadjuvant treatment?

A cut-off of $> 270^\circ$ for post-NAT circumferential contiguity by solid soft tissue yielded the second-highest Youden's J value ($J = 0.365$, 95 % CI 0.024 to 0.607) with a high NPV (89.3 %, 95 % CI 73.6%–96.1%) and moderate PPV (44.7 %, 95 % CI 37.2%–52.4%; accuracy: 61.3 %, 95 % CI 49.4%–72.4%). In other words, the probability that an artery with post-NAT circumferential contiguity by solid soft tissue $>180^\circ$ and $\leq 270^\circ$ is not invaded is 89.3 %.

RESSECÇÃO ARTERIAL



Tipo 1 Ressecção Padrão (74,1%)
Tipo 2 Ressecção porta-mesentérica (14,4%)
Tipo 3 Ressecção multivisceral (10,5%)
Tipo 4 Ressecção arterial (1,0%)

Divestment
Ressecção arterial
Paliação



Contents lists available at [ScienceDirect](https://www.sciencedirect.com)

Surgery

journal homepage: www.elsevier.com/locate/surg



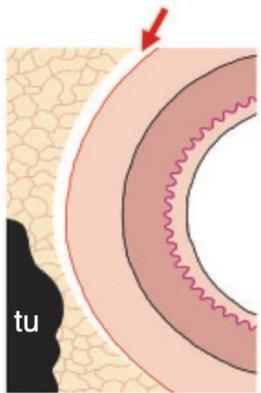
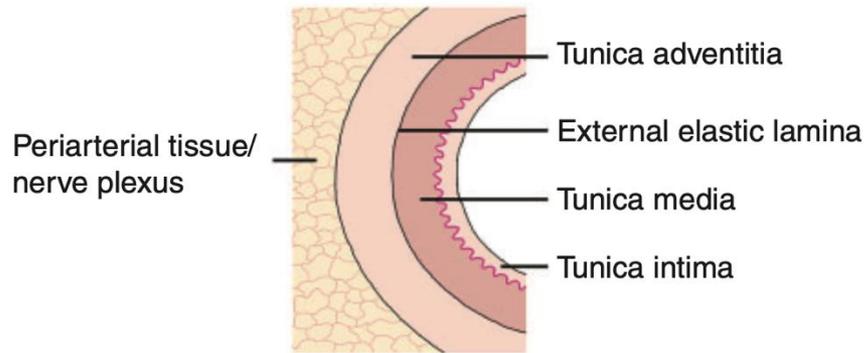
Periarterial divestment in pancreatic cancer surgery

Markus K. Diener, MD^a, André L. Mihaljevic, MD^a, Oliver Strobel, MD^a, Martin Loos, MD^a, Thomas Schmidt, MD^a, Martin Schneider, MD^a, Christoph Berchtold, MD^a, Arianeb Mehrabi, MD^a, Beat P. Müller-Stich, MD^a, Kuirong Jiang, MD^b, John P. Neoptolemos, MD^a, Thilo Hackert, MD^a, Yi Miao, MD^b, Markus W. Büchler, MD^{a,*}

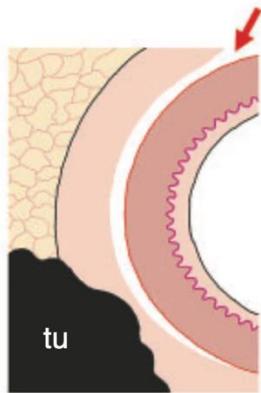
^a Department of General, Visceral, and Transplantation Surgery, University of Heidelberg, Heidelberg, Germany

^b Pancreas Centre, First Affiliated Hospital, Nanjing Medical University, Nanjing, P.R. China

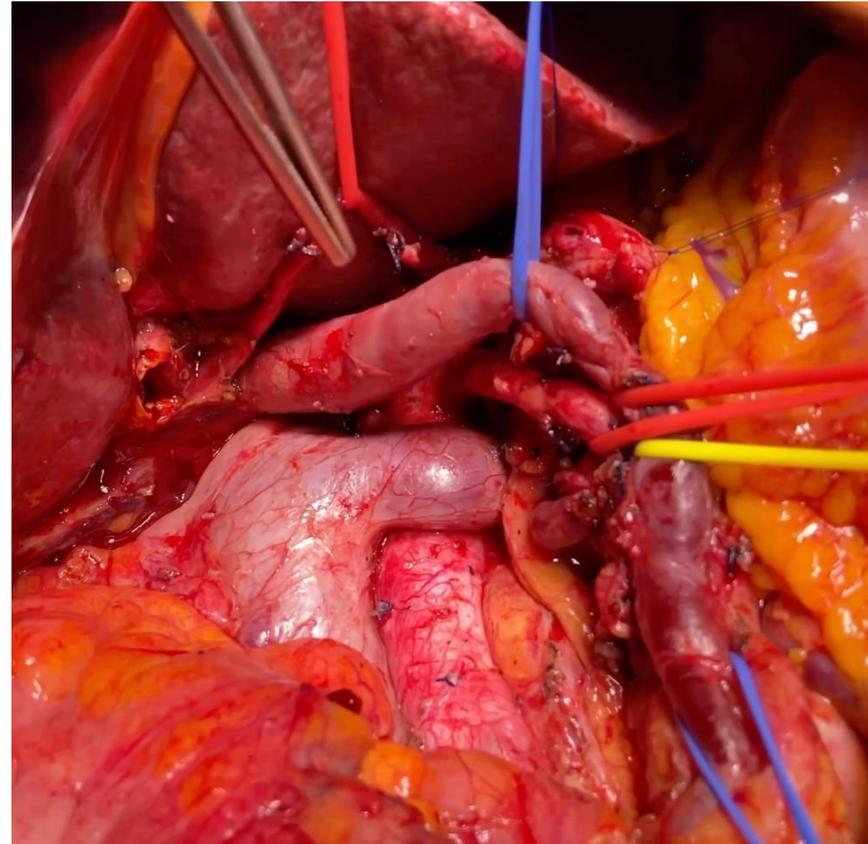
DIVESTMENT



Periarterial divestment



Subadventitial divestment



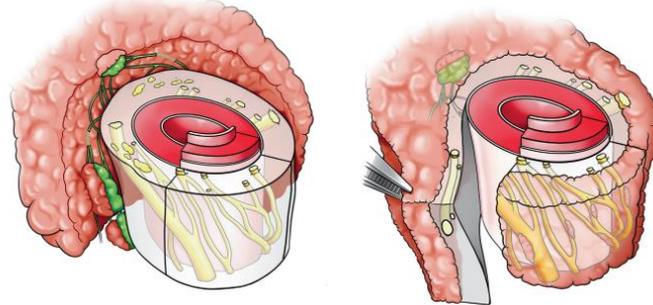
DIVESTMENT

A) Grade 0 (No tumor)

B) Grade I (Invasion of the tunica adventitia). Tumor free distance from external elastic lamina \geq 1mm.

R0 – Sub-adventitial divestment

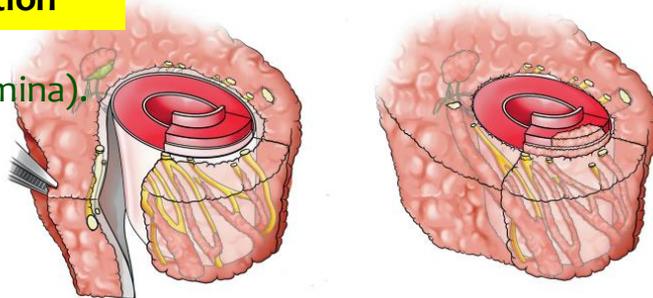
C) Grade II (Tumor invasion of the tunica adventitia $<$ 1mm of the external elastic lamina).



D

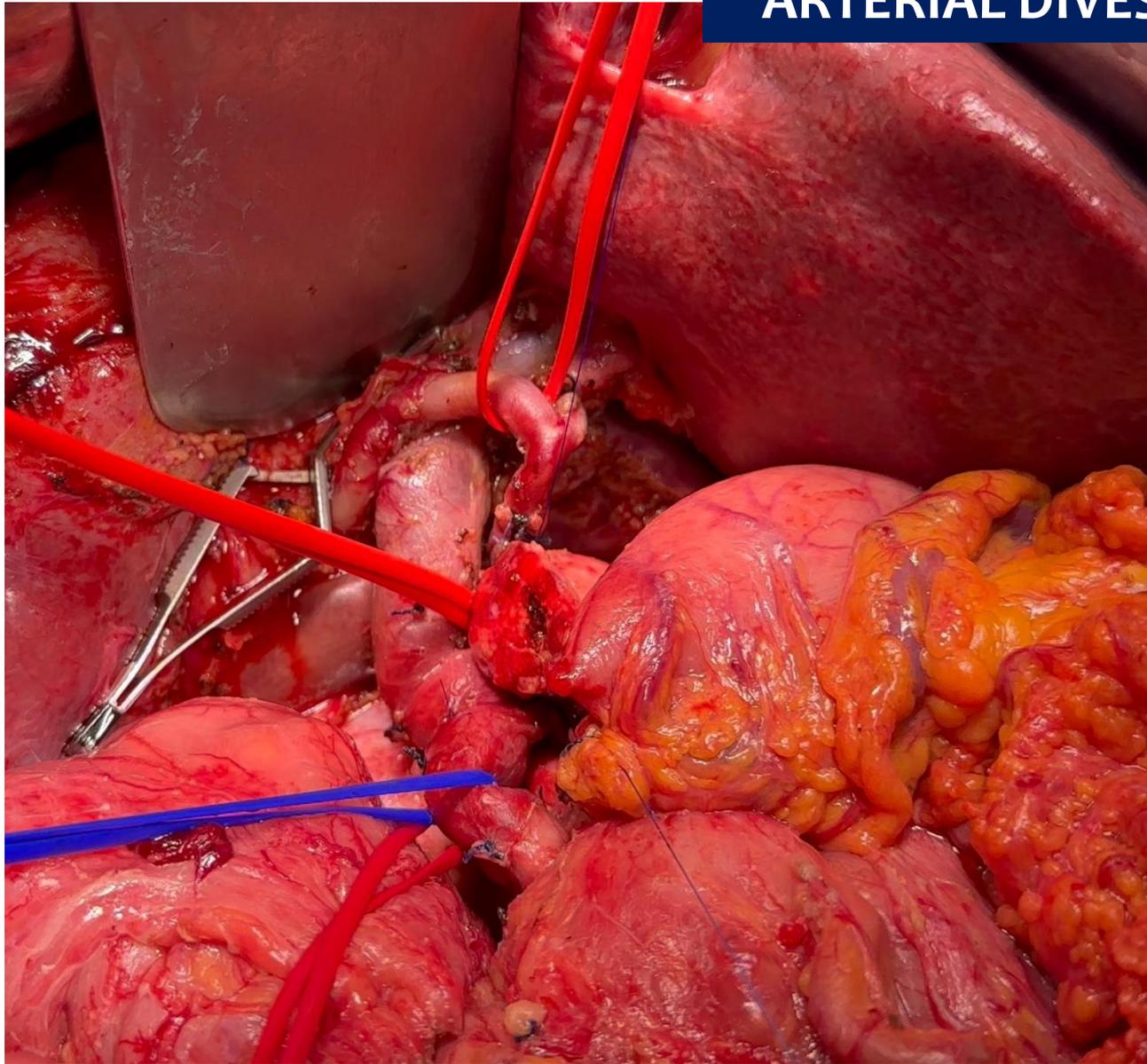
R1 – Sub-adventitial divestment Or Arterial resection

D) Grade III (Tumor invasion of the external elastic lamina).

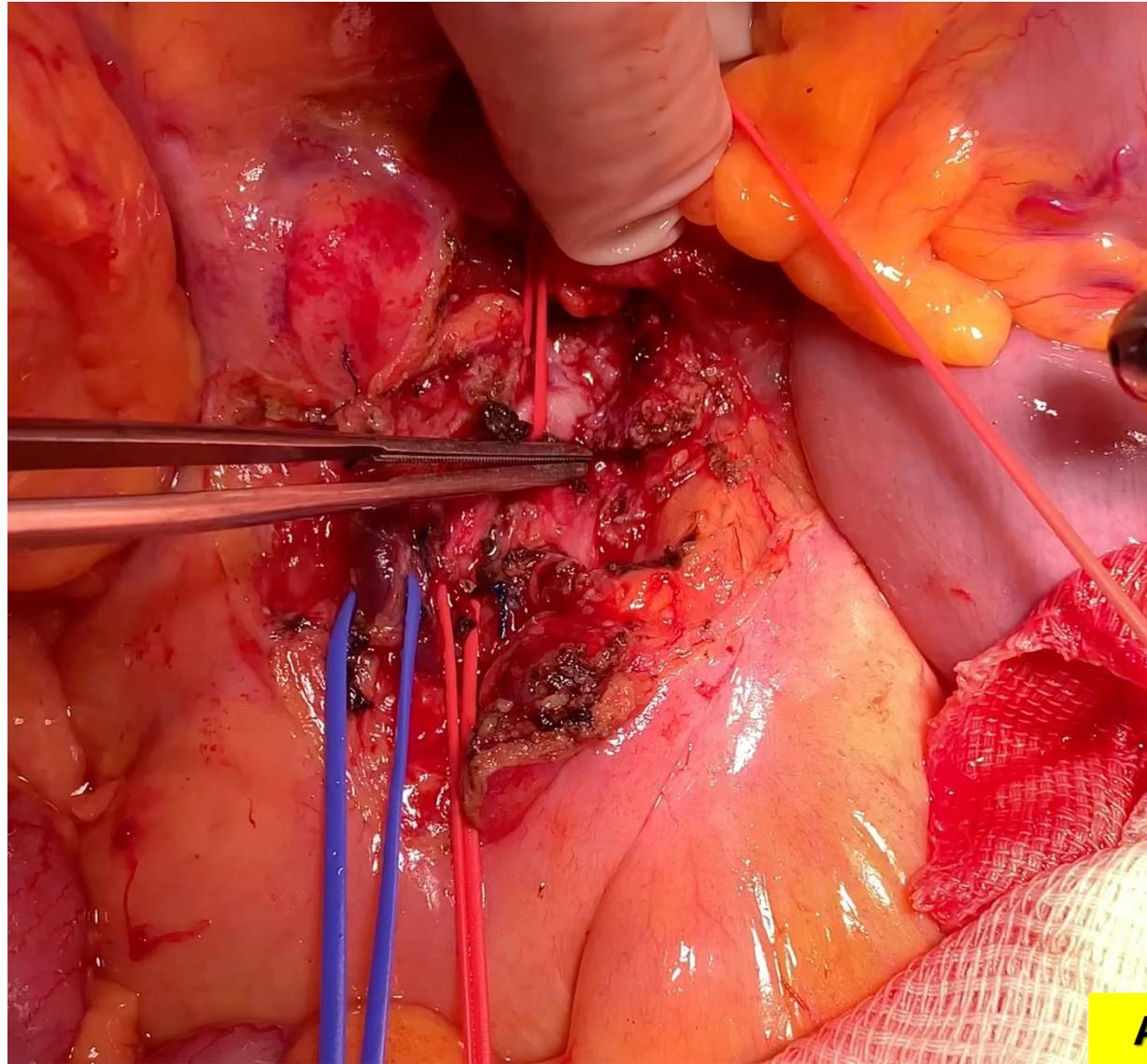


Arterial resection Or Case unresectable

ARTERIAL DIVESTMENT

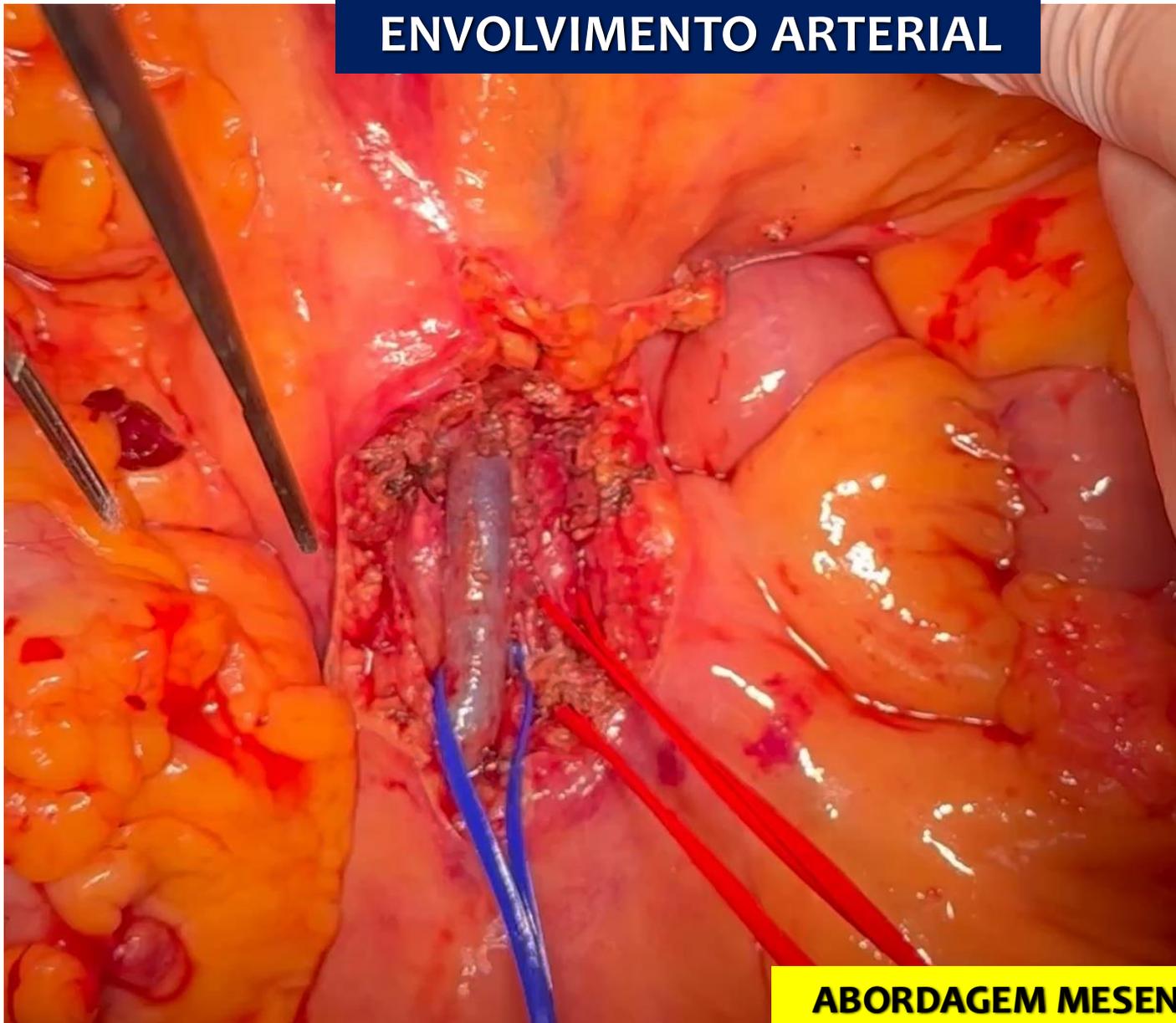


ENVOLVIMENTO ARTERIAL



ABORDAGEM MESENTÉRICA

ENVOLVIMENTO ARTERIAL

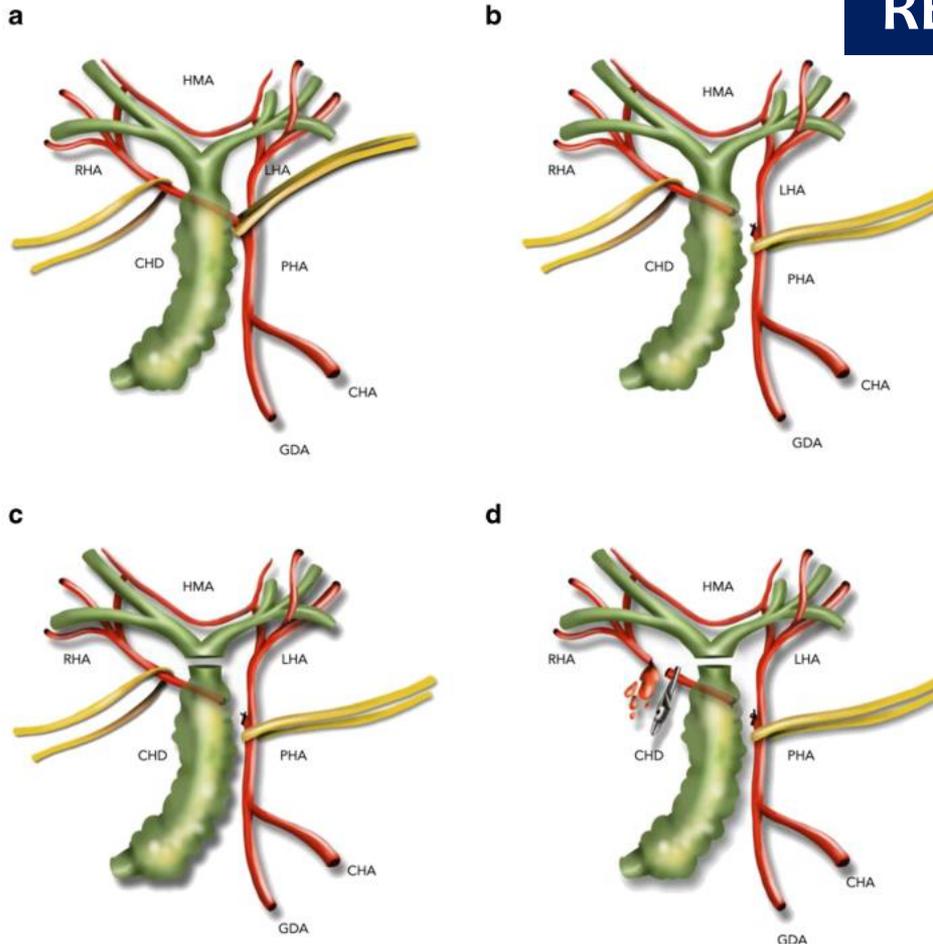


ABORDAGEM MESENTÉRICA



Hepatic artery resection without reconstruction in pancreatoduodenectomy

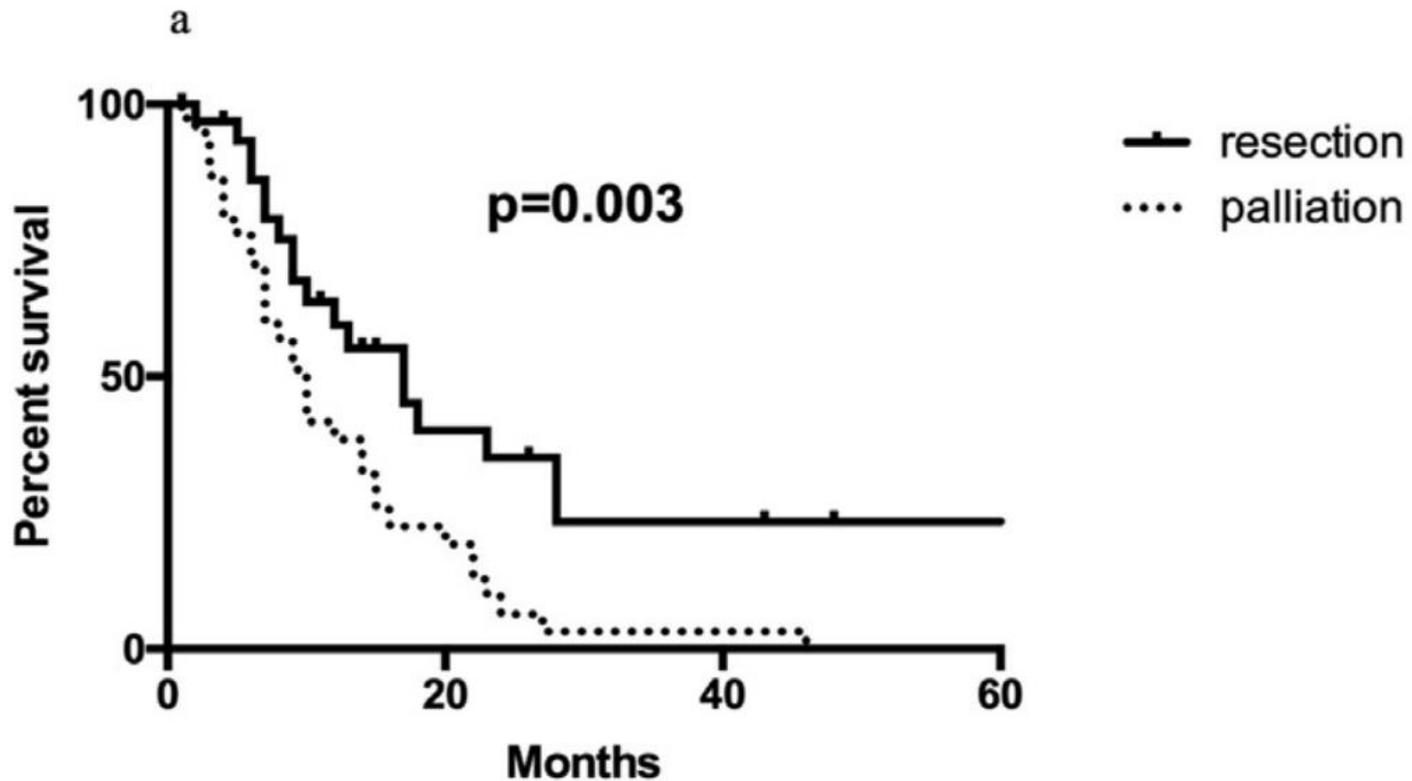
RESSECÇÃO ARTERIAL



ORIGINAL ARTICLE

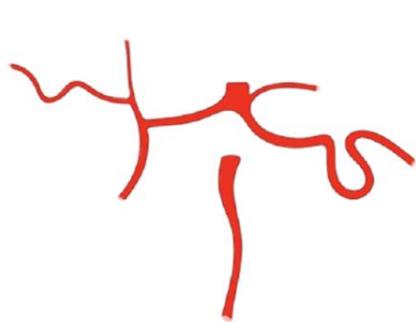
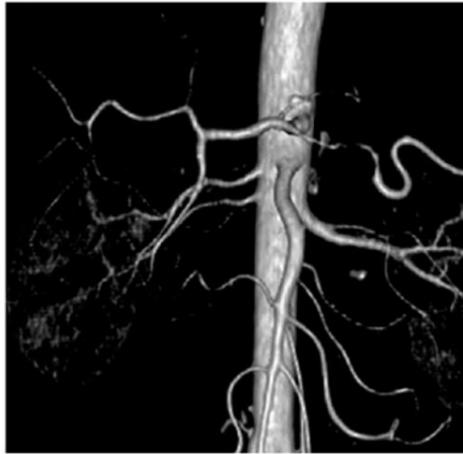
Pancreatectomy with arterial resection is superior to palliation in patients with borderline resectable or locally advanced pancreatic cancer

RESSECÇÃO ARTERIAL



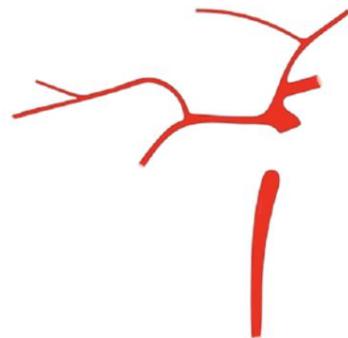
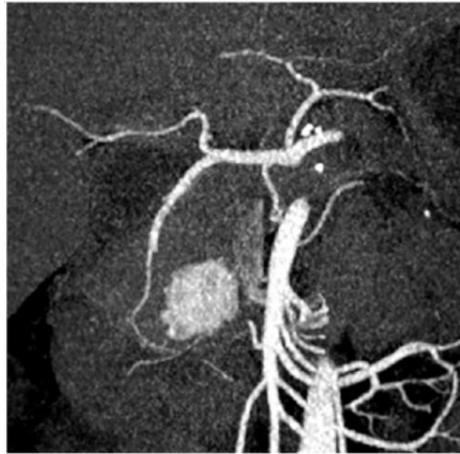
RESSECÇÃO ARTERIAL

Michels type I
Hiatt type I



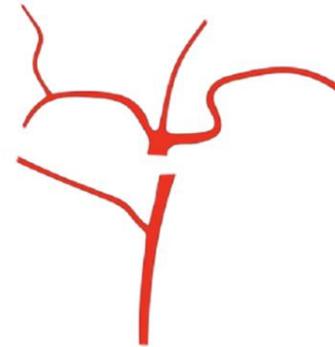
Normal

Michels type II
Hiatt type II



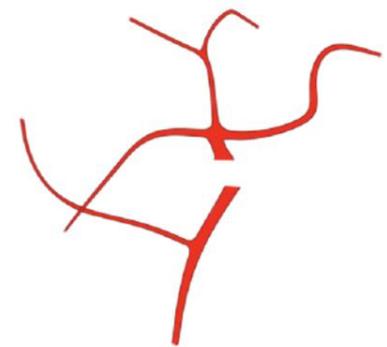
rLHA from LGA

Michels type III
Hiatt type III



rRHA from SMA

Michels type IV
Hiatt type IV



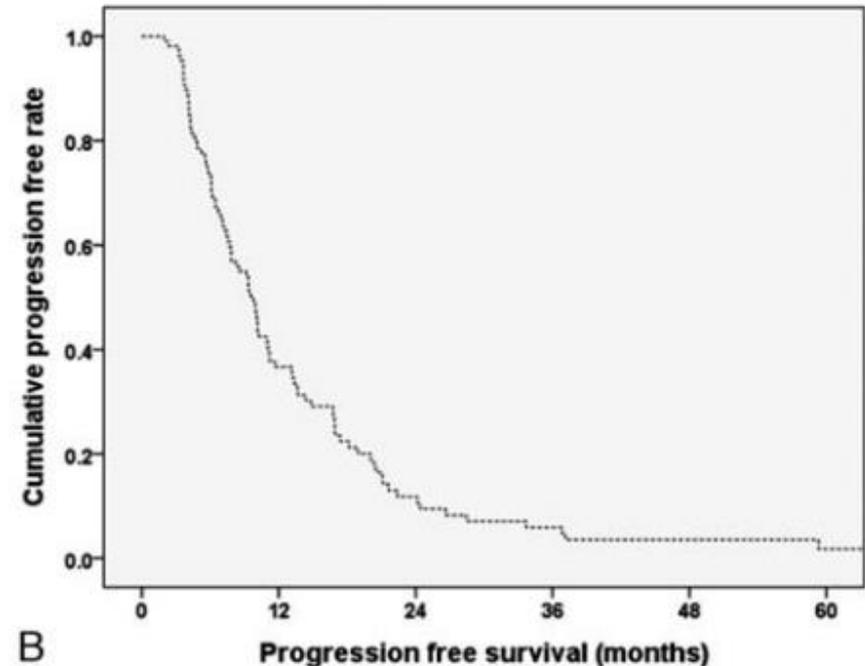
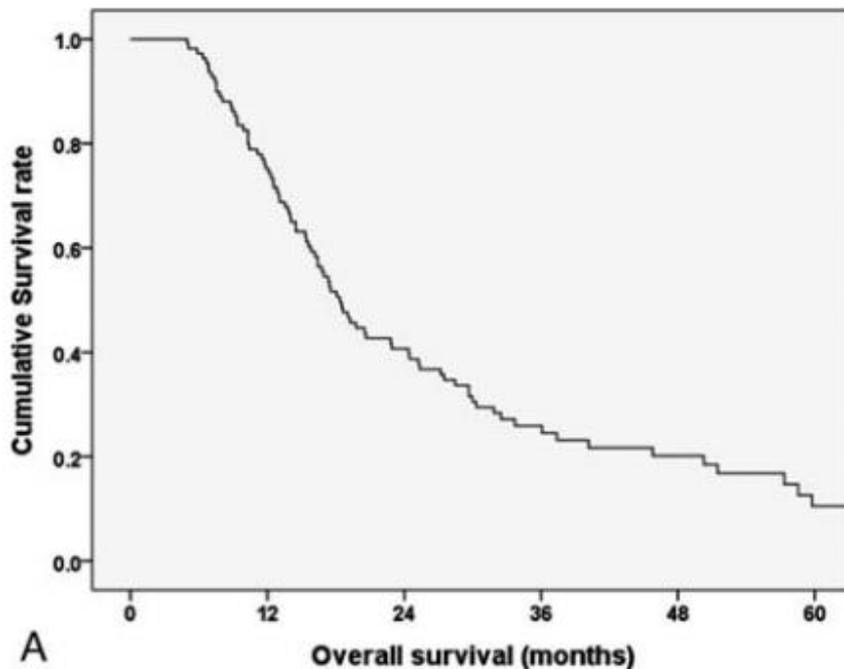
rRHA + rLHA

Arterial resection during pancreatotomy for pancreatic ductal adenocarcinoma with arterial invasion

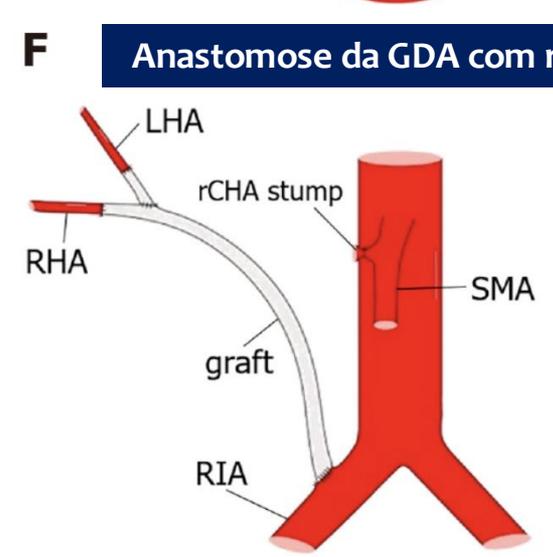
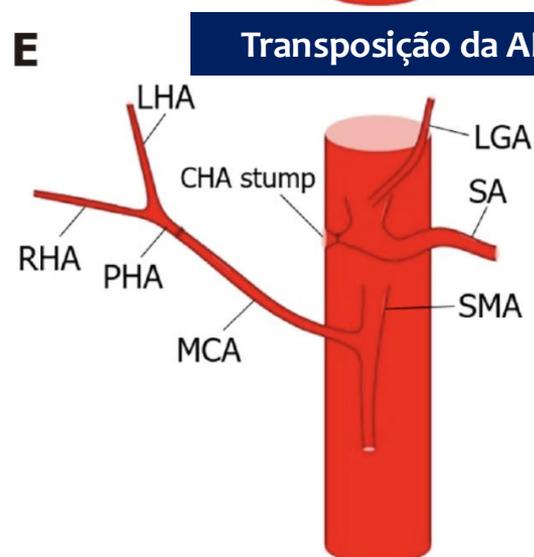
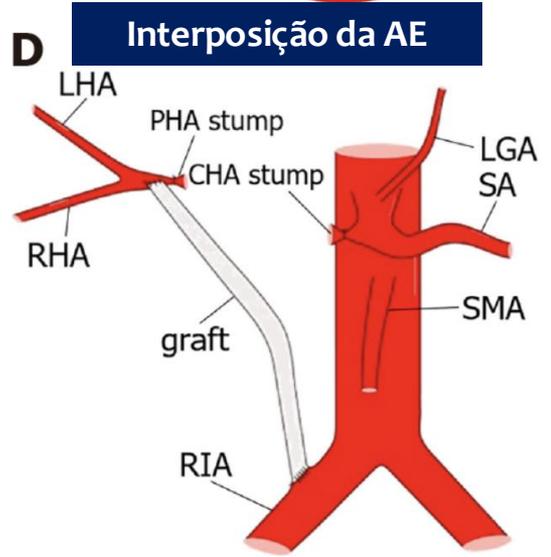
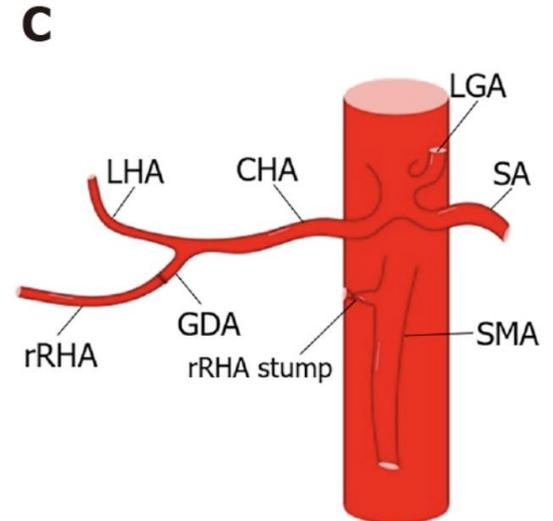
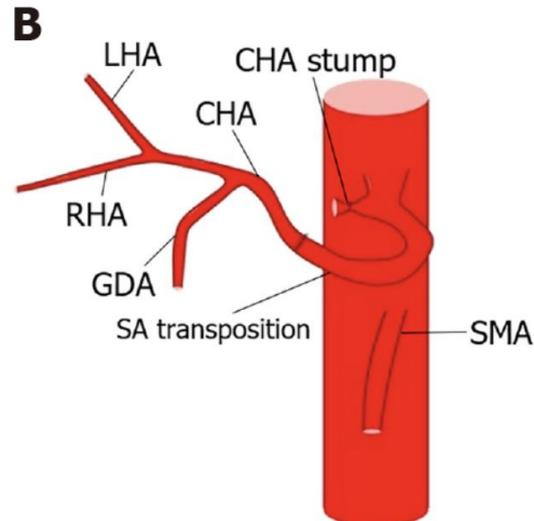
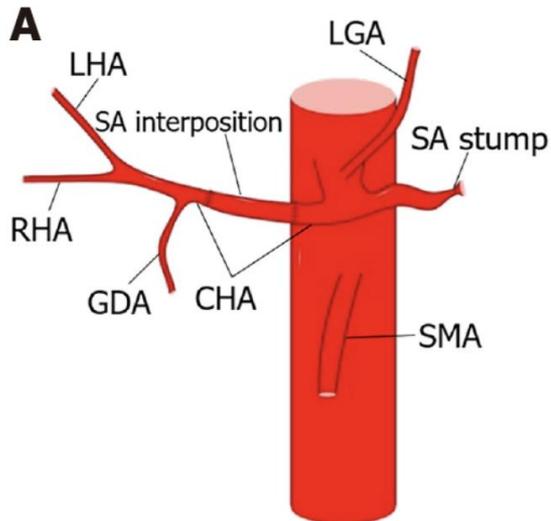
A single-center experience with 109 patients

RESSECÇÃO ARTERIAL

Sobrevida global média 18,4 meses
Sobrevida livre de progressão média 9,8 meses



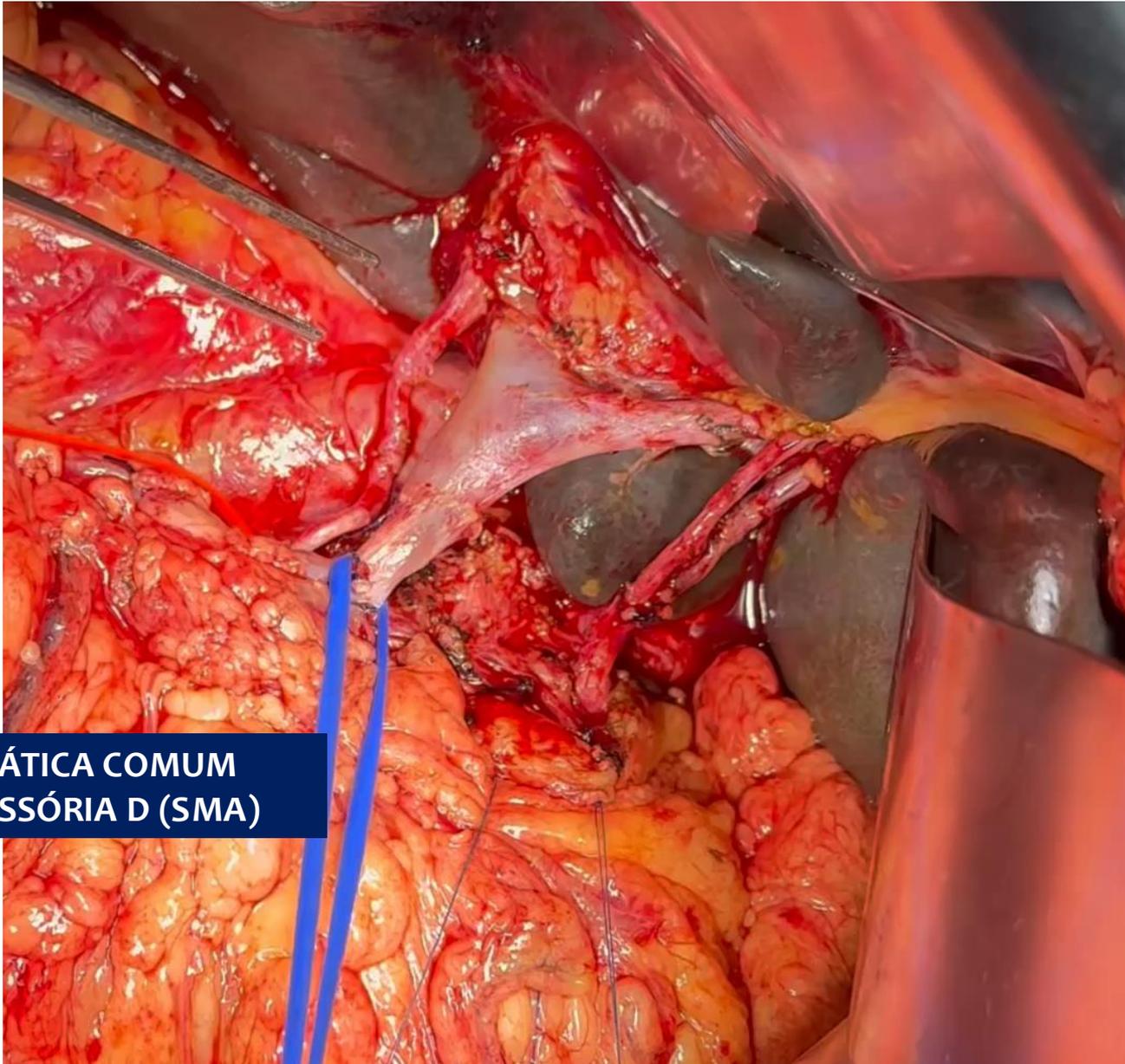
RESSECÇÃO ARTERIAL



Interposição de enxerto

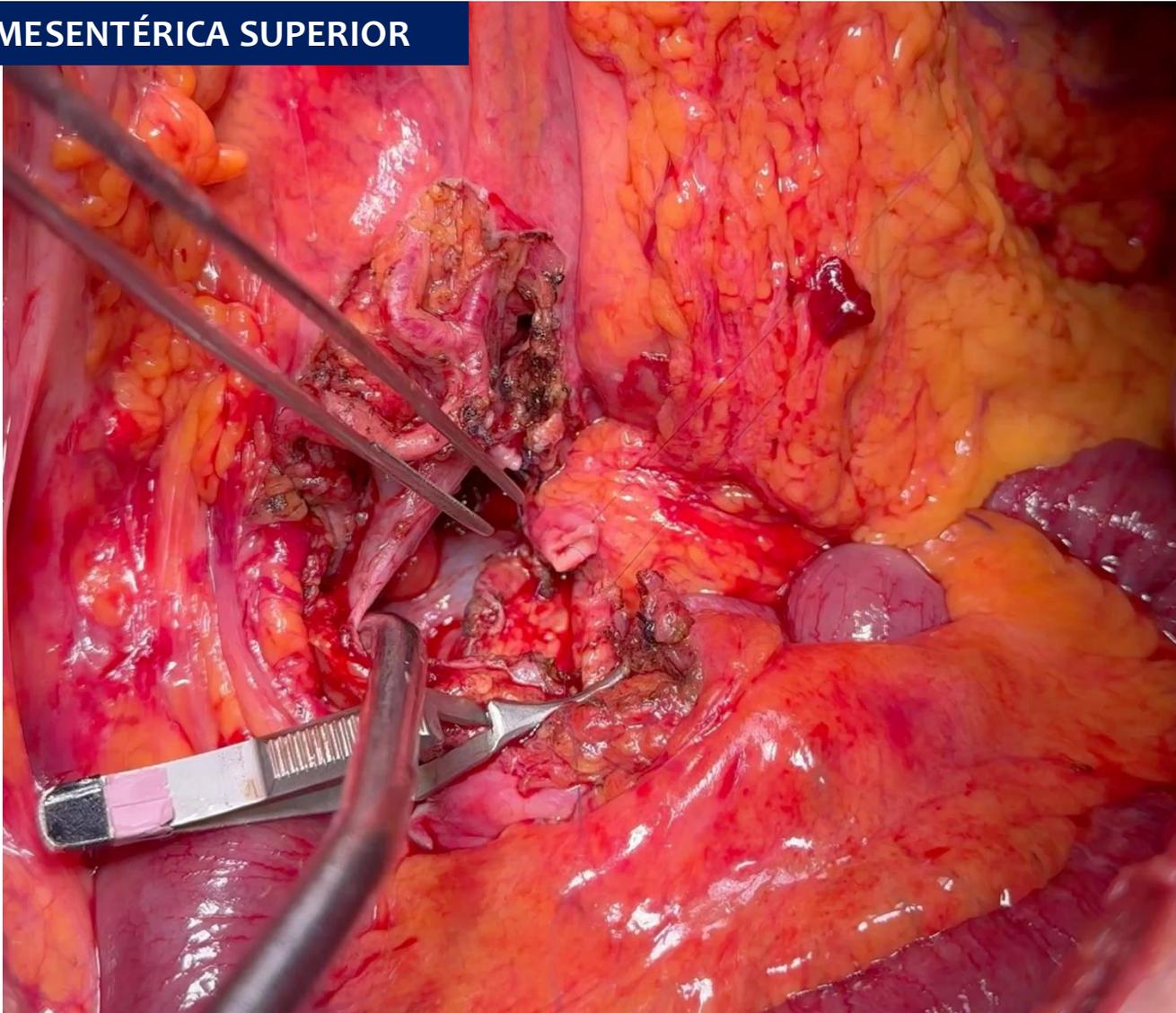
Anastomose de PHA com a MCA

Interposição de enxerto RHA e RIA



**ARTÉRIA HEPÁTICA COMUM
ARTÉRIA ACESSÓRIA D (SMA)**

ARTÉRIA MESENTÉRICA SUPERIOR

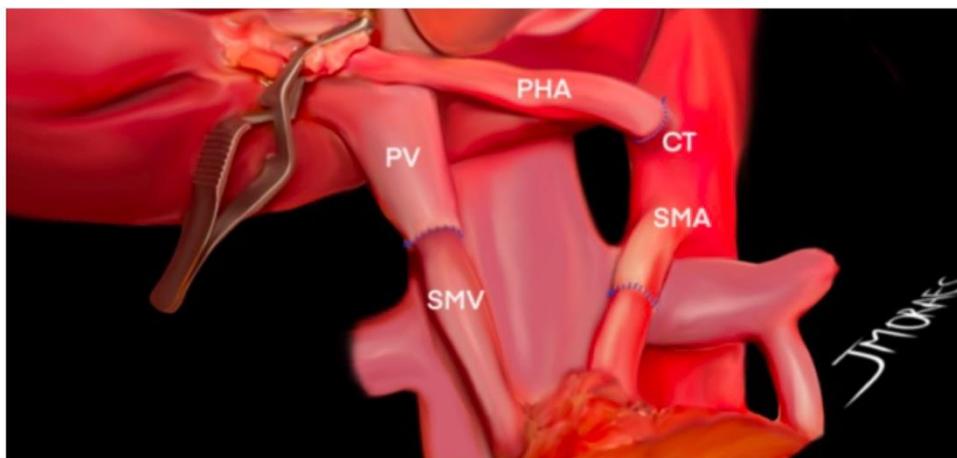




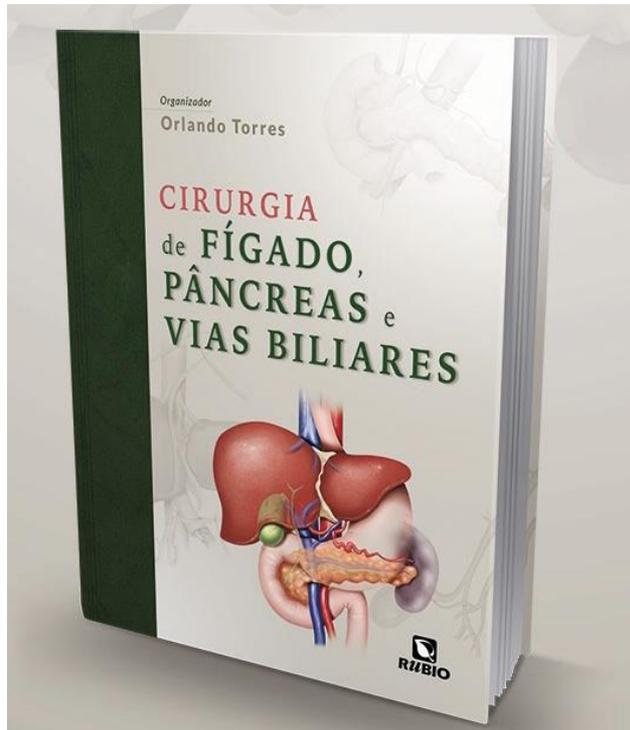
COMBINED VENOUS AND ARTERIAL RECONSTRUCTION IN THE TRIANGLE AREA AFTER TOTAL PANCREATODUODENECTOMY

RECONSTRUÇÃO VENOSA E ARTERIAL COMBINADA NA ÁREA DO TRIÂNGULO APÓS PANCREATODUODENECTOMIA TOTAL

Eduardo de Souza Martins **FERNANDES**¹®, Jose Maria Assunção **MORAES-JUNIOR**²®, Rodrigo Rodrigues **VASQUES**²®, Marcos **BELOTTO**³®, Orlando Jorge Martins **TORRES**²®



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