ARTERY FIRST AND TOTAL MESOPANCREAS EXCISION FOR PANCREATIC DUCTAL ADENOCARCINOMA

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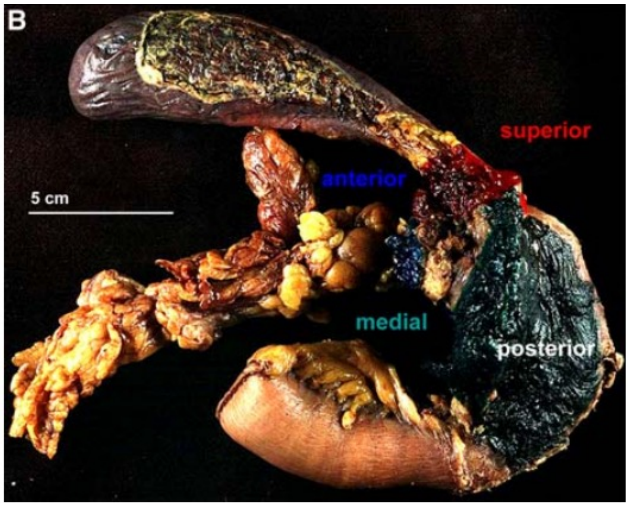
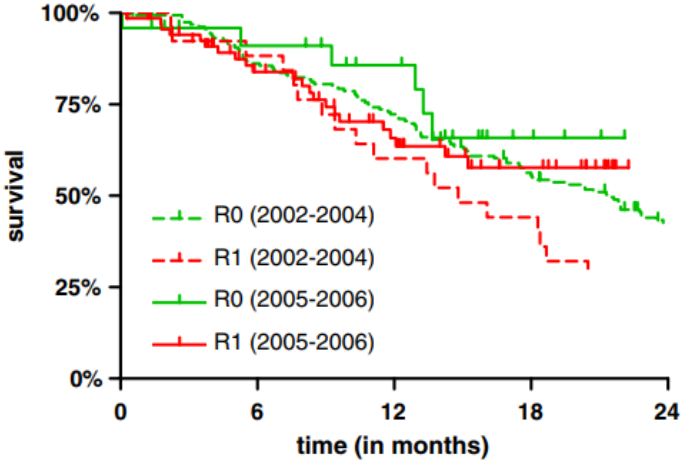
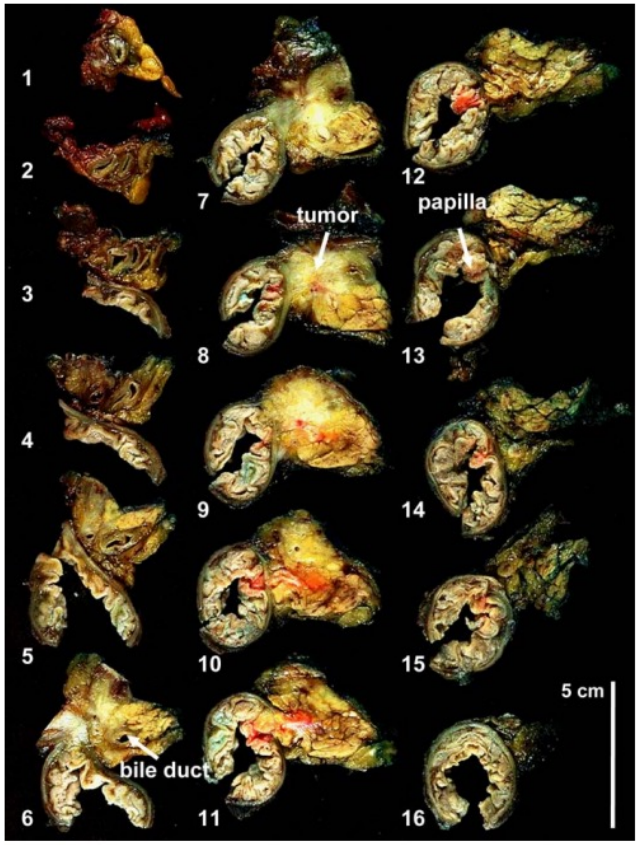
Annals of Surgical Oncology **15**(6):1651–1660
DOI: 10.1245/s10434-008-9839-8

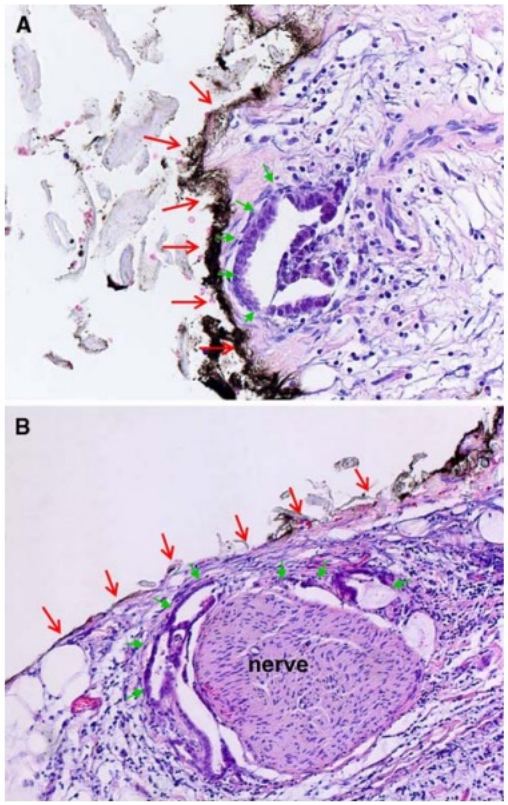
Most Pancreatic Cancer Resections are R1 Resections

Irene Esposito, MD,[1,3] Jörg Kleeff, MD,[2,4] Frank Bergmann, MD,[1] Caroline Reiser, MD,[2,4]
Esther Herpel, MD,[1] Helmut Friess, MD,[2,4] Peter Schirmacher, MD,[1] and
Markus W. Büchler, MD[2]









Esposito I, et al. Ann Surg Oncol 2008; 15:1651–60

Annals of Surgical Oncology **15**(6):1651–1660
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Most Pancreatic Cancer Resections are R1 Resections

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TABLE 3. *Tumor margin characteristics of 111 consecutive macroscopic complete resections for pancreatic ductal adenocarcinoma (2005–2006)*

Characteristic	Value, n (%)
R classification	
R0	27 (24%)
R1	84 (76%)
RM involvement	
Posterior	39 (47%)
Medial	57 (68%)
Anterior surface	8 (10%)
Superior	0
Transection (pancreas)	3 (4%)
Bile duct	4 (5%)
Stomach/duodenum	3 (4%)
Number of margins	
1	56 (68%)
2	22 (26%)
3 or more	5 (6%)
Type of involvement	
Direct extension	78 (93%)
Locoregional spreading	6 (7%)

RM, resection margin.

2008

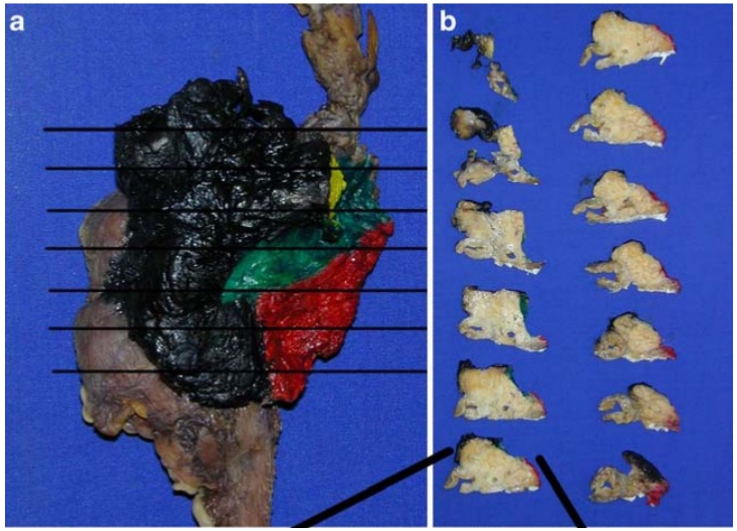
Esposito I, et al. Ann Surg Oncol 2008; 15:1651–60

Langenbecks Arch Surg (2010) 395:451–458
DOI 10.1007/s00423-009-0494-8

ORIGINAL ARTICLE

MESOPANCREAS

The mesopancreas is the primary site for R1 resection in pancreatic head cancer: relevance for clinical trials



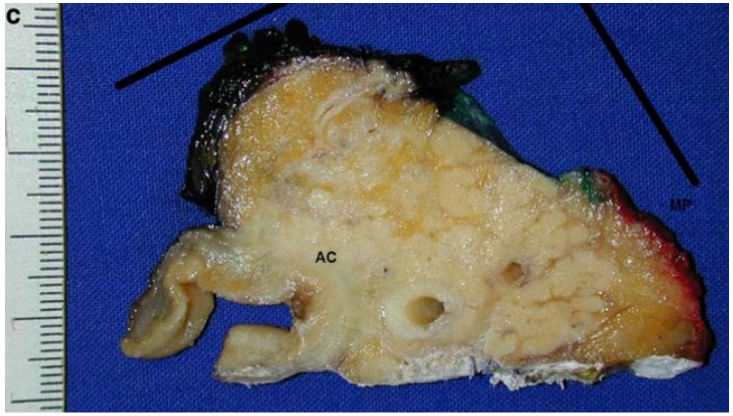


Table 2 Histopathological and resection classification data

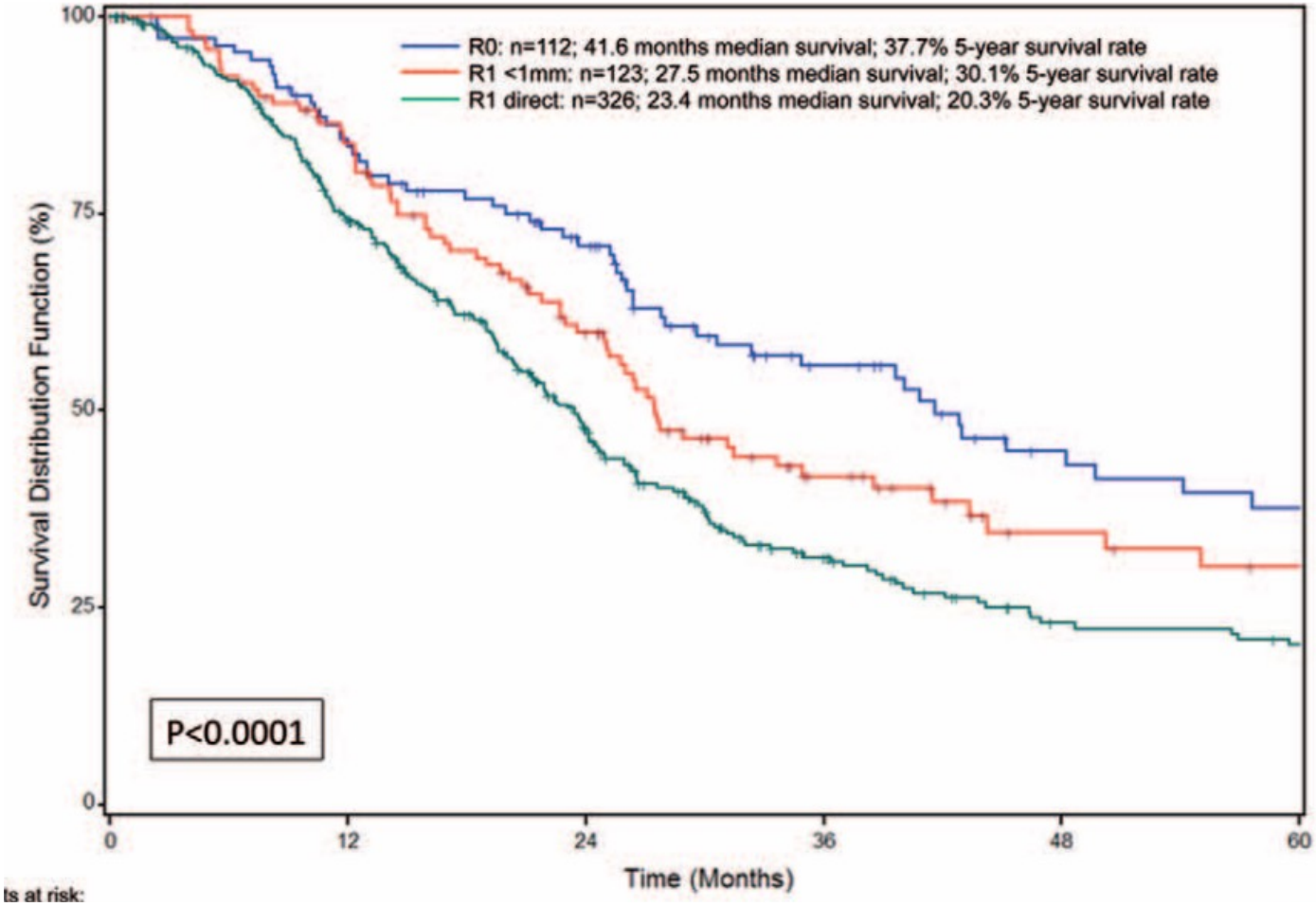
	All cancers		PDAC	
	UICC	RCP	UICC	RCP
Resection				
R0	32 (49.2%)	19 (29.2%)	17 (37.0%)	8 (17.4%)
R1/R2	33 (50.8%)	46 (70.8%)	29 (63.0%)	38 (82.6%)
Site of R1				
Mesopancreas	22 (56.4%)	27 (32.5%)	19 (57.6%)	24 (34.3%)
Pancreatic transection margin	4 (10.3%)	11 (13.3%)	3 (9.1%)	10 (14.3%)
Anterior	2 (5.1%)	18 (21.7%)	2 (6.1%)	15 (21.4%)
Posterior	1 (2.6%)	13 (15.7%)	1 (3.0%)	11 (15.7%)
Groove of SMV	1 (2.6%)	4 (4.8%)	1 (3.0%)	2 (2.9%)
SMV (n=17)	7 (17.9%)	8 (9.6%)	5 (15.2%)	6 (8.6%)
Duodenum oral	2 (5.1%)	2 (2.4%)	2 (6.1%)	2 (2.9%)

Gaedcke J, et al. Langenbeck's Arch Surg 2010

Pancreatic Cancer Surgery

The New R-status Counts

Oliver Strobel, MD, Thomas Hank, MD,* Ulf Hinz, MSc,* Frank Bergmann, MD,† Lutz Schneider, MD,* Christoph Springfeld, MD, PhD,‡ Dirk Jäger, MD,‡ Peter Schirmacher, MD,† Thilo Hackert, MD,* and Markus W. Büchler, MD**



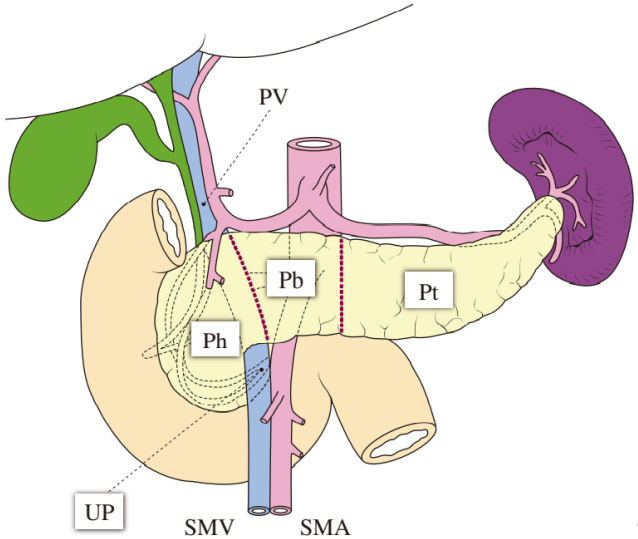
Strobel O, et al. Ann Surg 2016

膵癌取扱い規約（英語版 第4版）
［膵癌取扱い規約 第7版 準拠］

Classification of Pancreatic Carcinoma

Japan Pancreas Society

Fourth English Edition



PL

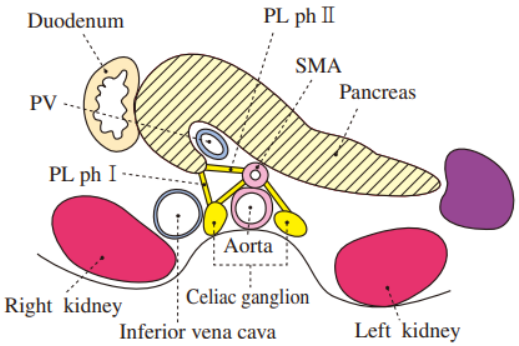


Fig. 3a Pancreatic nerve plexuses (cross-sectional diagram)

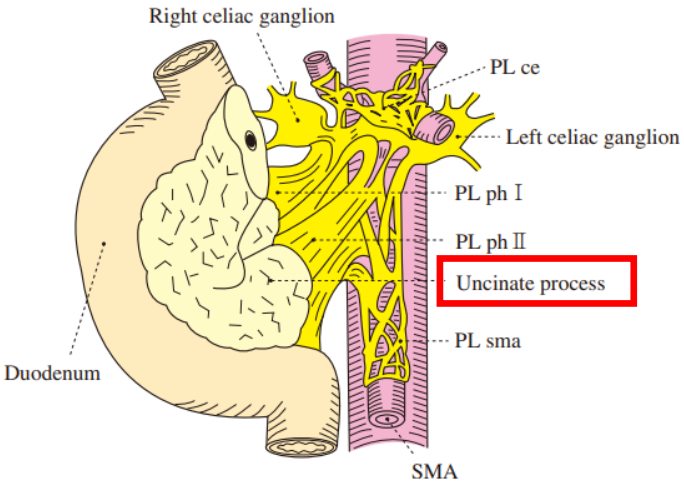
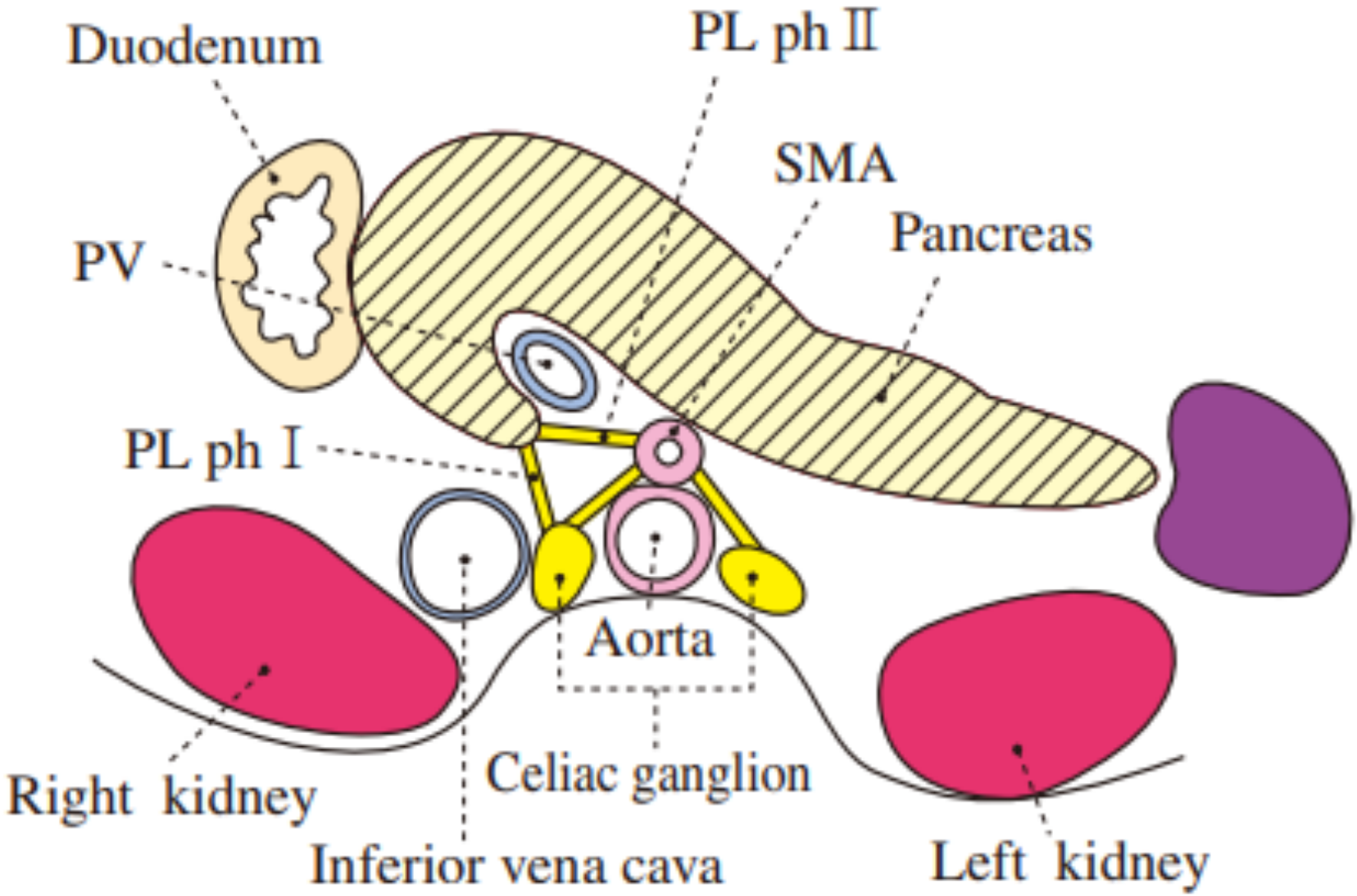


Fig. 3b Extrapancreatic nerve plexuses

PLph I: pancreatic head nerve plexus I
PLsma: superior mesenteric nerve plexus
PLhdl: hepatoduodenal ligament nerve plexus
PLce: celiac plexus
PLph II: pancreatic head nerve plexus II
PLcha: common hepatic artery nerve plexus
PLspa: splenic artery nerve plexus

Ativar o Windows

Japan Pancreas Society – Fourth English Edition, 2017


Duodenum
PL ph Ⅱ
SMA
Pancreas
PV
PL ph Ⅰ
Aorta
Celiac ganglion
Right kidney
Inferior vena cava
Left kidney

Surgery xxx (2020) 1–7

Contents lists available at ScienceDirect

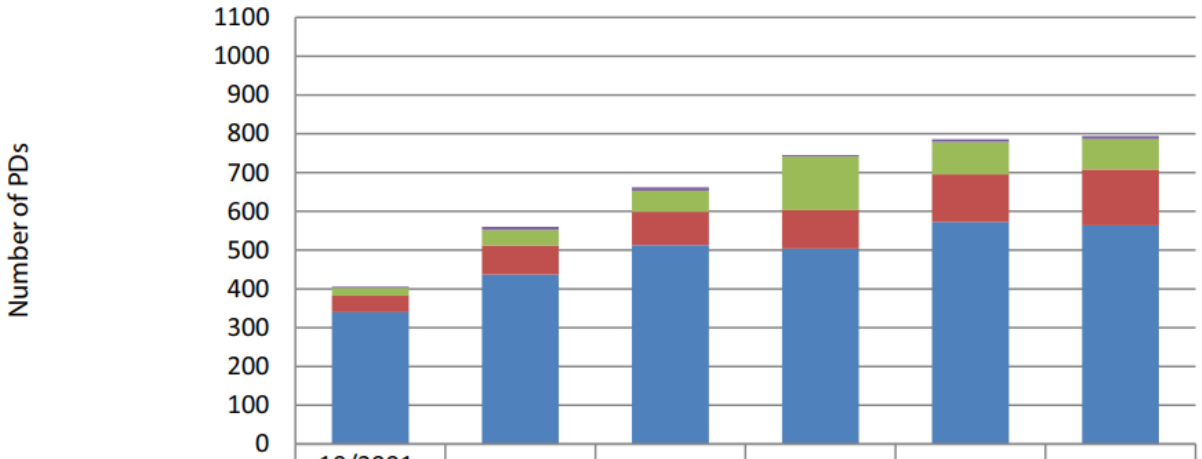
Surgery

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

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

Andre L. Mihaljevic, MD, Thilo Hackert, MD, Martin Loos, MD, Ulf Hinz, PhD, Martin Schneider, MD, Arianeb Mehrabi, MD, Katrin Hoffmann, MD,

Year of operation and type of PD

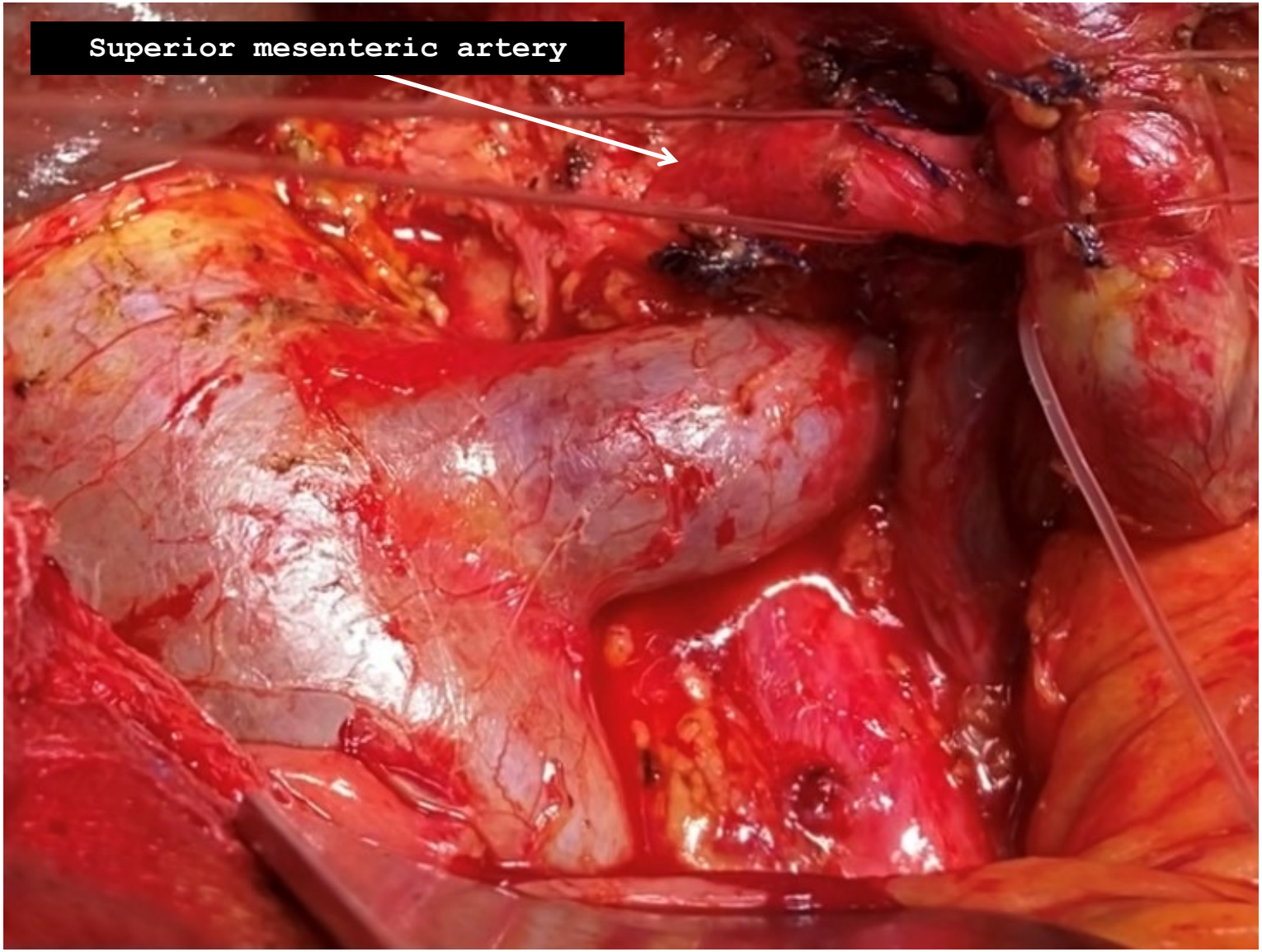


	10/2001-2004	2005-2007	2008-2010	2011-2013	2014-2016	2017-2019
PD + artery	3	8	9	4	7	8
PD + additional organ	21	40	54	138	84	78
PD + portal vein	42	75	86	99	122	144
Standard PD	340	437	513	504	573	564

Typo I. Classic (74.1%)
Type II. Portal Vein (14.4%)
Type III. Organs + (10.5%)
Type IV. Artery (1.0%)

Mihaljevic AL, et al. Surgery 2020

ARTERY FIRST



Langenbeck's Archives of Surgery
https://doi.org/10.1007/s00423-021-02211-y

REVIEW ARTICLE

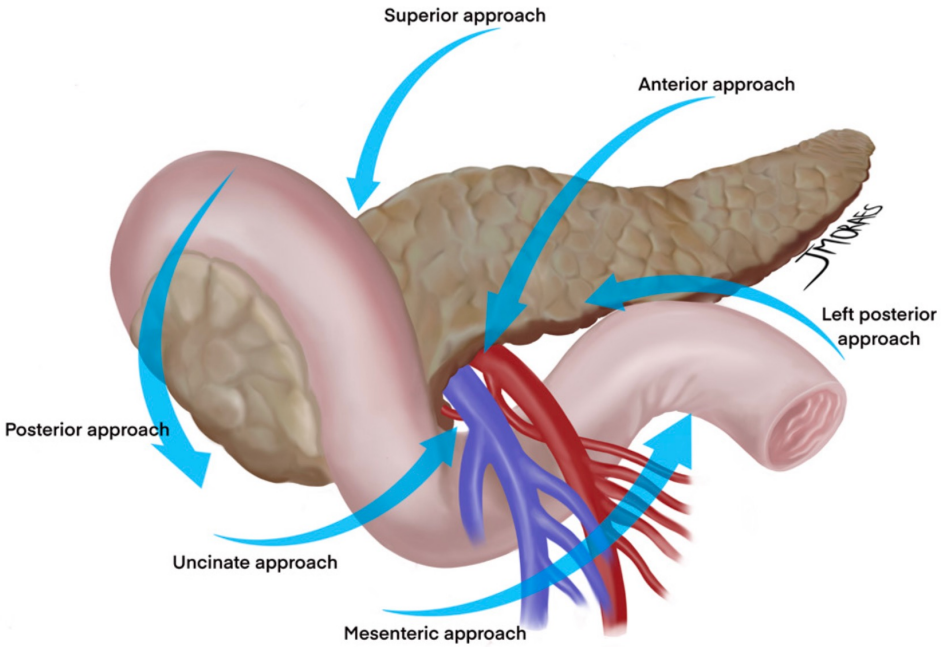
What do surgeons need to know about the mesopancreas

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)

Fernandes ESM, et al. Langenbeck's Arch Surg 2021

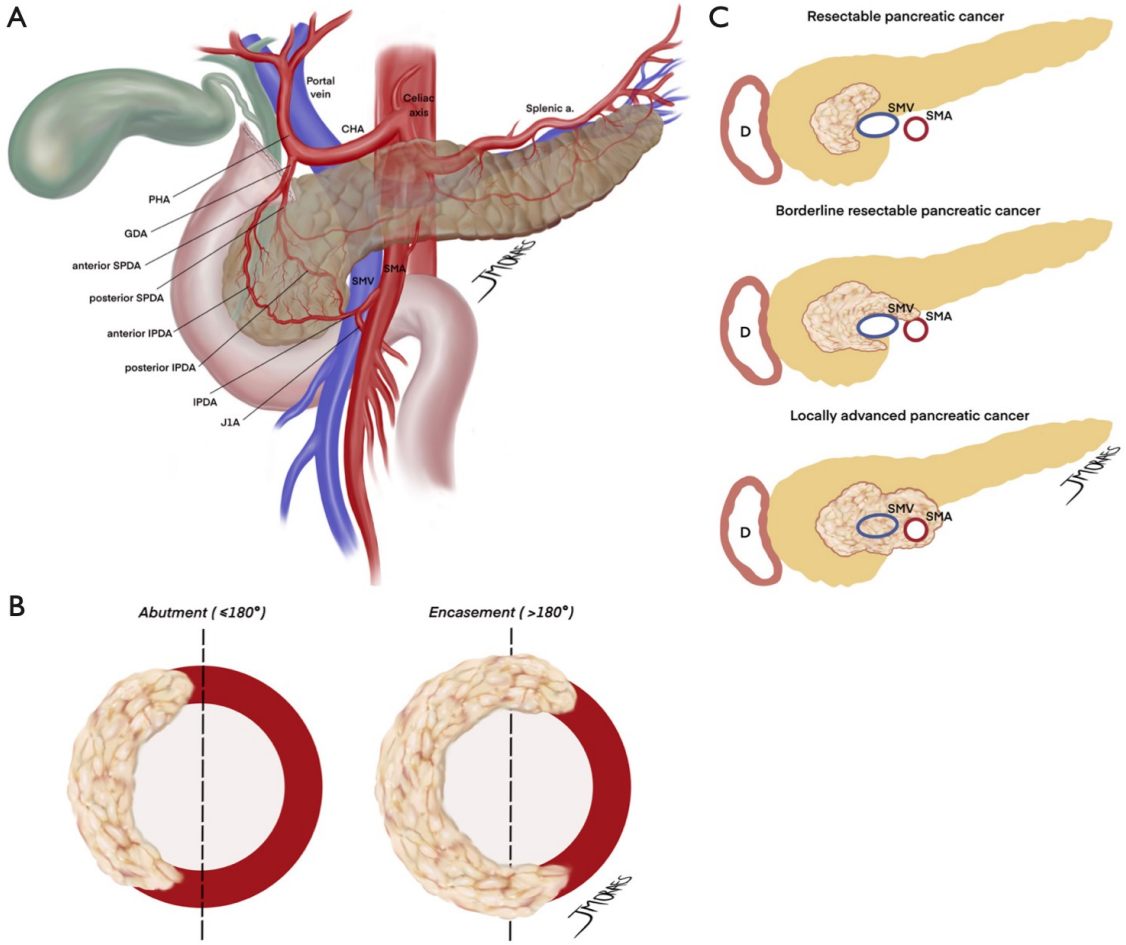


Fernandes ESM, et al. J Gastrointest Oncol 2023

Review Article

A more radical perspective on surgical approach and outcomes in pancreatic cancer—a narrative review

Eduardo de Souza M. Fernandes[1,2,3], Felipe Pedreira T. de Mello[1,2], Eduardo Pinho Braga[1], Gabrielle Oliveira de Souza[1], Ronaldo Andrade[1,2], Leandro Savattone Pimentel[1,2], Camila Liberato Girão[1,2], Munique Siqueira[1,2], José Maria A. Moraes-Junior[6,7], Romulo Varella de Oliveira[4], Nicolas Goldaracena[5], Orlando Jorge M. Torres[6,7]



Fernandes ESM, et al. J Gastrointest Oncol 2023

International Journal of Surgery 73 (2020) 14–24

Contents lists available at ScienceDirect

International Journal of Surgery

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

Review

Superior mesenteric artery first approach can improve the clinical outcomes of pancreaticoduodenectomy: A meta-analysis

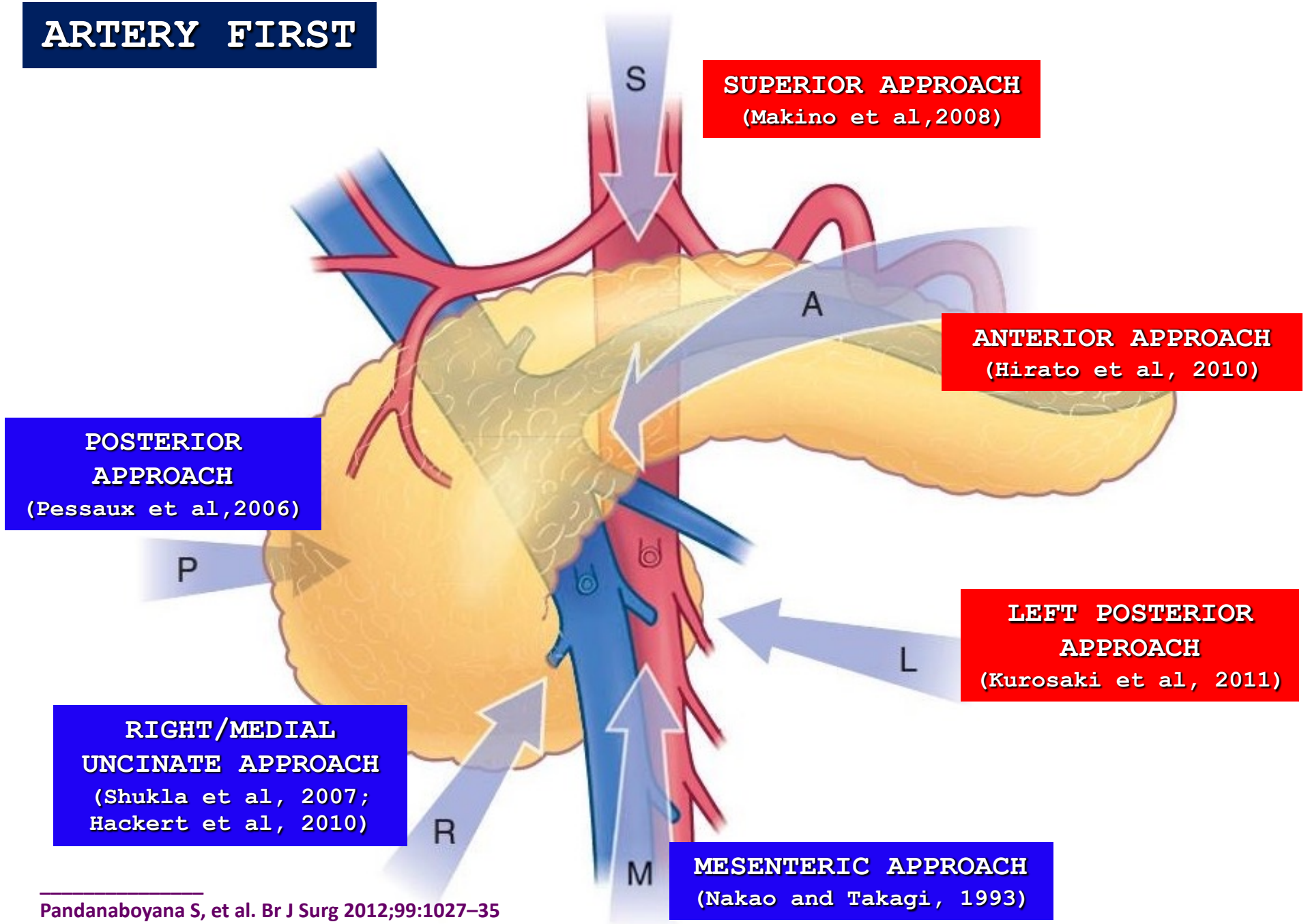
ARTERY FIRST

- Higher R0 resection rate (p< 0.001)
- Lower local recurrence rate (p< 0.0001)
- Higher overall survival:
  - 1-year p=0.015
  - 2-year p=0.005
  - 3-year p=0.001

Meta-analysis – 18 studies

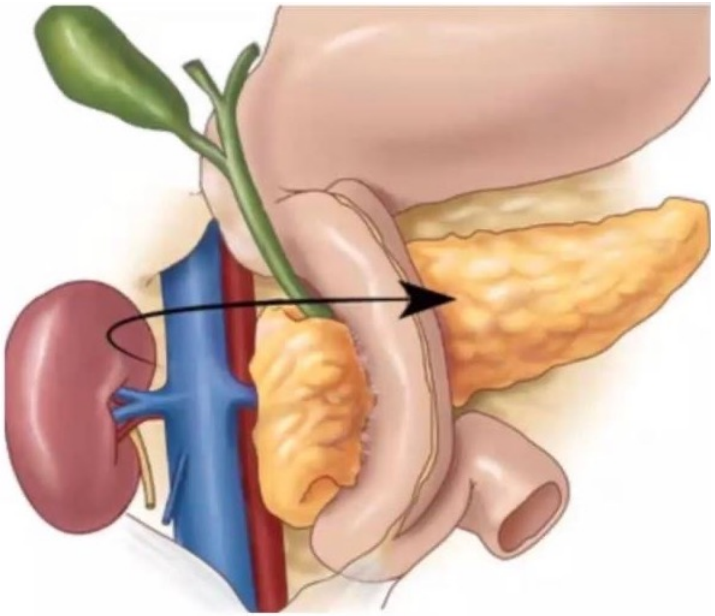
Jiang X, et al. Int J Surg 2020;73:14-24

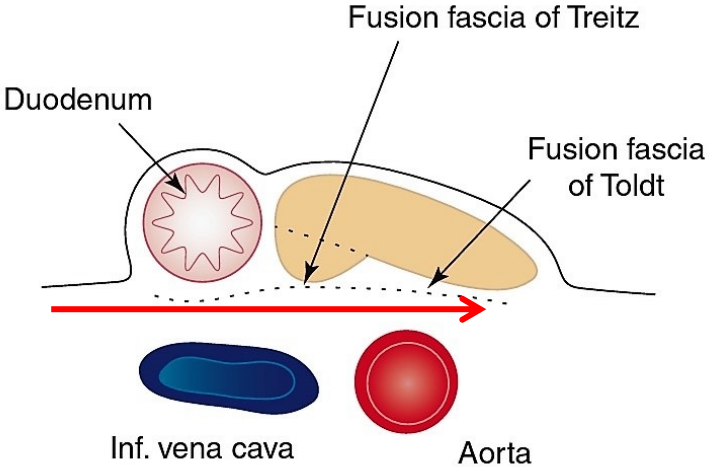
ARTERY FIRST

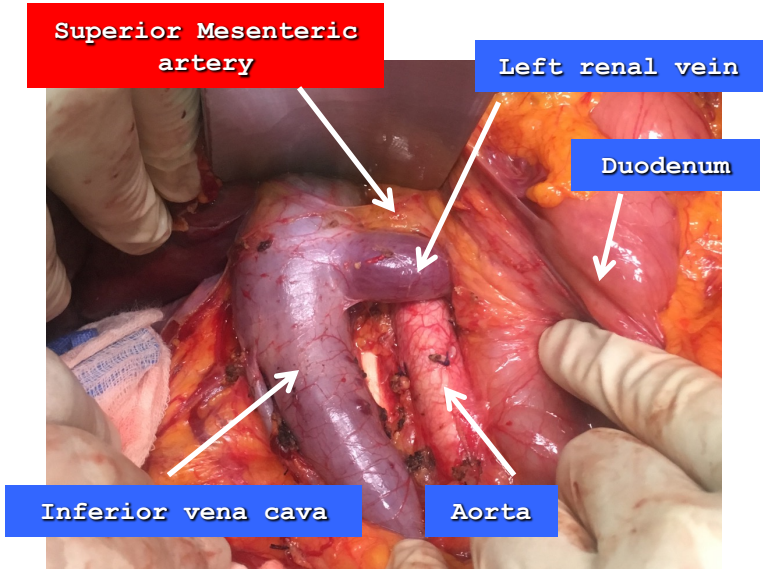


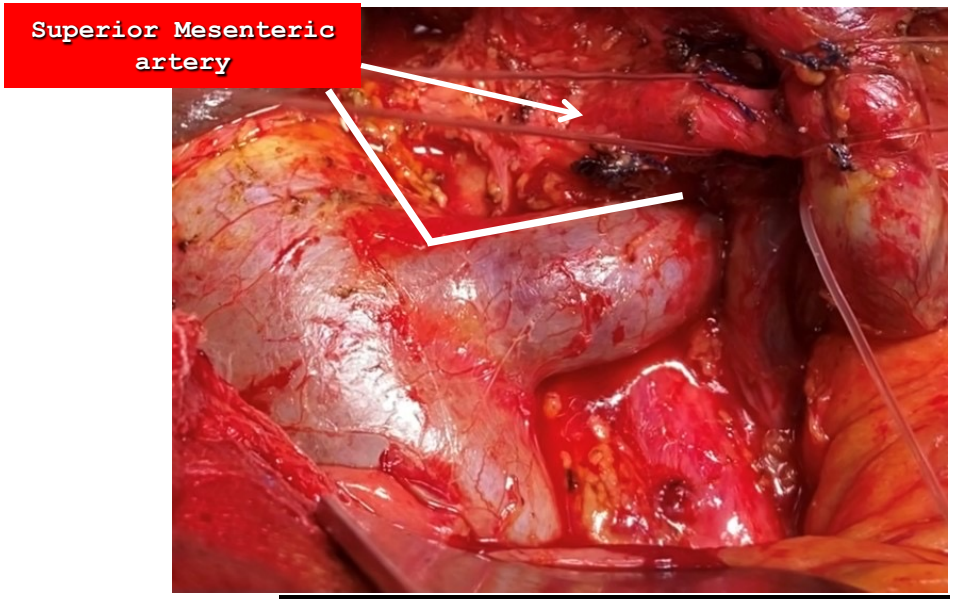
Pandanaboyana S, et al. Br J Surg 2012;99:1027–35

ARTERY FIRST

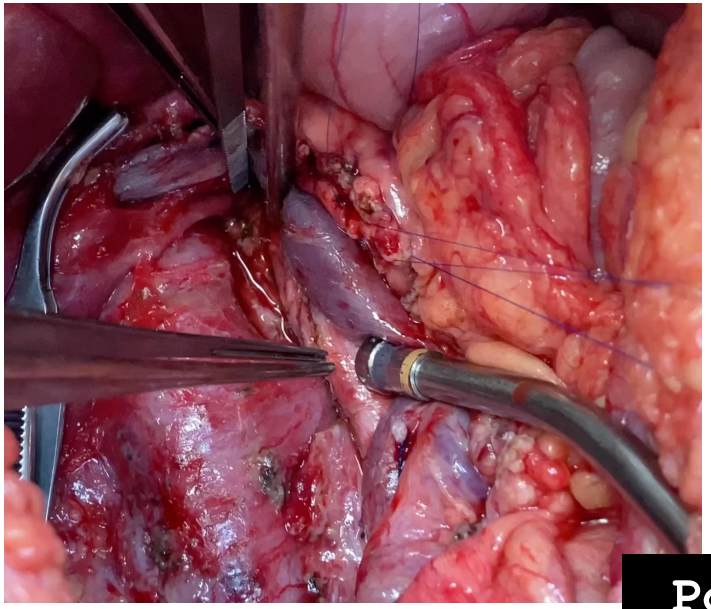


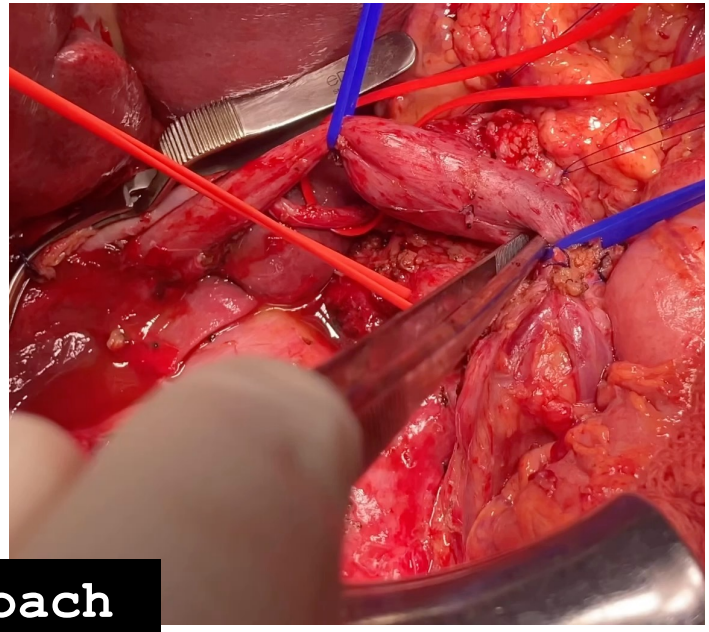




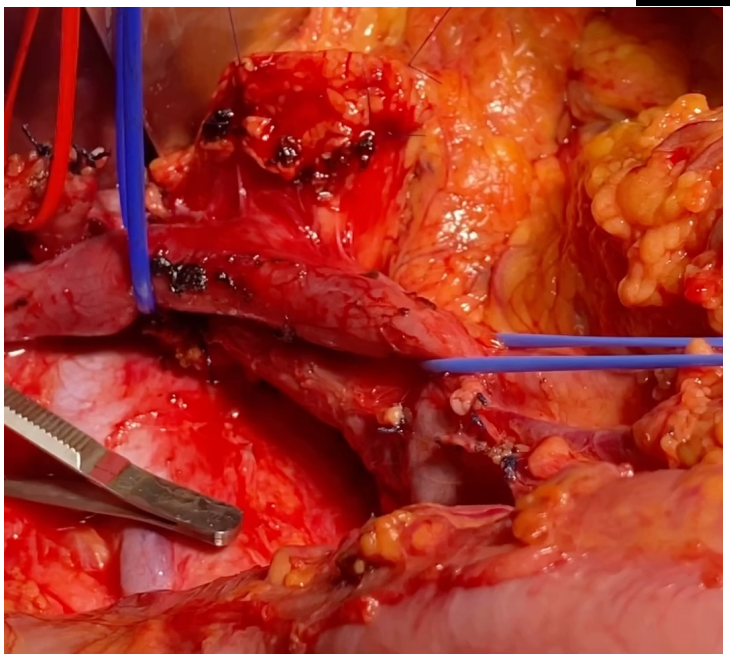


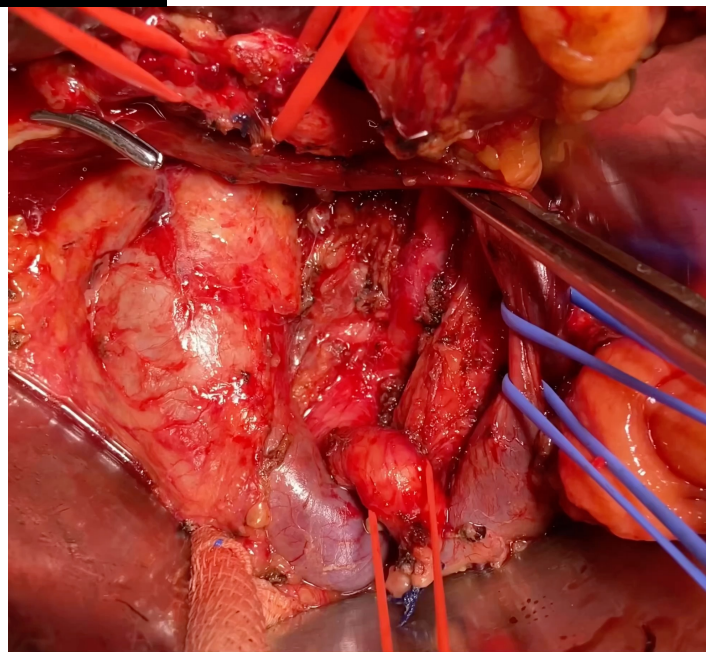
Posterior approach

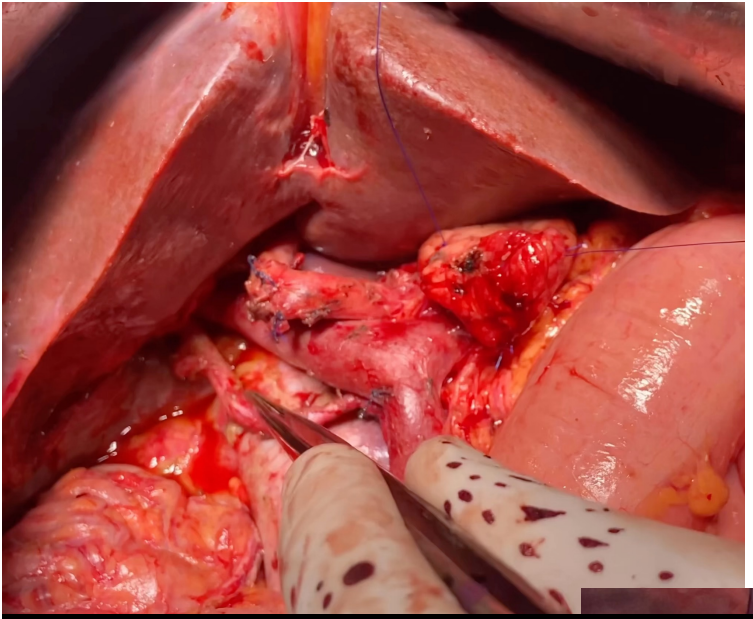


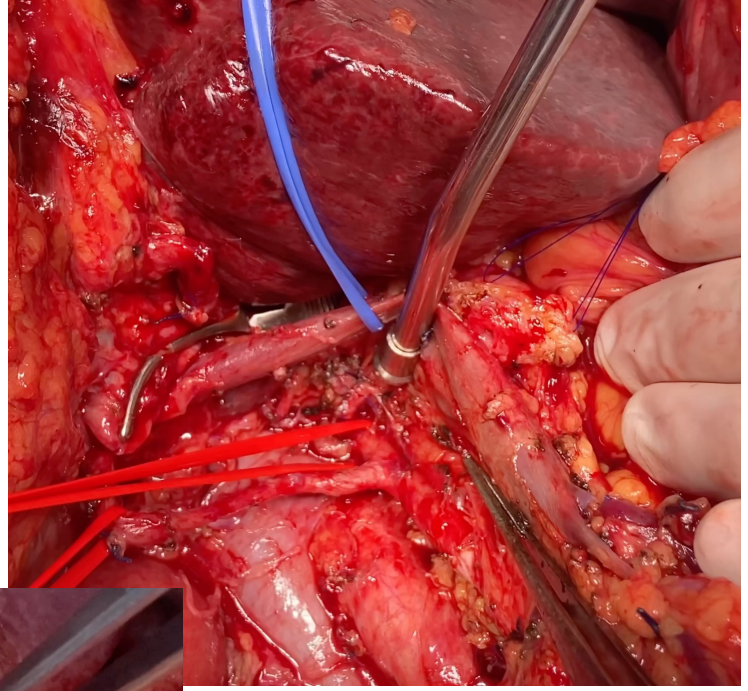


Posterior approach

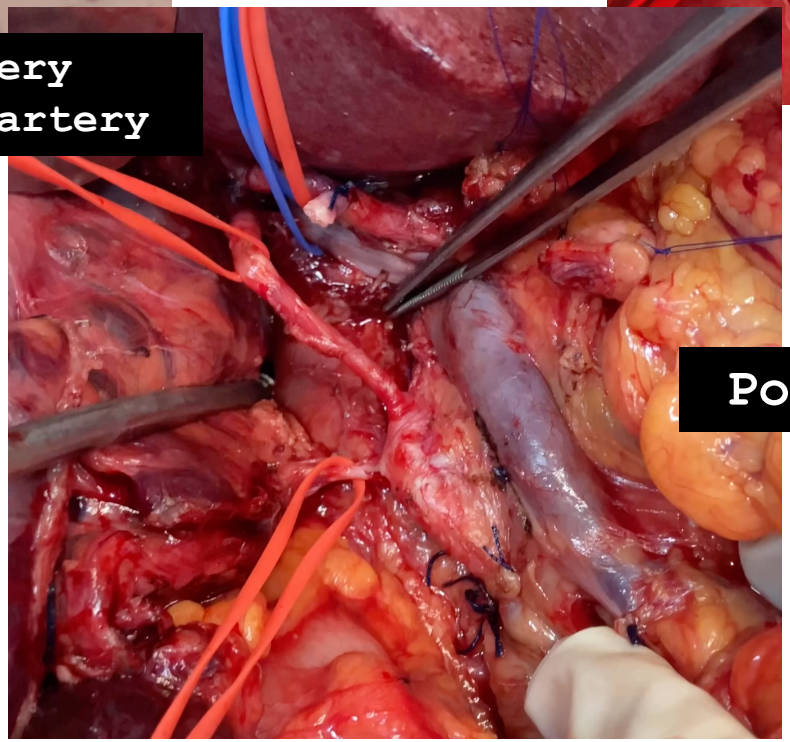




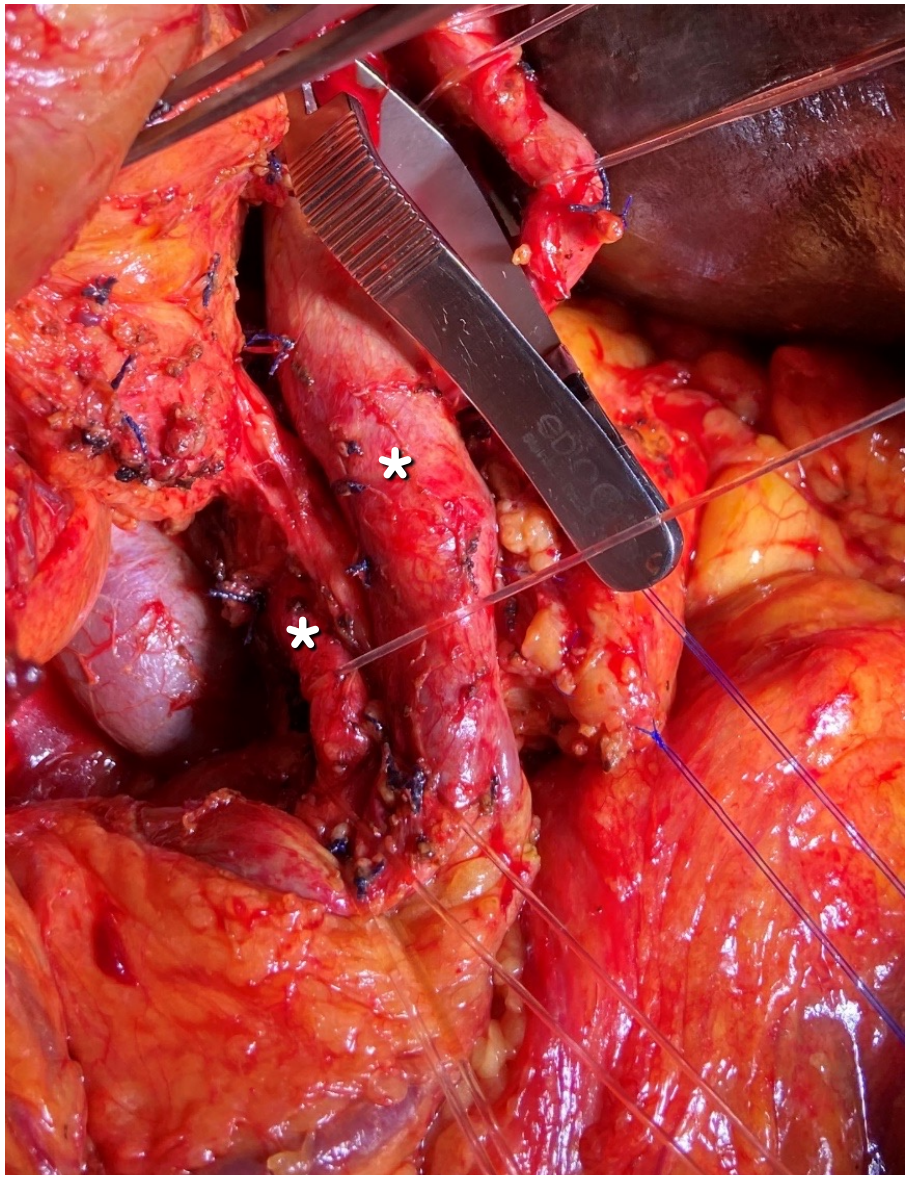


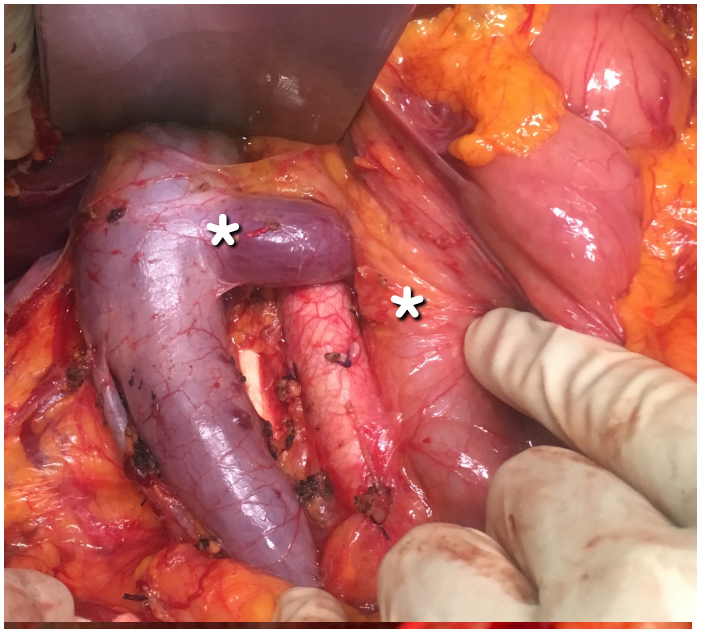


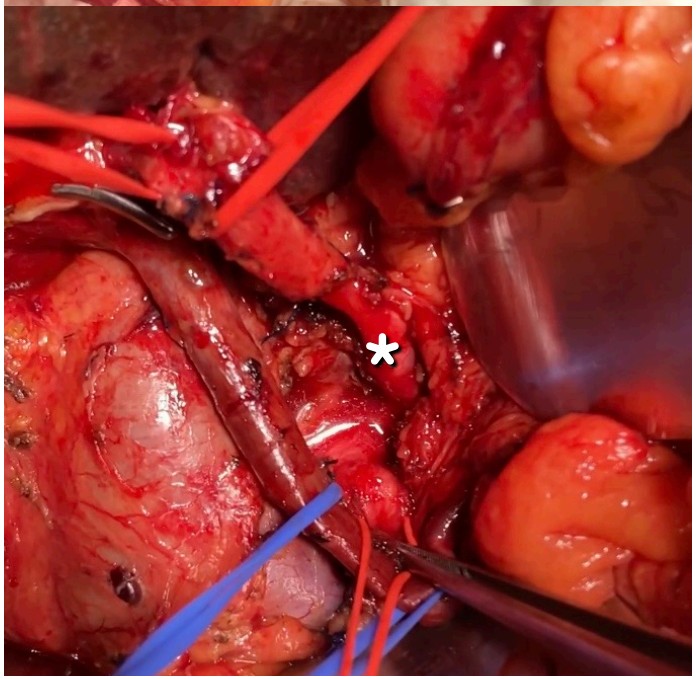
Right hepatic artery
Superior mesenteric artery



Posterior approach







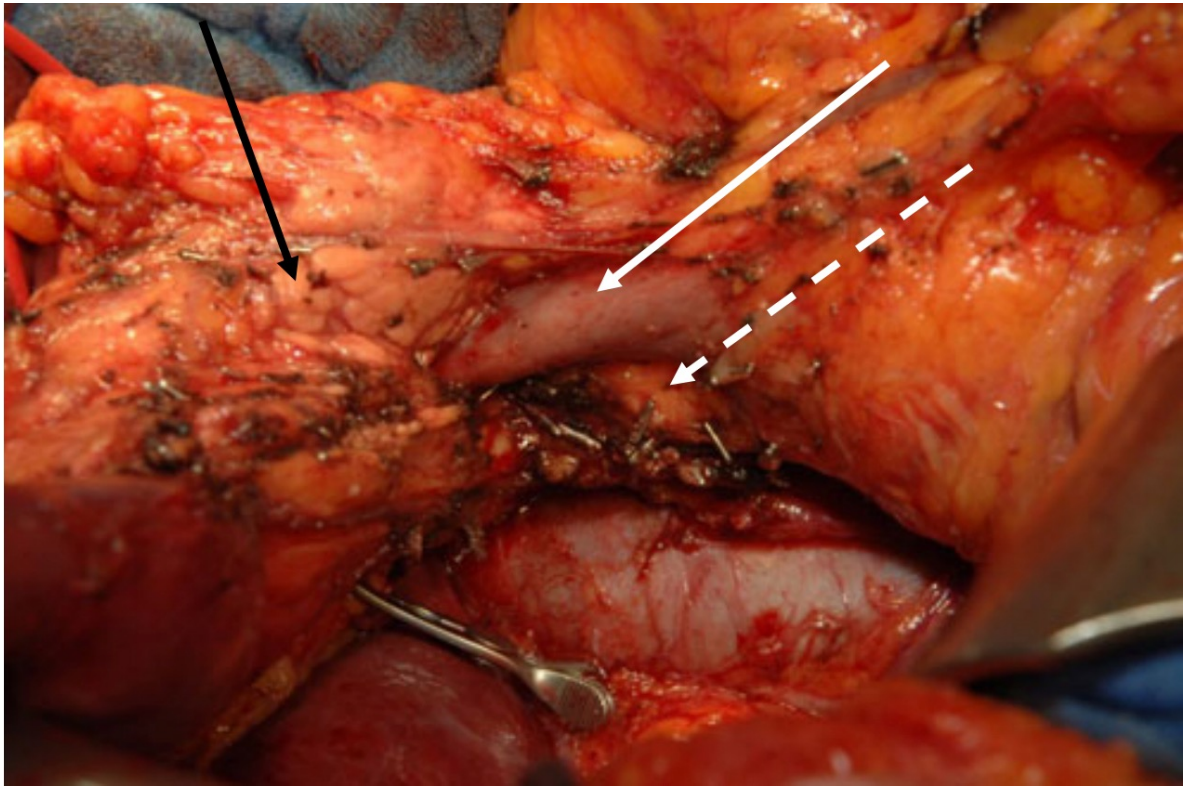
Posterior approach

Langenbecks Arch Surg (2010) 395:1161–1164
DOI 10.1007/s00423-010-0663-9

ARTERY FIRST

HOW TO DO IT

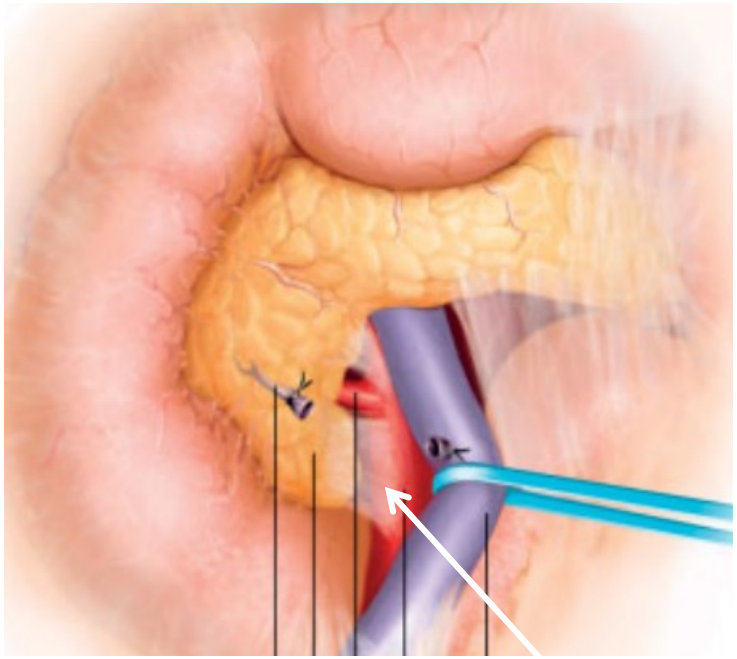
Uncinate process first—a novel approach for pancreatic head resection



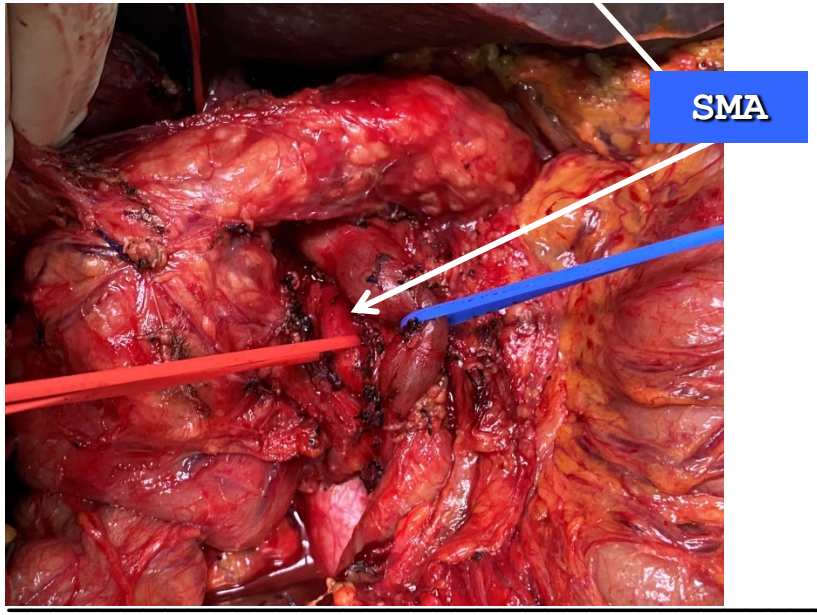
Uncinate first

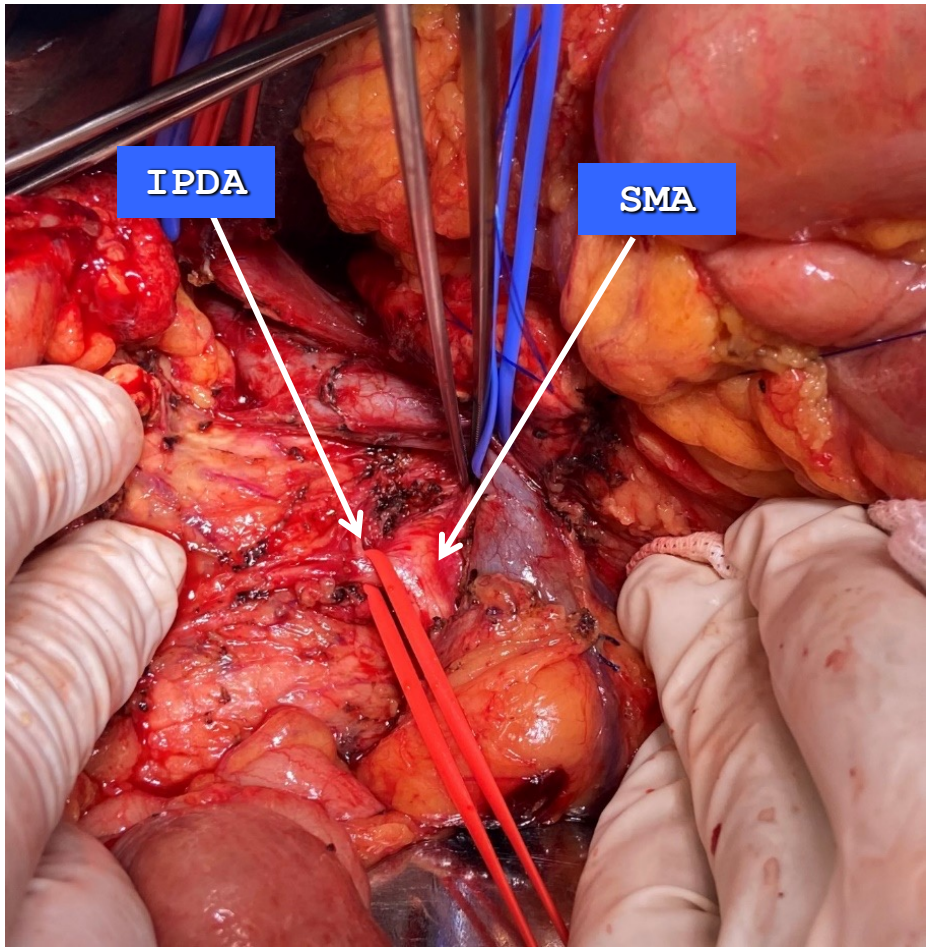
Hackert T, et al. Langenbecks Arch Surg 2010; 395:1161–4

ARTERY FIRST



Pandanaboyana S, et al. Br J Surg 2012;99.1027–35





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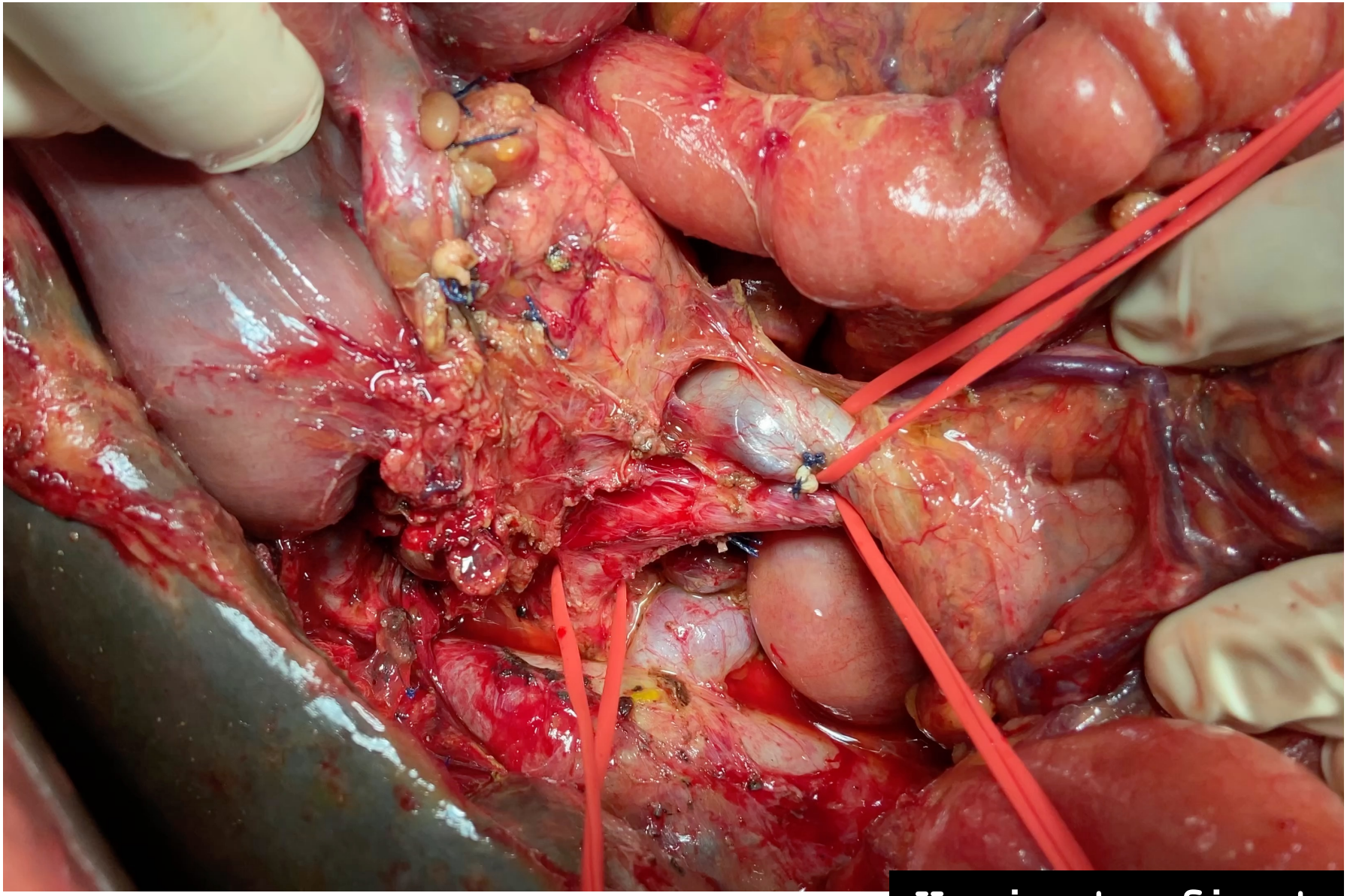

Uncinate first

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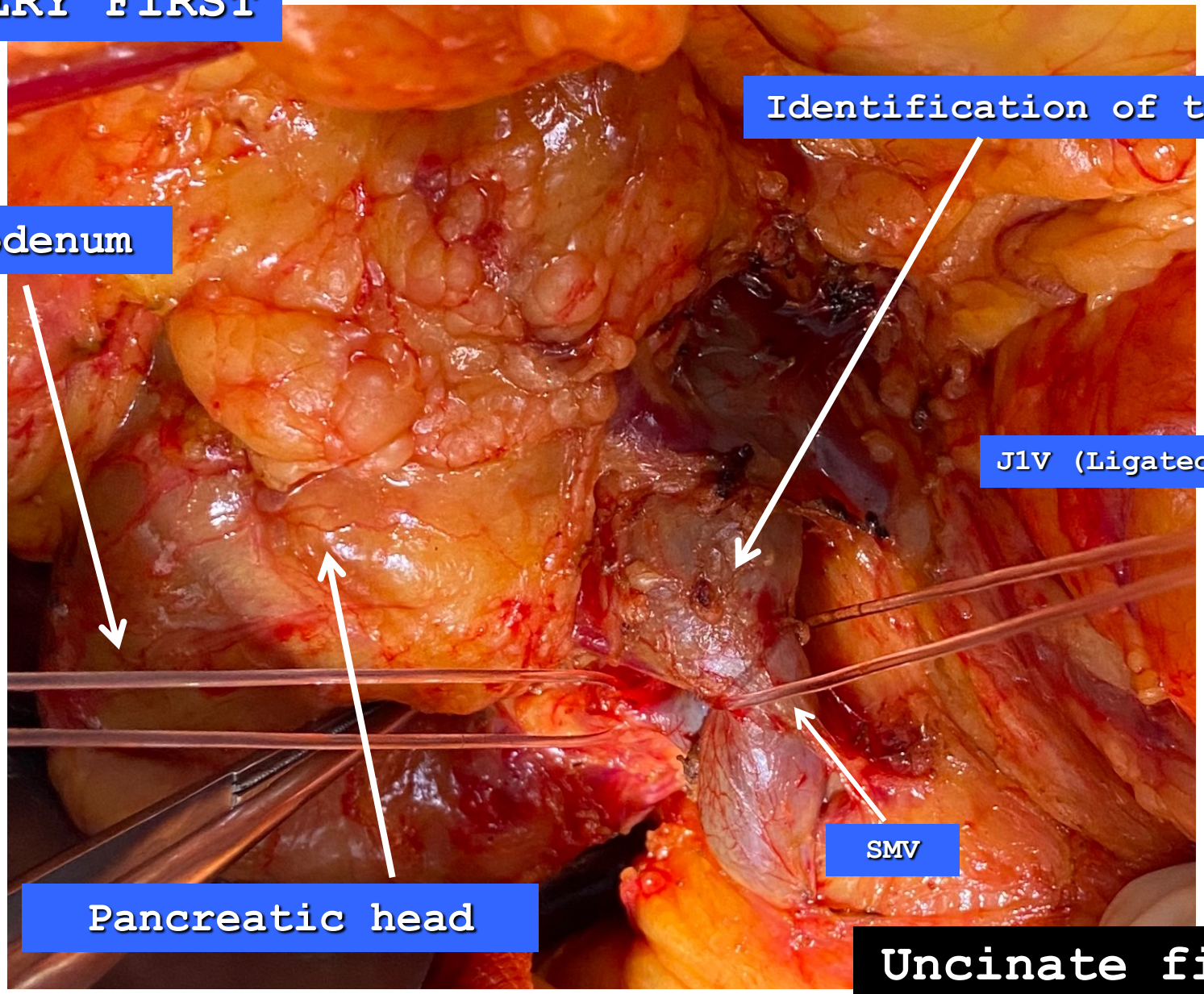

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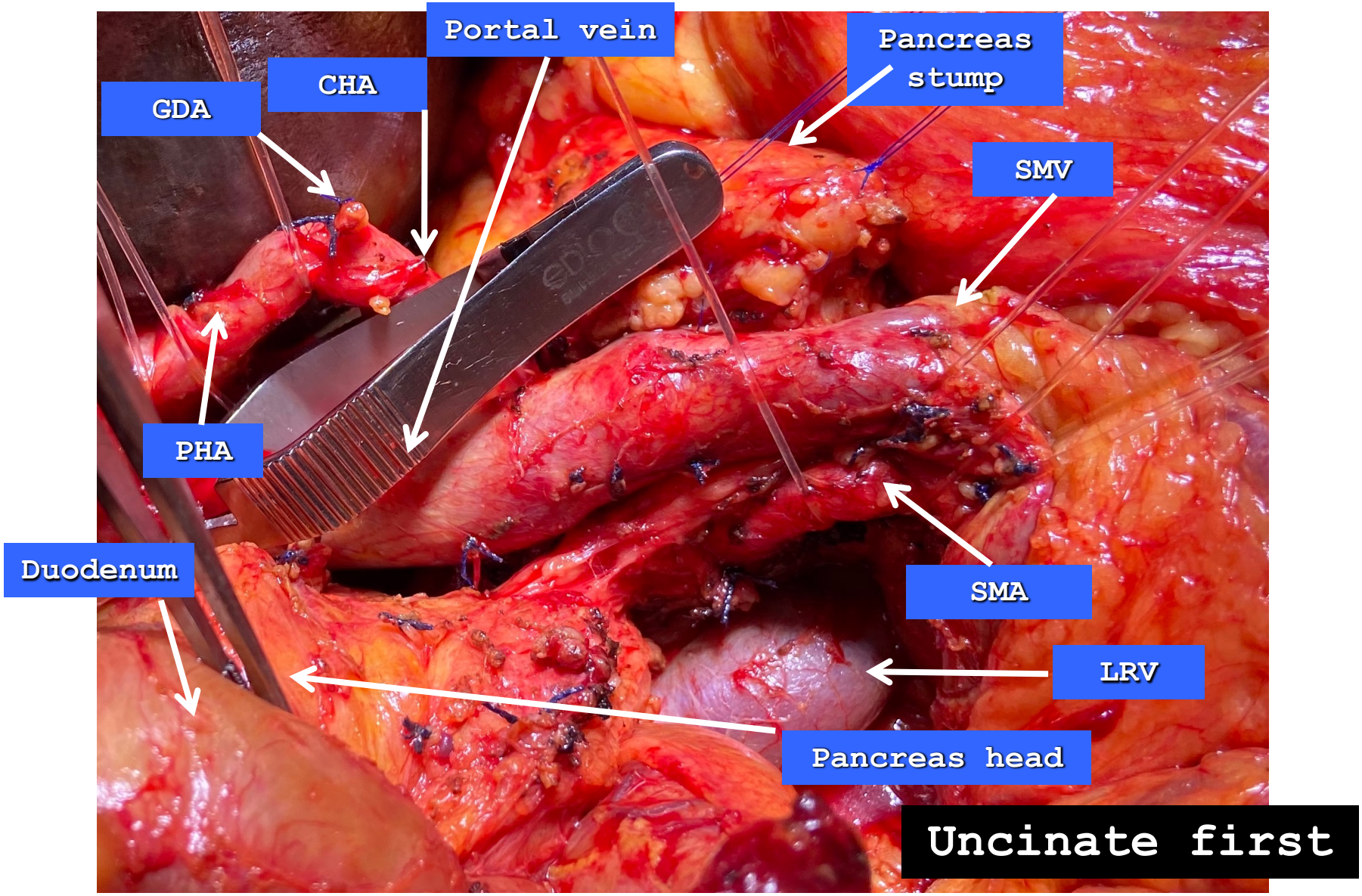

Portal vein
Pancreas stump
CHA
GDA
SMV
PHA
Duodenum
SMA
LRV
Pancreas head
Uncinate first

ARTERY FIRST

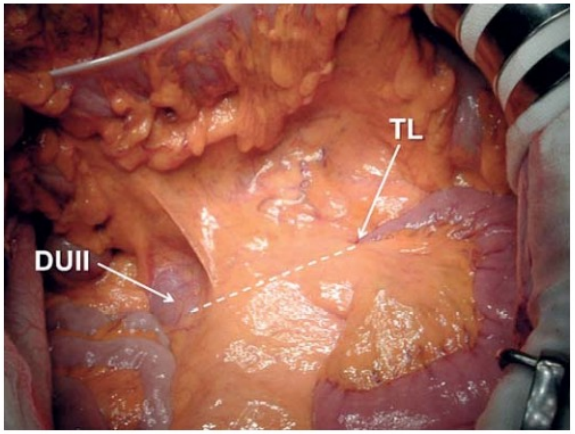
Digestive Surgery

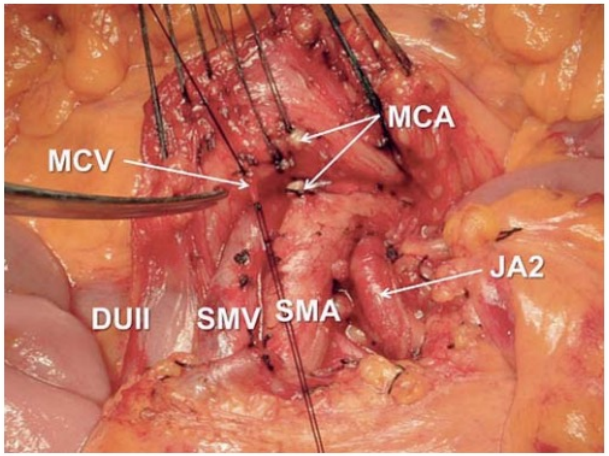
How I Do It

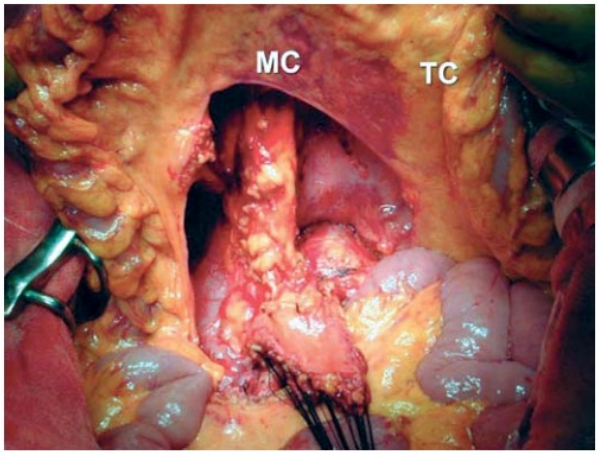
Dig Surg 2016;33:308–313
DOI: 10.1159/000445014

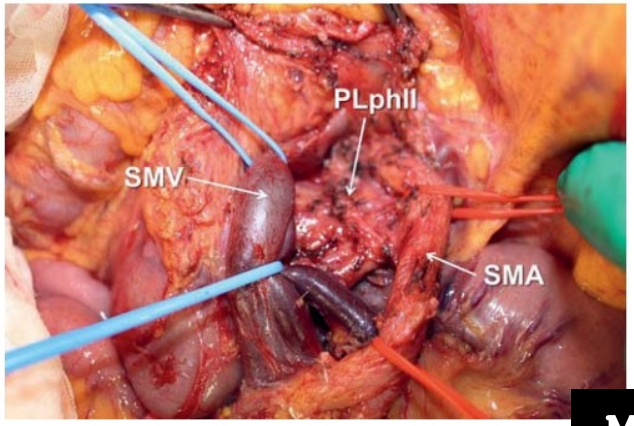
Published online: May 25, 2016

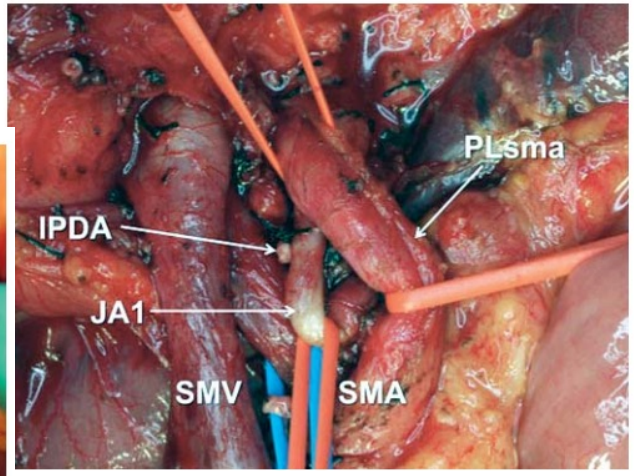
The Mesenteric Approach in Pancreatoduodenectomy











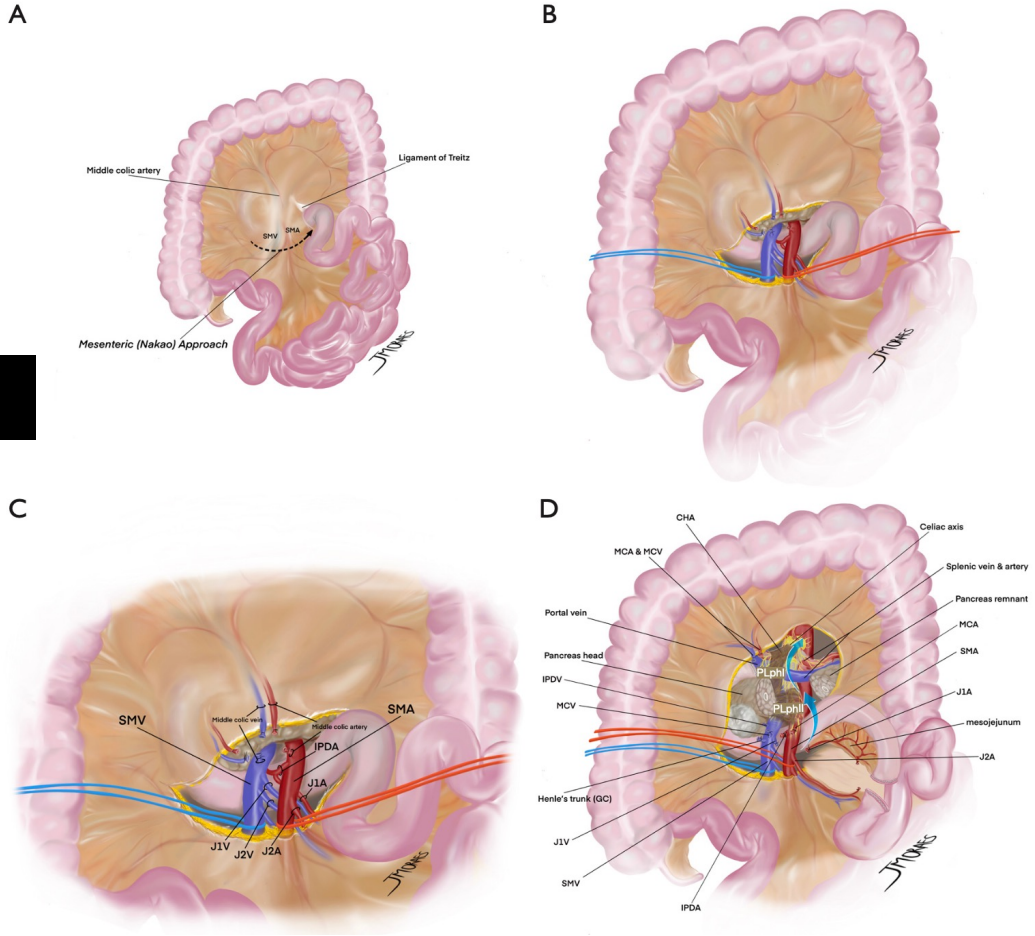
Mesenteric approach

Nakao A, et al. Dig Surg 2016;33:308-13

Review Article

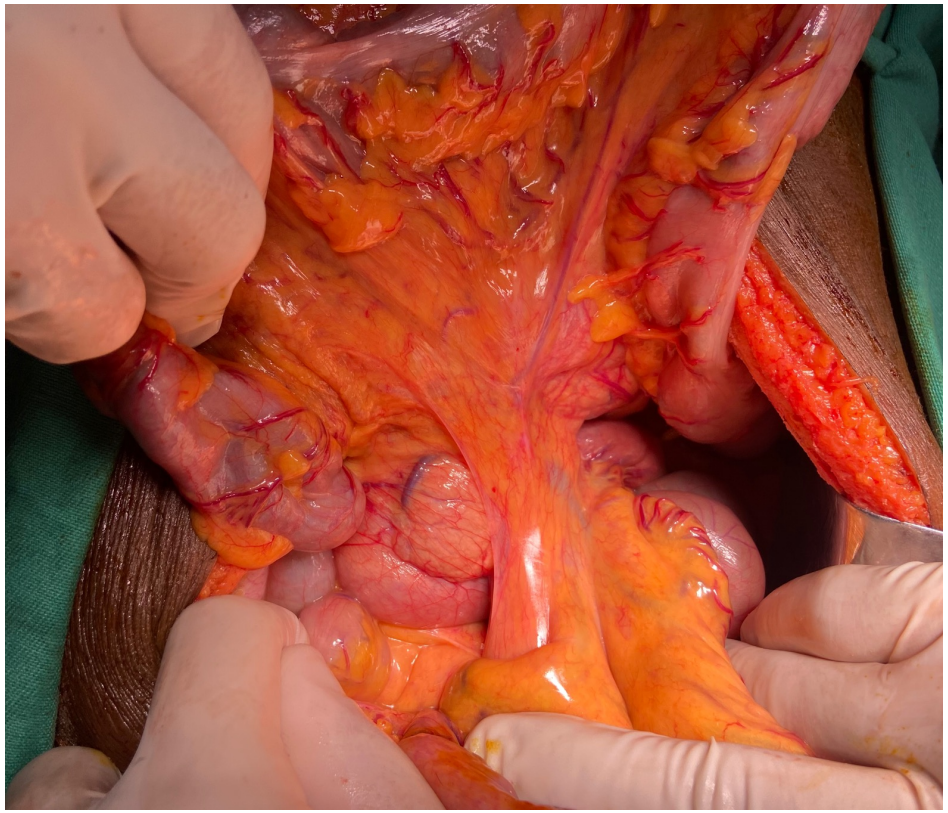
A more radical perspective on surgical approach and outcomes in pancreatic cancer—a narrative review

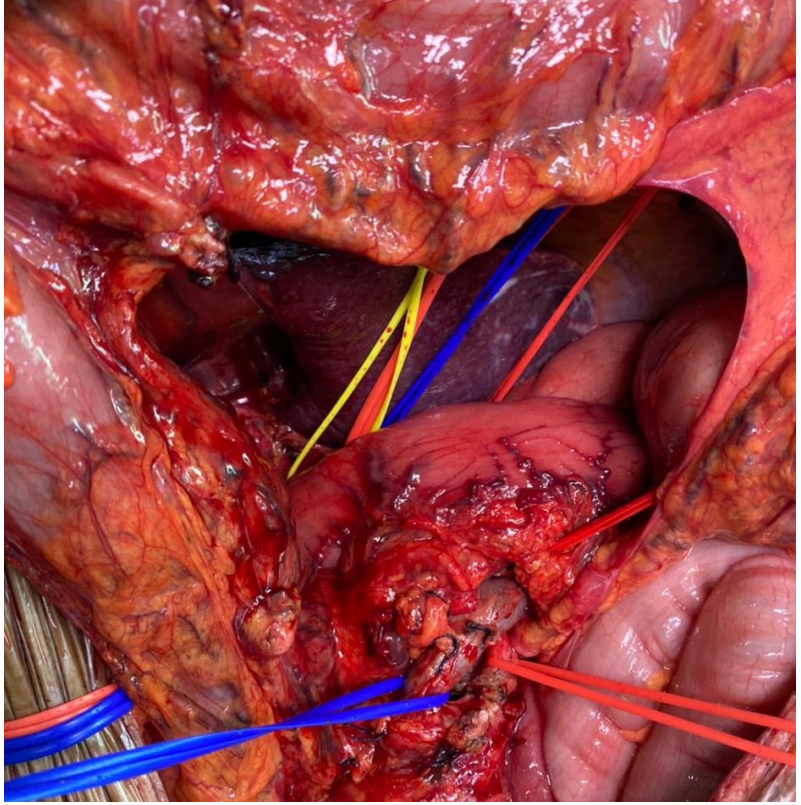
Eduardo de Souza M. Fernandes[1,2,3], Felipe Pedreira T. de Mello[1,2], Eduardo Pinho Braga[1], Gabrielle Oliveira de Souza[1], Ronaldo Andrade[1,2], Leandro Savattone Pimentel[1,2], Camila Liberato Girão[1,2], Munique Siqueira[1,2], José Maria A. Moraes-Junior[6,7], Romulo Varella de Oliveira[4], Nicolas Goldaracena[5], Orlando Jorge M. Torres[6,7]



Mesenteric approach

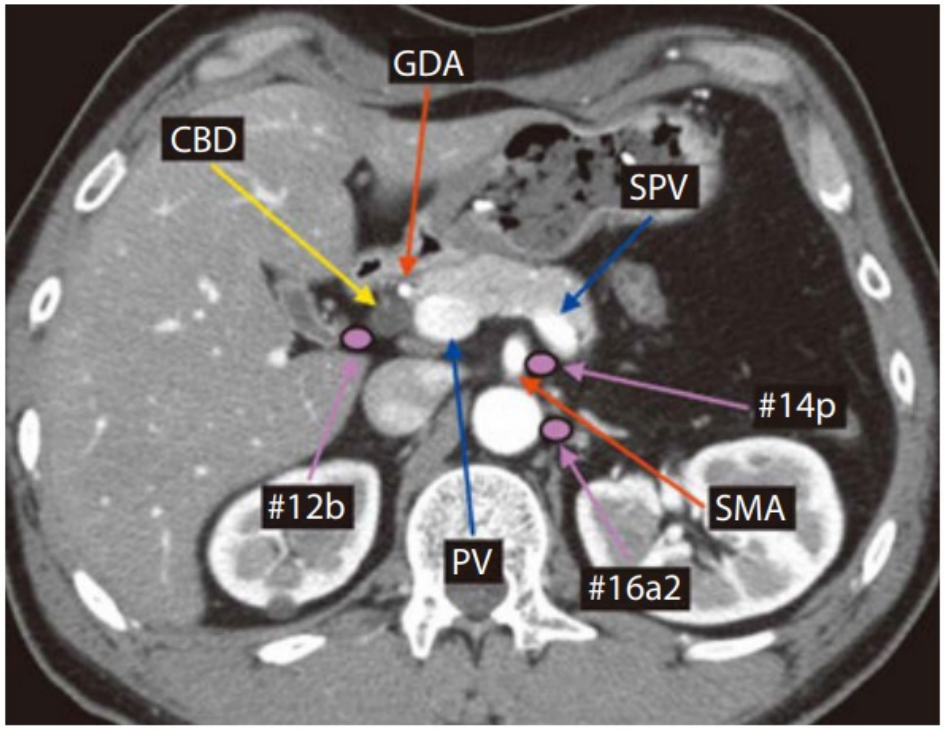
Fernandes ESM, et al. J Gastrointest Oncol 2023

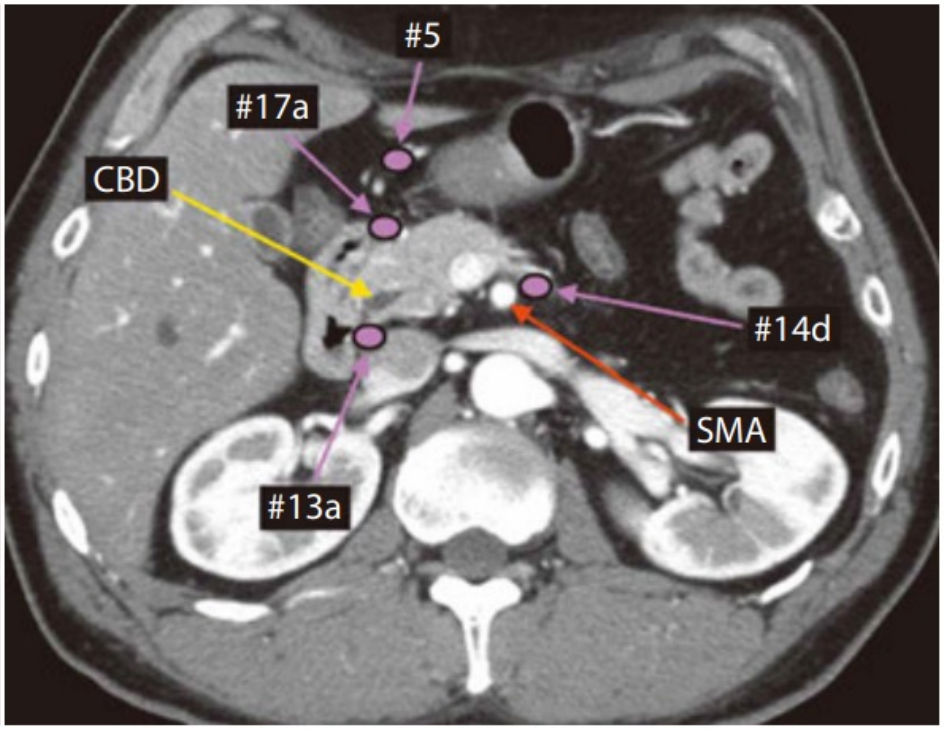




Mesenteric approach

LYMPHADENECTOMY





14p, 14d

World J Surg
https://doi.org/10.1007/s00268-020-05856-w

ORIGINAL SCIENTIFIC REPORT

Complete Lymphadenectomy Around the Entire Superior Mesenteric Artery Improves Survival in Artery-First Approach Pancreatoduodenectomy for T3 Pancreatic Ductal Adenocarcinoma

Table 2 Comparison of perioperative and oncological outcomes between the AFA-PD group and the conventional PD group

	AFA-PD group	Conventional PD group	*P*
	n = 45	*n* = 43	
Operative time, median (range), min	443 (390–497)	467 (414–530)	0.1312
Intraoperative blood loss, median (range), mL	811 (520–1150)	899 (720–1443)	**0.0210**
Transfusion, n (%)	19 (42.2)	22 (51.2)	0.5178
Portal vein resection, n (%)	12 (26.7)	13 (30.2)	0.8147
Postoperative complications, ≥ grade IIIa, n (%)	3 (6.7)	5 (11.6)	0.4794
Curative resection R0, n (%)	35 (77.8)	28 (65.1)	0.3423
No. harvested lymph nodes, median (range)	23 (14–37)	19 (12–22)	**0.0165**
No. harvested lymph nodes of #14p, median (range)	4 (2–5)	1 (0–3)	**< 0.001**
No. harvested lymph nodes of #14d, median (range)	4 (2–5)	2 (0–3)	**0.0146**
Lymph node metastasis, n (%)	27 (60)	30 (69.8)	0.3376

Bold values are statistically significant ($p < 0.05$)

Kobayashi S, et al. World J Surg 2020

World J Surg
https://doi.org/10.1007/s00268-020-05856-w

ORIGINAL SCIENTIFIC REPORT

Complete Lymphadenectomy Around the Entire Superior Mesenteric Artery Improves Survival in Artery-First Approach Pancreatoduodenectomy for T3 Pancreatic Ductal Adenocarcinoma

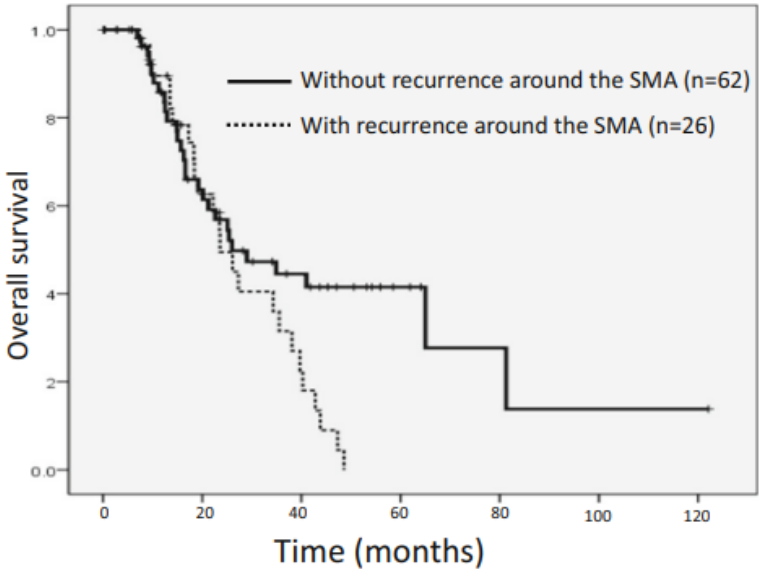


Fig. 1 Overall survival according to recurrence around the SMA. The median survival was 23.6 months in patients with recurrence around the SMA and 26 months in patients without recurrence around the SMA ($p = 0.0367$) SMA: superior mesenteric artery

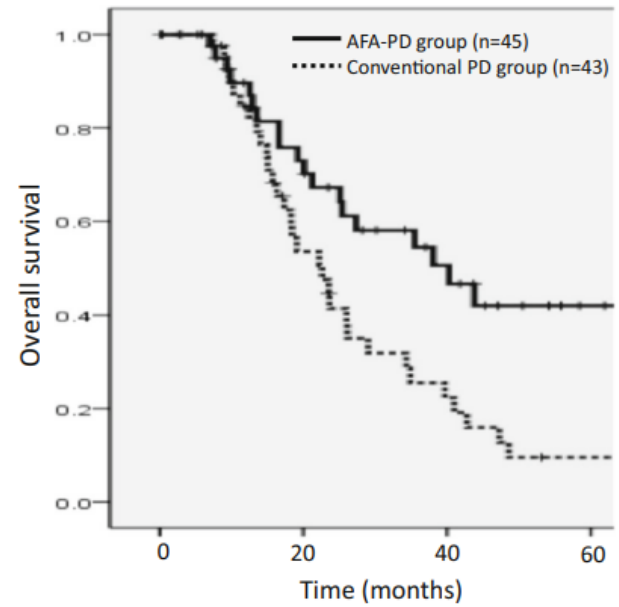


Fig. 2 Overall survival according to the type of the surgery. The median survival was 40.3 months in the AFA-PD group and 22.6 months in the conventional PD group ($p = 0.005$) AFA-PD: artery-first approach pancreatoduodenectomy

Kobayashi S, et al. World J Surg 2020

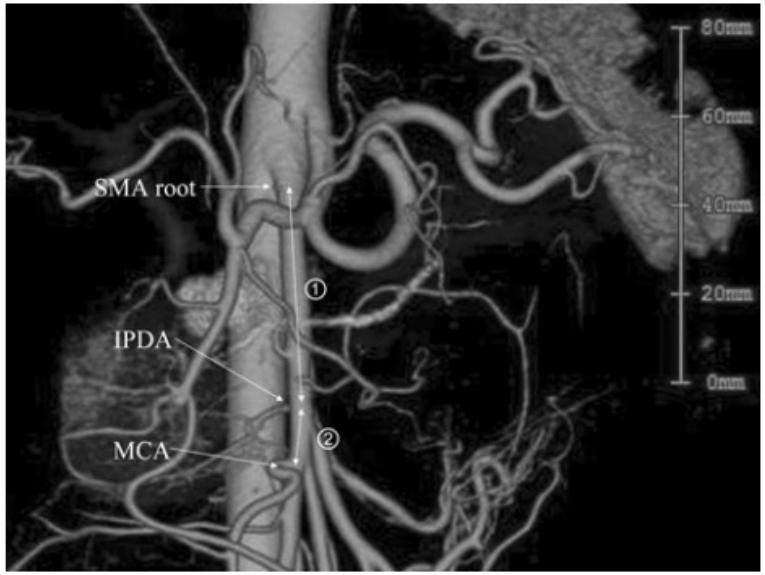
J Hepatobiliary Pancreat Sci (2010) 17:523–526
DOI 10.1007/s00534-009-0261-9

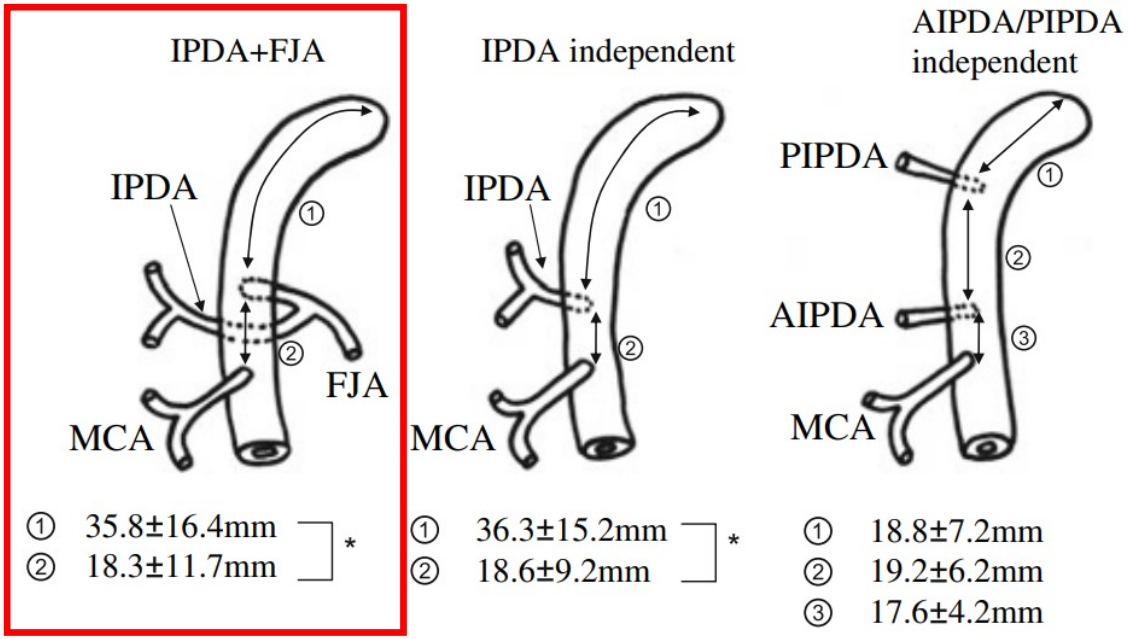
ORIGINAL ARTICLE

IPDA

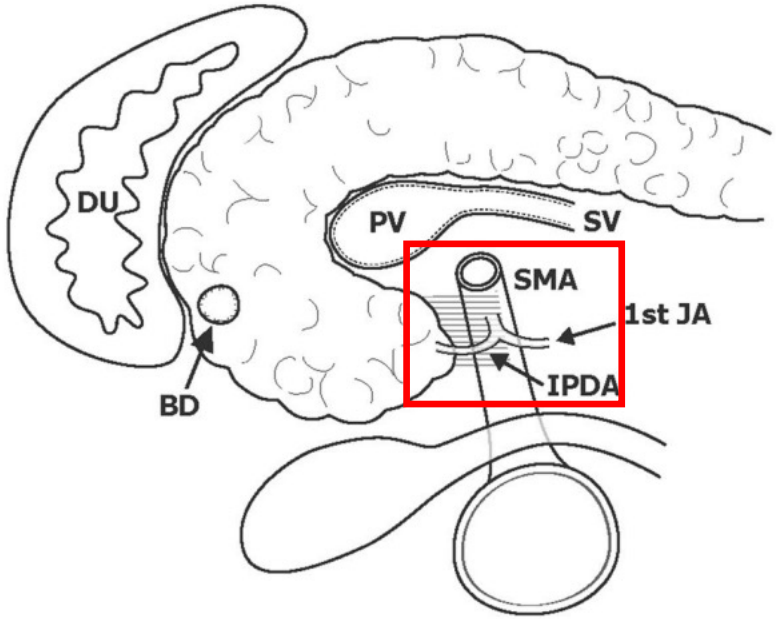
Three-dimensional models of arteries constructed using multidetector-row CT images to perform pancreatoduodenectomy safely following dissection of the inferior pancreaticoduodenal artery

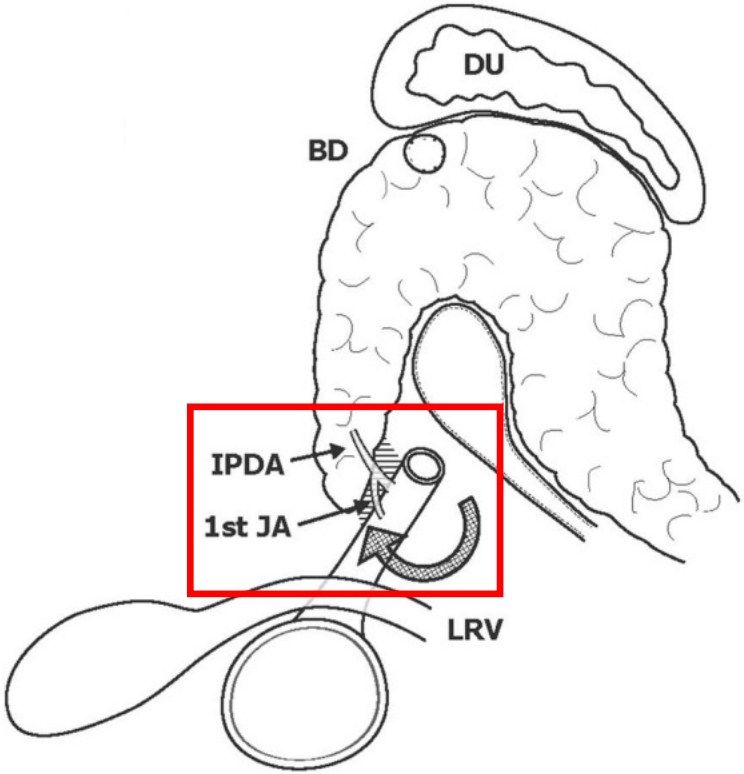
Inferior pancreatoduodenal artery

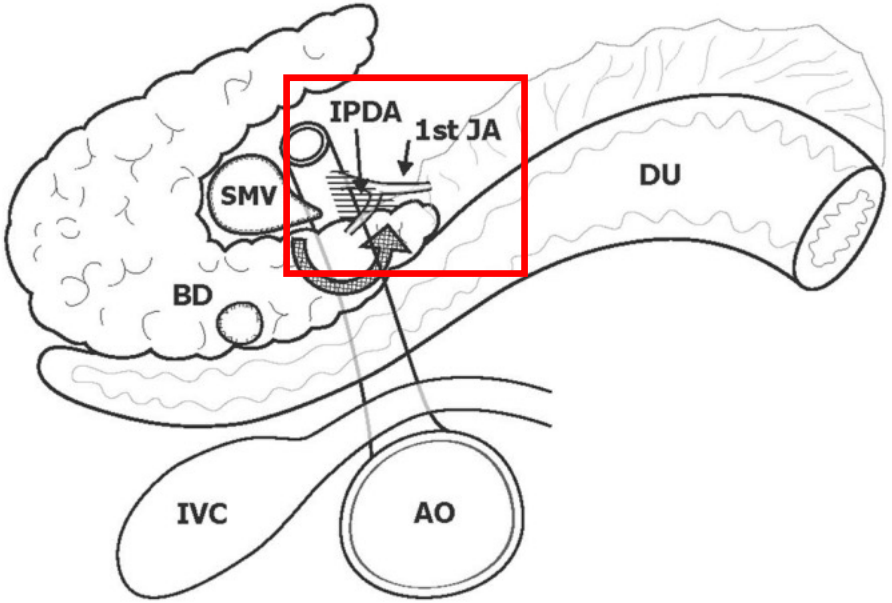




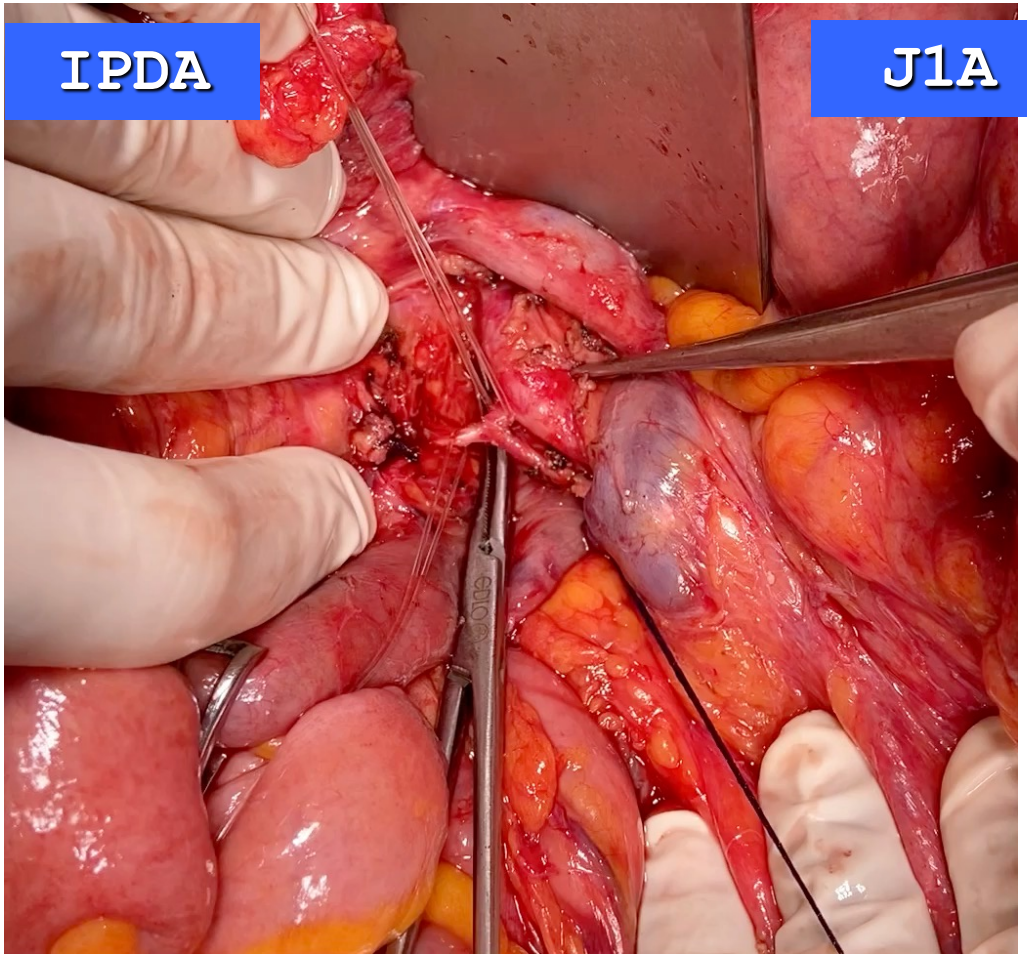
Horiguchi A, et al. J Hepatobiliary Pancreat Sci (2010) 17:523–6



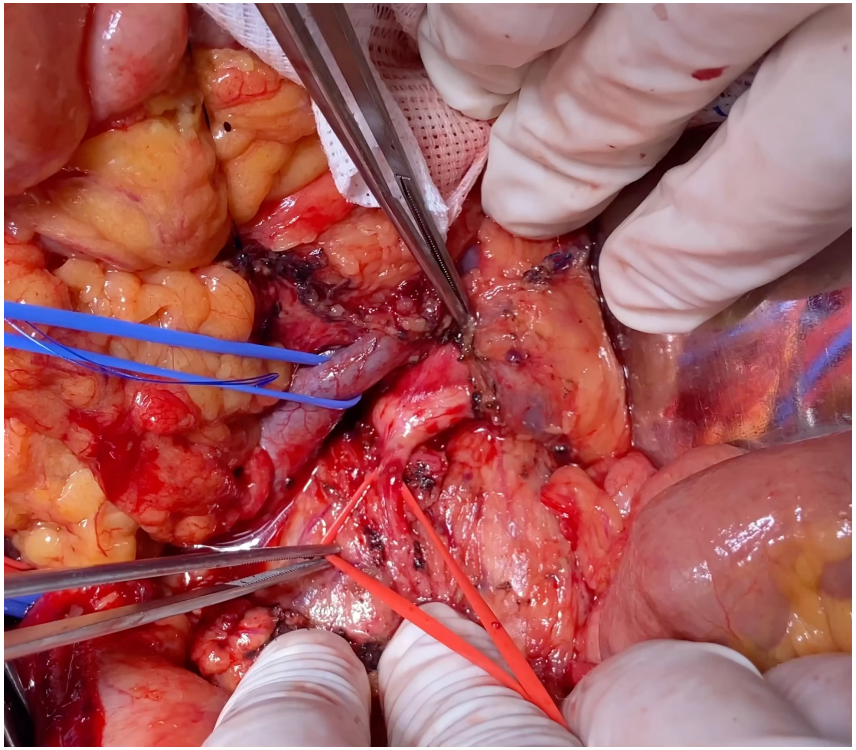




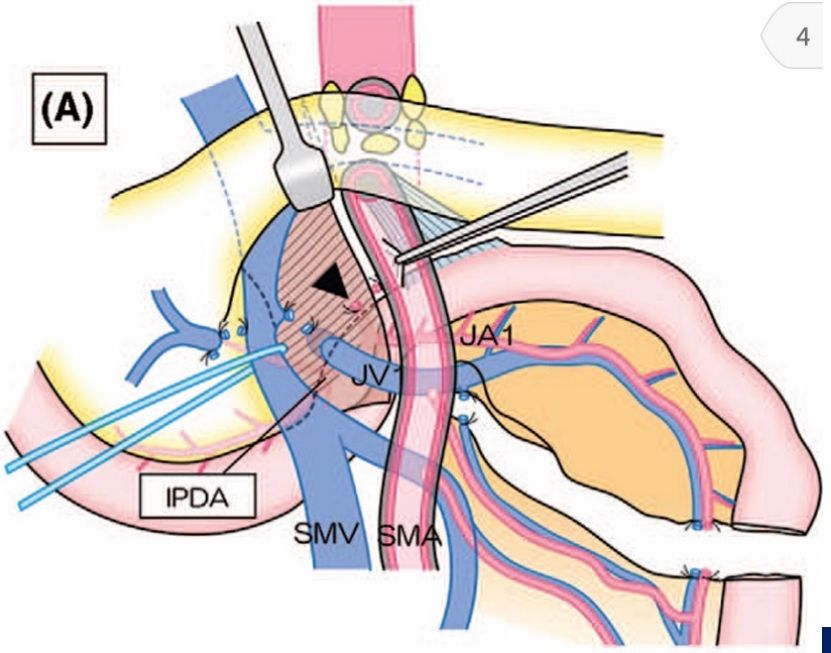
Yamamoto J, et al. Surg Today 2020

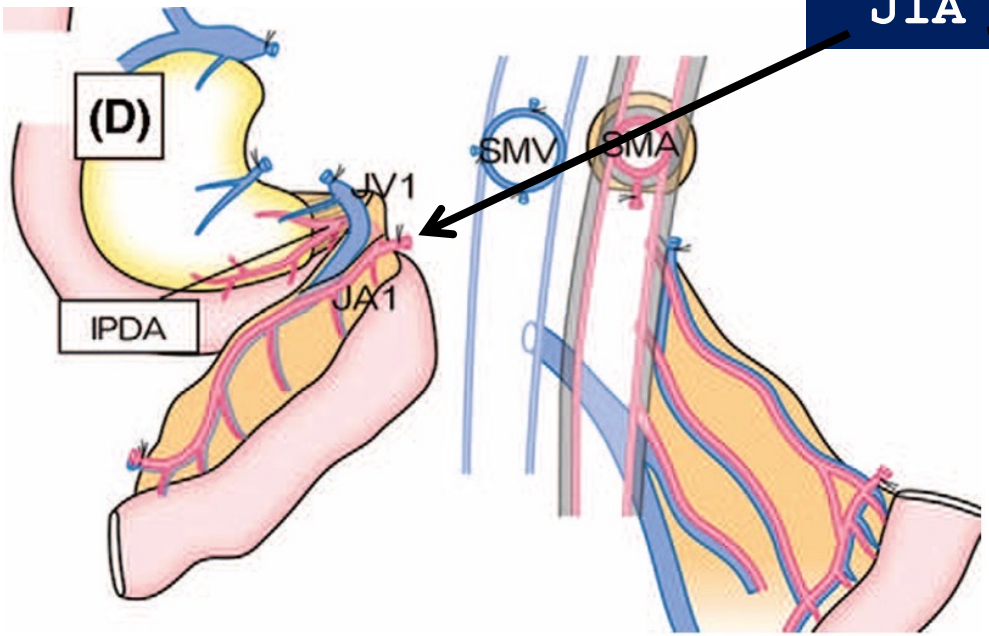


Superior mesenteric artery

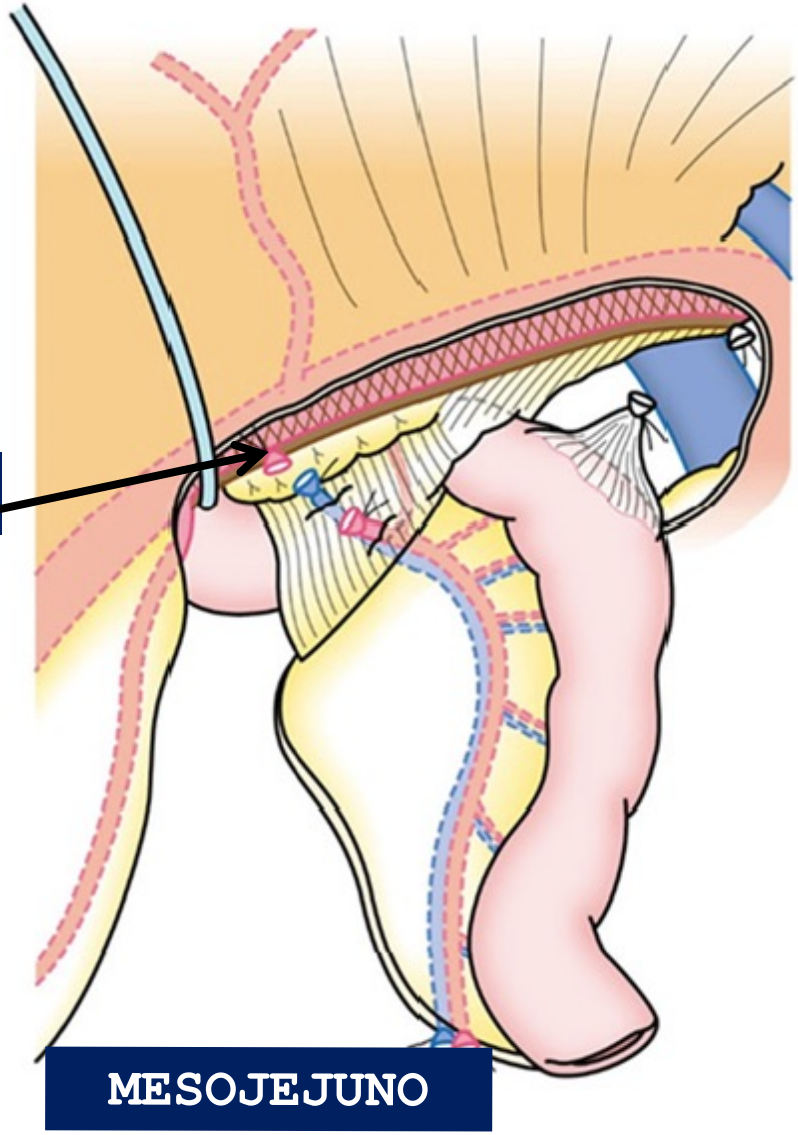


FIRST JEJUNAL ARTERY





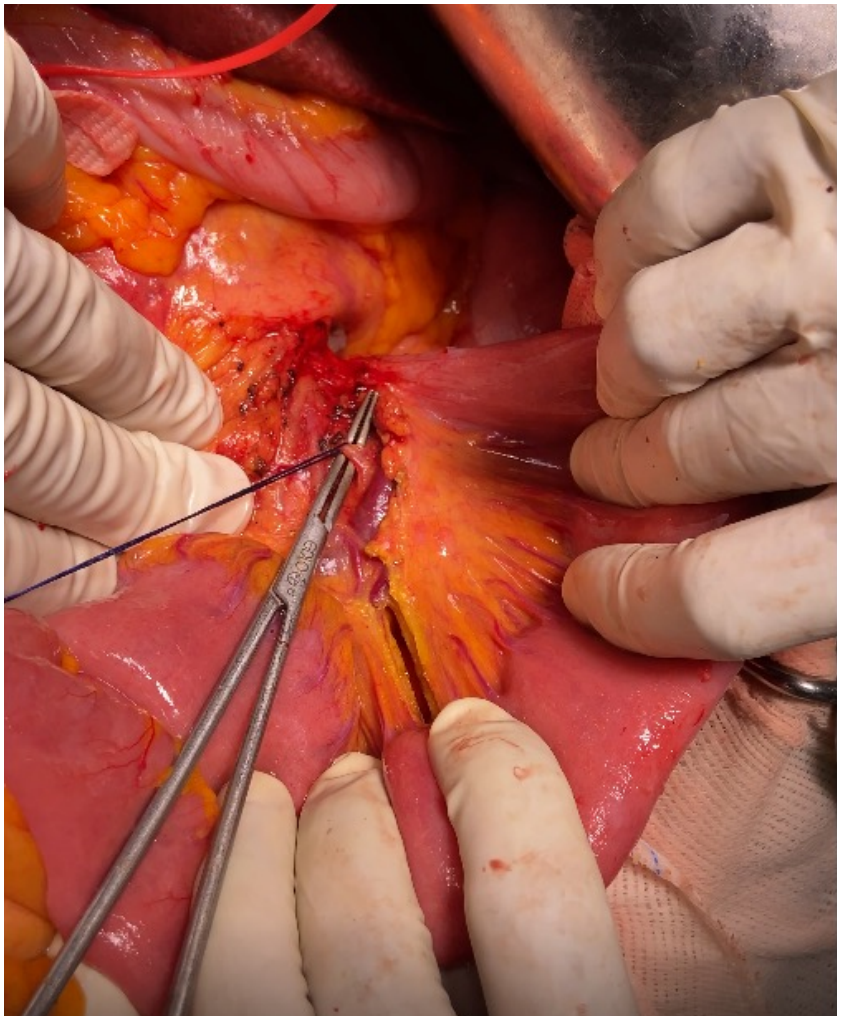
J1A

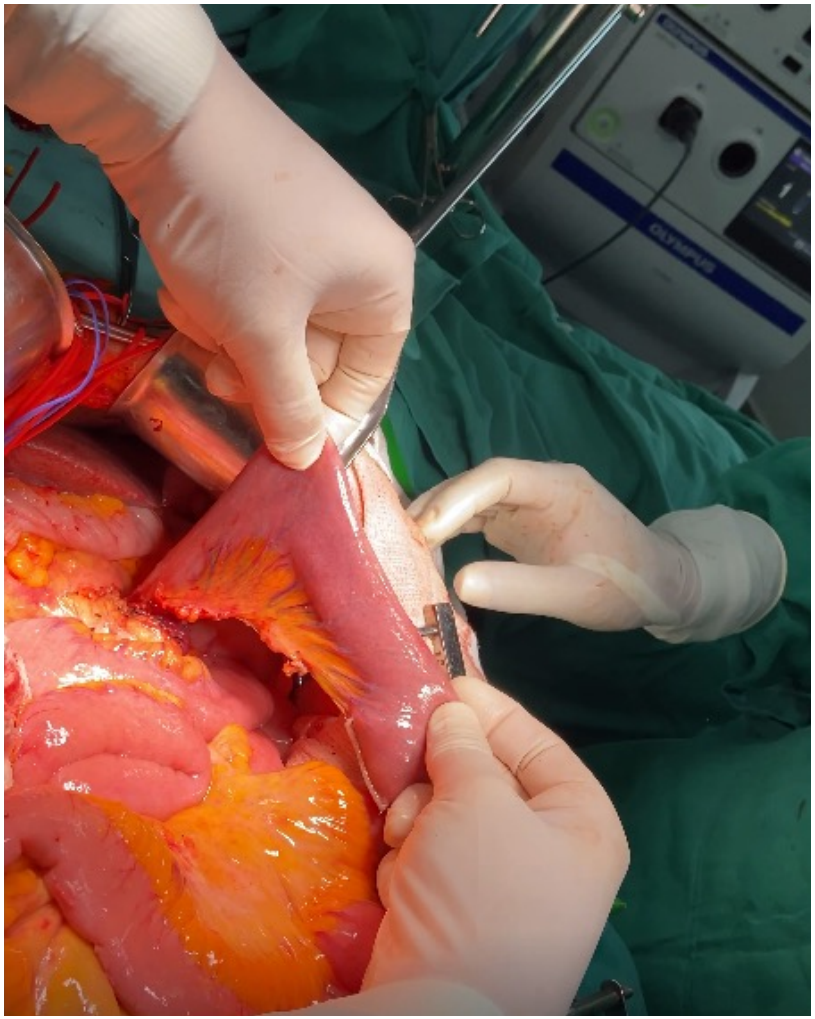


Inoue Y, et al. 2016

FIRST JEJUNAL ARTERY

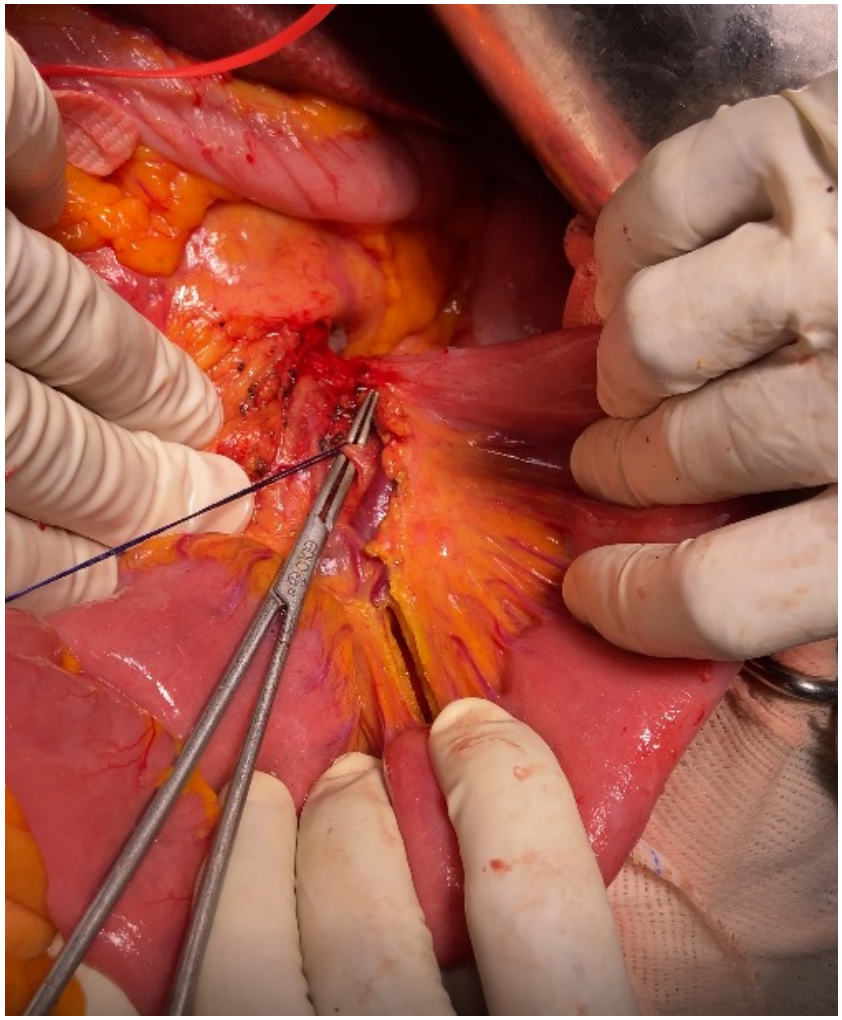
Level 2

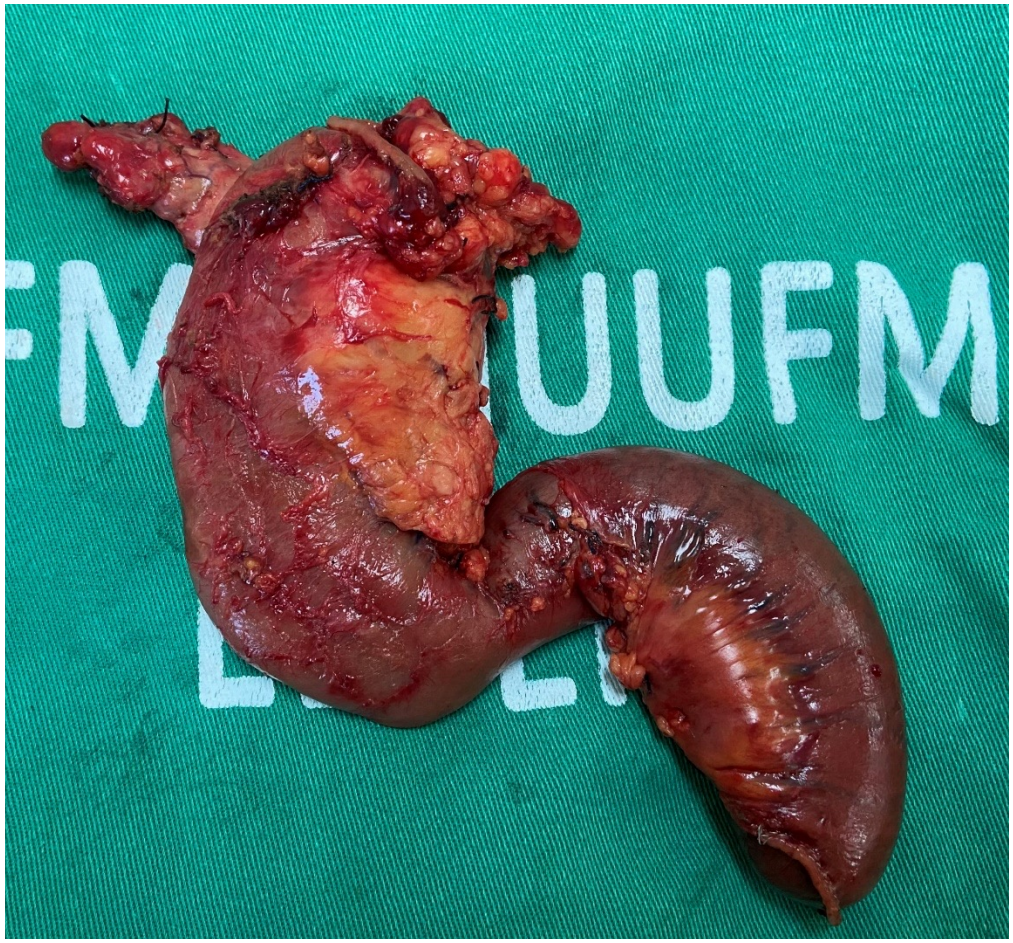




FIRST JEJUNAL ARTERY

Level 2



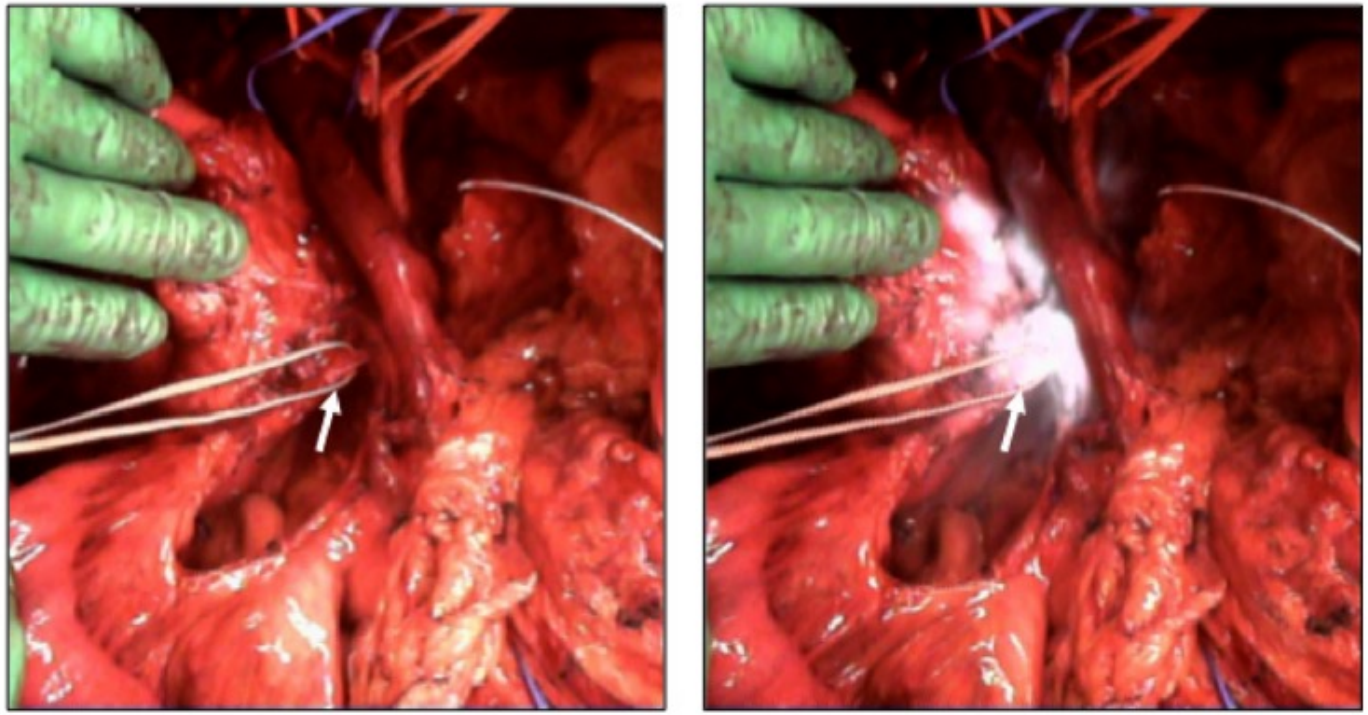


Journal of Gastrointestinal Surgery
https://doi.org/10.1007/s11605-020-04619-1

ORIGINAL ARTICLE

Optimal Lymphadenectomy of the Mesopancreas Based on Fluorescence Imaging During Pancreaticoduodenectomy

Fig. 1 Lymphatic pathways from the pancreatic head. The first JA is taped. Fluorescence is seen in the mesentery of the IPDA and first JA (arrow), but not in that of the second JA or more distant



IPDA

J1A

Matsuki R, et al. J Gastrointest Surg 2020

Journal of Gastrointestinal Surgery
https://doi.org/10.1007/s11605-020-04619-1

ORIGINAL ARTICLE

Optimal Lymphadenectomy of the Mesopancreas Based on Fluorescence Imaging During Pancreaticoduodenectomy

Table 2 Lymphatic pathways around the mesopancreas in the patients injected with ICG

No	Time after injection of ICG (min)	Mesentery along the IPDA-J1A	Mesentery along the J2A	Mesentery along the middle colic artery	Along the SMA	Paraaortic region
1	112	○	×	×	○	○
2	117	○	×	×	○	○
3	145	○	×	×	○	○
4	217	○	×	×	○	○
5	170	○	×	×	○	○
6	246	○	×	×	○	○
7	157	○	×	×	○	○
8	175	×	×	×	○	○
9	280	○	×	×	○	○
10	180	○	×	×	○	○

○: Positive staining
×: Negative staining
ICG indocyanine green, *IPDA* inferior pancreatoduodenal artery, *JA* jejunal artery, *SMA* superior mesenteric artery

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Matsuki R, et al. J Gastrointest Surg 2020

Journal of Gastrointestinal Surgery
https://doi.org/10.1007/s11605-020-04619-1

ORIGINAL ARTICLE

Check for updates

Optimal Lymphadenectomy of the Mesopancreas Based on Fluorescence Imaging During Pancreaticoduodenectomy

Conclusion

Lymphatic flow from the pancreatic head to the SMA and finally to the paraaortic region was mainly via the IPDA and first JA. Excision of the mesopancreas with the IPDA and first JA, while preserving the second JA and more distant arteries, might be optimal for PD with lymphadenectomy for periampullary malignancies.

Matsuki R, et al. J Gastrointest Surg 2020

BMC Cancer

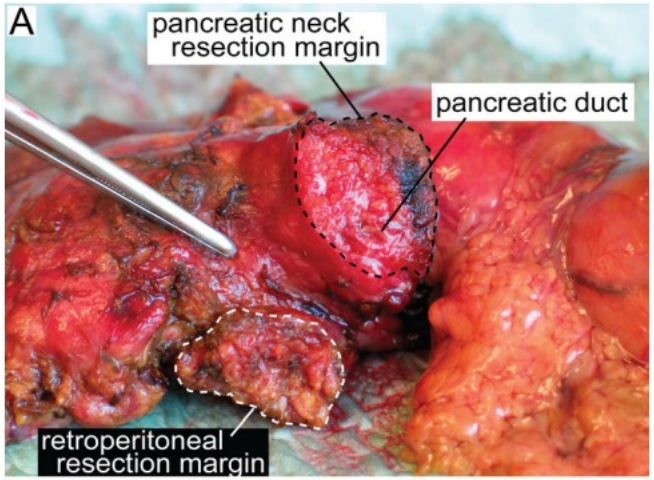
MESOPANCREAS

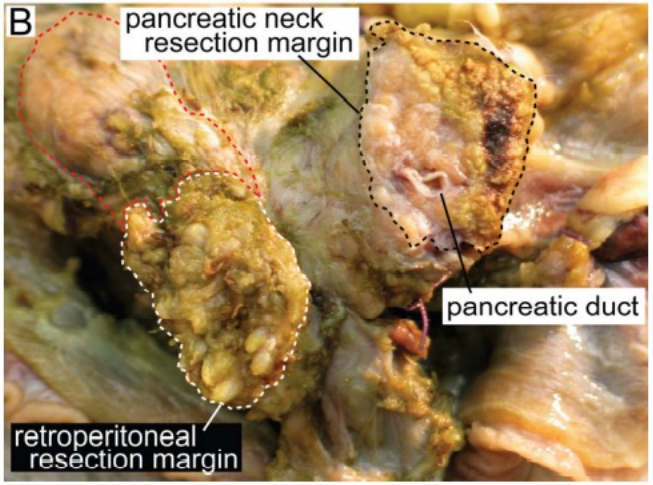
BioMed Central

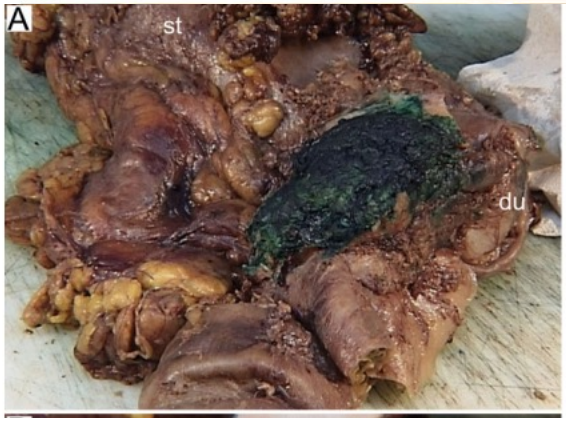
Research article

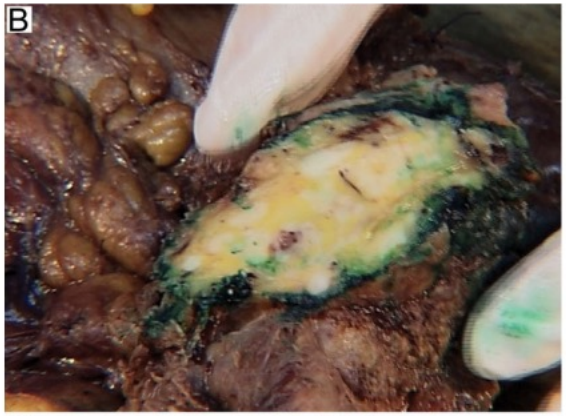
Open Access

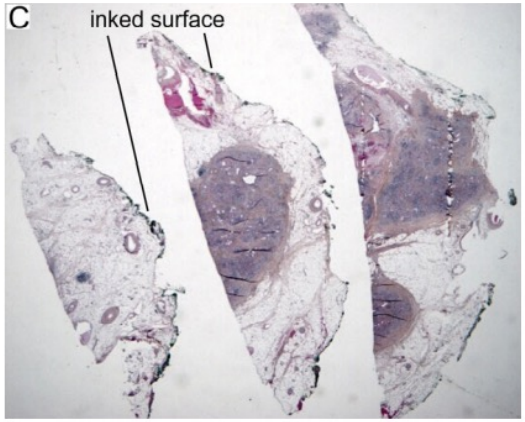
Resectable adenocarcinomas in the pancreatic head: the retroperitoneal resection margin is an independent prognostic factor











Westgaard A, et al. BMC Cancer 2008, 8:5

BMC Cancer

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Research article

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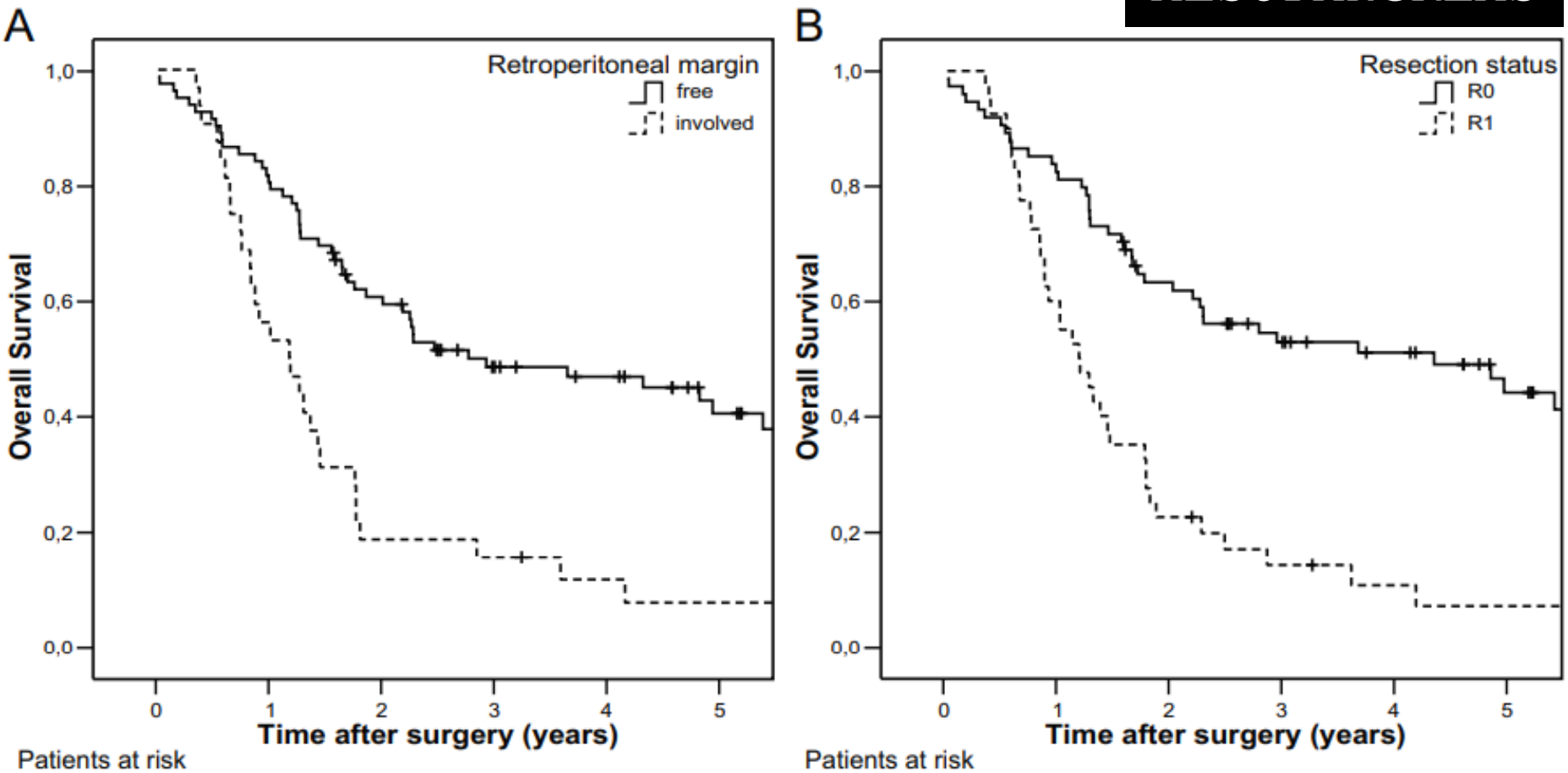
Resectable adenocarcinomas in the pancreatic head: the retroperitoneal resection margin is an independent prognostic factor

MESOPANCREAS



Westgaard A, et al. BMC Cancer 2008, 8:5

https://doi.org/10.1016/j.hpb.2020.01.005 HPB

ORIGINAL ARTICLE

SMA Margin

Recurrence patterns of pancreatic cancer after pancreatoduodenectomy: systematic review and a single-centre retrospective study

Table 3 Patterns of pathologic margin involvement and recurrence of pancreatic cancer after pancreatoduoden

Recurrence	Overall (n = 204)	R0 (clear margins n = 101)	R1 any margin (n = 103)	p-value (R0 vs. R1 overall)	R1 including SMA margin (n = 74)	p-value (R0 vs. R1 incl SMA)
Overall	163 (79%)	72 (71%)	91 (88%)	*0.002*	68 (92%)	*0.001*
Local	109 (53%)	45 (45%)	64 (62%)	*0.012*	49 (66%)	*0.005*
Metastatic disease	106 (52%)	50 (50%)	56 (54%)	*0.487*	41 (55%)	*0.44*
Lymph nodes	25 (12%)	11 (11%)	14 (14%)	–	10 (14%)	–
Peritoneal	23 (11%)	*8 (8%)*	*15 (15%)*	–	12 (16%)	–
Liver	58 (28%)	27 (27%)	31 (30%)	–	23 (31%)	–
Distant metastases	34 (17%)	23 (23%)	11 (11%)	–	10 (14%)	–
Recurrence pattern				*0.013*		*0.004*
No Recurrence	41 (20%)	29 (29%)	12 (12%)	–	6 (8%)	–
Only local	56 (28%)	22 (22%)	34 (33%)	–	27 (37%)	–
Only metastases	53 (26%)	27 (27%)	26 (25%)	–	19 (26%)	–
Simultaneous	54 (26%)	23 (23%)	31 (30%)	–	22 (30%)	–
Timing of recurrence				*0.009*		*0.003*
≤18 months	123 (60%)	53 (53%)	69 (67%)	–	52 (70%)	–
>18 months	40 (20%)	19 (19%)	22 (21%)	–	16 (22%)	–

Kalisvaart M, et al. HPB 2020

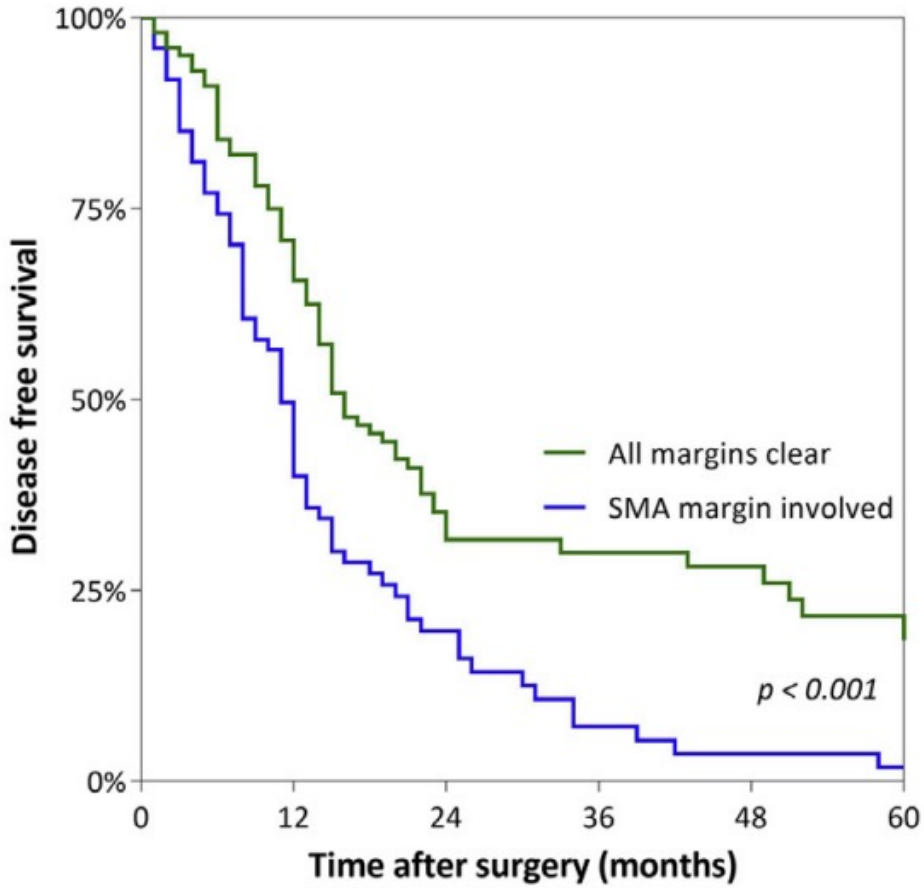
https://doi.org/10.1016/j.hpb.2020.01.005 HPB

Superior mesenteric artery

ORIGINAL ARTICLE

Recurrence patterns of pancreatic cancer after pancreatoduodenectomy: systematic review and a single-centre retrospective study

d - SMA margin clearance & disease free survival



SMA Margin

Kalisvaart M, et al. HPB 2020

https://doi.org/10.1016/j.hpb.2020.01.005 HPB

SMA Margin

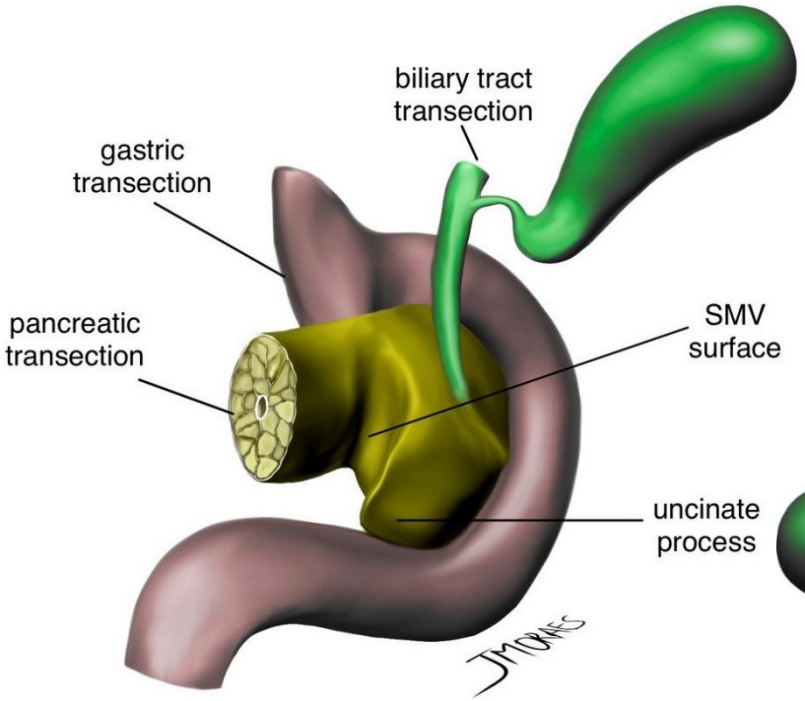
ORIGINAL ARTICLE

Recurrence patterns of pancreatic cancer after pancreatoduodenectomy: systematic review and a single-centre retrospective study

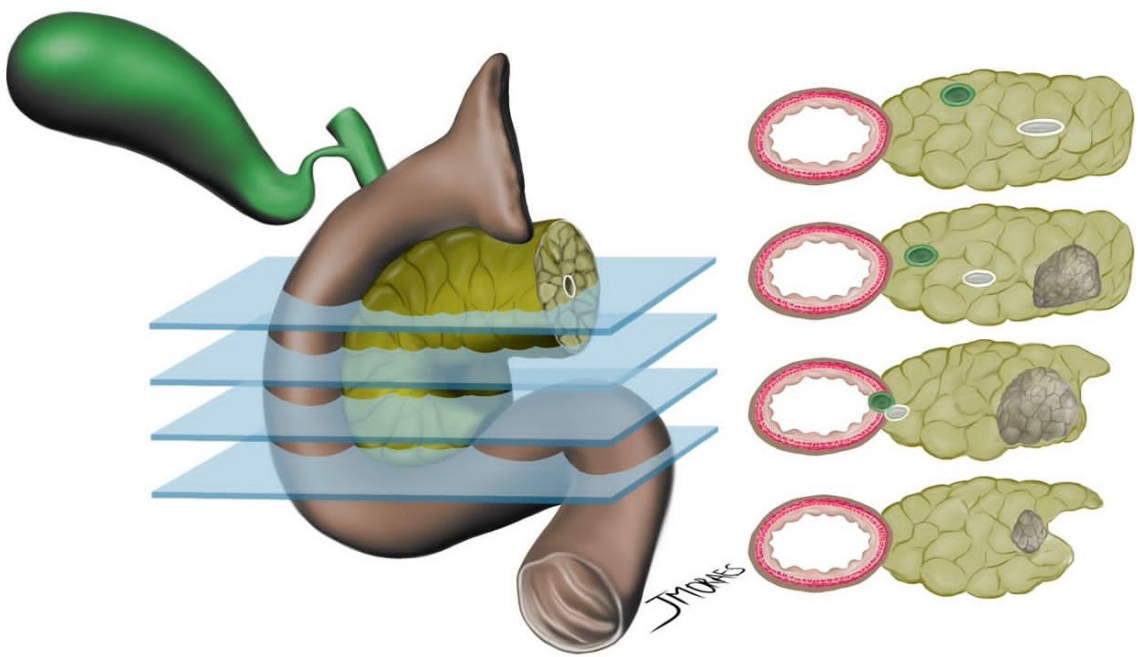
Conclusion: Local recurrence of pancreatic cancer is common and associated with similar mortality rates as those who present with simultaneous or metastatic recurrence. Involvement of the SMA margin is an independent predictor for disease progression and should be the target of future adjuvant local therapies.

Kalisvaart M, et al. HPB 2020

MARGEN



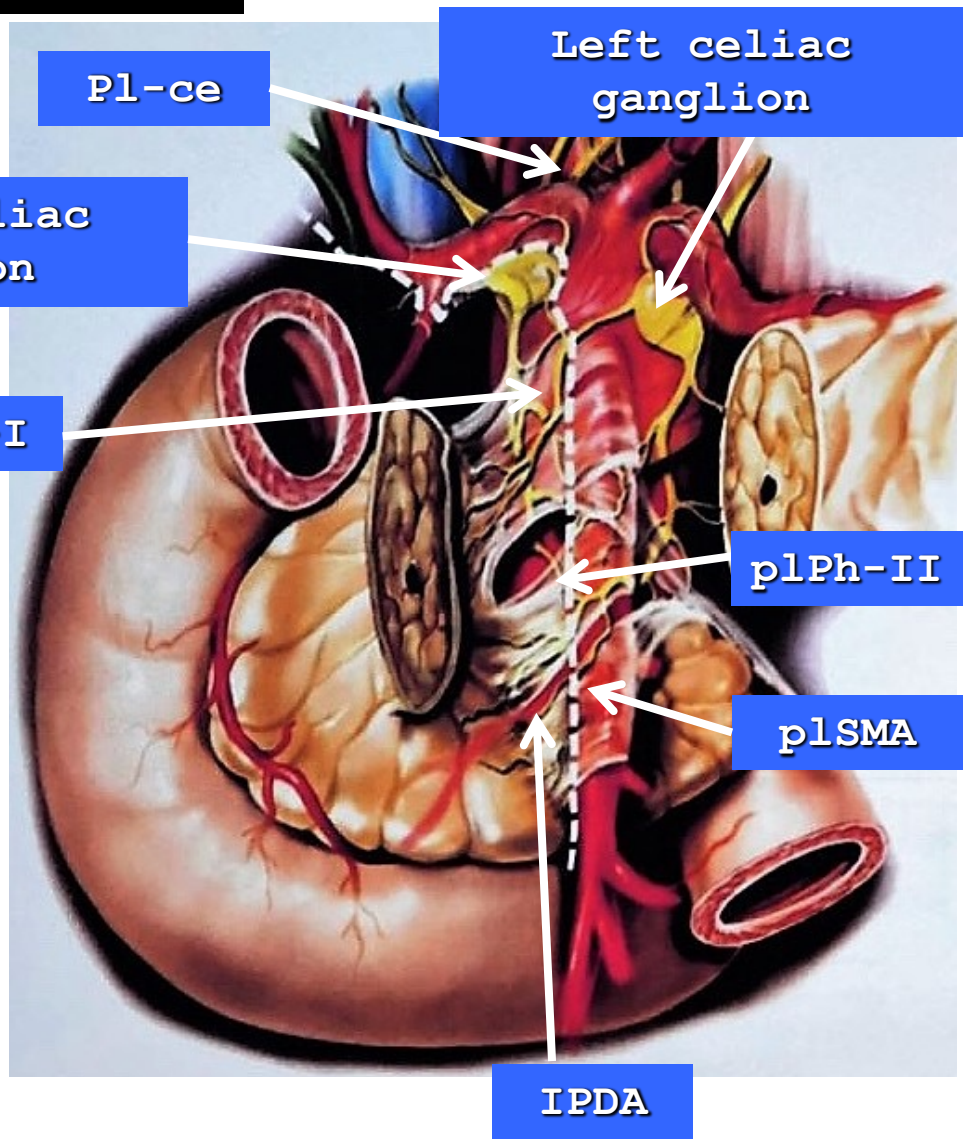
PATOLOGY



Fernandes ESM, et al. Langenbeck's Arch Surg 2021

TOTAL MESOPANCREAS EXCISION

- Bleeding
- Pancreatic fistula
- Delayed gastric emptying
- Oncology



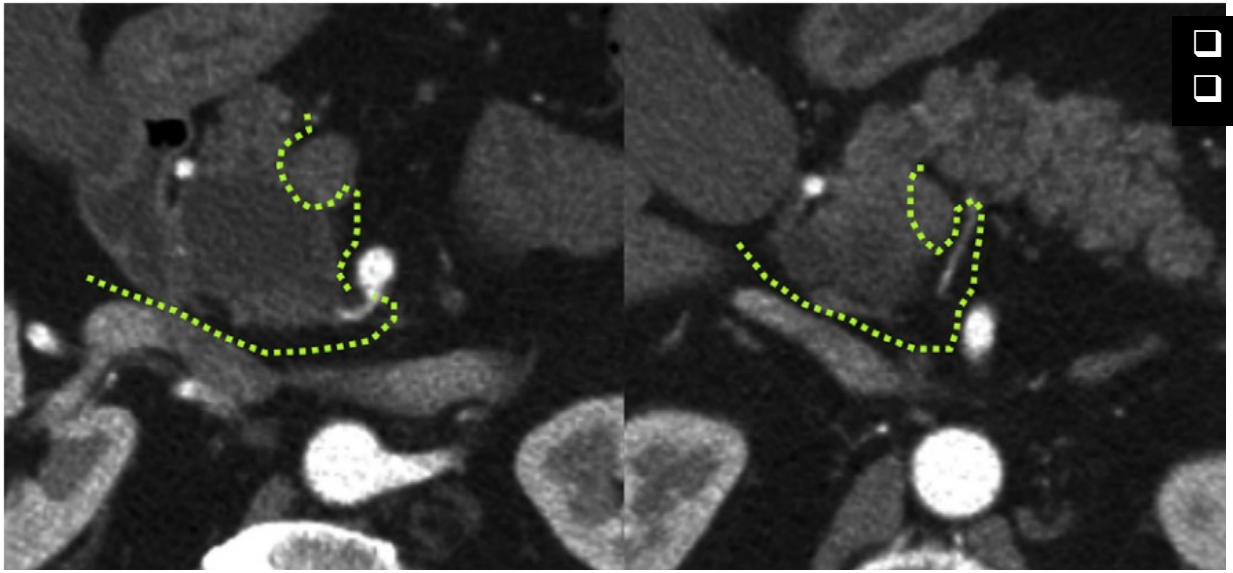
MESOPANCREAS

- plPh-I
- plPh-II
- IPDA inferior
- Jejunal arteries
- Jejunal veins
- Lymph nodes

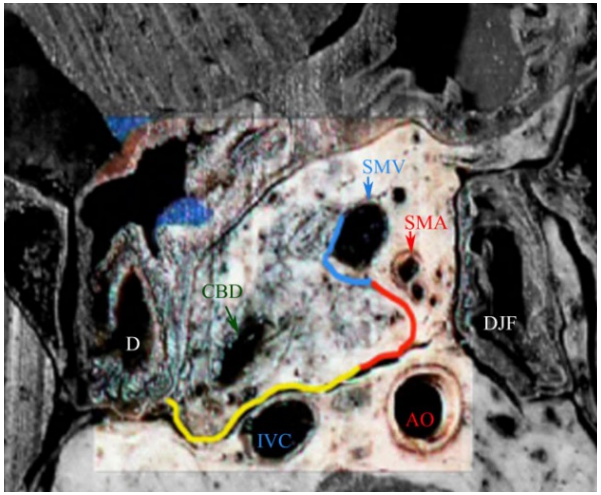
MESOPANCREAS

- **Medial:** right side of SMA and SMV/PV
- **Lateral:** pancreatic head and uncinate process
- **Proximal (cephalic):** celiac axis
- **Distal (caudal):** mesenteric root
- **Posterior:** left renal vein

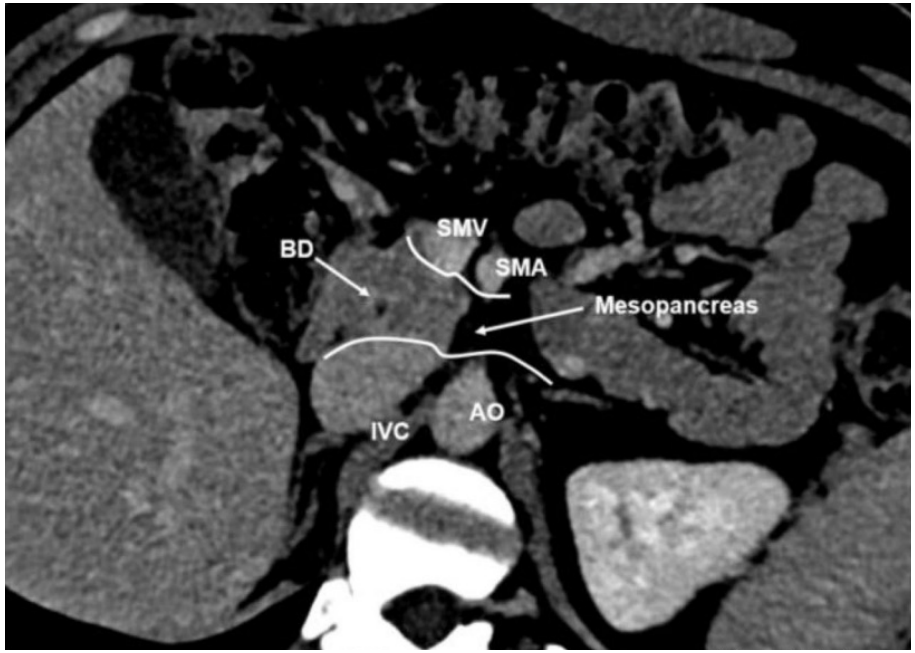
- Superior mesenteric artery
- IPDA



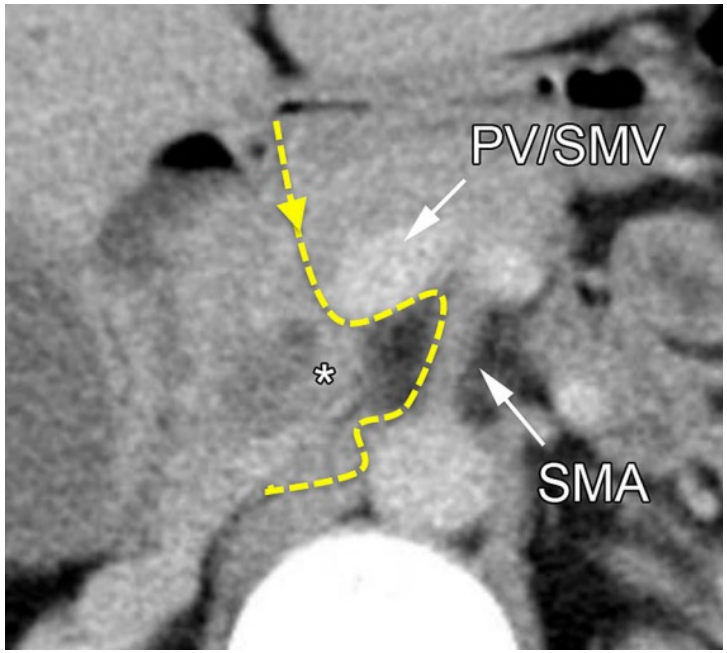
Adham M, et al. 2012



Delpero JR, et al. HPB 2014;16:20-33



Fernandes ESM, et al. Langenbeck's Arch Surg 2021

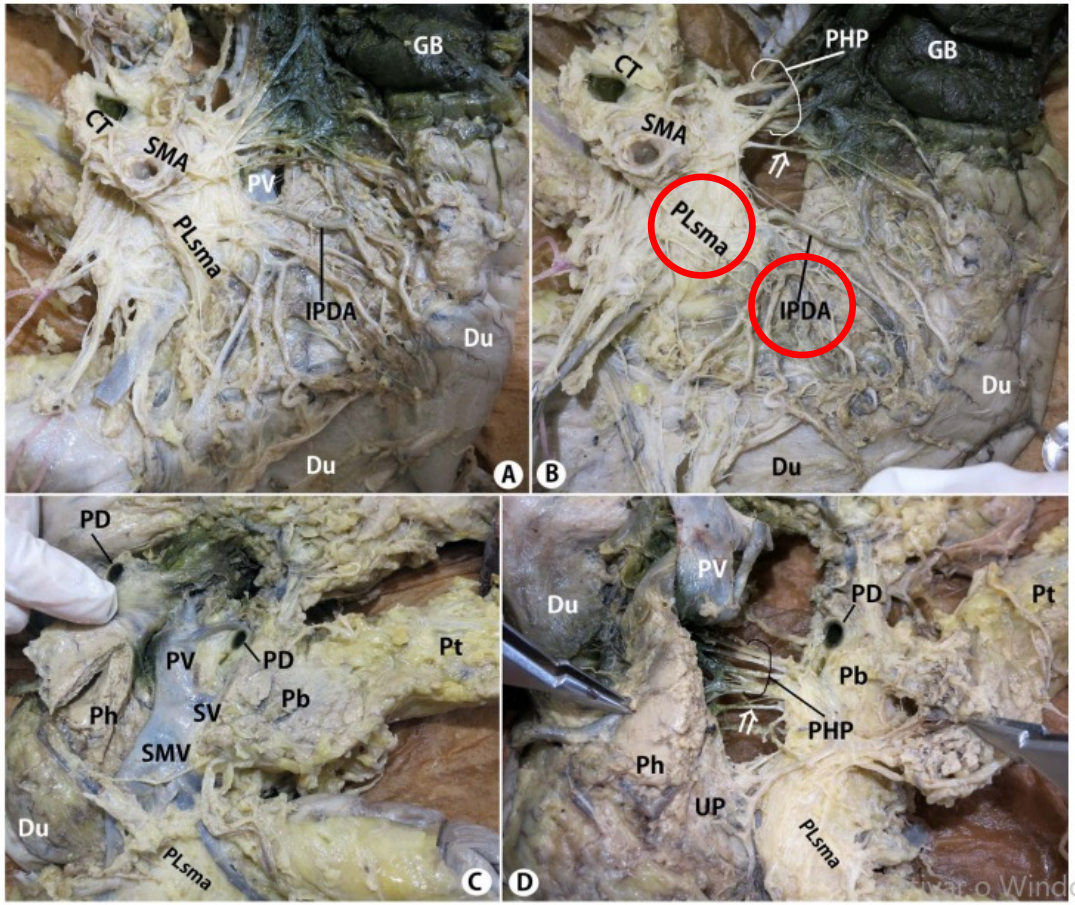


Welsch T, et al. J Surg Oncol 2016

Surgical and Radiologic Anatomy (2020) 42:1501–1508
https://doi.org/10.1007/s00276-020-02547-y

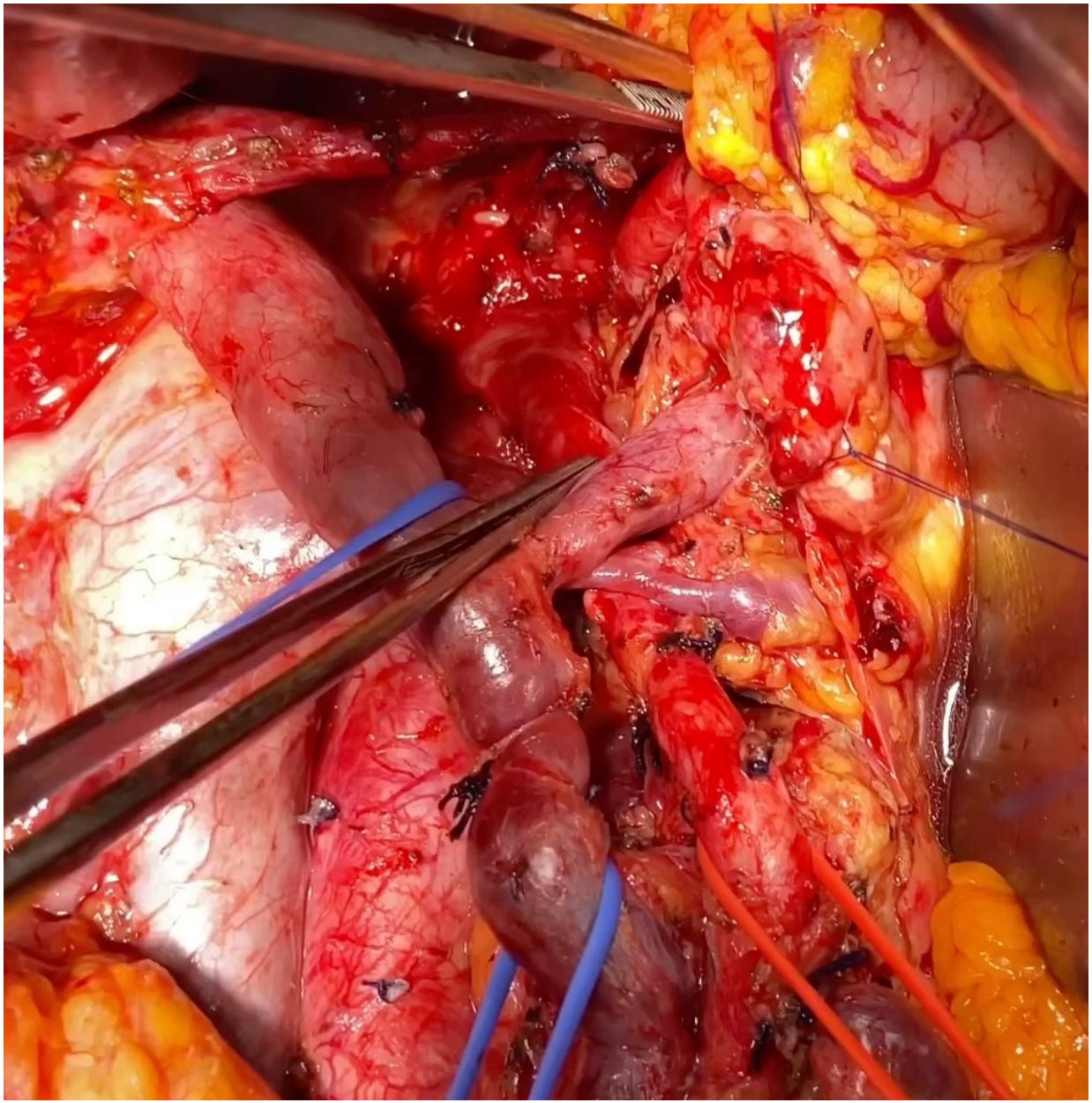
ORIGINAL ARTICLE

The mesopancreas and pancreatic head plexus: morphological, developmental, and clinical perspectives

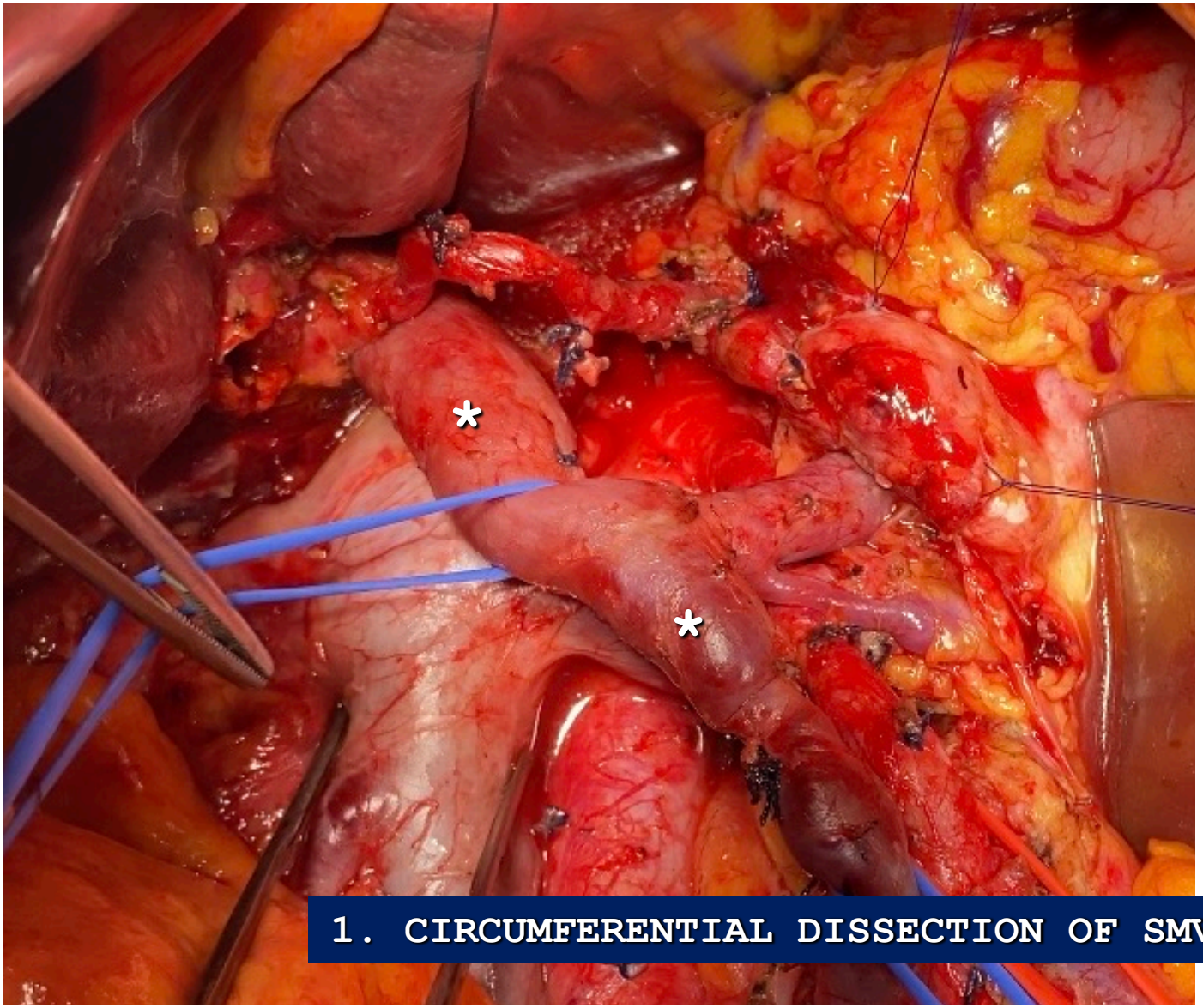


PLph I
PLph II
PLsma

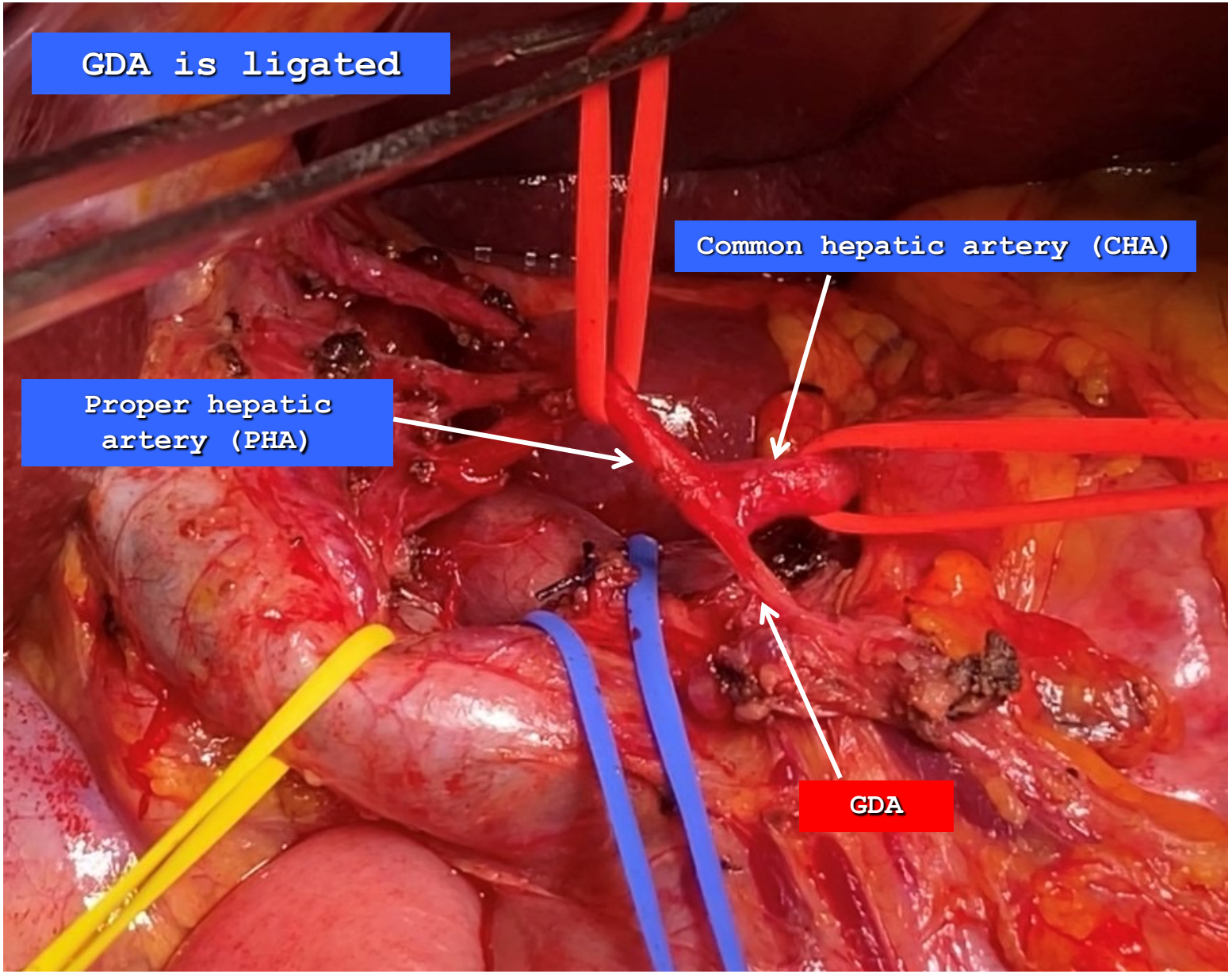
Yi SQ, et al. Surg Radiol Anat 2020



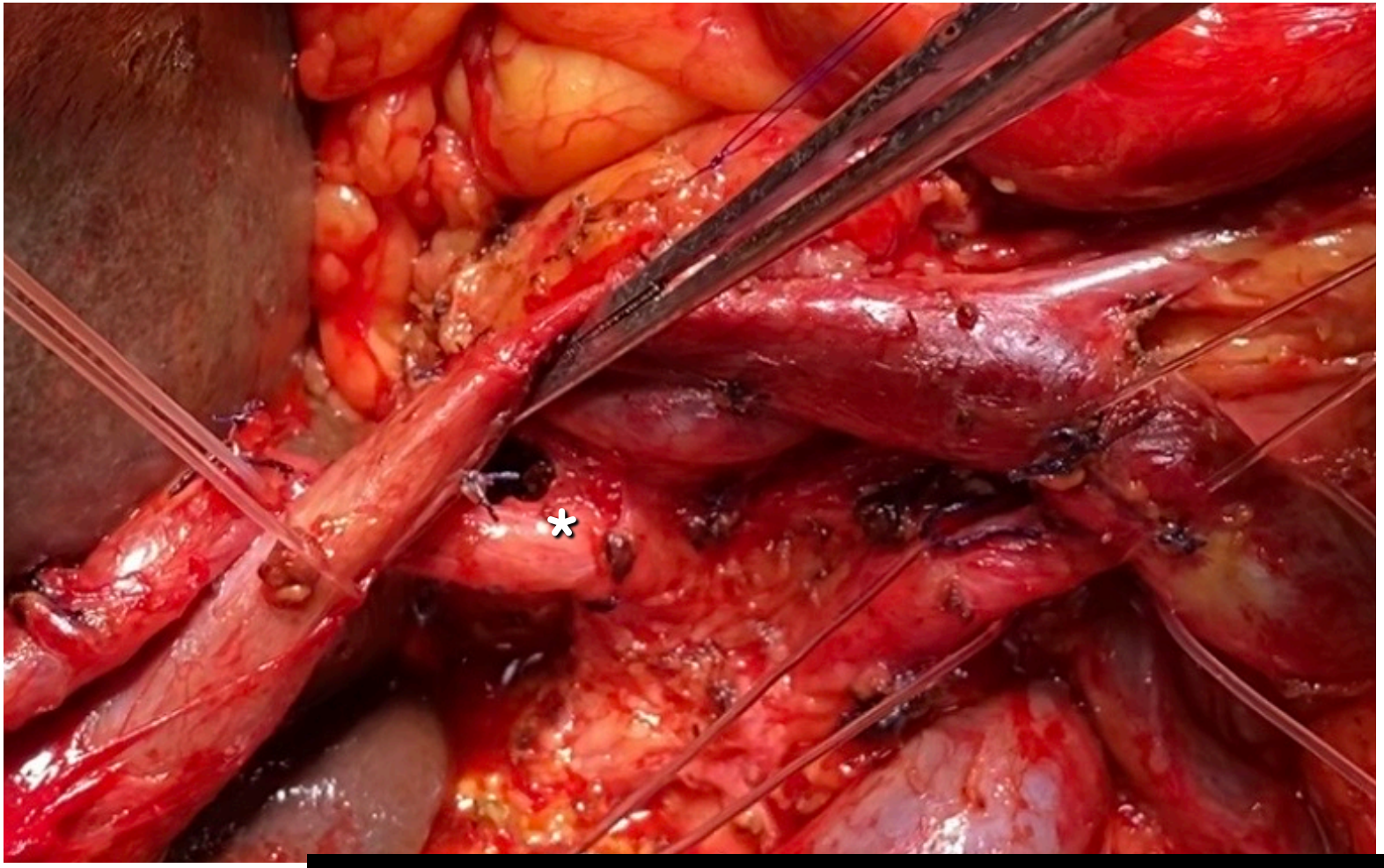
TOTAL MESOPANCREAS EXCISION



1. CIRCUMFERENTIAL DISSECTION OF SMV/PV

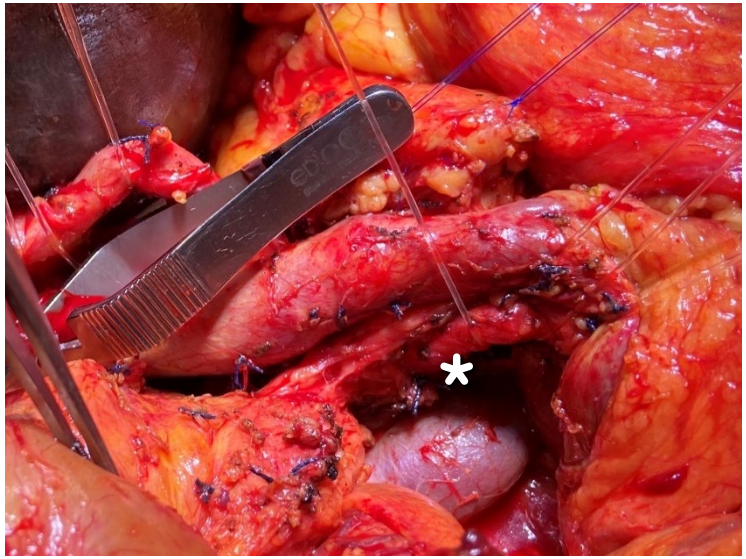

GDA is ligated
Common hepatic artery (CHA)
Proper hepatic artery (PHA)
GDA

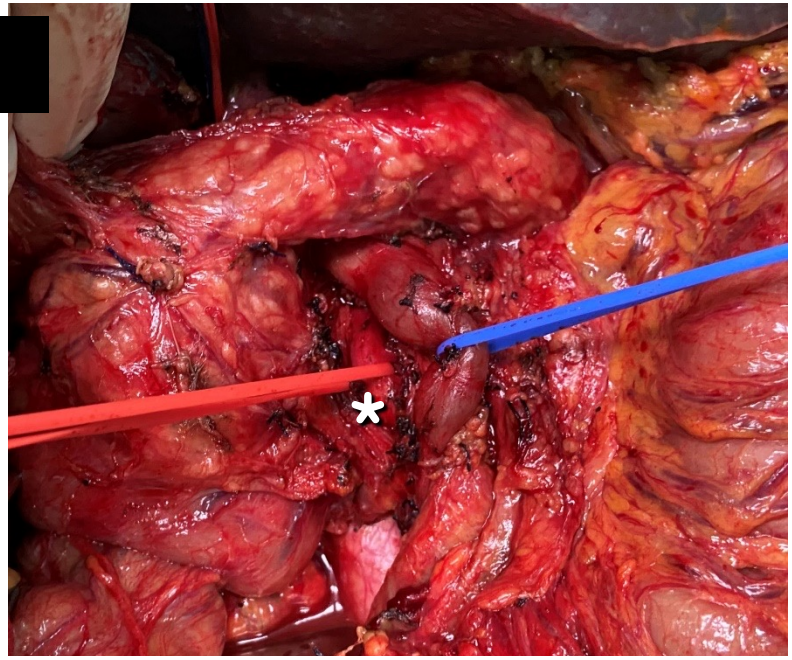
TOTAL MESOPANCREAS EXCISION

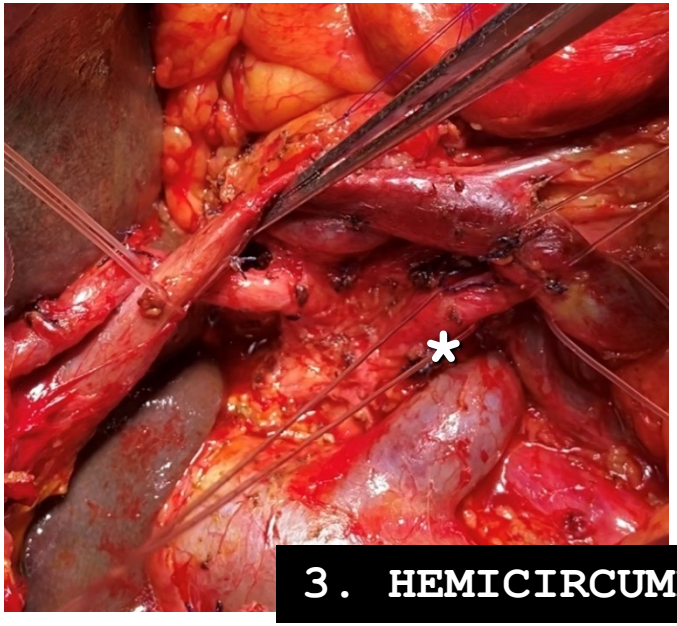


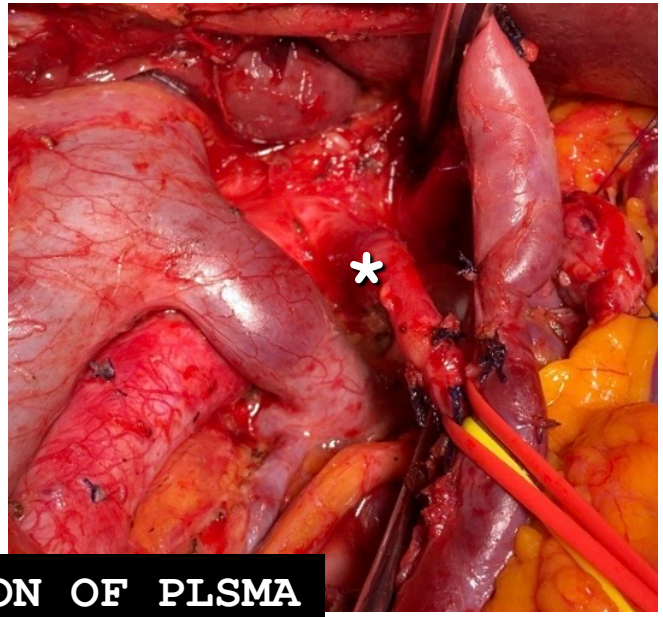
2. HEMICIRCUMFERENTIAL DISSECTION OF CHA

TOTAL MESOPANCREAS EXCISION





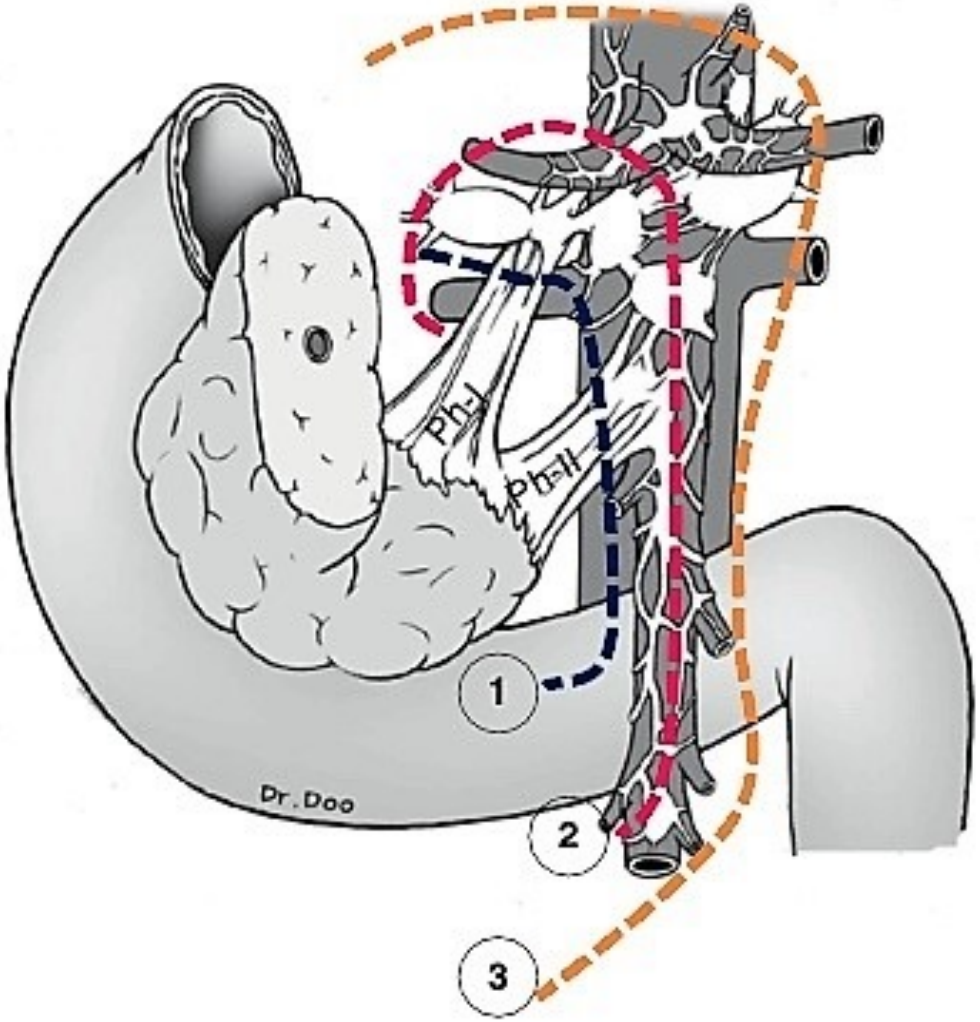


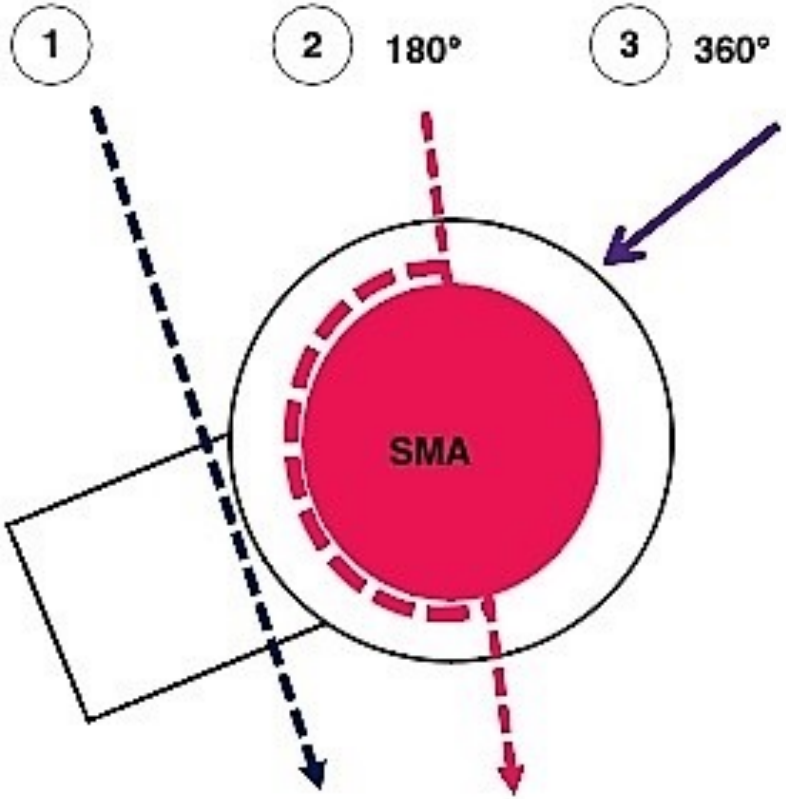


3. HEMICIRCUMFERENTIAL DISSECTION OF PLSMA

Mesopancreas

Level 2





OXFORD

BJS, 2021, **108**, 777–785
DOI: 10.1093/bjs/znab133
Advance Access Publication Date: 27 May 2021
Review Article

Technical advances in surgery for pancreatic cancer

M. Schneider[1], T. Hackert [1], O. Strobel[2] and M.W. Büchler[1,*]

State-of-the-art dissection techniques in pancreatic ductal adenocarcinoma

To achieve tumour-free resection margins, state-of-the-art dissection aims to systematically clear tumour-infiltrated soft tissue alongside the coeliac and superior mesenteric vessels in PDAC situated in the pancreatic head

Schneider M, et al. Br J Surg 2021;108:777-85

OXFORD

BJS, 2021, **108**, 777–785
DOI: 10.1093/bjs/znab133
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Review Article

Technical advances in surgery for pancreatic cancer

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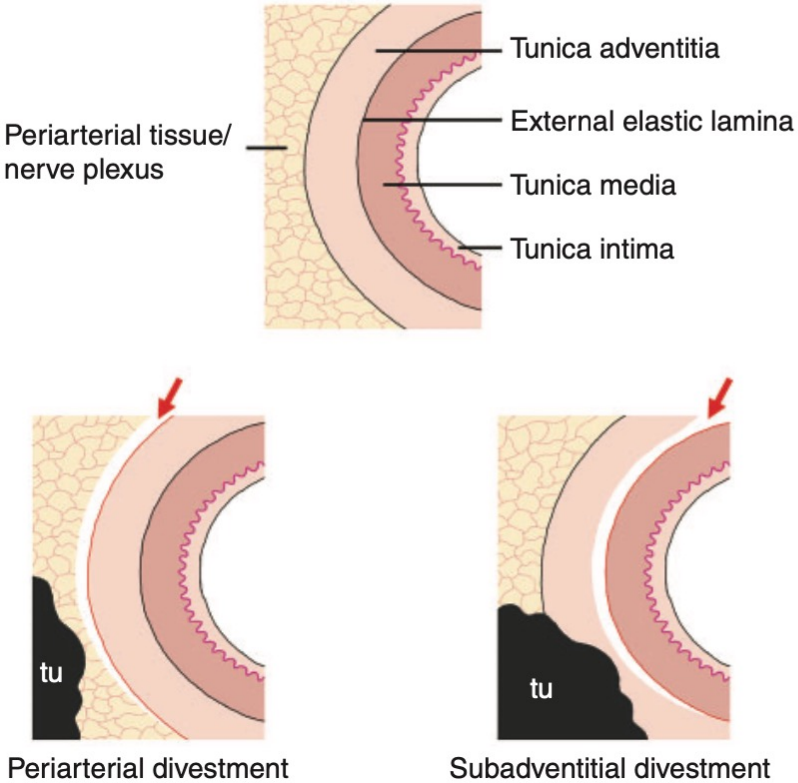
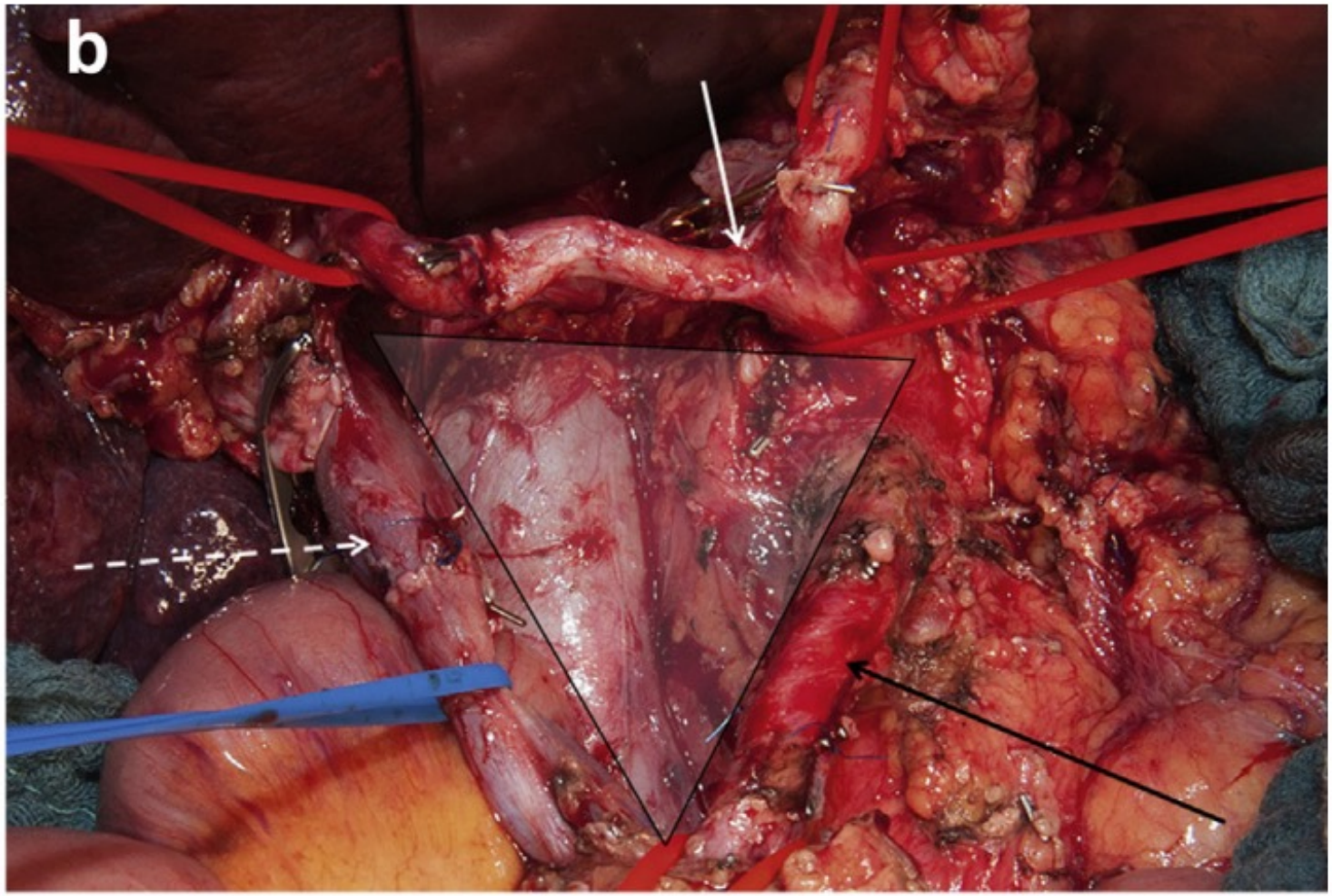


Schneider M, et al. Br J Surg 2021;108:777-85

http://dx.doi.org/10.1016/j.hpb.2017.07.007 HPB

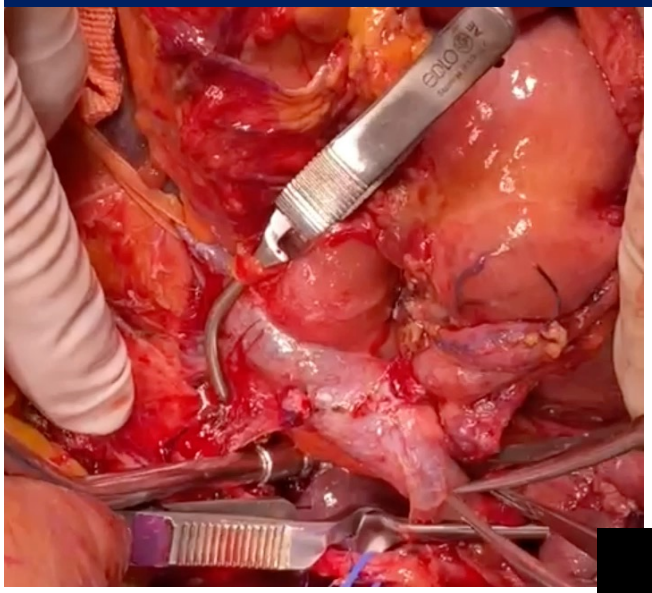
ORIGINAL ARTICLE

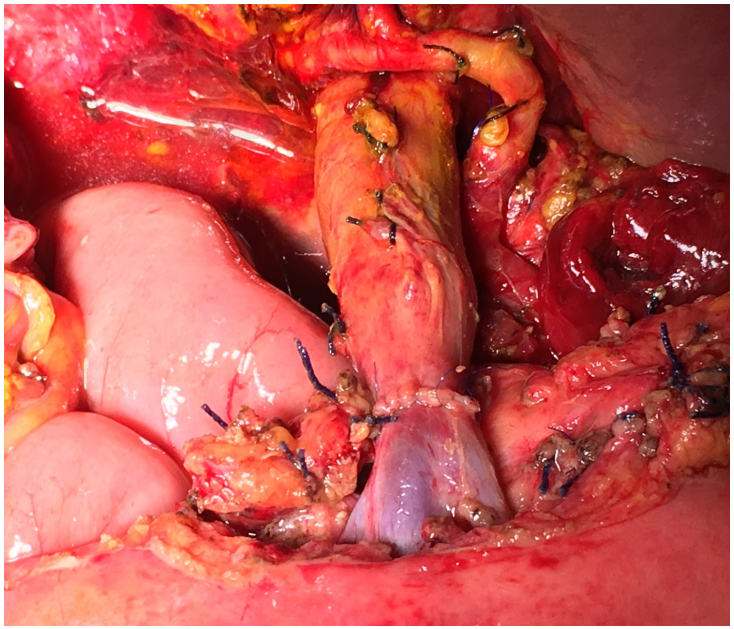
The TRIANGLE operation – radical surgery after neoadjuvant treatment for advanced pancreatic cancer: a single arm observational study



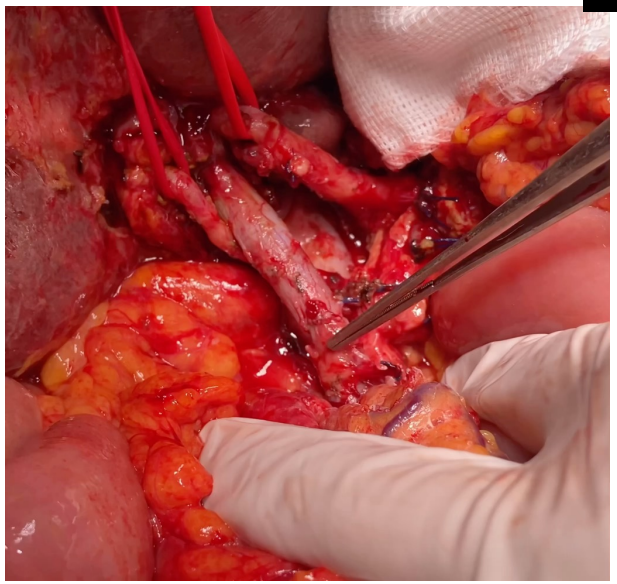
Hackert T, et al. HPB 2017

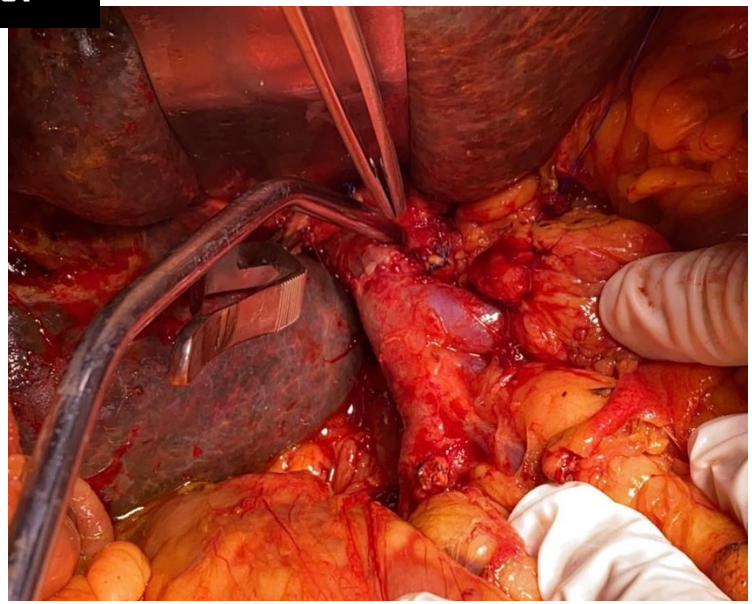
VASCULAR RESECTION





VENOUS RESECTION





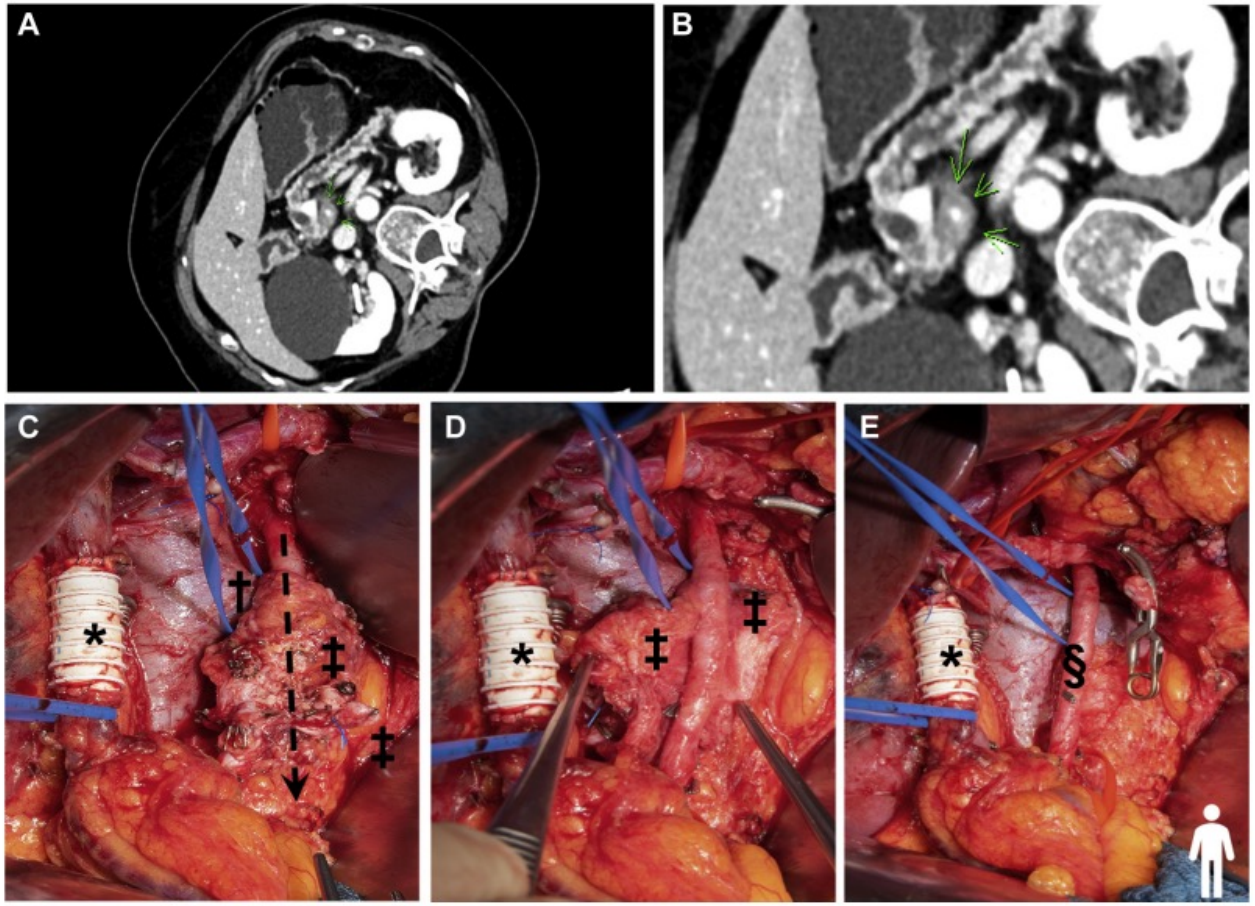
Contents lists available at ScienceDirect

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],



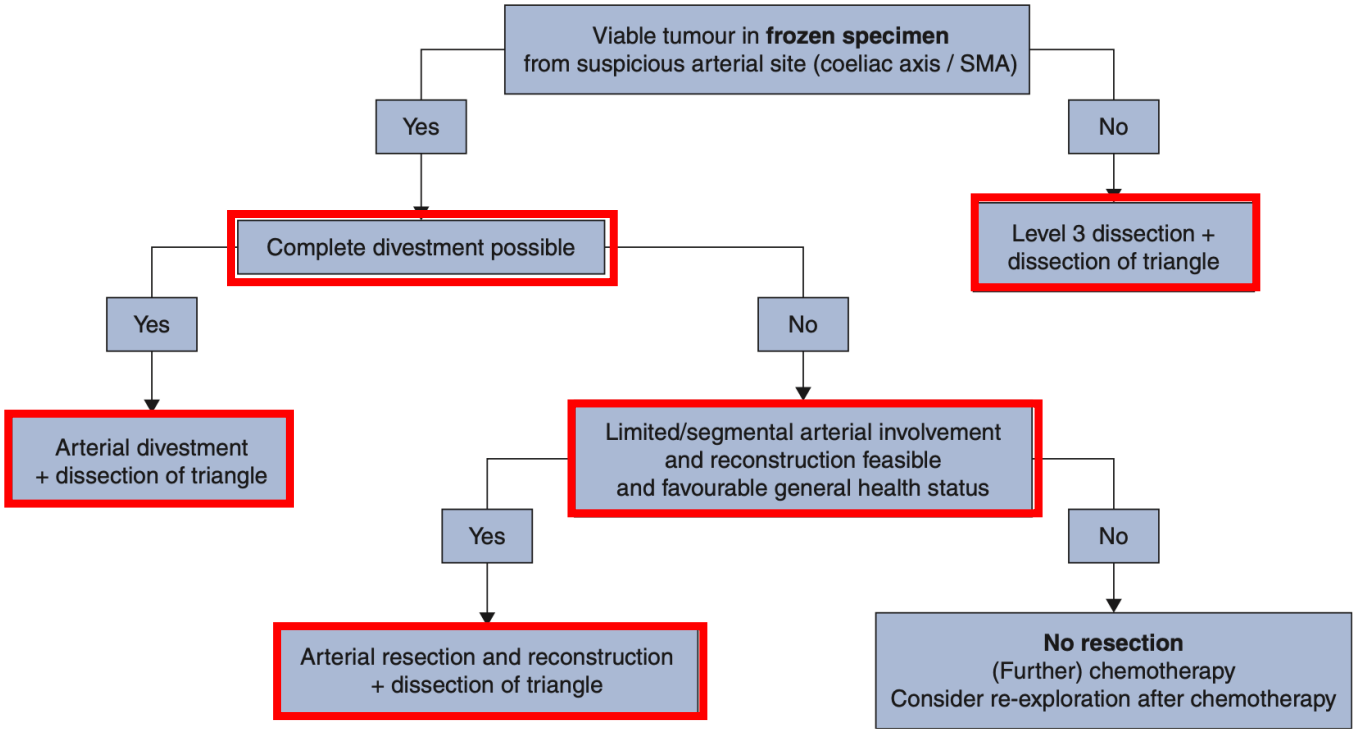
Diener MK, et al. Surgery 2020

OXFORD

BJS, 2021, **108**, 777–785
DOI: 10.1093/bjs/znab133
Advance Access Publication Date: 27 May 2021
Review Article

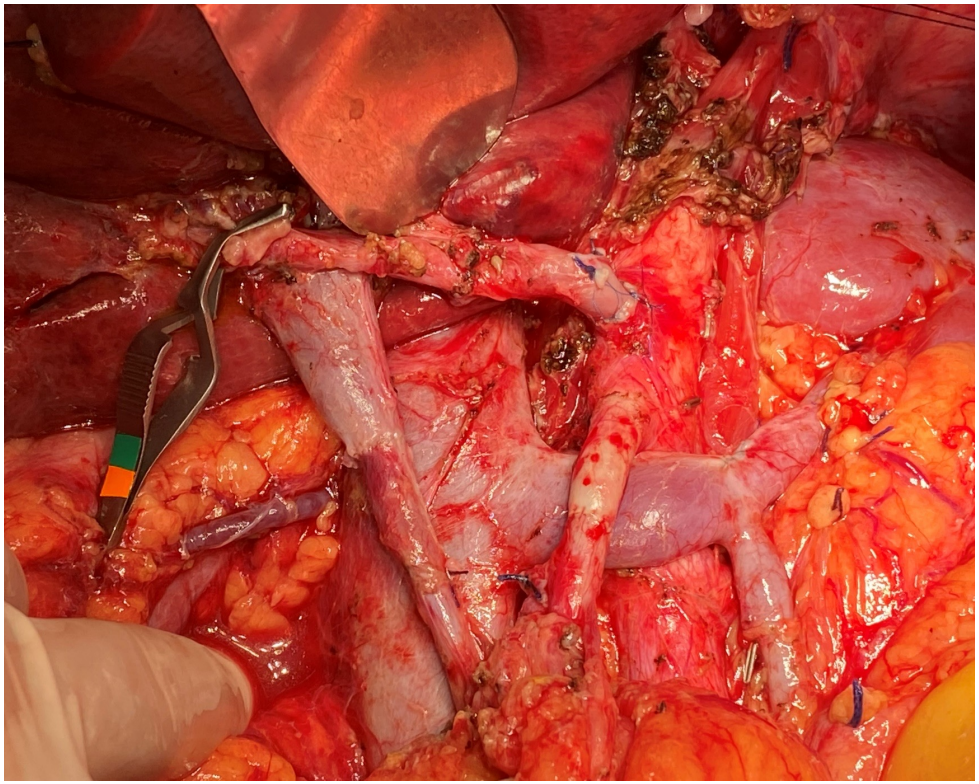
Technical advances in surgery for pancreatic cancer

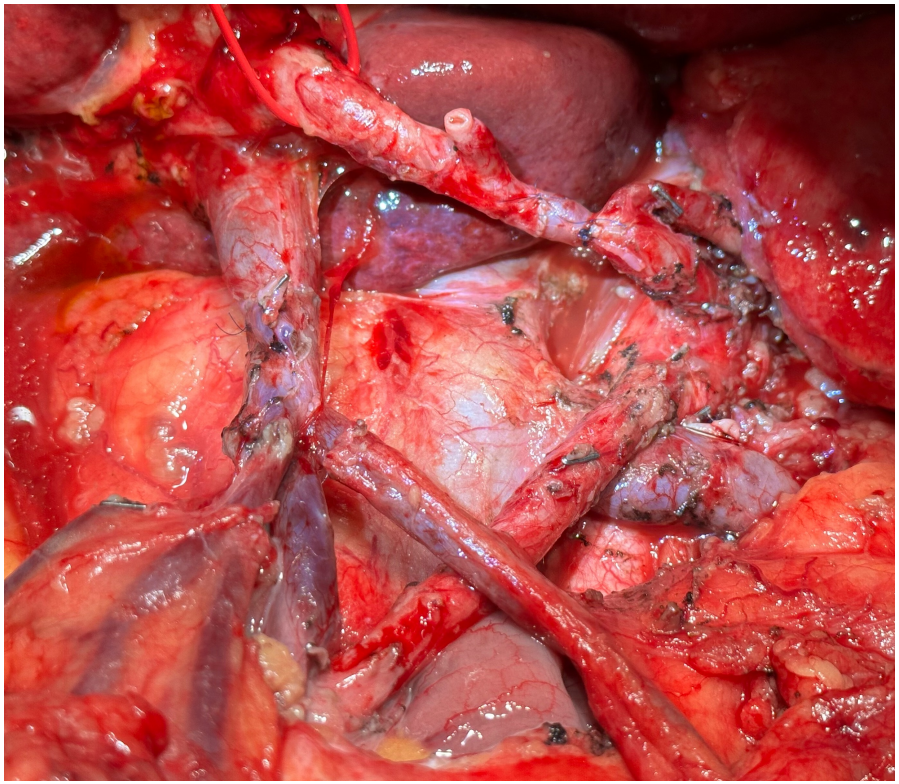
M. Schneider[1], T. Hackert [1], O. Strobel[2] and M.W. Büchler[1,*]



Schneider M, et al. Br J Surg 2021;108:777-85

VASCULAR RESECTION





ARTERIAL RESECTION

Fernandes ES, et al. Arq Bras Cir Dig 2022

Received: 14 April 2019 | Revised: 18 May 2019 | Accepted: 6 June 2019

DOI: 10.1002/ags3.12273

REVIEW ARTICLE

AGSurg Annals of Gastroenterological Surgery Open Access WILEY

Local radicality and survival outcome of pancreatic cancer surgery

Willem Niesen | Thomas Hank | Markus Büchler | Oliver Strobel

Study	Type of study	Patients included	Type of surgery	R-definition	R0/R1 rate, absolute (%)	Years	Median survival	5-year survival rate	Adjuvant (chemo-) therapy
Uesaka 2016[4] JASPAC 01	RCT	385	257 (68%): PD 116 (13%): DP 4 (19%): TP	0-mm rule	R0 > 0 mm: 49 (13%) R1 0 mm: 328 (87%)	2007-2010			Yes: 98.7%
		190 GEM	136 (72%): PD 50 (26%): DP 4 (2%): TP		R0 > 0 mm: 26 (14%) R1 0 mm: 164 (86%)		25.5 months	24.4%	
		187 S-1	121 (65%): PD 66 (35%): DP 0 (0%): TP		R0 > 0 mm: 23 (12%) R1 0 mm: 164 (88%)		46.5 months	44.1%	
Demir 2017[43]	Retrospective single-center	254	174 (67.5%): PD 44 (17.3): DP 36 (14.2%): TP	0-mm rule	R0 > 0 mm: 153 (60.2%) R1 0 mm: 101 (39.8%)	2007-2014	R0 > 0 mm: 28.6 months R1 0 mm: 16.5 months PD: R0 > 0 mm: 31.8 months R1 0 mm: 14.5 months	All patients: 22.5%	Yes: 92%
				1-mm rule	R0 > 1 mm: 109 (42.9%) R1 0-1 mm: 145 (57.1%)		R0 > 1 mm: 31.7 months R1 0-1 mm: 17.1 months PD: R0 > 1 mm: 41.2 months R1 0-1 mm: 16.8 months		
Strobel 2017[41]	Retrospective single-center	561	561 PD 72 (12.8%): cPD 427 (76.1%): ppPD 62 (11.1%): prPD	1-mm rule	R0 > 1 mm: 112 (20%) R1 0-1 mm: 123 (21.9%) R1 0 mm: 326 (58.1%)	2006-2012	R0 > 1 mm: 41.6 months R1 0-1 mm: 27.5 months R1 0 mm: 23.4 months	37.7% 30.1% 20.3%	Yes: 438 (78.1%) No: 72 (12.8%) NA: 51 (9.1%)
Hank 2018[42]	Retrospective single-center	455	218 DP: (47.9%) 237 TP: (52.1%)	1-mm rule	R0 > 1 mm: 107 (23.5%) R1 0-1 mm: 104 (22.9%) R1 0 mm: 244 (53.6%)	2006-2014	R0 > 1 mm: 62.4 months R1 0-1 mm: 24.6 months R1 0 mm: 17.2 months	52.6% 16.8% 13%	Yes: 81.5% No: 18.5%

Niesen W, et al. Ann Gastroenterol Surg. 2019;3:464–75.

Received: 14 April 2019 | Revised: 18 May 2019 | Accepted: 6 June 2019
DOI: 10.1002/ags3.12273

REVIEW ARTICLE

AGSurg Annals of Gastroenterological Surgery Open Access WILEY

Local radicality and survival outcome of pancreatic cancer surgery

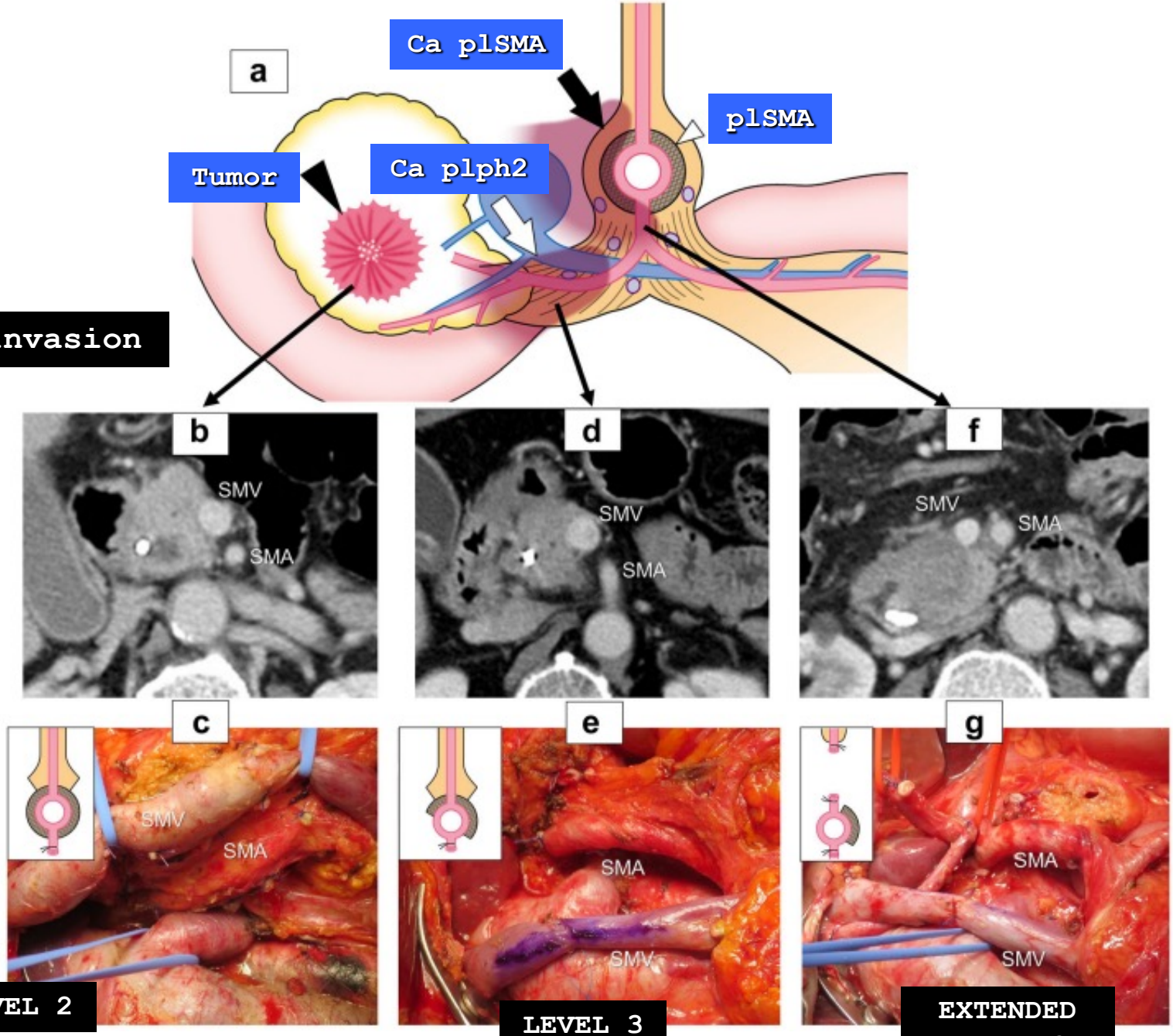
Willem Niesen | Thomas Hank | Markus Büchler | Oliver Strobel

These techniques include artery-first approaches, level-3 dissection with removal of the periarterial nerve plexus, the triangle operation, and extended resections. Local radicality and quality of surgical resection remain among the most important parameters that determine the chances for survival in patients with non-metastatic pancreatic cancer.

- ❑ Artery first
- ❑ Level 3 dissection
- ❑ Triangle operation
- ❑ Extended resection

Niesen W, et al. Ann Gastroenterol Surg. 2019;3:464–75.

Perineural invasion



Inoue Y, et al. J Gastrointest Surg 2018

Journal of Gastrointestinal Surgery
https://doi.org/10.1007/s11605-018-3995-3

ORIGINAL ARTICLE

Optimal Extent of Superior Mesenteric Artery Dissection during Pancreaticoduodenectomy for Pancreatic Cancer:

Table 2 Pathological outcomes and recurrences

	Level 2 75	Level 3 117	Extended-level 3 41	*P* value
Pathology (pap well/mod/por)	23/46/6	29/71/17	13/26/2	0.53
Pathological margin status				
R0	63 (84%)	93 (79%)	24 (59%)	0.0054
R1	11	24	17	
R2	1	0	0	
Site of positive margin*				
Margin around the SMA	8 (11%)	15 (13%)	15 (37%)	0.0005
Posterior margin	2 (3%)	2 (2%)	2 (5%)	
Margin around the hepatic artery	2 (3%)	4 (3%)	0	
Pancreatic stump	1 (1%)	3 (3%)	2 (5%)	
Bile duct stump	0	1 (1%)	0	
Recurrence	54 (72%)	85 (74%)	30 (73%)	0.82
Local recurrence	13 (17%)	24 (21%)	6 (15%)	0.63
Soft tissue	9 (12%)	20 (17%)	6 (15%)	
Remnant pancreas	4 (5%)	4 (3%)	0	
Distant metastasis**	42 (55%)	65 (57%)	25 (61%)	0.83
Liver	25 (33%)	37 (32%)	12 (29%)	
Mesenteric lymph nodes	5 (7%)	3 (3%)	1 (2%)	
Peritoneal dissemination	7 (9%)	17 (15%)	7 (17%)	
Others	14 (19%)	12 (10%)	6 (15%)	

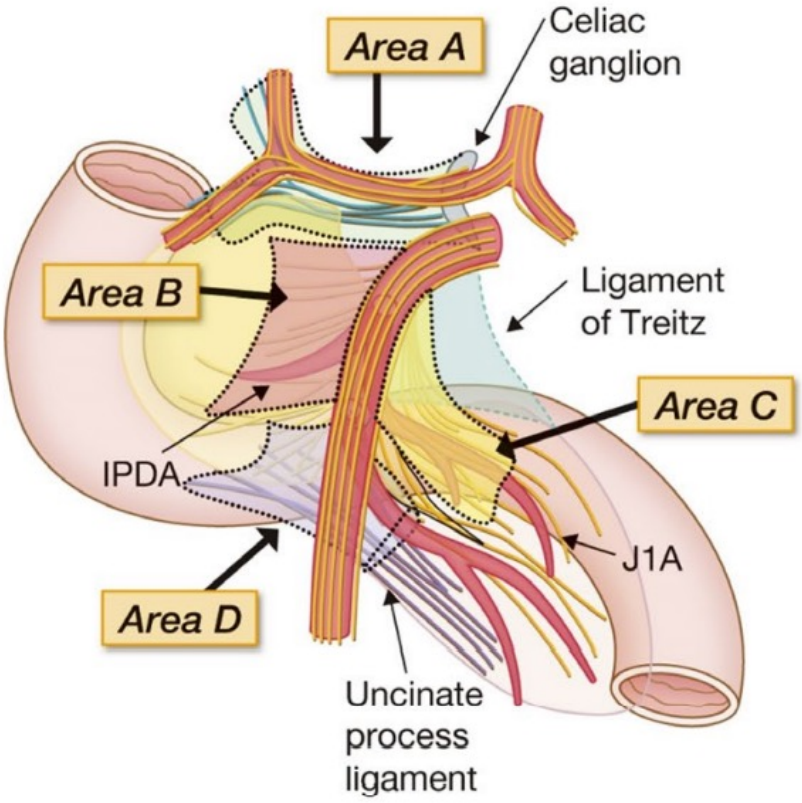
Inoue Y, et al. J Gastrointest Surg 2018

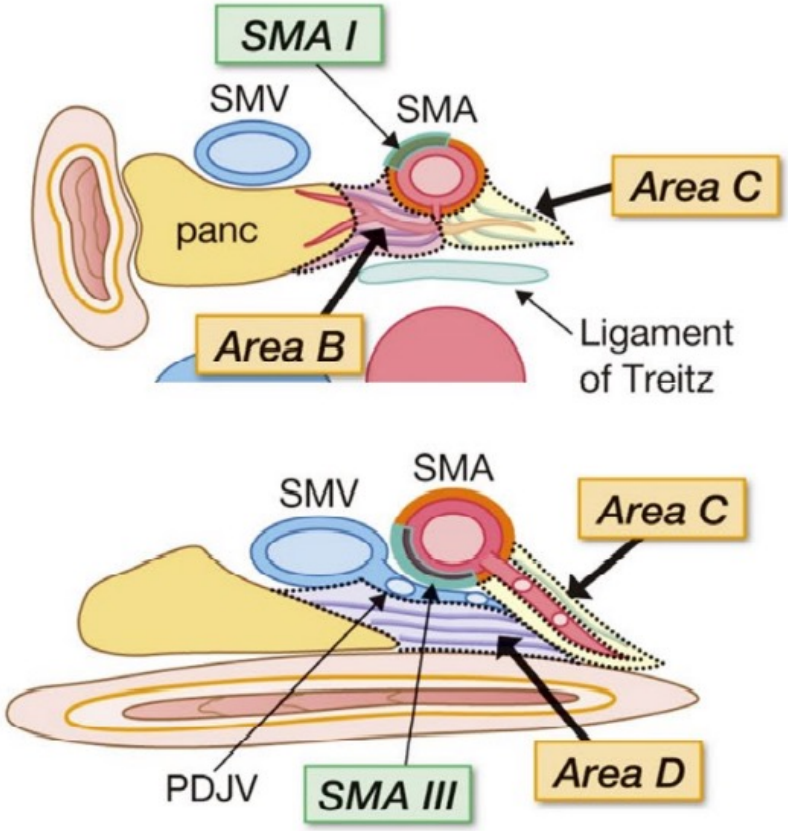
DOI: 10.1002/jhbp.725

Check for updates

ORIGINAL ARTICLE

Precise anatomical resection based on structures of nerve and fibrous tissue around the superior mesenteric artery for mesopancreas dissection in pancreaticoduodenectomy for pancreatic cancer





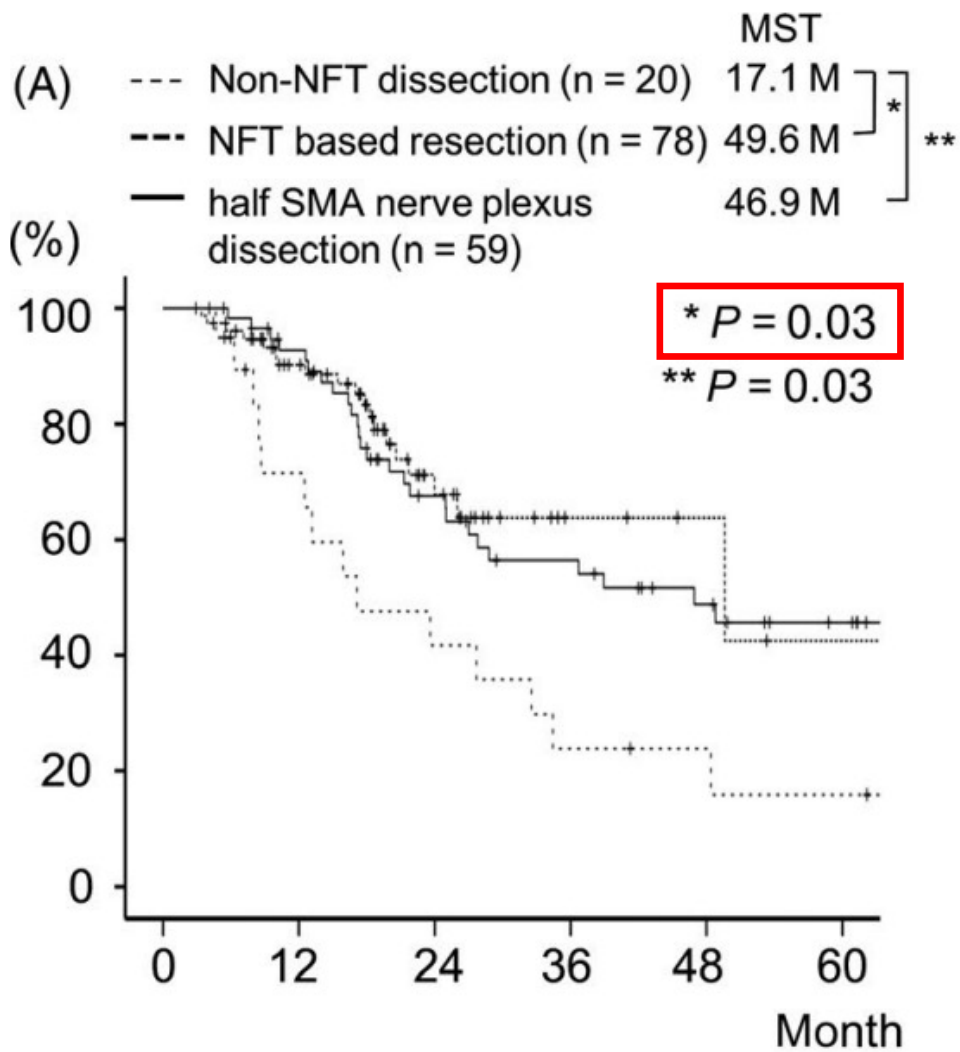
Nagakawa Y, et al. J Hepatobiliary Pancreat Sci. 2020;27:342–51

DOI: 10.1002/jhbp.725

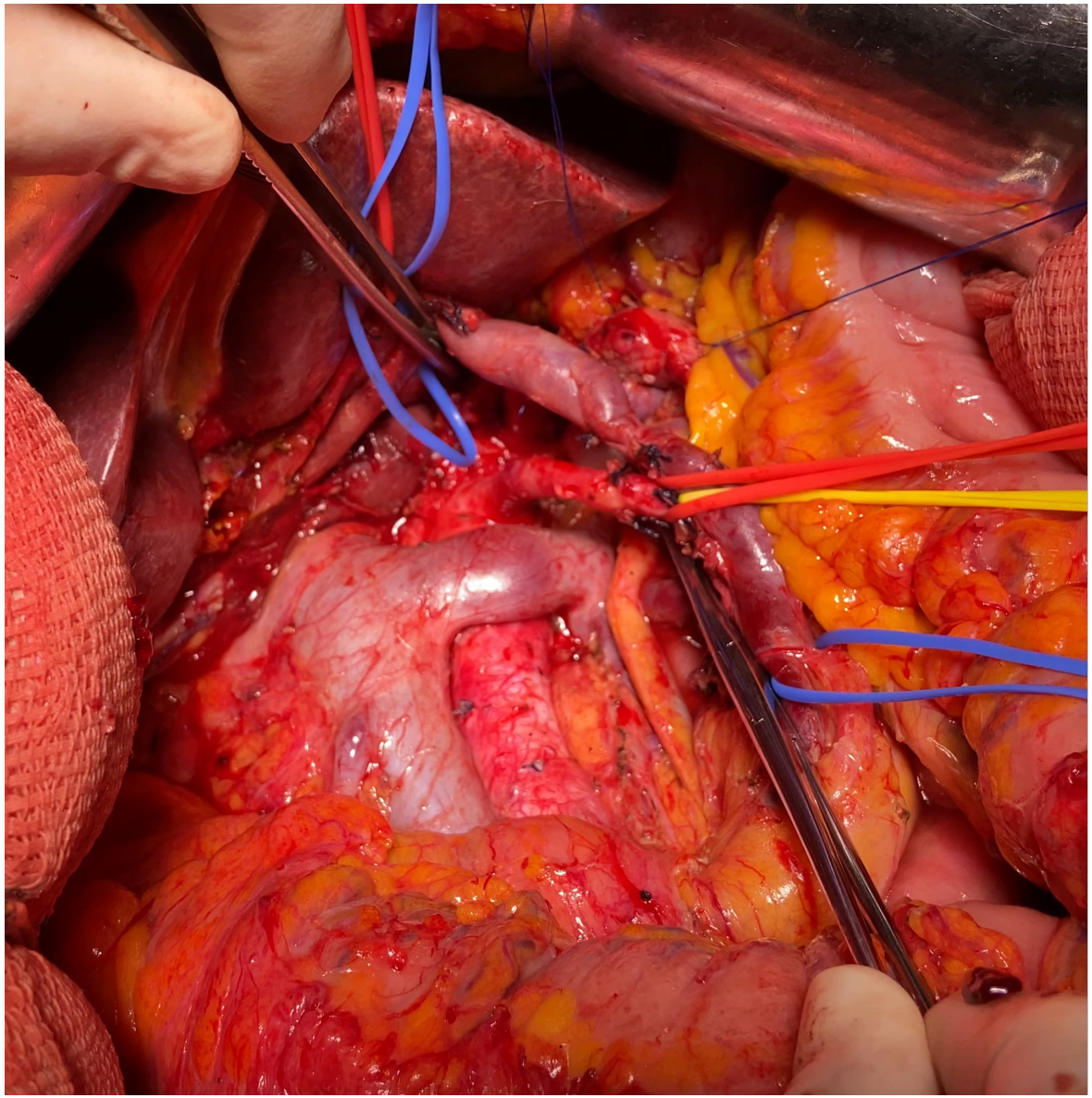
Check for updates

ORIGINAL ARTICLE

Precise anatomical resection based on structures of nerve and fibrous tissue around the superior mesenteric artery for mesopancreas dissection in pancreaticoduodenectomy for pancreatic cancer



Nagakawa Y, et al. J Hepatobiliary Pancreat Sci. 2020;27:342–51



Langenbeck's Archives of Surgery
https://doi.org/10.1007/s00423-021-02211-y

REVIEW ARTICLE

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 1 Studies comparing total mesopancreas excision versus standard pancreatoduodenectomy

Author	Results	TME	SPD	p	Ref
Kawabata et al. (2012)	R0 resection (%)	92.8	60	0.019	39
	R1 resection (%)	7.2	40		
	Recurrence (%)	14.2	64	0.036	
Aimoto et al. (2013)	R0 resection (%)	74	68	NS	41
	R1 resection (%)	26	30	NS	
	Local recurrence (%)	0	37	<0.01	
Xu et al. (2017)	Median DFS (Months)	16.9	13.4	0.044	37
	Median OS (Months)	19.9	22.5	0.176	
	1-year total recurrence rate (%)	31.8	55.3	0.054	
	1-year local recurrence rate (%)	18.2	39.5	0.018	
Quero et al. (2021)	Disease-free survival (%)	22.3	14.8	0.04	38
	R1 Mesopancreas margin (%)	5.0	16.7	0.04	
	Local tumor recurrence (%)	26.8	55.5	0.002	

Legends: *TME*, total mesopancreas excision; *SPD*, standard pancreatoduodenectomy; *DFS*, disease-free survival; *OS*, overall survival; *NS*, no significant

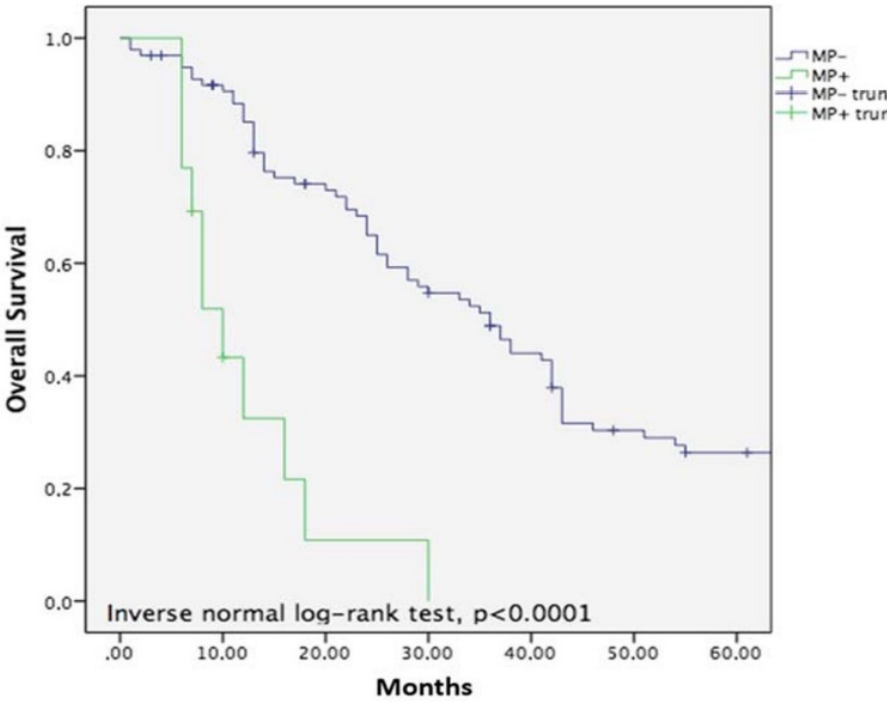
Fernandes ESM, et al. Langenbeck's Arch Surg 2021

Langenbeck's Archives of Surgery (2020) 405:303–312
https://doi.org/10.1007/s00423-020-01873-4

ORIGINAL ARTICLES

Check for updates

Total mesopancreas excision for periampullary malignancy: a single-center propensity score-matched comparison of long-term outcomes



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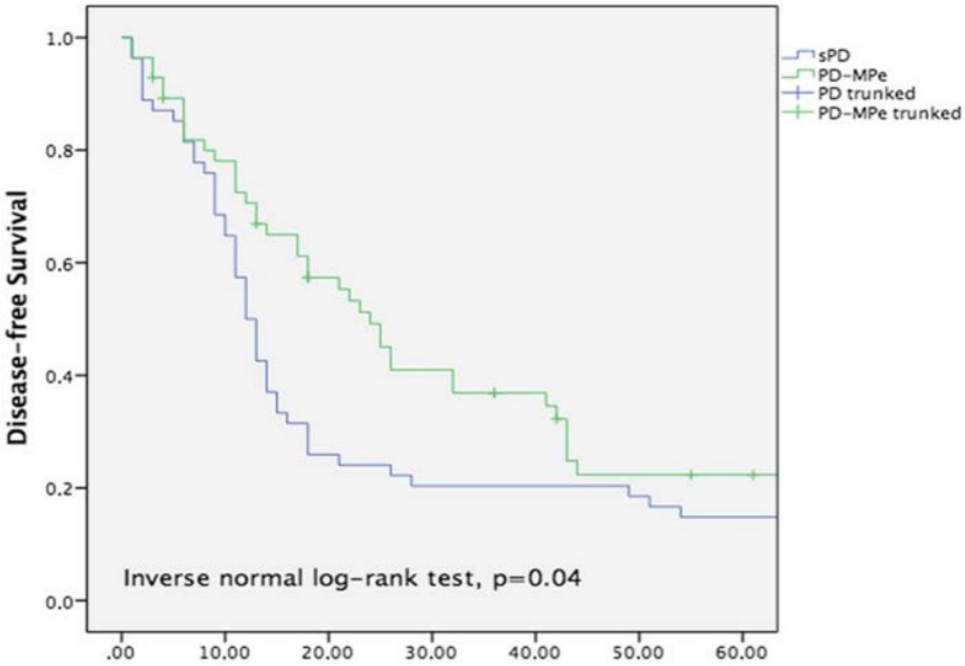

P=0,04

Quero G, et al. Langenbeck's Arch Surg 2020;405:303-12

CONCLUSION

Langenbeck's Archives of Surgery (2020) 405:303–312
https://doi.org/10.1007/s00423-020-01873-4

ORIGINAL ARTICLES

Check for updates

Total mesopancreas excision for periampullary malignancy: a single-center propensity score-matched comparison of long-term outcomes

Conclusion PD-MPe offers clinical advantages in terms of MP resection margin status, local recurrence, long-term mortality, and DFS. The lower MP positivity rate, achieved with PD-MPe, leads to better outcomes both in terms of OS and DFS.

Quero G, et al. Langenbeck's Arch Surg 2020;405:303-12

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Thanks!

Obrigado!

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