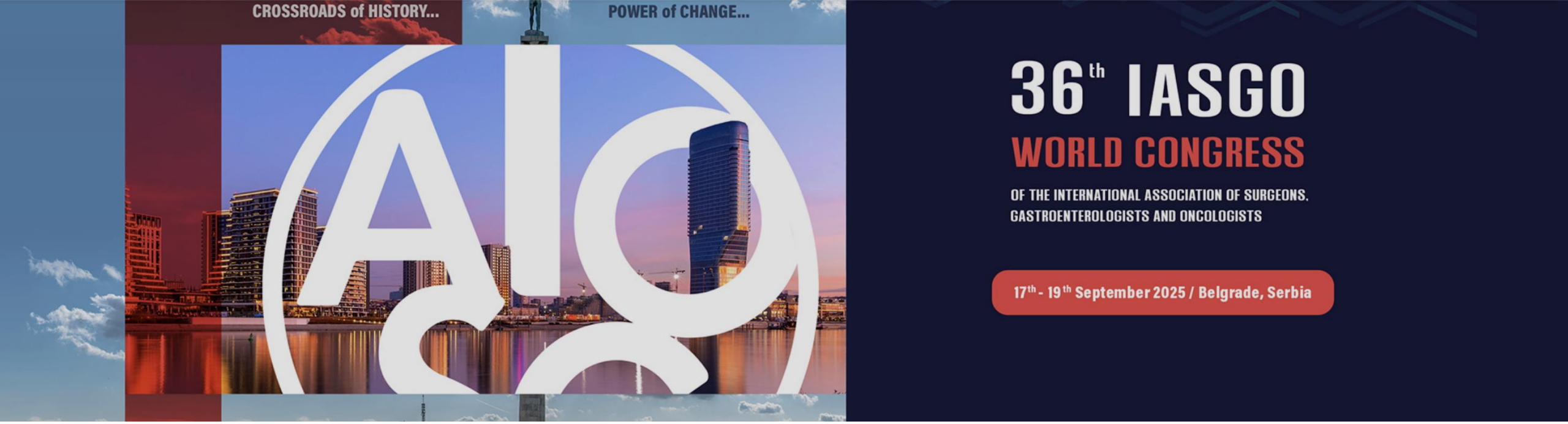


Artery first and total mesopancreas excision for pancreatic head adenocarcinoma

Orlando Jorge M. Torres
Department of Gastrointestinal Sugery
Hepatopancreatobiliary and Liver Transplant Unit
Maranhão Federal University - Brazil

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

Most Pancreatic Cancer Resections are R1 Resections

Medial margin: Mesopancreas

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]

SUPERIOR MESENTERIC ARTERY

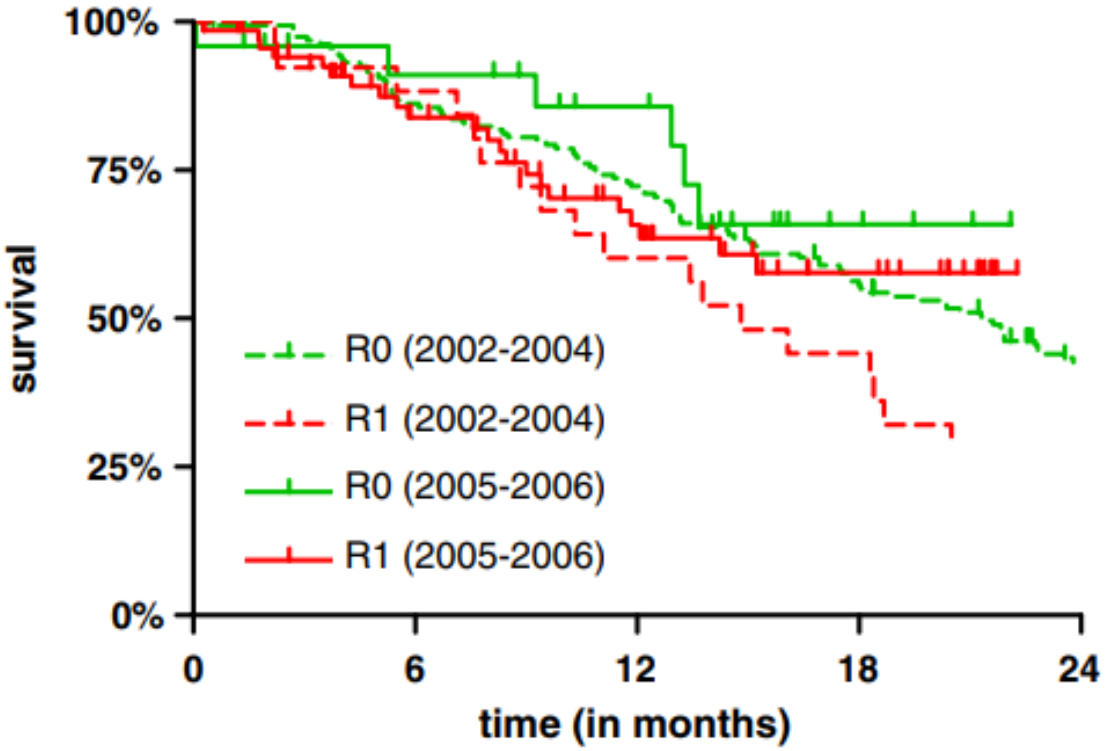


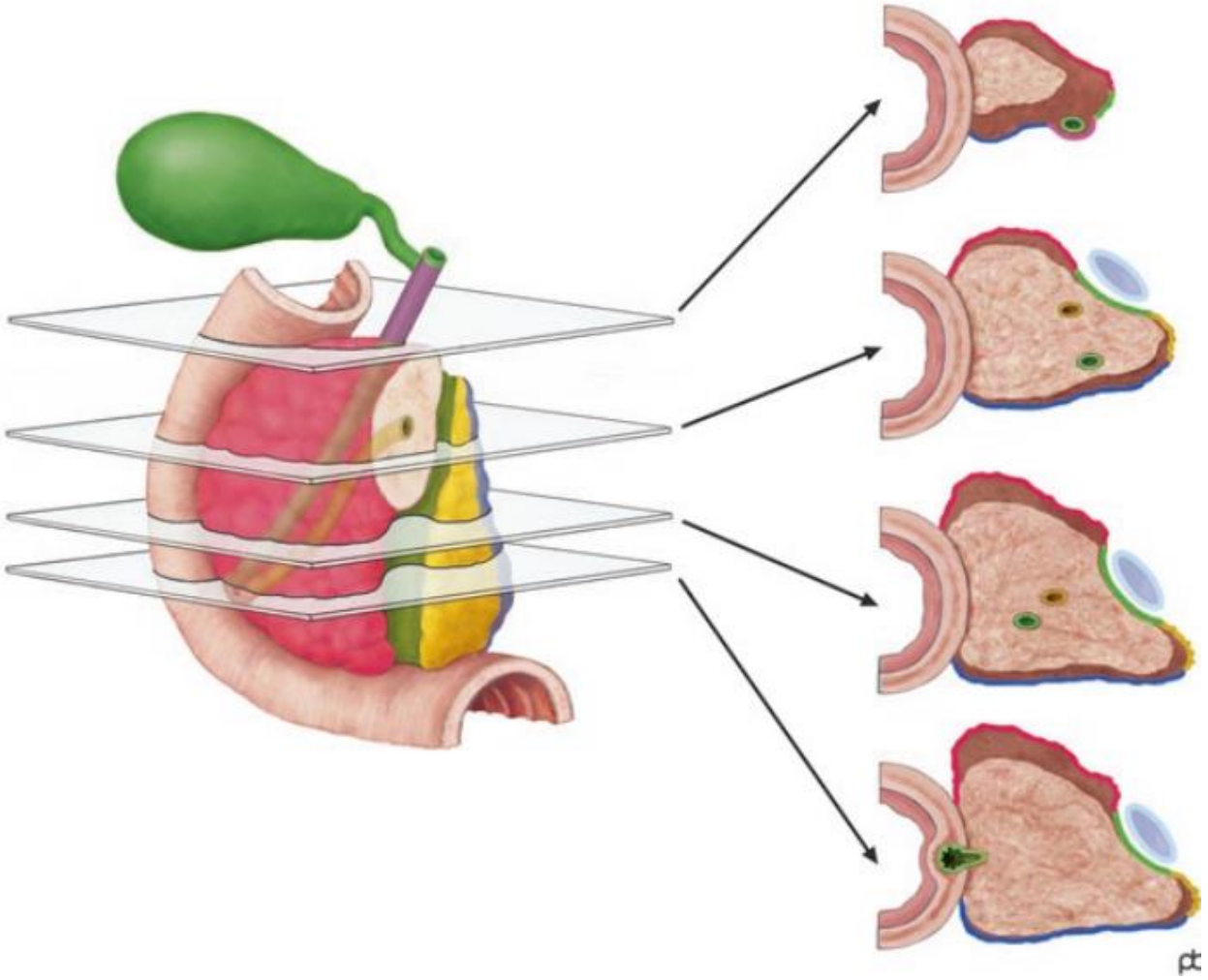
TABLE 3. *Tumor margin characteristics of 111 consecutive macroscopic complete resections for pancreatic ductal adenocarcinoma (2005–2006)*

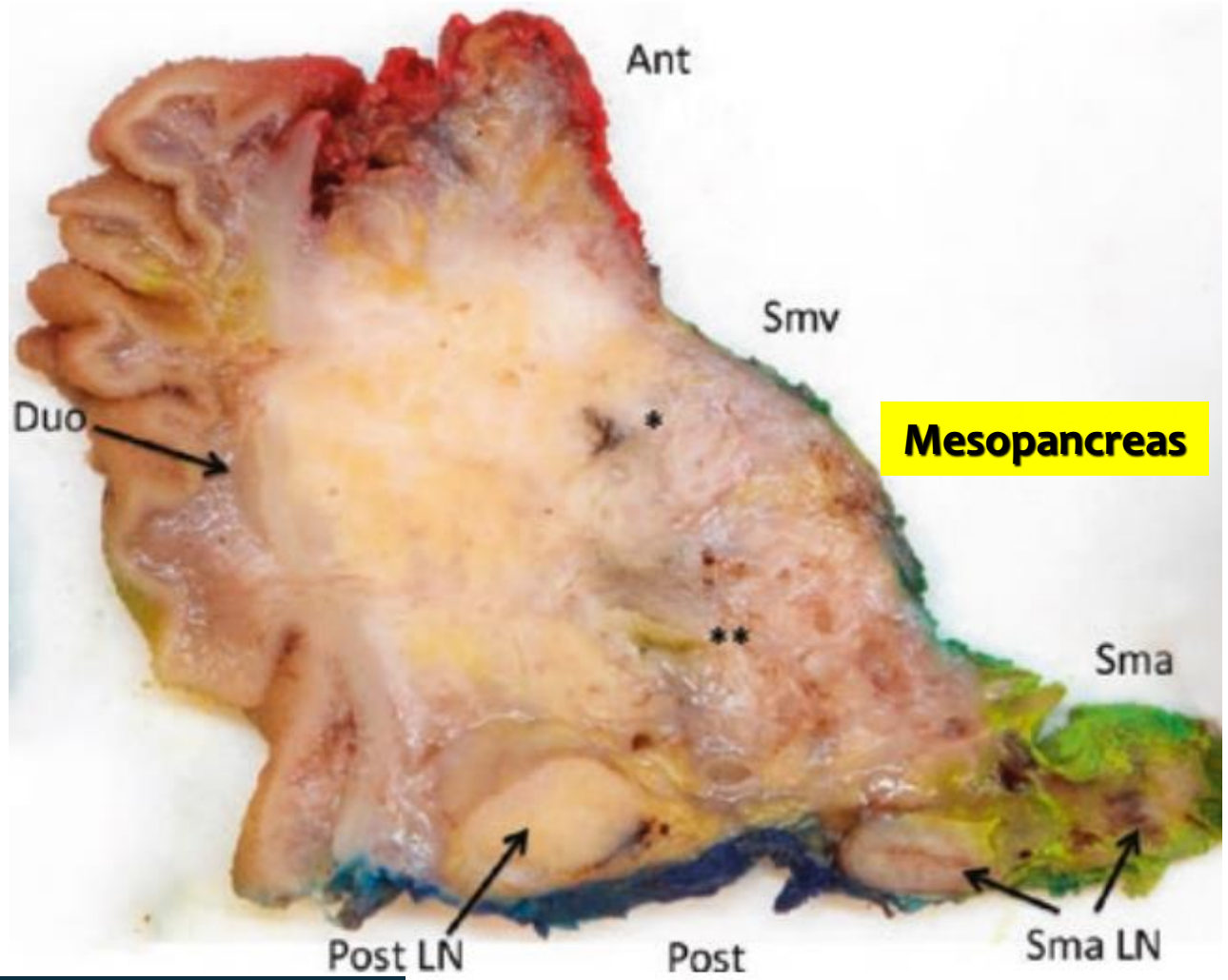
Characteristic	Value, n (%)
R classification	
R0	27 (24%)
R1	84 (76%)
RM involvement	
Posterior	39 (47%)
Medial	57 (68%)
Anterior surface	8 (10%)
Superior	0
Transection (pancreas)	3 (4%)
Bile duct	4 (5%)
Stomach/duodenum	3 (4%)
Number of margins	
1	56 (68%)
2	22 (26%)
3 or more	5 (6%)
Type of involvement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

RM, resection margin.

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

SUPERIOR MESENTERIC ARTERY





Superior mesenteric vein (SMV)
Superior mesenteric artery (SMA)

Verbeke C, et al. Cancer Treat Rev. 2015;41:17–26

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

Most Pancreatic Cancer Resections are R1 Resections

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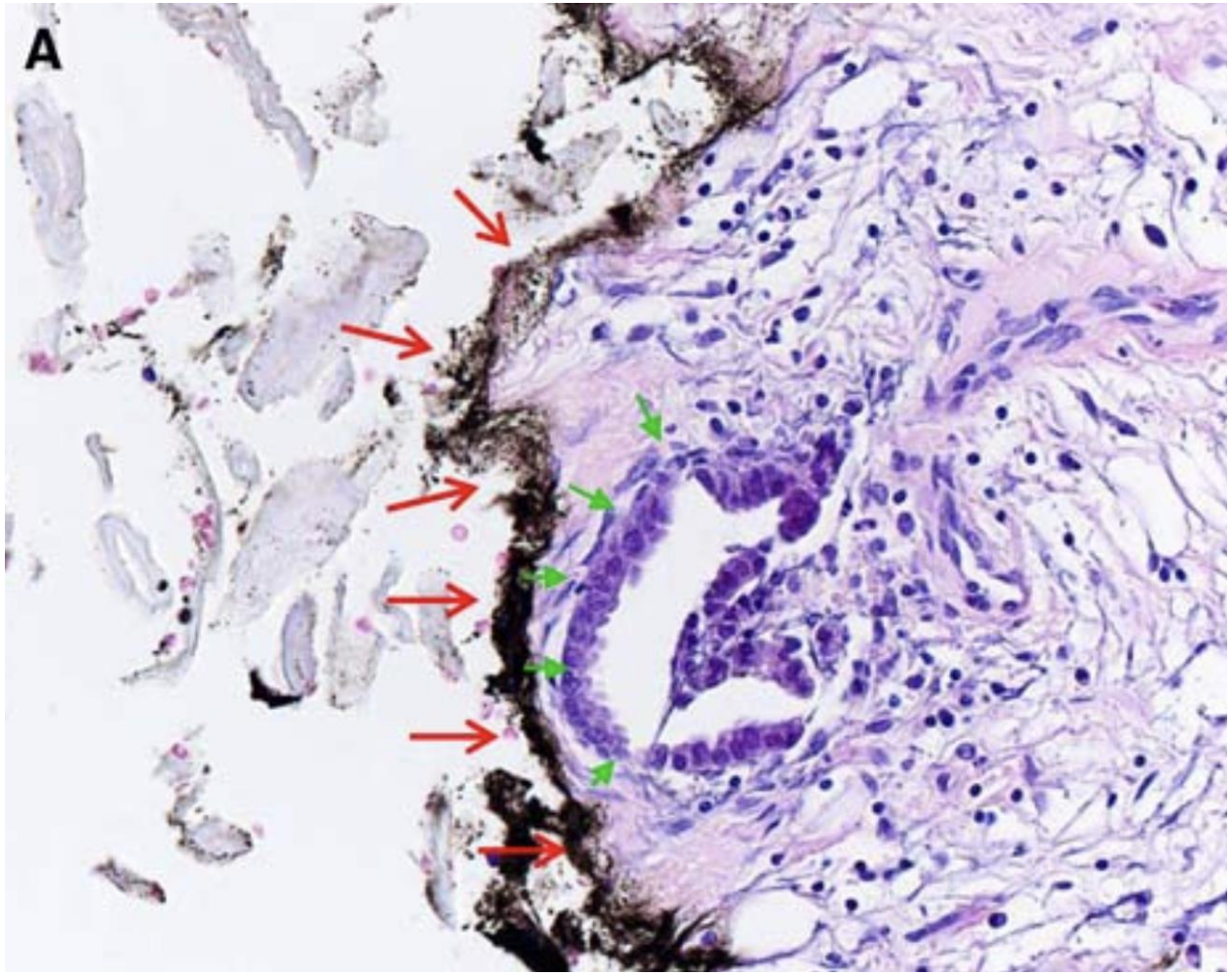
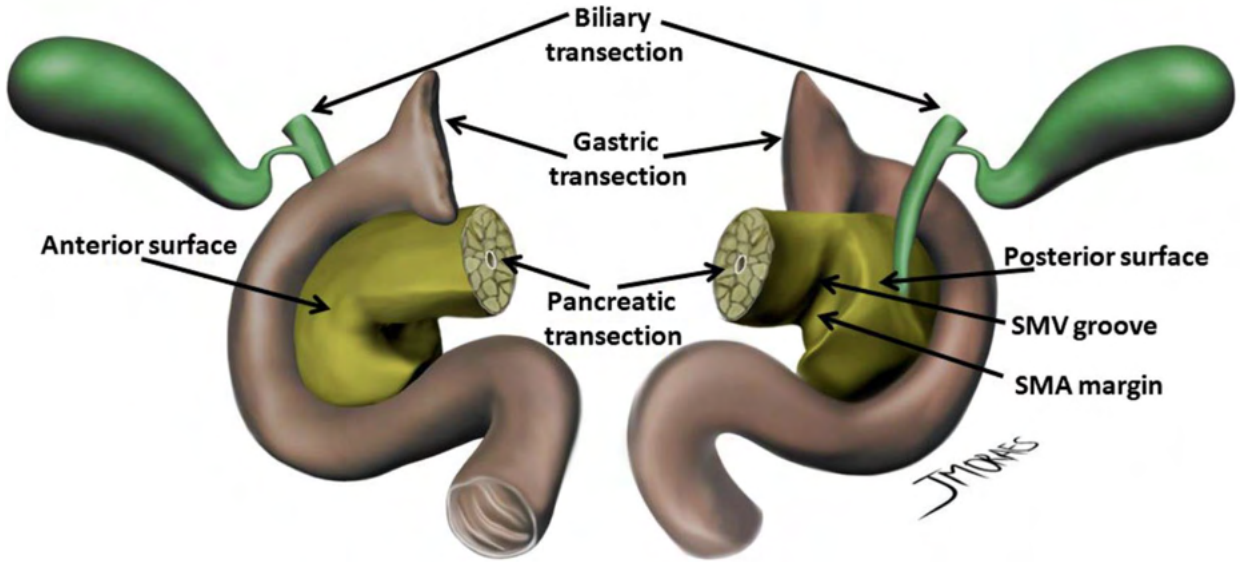


Esposito I, et al. Ann Surg Oncol 2008; 15:1651–60

Mesopancreas



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

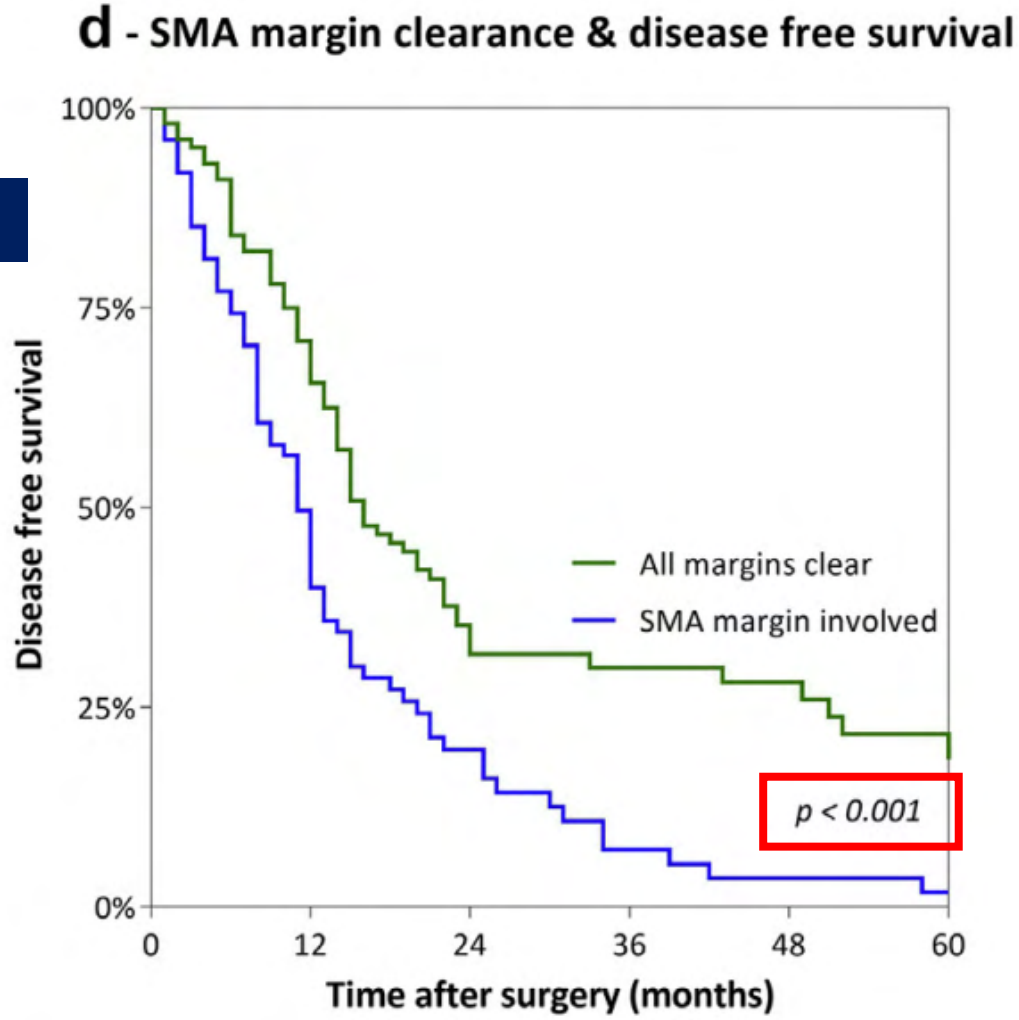
SUPERIOR MESENTERIC ARTERY

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

ORIGINAL ARTICLE

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

SUPERIOR MESENTERIC ARTERY



Kalisvaart M, et al. HPB 2020

36th IASGO
WORLD CONGRESS

17th - 19th September 2025
Belgrade, Serbia

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

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

SUPERIOR MESENTERIC ARTERY

Kalisvaart M, et al. HPB 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

Ryota Matsuki[1] · Masanori Sugiyama[2] · Masaharu Kogure[1] · Masaaki Yokoyama[3] · Tetsuya Nakazato[1] · Yutaka Suzuki[1] · Toshiyuki Mori[1] · Nobutsugu Abe[1] · Yoshihiro Sakamoto[1]

SUPERIOR MESENTERIC ARTERY

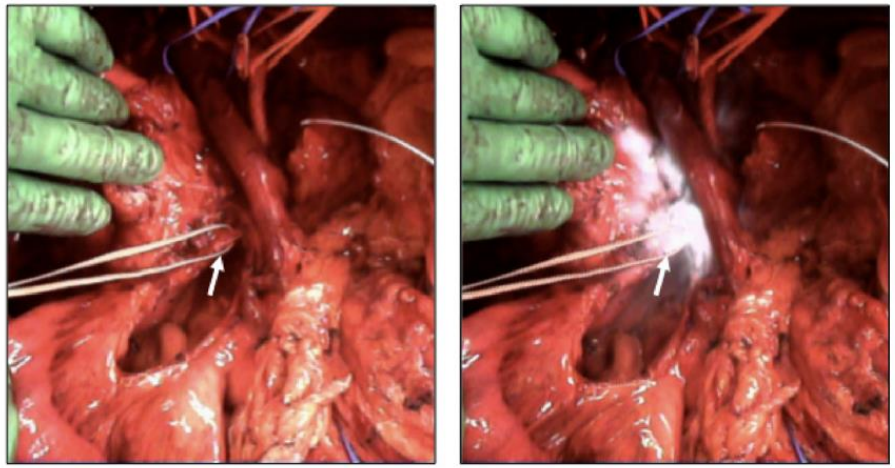


Fig. 1 Lymphatic pathways from the pancreatic head. The first JA is taped. Fluorescence is seen in the mesentery of the IPDA and first JA (arrow), but not in that of the second JA or more distant

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
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

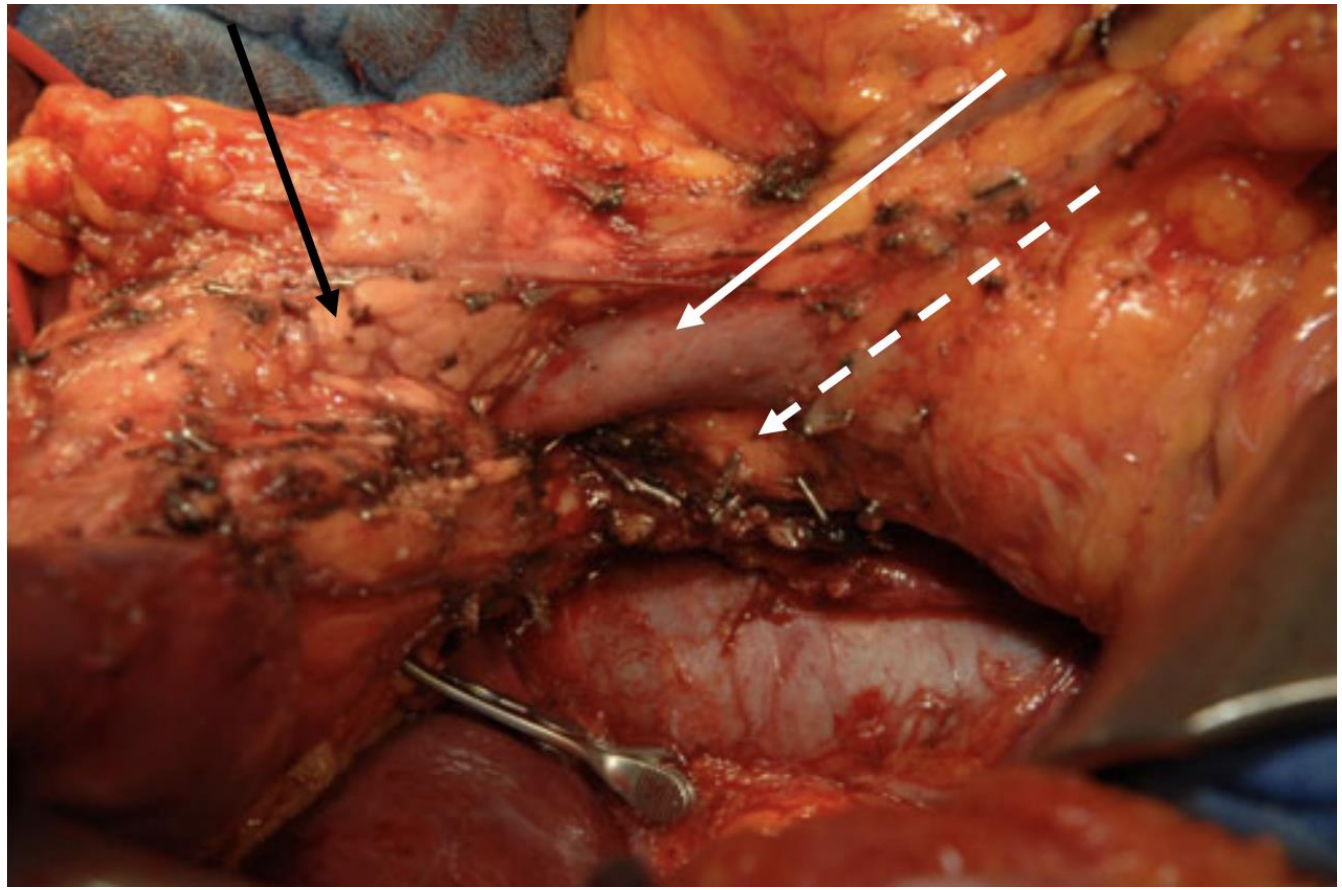
Matsuki R, et al. J Gastrointest 2020

ARTERY FIRST

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

HOW TO DO IT

Uncinate process first—a novel approach for pancreatic head resection



UNCINATE FIRST

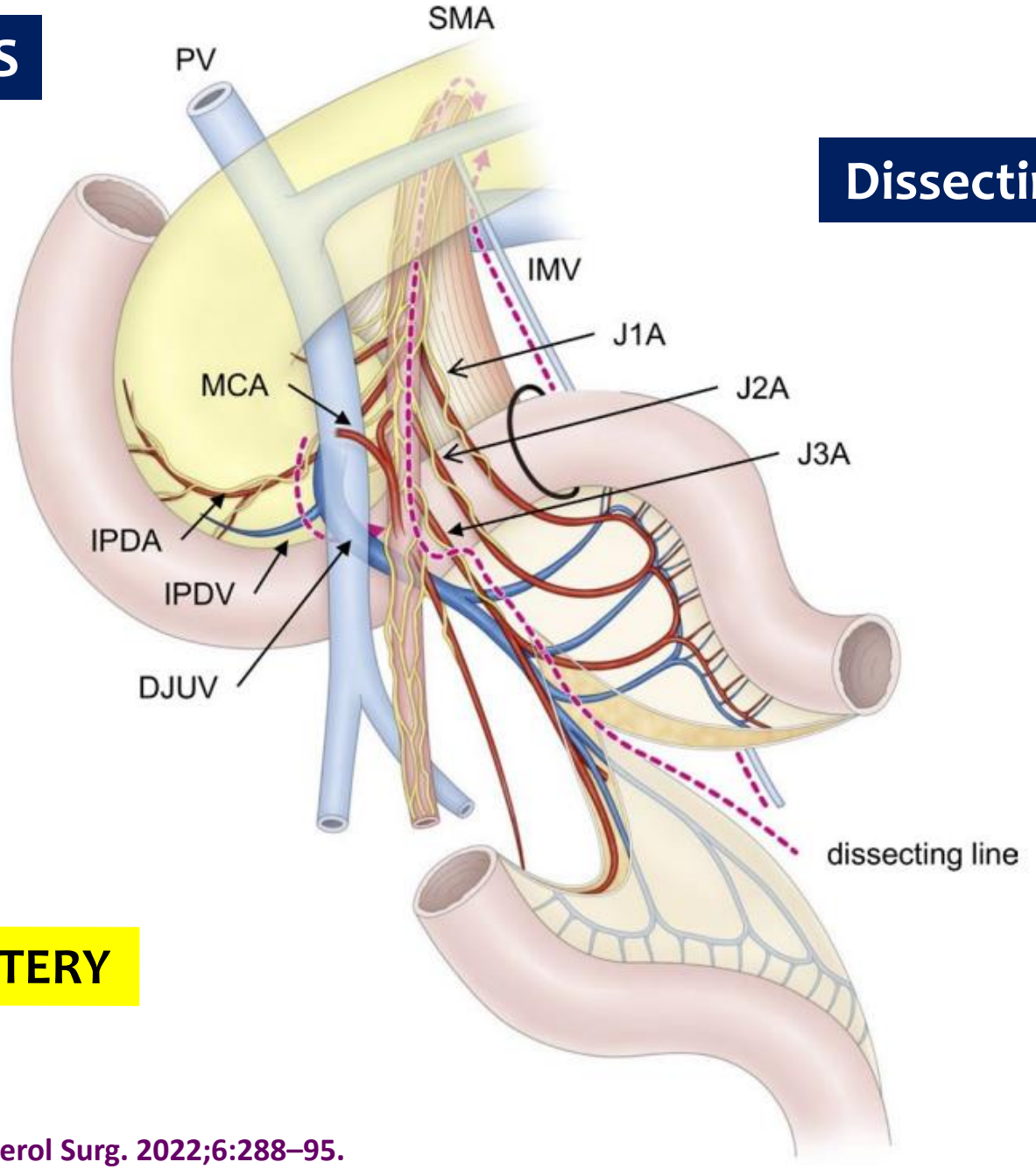
Hackert T, et al. Langenbecks Arch Surg 2010; 395:1161–4

36th IASGO
WORLD CONGRESS

17th - 19th September 2025
Belgrade, Serbia

MESOPANCREAS

Dissecting line



FIRST JEJUNAL ARTERY

Honjo M, et al. Ann Gastroenterol Surg. 2022;6:288–95.

ARTERY FIRST

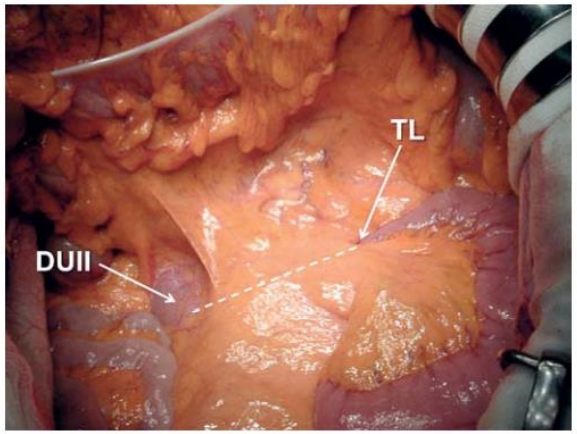
Digestive Surgery

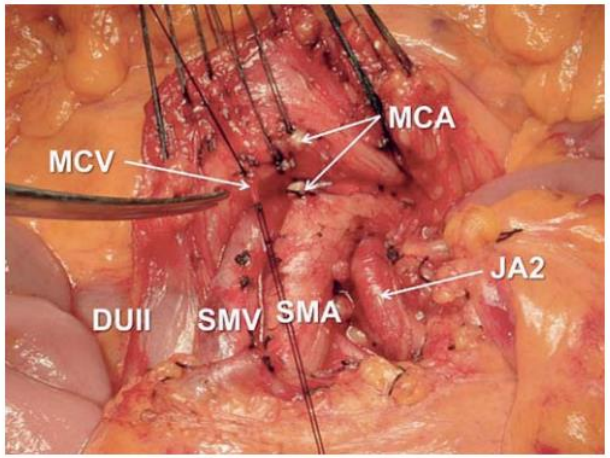
How I Do It

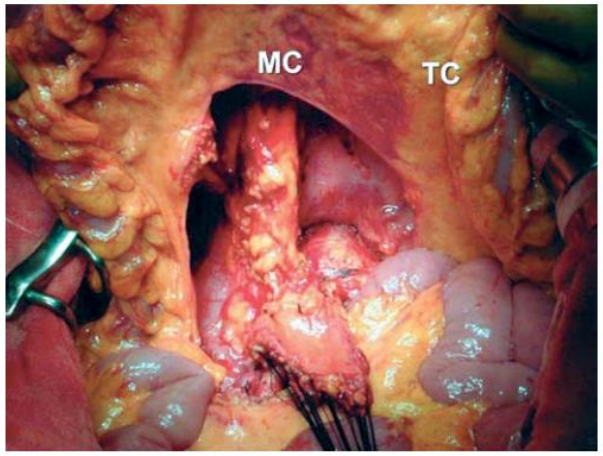
Dig Surg 2016;33:308–313
DOI: 10.1159/000445014

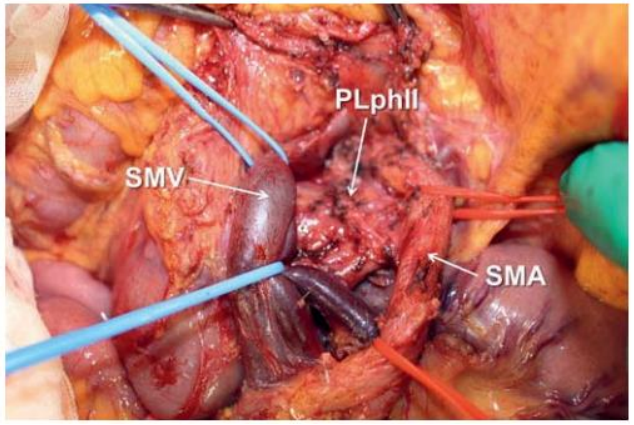
Published online: May 25, 2016

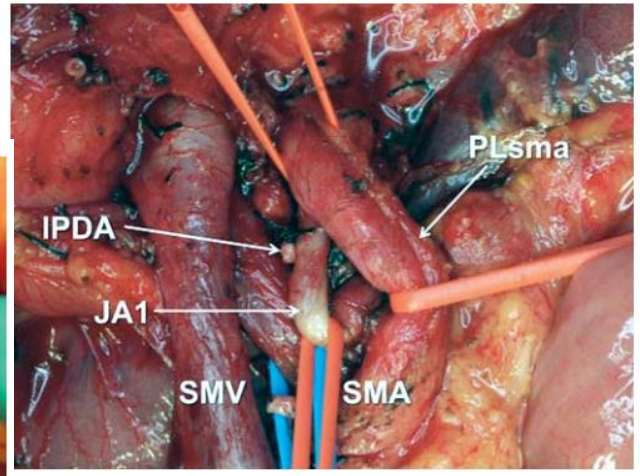
The Mesenteric Approach in Pancreatoduodenectomy











MESENTERIC APPROACH

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

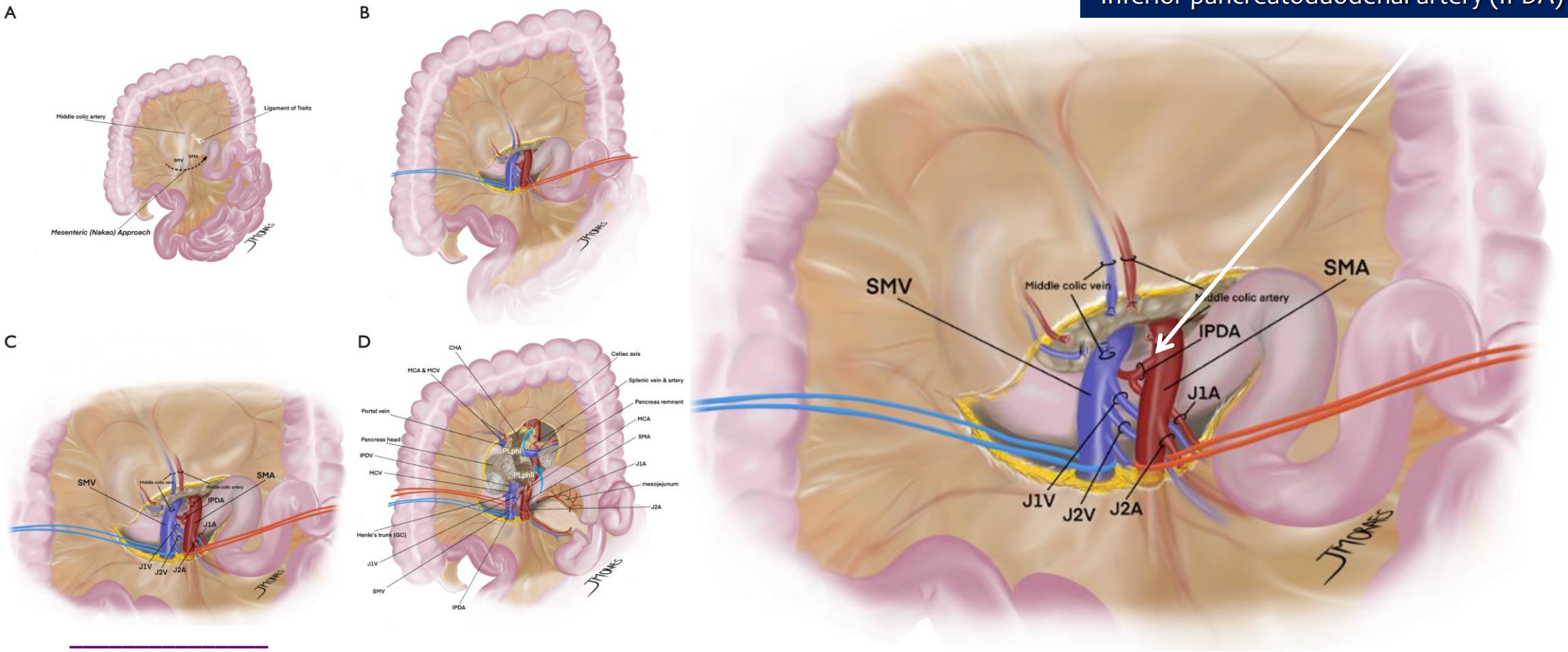
Review Article

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

MESENTERIC APPROACH

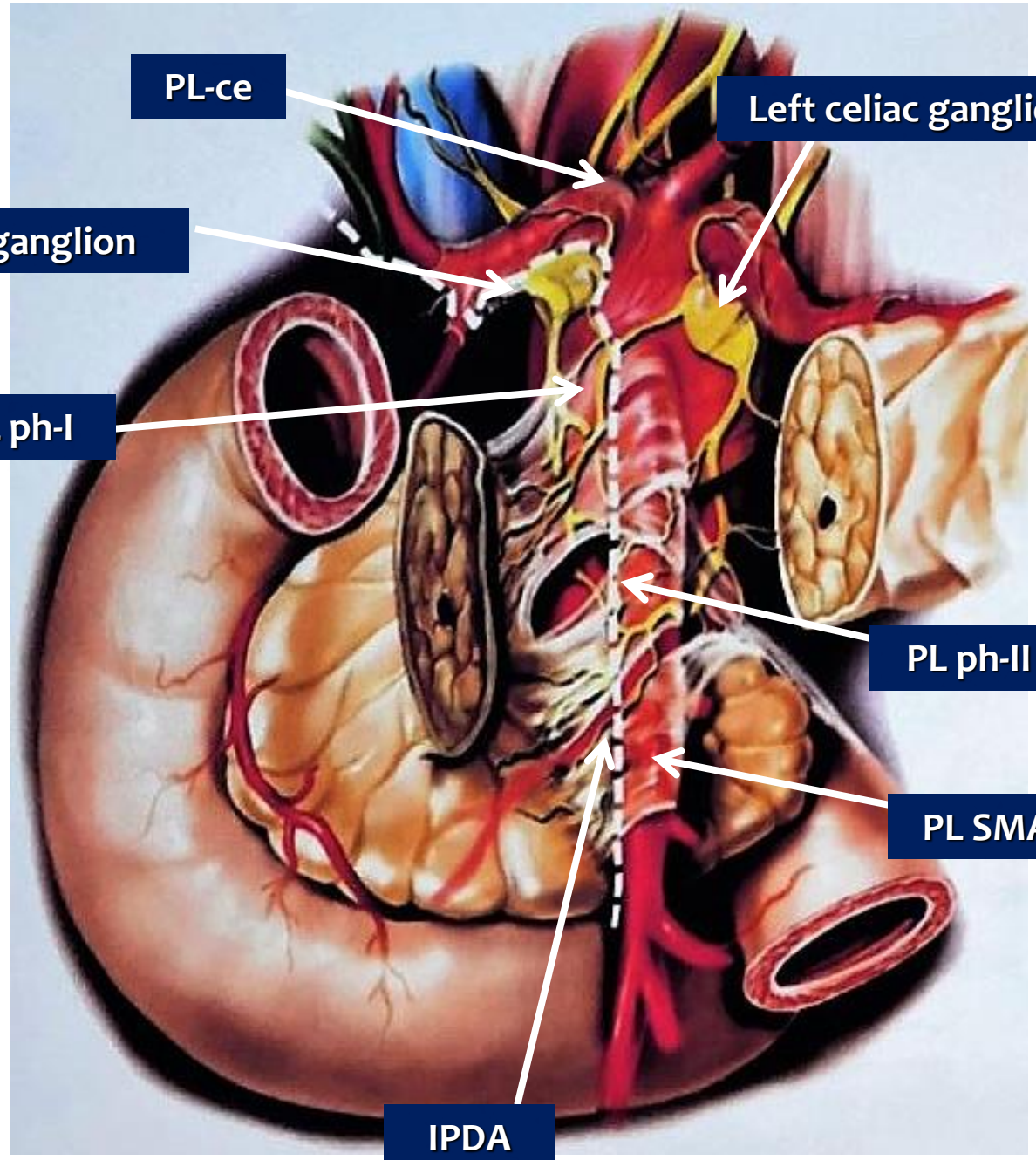
Eduardo de Souza M. Fernandes[1,2,3], Felipe Pedreira T. de Mello[1,2], Eduardo Pinho Braga[1], Gabrielle Oliveira de Souza[1], Ronaldo Andrade[1,2], Leandro Savattone Pimentel[1,2], Camila Liberato Girão[1,2], Munique Siqueira[1,2], José Maria A. Moraes-Junior[6,7], Romulo Varella de Oliveira[4], Nicolas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

Inferior pancreatoduodenal artery (IPDA)



Fernandes ESM, et al. J Gastrointest Oncol 2023

TOTAL MESOPANCREAS EXCISION

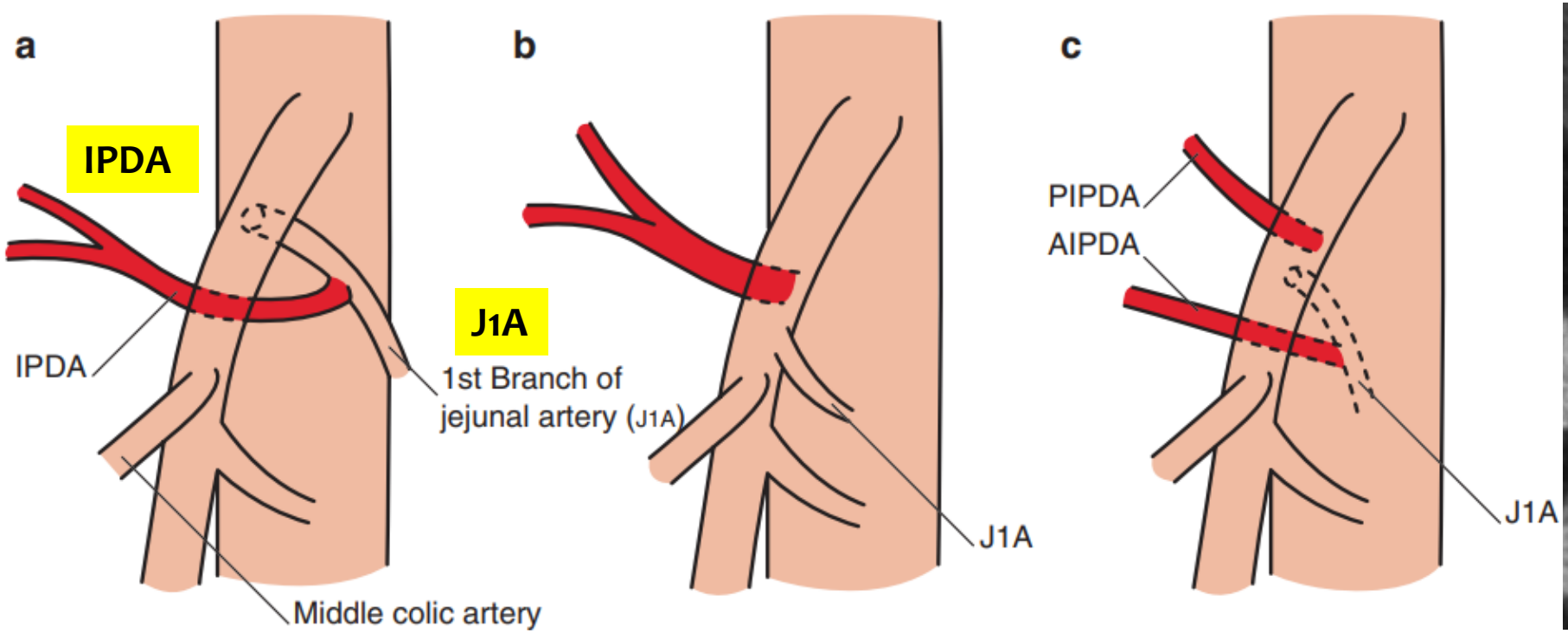


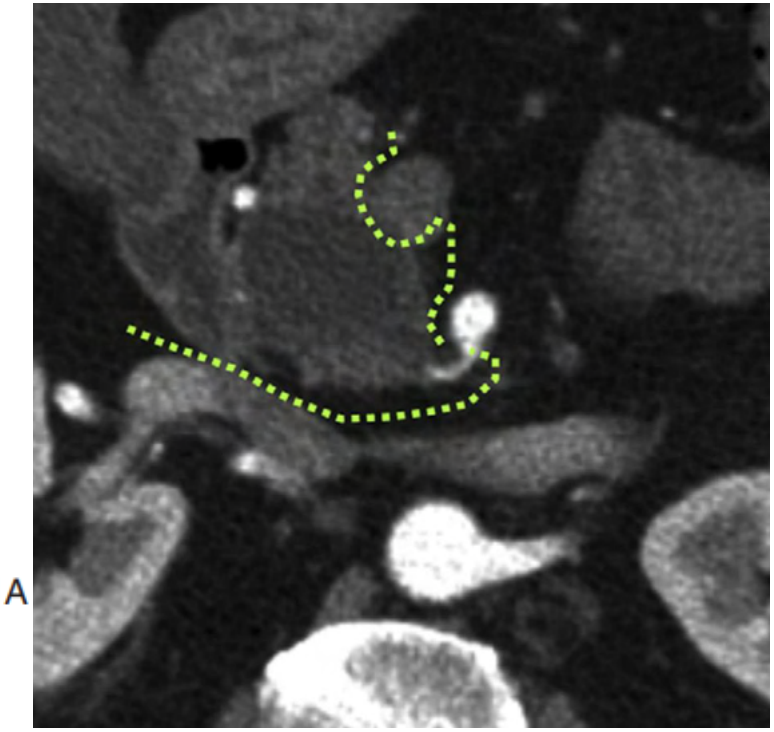
MESOPANCREAS

- ❑ PLPh-I
- ❑ PLPh-II
- ❑ IPDA
- ❑ Jejunal arteries
- ❑ Jejunal veins
- ❑ Lymph nodes

ARTERIES

INFERIOR PANCREATODUODENAL ARTERY (IPDA)





Common trunk

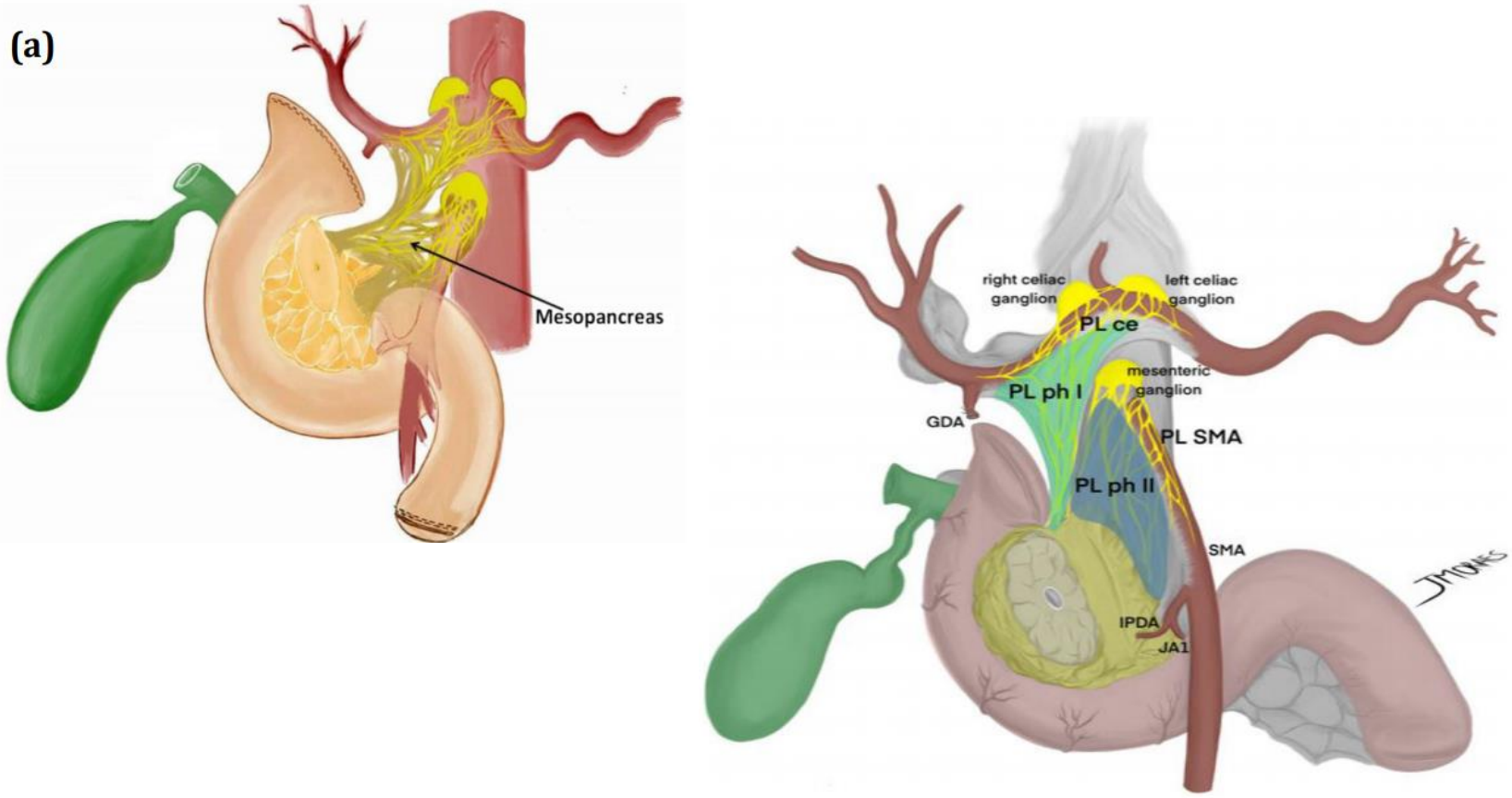
EPICENTER

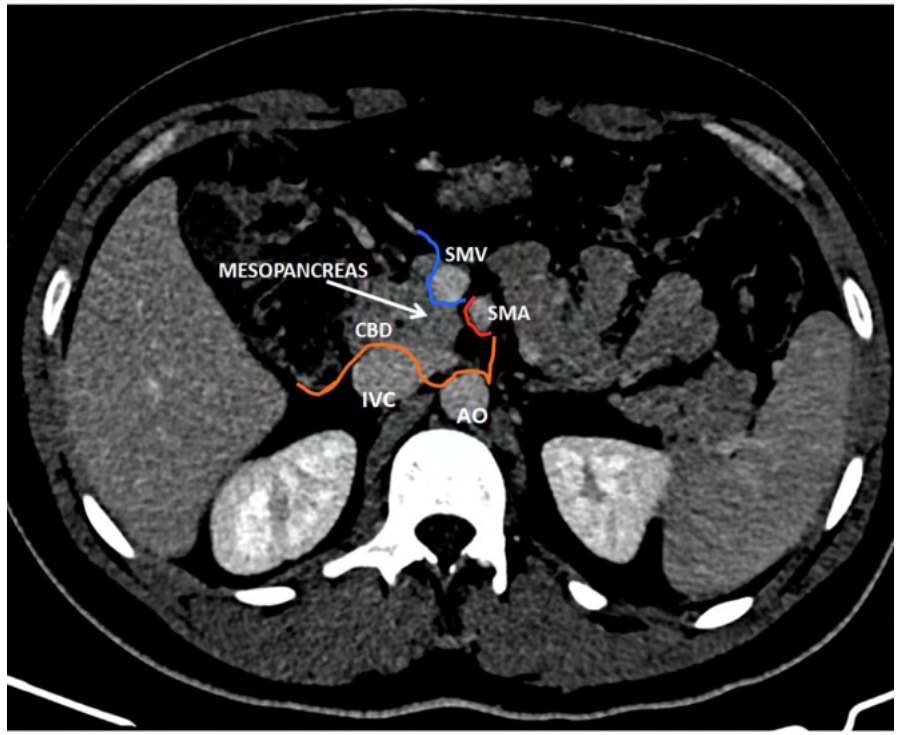
Langenbeck's Archives of Surgery
https://doi.org/10.1007/s00423-021-02211-y

REVIEW ARTICLE

What do surgeons need to know about the mesopancreas

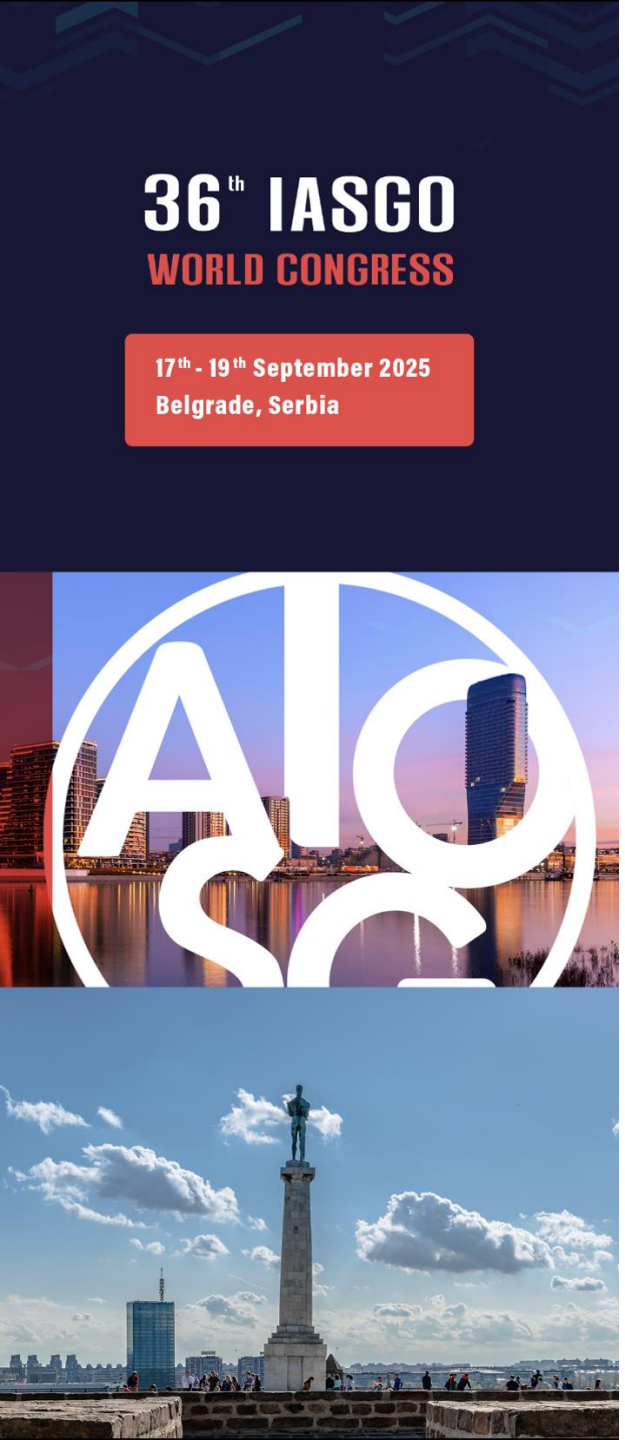
Eduardo de Souza M. Fernandes [1,2] · Oliver Strobel [3,4] · Camila Girão [1,2] · Jose Maria A. Moraes-Junior [5,6] · Orlando Jorge M. Torres [5,6]





PANCREATIC HEAD PLEXUS (PL ph)

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



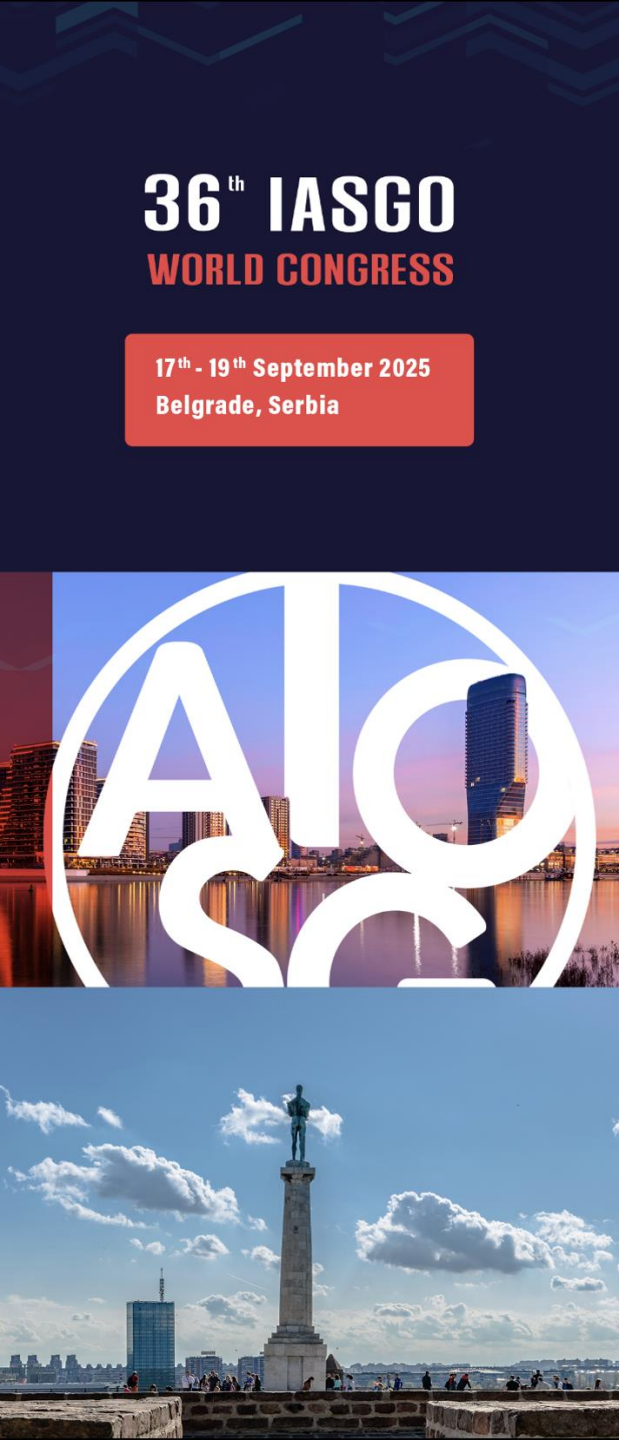
ADVANTAGES OF ARTERY FIRST APPROACH

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)

Superior mesenteric artery

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



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ARTERY FIRST

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

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Belgrade, Serbia

ARTERY FIRST

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

- 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

.1007/s00268-020-05856-w

World Journal of Surgery

ORIGINAL SCIENTIFIC REPORT

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

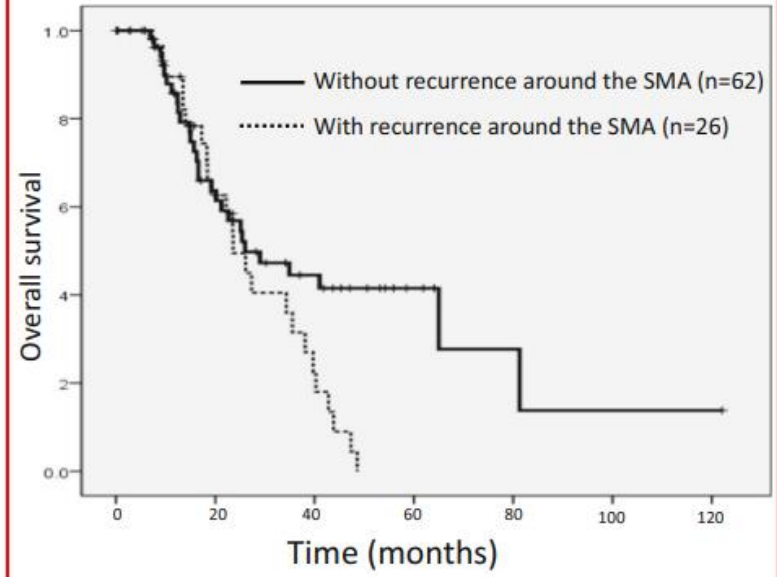


Fig. 1 Overall survival according to recurrence around the SMA. The median survival was 23.6 months in patients with recurrence around the SMA and 26 months in patients without recurrence around the SMA (p = 0.0367) SMA: superior mesenteric artery

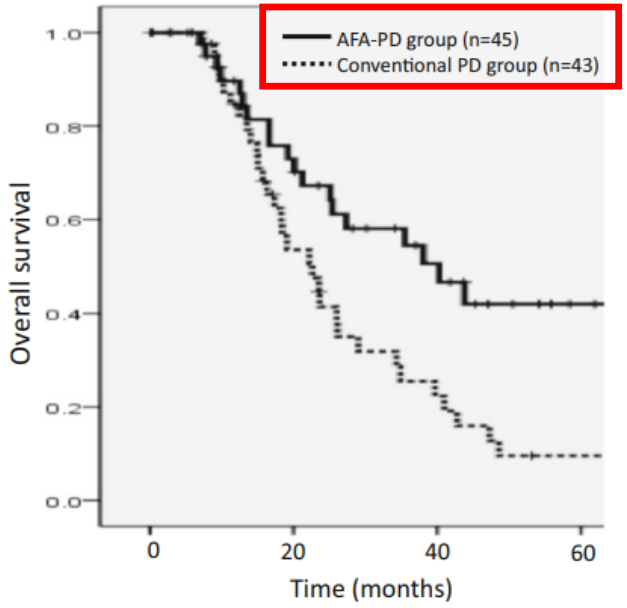
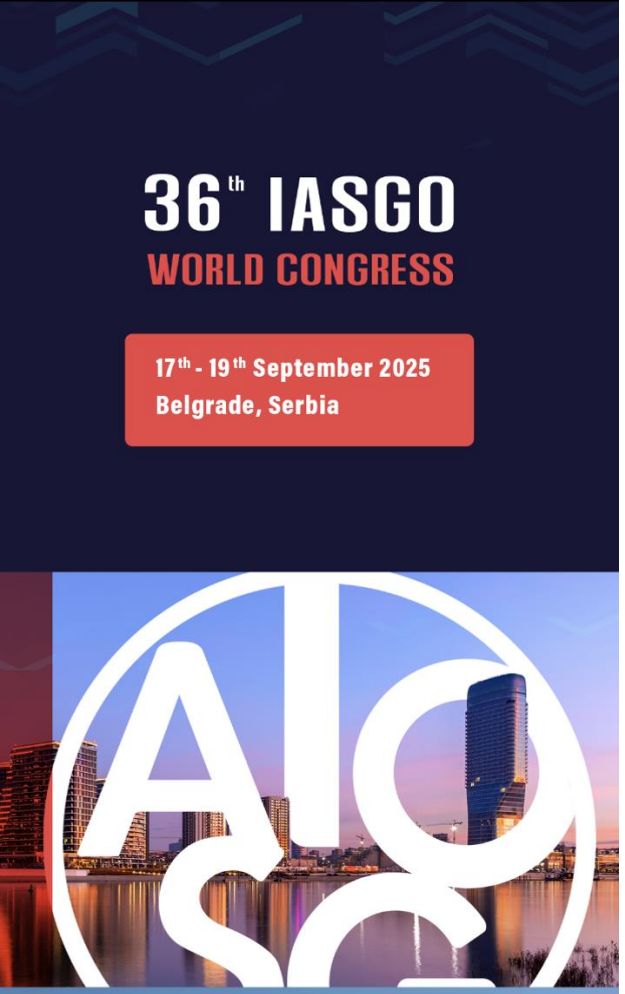


Fig. 2 Overall survival according to the type of the surgery. The median survival was 40.3 months in the AFA-PD group and 22.6 months in the conventional PD group (p = 0.005) AFA-PD: artery-first approach pancreatoduodenectomy

40.3 months vs 22.6 months (p= 0.005)

OVERALL SURVIVAL

Kobayashi S, et al. World J Surg 2020



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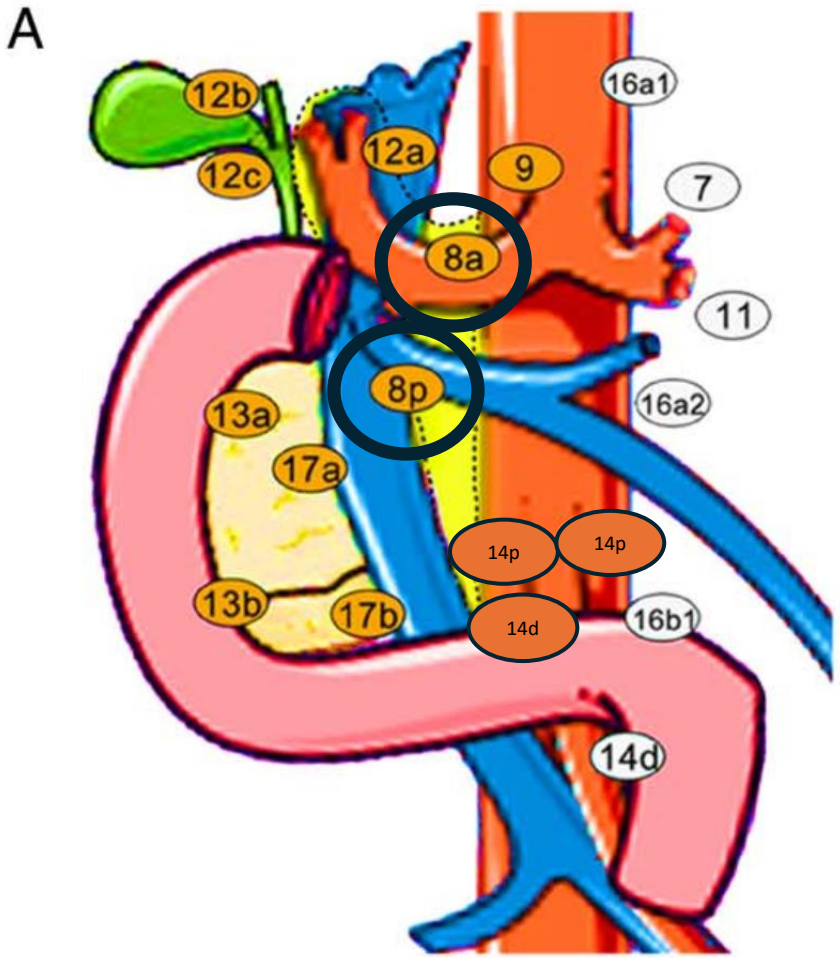
PANCREATIC HEAD PLEXUS (PL ph)

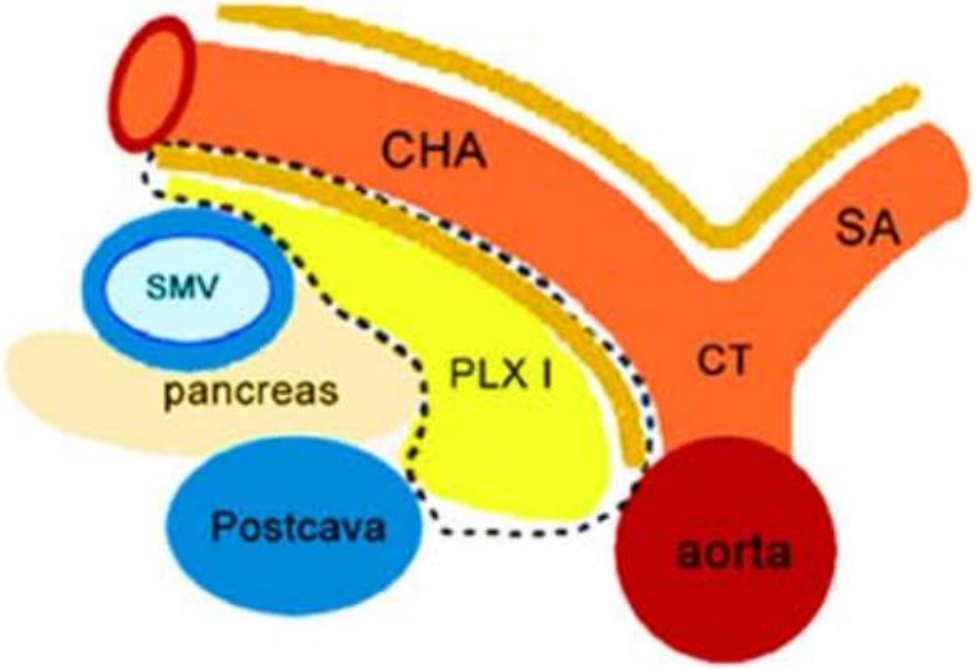
ARTERY FIRST

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

COMMON HEPATIC ARTERY LYMPH NODES

❑8a ❑8p





Guo X, et al. Int J Surg 2023.

36th IASGO
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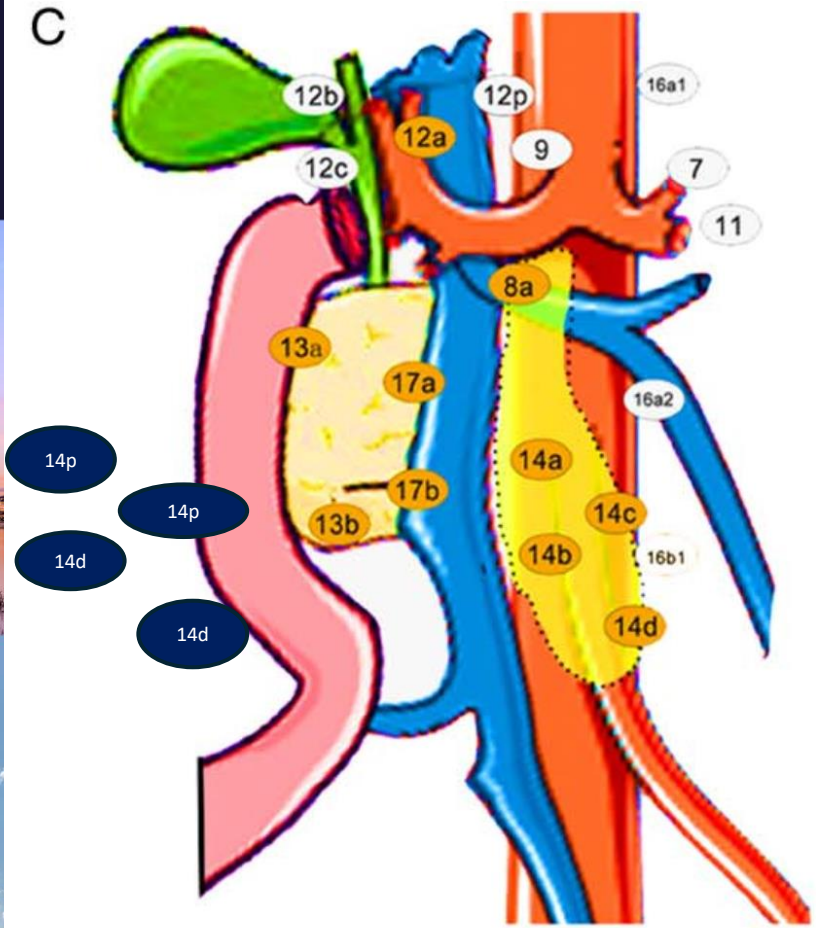
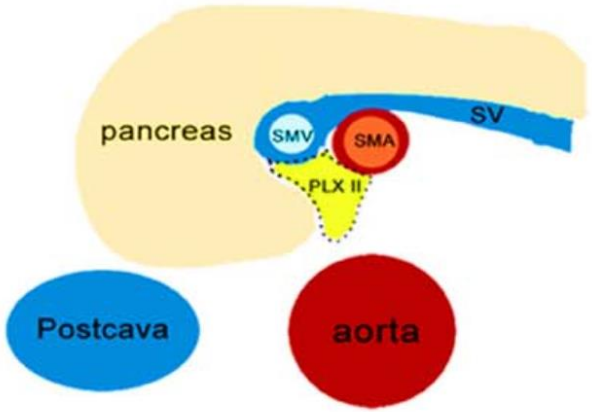
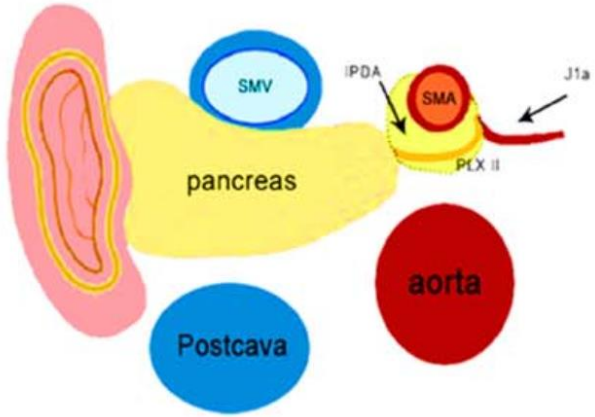
Belgrade, Serbia

SUPERIOR MESENTERIC ARTERY LYMPH NODES

❑14p ❑14d





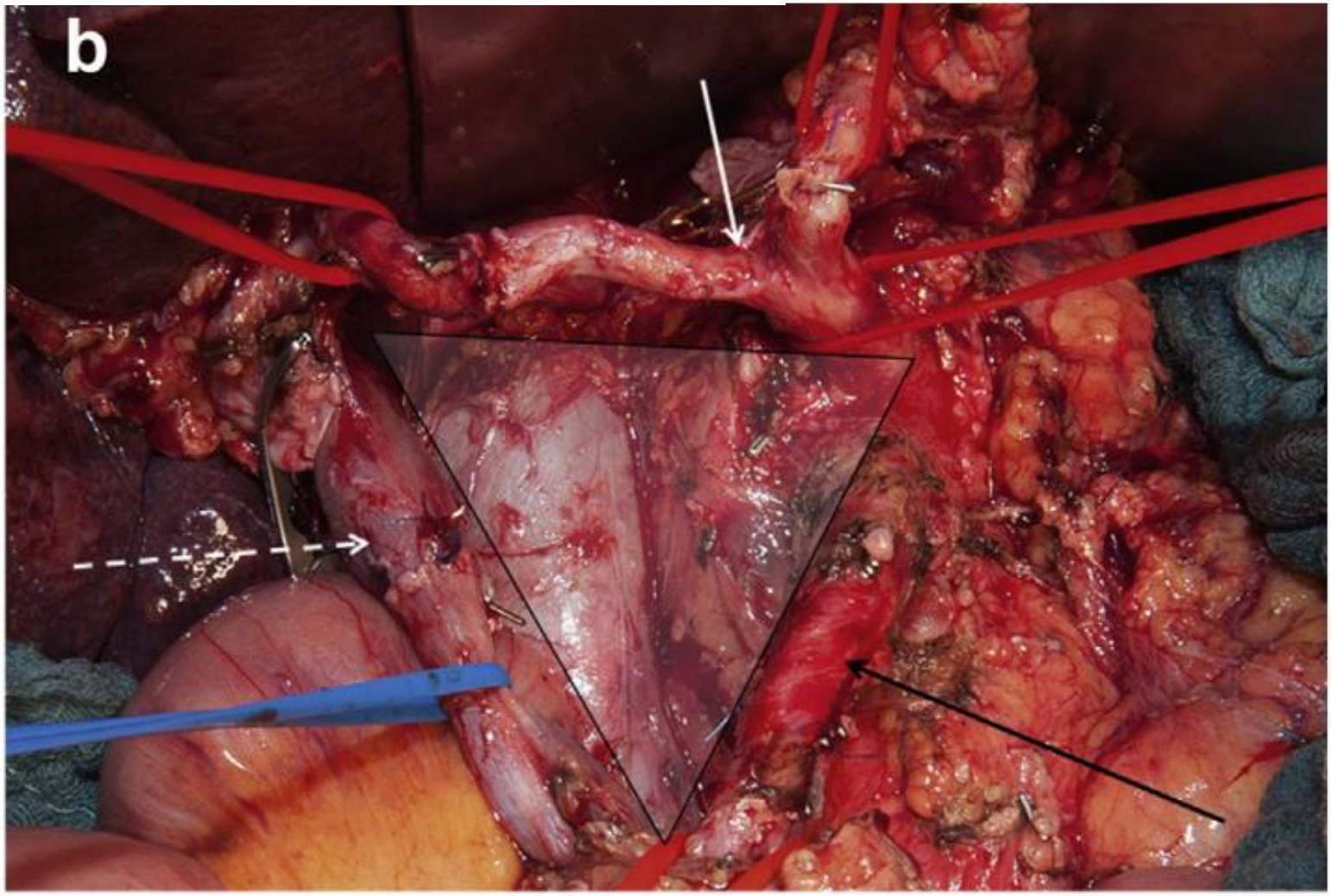


Guo X, et al. Int J Surg 2023.

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

36th IASGO
WORLD CONGRESS

17th - 19th September 2025
Belgrade, Serbia

http://dx.doi.org/10.1016/j.hpb.2015.11.009 HPB

REVIEW ARTICLE

A systematic review of the role of periadventitial dissection of the superior mesenteric artery in affecting margin status after pancreatoduodenectomy for pancreatic adenocarcinoma

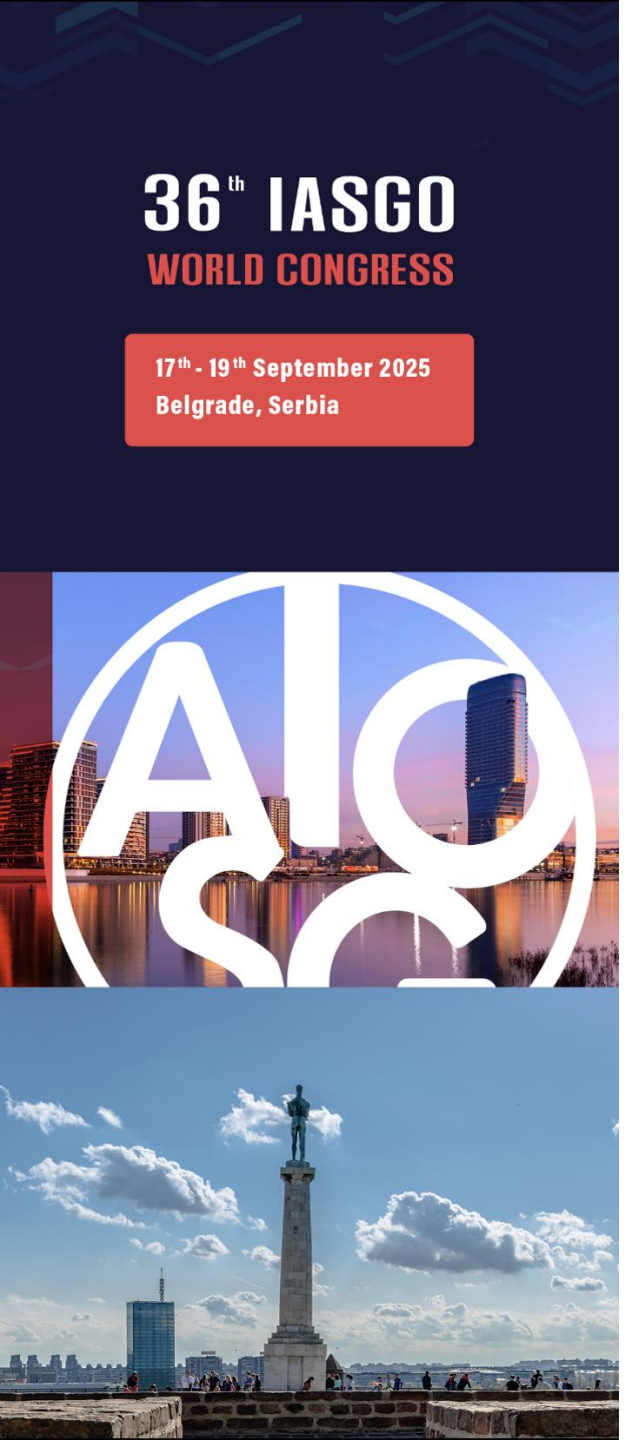
James R. Butler[1], Syed A. Ahmad[2], Matthew H. Katz[3], Jessica L. Cioffi[1] & Nicholas J. Zyromski[1]

[1]Indiana University School of Medicine, Department of Surgery, Indianapolis IN, [2]The University of Cincinnati Cancer Institute, Cincinnati OH, and [3]Department of Surgical Oncology, The University of Texas MD Anderson Cancer Center, Houston, TX, USA

- R0 resection 16-79%
- SMA most often positive (15-45%)
- Positive margin was associated with decreased survival.

Conclusions: Margin positivity in resectable pancreatic adenocarcinoma is associated with poor survival. Inability to clear the SMA margin is the most common cause of incomplete resection.

Butler JR, et al. HPB 2015



ADVANTAGES OF ARTERY FIRST APPROACH

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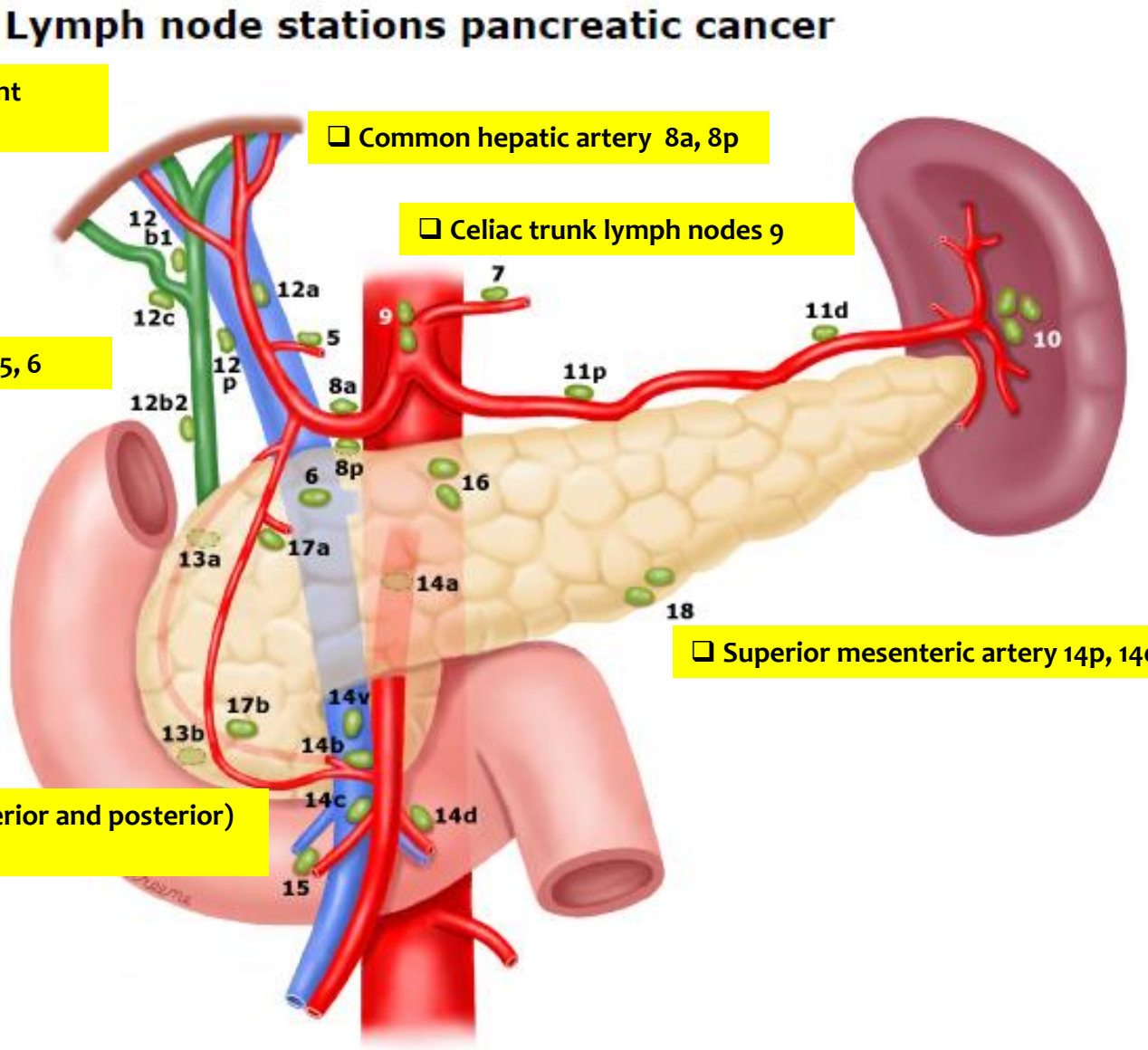
LYMPHATICS



❑ Hepatoduodenal ligament
12a, 12b1, 12b2, 12p, 12c

❑ Common hepatic artery 8a, 8p

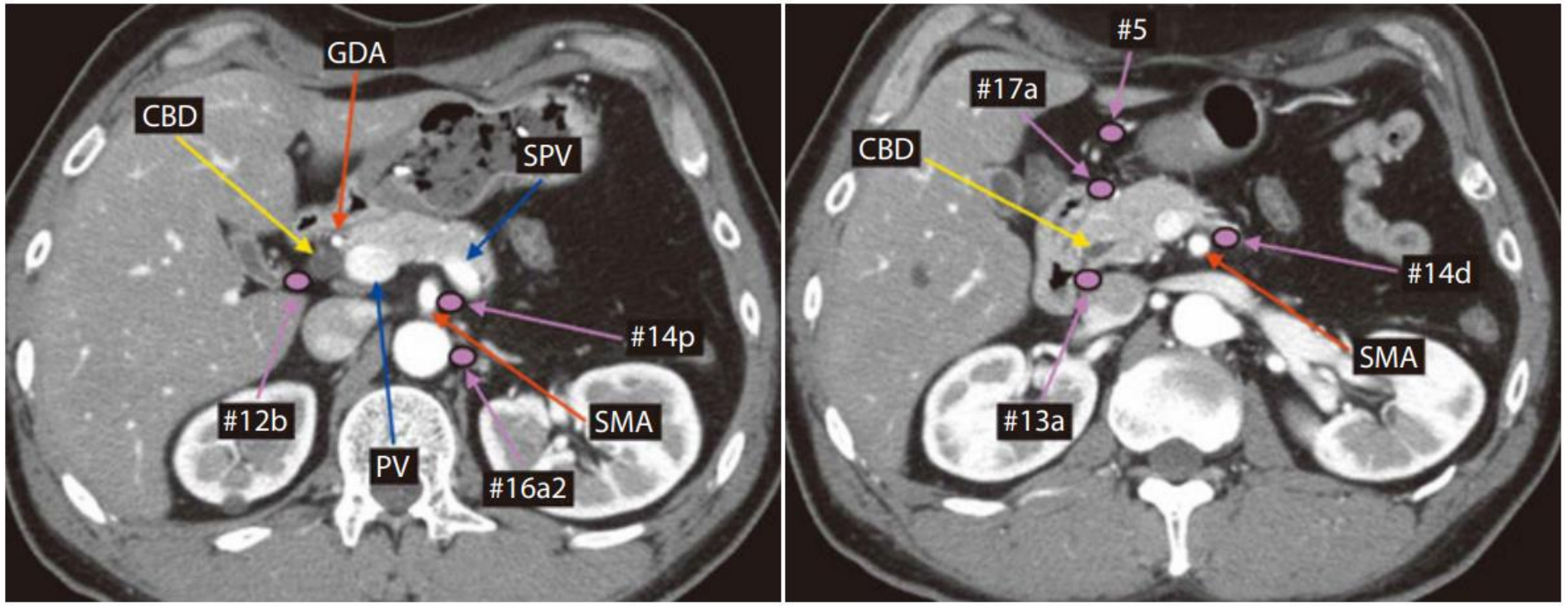
❑ Celiac trunk lymph nodes 9

❑ Pyloric 5, 6

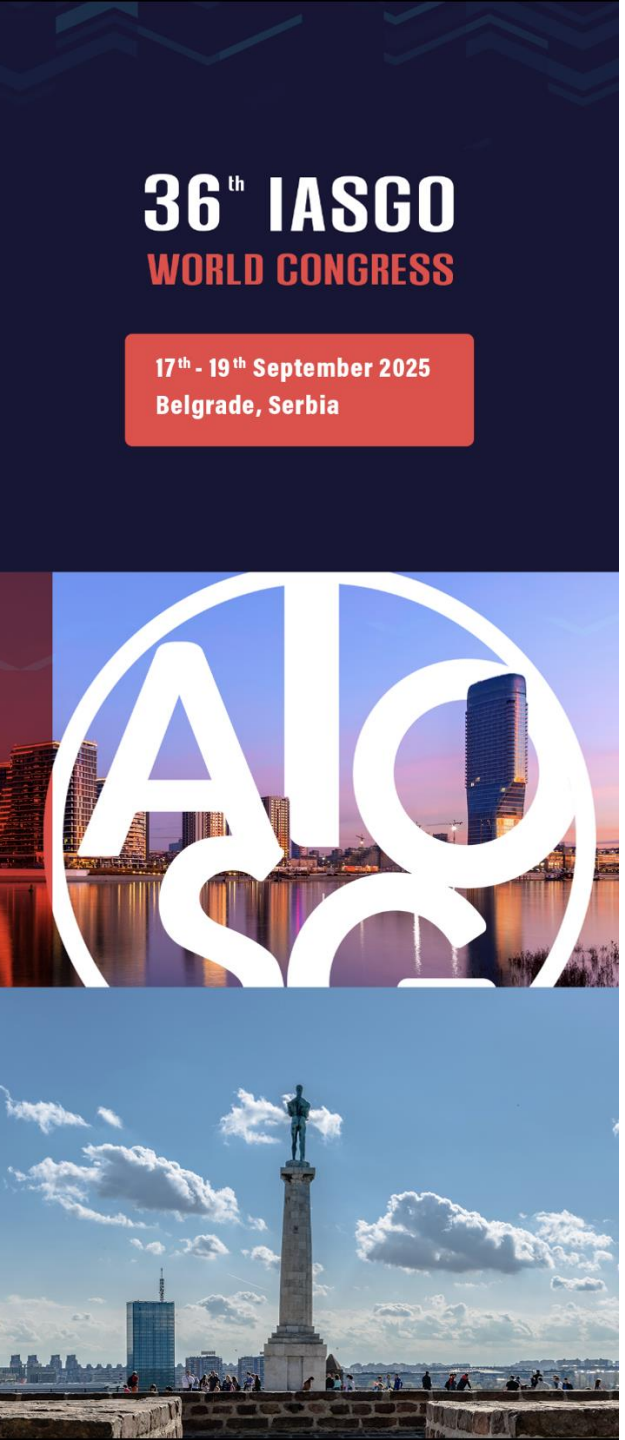
❑ Superior mesenteric artery 14p, 14d

❑ Pancreatoduodenal (anterior and posterior)
13a, 13b, 17a, 17b

LYMPHADENECTOMY



14p, 14d



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.1007/s00268-020-05856-w

World Journal of Surgery

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ORIGINAL SCIENTIFIC REPORT

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

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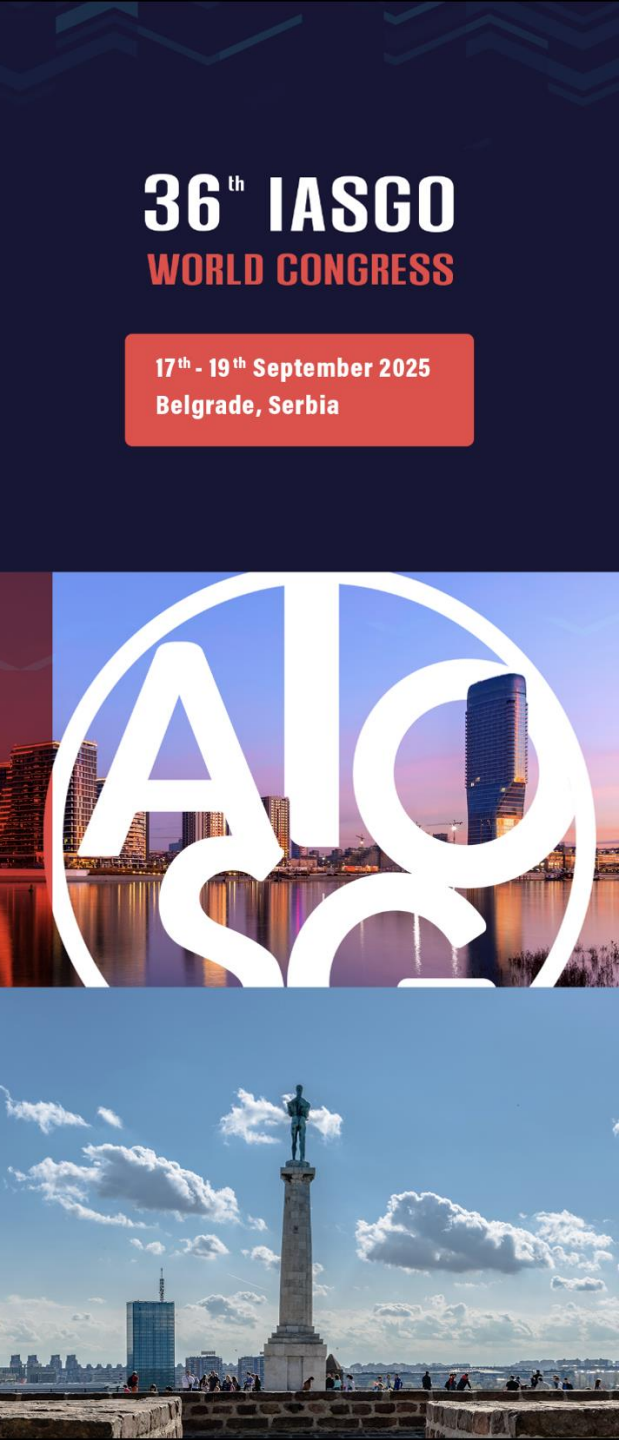
Table 2 Comparison of perioperative and oncological outcomes between the AFA-PD group and the conventional PD group

	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 ($p < 0.05$)

AFA-PD - Artery first approach pancreatoduodenectomy

Kobayashi S, et al. World J Surg 2020



ADVANTAGES OF ARTERY FIRST APPROACH

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

1. Resection without breaching the tumor extension plane, thereby minimizing cell spillage
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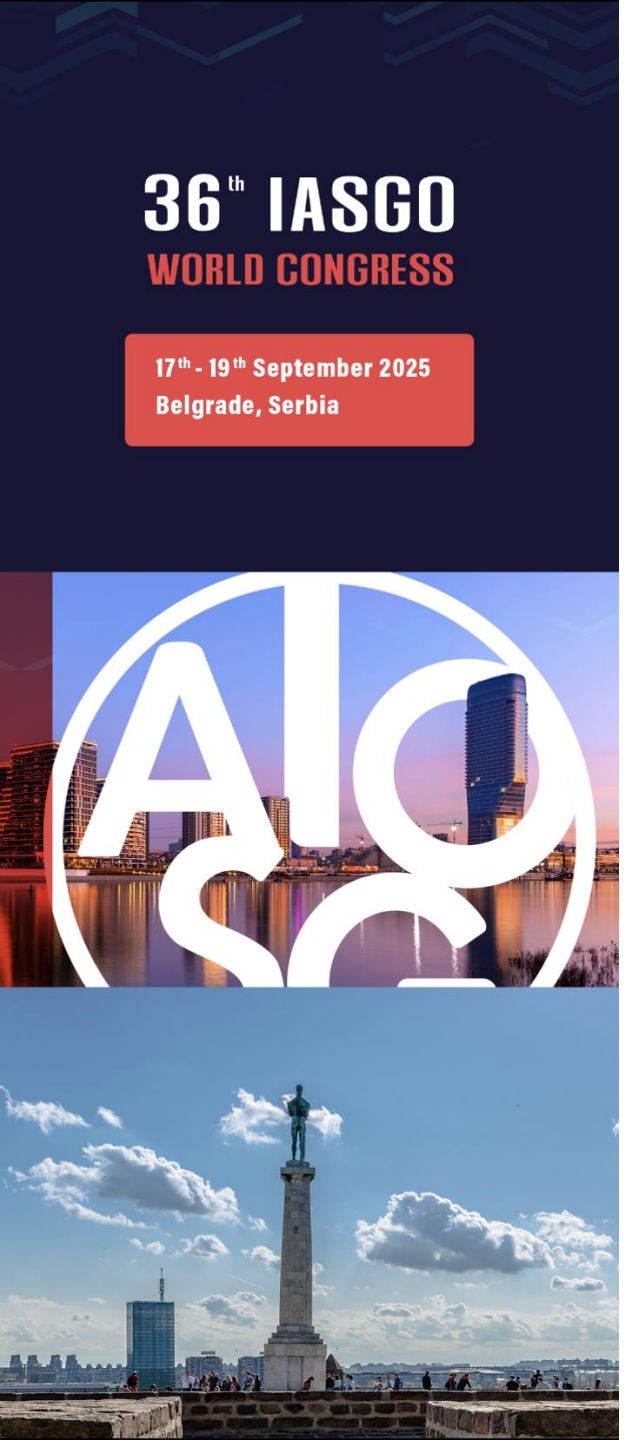

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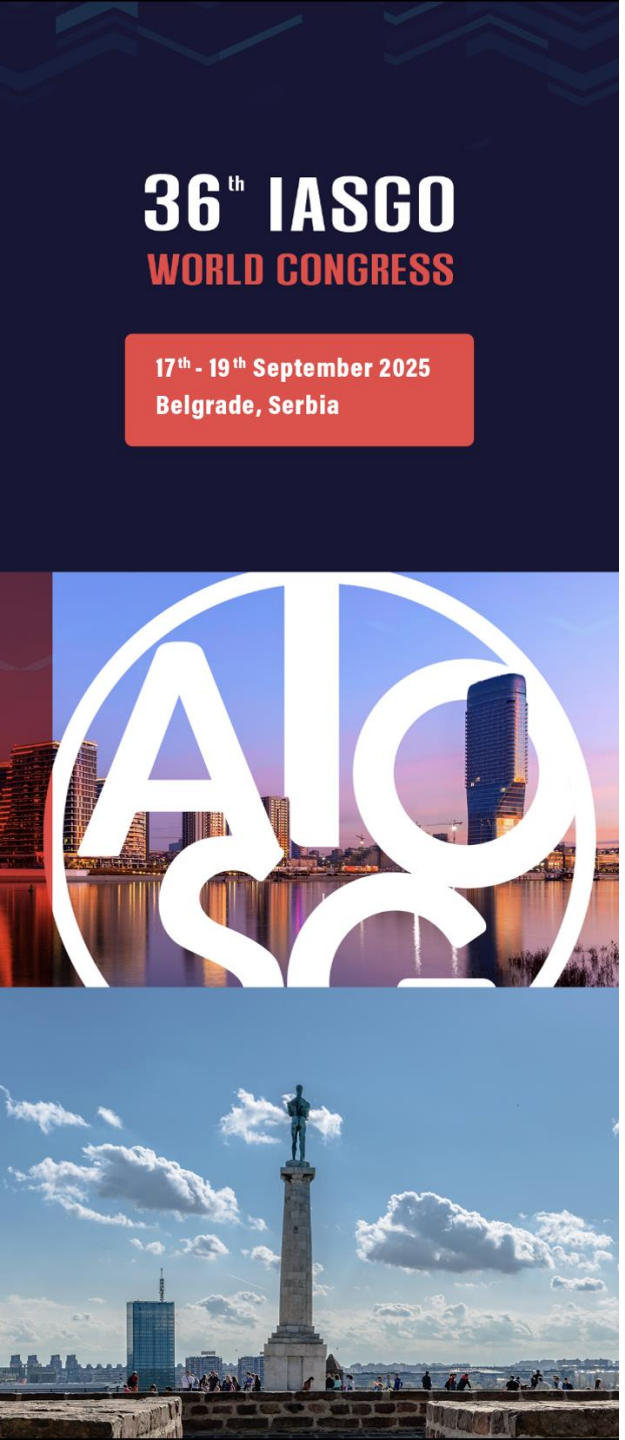

VASCULAR RESECTION

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VEIA PORTA/VEIA MESENTÉRICA SUPERIOR

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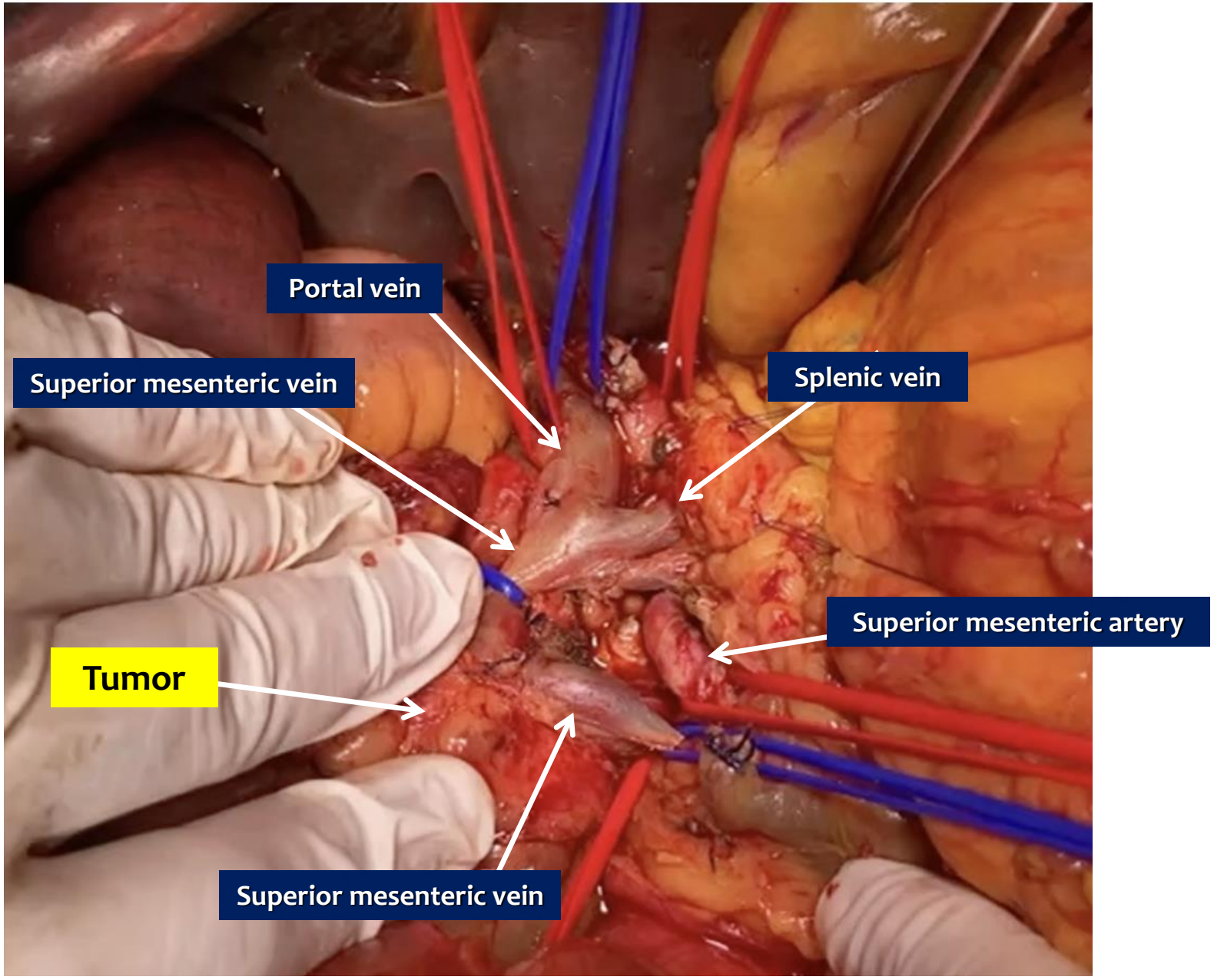
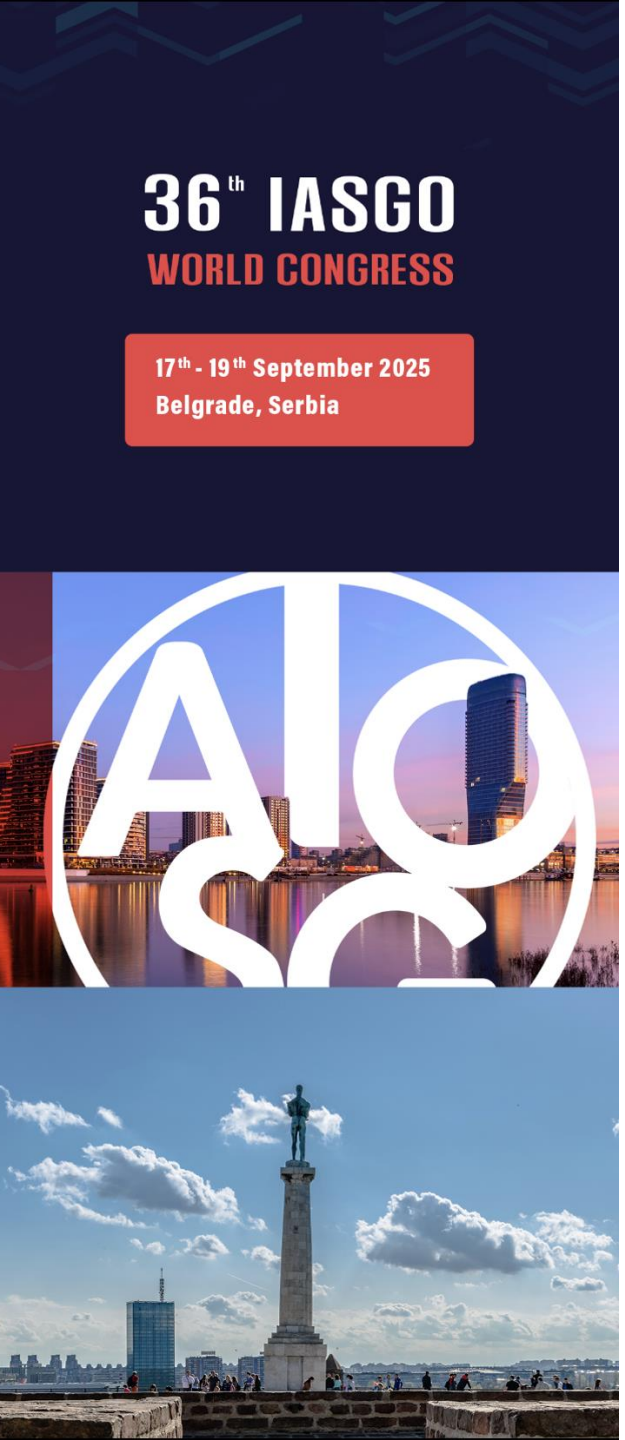

Portal vein
Superior mesenteric vein
Splenic vein
Superior mesenteric artery
Tumor
Superior mesenteric vein



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MENOR TEMPO OPERATÓRIO

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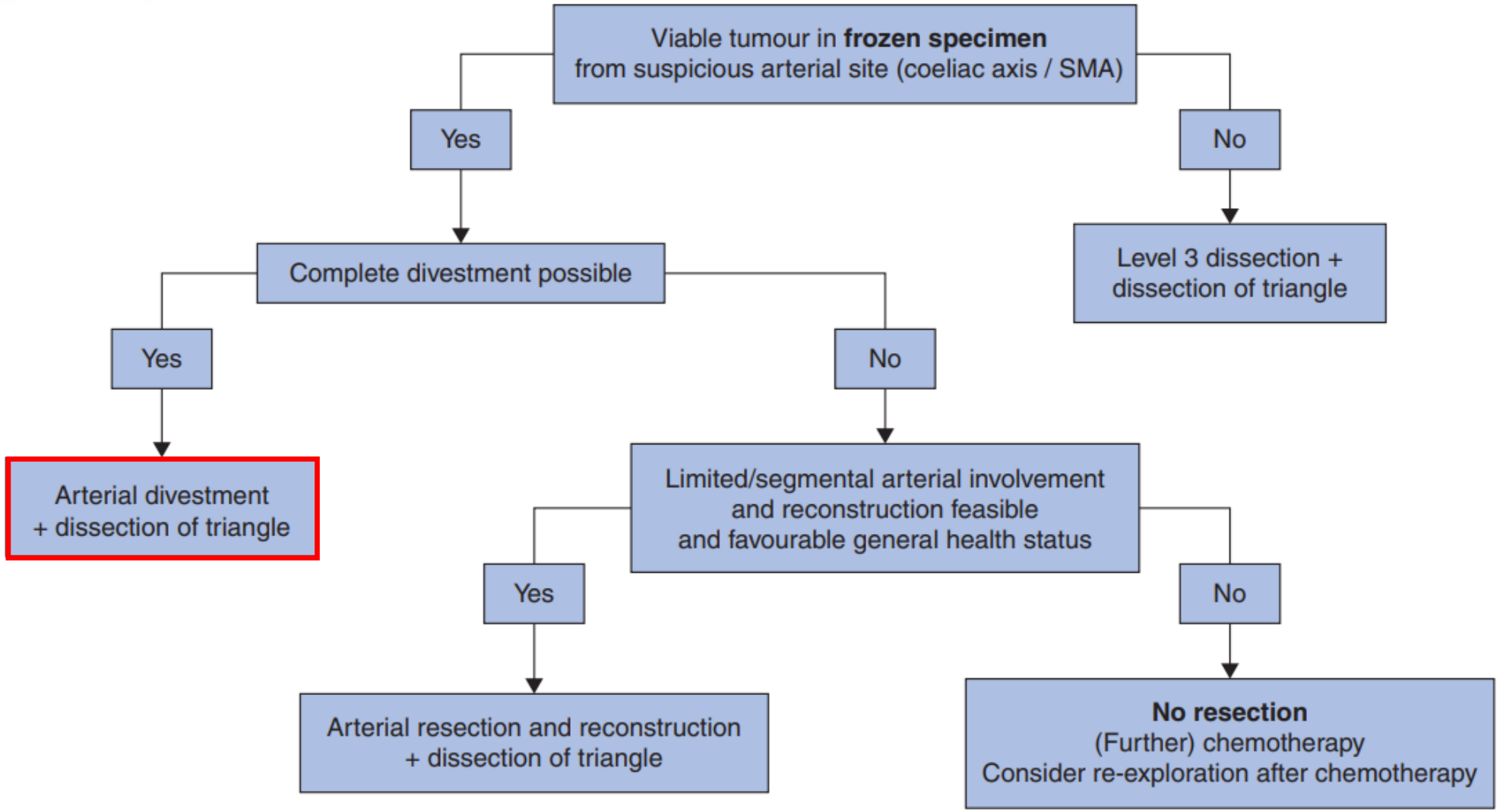
DIVESTMENT



Schneider M, et al. BJS 2021; 108: 777–85

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BJS, 2023, 1–4
https://doi.org/10.1093/bjs/znad175
Young BJS

Contemporary artery-first approaches in pancreatoduodenectomy

Philip C. Müller[1,*], Beat P. Müller[1] and Thilo Hackert[2]

Conclusions

In modern pancreatic surgery, a thorough understanding of the various AFAs is of paramount importance, especially in advanced pancreatic head cancers or after neoadjuvant chemotherapy.

Muller PC, et al. Br J Surg 2023

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