SOCIEDADE BRASILEIRA DE CIRURGIA ONCOLÓGICA
Filiada à AMB

XVI CONGRESSO BRASILEIRO DE CIRURGIA ONCOLÓGICA

15 A 18 DE NOVEMBRO DE 2023

RIO DE JANEIRO

# EXCISÃO DO MESOPÂNCREAS E DIVESTMENT: EVIDÊNCIA DE BENEFÍCIOS?

**Orlando Jorge M. Torres**
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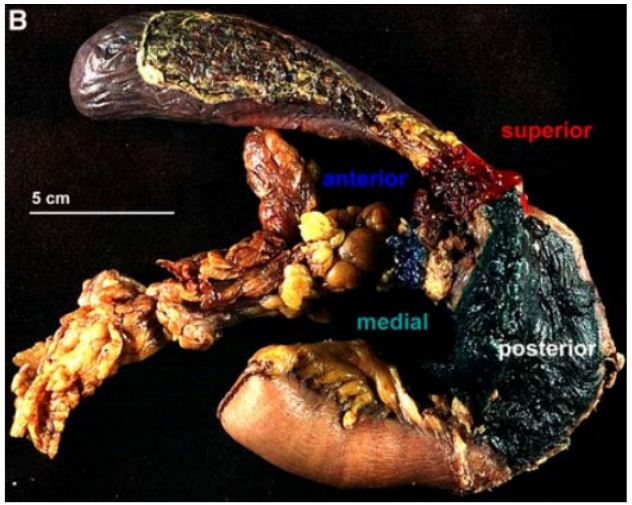
Universidade Federal do Maranhão - Brazil

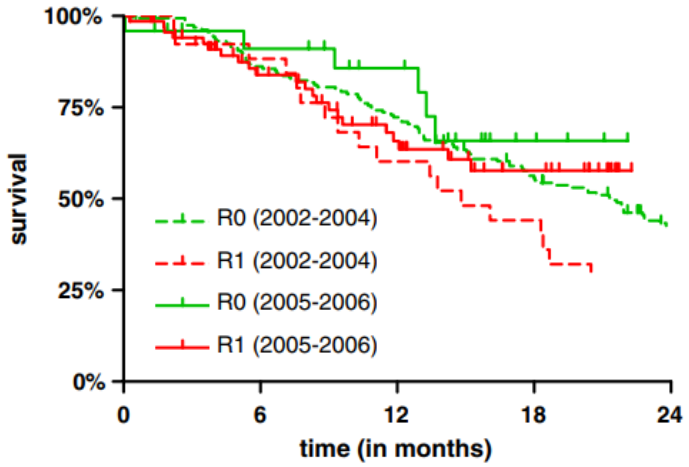
*Annals of Surgical Oncology* **15**(6):1651–1660
DOI: 10.1245/s10434-008-9839-8

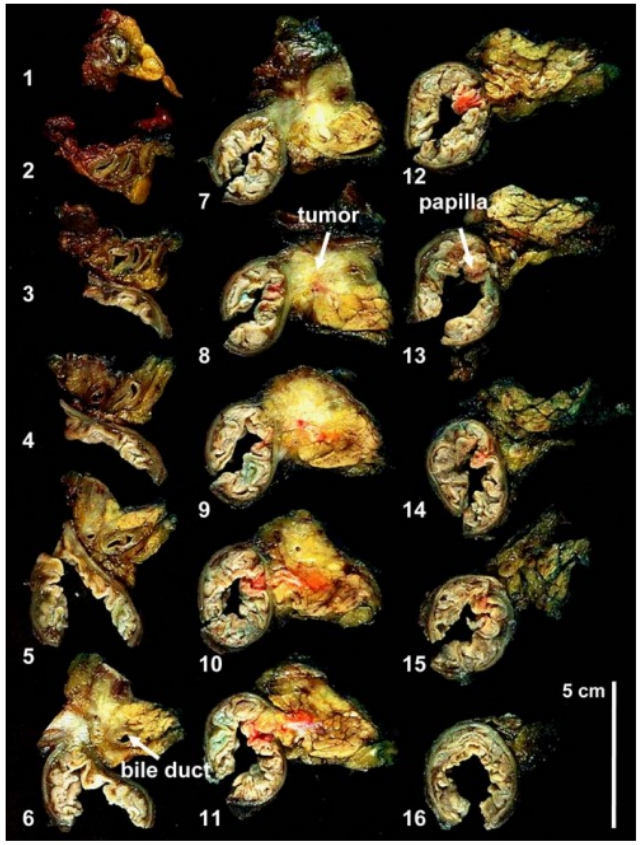
# Most Pancreatic Cancer Resections are R1 Resections

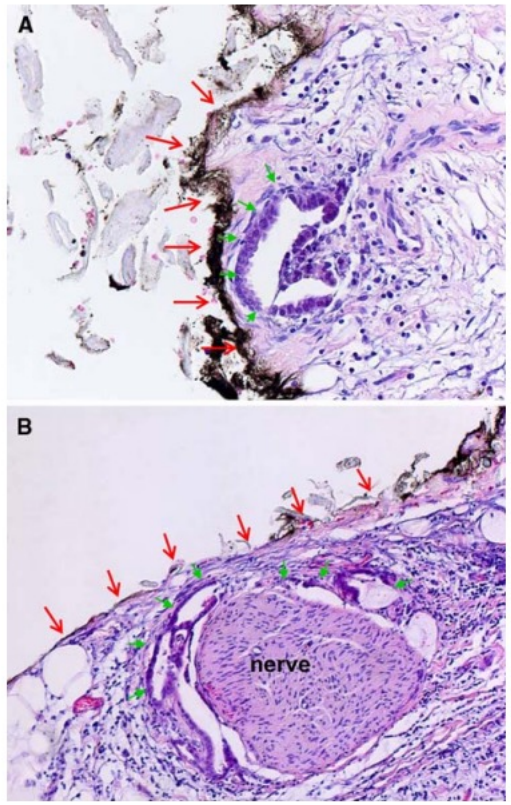
**2008**

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]




**Irene Esposito**
**Patologista de Heidelberg (Alemanha)**

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

*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]

**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.

**Mesopancreas**

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

ORIGINAL ARTICLE

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

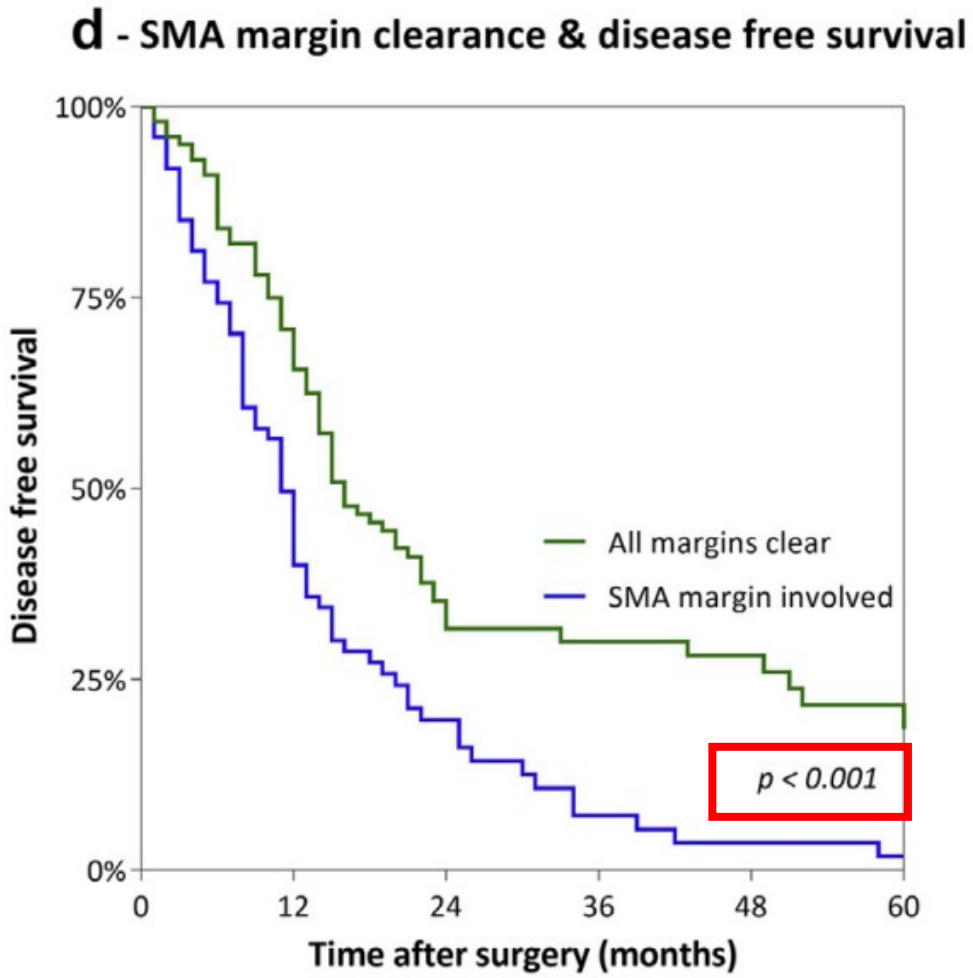
**Table 3** Patterns of pathologic margin involvement and recurrence of pancreatic cancer after pancreatoduodene

| 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

ORIGINAL ARTICLE

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




Kalisvaart M, et al. HPB 2020

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 and should be the target of future adjuvant local therapies.

Kalisvaart M, et al. HPB 2020

# Vocês estão operando errado!

**Irene Esposito**
**Patologista – Heidelberg, Alemanha**

frontiers in Oncology

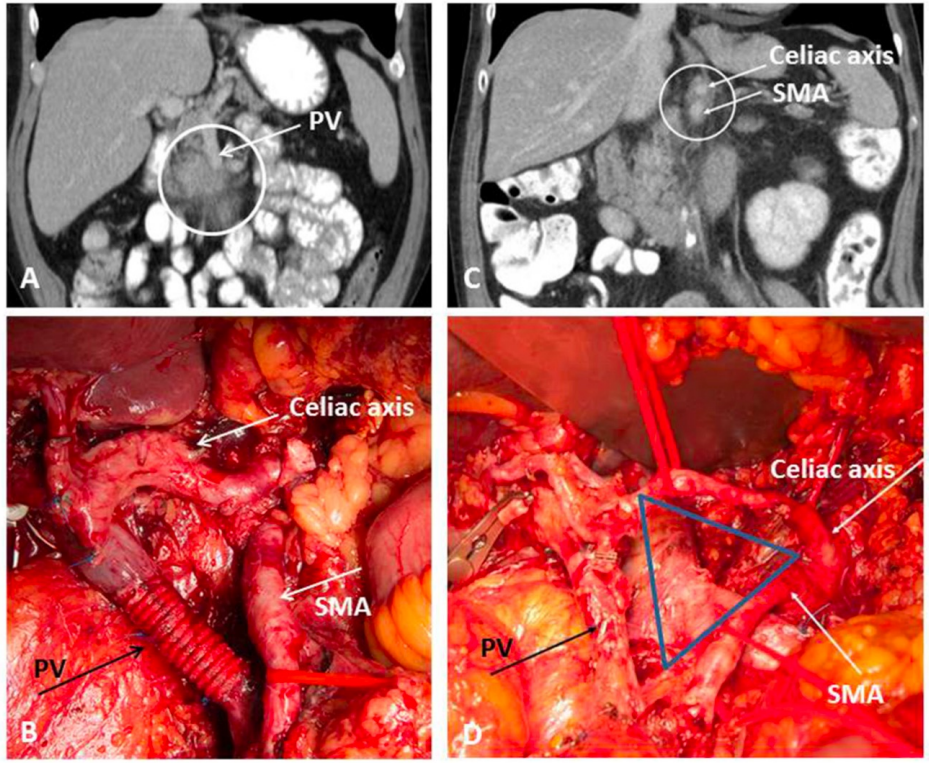
REVIEW
published: 14 January 2020
doi: 10.3389/fonc.2019.01501

# Conversion Surgery for Pancreatic Cancer—The Impact of Neoadjuvant Treatment

*Ulla Klaiber and Thilo Hackert**

*Department of General, Visceral and Transplantation Surgery, University of Heidelberg, Heidelberg, Germany*

Pancreatic ductal adenocarcinoma (PDAC) has still a dismal prognosis, mainly because only 15–20% of all patients present with resectable tumor stages at the time of diagnosis. Due to locally extended tumor growth or distant metastases upfront resection is not

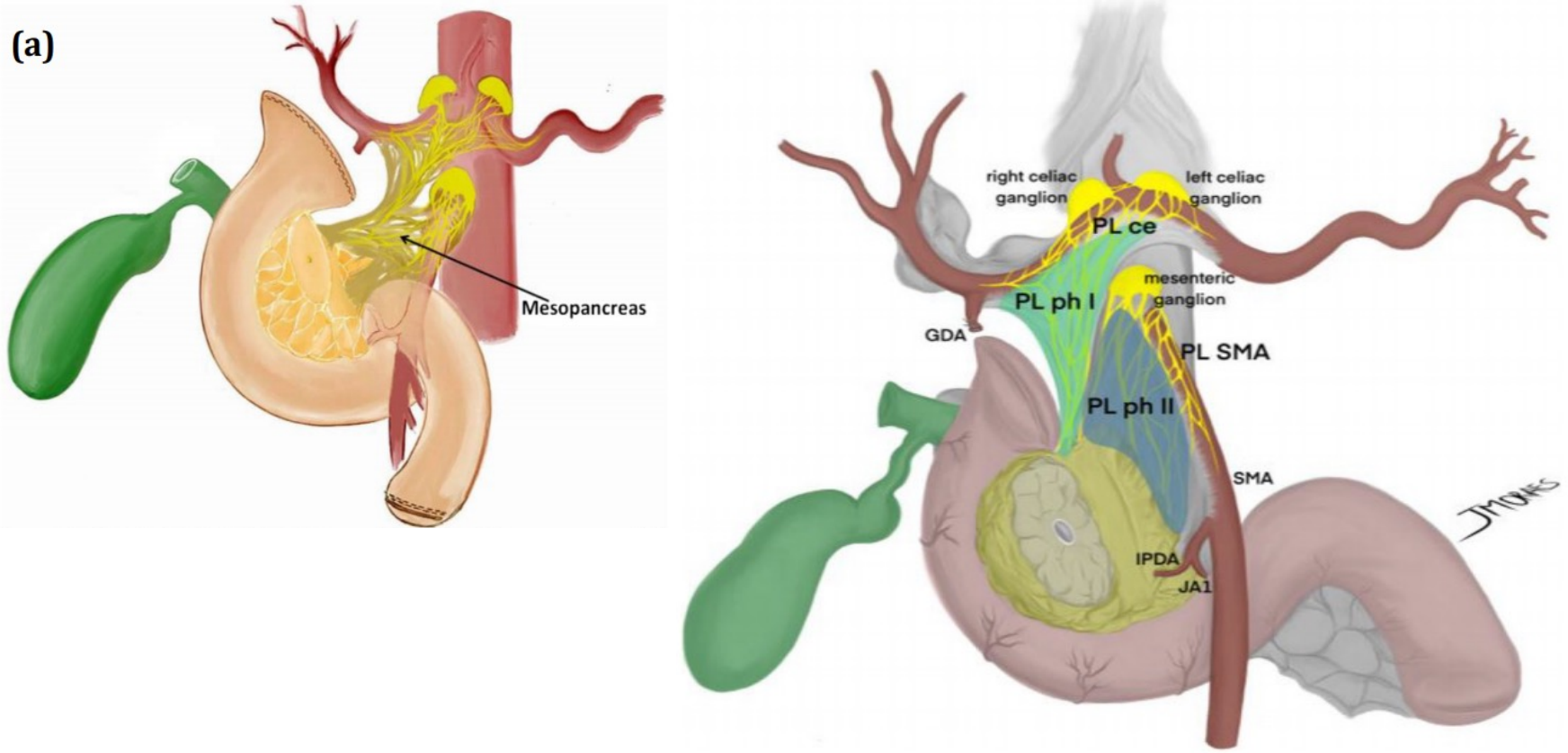


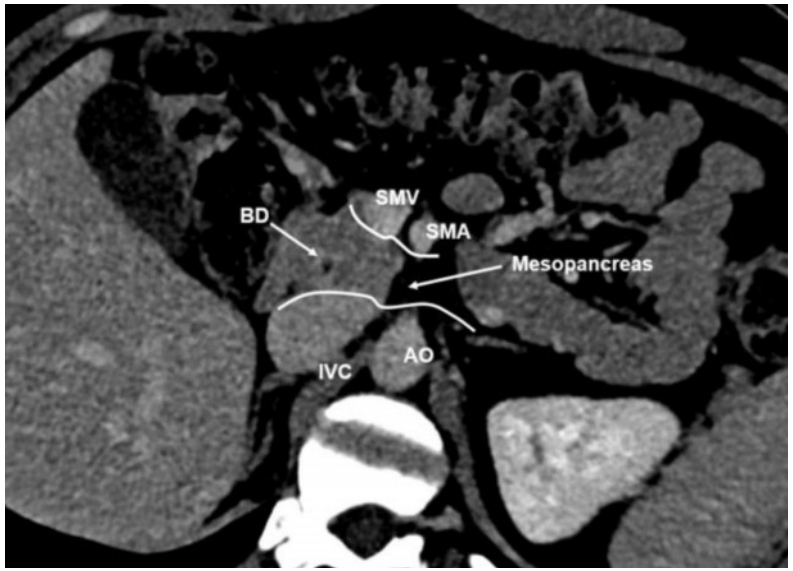
Langenbeck's Archives of Surgery
https://doi.org/10.1007/s00423-021-02211-y

REVIEW ARTICLE

# What do surgeons need to know about the mesopancreas

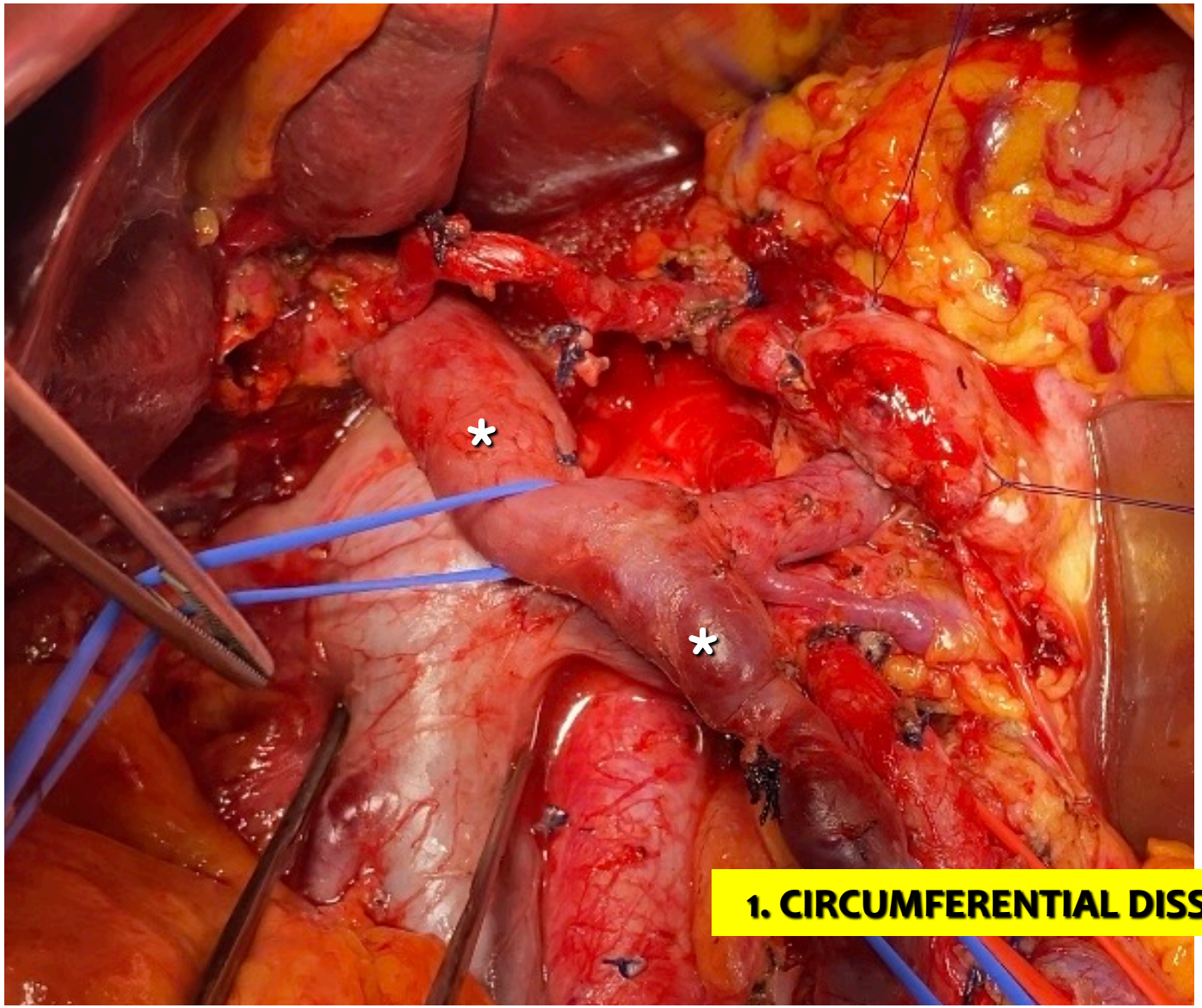
Eduardo de Souza M. Fernandes [1,2] · Oliver Strobel [3,4] · Camila Girão [1,2] · Jose Maria A. Moraes-Junior [5,6] · Orlando Jorge M. Torres [5,6]



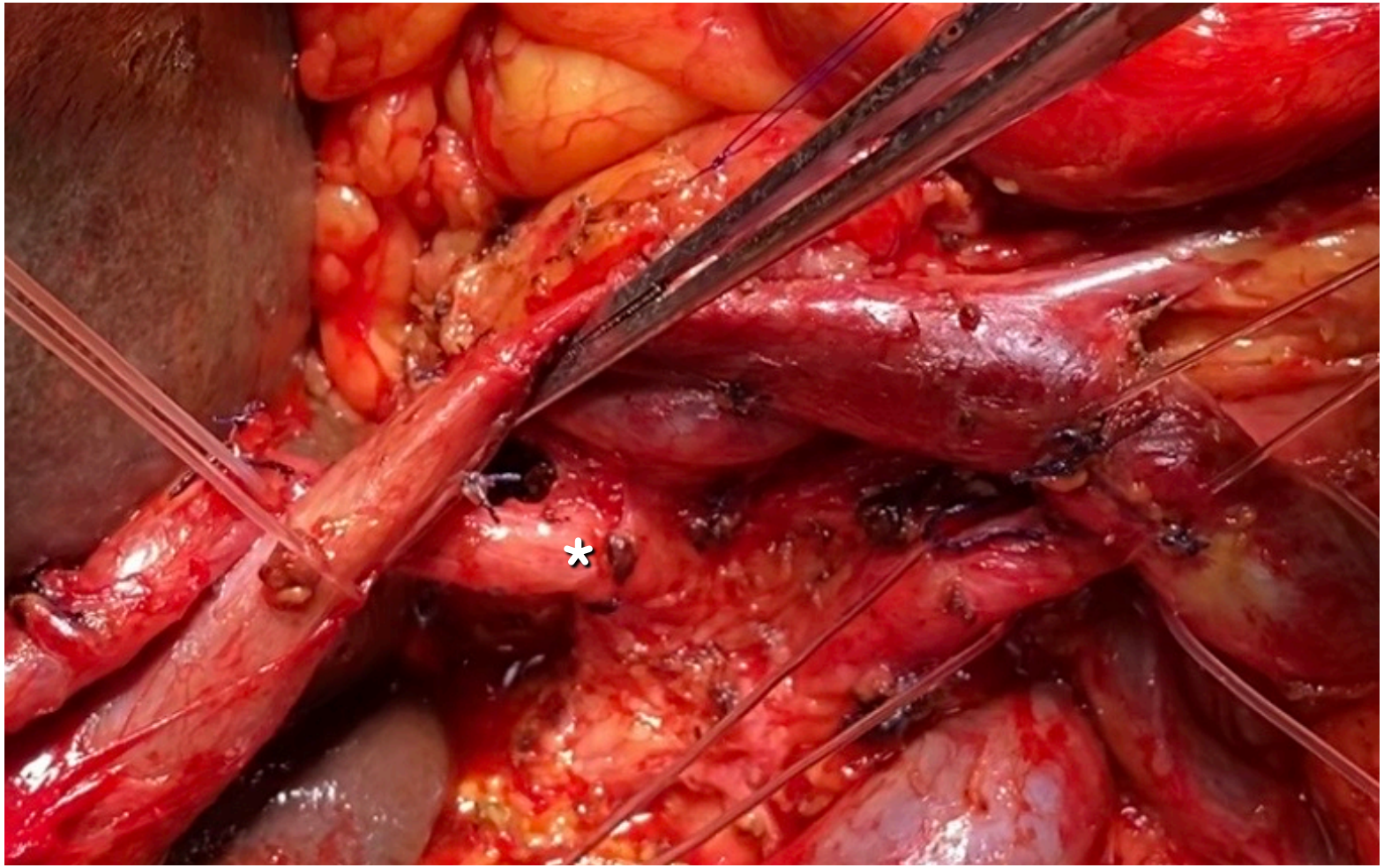

Fernandes ESM, et al. Langenbeck's Arch Surg 2021

# TOTAL MESOPANCREAS EXCISION



# TOTAL MESOPANCREAS EXCISION

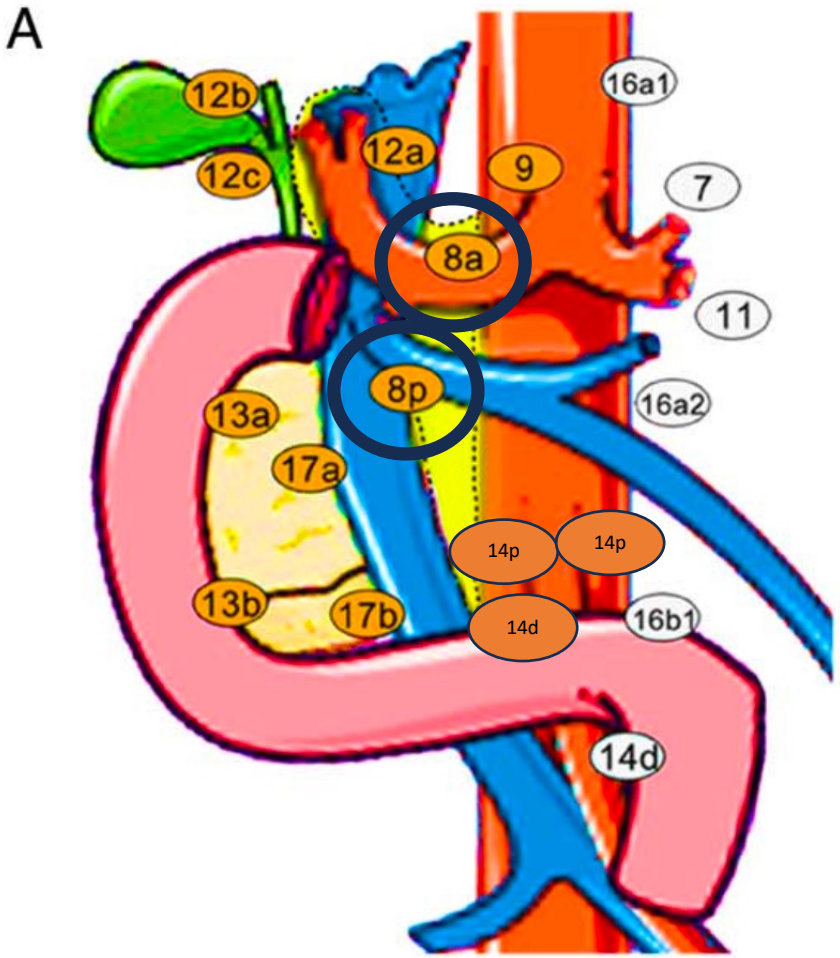
❑Common hepatic artery lymph nodes 8a, 8p

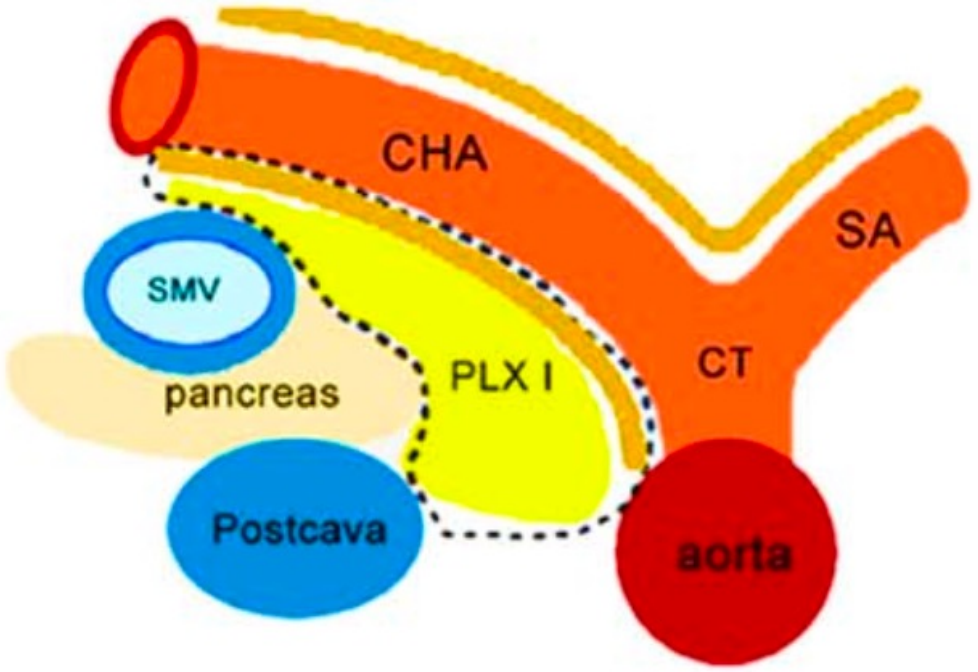



**2. HEMICIRCUMFERENTIAL DISSECTION OF CHA**

# COMMON HEPATIC ARTERY LYMPH NODES

❑8a ❑8p

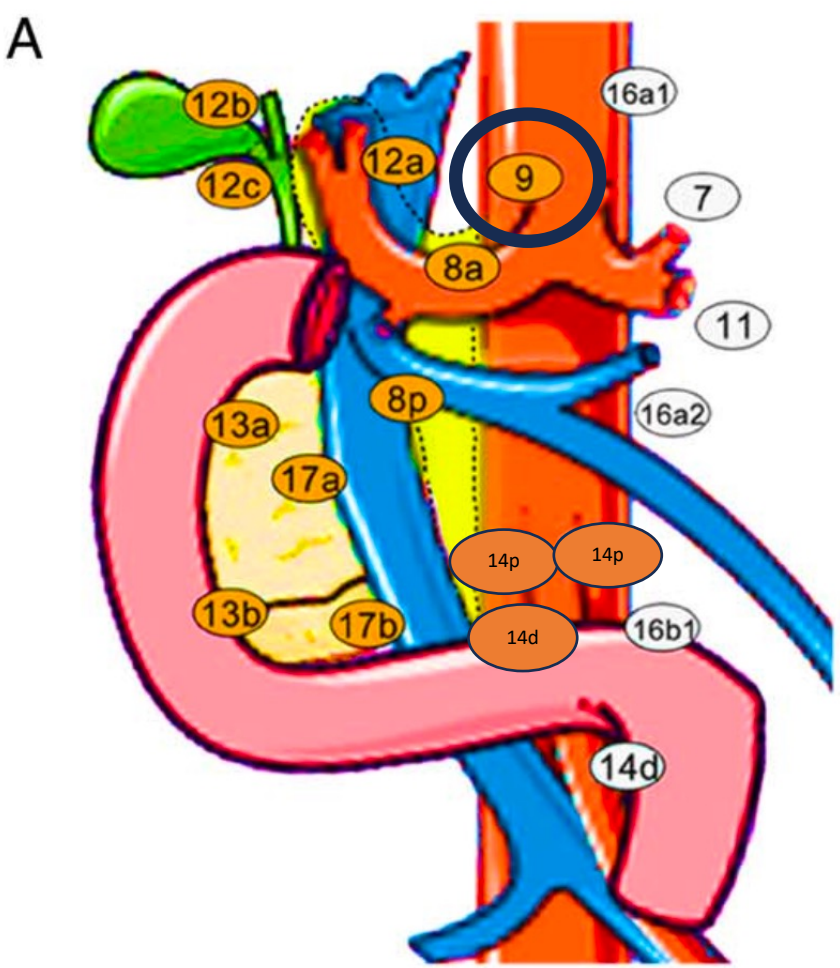


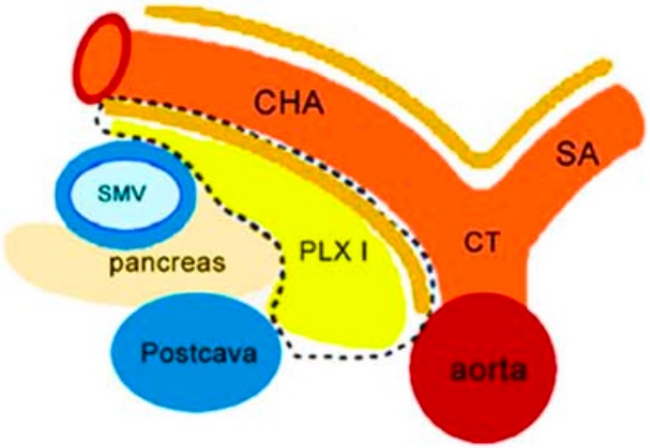

Guo X, et al. Int J Surg 2023.

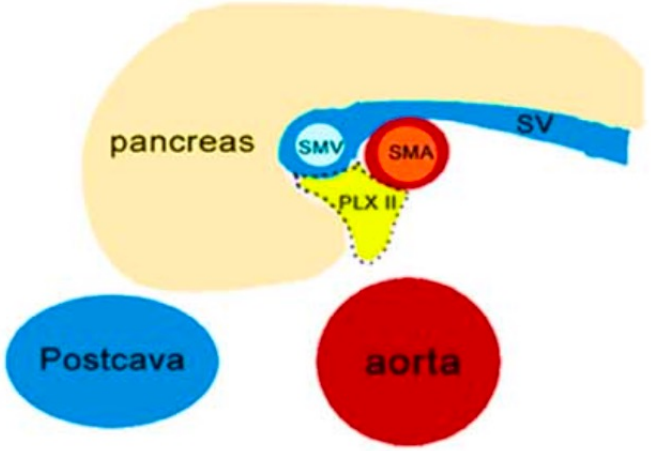
# CELIAC TRUNK LYMPH NODES

❑ Celiac trunk lymph nodes 9



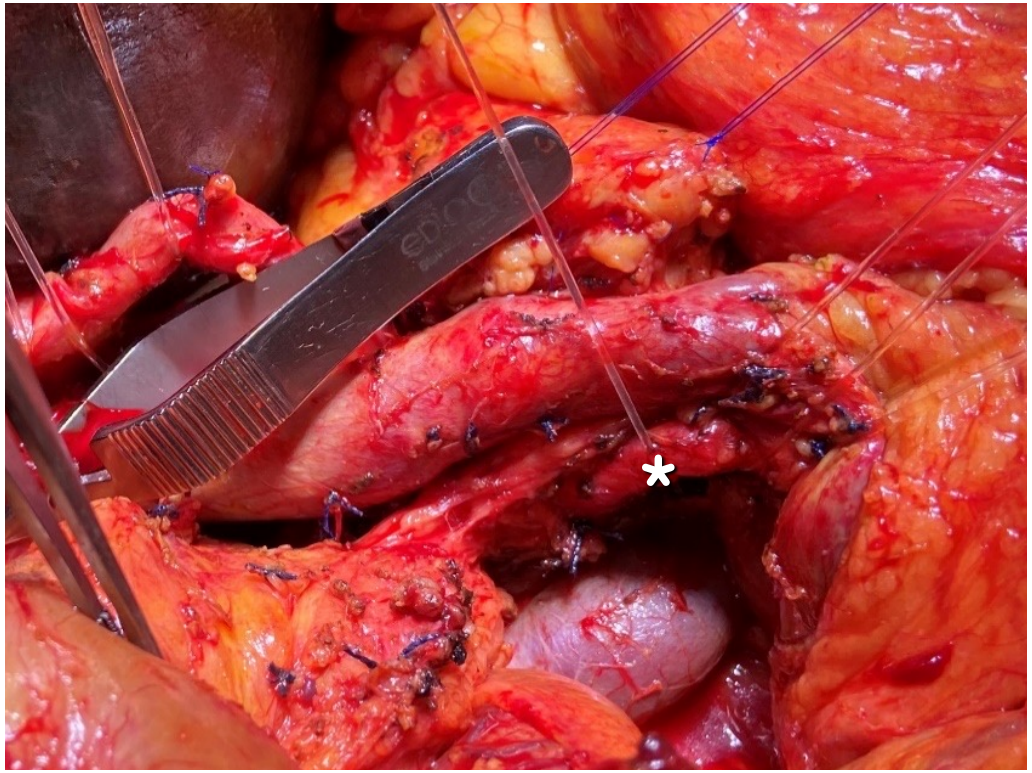

❑9

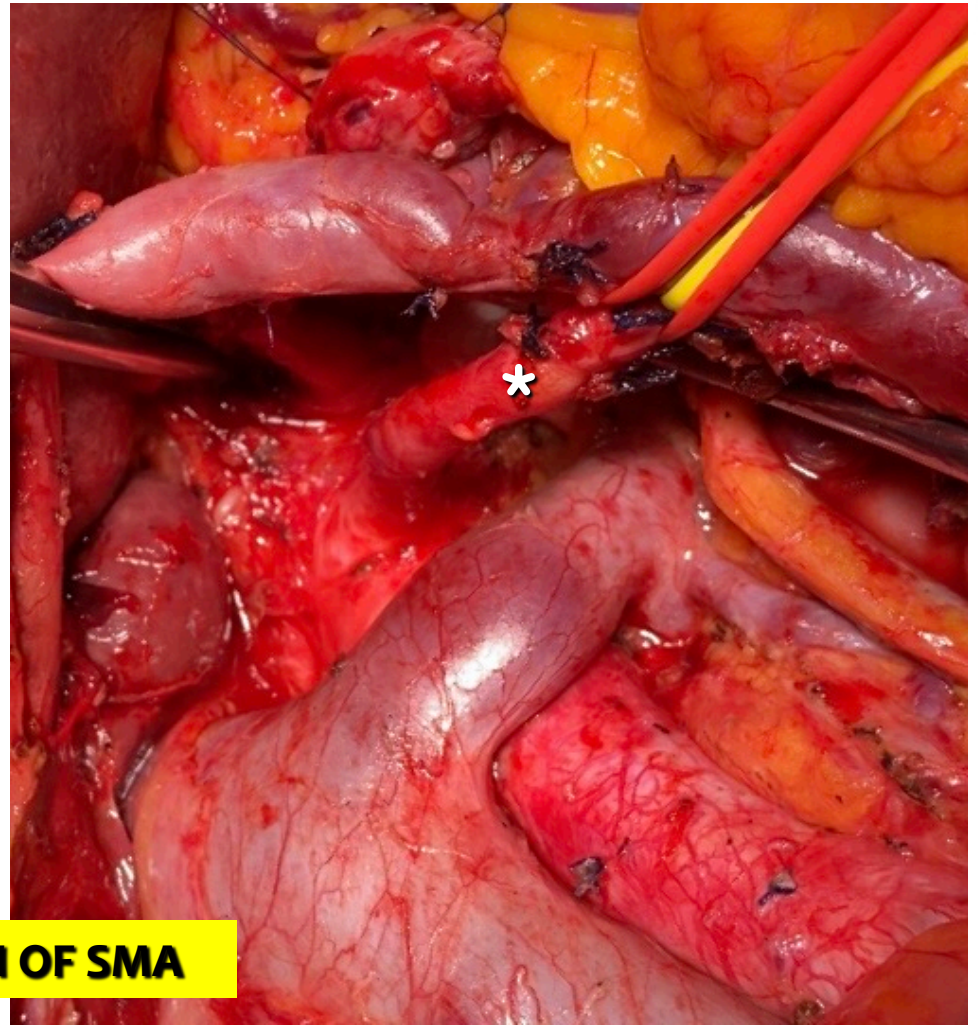



Guo X, et al. Int J Surg 2023.

# TOTAL MESOPANCREAS EXCISION

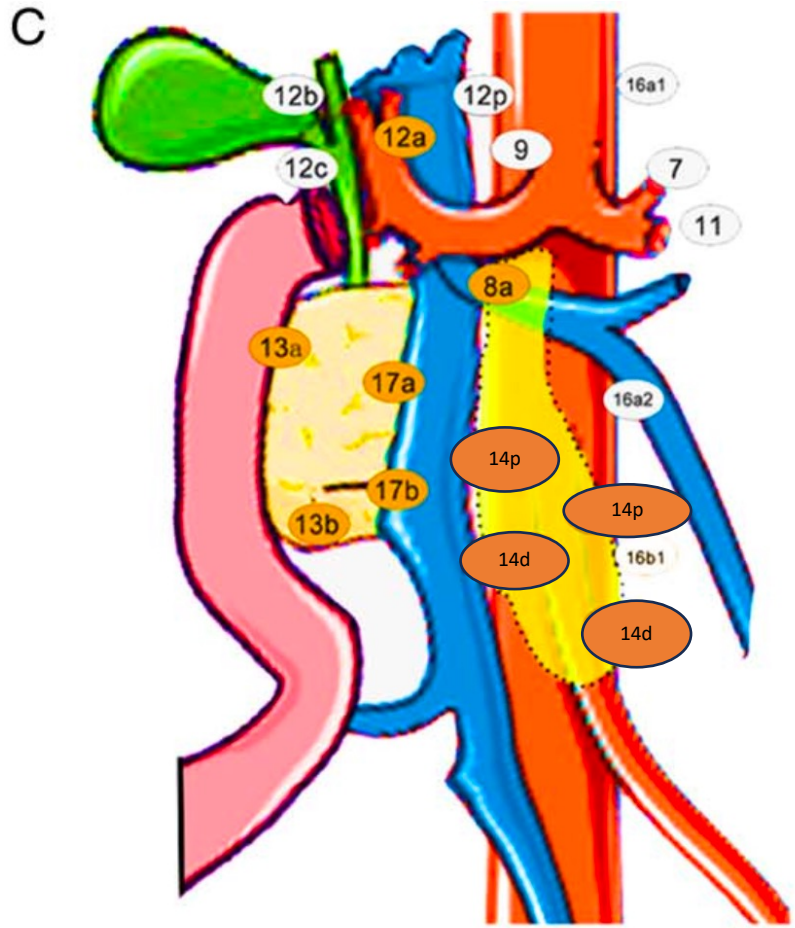


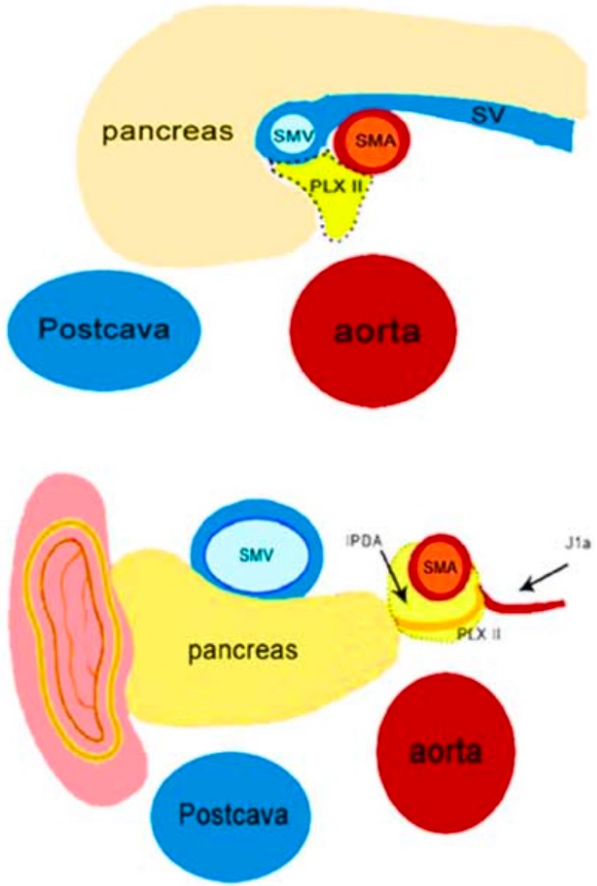


**3. HEMICIRCUMFERENTIAL DISSECTION OF SMA**

# SUPERIOR MESENTERIC ARTERY LYMPH NODES

❑14p ❑14d



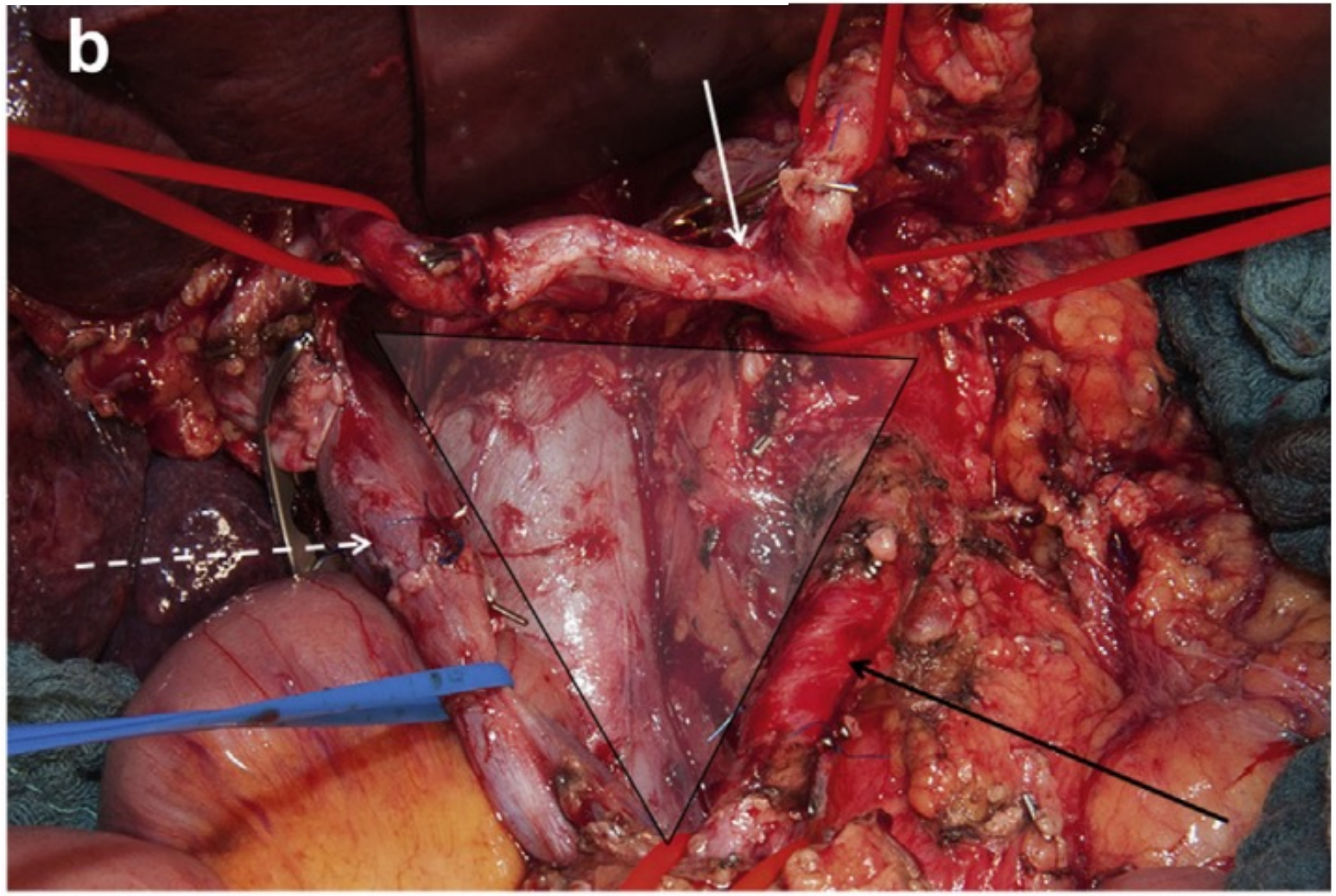




Guo X, et al. Int J Surg 2023.

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

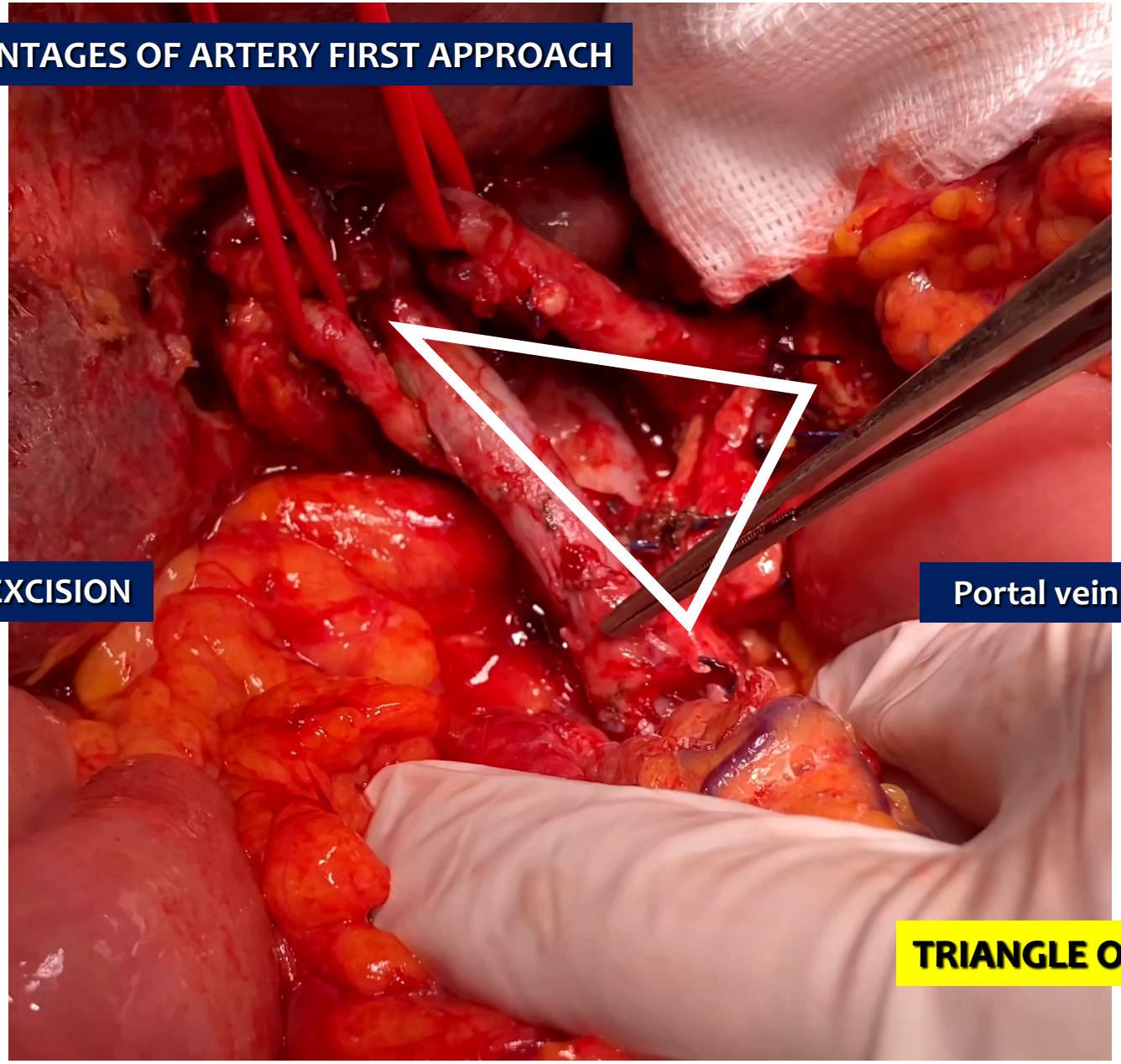
ORIGINAL ARTICLE

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




Hackert T, et al. HPB 2017

# ADVANTAGES OF ARTERY FIRST APPROACH



TOTAL MESOPANCREAS EXCISION

Portal vein resection

TRIANGLE OPERATION

Ann Hepatobiliary Pancreat Surg 2020;24:389-395
https://doi.org/10.14701/ahbps.2020.24.4.389

Review Article

# *En bloc* proximal peri-mesenteric clearance for pancreatic head cancer surgery

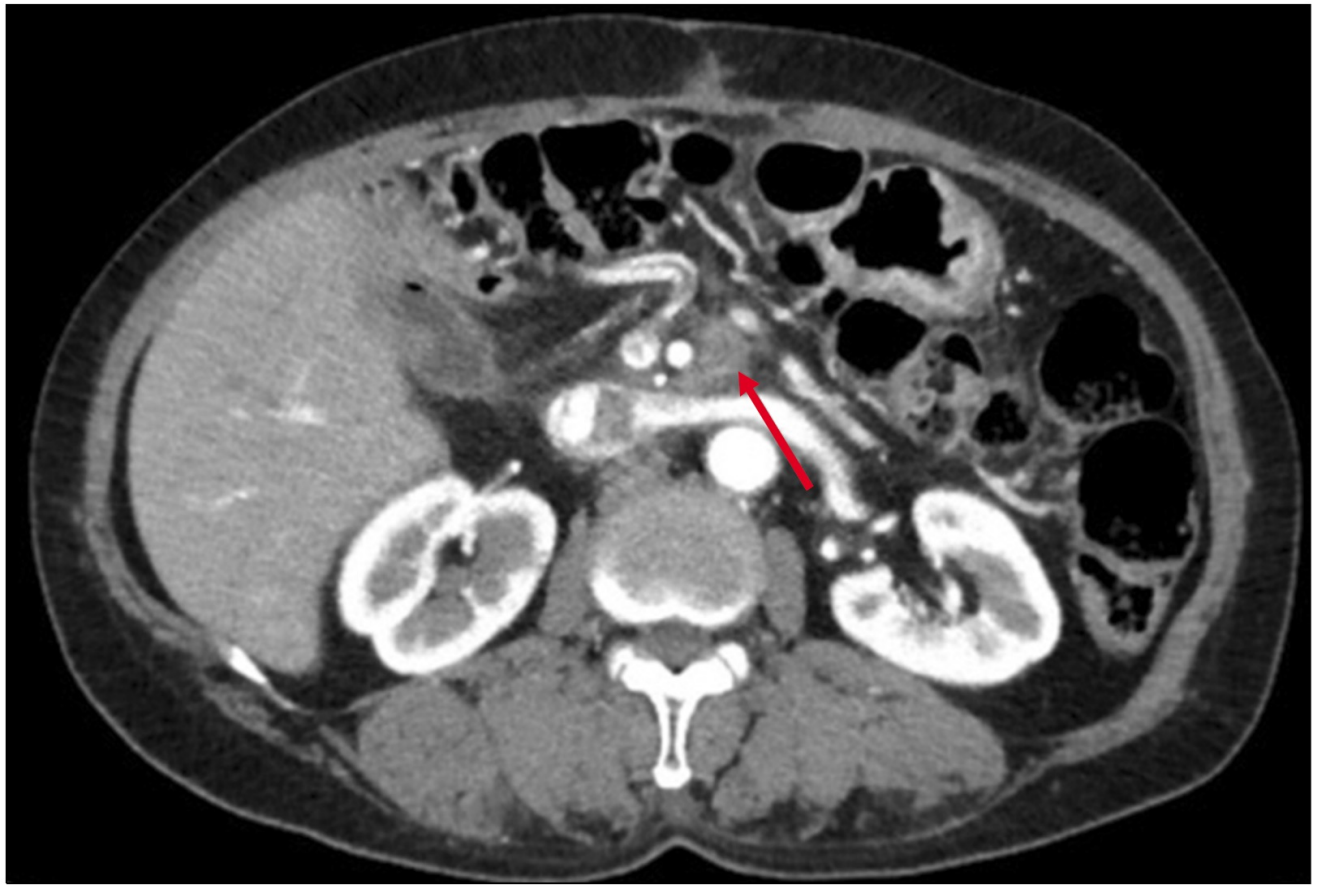


**Fig. 1.** Nodal type local recurrence of pancreatic head cancer on the left side of SMA.

Kang MJ, et al. Ann Hepatobiliary Pancreat Surg 2020;24:389-95

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. More complete and consistently reported data are needed to evaluate the potential effect of periadventitial SMA dissection on margin status, local recurrence, or survival.

Butler JR, et al. HPB 2015

# DIVESTMENT

XVI CONGRESSO BRASILEIRO DE CIRURGIA ONCOLÓGICA
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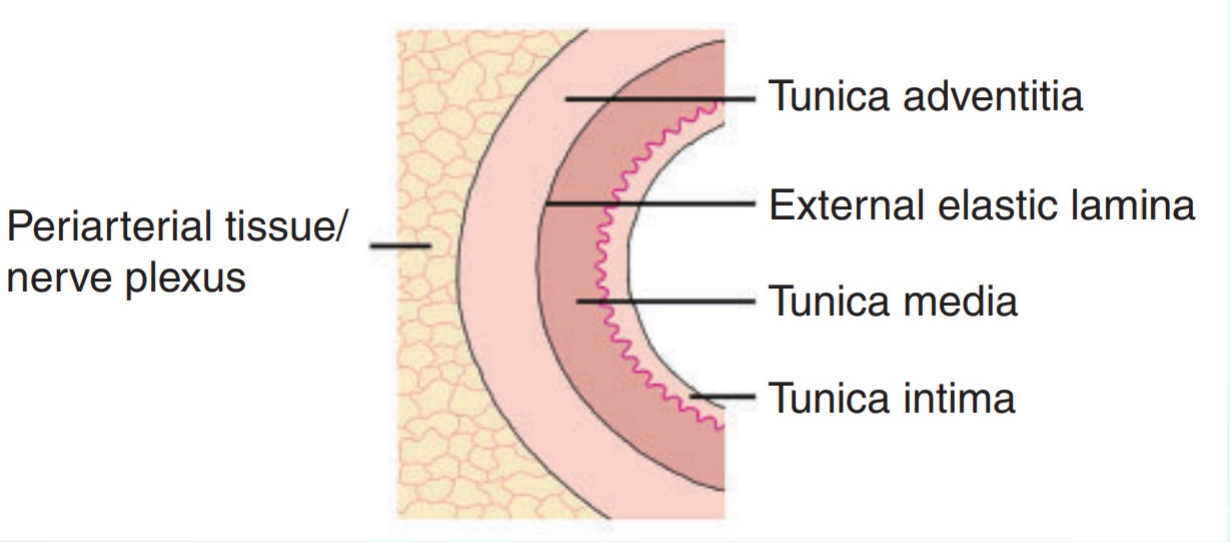
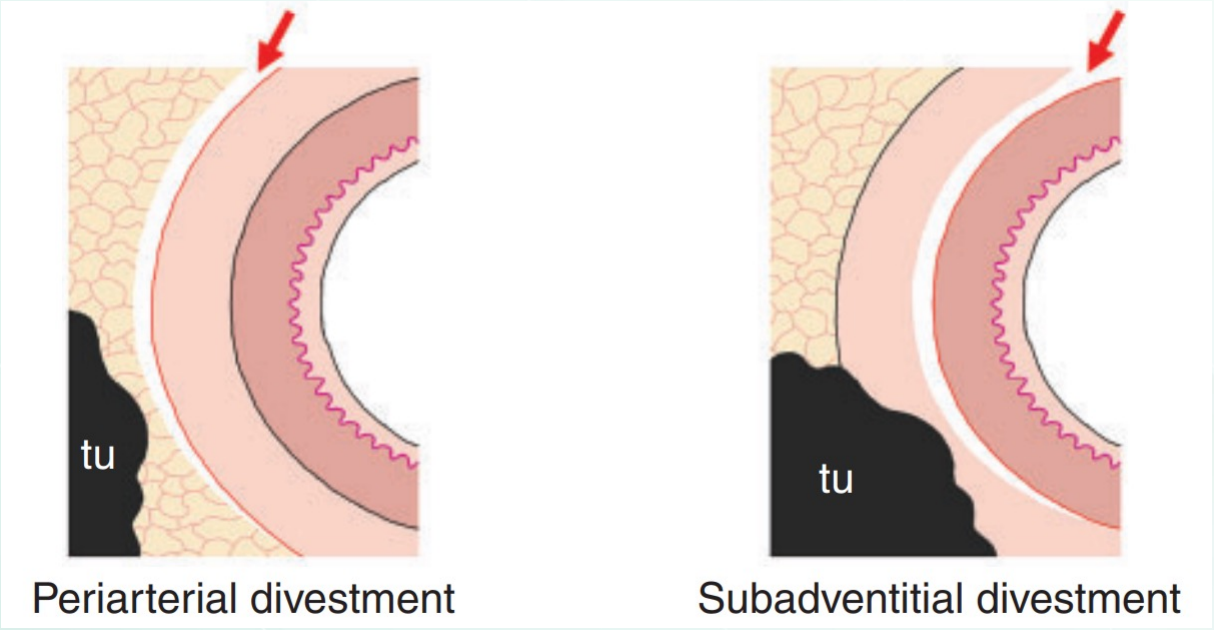
RIO DE JANEIRO

Resultados promissores LAPC após quimioterapia neoadjuvante[1]
Ressecção arterial com resultados animadores[2]
Difícil interpretação radiológica (>180) de tumor e fibrose após QTNeo[3]
Critérios radiológicos de invasão vascular superestimam envolvimento após QTNeo[4]
Envolvimento radiológico arterial >180° e ≤ 270°, não estava invadida em 89,3% das vezes[5]
Duodenopancreatectomia + ressecção arterial é superior ao tratamento paliativo[6]


Hackert T, et al. Ann. Surg. 2016;264: 457–63
Loos M et al, Ann Surg 2022;275:759-68
Sasson AR, et al. Cancer 2003;34:121–8
Clanton J, et al. HPB 2018;20:925–31
Mayer P, et al. Eur J Radiol 2021;137
Del Chiaro M, et al. HPB 2019; 21:219–25

# Divestment




Periarterial divestment

Subadventitial divestment

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

# Divestment

A) Grade 0 (No tumor)

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

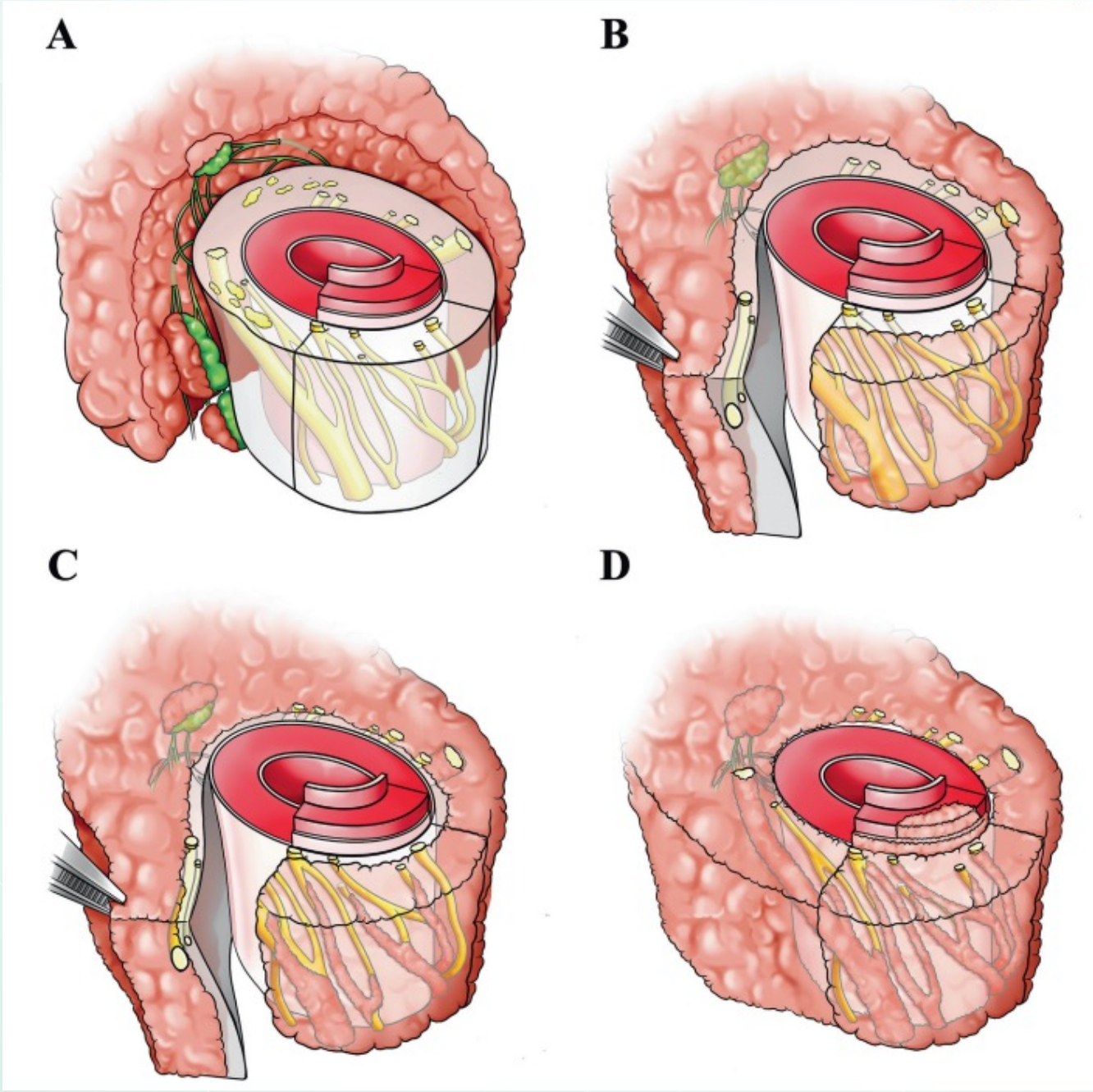
**R0 – Sub-adventitial divestment**

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

**R1 – Sub-adventitial divestment**
**Or**
**Arterial resection**

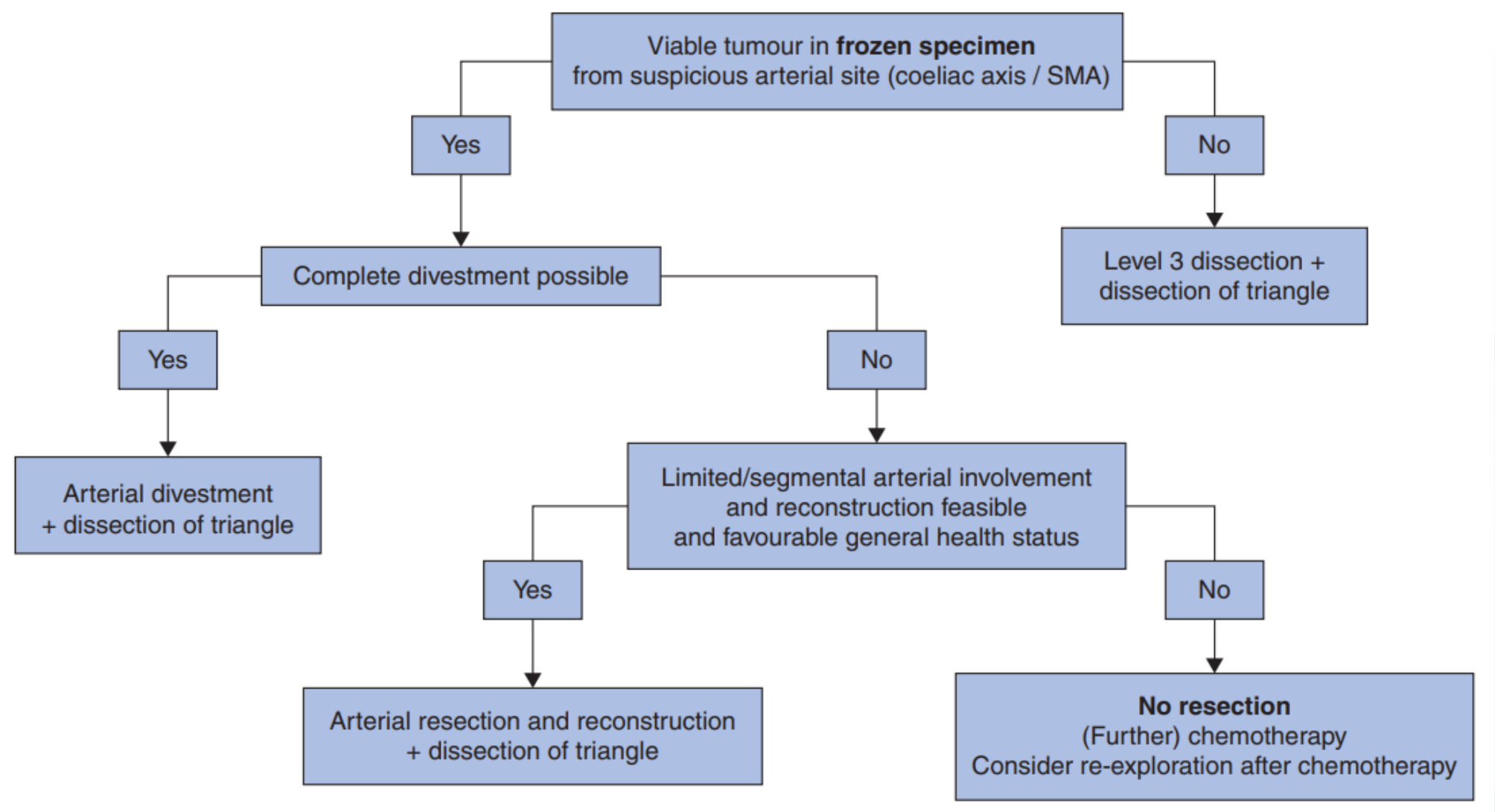
D) Grade III (Tumor invasion of the external elastic lamina).

**Arterial resection**
**Or**
**Case unresectable**



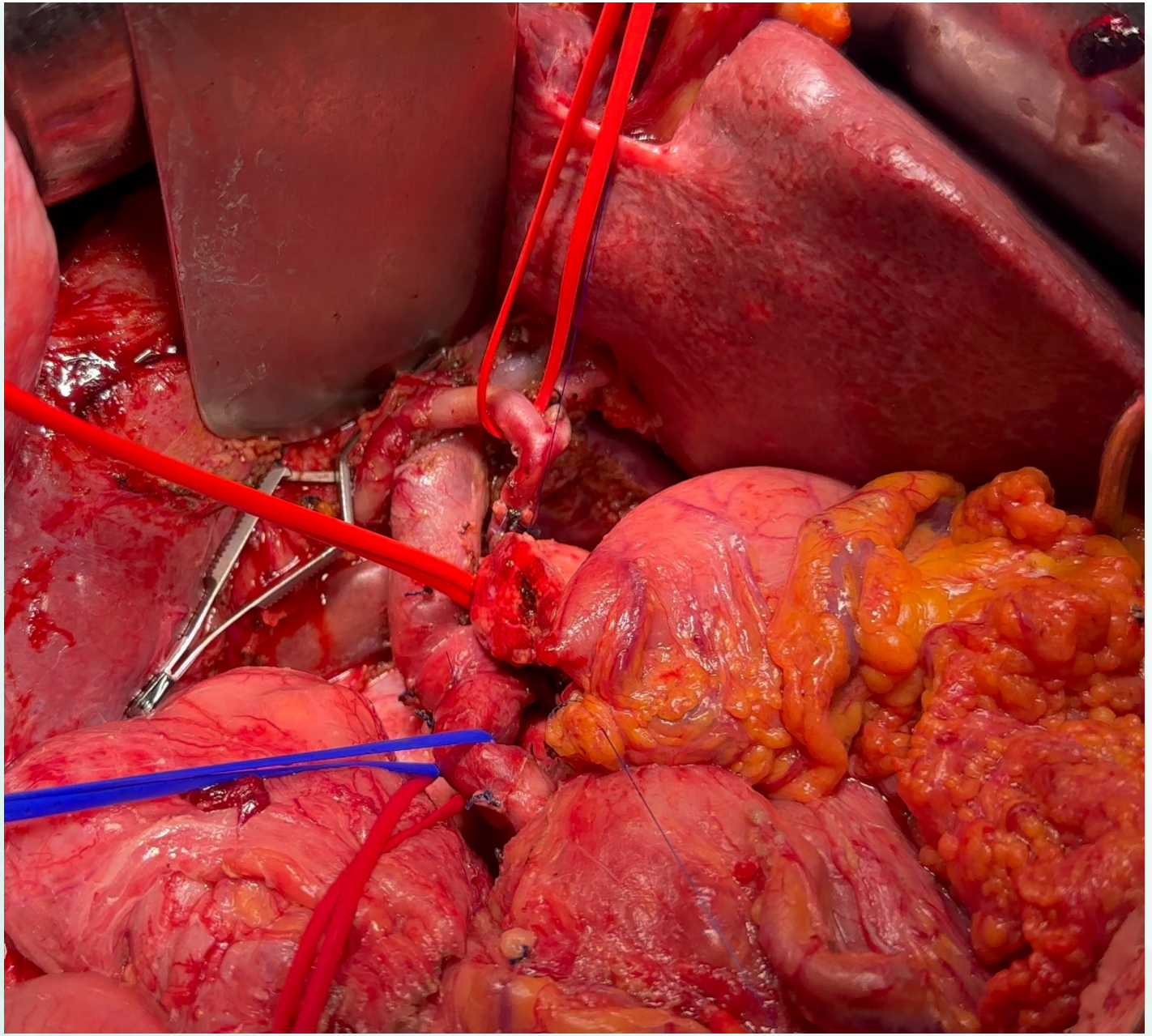

Miao Y, et al. Surg Open Sci 2023

# Divestment




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

# Divestment

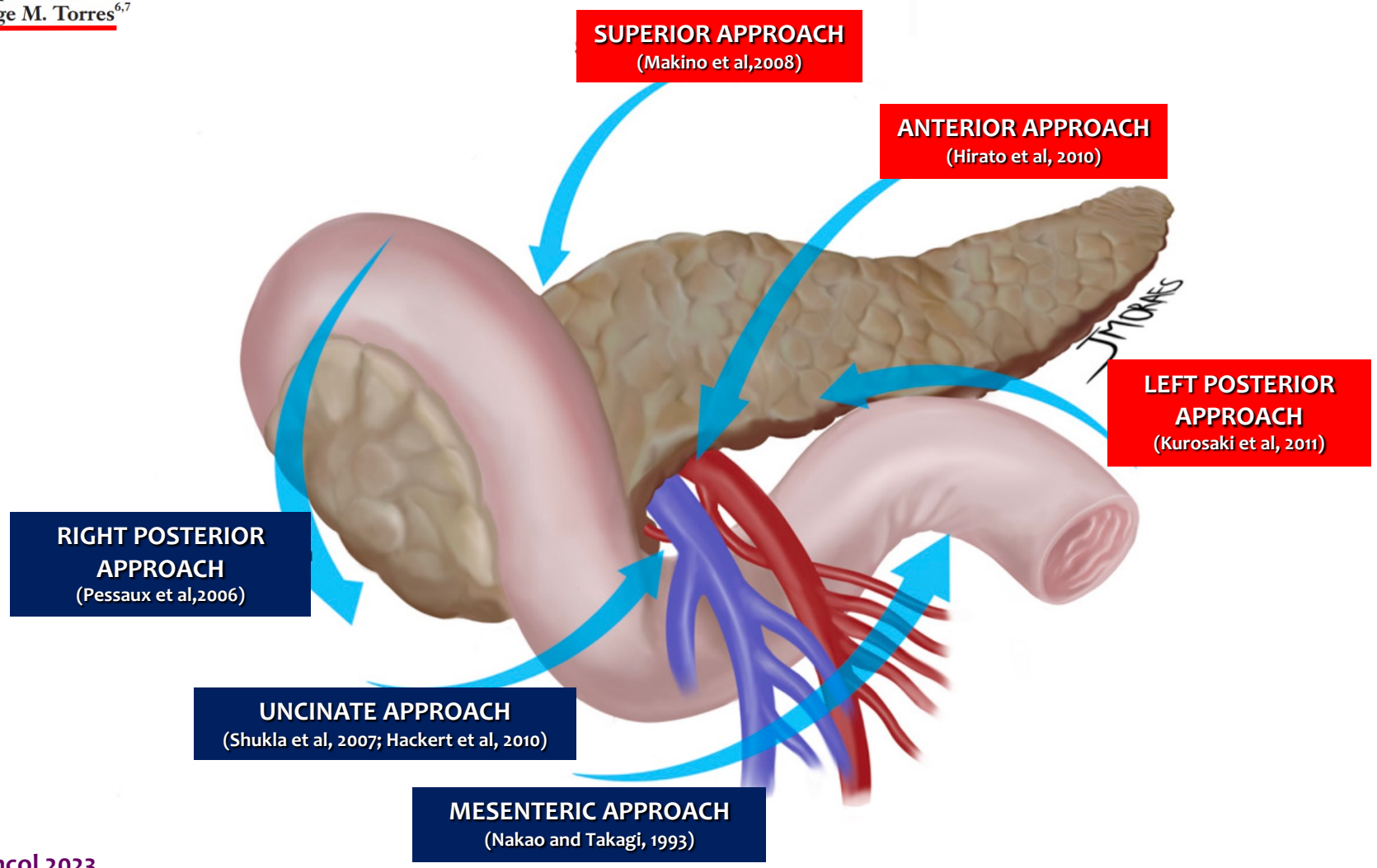


Review Article

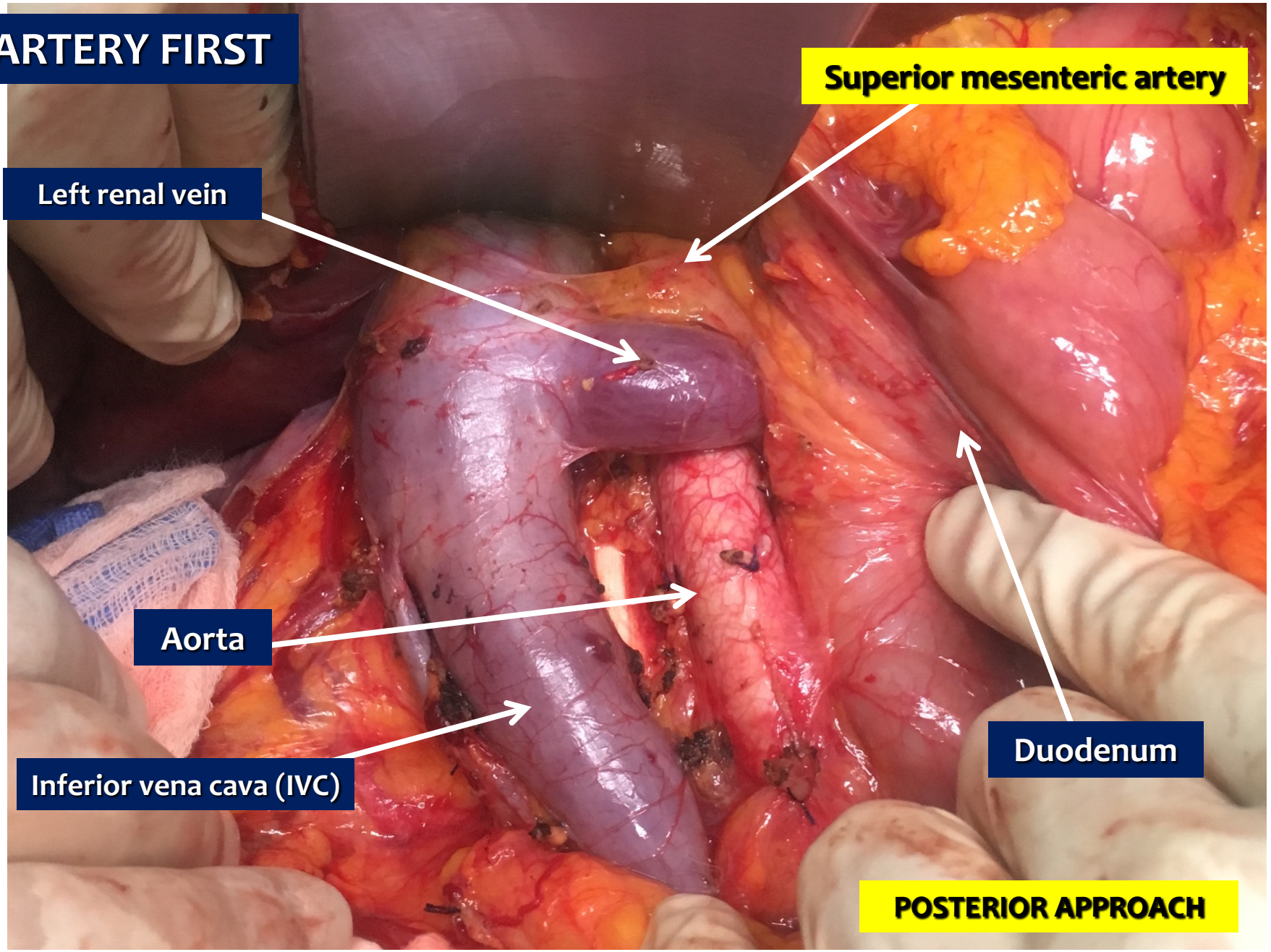
# A more radical perspective on surgical approach and outcomes in pancreatic cancer—a narrative review

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]

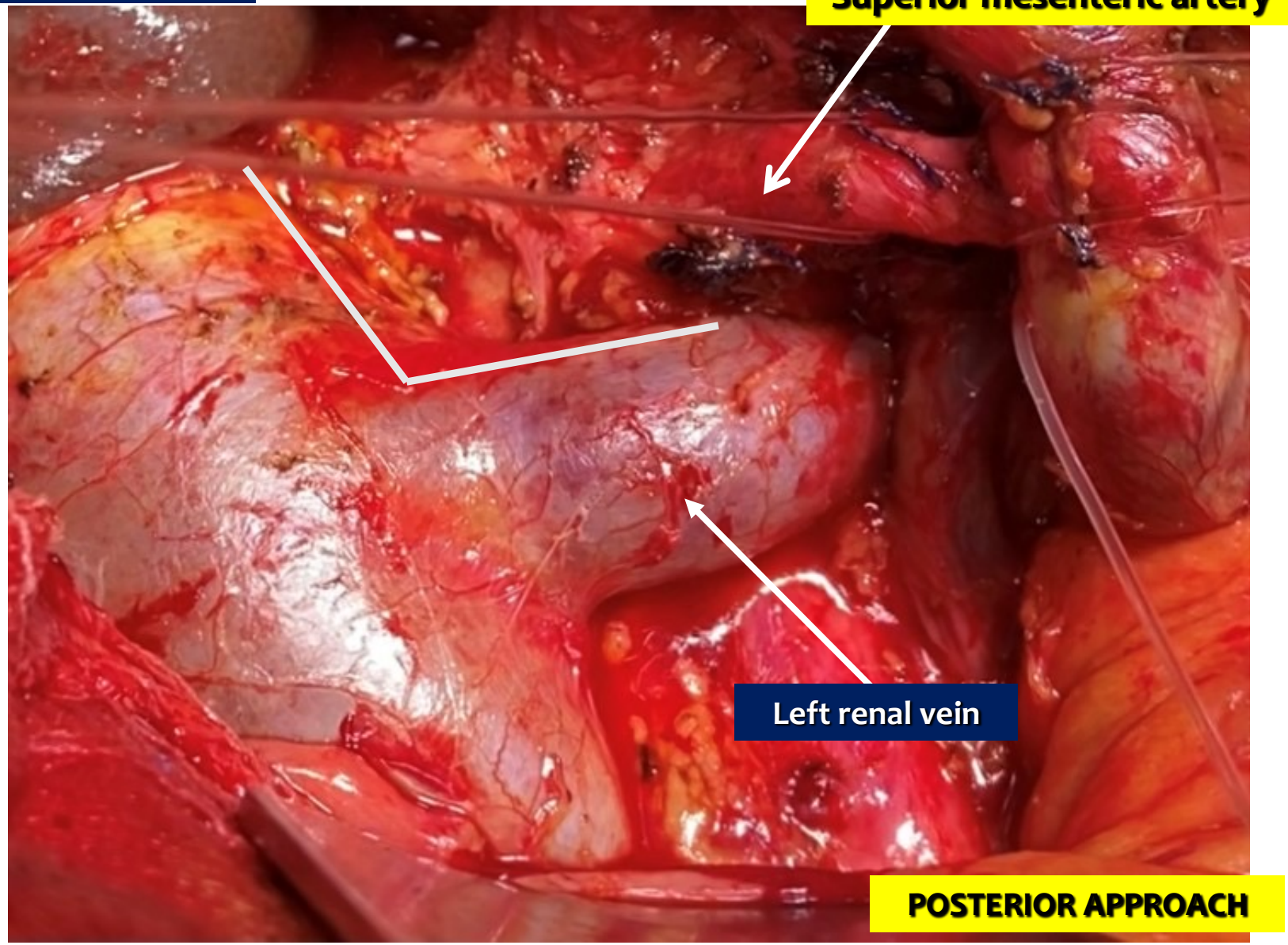
**ARTERY FIRST**



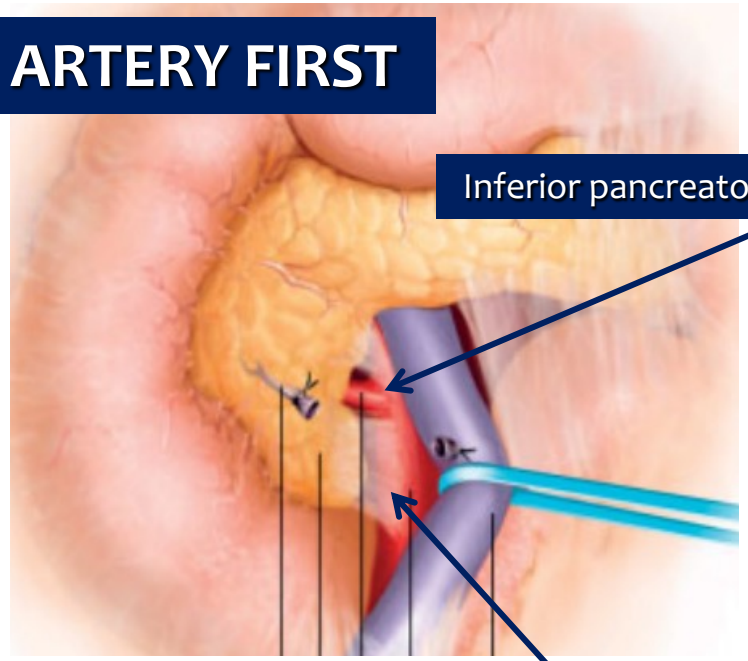

Fernandes ESM, et al. J Gastrointest Oncol 2023


ARTERY FIRST
Superior mesenteric artery
Left renal vein
Aorta
Inferior vena cava (IVC)
Duodenum
POSTERIOR APPROACH

# ARTERY FIRST

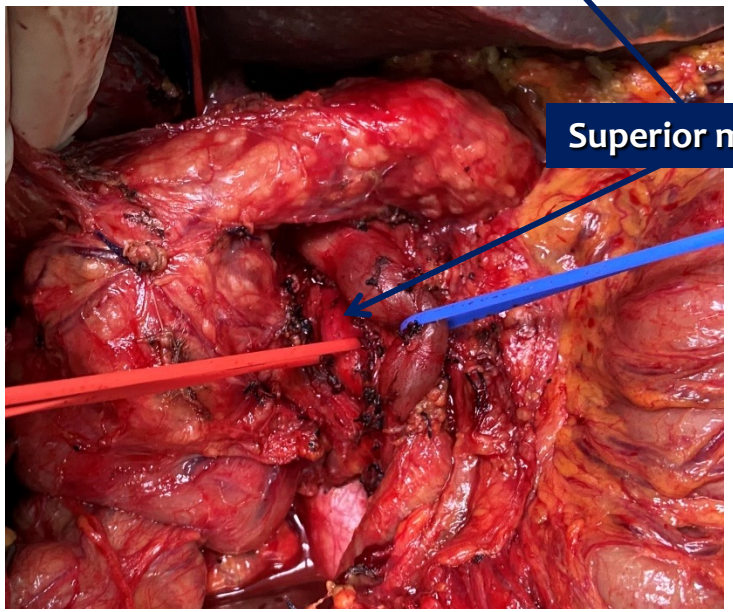


# ARTERY FIRST

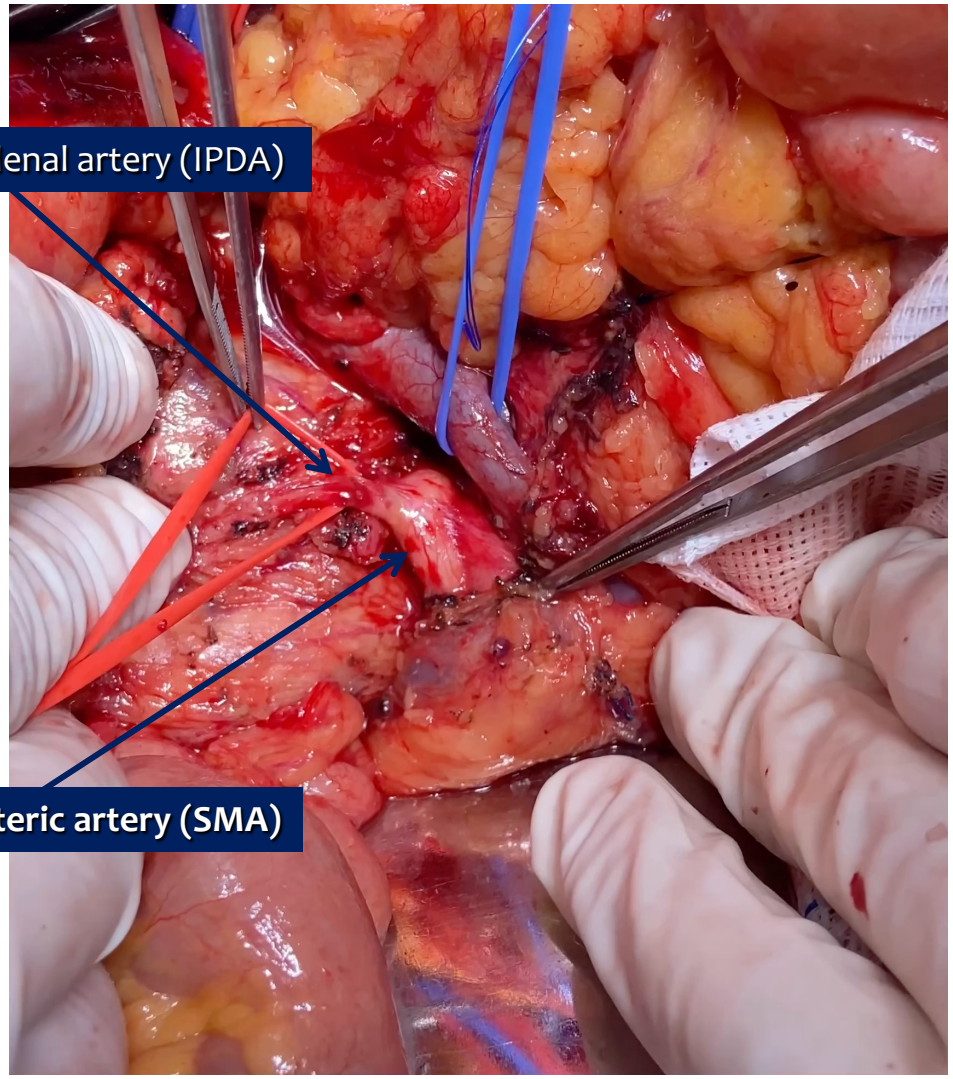


Inferior pancreatoduodenal artery (IPDA)

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

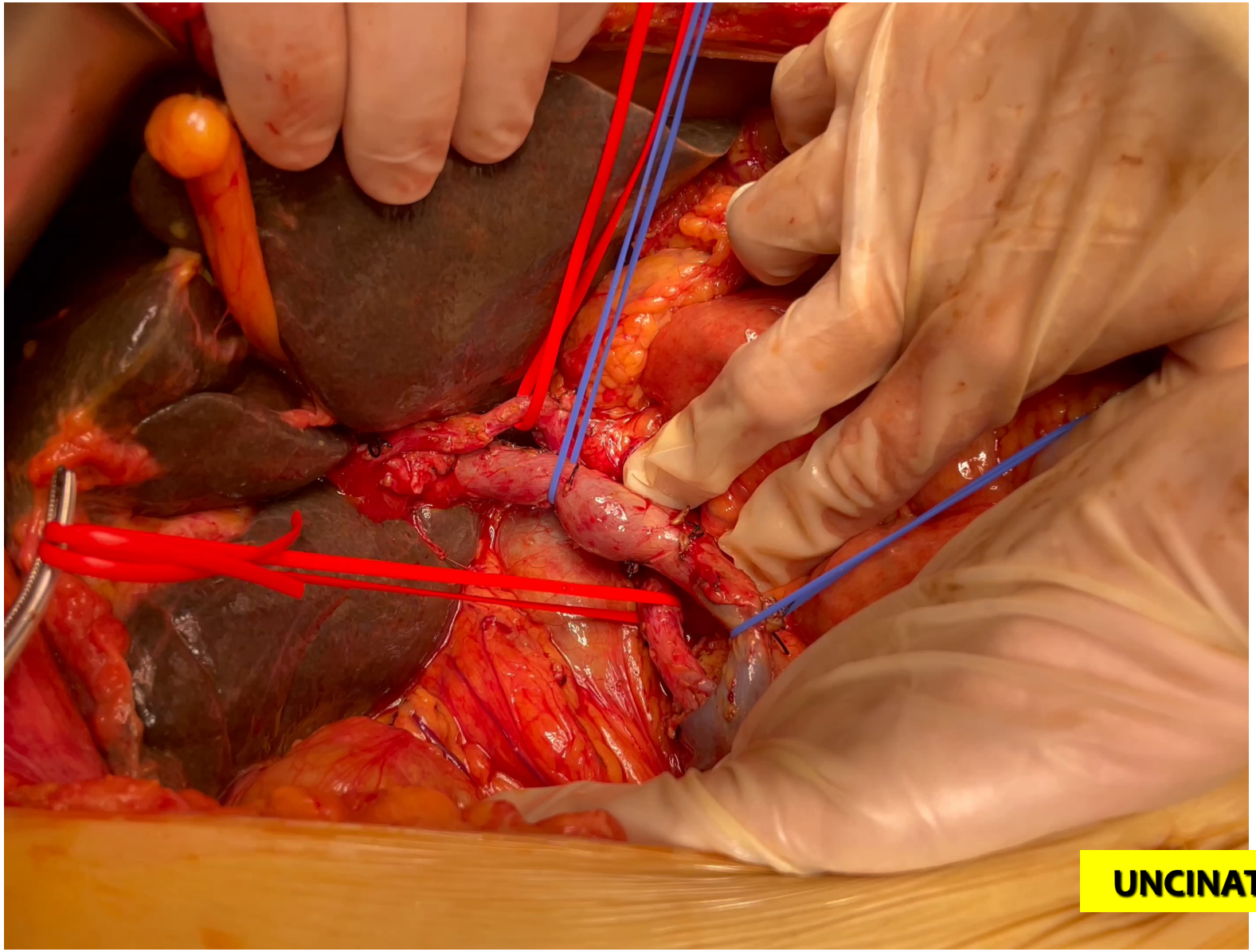


Superior mesenteric artery (SMA)



**UNCINATE FIRST**

# ARTERY FIRST



# ARTERY FIRST

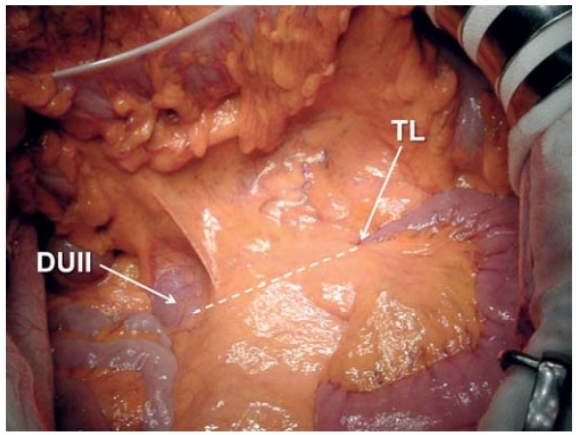
Digestive Surgery

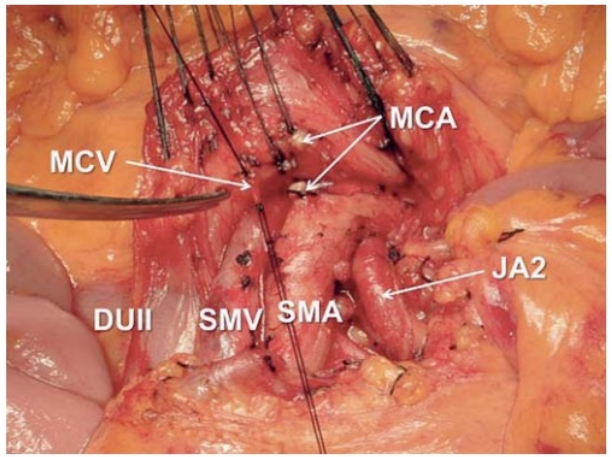
How I Do It

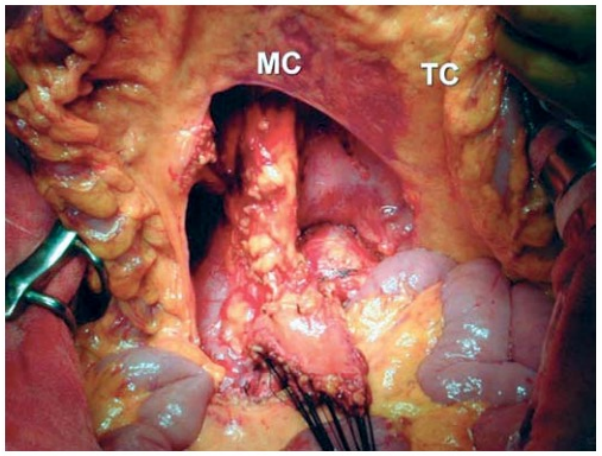
Dig Surg 2016;33:308–313
DOI: 10.1159/000445014

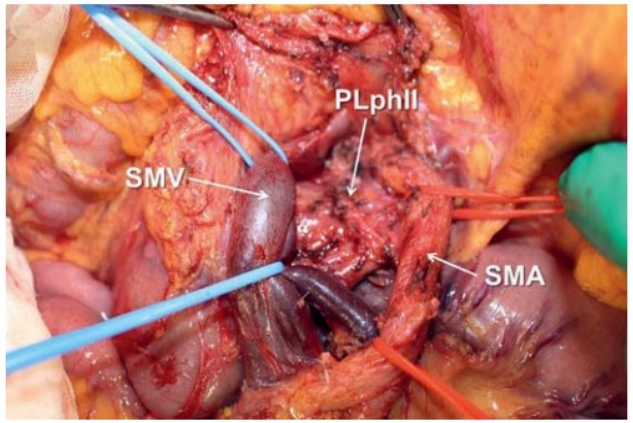
Published online: May 25, 2016

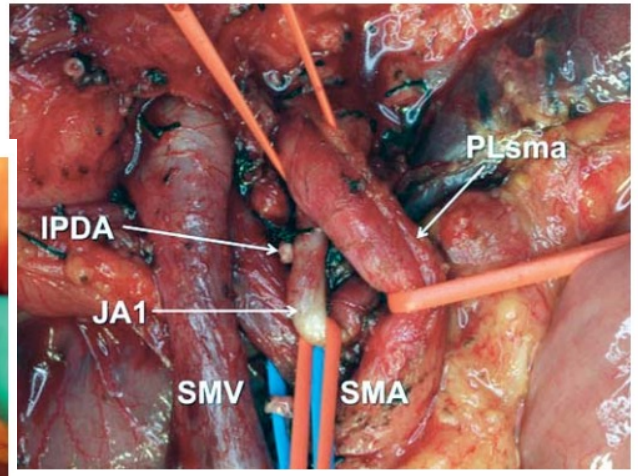
## The Mesenteric Approach in Pancreatoduodenectomy




**MESENTERIC APPROACH**

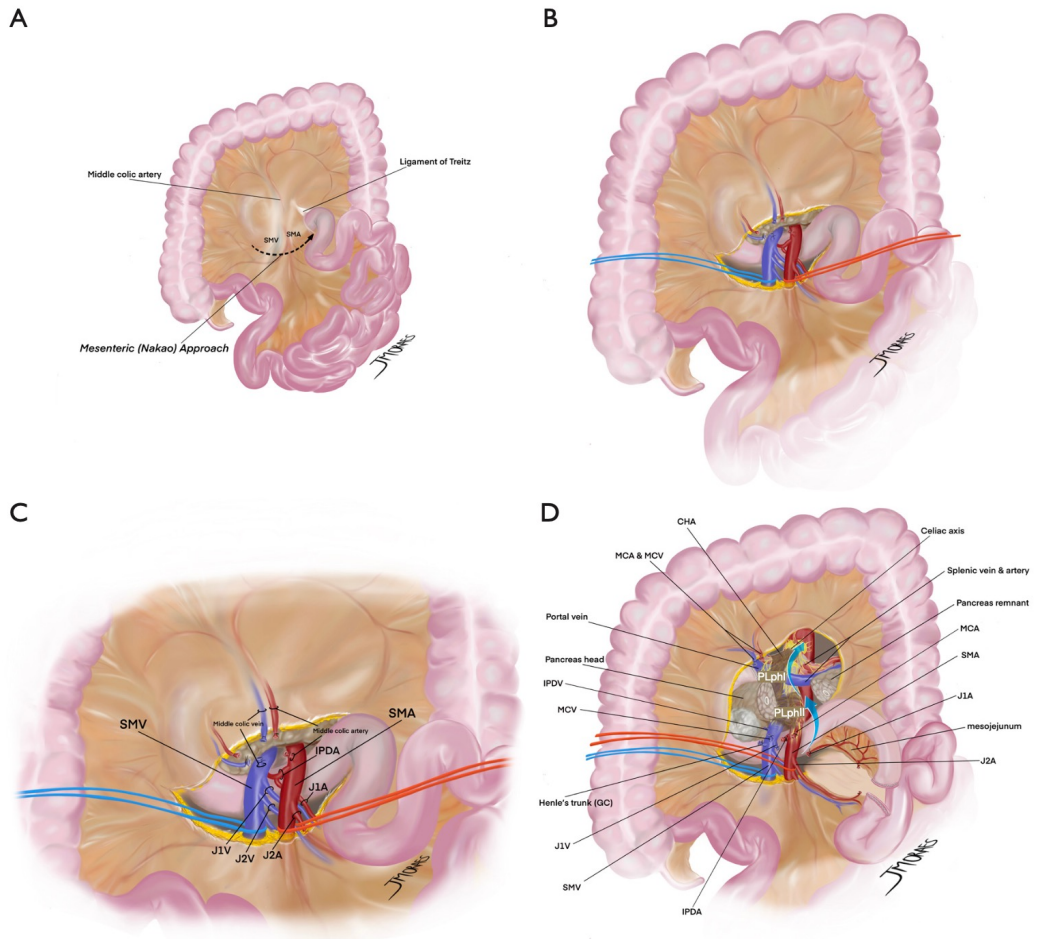
Nakao A, et al. Dig Surg 2016;33:308-13

Review Article

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

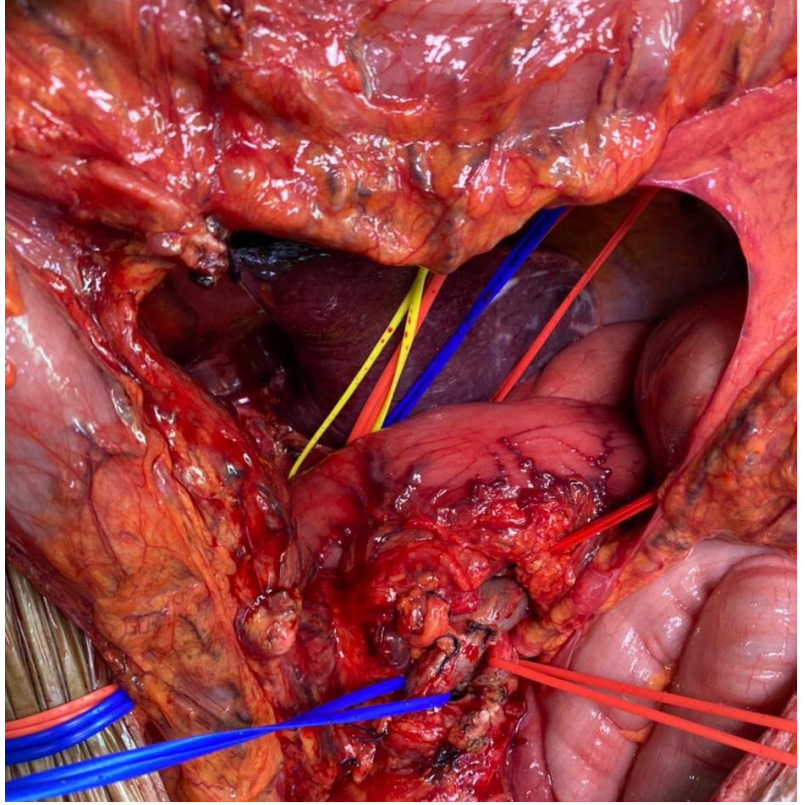
Eduardo de Souza M. Fernandes[1,2,3], Felipe Pedreira T. de Mello[1,2], Eduardo Pinho Braga[1], Gabrielle Oliveira de Souza[1], Ronaldo Andrade[1,2], Leandro Savattone Pimentel[1,2], Camila Liberato Girão[1,2], Munique Siqueira[1,2], José Maria A. Moraes-Junior[6,7], Romulo Varella de Oliveira[4], Nicolas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

**MESENTERIC APPROACH**




Fernandes ESM, et al. J Gastrointest Oncol 2023

Infracolic approach

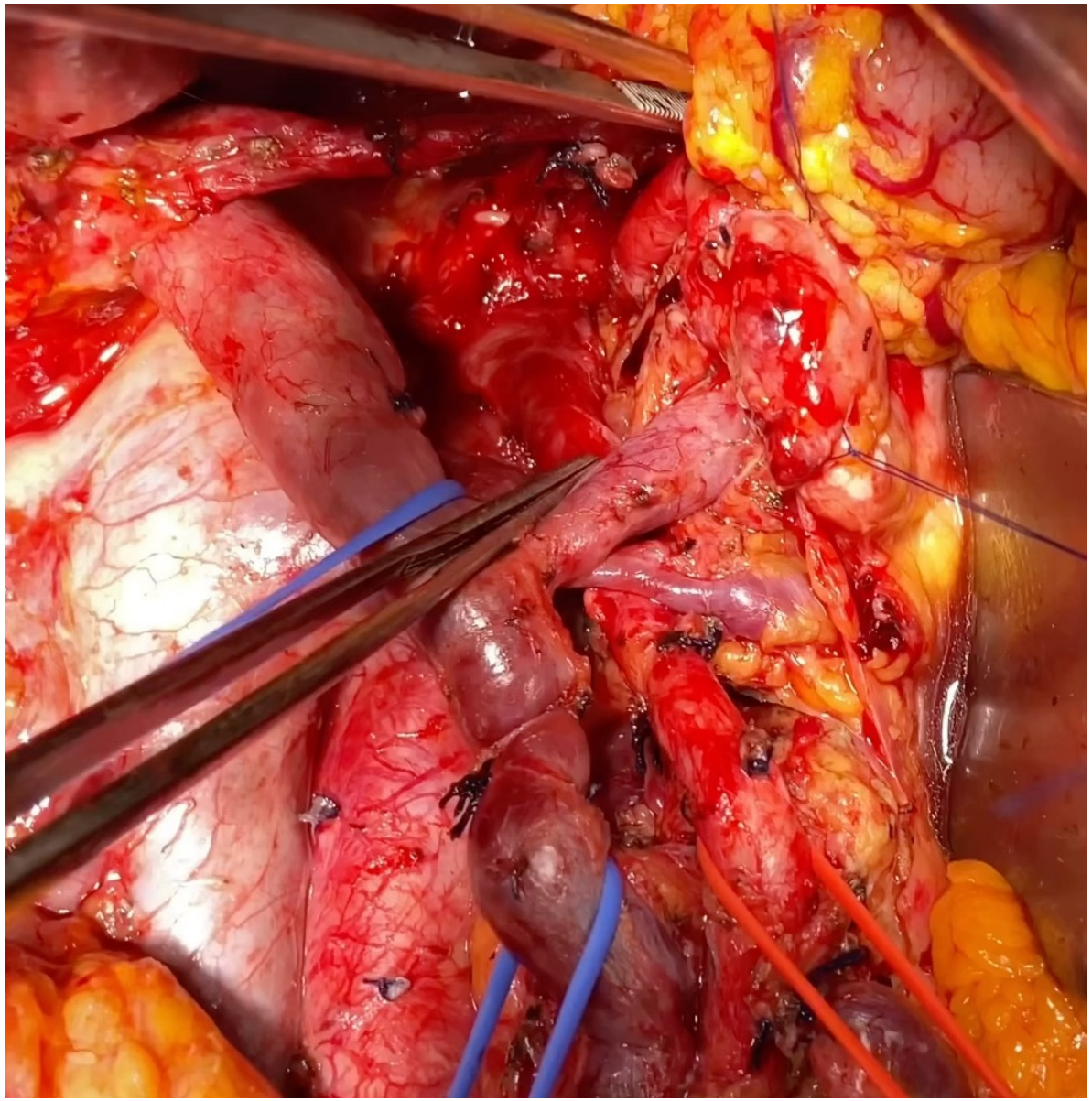


**MESENTERIC APPROACH**

# STATE OF THE ART

**Pancreatoduodenectomy:**

- Total mesopancreas excision[1]
- "Artery first"[2]
- Level 3 dissection[3]
- "Triangle operation"[4]
- Extended resection[5]
  - +/- portal/SM vein
- Torres anastomosis[6]




1.Fernandes ES, et al. Langenbecks Arch Surg 2021
2.Inoue Y, et al. J Gastrointest Surg 2018
3.Niesen W, et al. Ann Gastroenterol Surg. 2019
4.Hackert T, et al. HPB 2017
5.Fernandes ES, et al. J Gastrointest Oncol 2023
6.Torres OJ, et al. Arq Bras Cir Dig 2017

# ADVANTAGES OF ARTERY FIRST APPROACH

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

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| 1. Resection without breaching the tumor extension plane, thereby minimizing cell spillage |
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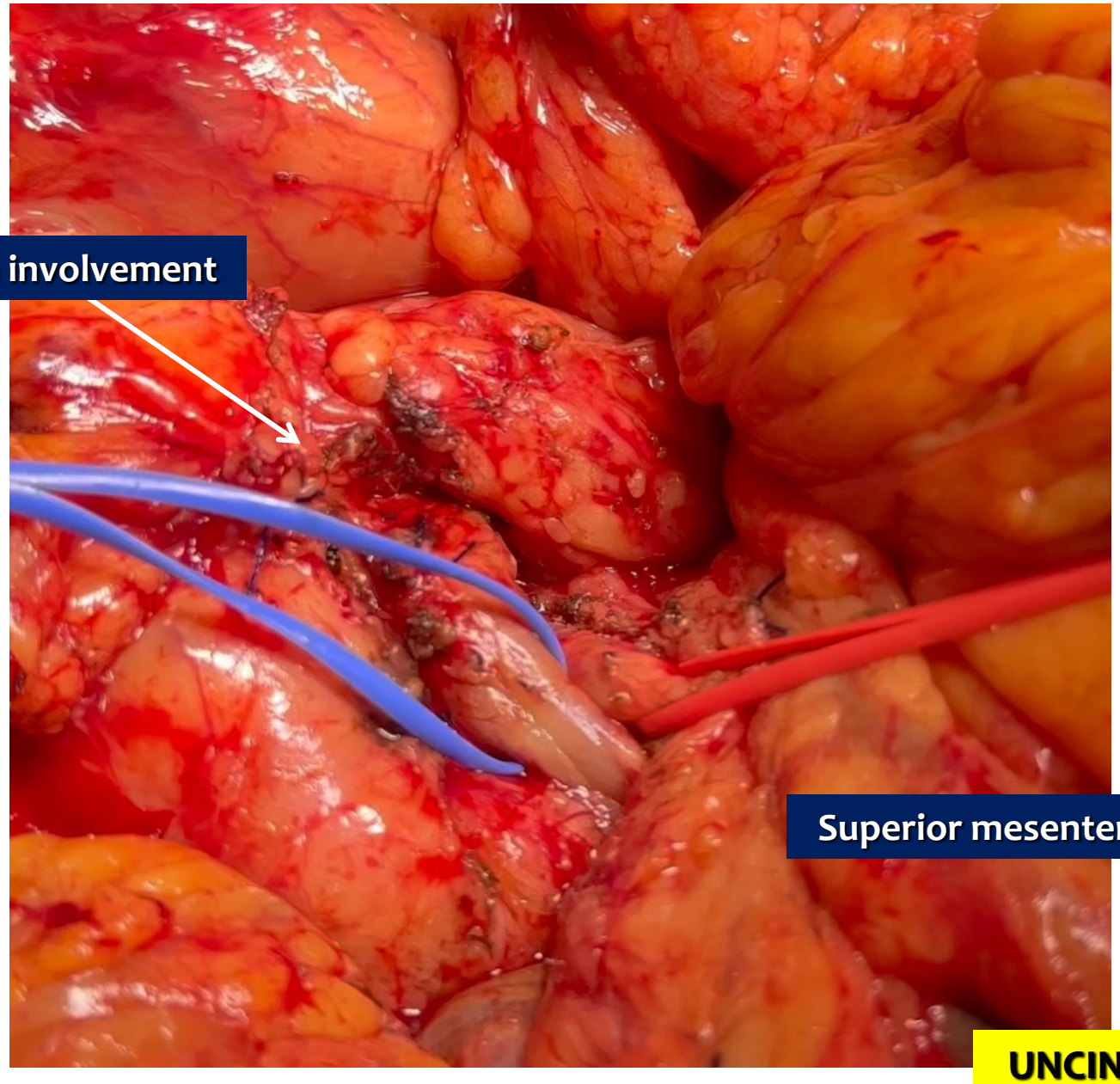
| 9. Reduced operative time and blood loss (early ligation of IPDA/JA1) |

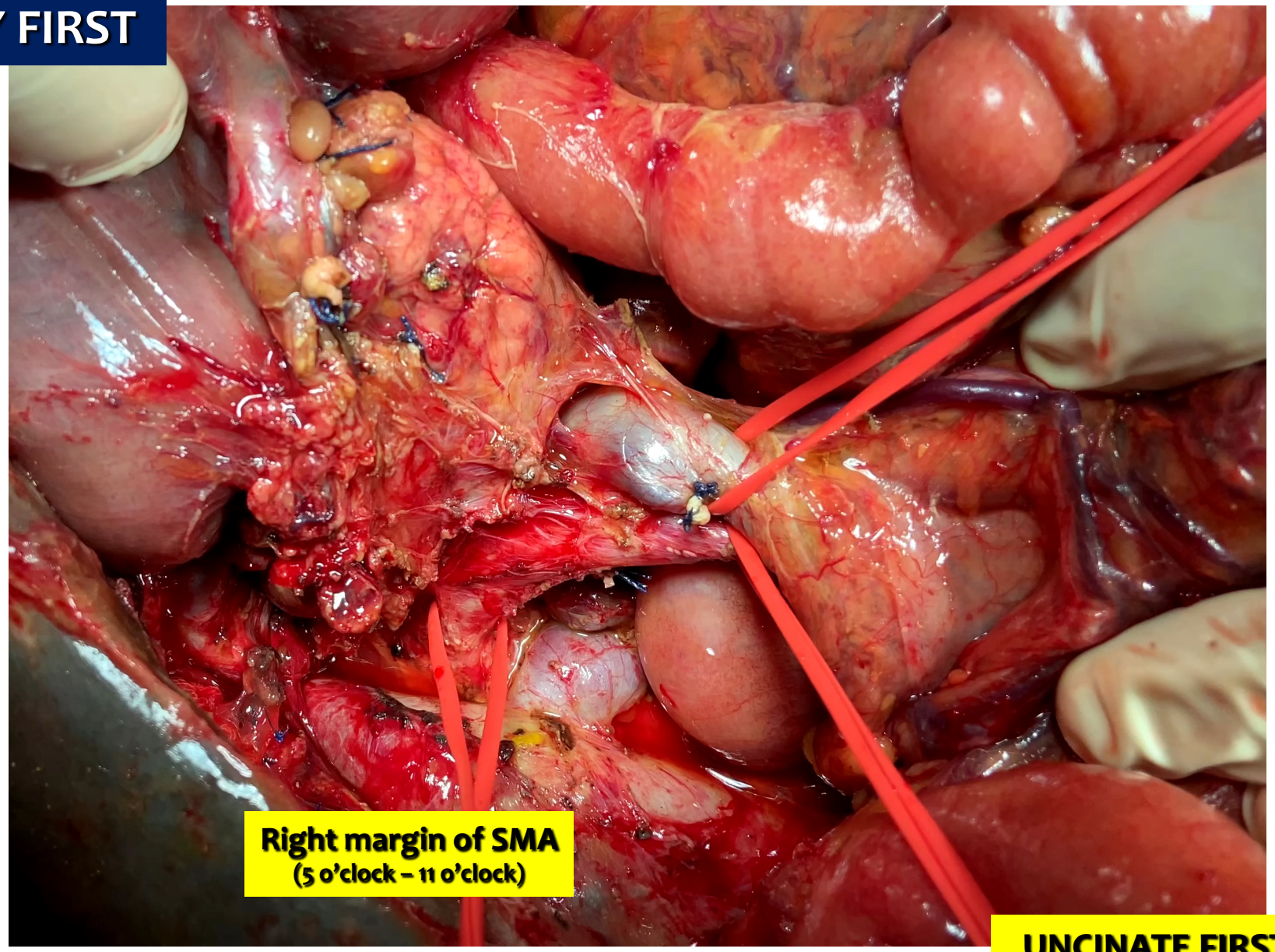
**Superior mesenteric artery**

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




**UNCINATE FIRST**

# ARTERY FIRST




UNCINATE FIRST

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**ARTERY FIRST**

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

# 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

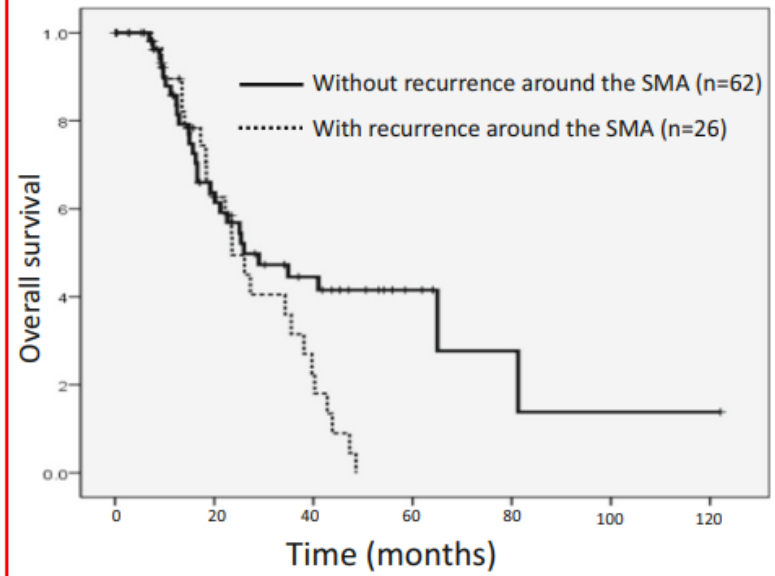


**Fig. 1** Overall survival according to recurrence around the SMA. The median survival was 23.6 months in patients with recurrence around the SMA and 26 months in patients without recurrence around the SMA ($p$ = 0.0367) SMA: superior mesenteric artery

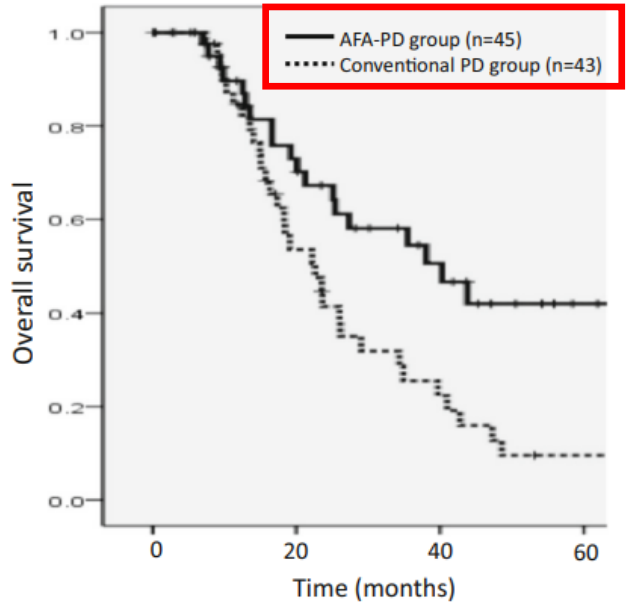


**Fig. 2** Overall survival according to the type of the surgery. The median survival was 40.3 months in the AFA-PD group and 22.6 months in the conventional PD group ($p$ = 0.005) AFA-PD: artery-first approach pancreatoduodenectomy

**40.3 months vs 22.6 months (p= 0.005)**

**OVERALL SURVIVAL**

Kobayashi S, et al. World J Surg 2020

# ADVANTAGES OF ARTERY FIRST APPROACH

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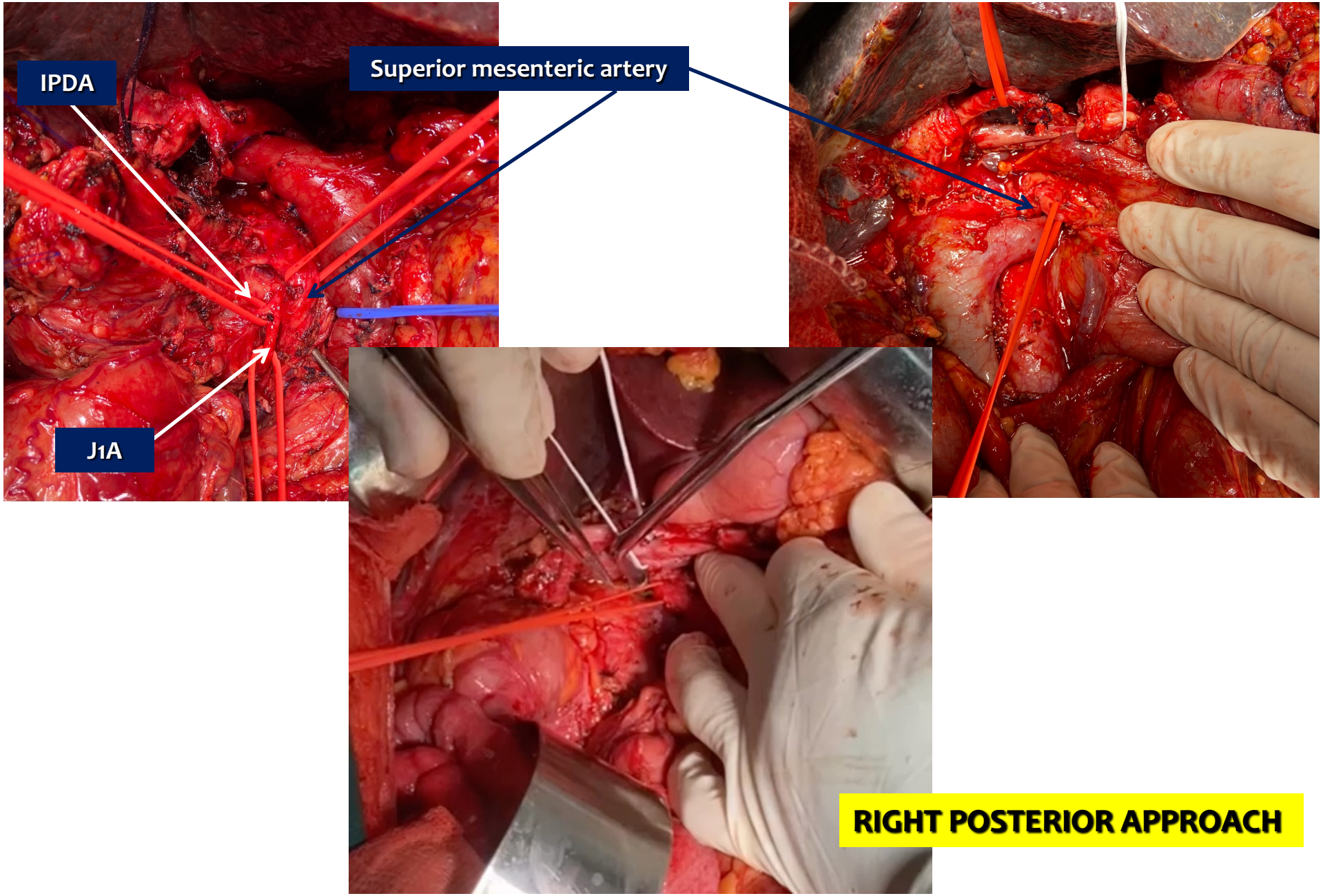
| 9. Reduced operative time and blood loss (early ligation of IPDA/JA1) |

**ARTERY FIRST**

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


IPDA
Superior mesenteric artery
J1A
RIGHT POSTERIOR APPROACH

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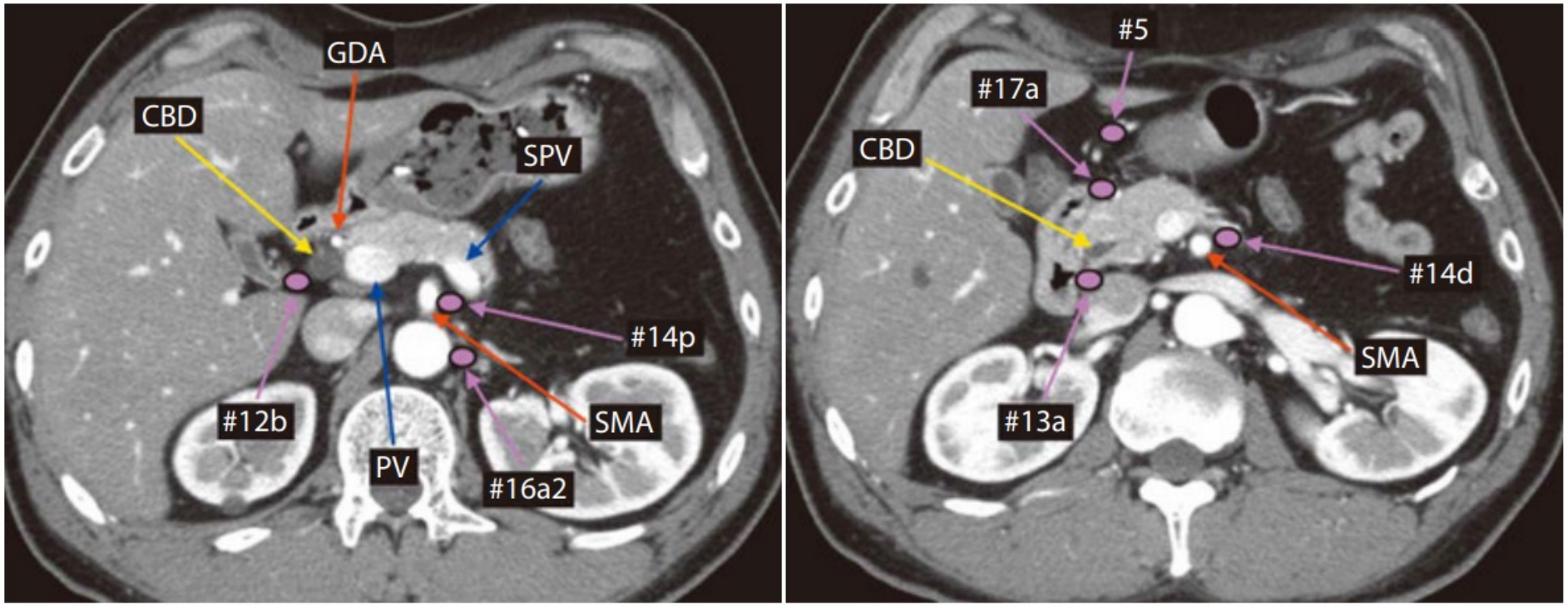
**ARTERY FIRST**

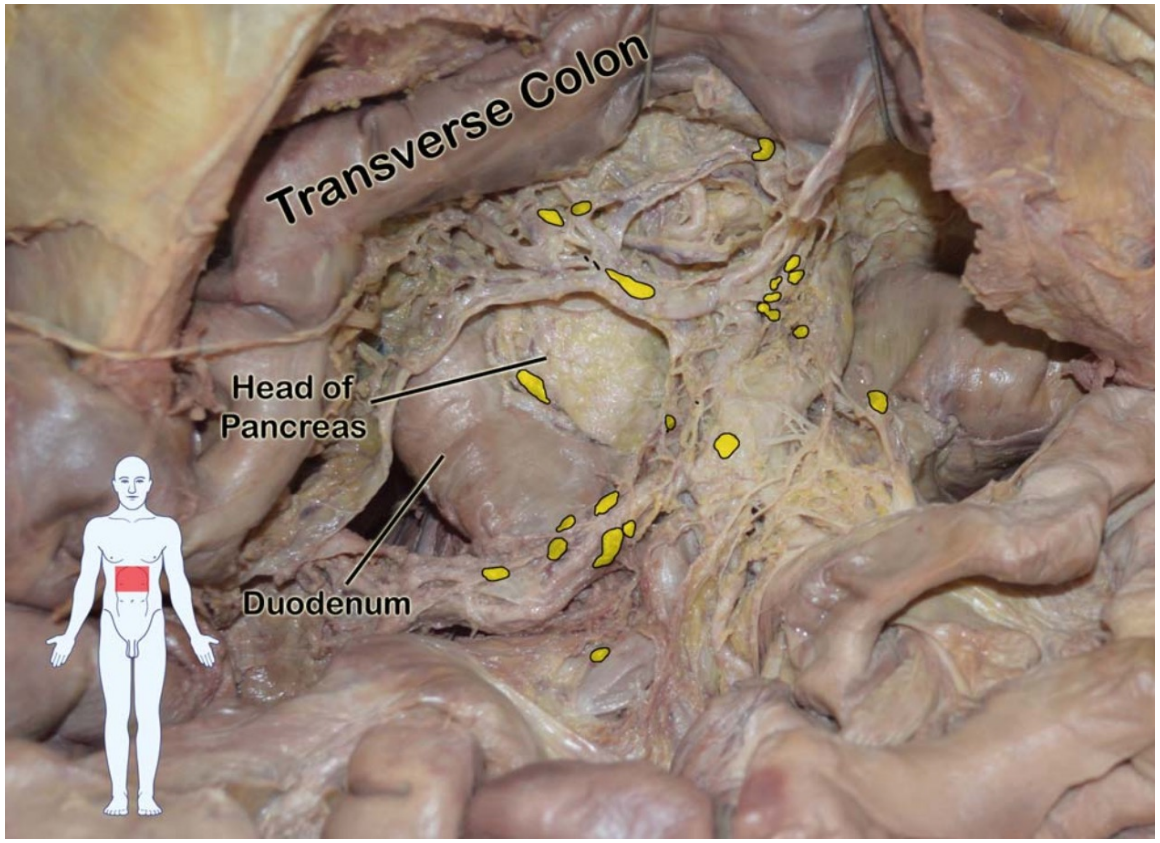
Fernandes ESM, et al. Langenbeck's Arch Surg 2021

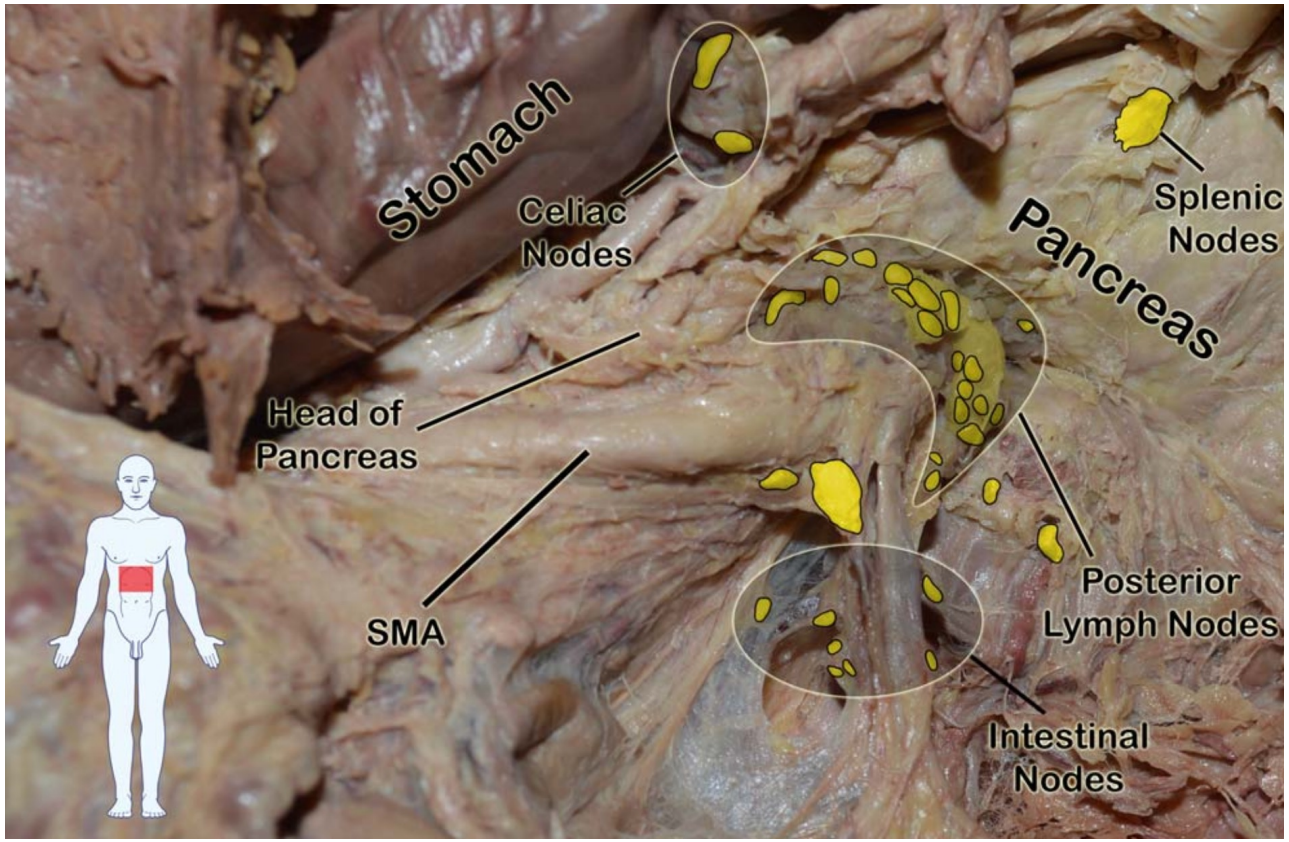
# LYMPHADENECTOMY




**14p, 14d**

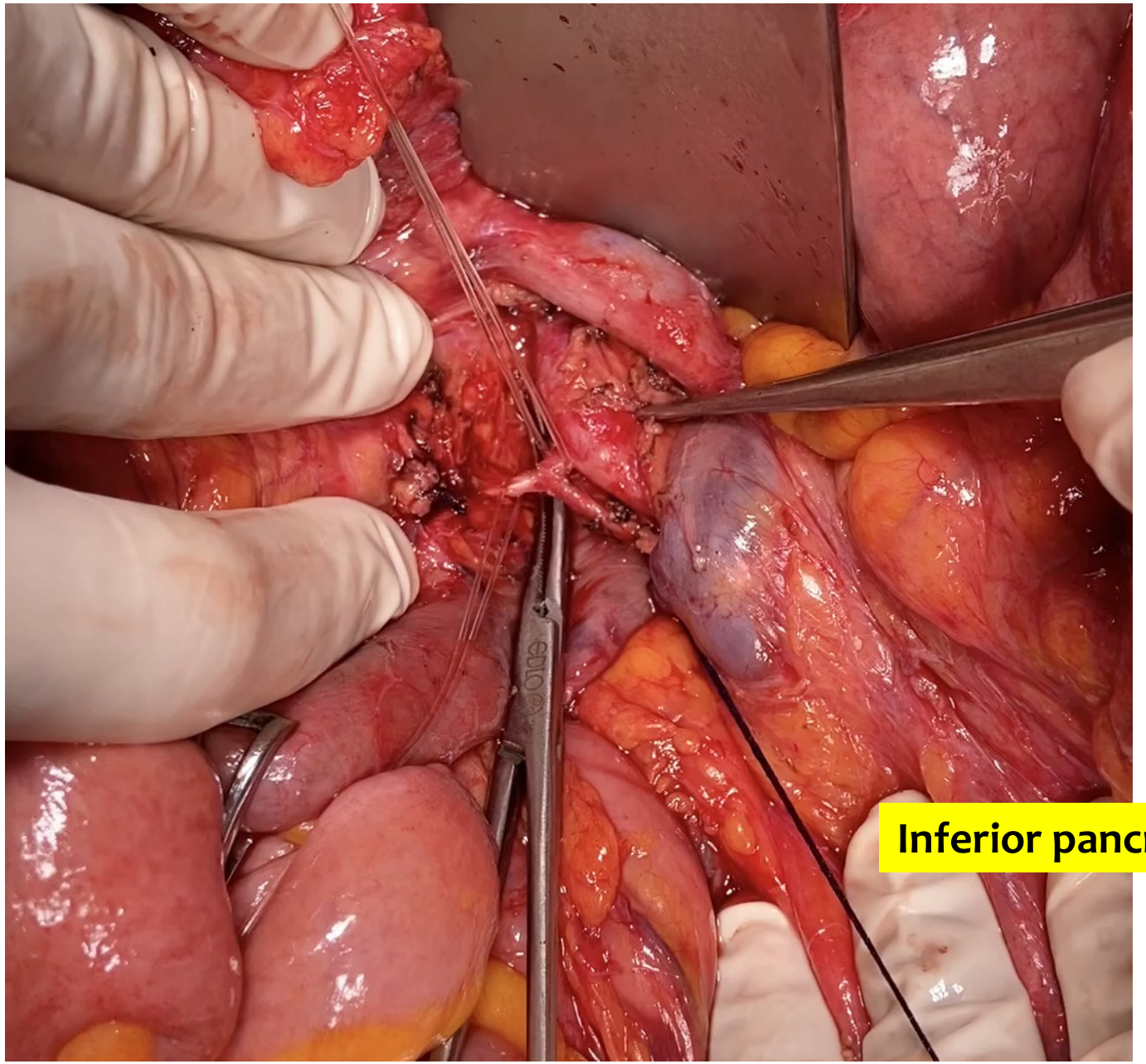
# LYMPHADENECTOMY



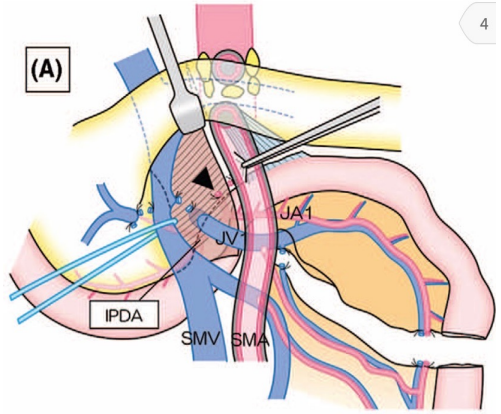

Cesmebasi A, et al. Clinical Anatomy 28:527–537 (2015)

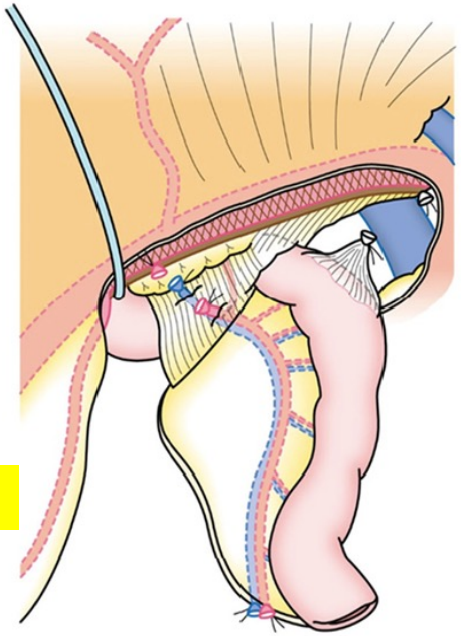
# IPDA



Inferior pancreatoduodenal artery

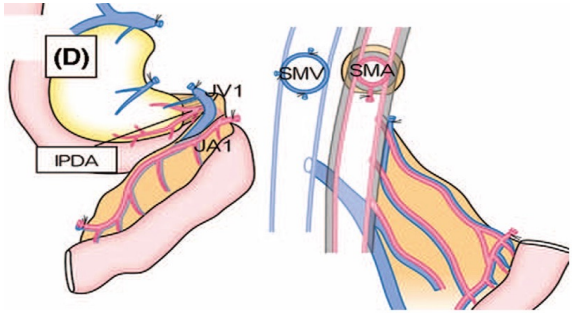
# FIRST JEJUNAL ARTERY

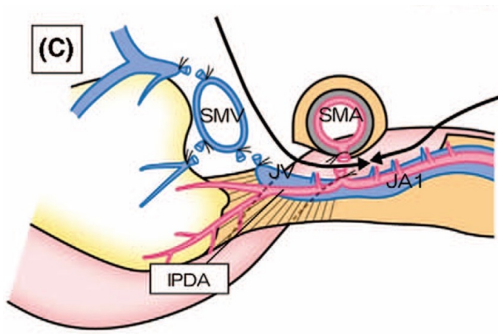


First jejunal artery (J1A)

Mesojejuno




Level 3

Inoue Y, et al. J Gastrintest Surg 2016

ARTERY FIRST

.1007/s00268-020-05856-w

World Journal of Surgery

Check for updates

ORIGINAL SCIENTIFIC REPORT

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

ARTERY FIRST

**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

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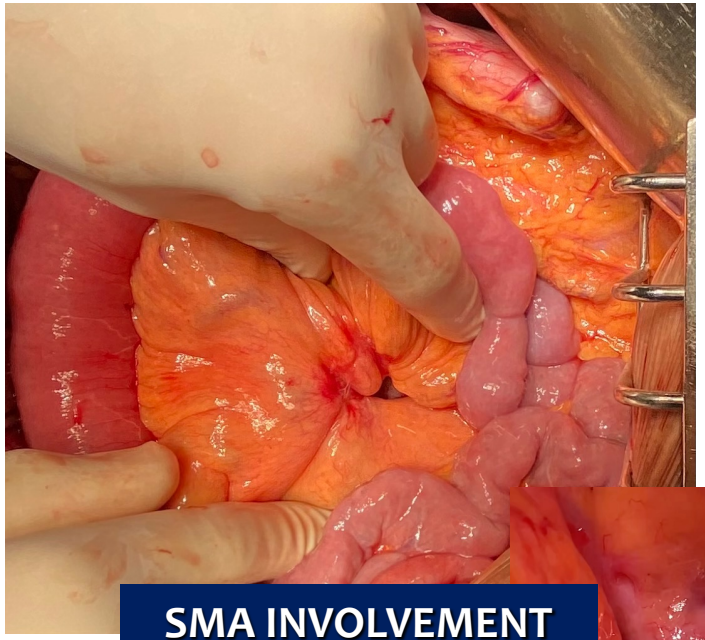
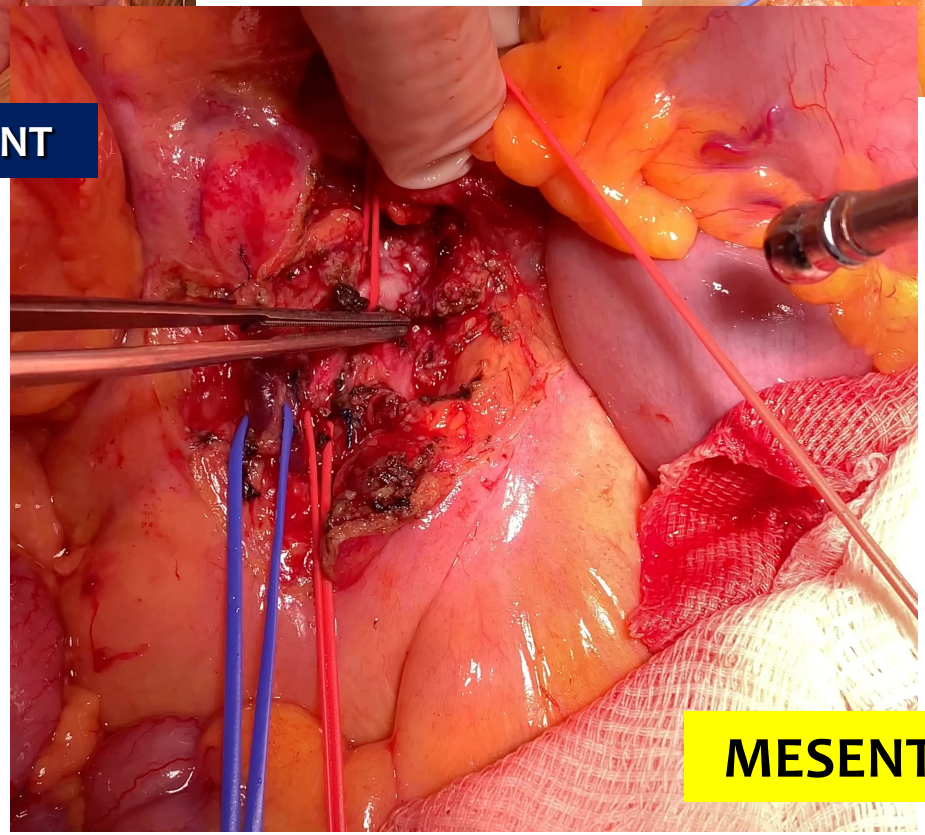
**ARTERY FIRST**

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



SMA INVOLVEMENT



MESENTERIC APPROACH

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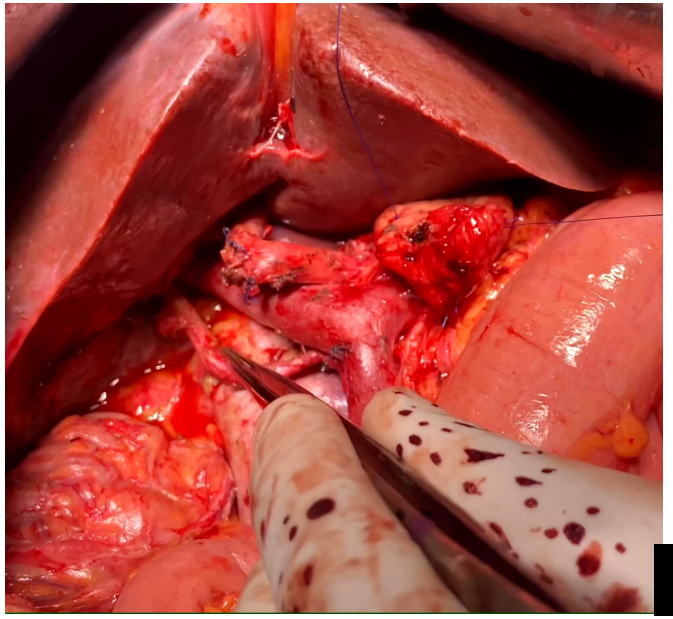
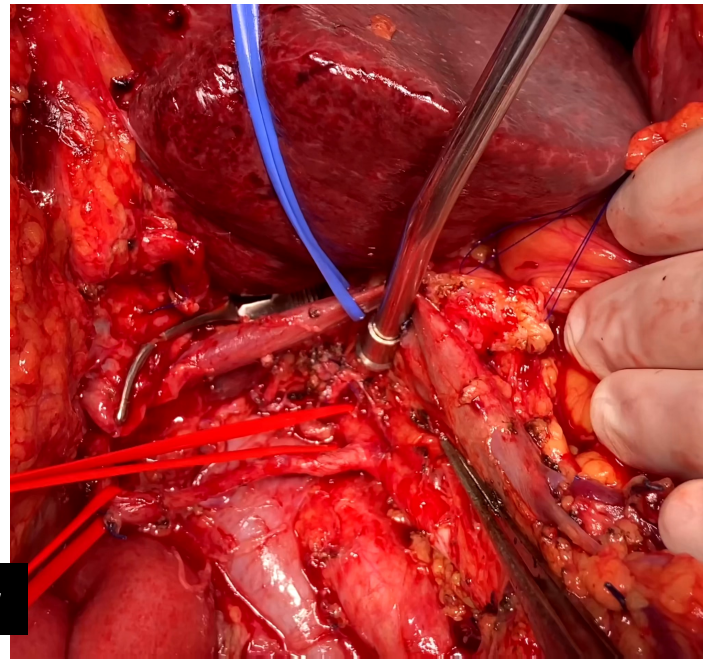
**ARTERY FIRST**

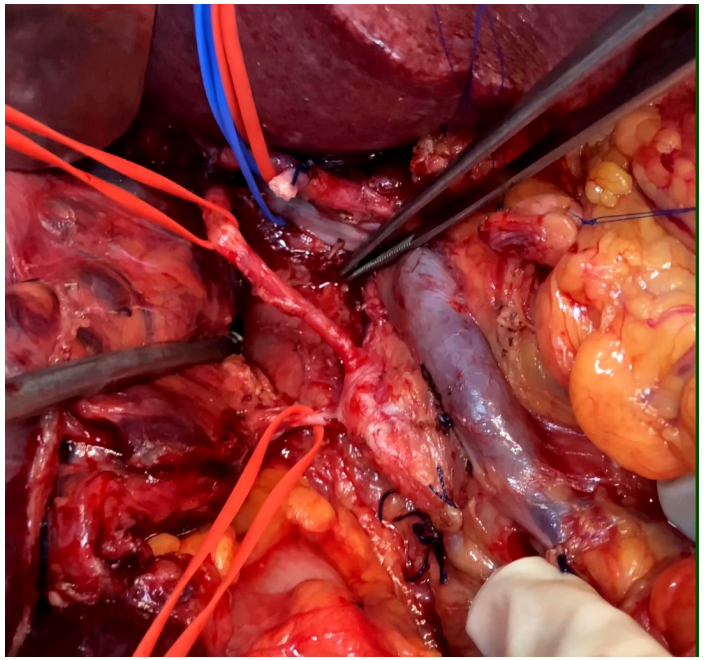
Fernandes ESM, et al. Langenbeck's Arch Surg 2021



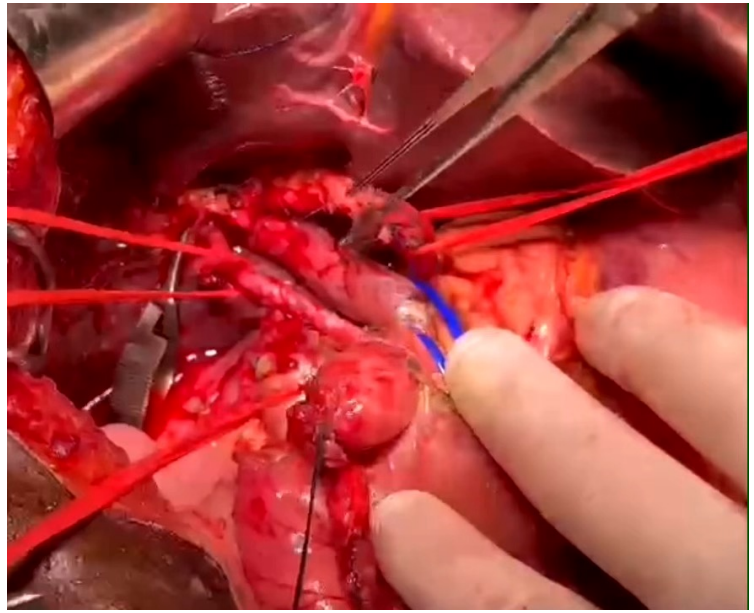
Right hepatic artery

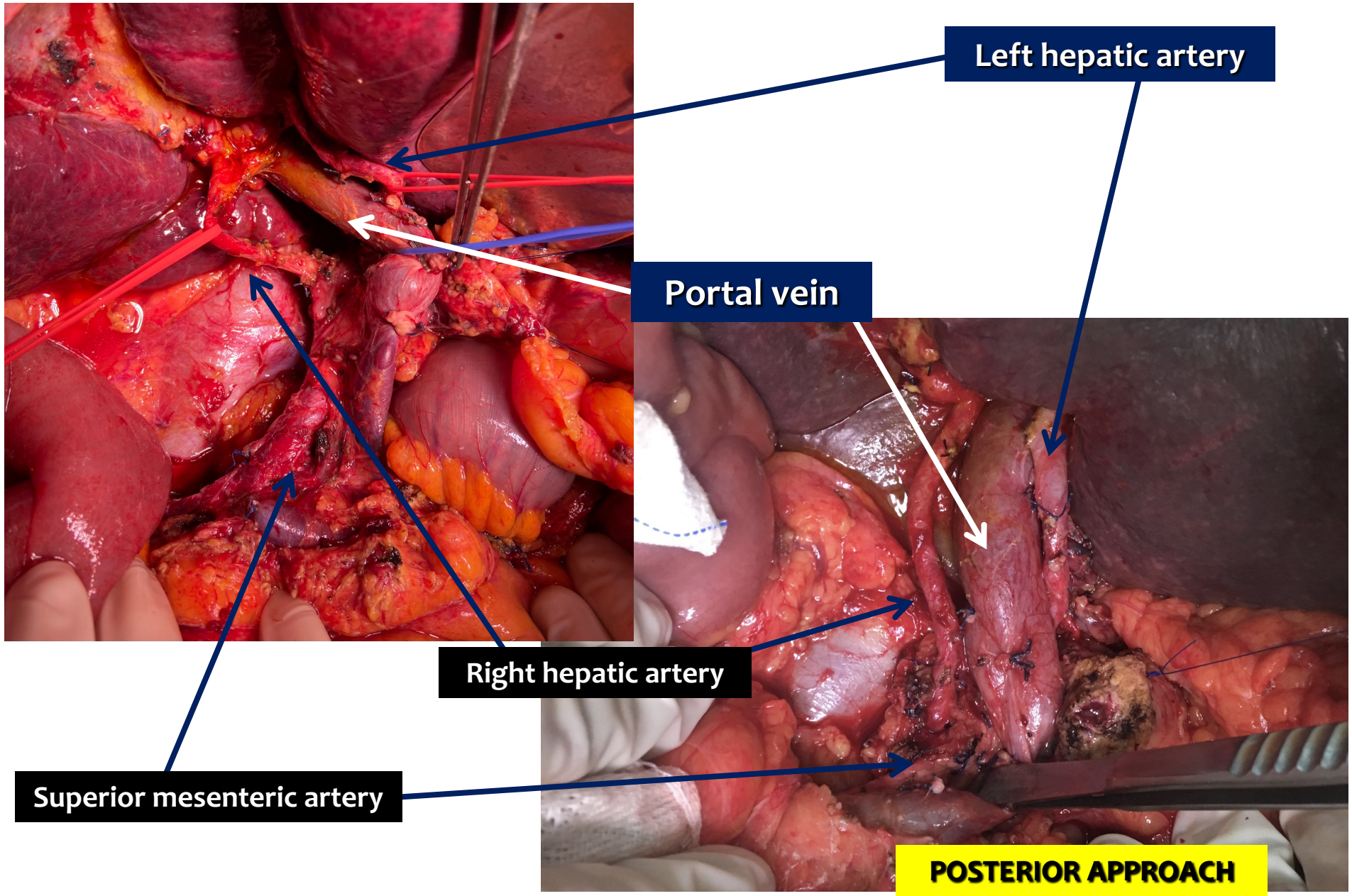


Superior mesenteric artery



**ARTERY FIRST**




Left hepatic artery
Portal vein
Right hepatic artery
Superior mesenteric artery
POSTERIOR APPROACH

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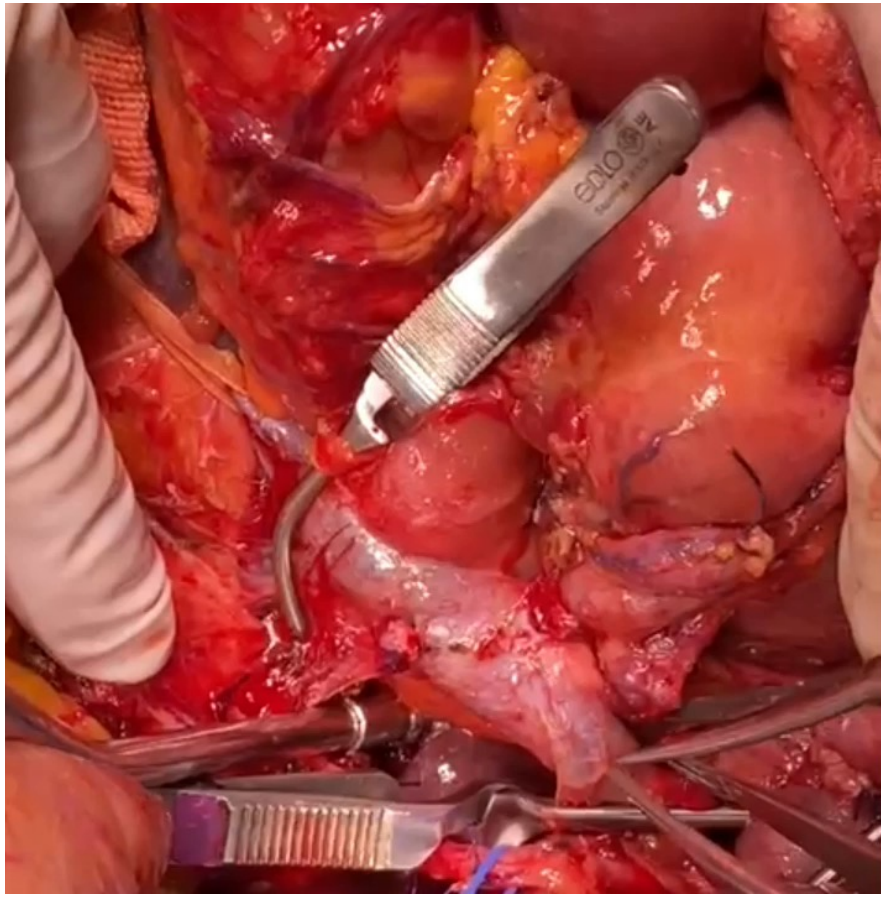
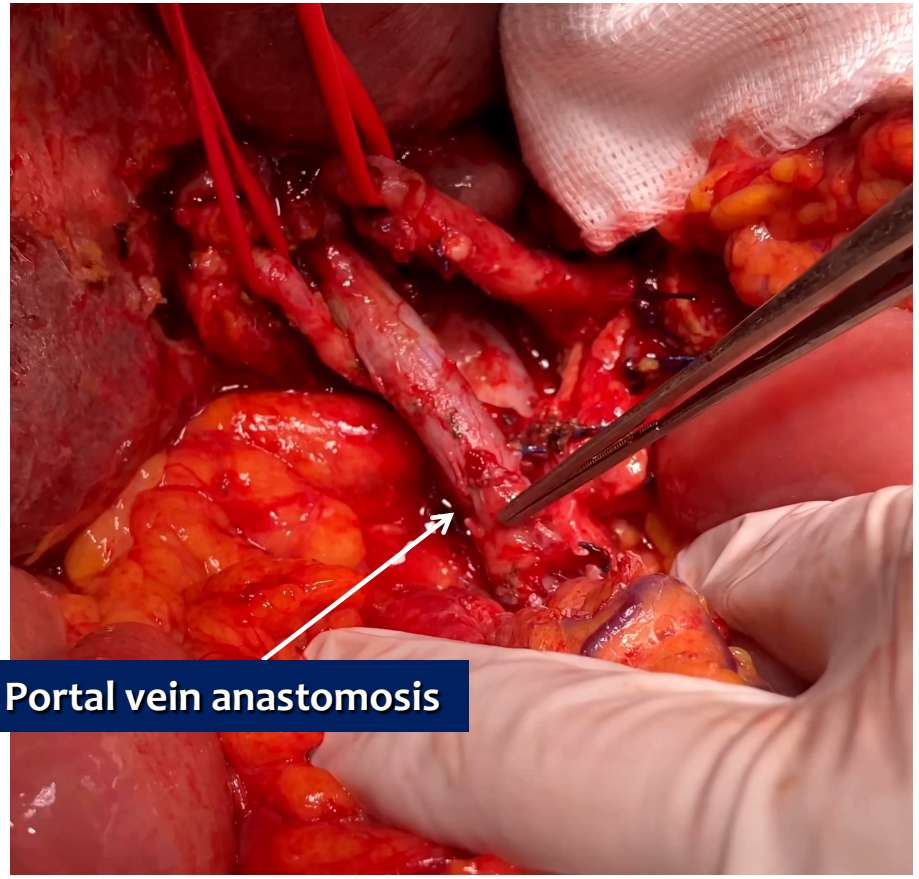
**ARTERY FIRST**

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






## Portal vein/superior mesenteric vein resection/reconstruction

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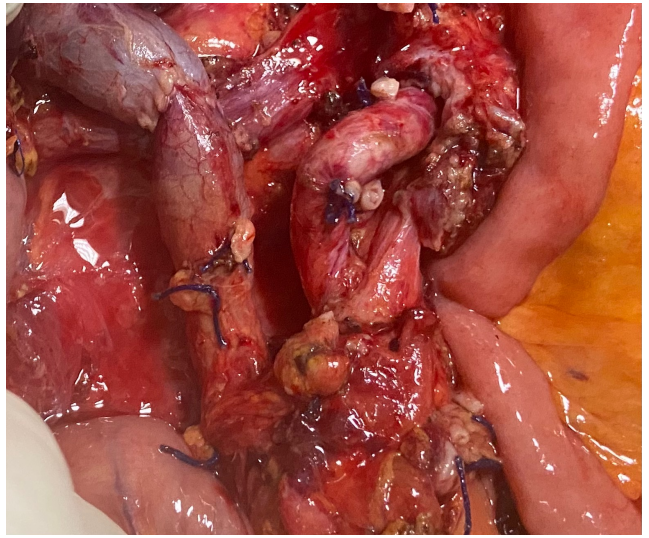

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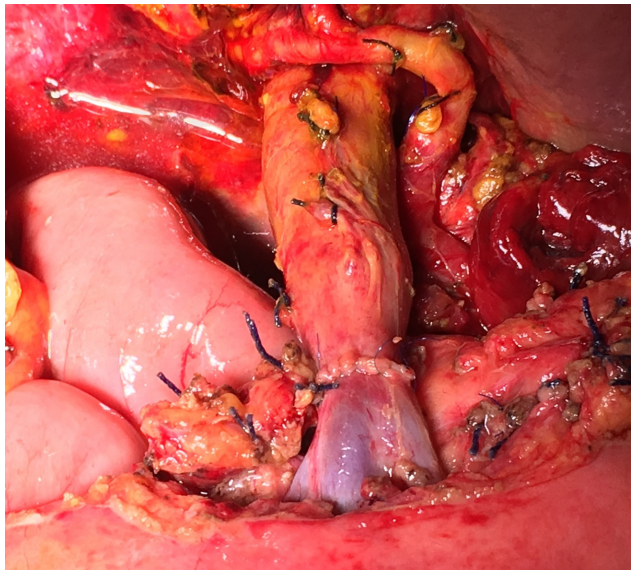
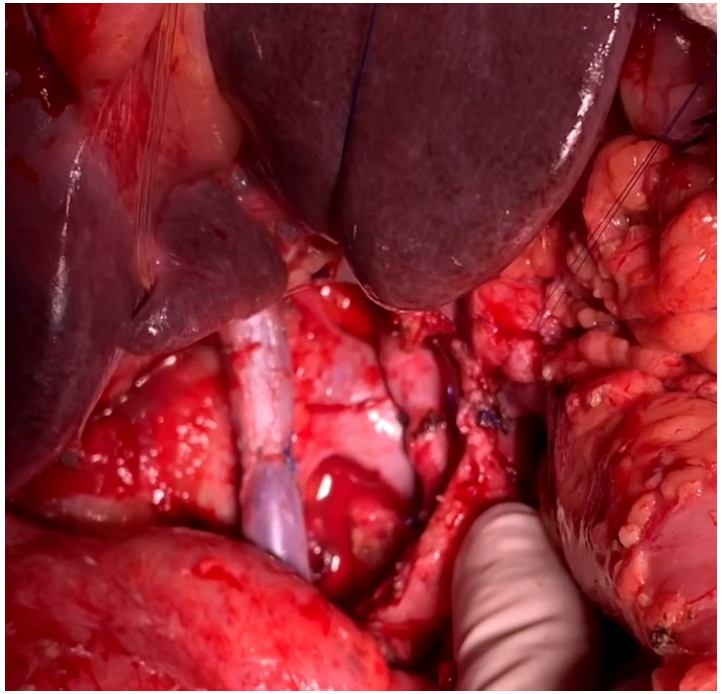
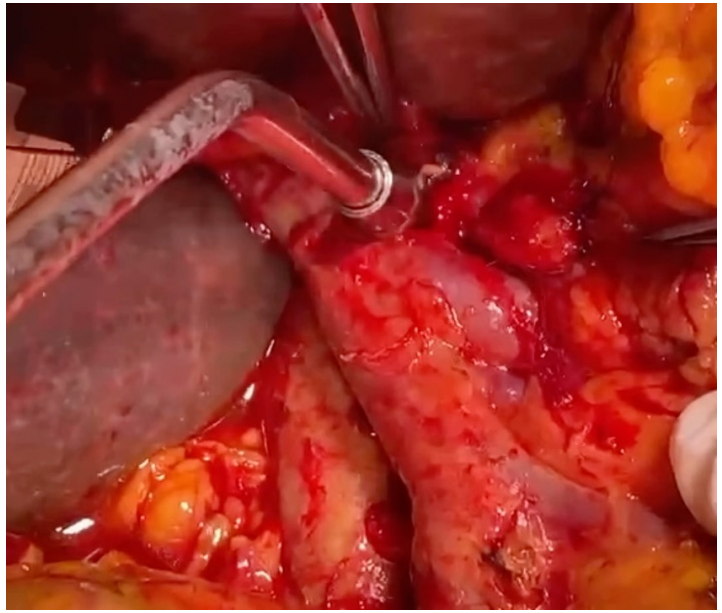


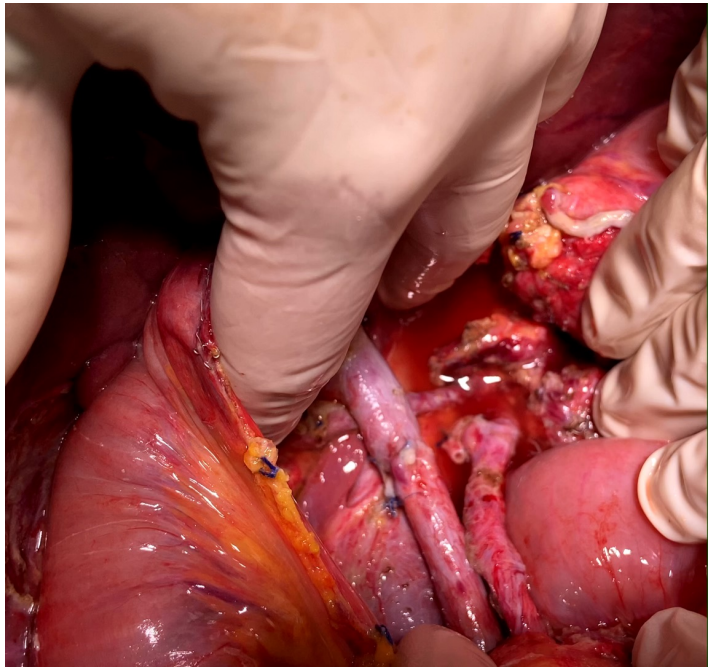
**ARTERY FIRST**

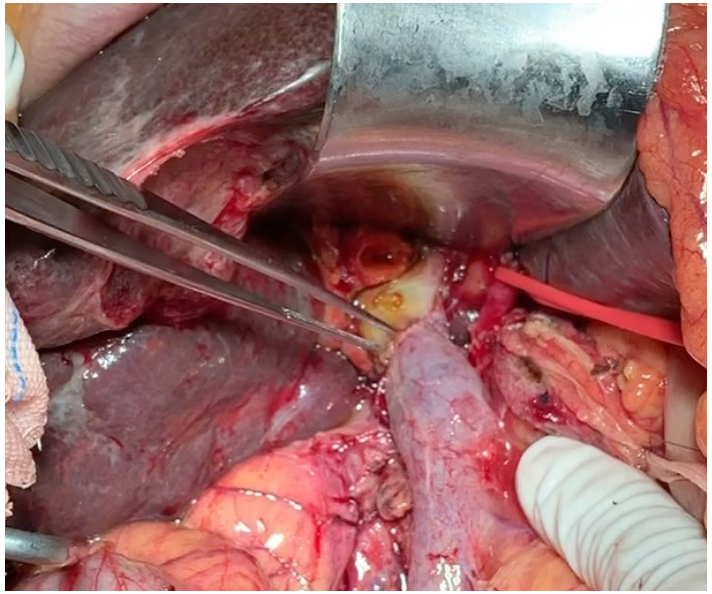
Fernandes ESM, et al. Langenbeck's Arch Surg 2021



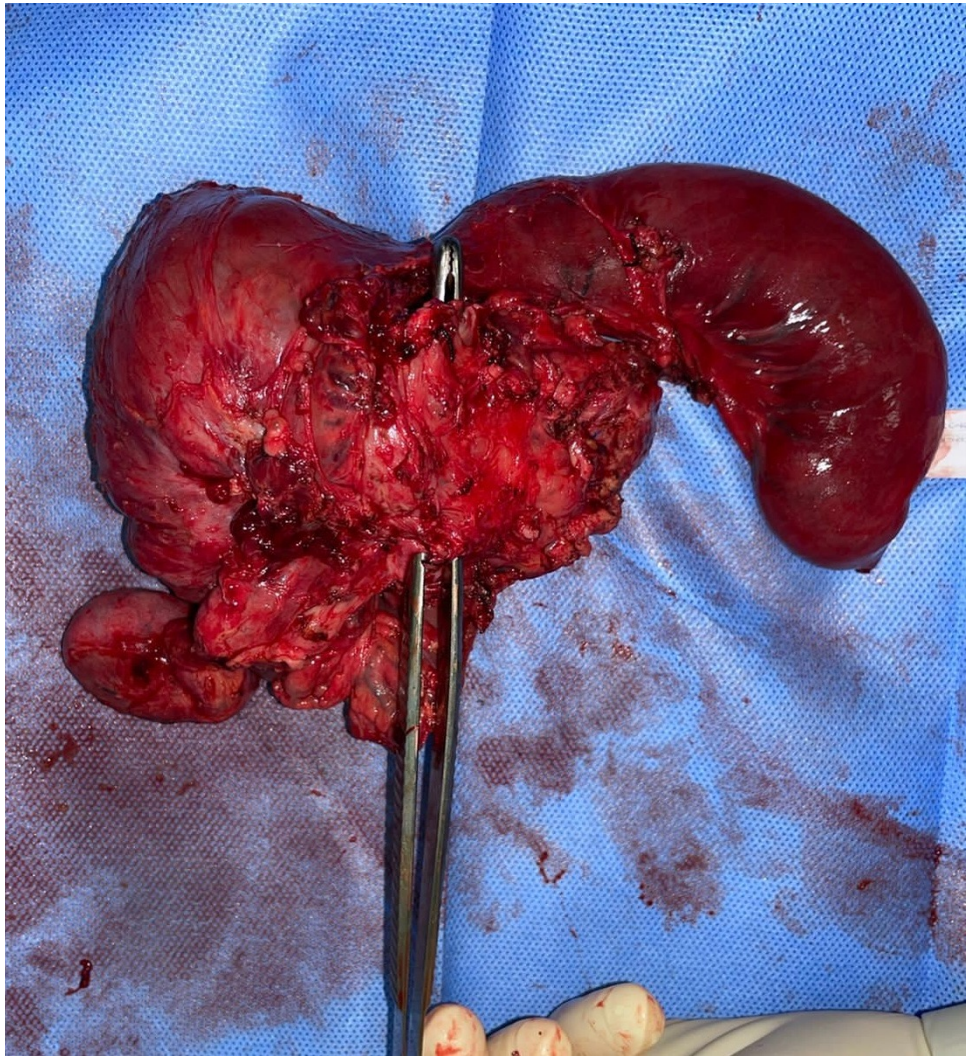


**NO GRAFT**





# VASCULAR RESECTION



Portal vein resection

Jakarta - Indonesia

September 2022

ARTERY FIRST

# ADVANTAGES OF ARTERY FIRST APPROACH

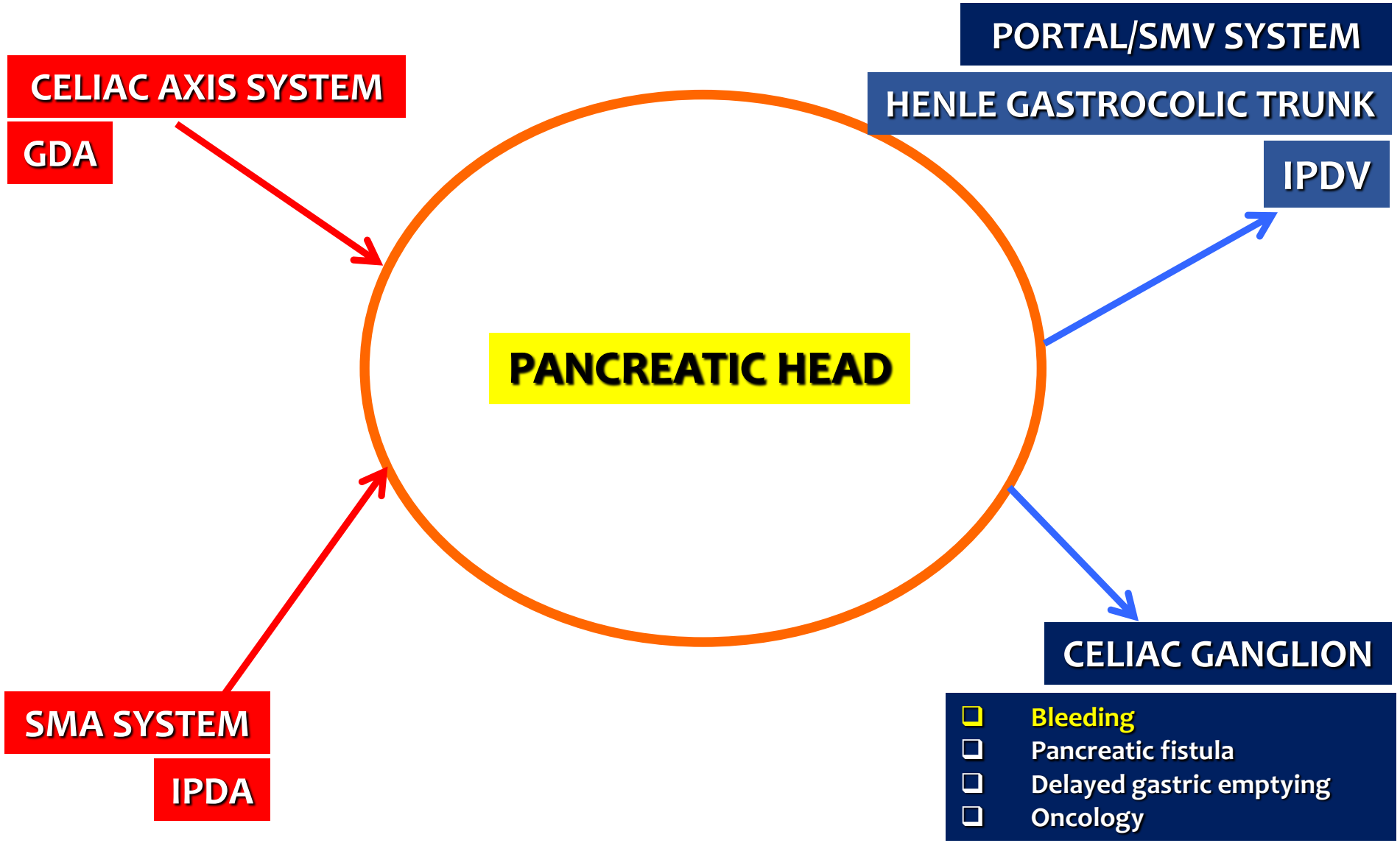
**Table 3** Advantages of the artery-first approach (SHARMA) [35]

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)

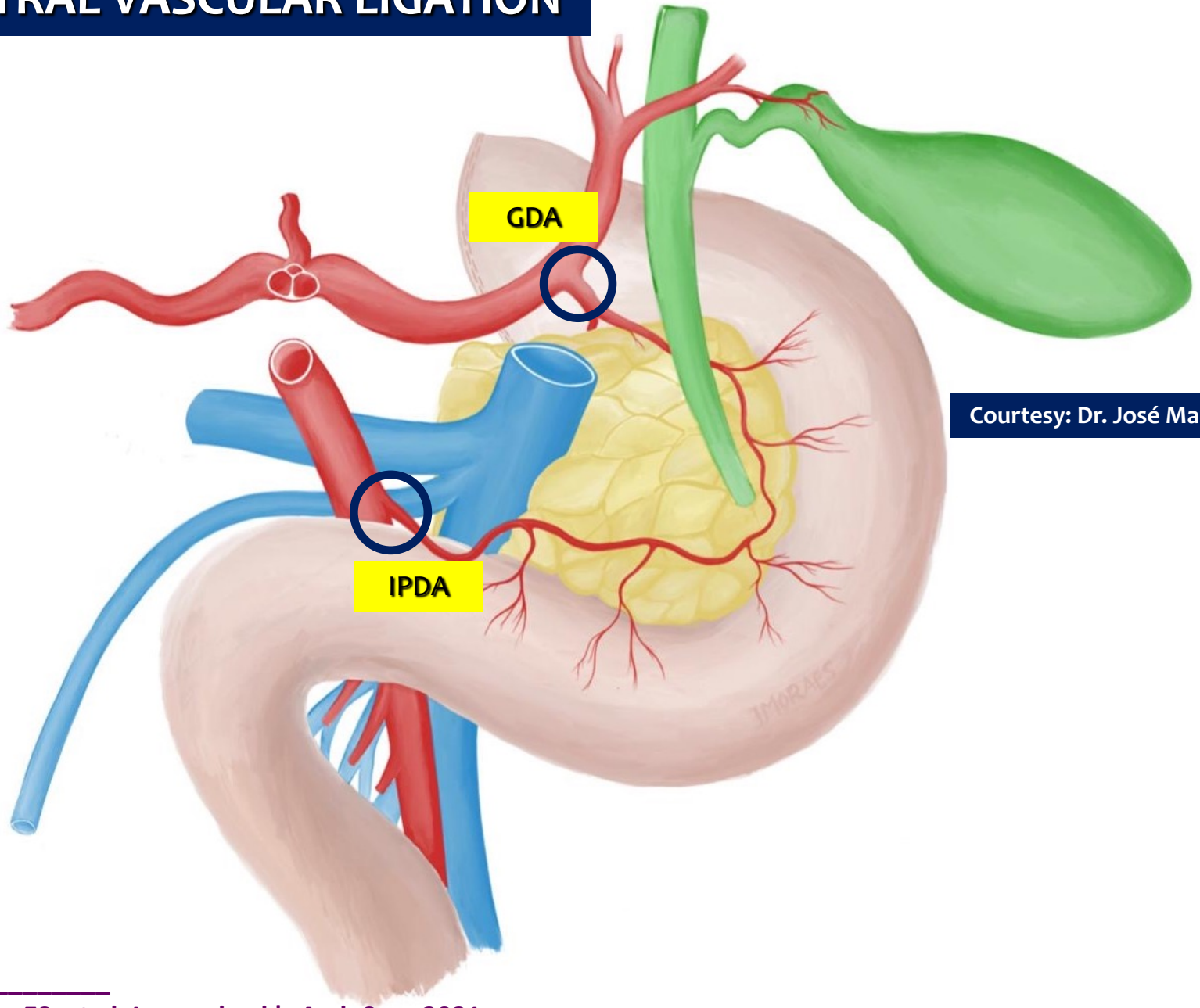
**ARTERY FIRST**

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

# CENTRAL VASCULAR LIGATION



# CENTRAL VASCULAR LIGATION




Courtesy: Dr. José Maria

- ❑ Bleeding
- ❑ Pancreatic fistula
- ❑ Delayed gastric emptying
- ❑ Oncology

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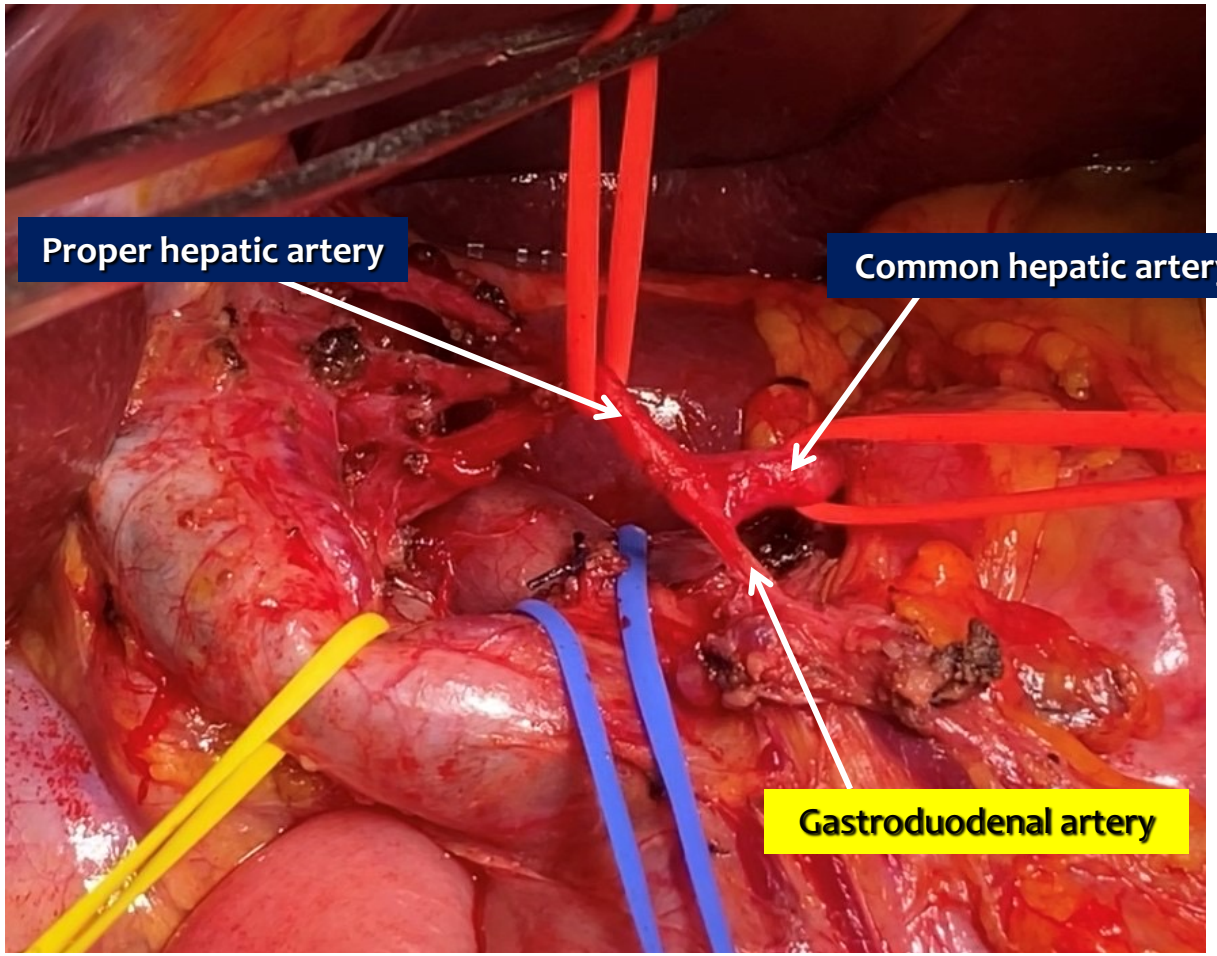
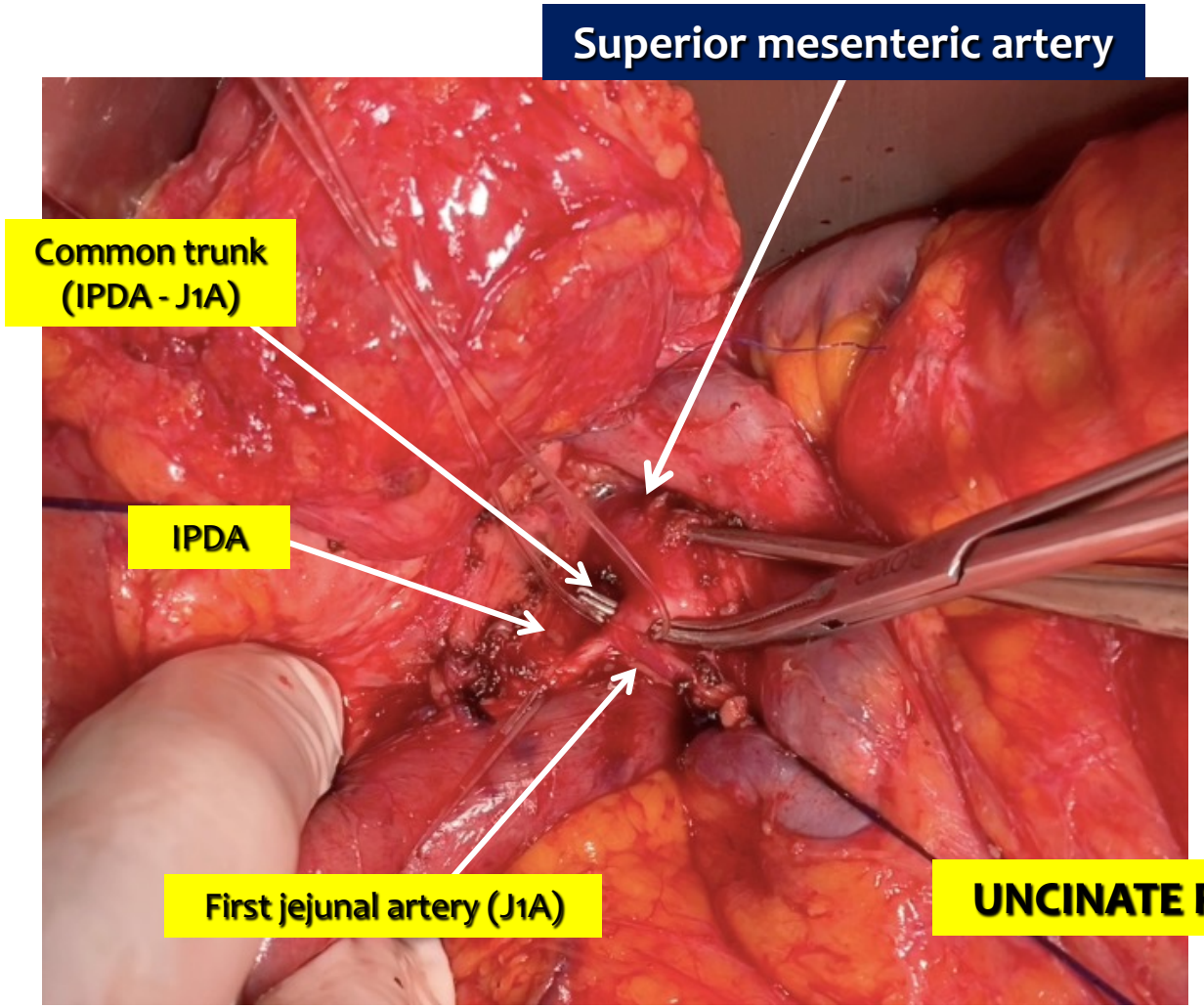
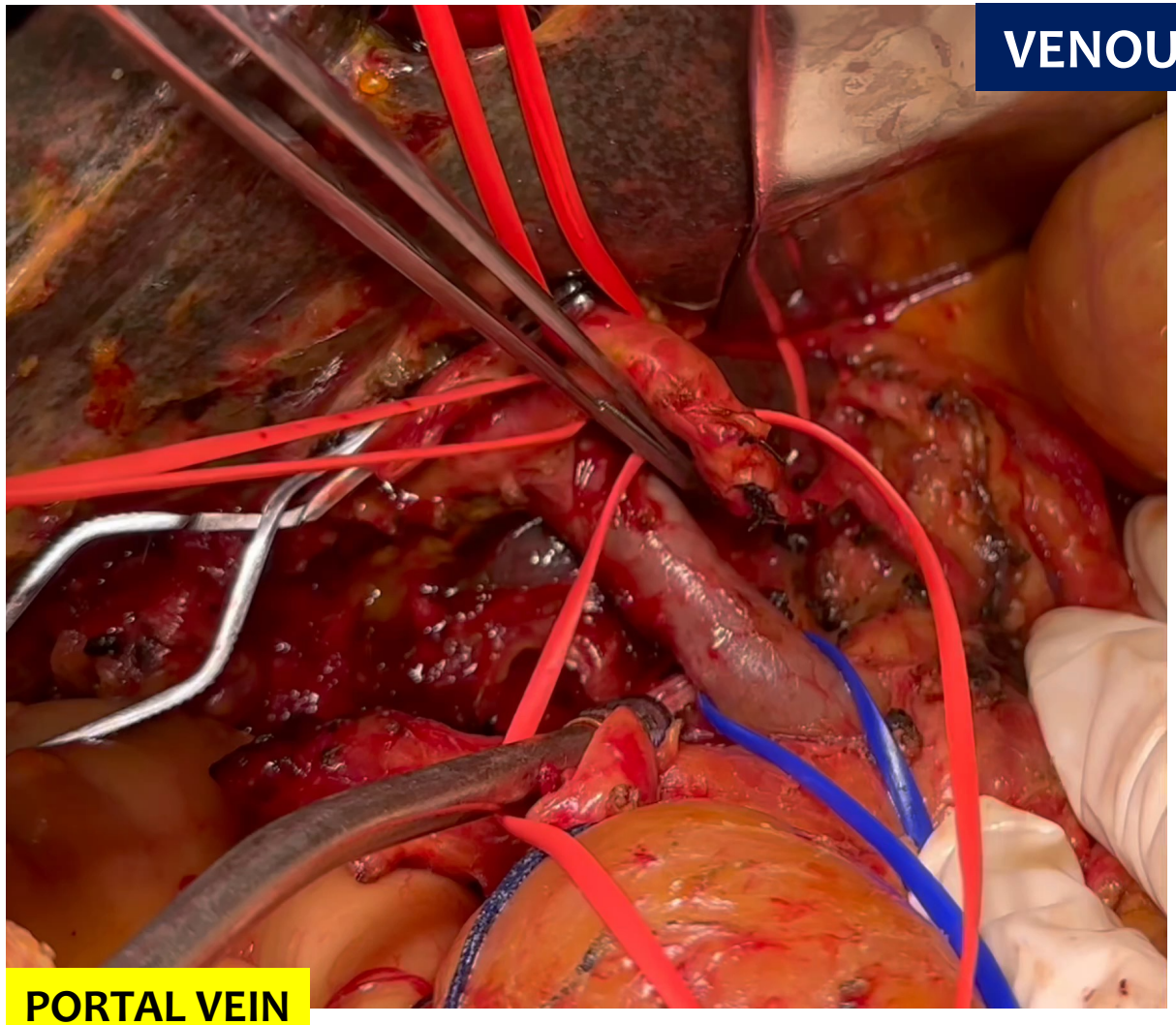
# ARTERY FIRST

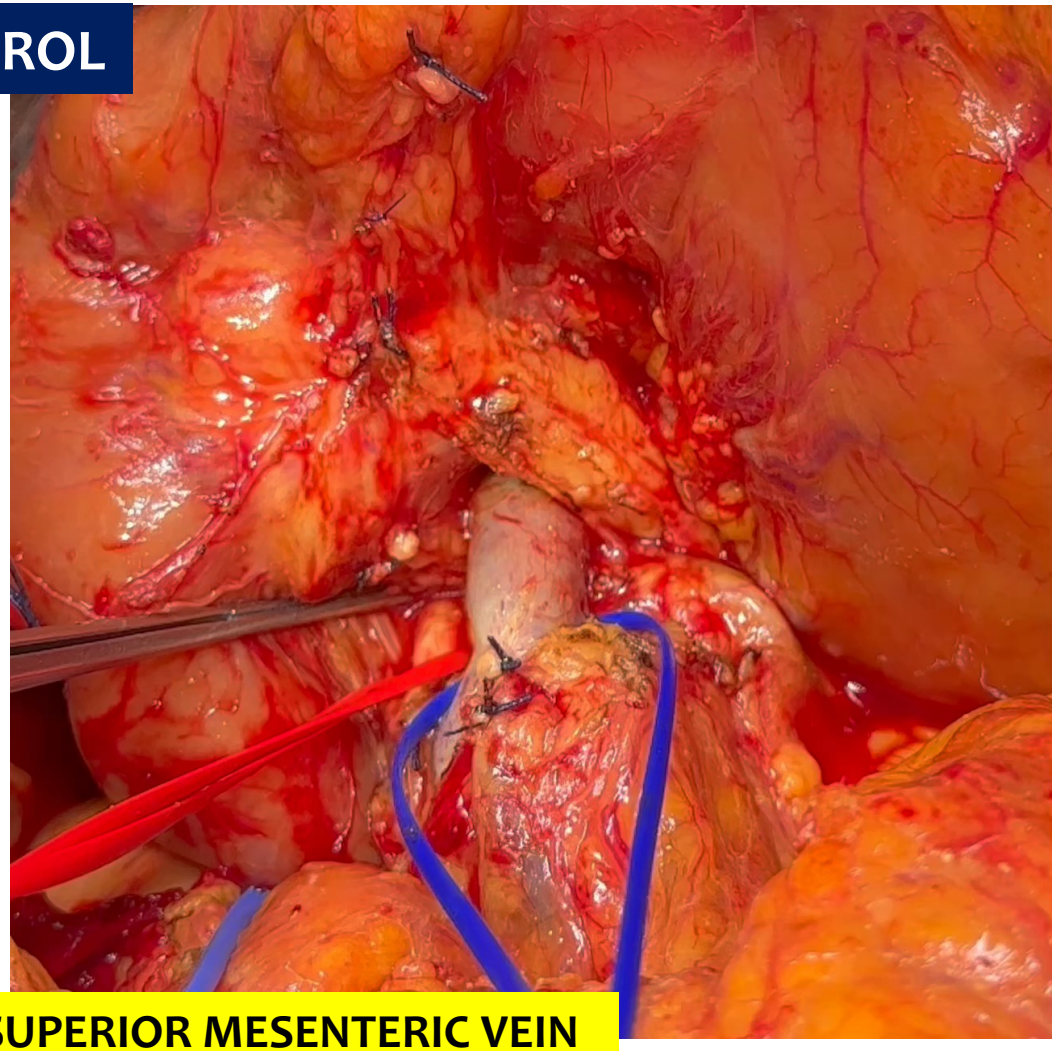


# VENOUS CONTROL



PORTAL VEIN



SUPERIOR MESENTERIC VEIN

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Review

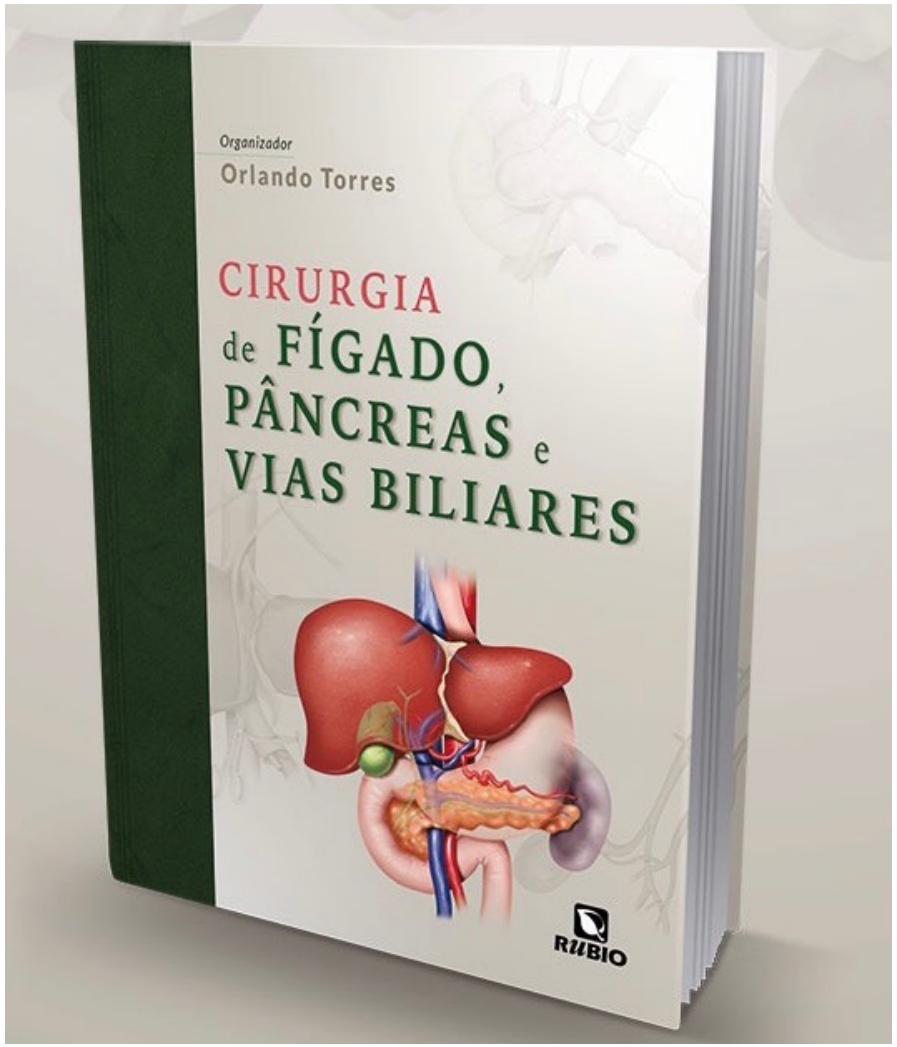
# Superior mesenteric artery first approach can improve the clinical outcomes of pancreaticoduodenectomy: A meta-analysis

## Conclusion

In conclusion, better clinical outcomes were found in patients treated with SMA-PD. Particularly in pancreatic cancer patients, SMA-PD significantly contributed to long-term survival. Furthermore, different operative efficacy was observed in six SMA approaches, and the posterior approach exerted the optimal effect on clinical outcomes of SMA-PD.

**Meta-analysis - 18 studies**

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




XXII Semana Brasileira do Aparelho Digestivo

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# Obrigado!