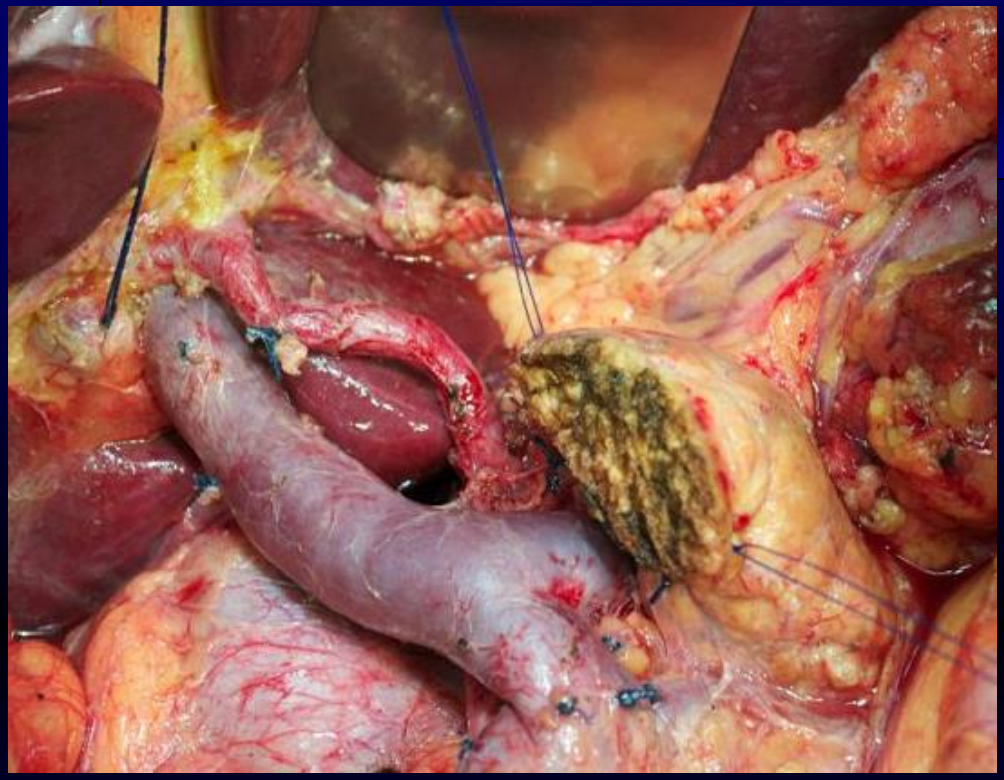

Management of pancreatic stump after pancreaticoduodenectomy

Orlando Jorge M. Torres
Full Professor and Chairman
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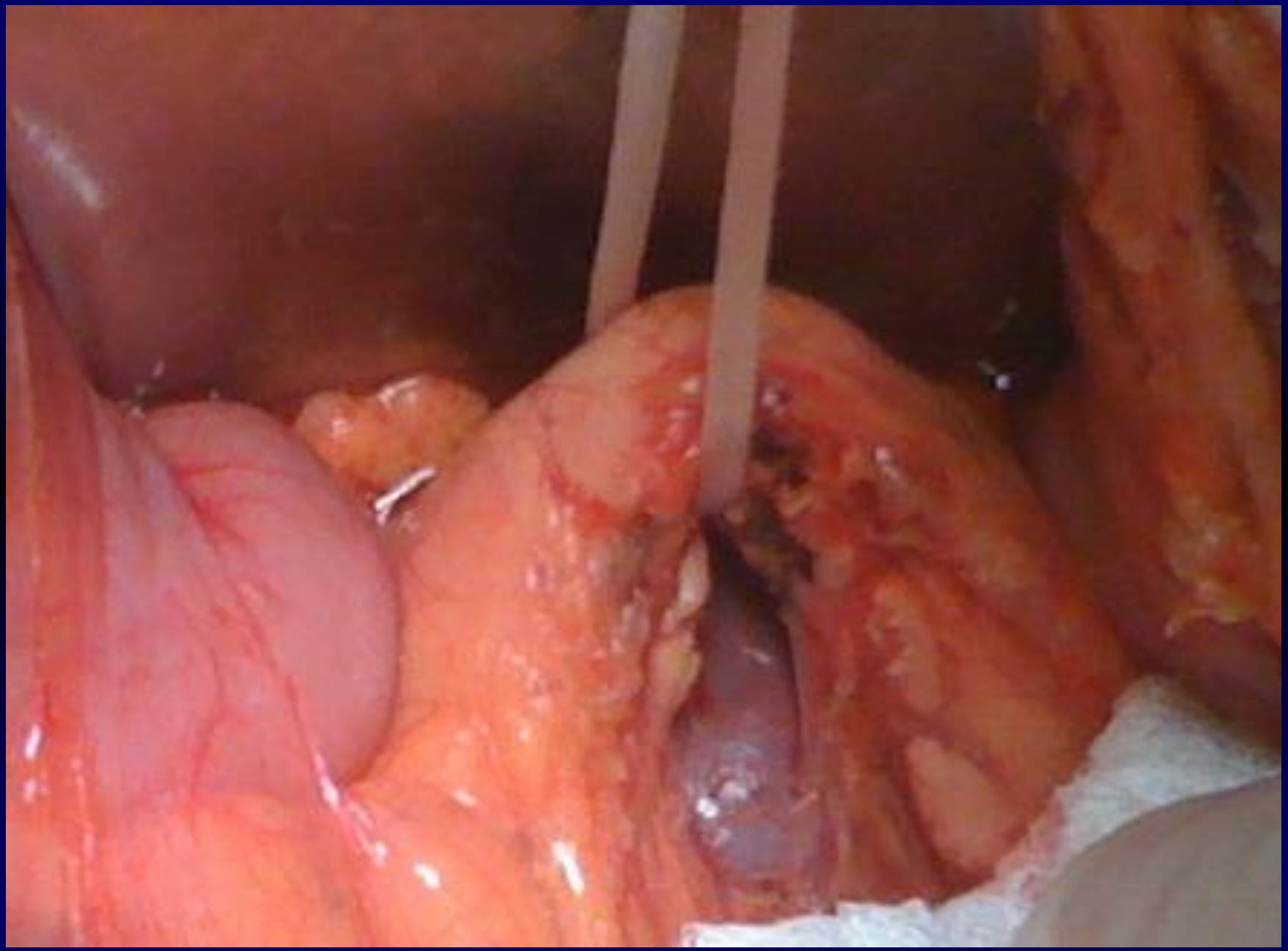
Federal University of Maranhao - Brazil



Two Thousand Consecutive Pancreaticoduodenectomies

John L Cameron, MD, FACS, Jin He, MD, PhD

BACKGROUND: The first successful local resection of a periampullary tumor was performed by Halsted in 1898. Kausch performed the first regional resection in 1909, and the operation was popularized by Whipple in 1935. The operation was infrequently performed until the 1980s and 1990s.

STUDY DESIGN: Two thousand consecutive pancreaticoduodenectomies performed by 1 surgeon (JLC) from the 1960s to the 2000s were retrospectively reviewed from a prospectively maintained database. The first 1,000 were performed over a period of 34 years, the second 1,000 over a period of 9 years.

RESULTS: The most common indication throughout was adenocarcinoma of the head of the pancreas (PDAC, 46%). Benign intraductal papillary mutinous neoplasm (IPMN) increased from

Cameron JL, He J. J Am Coll Surg 2015;220:530-6.

Pancreatic Cancer

Table 4. Morbidity

Complication	n	%
Delayed gastric emptying	410	21
Postoperative pancreatic fistula	295	15
Wound infection	222	11
Cardiac event	69	3
Pneumonia	38	2
Delayed bleeding	32	2
Chyle leak	28	1
Any complication	894	45

Mortality 1,55%

Cameron JL, He J. J Am Coll Surg 2015;220:530-6

Artigo Original

ISSN 0100-6991

DUODENOPANCREATECTOMIAS: ANÁLISE DE 39 PACIENTES

PANCREATICODUODENECTOMIES: ANALYSIS OF 39 PATIENTS

Orlando Jorge Martins Torres, TCBC-MA[1]; Érica Sampaio Barbosa[2]; Noelia Dias Carneiro Barros[2]; Cristiany de Almeida Barros[2]; Edson Dener Zandonadi Ferreira[2]; Herquimas Costa Pereira, ACBC-MA[3]

RESUMO: Objetivo: Pretendemos neste estudo analisar 39 pacientes submetidos à duodenopancreatectomia. **Método**: No período de julho de 1998 a março de 2004, trinta e nove pacientes foram submetidos a duodenopancreatectomia no Hospital Universitário da Universidade Federal do Maranhão. Foram analisados os dados epidemiológicos, o quadro clínico, os métodos radiológicos, as indicações da operação e as complicações encontradas. **Resultados:** Havia 22 pacientes do sexo masculino (56,4%) e 17 pacientes do sexo feminino (43,6%) com média de idade de 54,9 anos (variação de 21-82 anos). O exame radiológico mais utilizado foi a tomografia computadorizada. O diagnóstico histológico definitivo revelou adenocarcinoma periampolar em 35 pacientes (89,7%), pancreatite crônica (três pacientes – 7,7%) e adenocarcinoma colo-retal (um paciente – 2,6%). O adenocarcinoma periampolar mais freqüente foi o carcinoma ductal do pâncreas (27 pacientes – 69,2%), seguido por carcinoma de papila de Vater (cinco pacientes – 12,8%), adenocarcinoma duodenal (dois pacientes – 5,1%) e carcinoma de via biliar distal (um paciente – 2,6%). As complicações pulmonares foram as mais freqüentes sendo encontradas em cinco pacientes (12,8%), a sepse peritoneal em quatro pacientes (10,2%), fístula pancreática em três pacientes (7,6%) e a hemorragia intra-abdominal em três pacientes (7,6%). A mortalidade intra-hospitalar em 30 dias foi 10,2 % (quatro pacientes). **Conclusão:** A duodenopancreatectomia ainda está associada

Fistula 10,2%

Torres OJ, et al. Rev Col Bras Cir 2005;34:21-5


UFMA - Hospital Univ
UFMA-HUUFMA
EBSERH

TABLE 1. Criteria for Grading Pancreatic Fistula (ISGPF Classification Scheme)

Criteria	No Fistula	Grade A Fistula	Grade B Fistula	Grade C Fistula
Drain amylase	<3× normal serum amylase	>3× normal serum amylase	>3× normal serum amylase	>3× normal serum amylase
Clinical conditions	Well	Well	Often well	Ill appearing/bad
Specific treatment	No	No	Yes/no	Yes
US/CT (if obtained)	Negative	Negative	Negative/positive	Positive
Persistent drainage (>3 wk)	No	No	Usually yes	Yes
Signs of infection	No	No	Yes	Yes
Readmission	No	No	Yes/no	Yes/no
Sepsis	No	No	No	Yes
Reoperation	No	No	No	Yes
Death related to fistula	No	No	No	Yes

Signs of infection include elevated body temperature >38°C, leukocytosis, and localized erythema, induration, or purulent drainage. Readmission is any hospital admission within 30 days following hospital discharge from the initial operation. Sepsis is the presence of localized infection and positive culture with evidence of bacteremia (ie, chills, rigors, elevated WBC) requiring IV antibiotic treatment, or hemodynamic compromise as demonstrated by high cardiac output and low SVR within 24 hours of body temperature >38°C.

Adapted with permission from Bassi C, Dervenis C, Butturini G, et al. Postoperative pancreatic fistula: an international study group (ISGPF) definition. *Surgery.* 2005;138:8–13.[14]

Risk factors

- Pancreas
  - Pancreatic texture
  - Pancreatic duct size
  - Blood supply to the stump
  - Volume of pancreatic juice output
  - Pathologic features
- Patient
  - Age
  - Sex
  - Bilirubin level
  - Comorbid illness
- Operation
  - Operating time
  - Blood loss
  - Type of anastomosis
  - Stent use

Texture

Duct size

Lai ECH, et al. Arch Surg 2009;144:1074-80

Table 2 Fistula Risk Score for prediction of clinically-relevant pancreatic fistula (CR-POPF) after a pancreatoduodenectomy

Risk factor	Parameter	Points
Gland texture	Firm	0
	Soft	2
Pathology	Pancreatic adenocarcinoma or pancreatitis	0
	Ampullary, duodenal, cystic, islet cell	1
Pancreatic duct diameter	≥5 mm	0
	4 mm	1
	3 mm	2
	2 mm	3
	≤1 mm	4
Intra-operative blood loss	≤400 ml	0
	401–700 ml	1
	701–1,000 ml	2
	>1,000 ml	3
		Total 0 to 10 points

Callery MP, et al. J Am Coll Surg 2013;216:1-14

Quality of anastomosis

Risk of pancreatic fistula

Table 3 Intraoperative Classification of Pancreatic Parenchyma Density in 218 Consecutive Patients Undergoing Partial Duodenopancreatectomy

Parameters	*n*	Percentage
Pancreatic density	218	100
Soft	83	38.0
Intermediate	57	26.2
Hard	78	35.8

Frymerma AS, et al. J Gastrointest Surg 2010;14:711-8

Risk factors

- Pancreatic texture and fistula (%)

  Hard 0%

  Soft 25%

- Factors (soft pancreas):

  1. Normal exocrin function

     High volume of pancreatic juice output

  2. Associated with pancreatic duct size (thin)

  3. Damage of the pancreas during anastomosis

Yeo CJ, et al. Ann Surg 2000;232:419-29

Risk factors

Table 4 Multivariate logistic regression for pancreatic leakage

Parameters	*P*	Odds ratio	CI
Anastomotic technique			
Duct-to-mucosa	-	1	
Invagination	0.128	9.967	0.514-193.15
Pancreatic size (mm)			
≥3	-	1	
<3	0.007	11.867	1.96-71.86
Pancreatic texture			
Hard	-	1	
Soft	0.017	15.445	1.629-146.46

Yang YM, et al. World J Gastroenterol 2005;11:2456-61

Surgical strategies

- Oclusion of the pancreatic duct
- Pancreatogastrostomy
  - Classic
  - Montenegro technique
- Pancreatojejunostomy
  - Ducto-to-mucosa
  - Invagination
  - Peng technique
  - Shrikhande technique
- Octreotide

Lai ECH, et al. Arch Surg 2009;144:1074-80

Surgical strategies

- Stent into the pancreatic duct
  - Internal
  - External
- Pancreatojejunostomy
  - Classic
  - Y loop
  - Braun
- Biological glue
- Total Pancreatectomy

Lai ECH, et al. Arch Surg 2009;144:1074-80

ABCD Arq Bras C/r Dig, São Paulo
14(2):101-103, 2001

RELATO DO CASO

MANAGEMENT OF POSTOPERATIVE PANCREATIC FISTULA BY LIGATION OF THE PANCREATIC DUCT

Orlando Jorge Martins **TORRES**, Alzira de Alencar Lima **LINS**, Paulo Márcio Sousa **NUNES** and Itaguacy Rodrigues **COELHO**

ABCDDV/298

Torres OJM, Lins AAL, Nunes PMS, Coelho IR. Management of postoperative pancreatic fistula by ligation of the pancreatic duct. **ABCD Arq Bras Clr Dig,** São Paulo, 14(2): 101-103, 2001.

ABSTRACT - Pancreatic fistula is a serious and potentially lethal complication after pancreaticoduodenectomy. Ligation of the pancreatic duct ensure the absence of activated pancreatic enzymes in the lumem of the jejunum and the potential related complications. The aim of this study is to report a case of ligation of the pancreatic duct in the treatment of pancreatic fistula after pancreaticoduodenectomy. A 62-year-old man were underwent to pancreaticoduodenectomy due to a focal mass in the head of the pancreas. On the fourth postoperative day an anastomotic leak was found and treated by ligation of the pancreatic duct. The postoperative course was uneventful. The authors concluded that pancreatic duct ligation is an

eatic fistula after pancreaticoduc

creatic duct ligation. Pancreatic

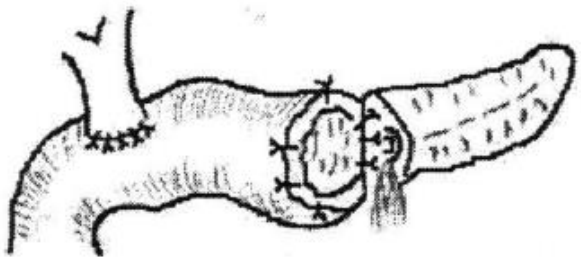


FIGURE 1 - Pancreaticojejunostomy and anastomotic leak

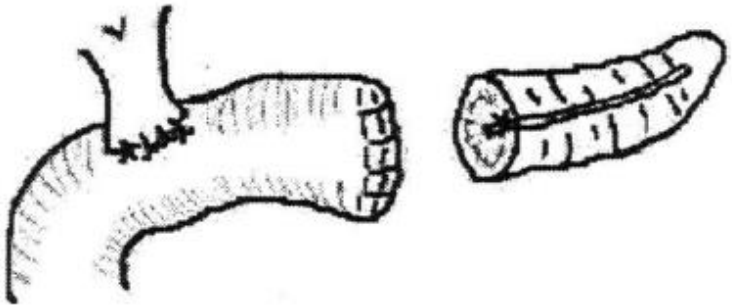
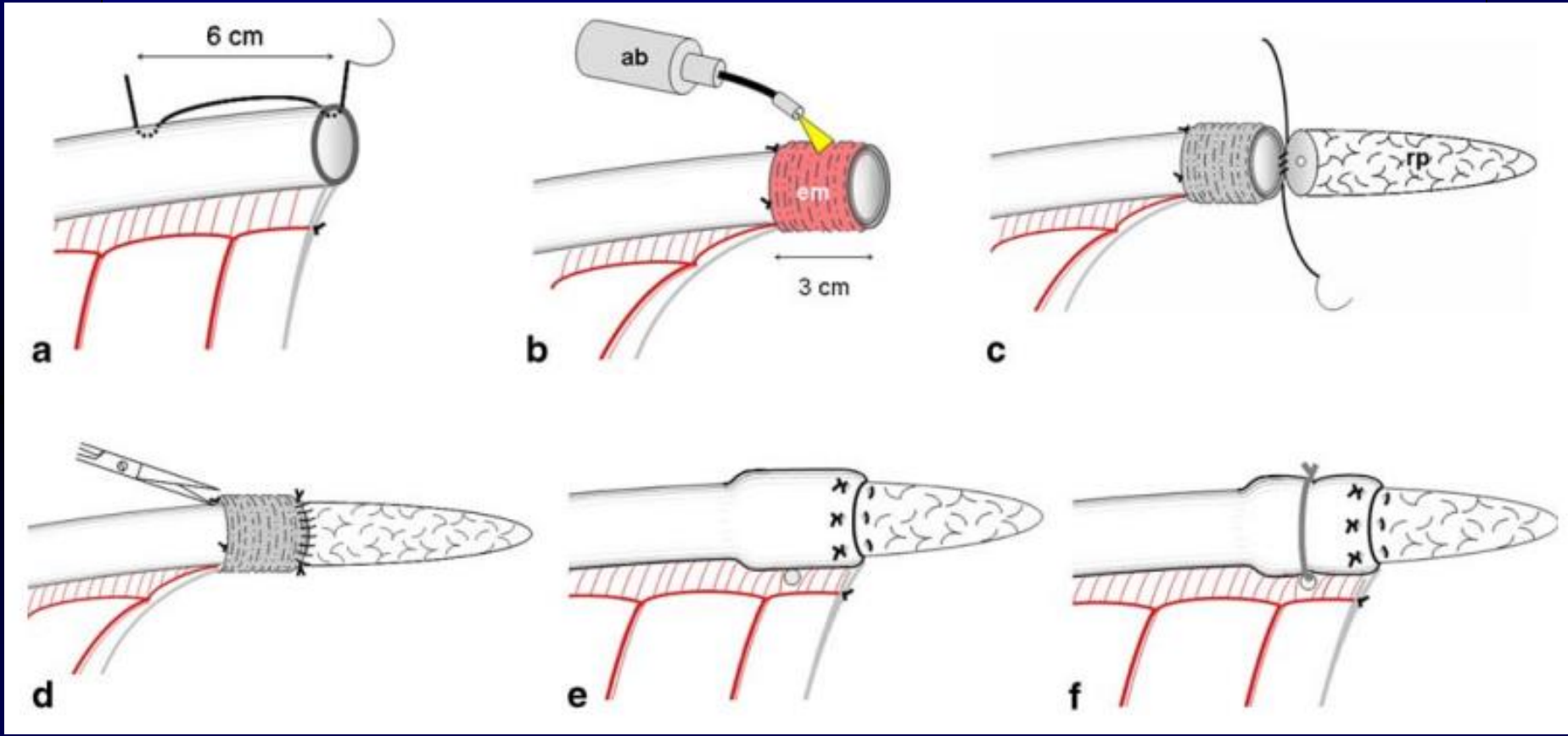


FIGURE 2 Closure of jejunal stump and pancreatic duct ligation.

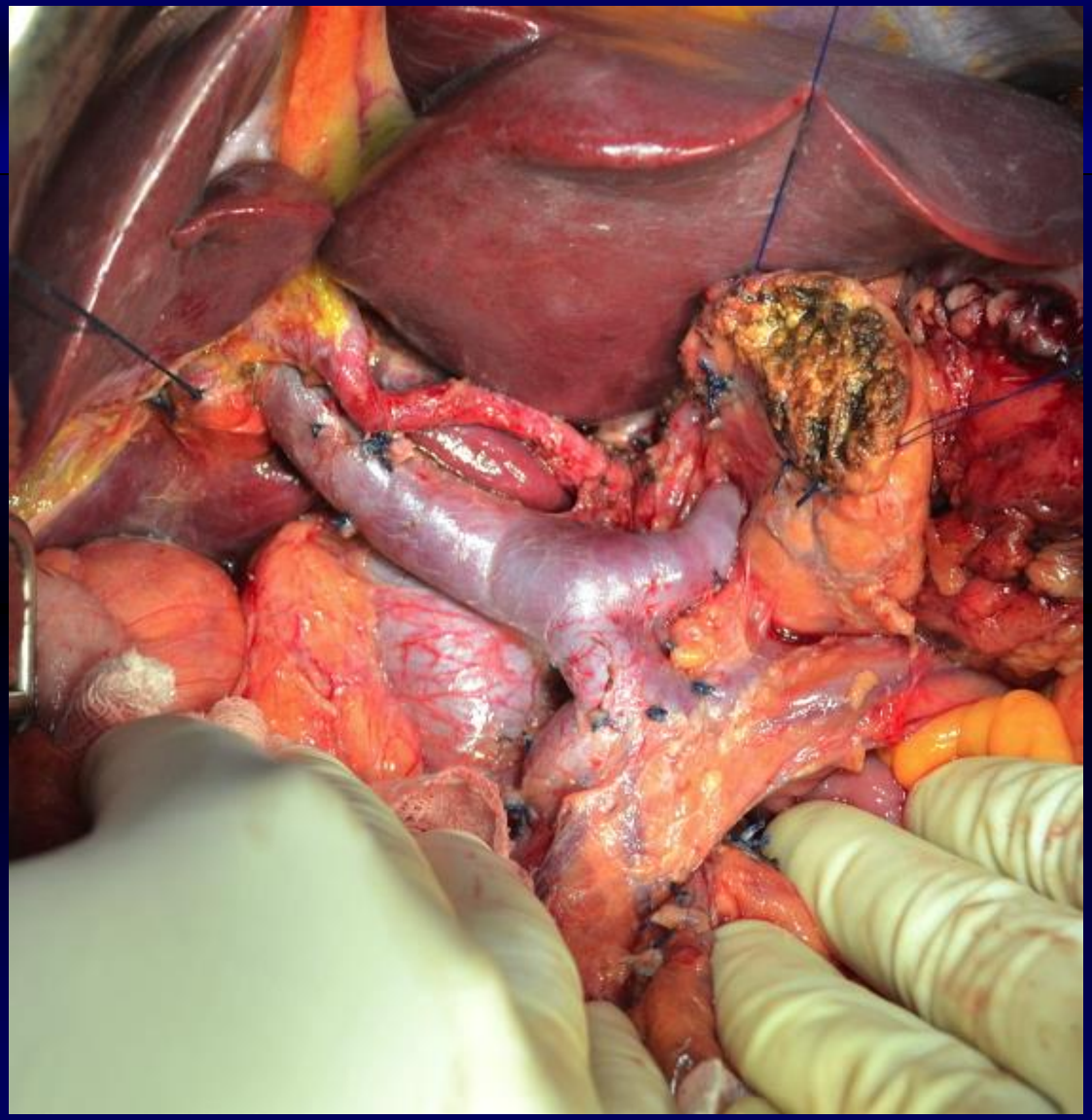
Torres OJM, et al. ABCD Arq Bras Cir Dig 2001; 14:101-3

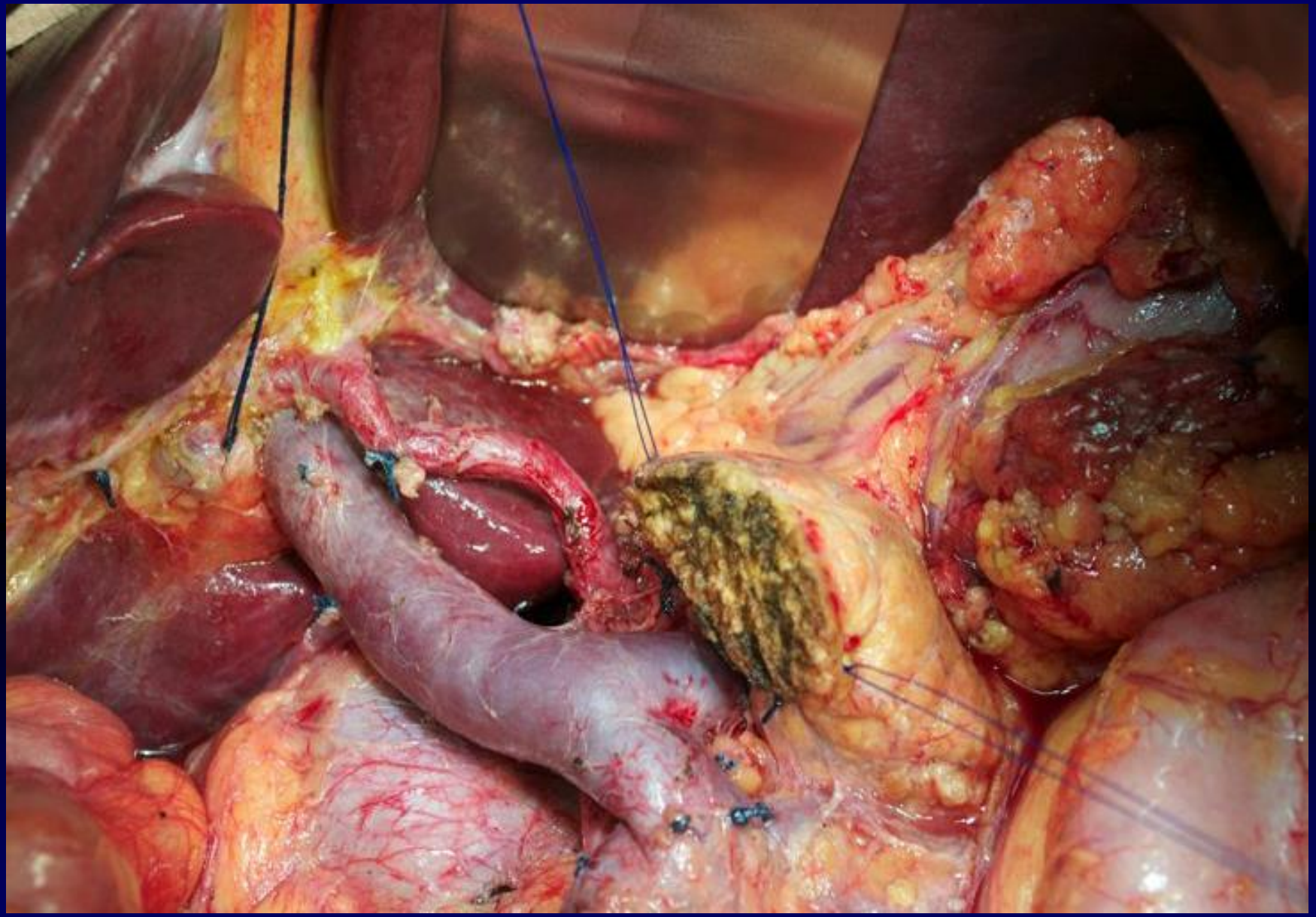
PENG

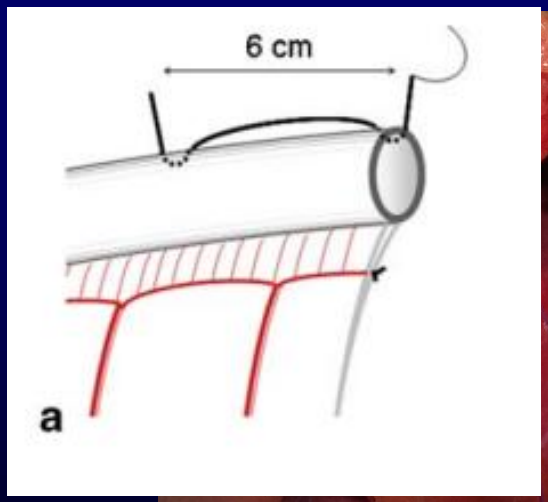
Peng Technique



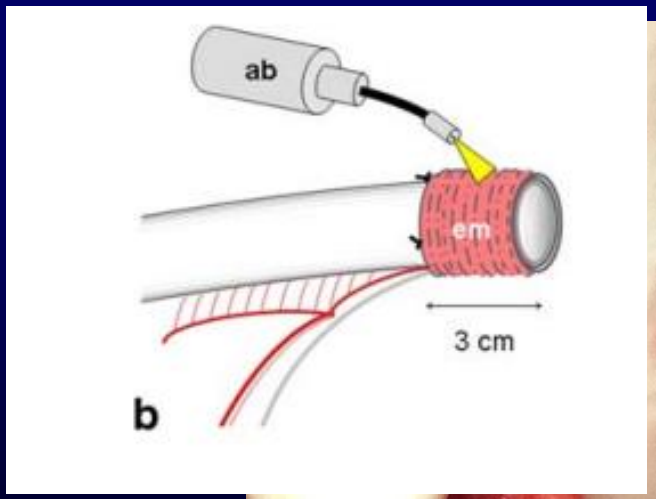
Peng S, et al. Am J Surg 2002;183:283-5



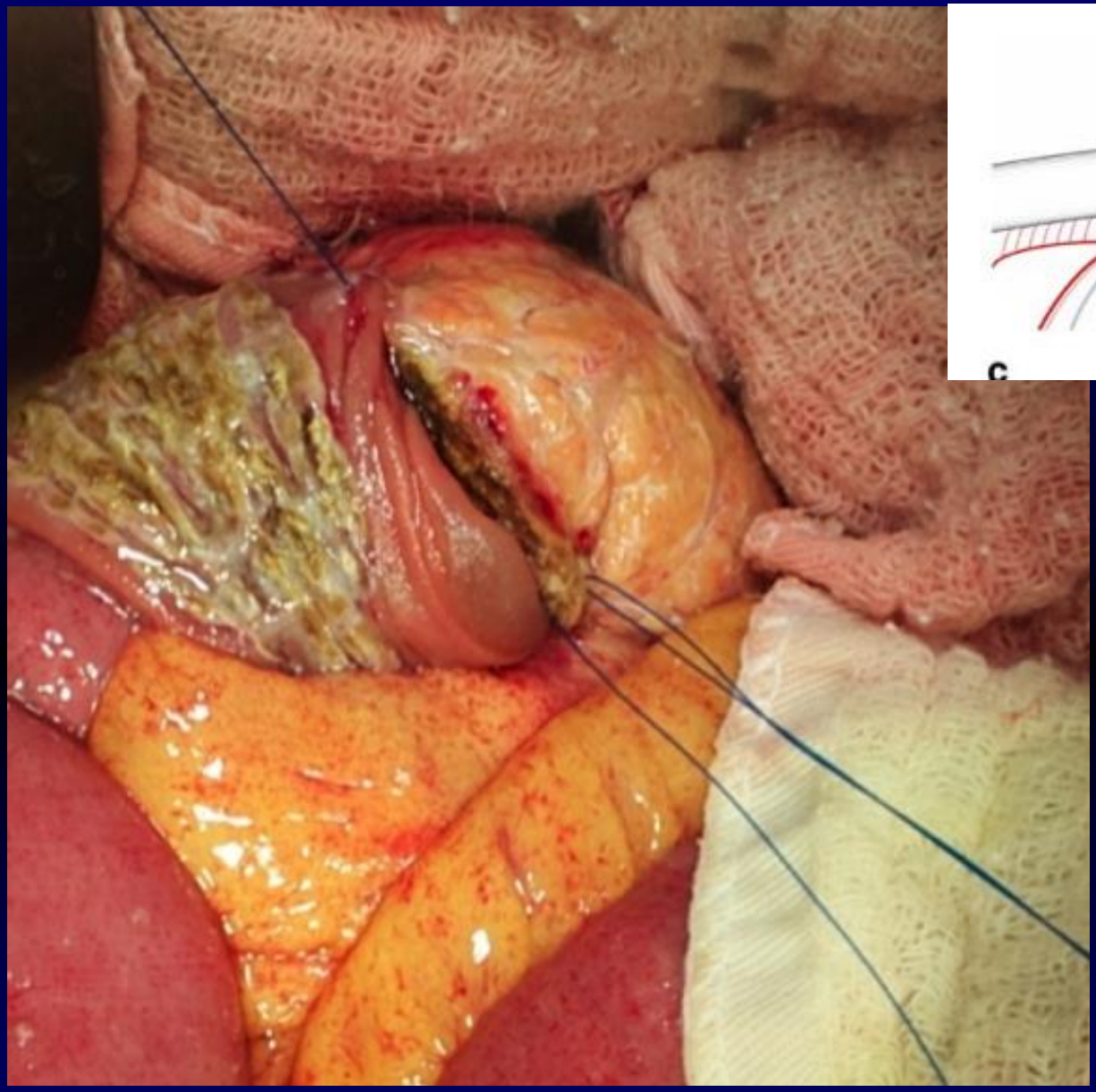


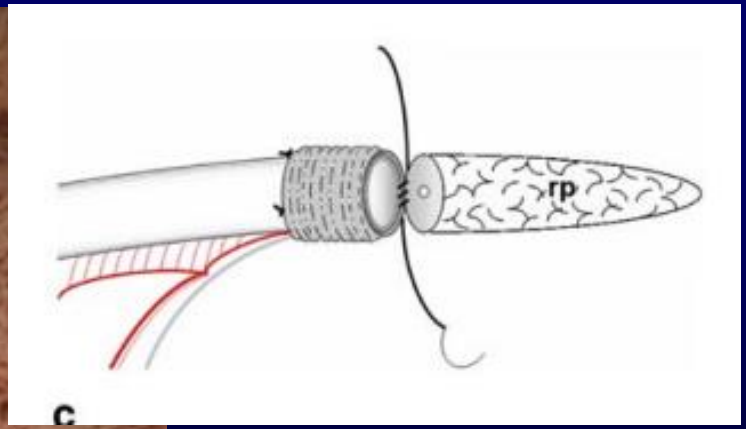


The stump of the jejunum is everted



The mucosa is destroyed by electric coagulation

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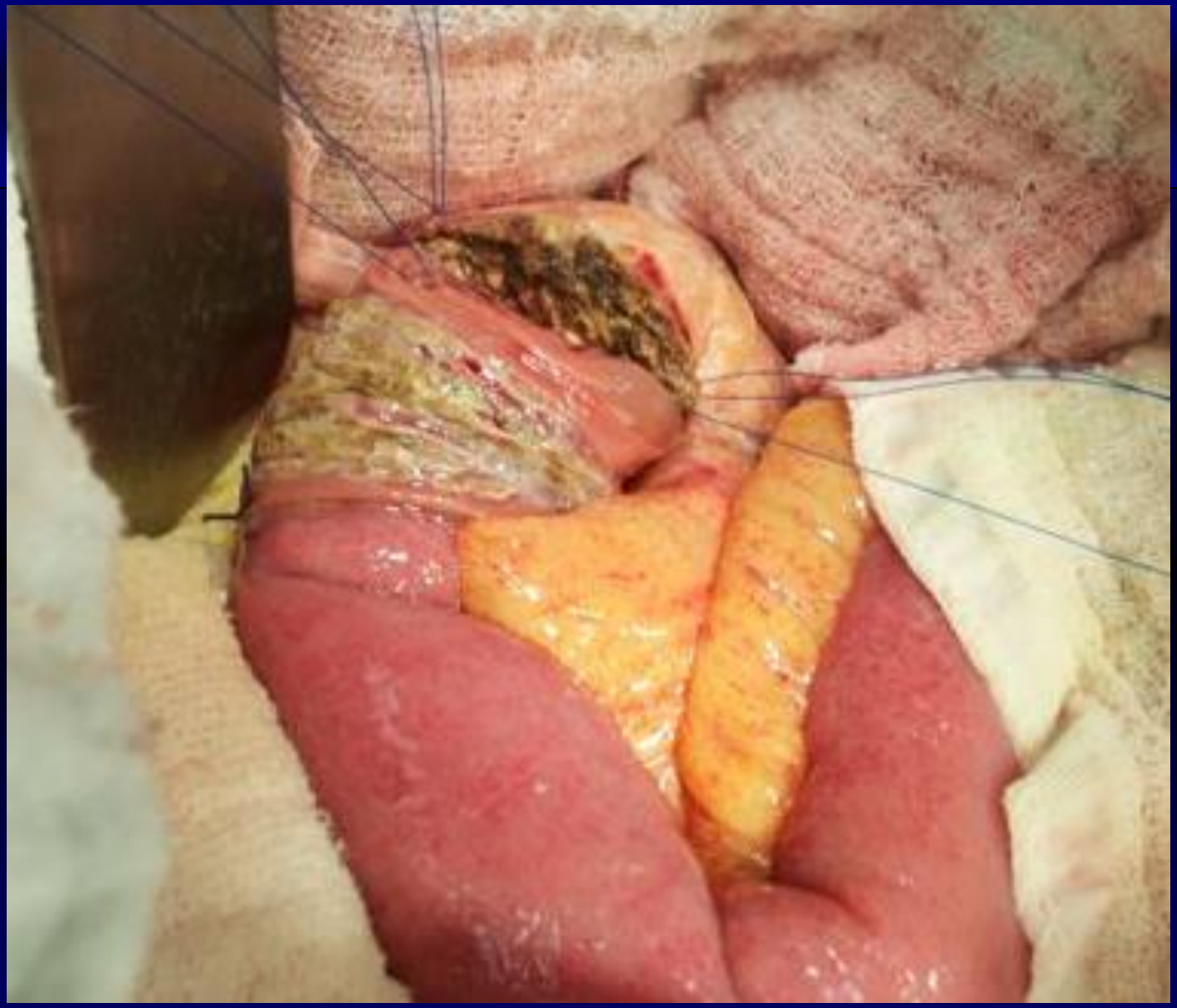

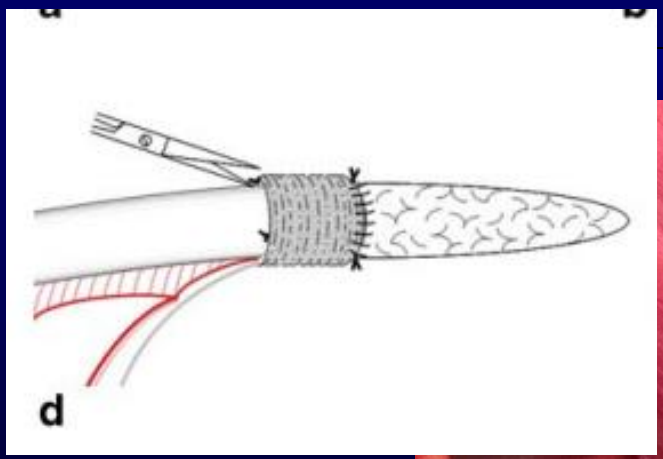
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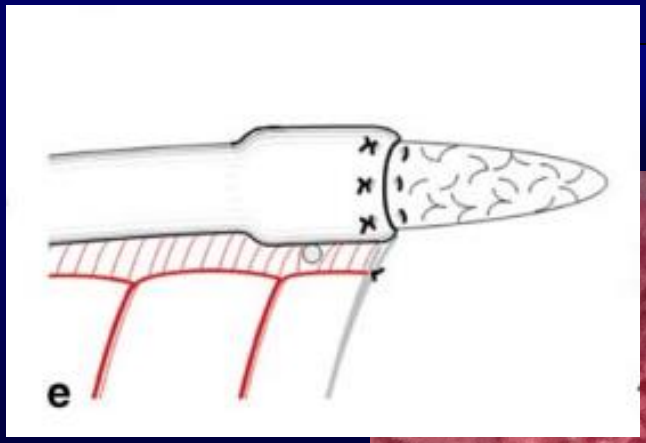
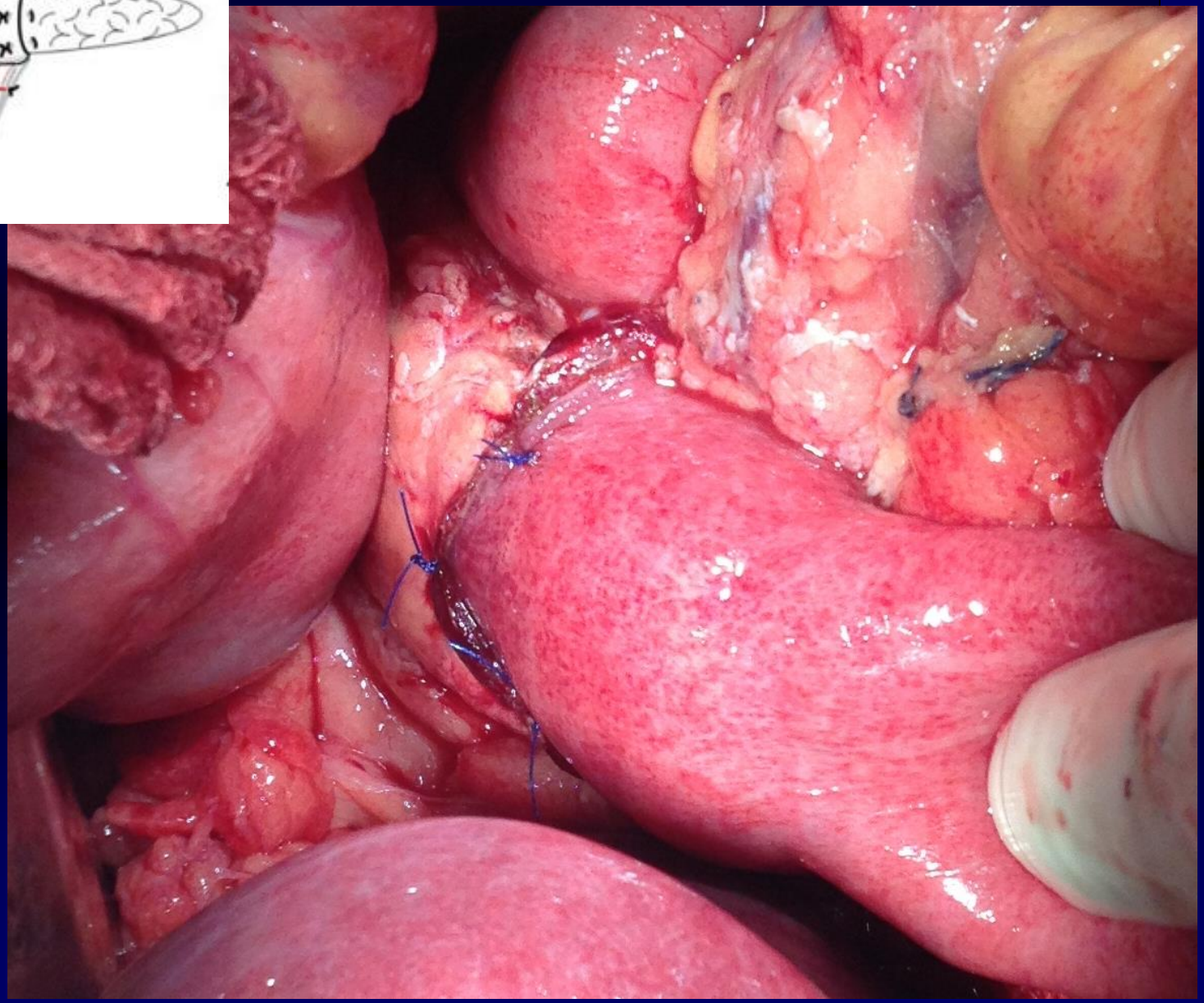
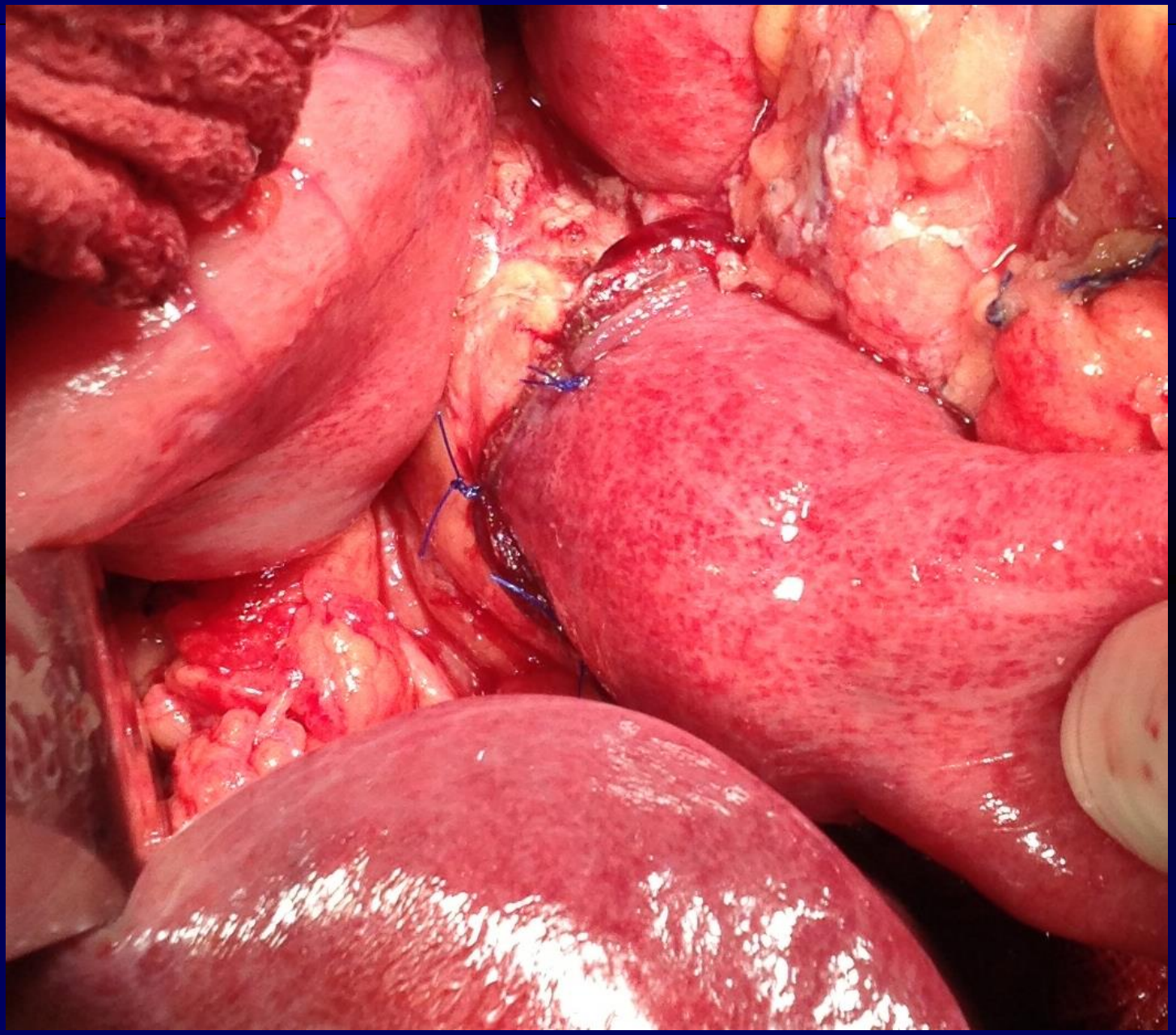
Invagination







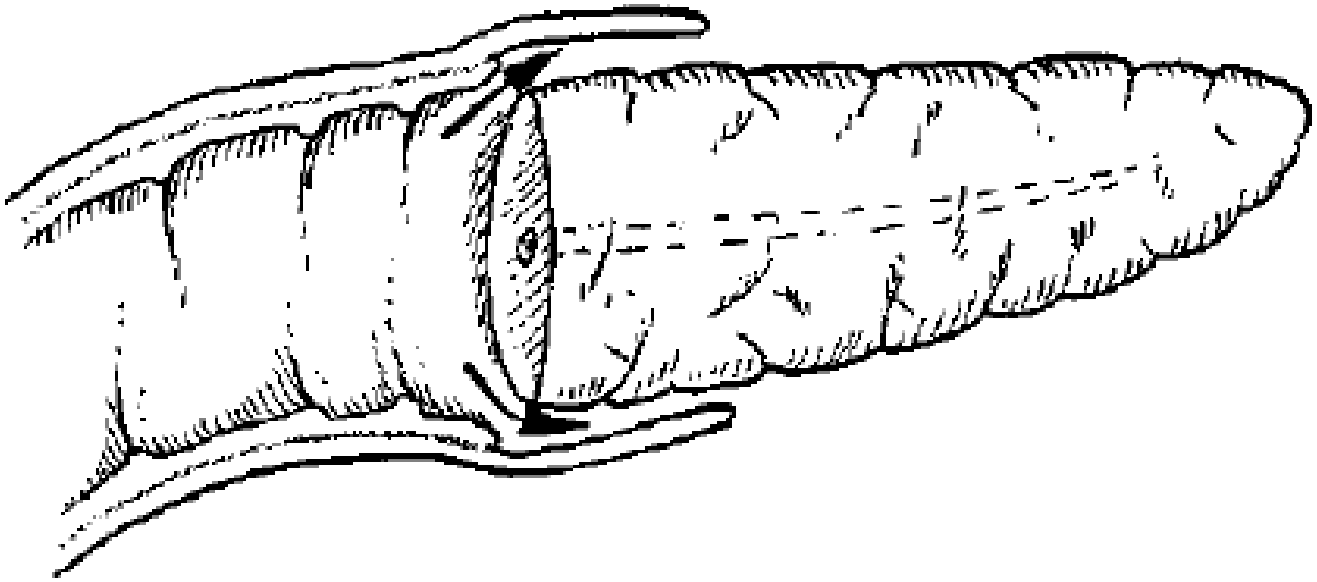
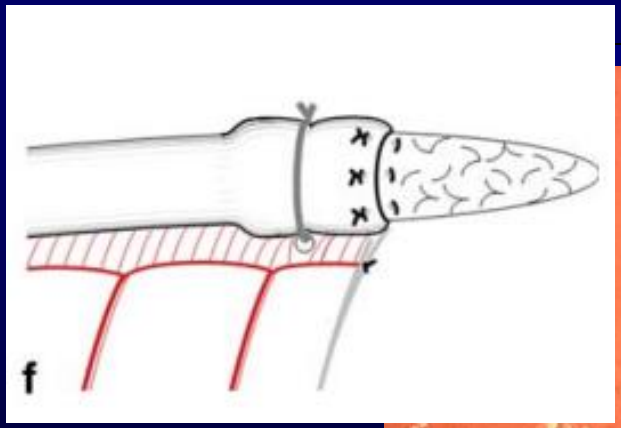
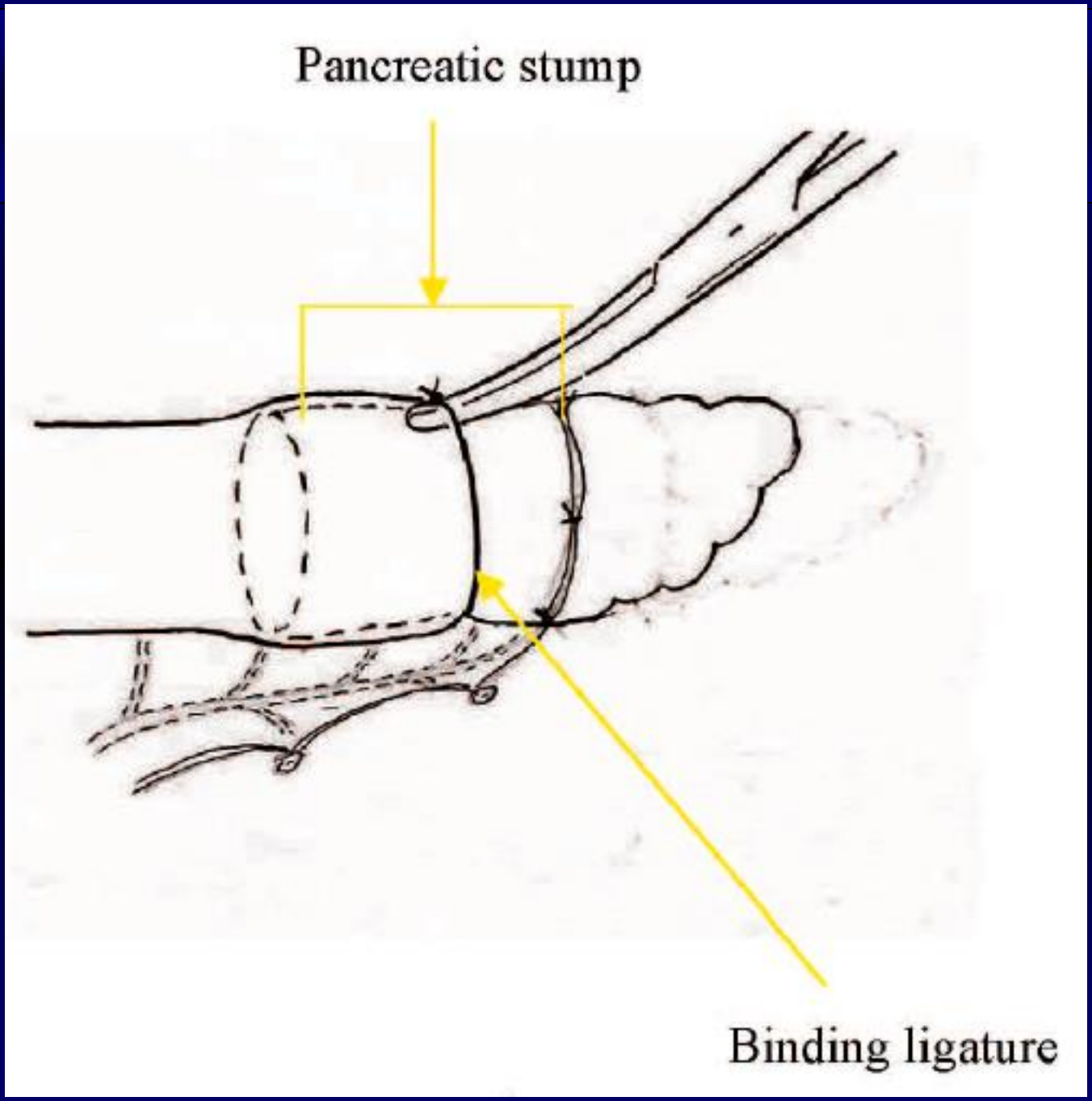


Figure 2. *The gap between the intussuscepting jejunum and the intussuscepted pancreas can be sealed up by compression from outside with a binding ligature.*



Binding ligature


Pancreatic stump
Binding ligature

Conventional Versus Binding Pancreaticojejunostomy After Pancreaticoduodenectomy

A Prospective Randomized Trial

TABLE 3. Postoperative Course and Complications

	Binding Group (n = 106)	Conventional Group (n = 111)	*P*
Drain outputs (mL)	86.7 ± 36.3	83.8 ± 46.3	NS
Amylase (U/L) [mean (range)]	38.0 (0–762.5)	63.8 (8.6–1654.0)	0.0005
Abdominal complications [no. (%)]			
Pancreatic anastomotic leakage	0 (0)	8 (7.2)	0.014
Biliary leakage	7 (6.6)	6 (5.4)	NS
Gastric-enteric anastomotic leakage	1 (0.9)	1 (0.9)	NS
Delayed gastric emptying	4	3	NS
Pancreatitis	1	1	NS
Intraperitoneal hemorrhage	2	3	NS
Intraperitoneal abscess	0	3	NS
Ascites	1	2	NS
Wound infection	6	7	NS
Incision wound dehiscence	1	3	NS

Peng S, et al. Ann Surg 2007;245:692-8

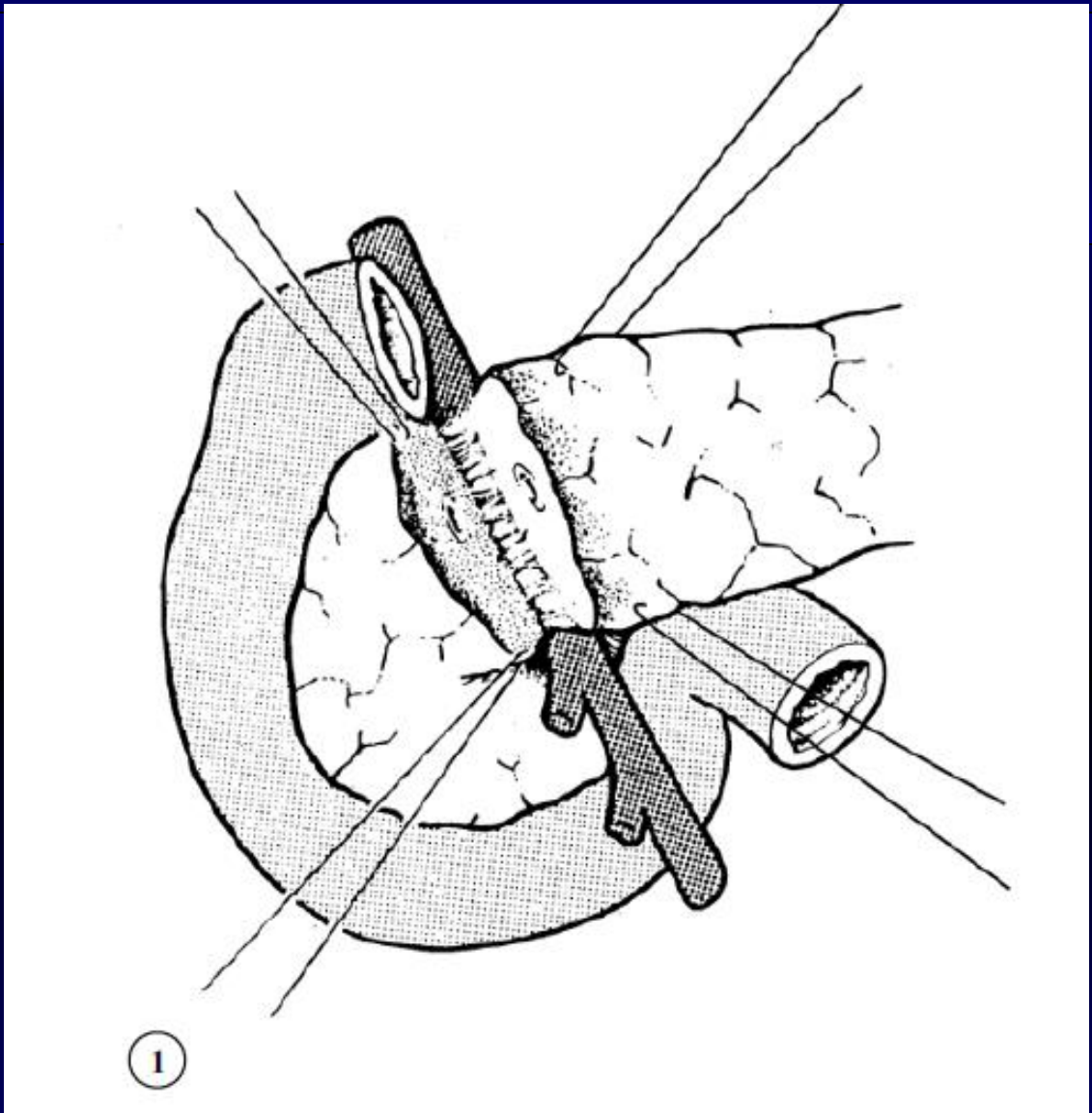
Pancreatojejunostomy

TABLE 4. Pancreatic Anastomotic Leakage in the Different Risk Categories

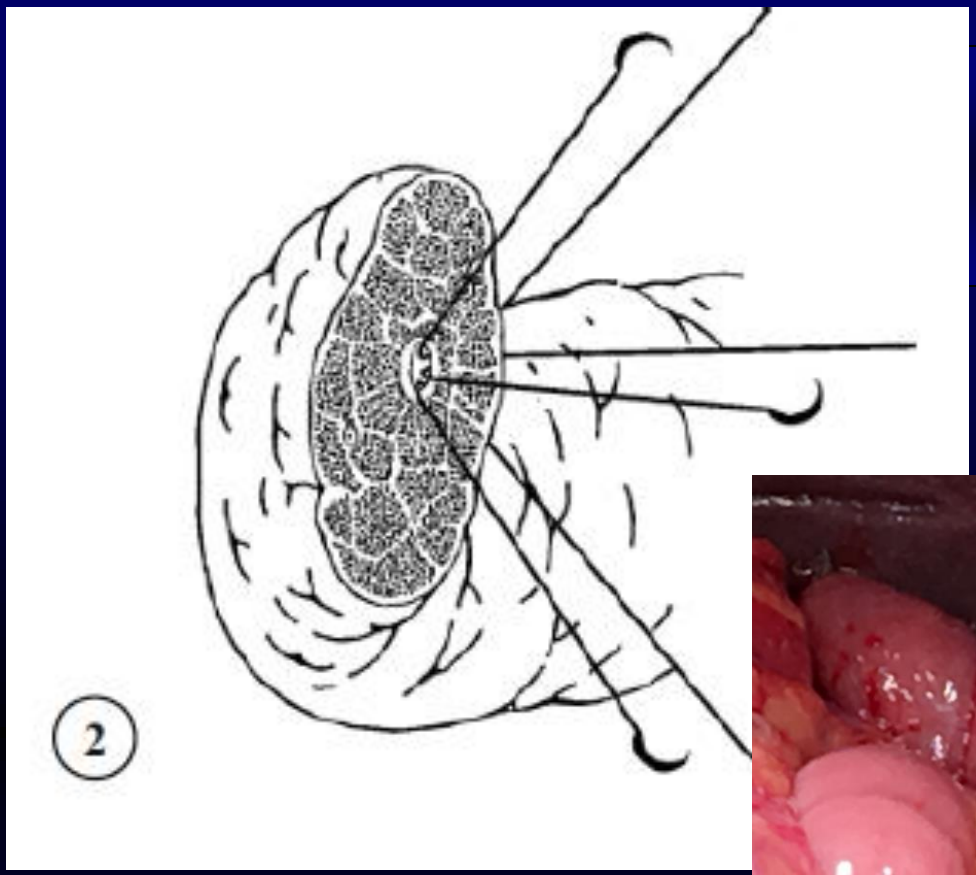
	Binding Group	Conventional Group	*P*
High risk			
Leakage	0	6	
No leakage	37	33	0.039
Low risk			
Leakage	0	2	
No leakage	69	70	NS
Total	106	111	

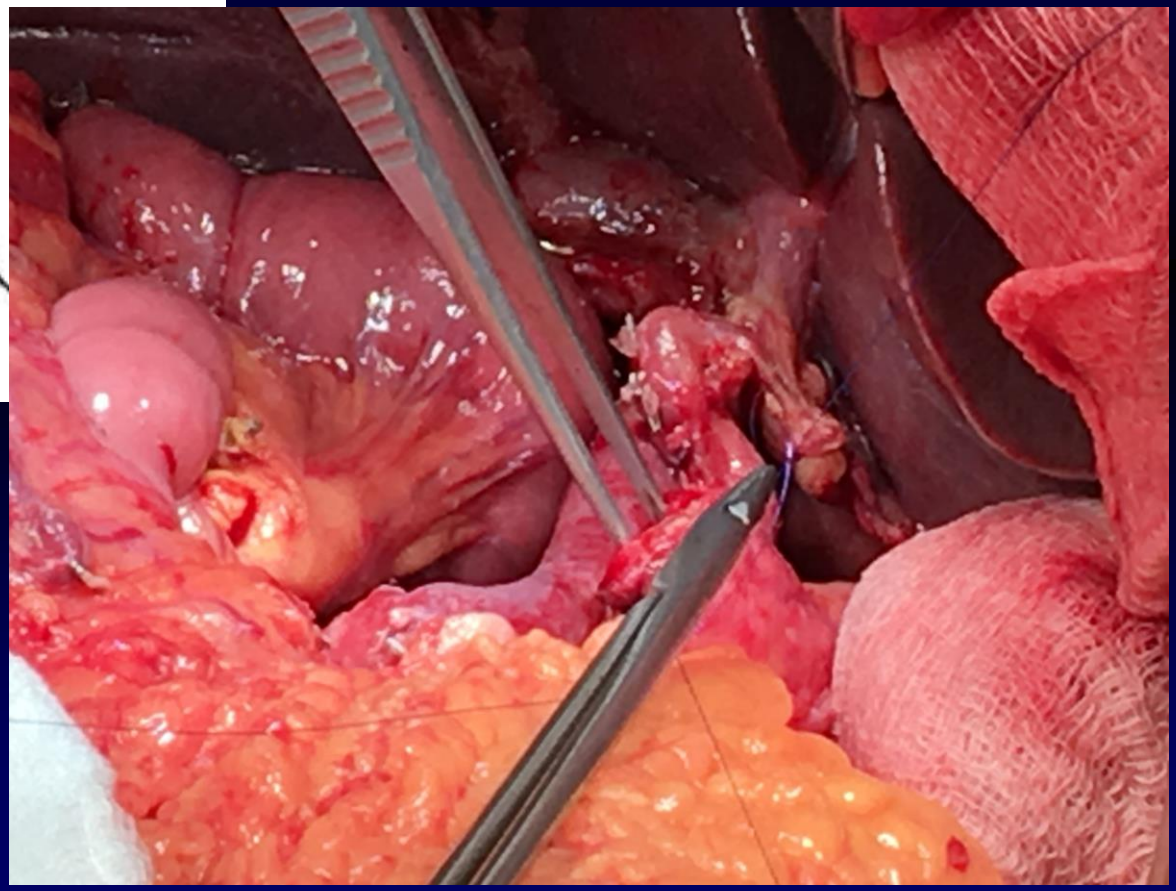
Peng S, et al. Ann Surg 2007;245:692-8

SHRIKHANDE

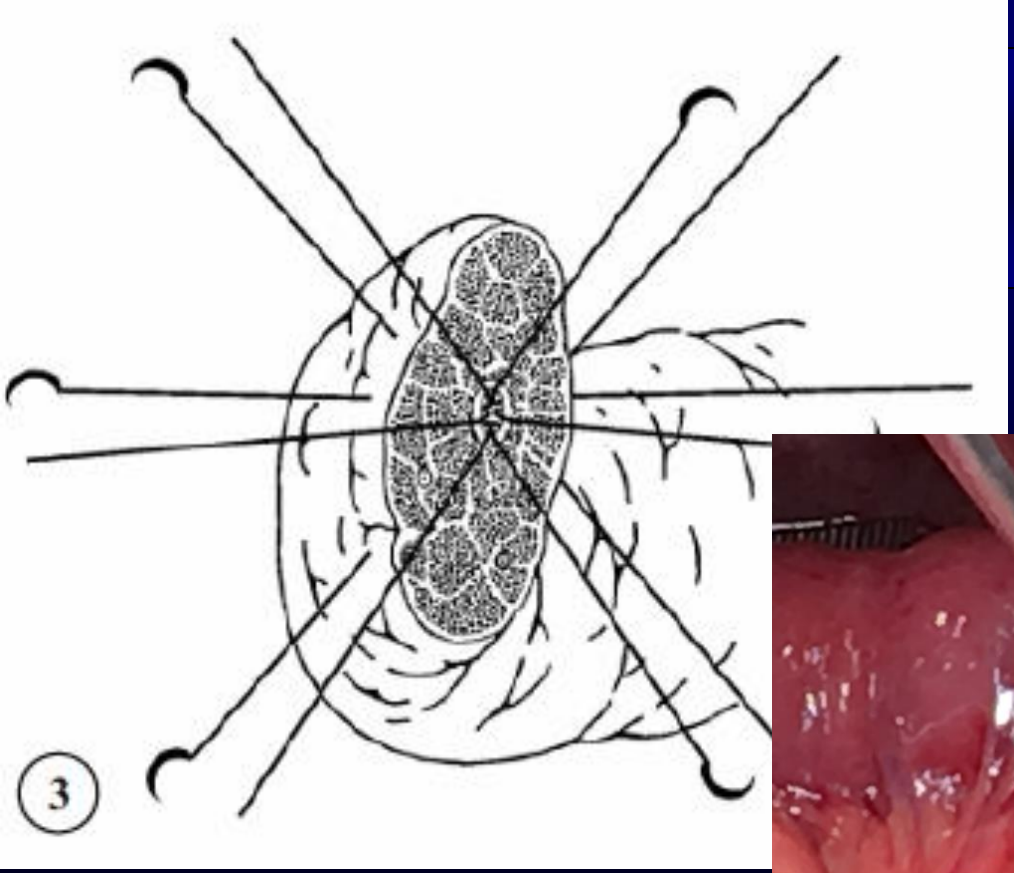


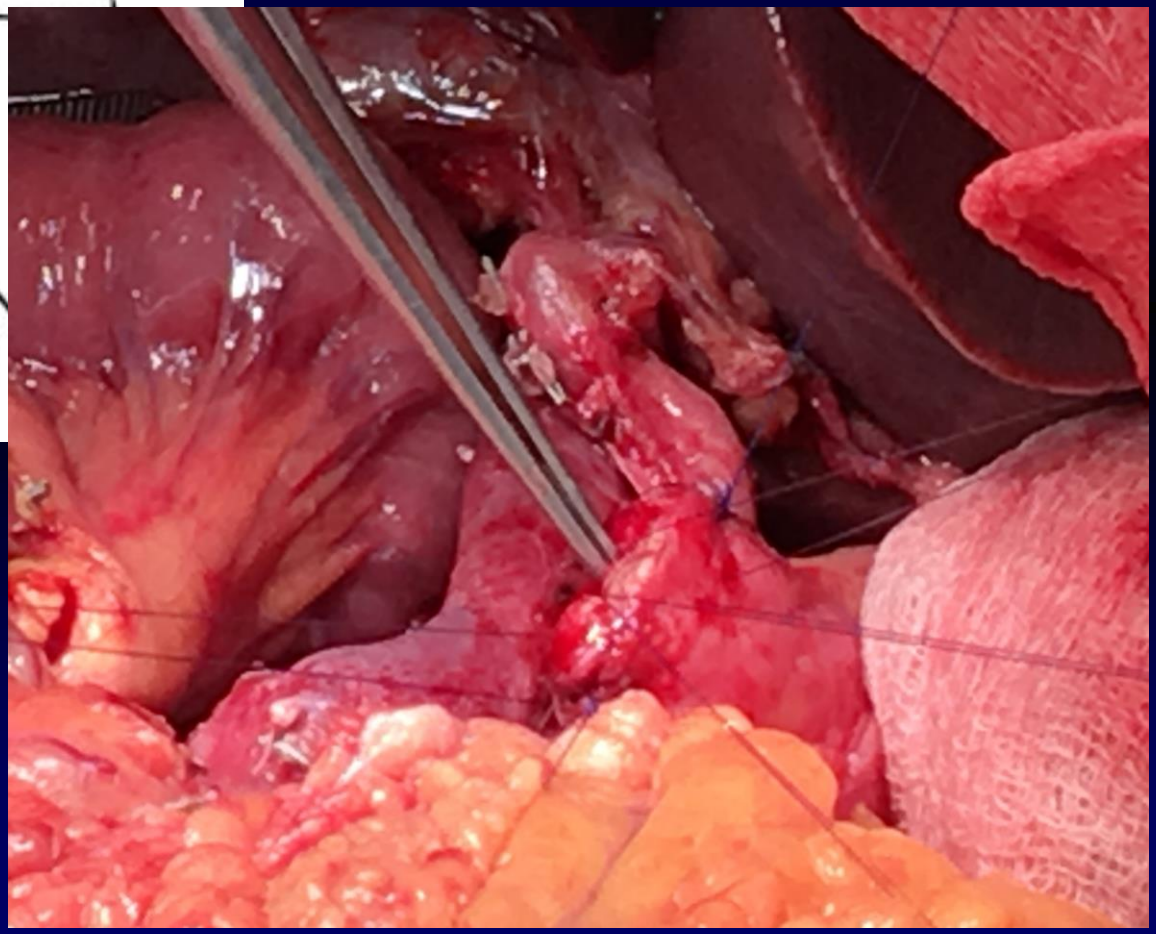
Shrikhande SV, et al. Indian J Surg 2007;69:224-9



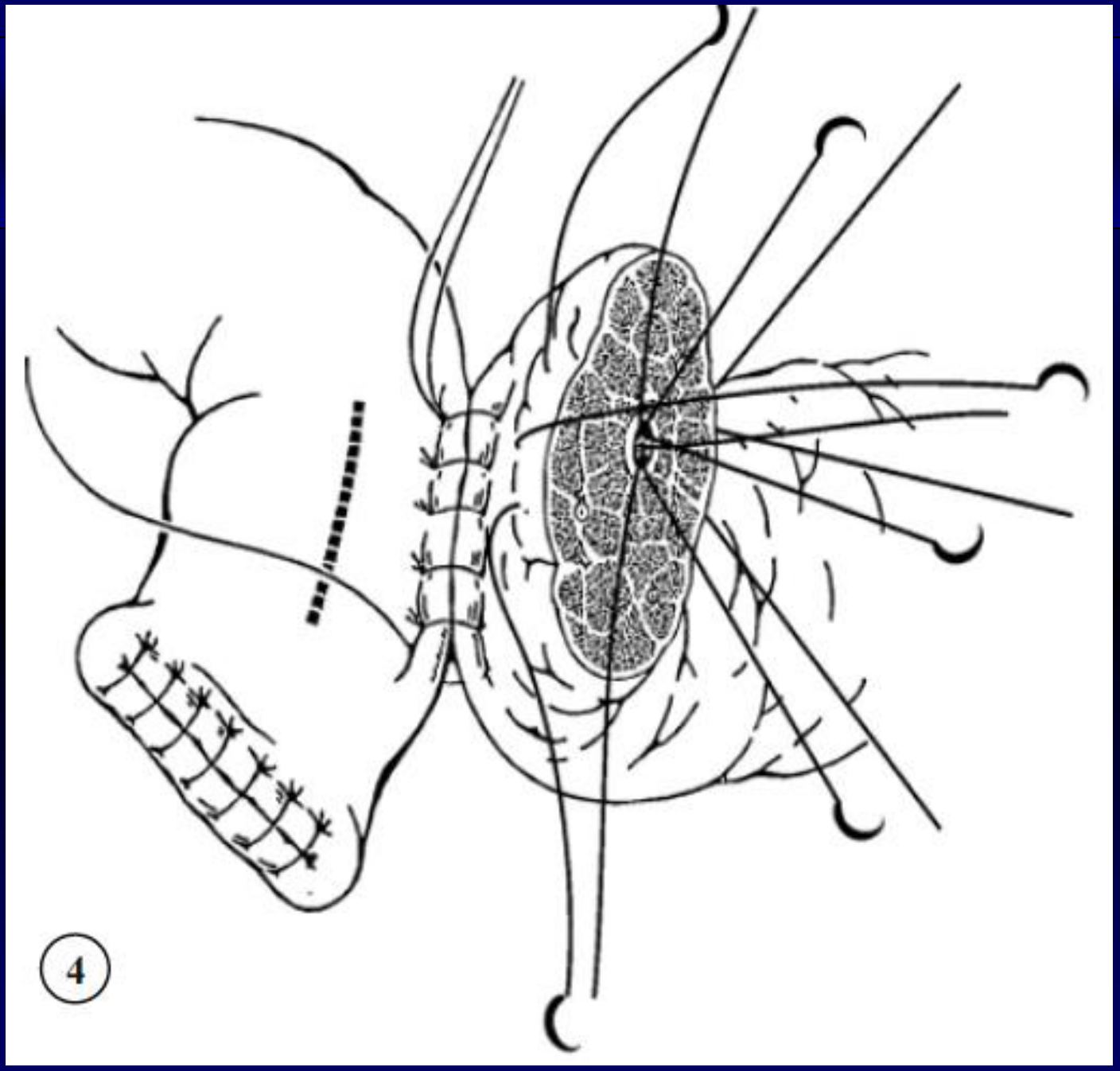


Shrikhande SV, et al. Indian J Surg 2007;69:224-9





Shrikhande SV, et al. Indian J Surg 2007;69:224-9



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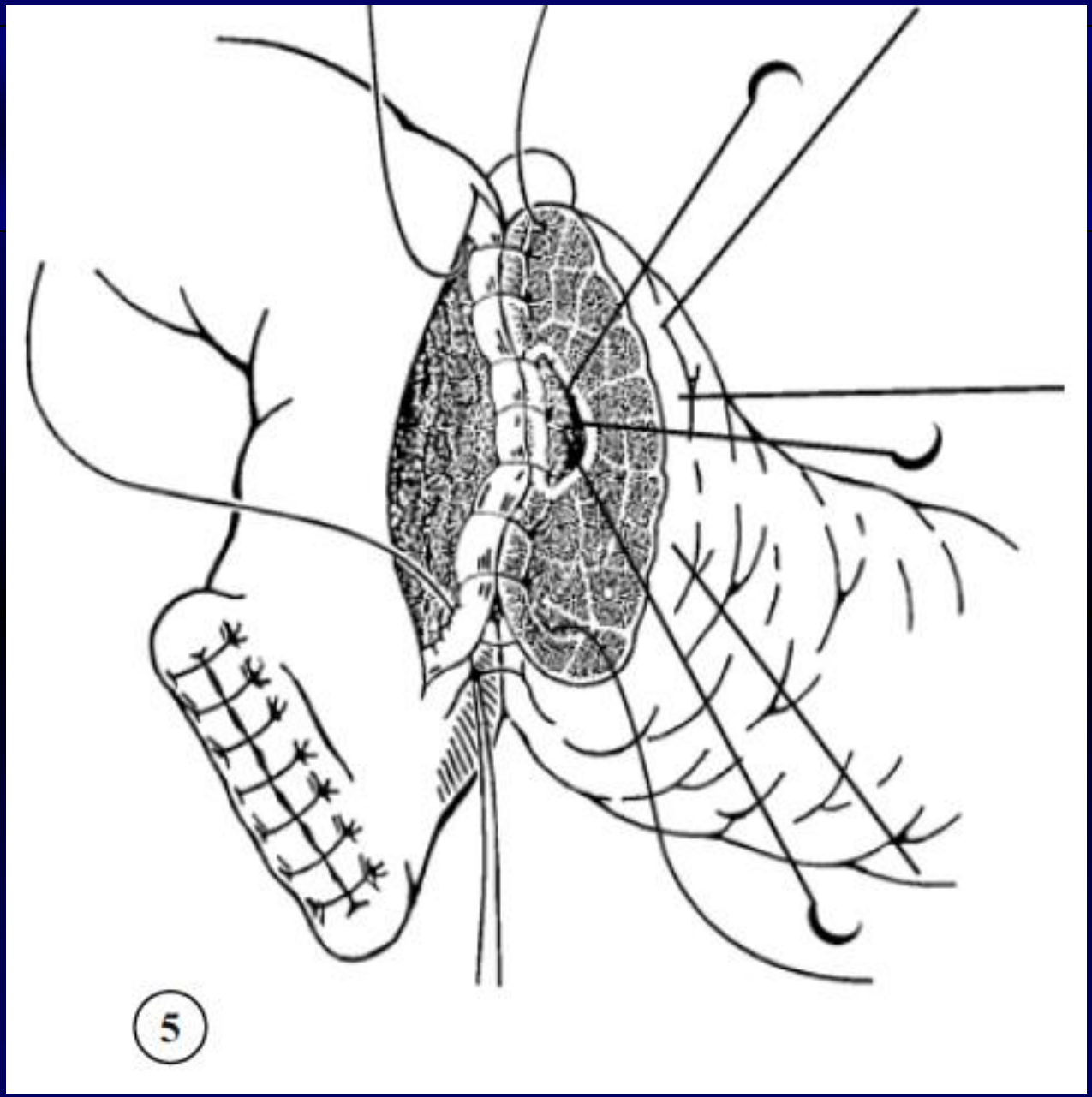

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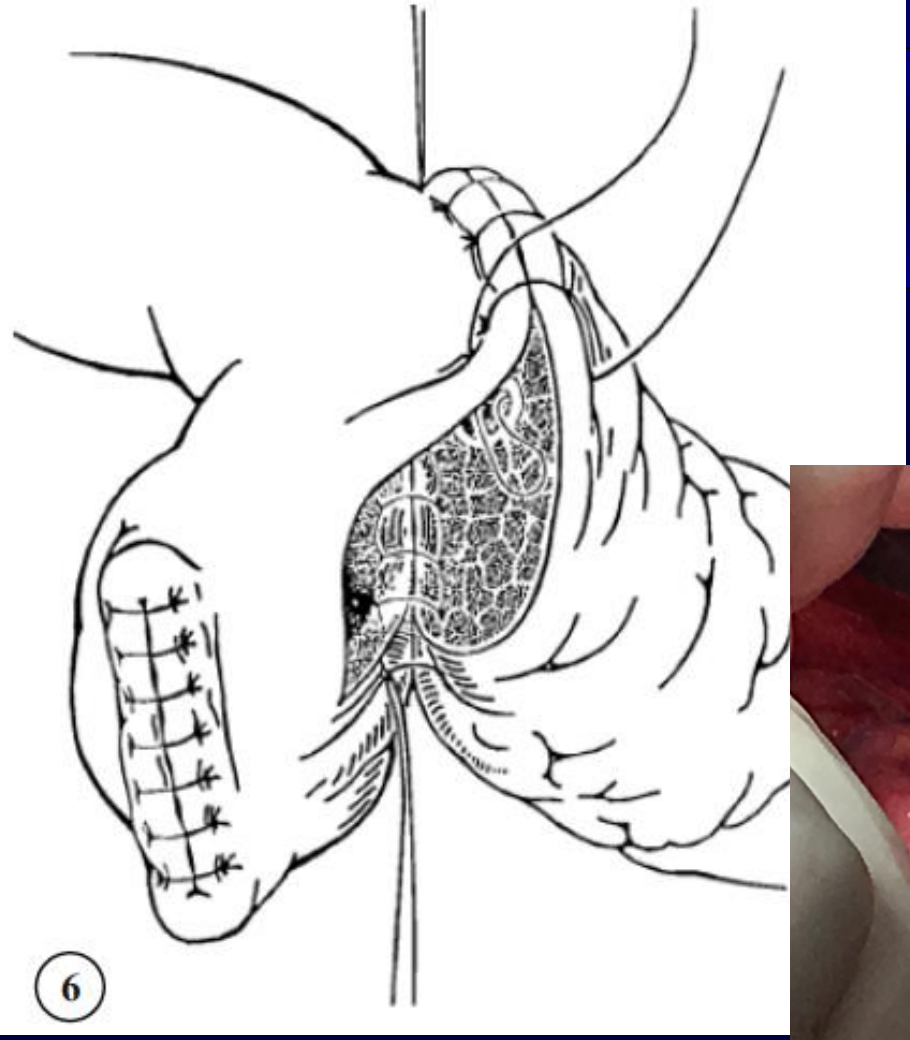

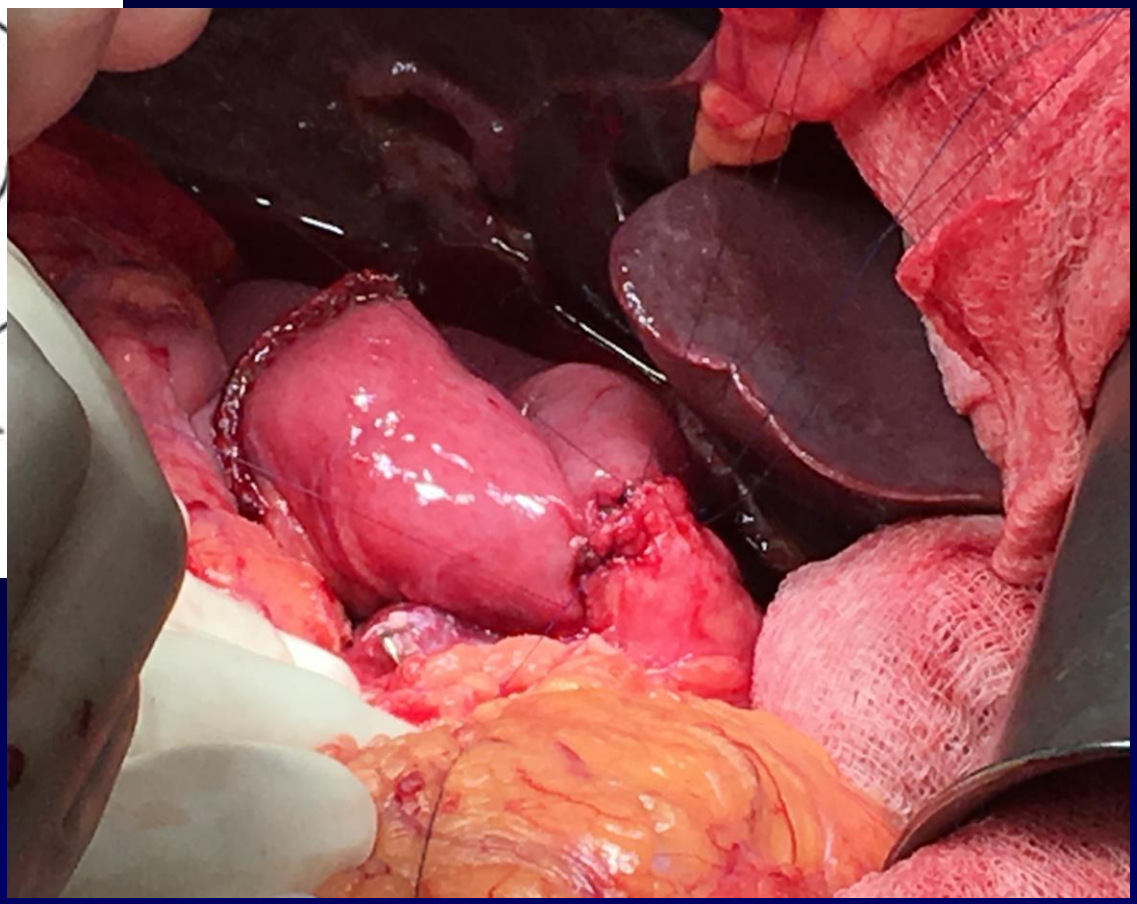

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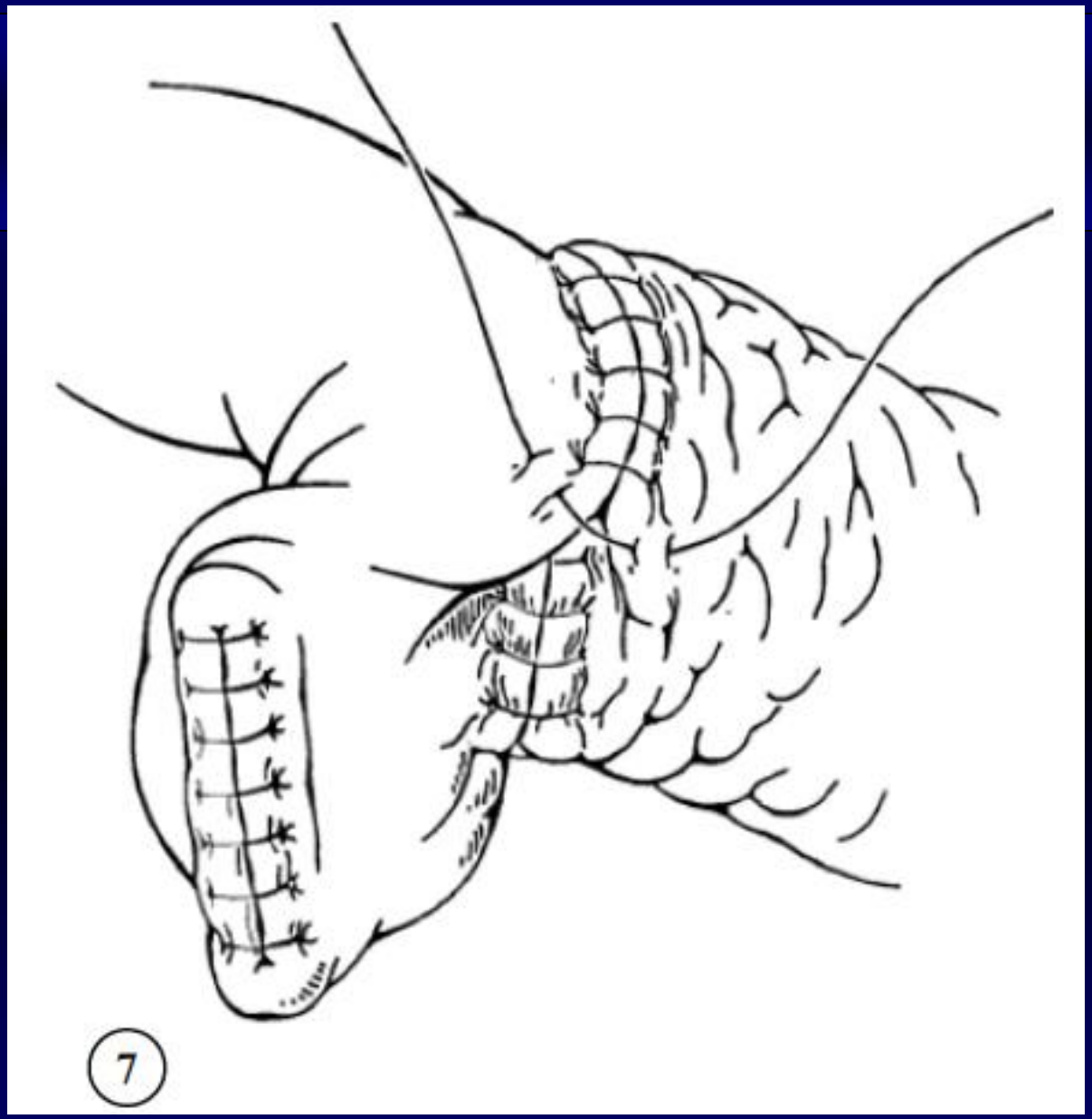
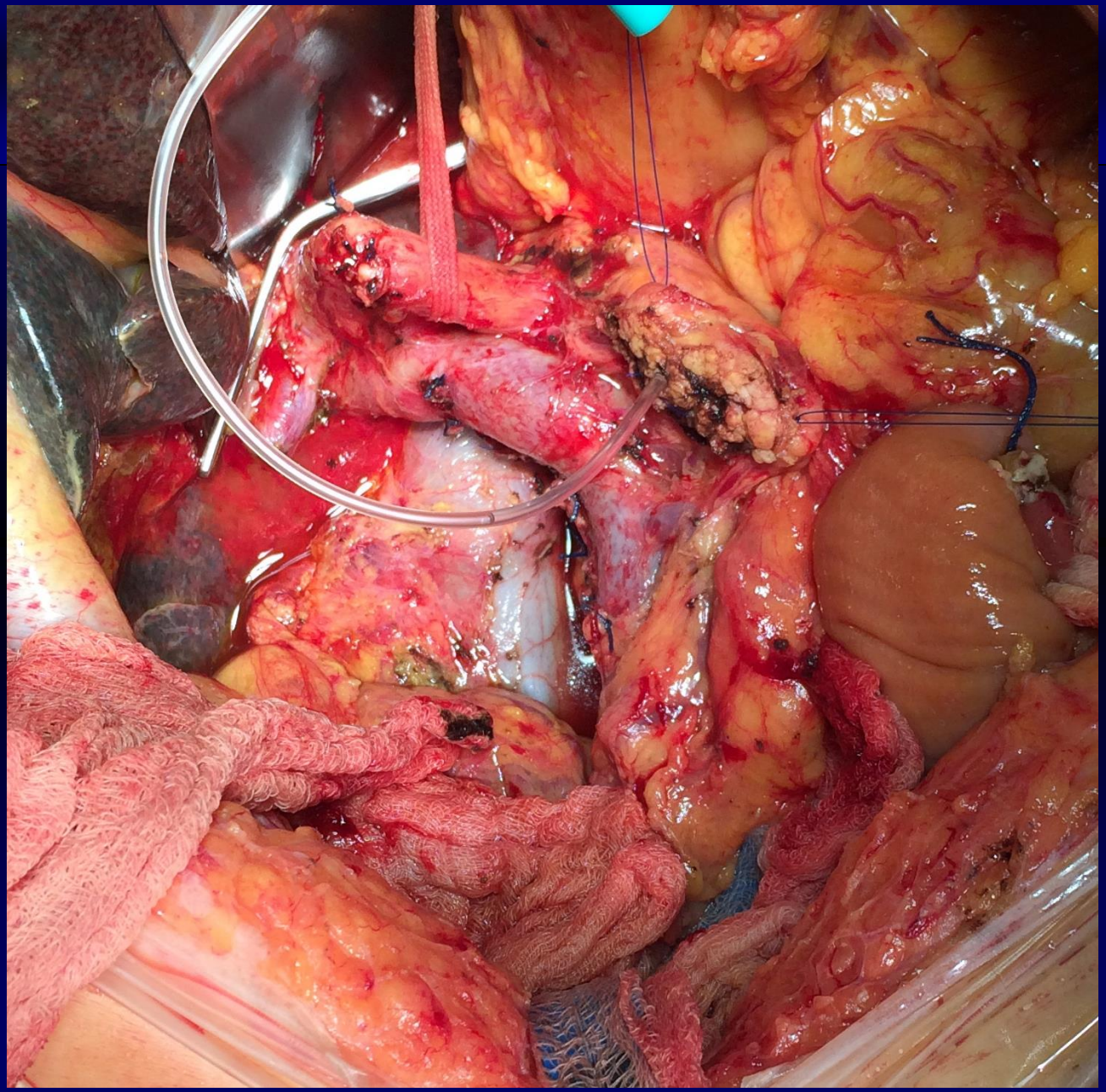
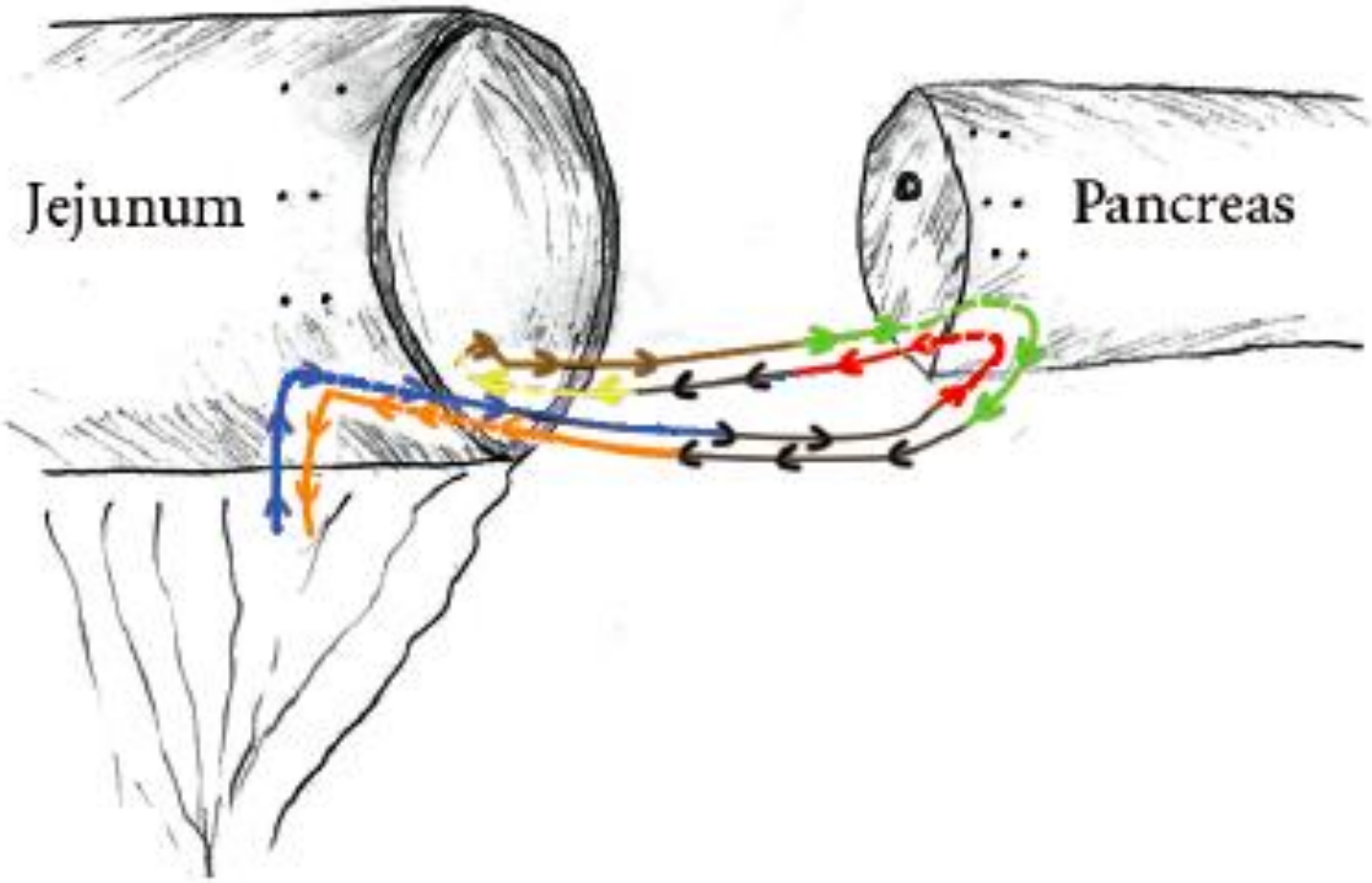
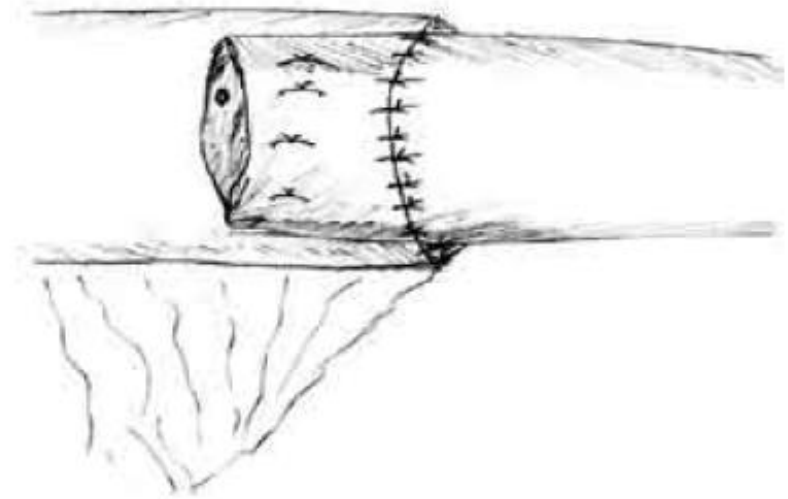


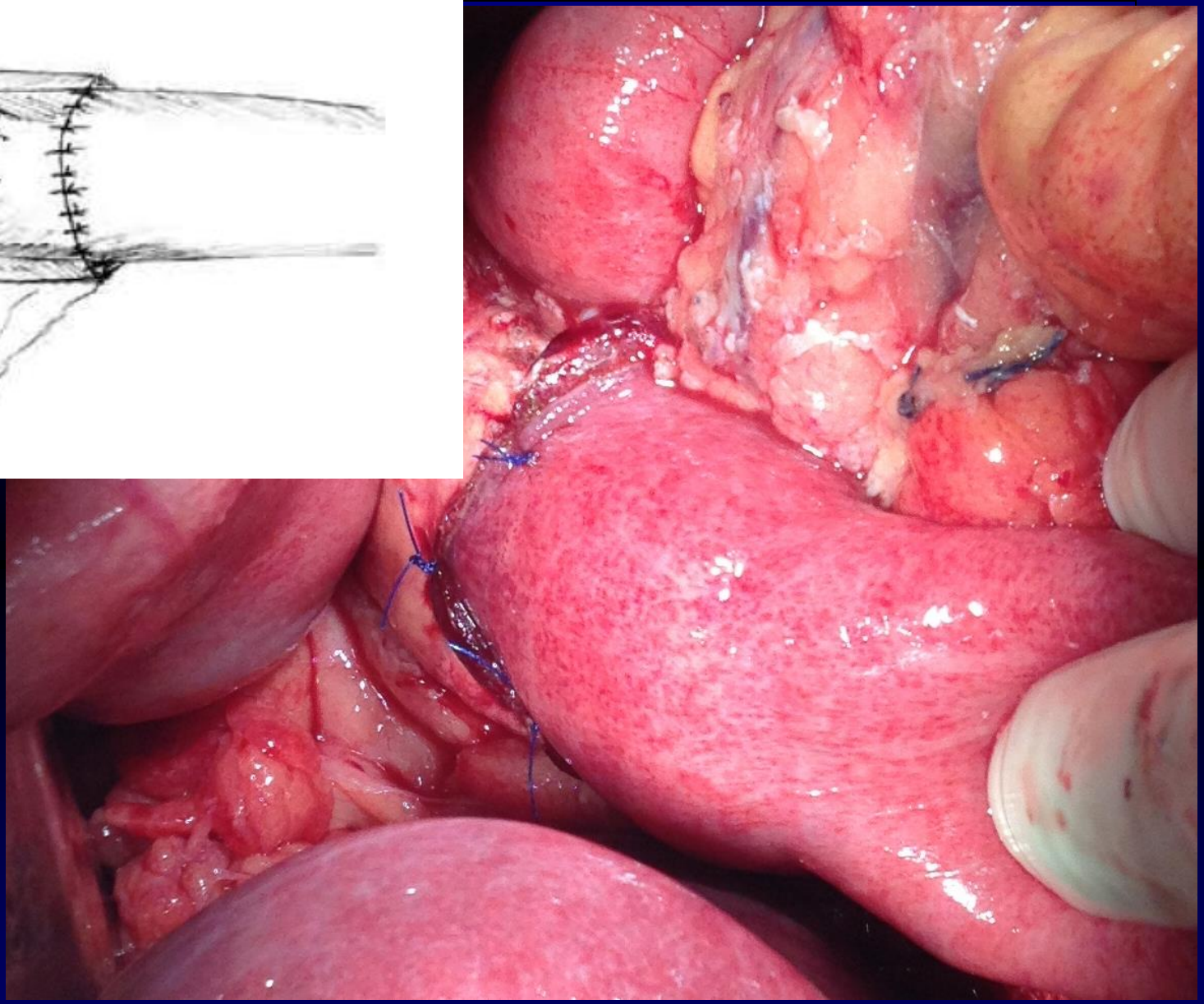
Shrikhande SV, et al. Indian J Surg 2007;69:224-9

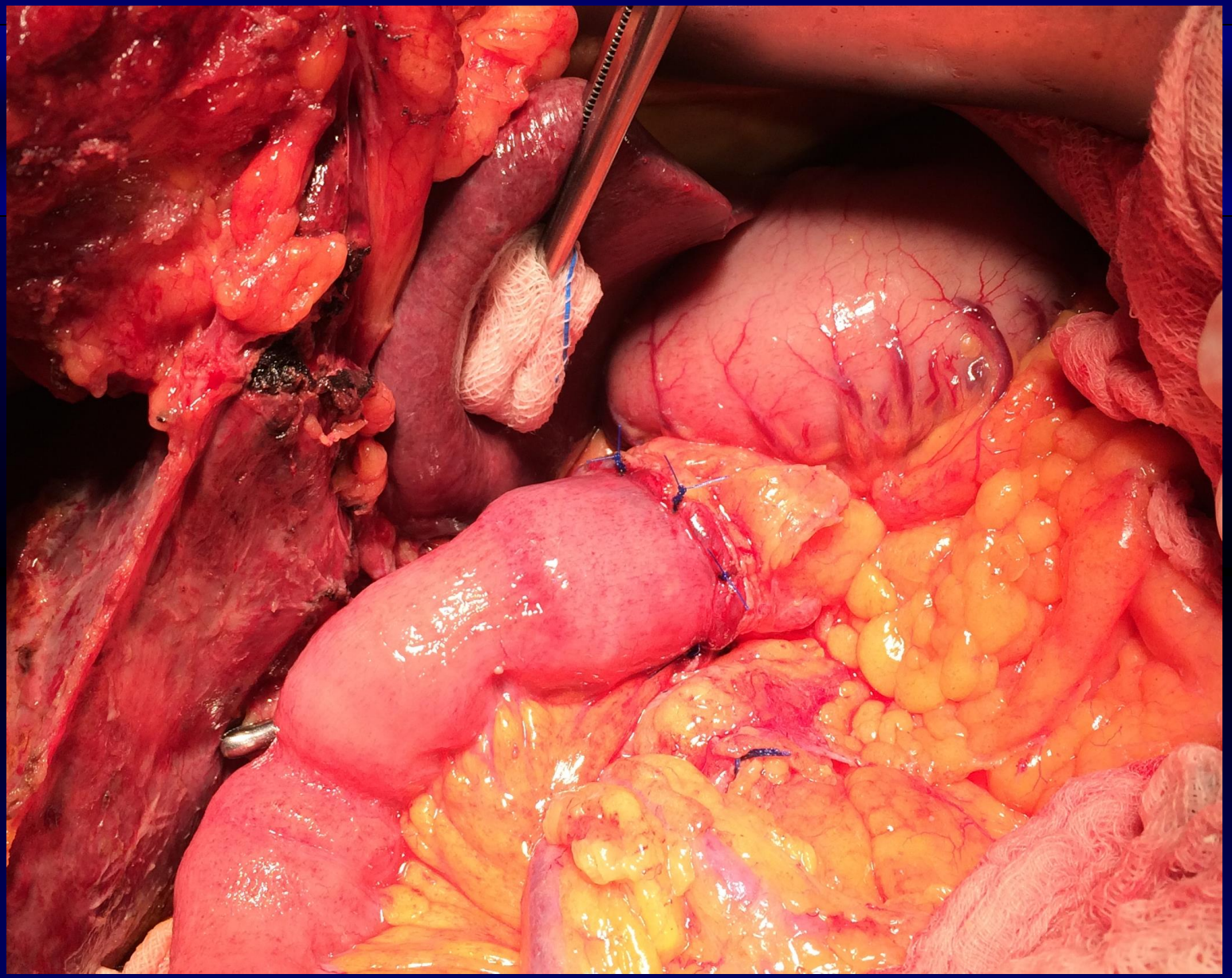
INVAGINATION ANASTOMOSIS



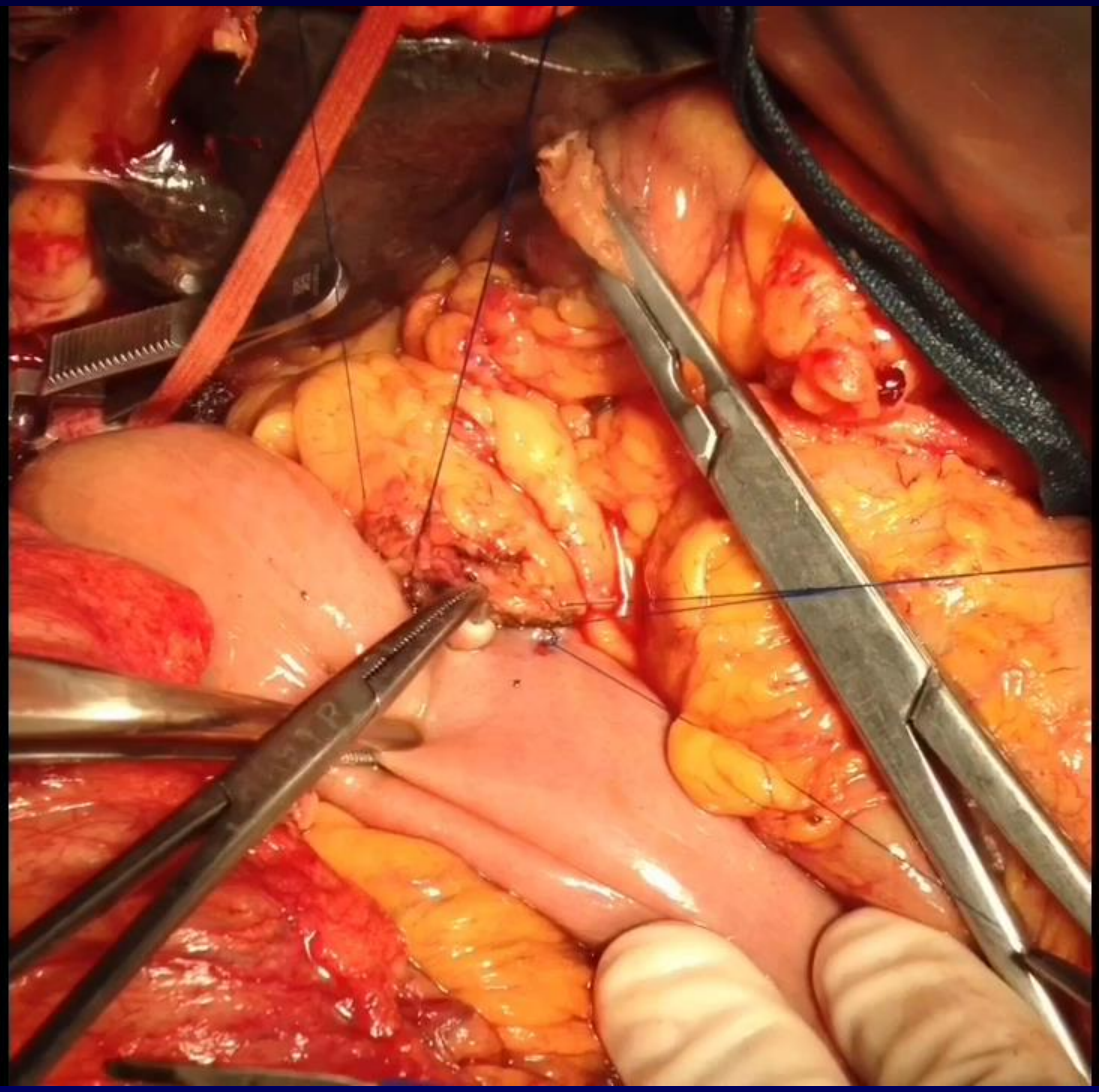

Jejunum
Pancreas

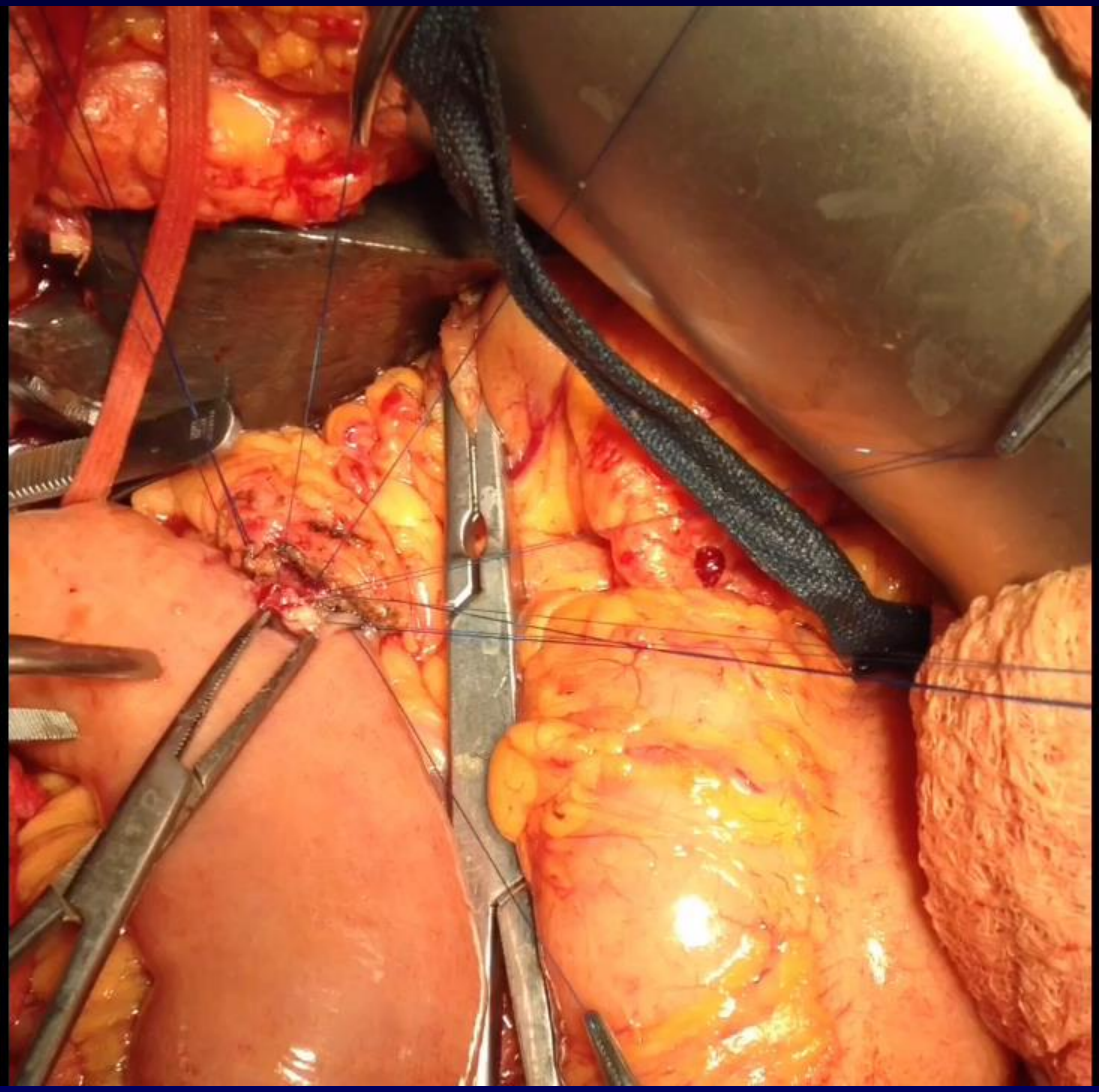


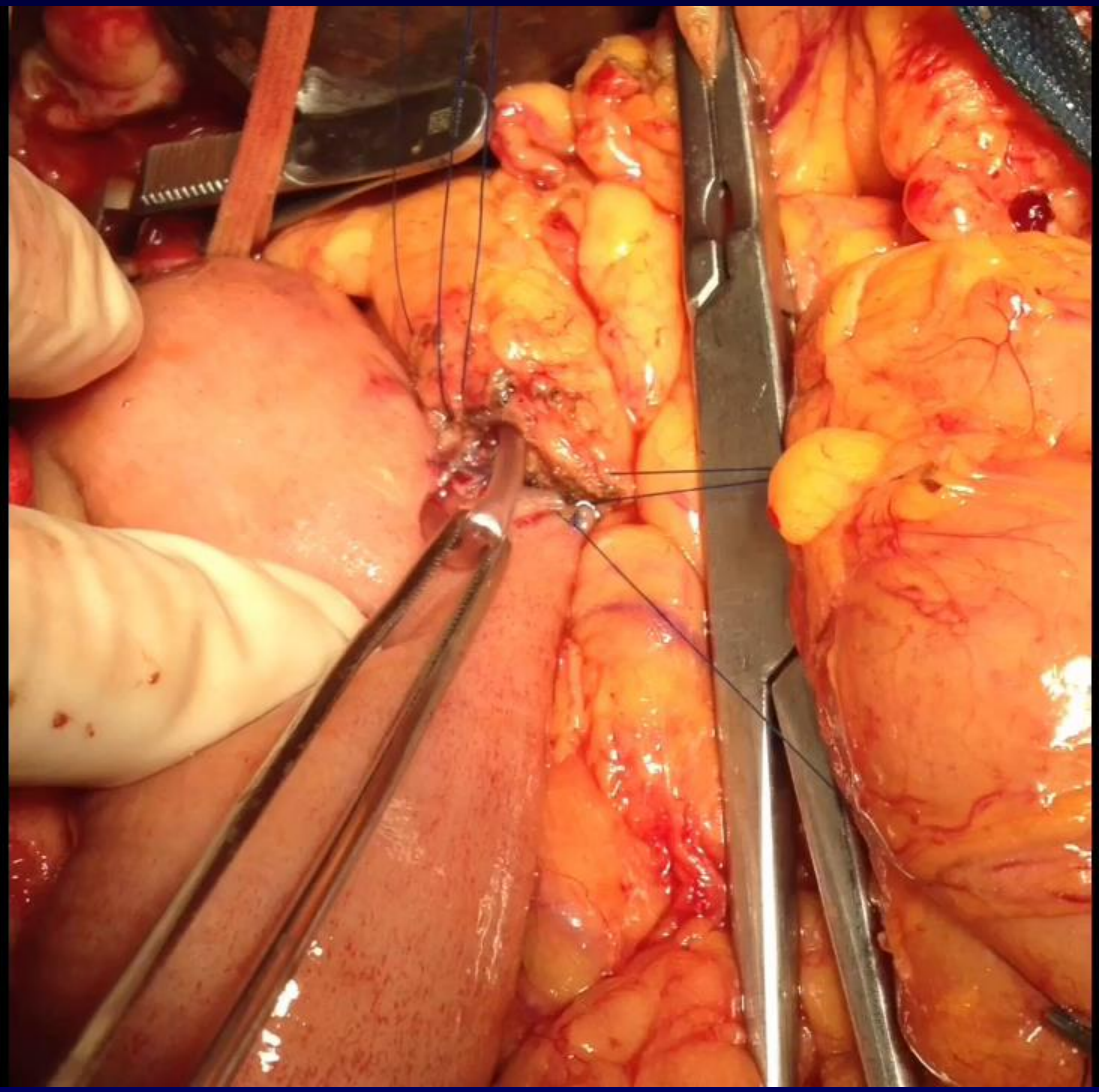


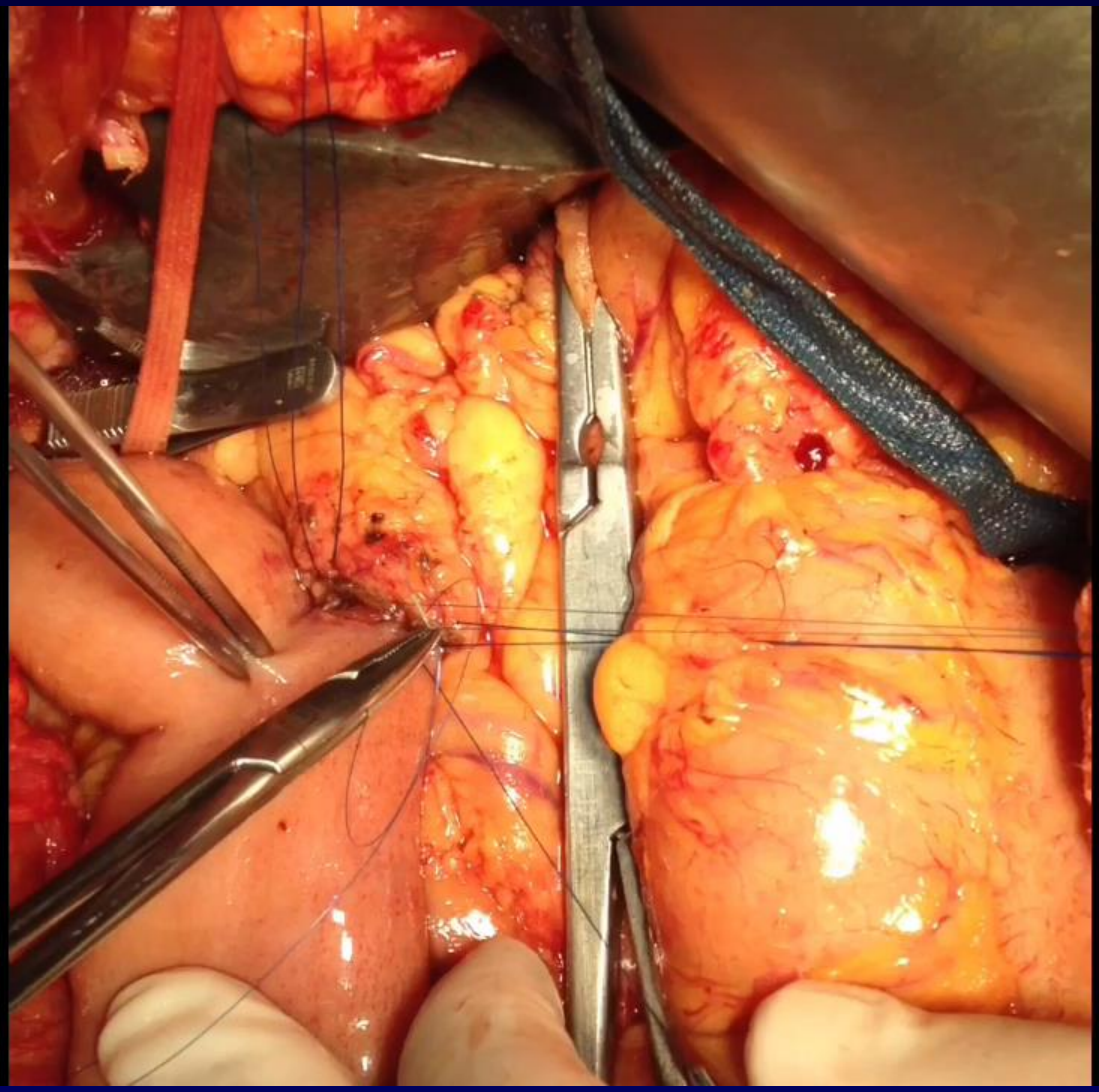


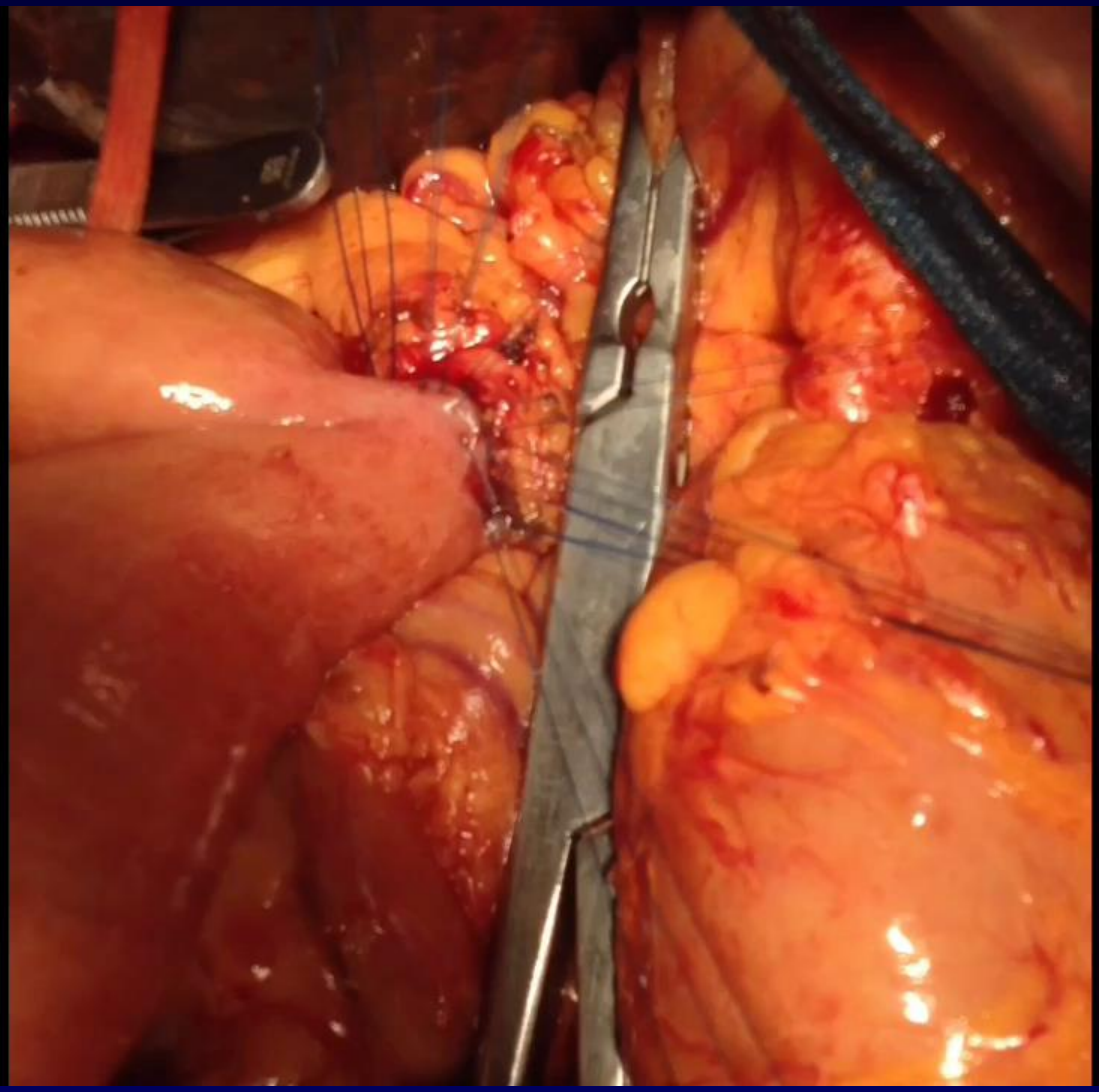
DUCT-TO-MUCOSA

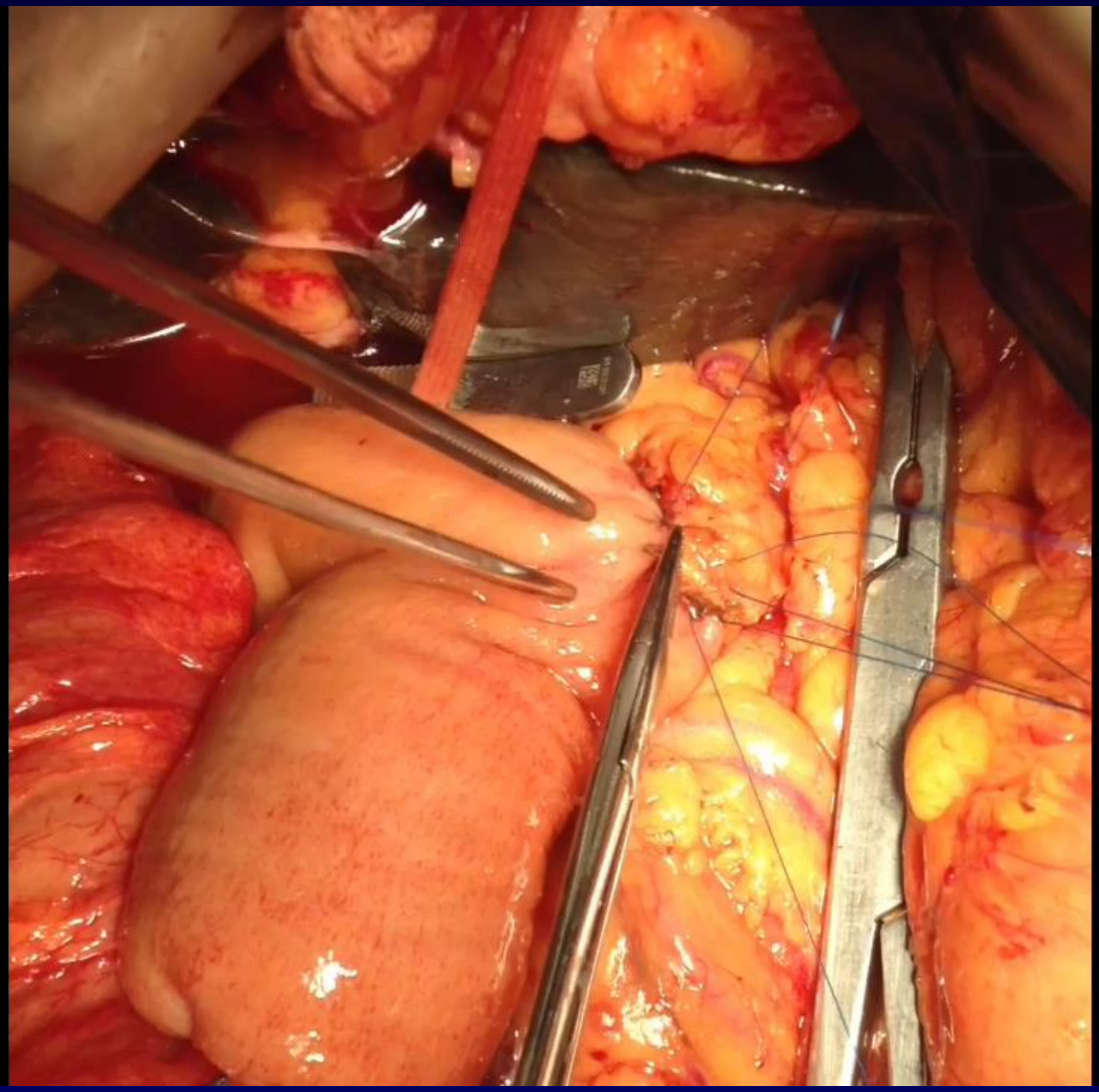


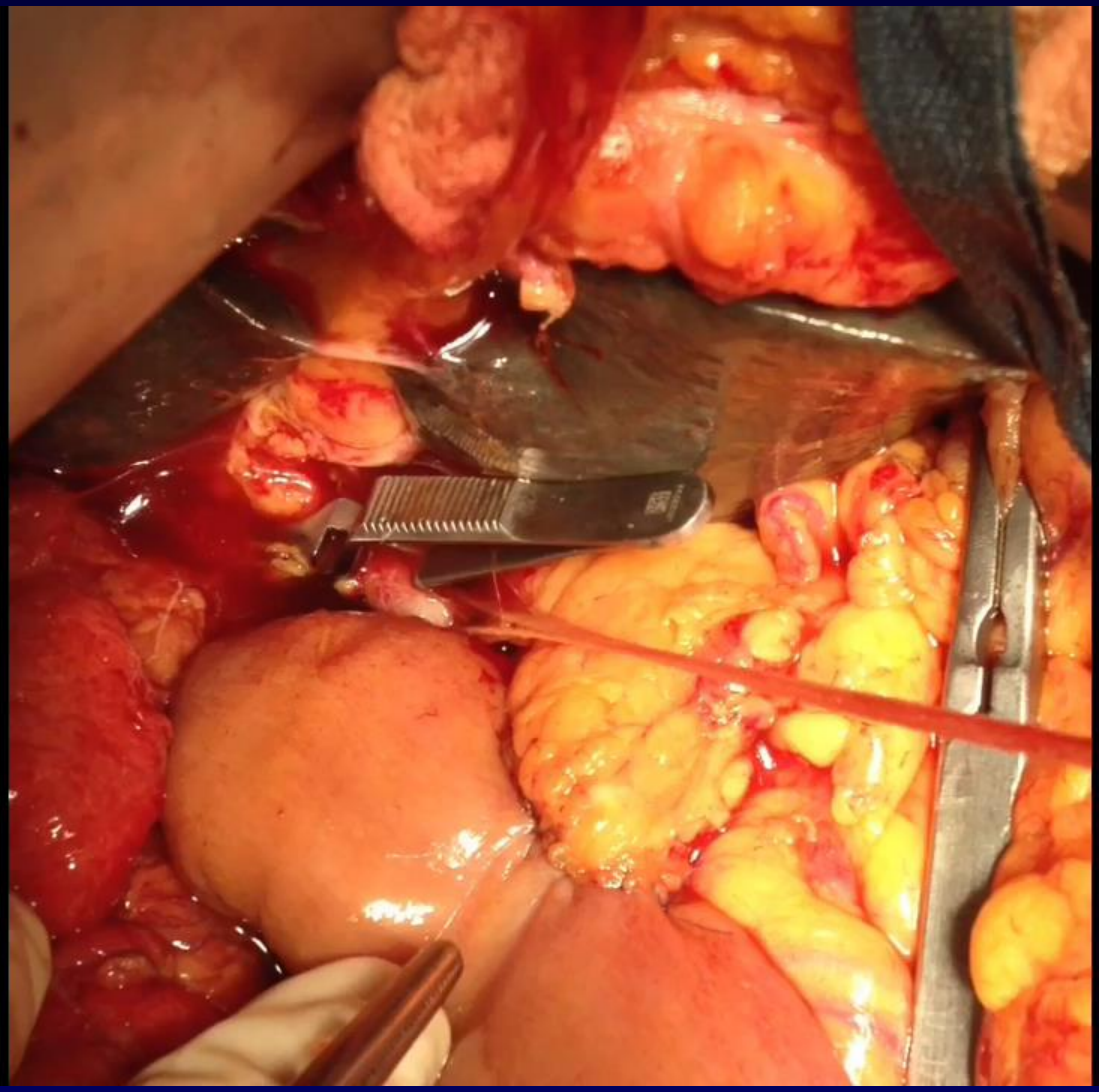


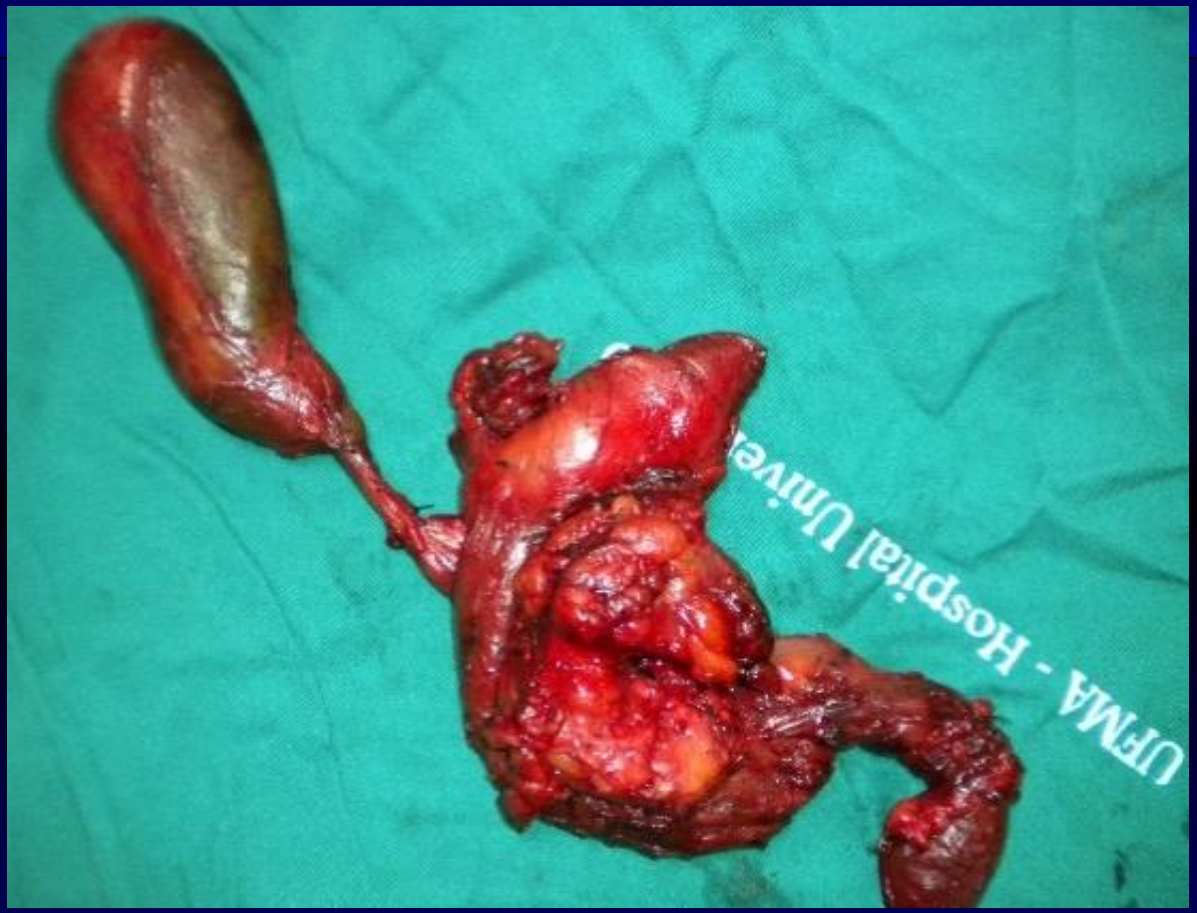




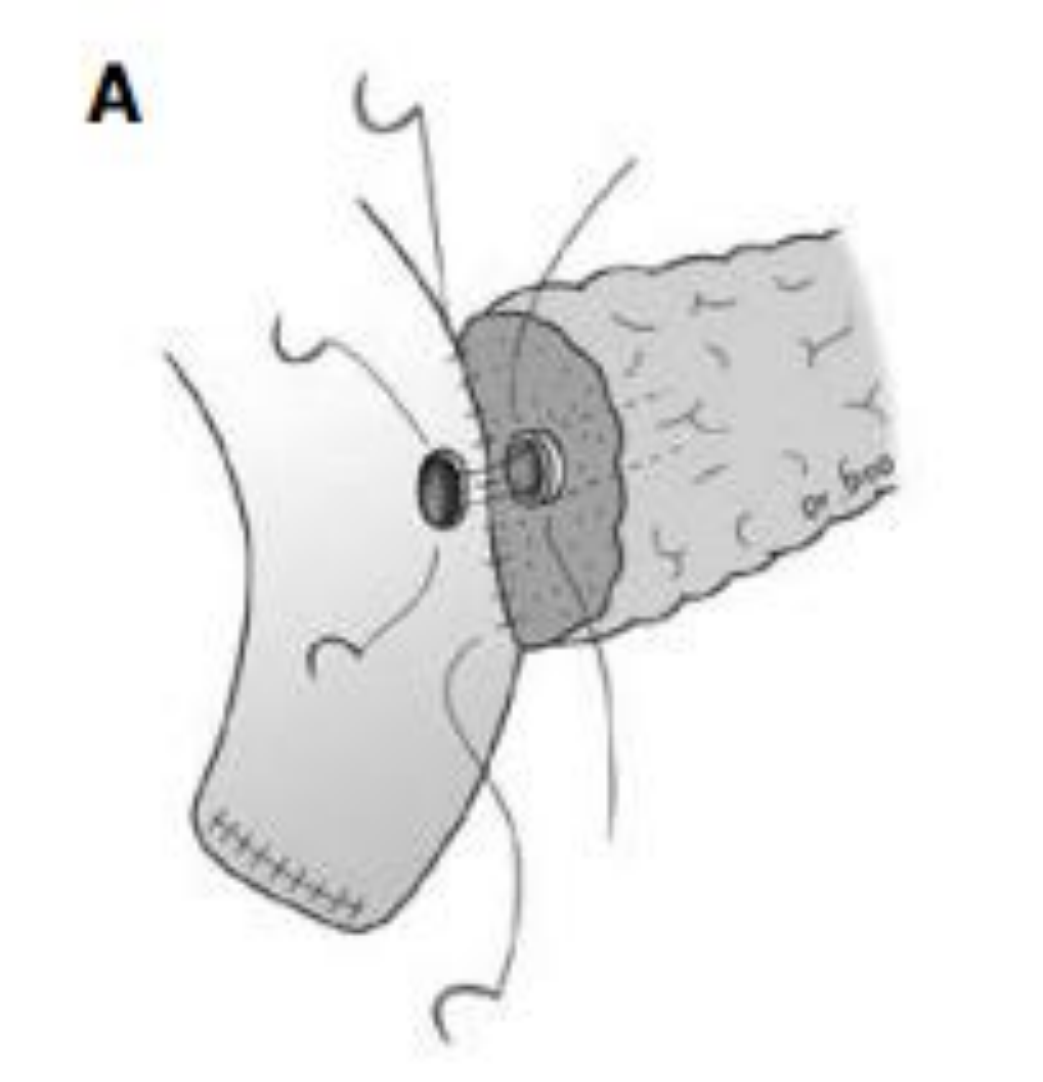




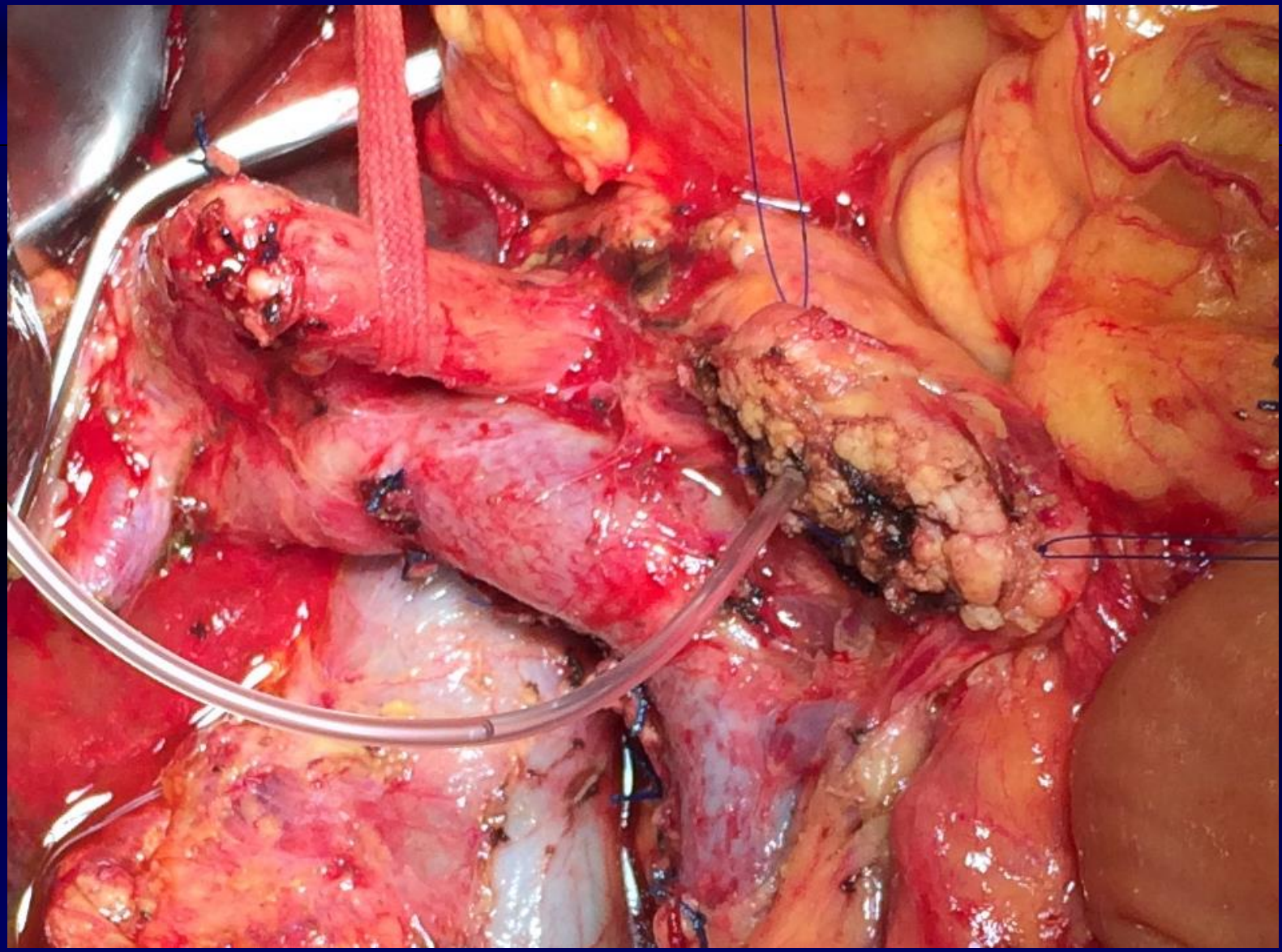



UFMA - Hospital Univer

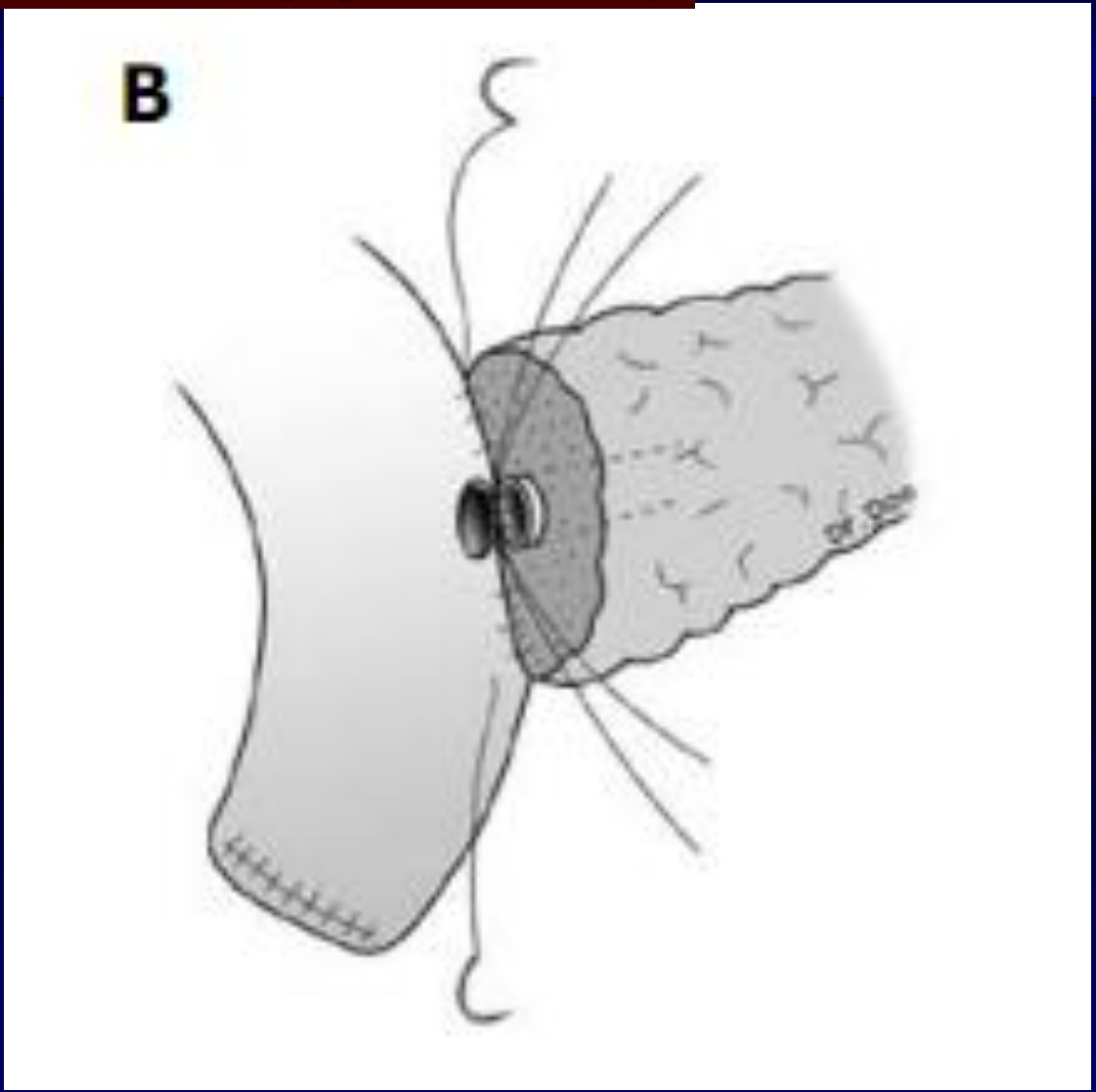
Duct-to-mucosa



Lee SE, et al. World J Gastroenterol 2007;13:5351-6



Pancreatojejunostomy



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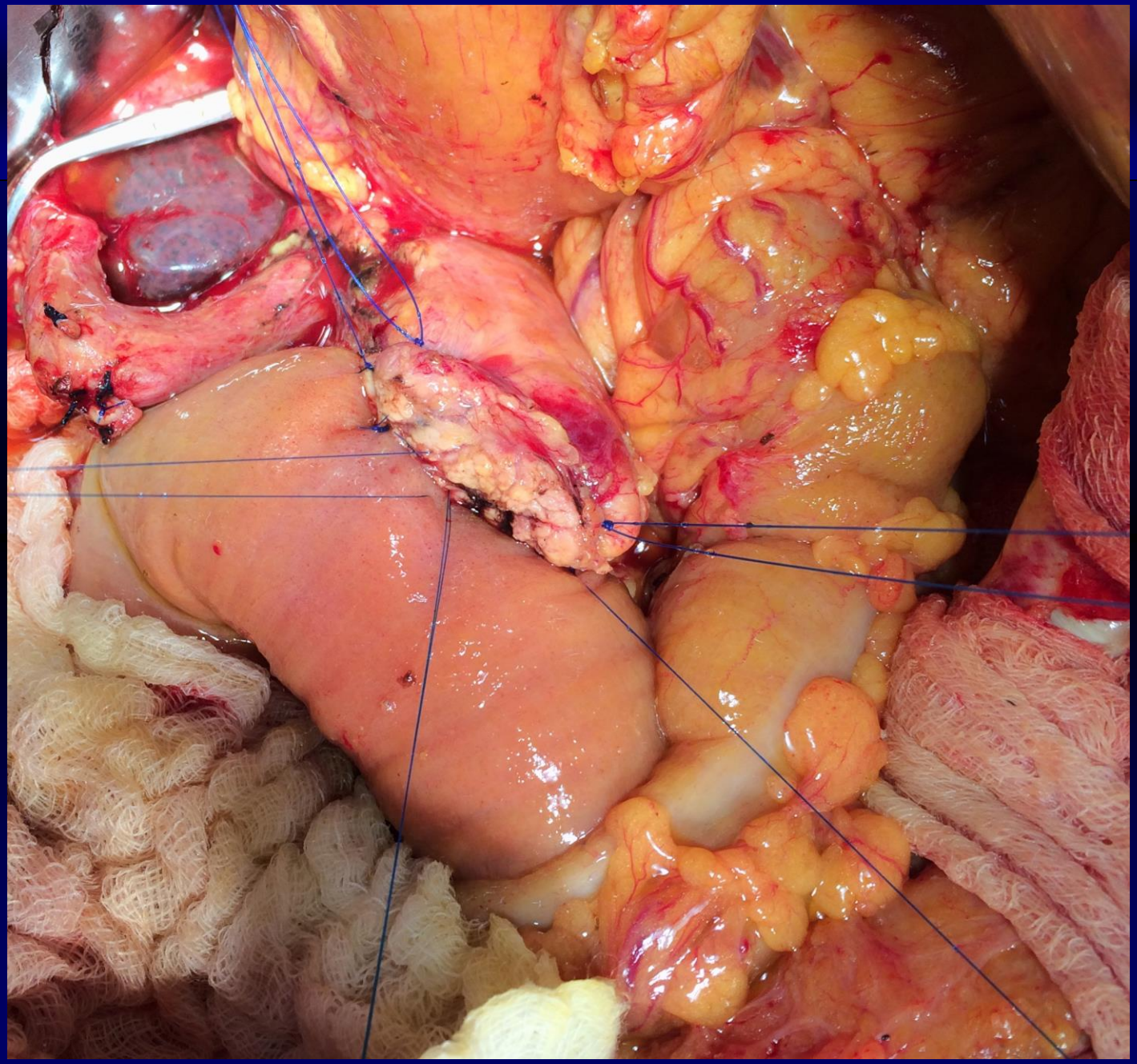
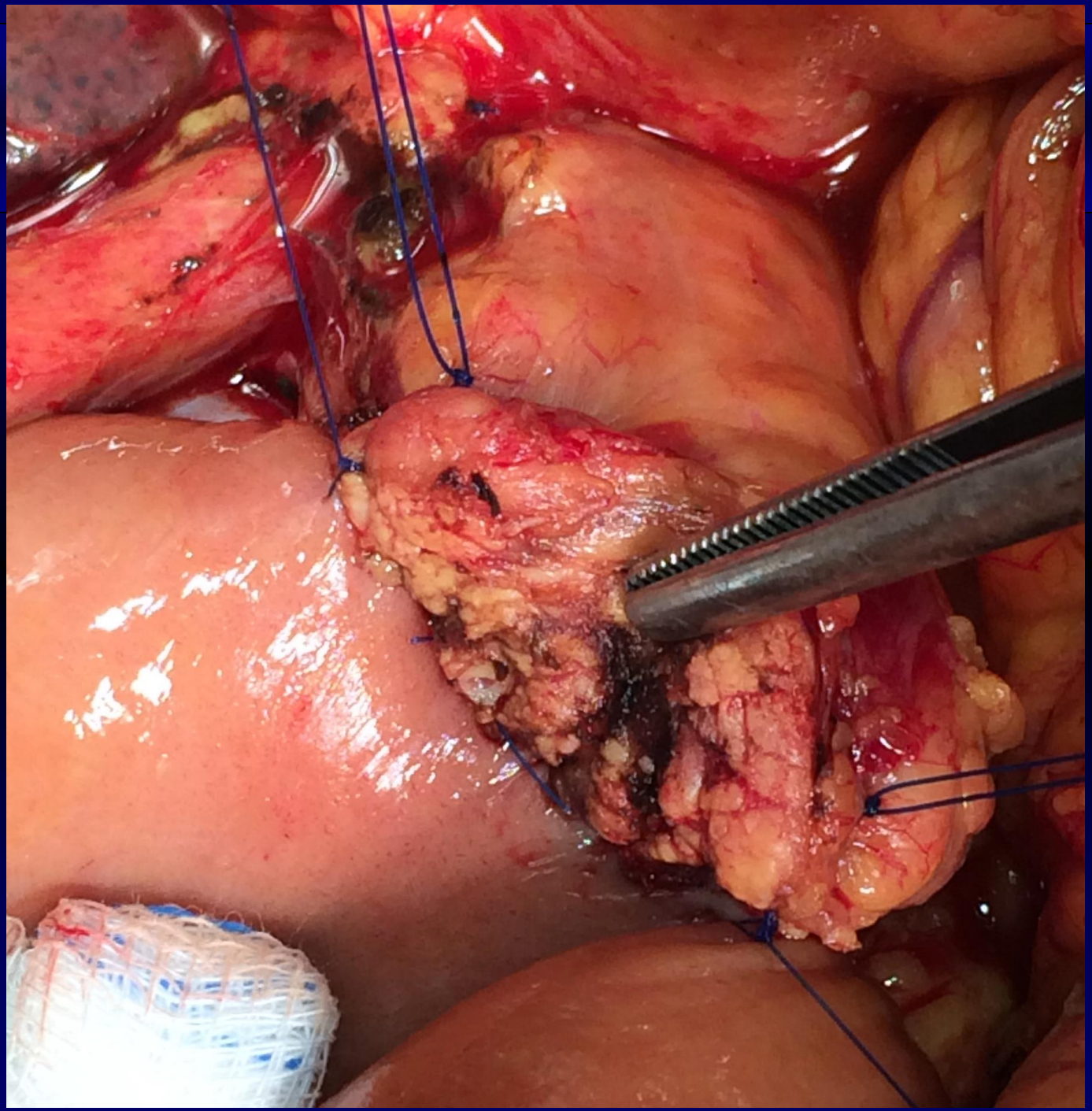
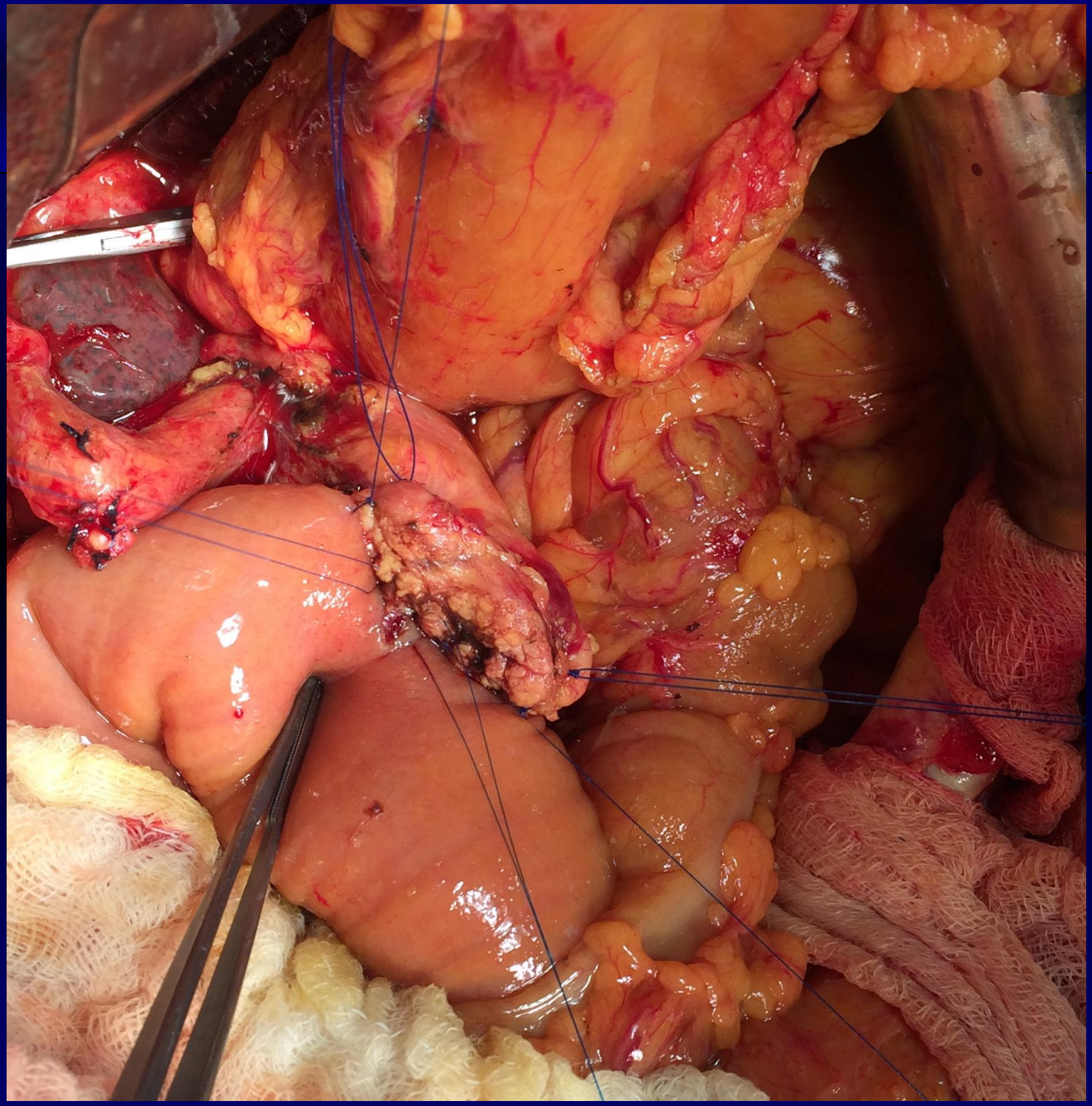
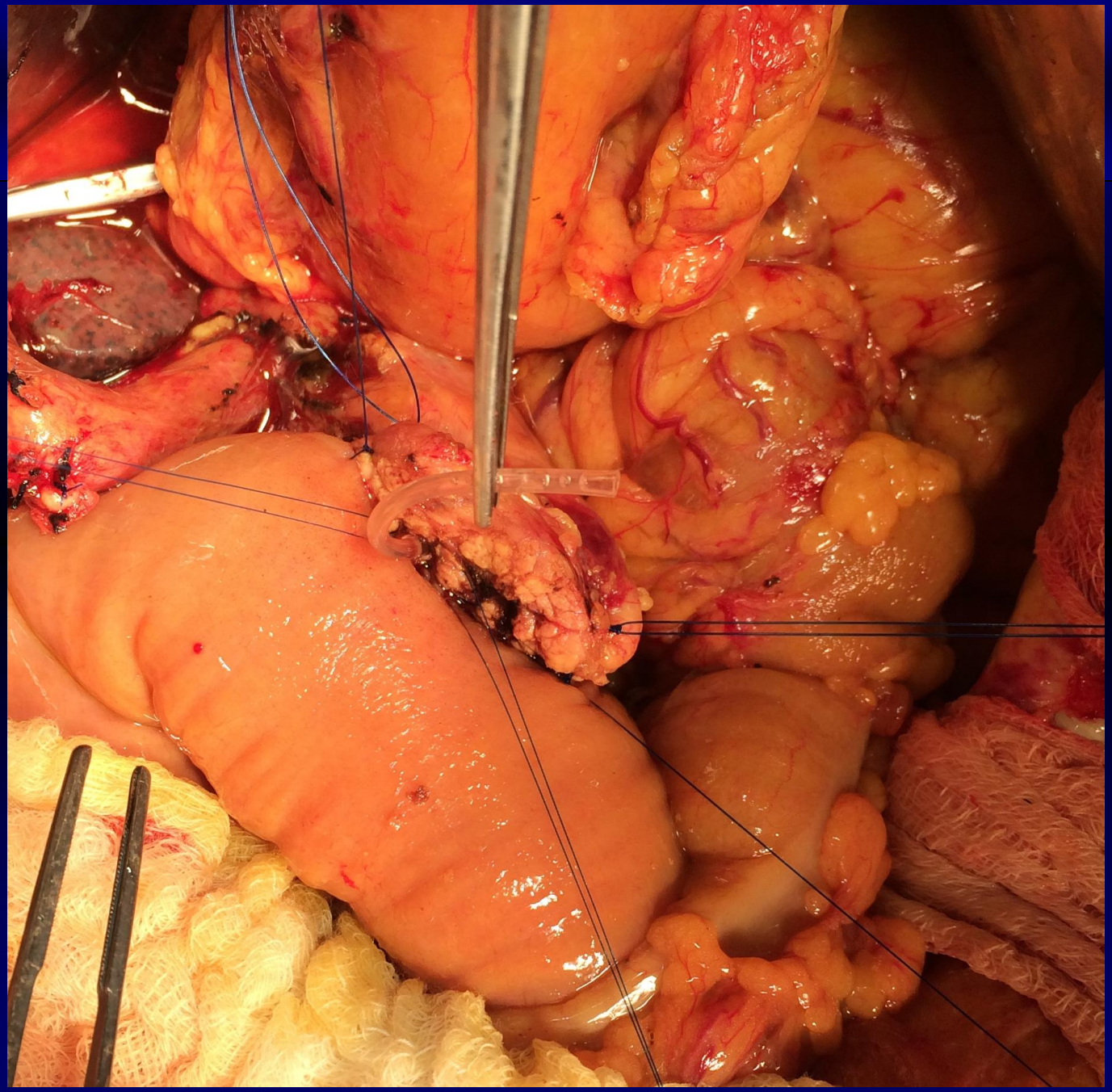
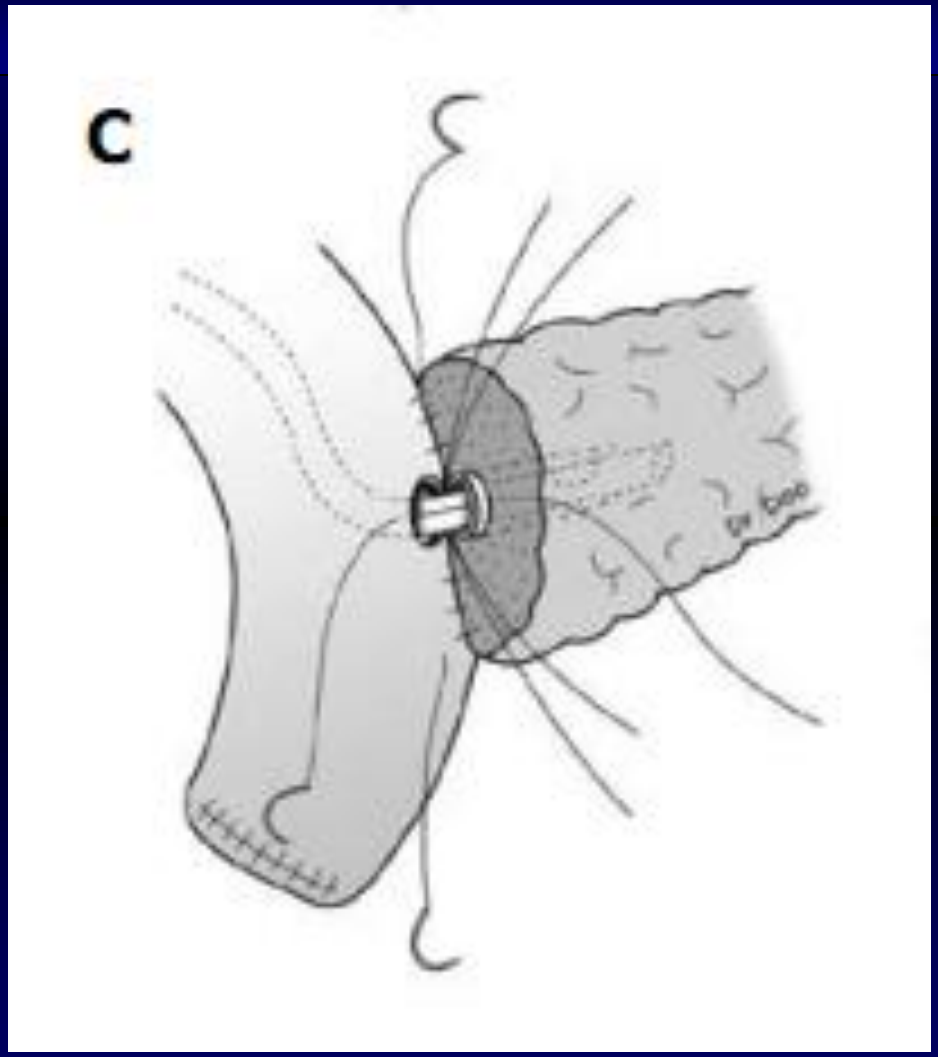








Pancreatojejunostomy



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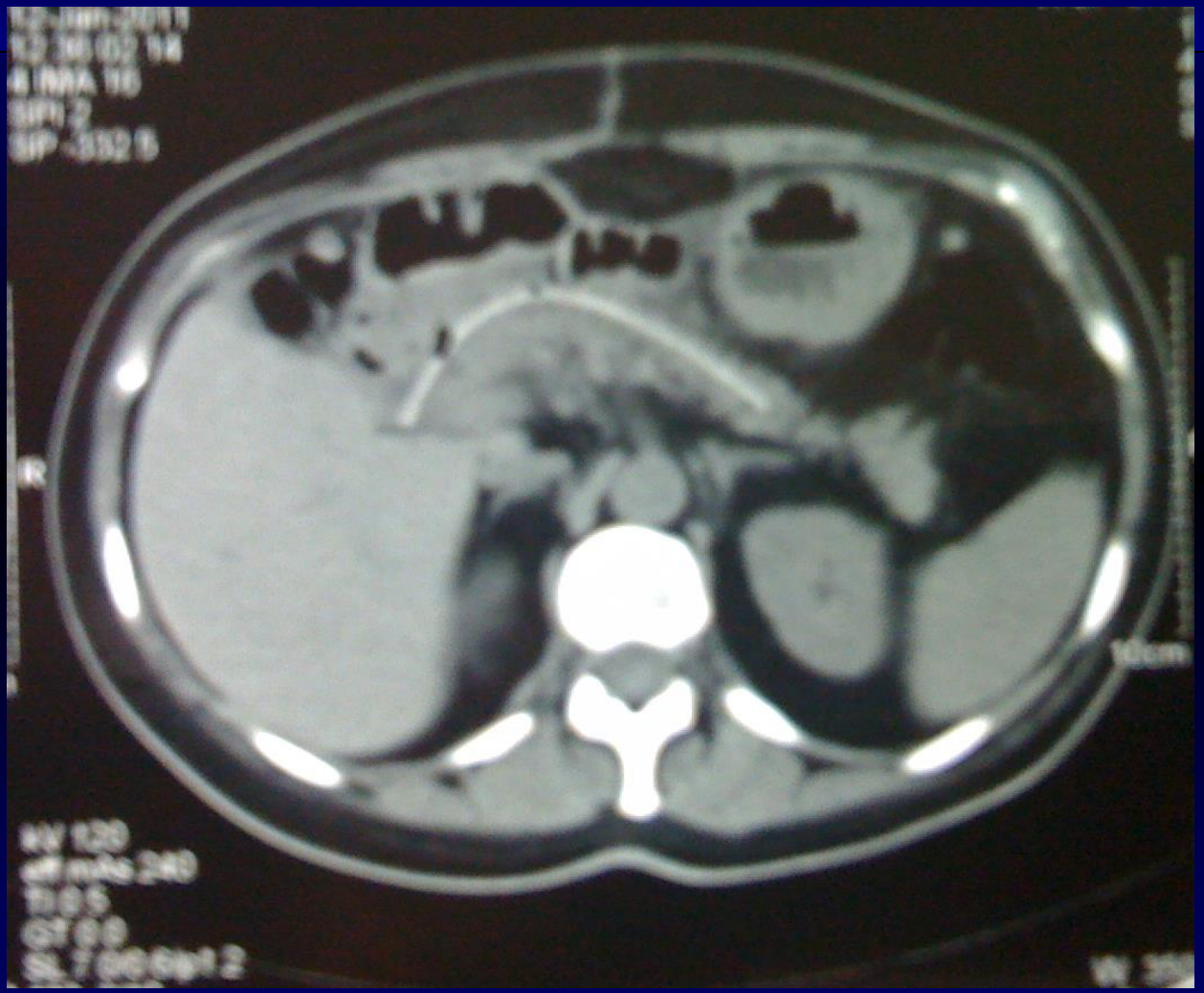
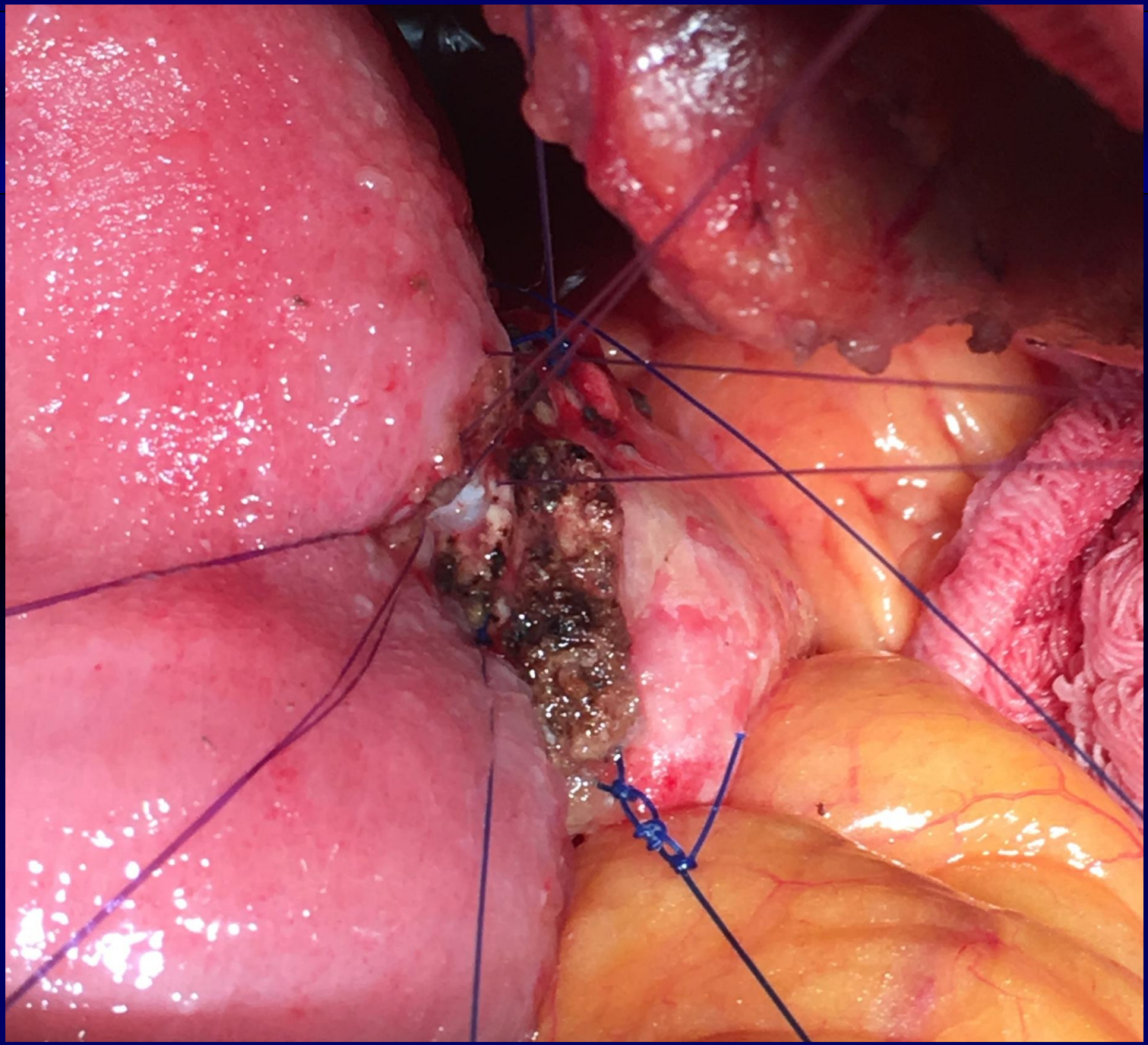
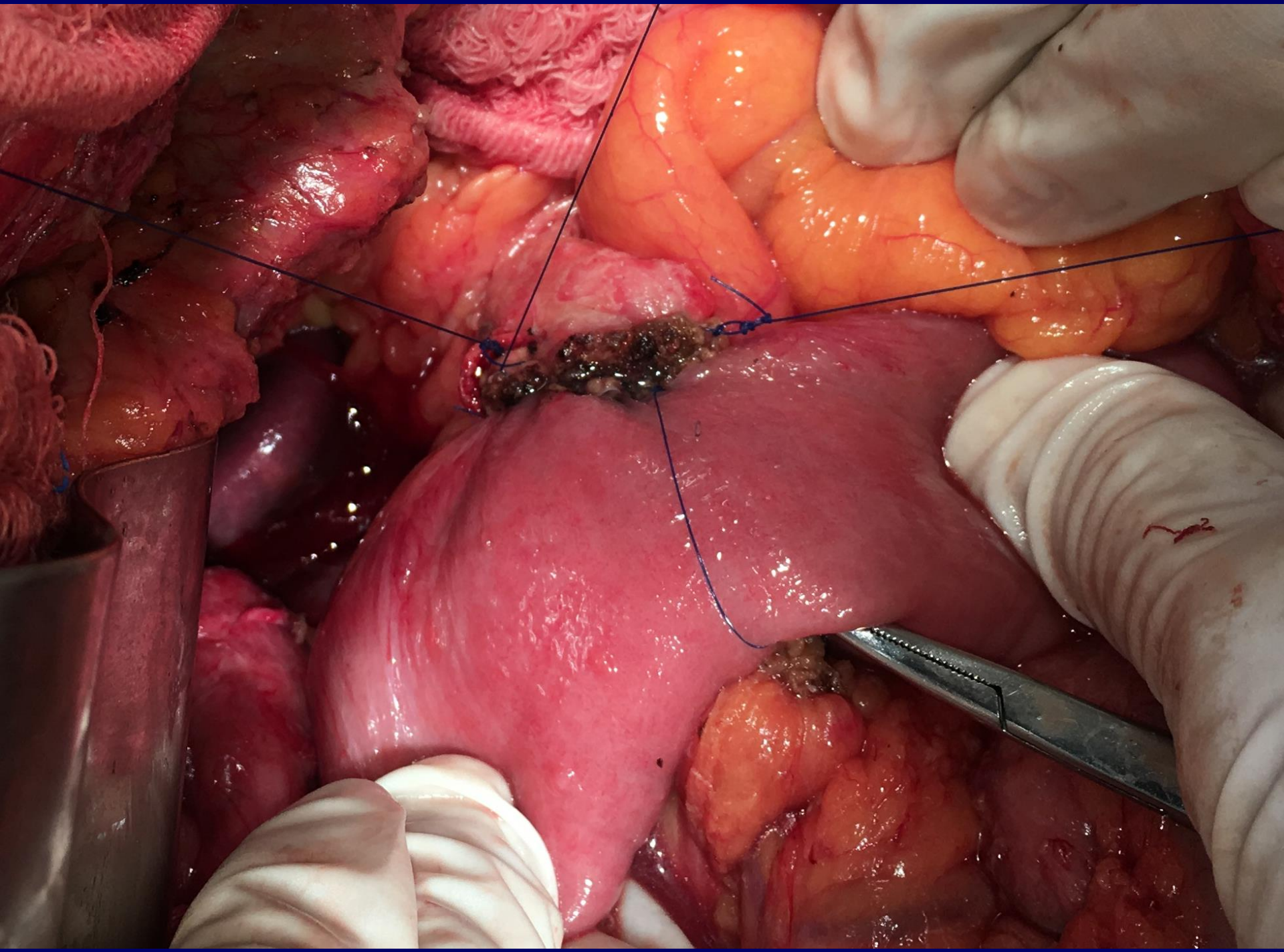
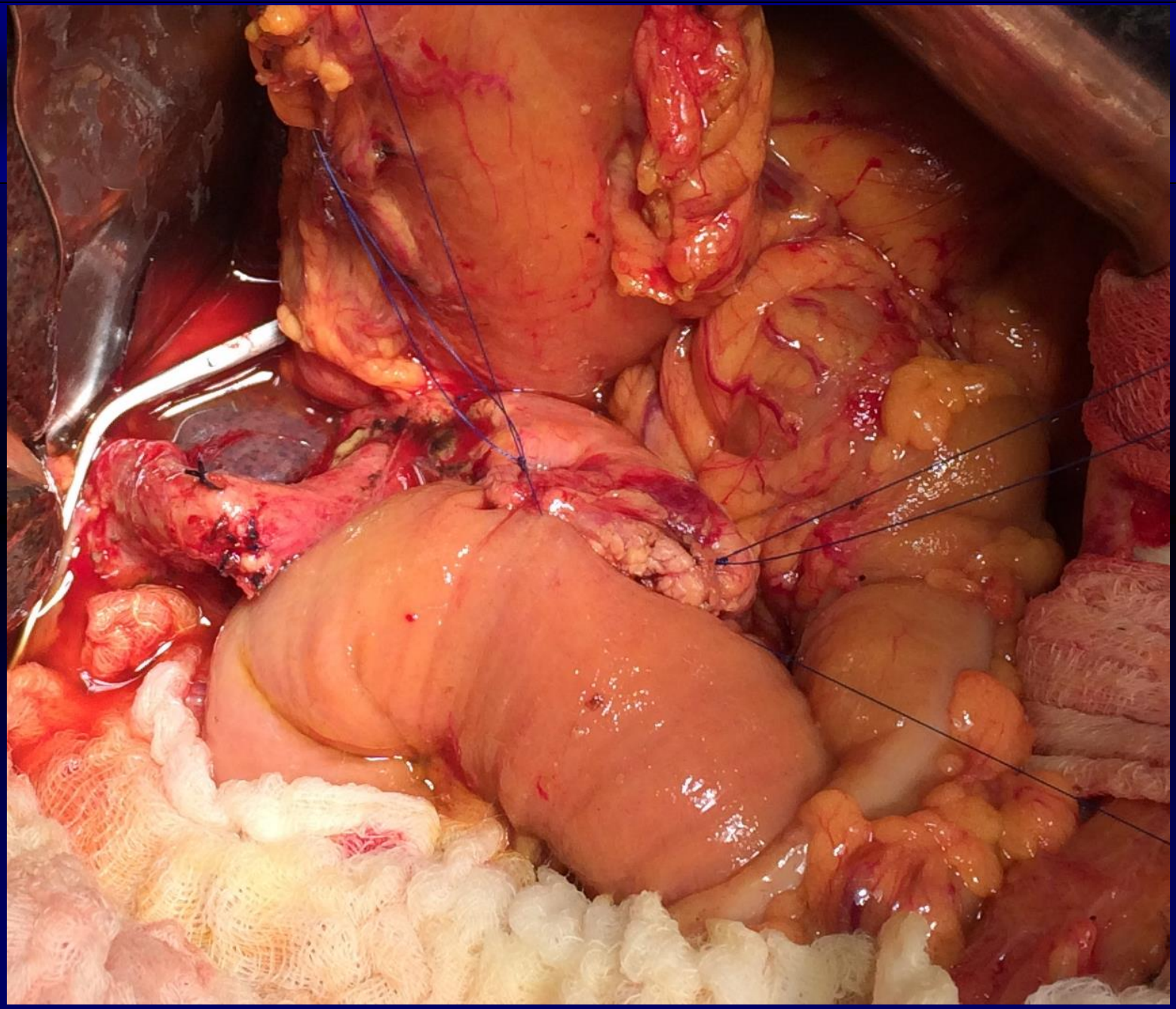
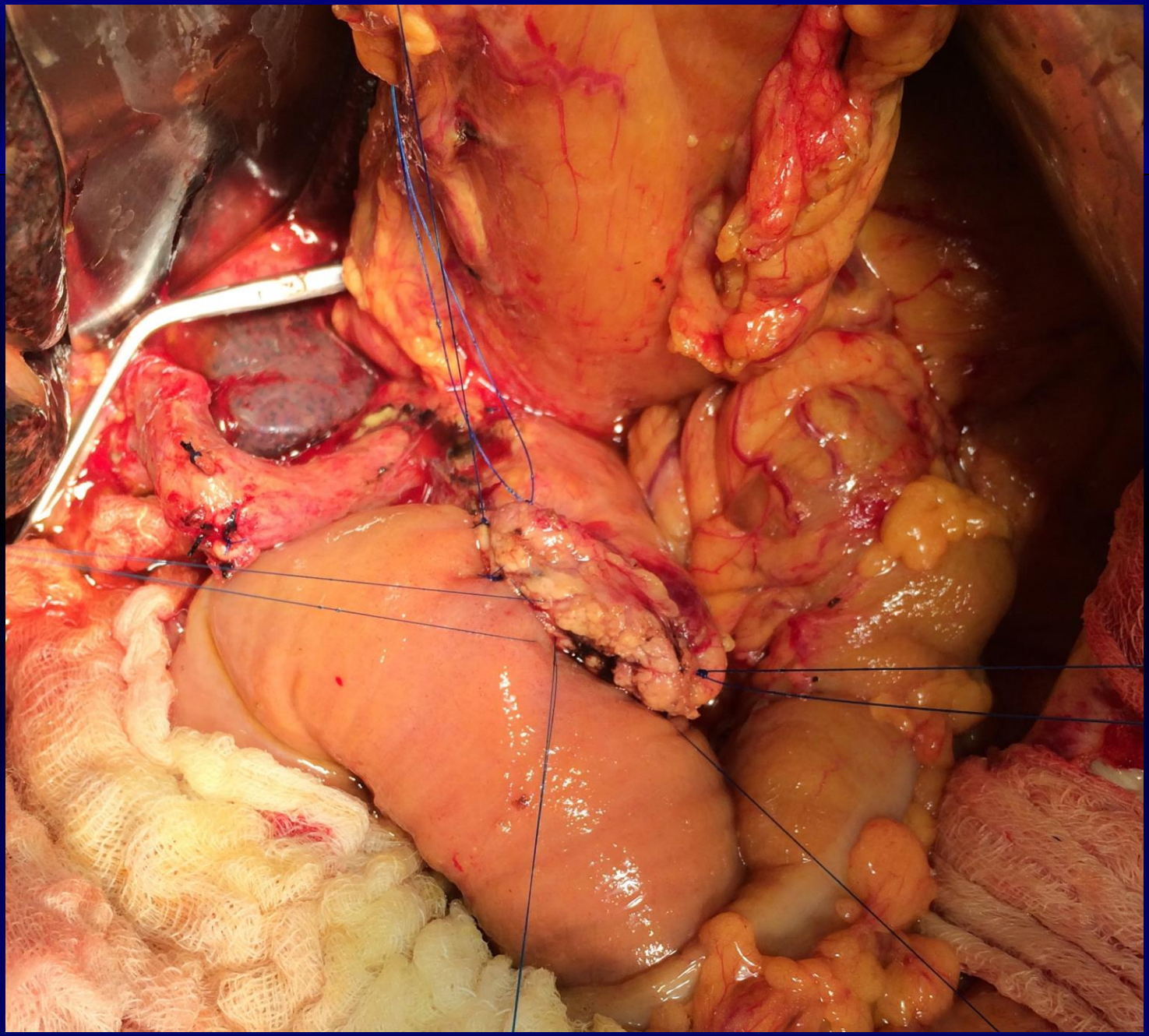


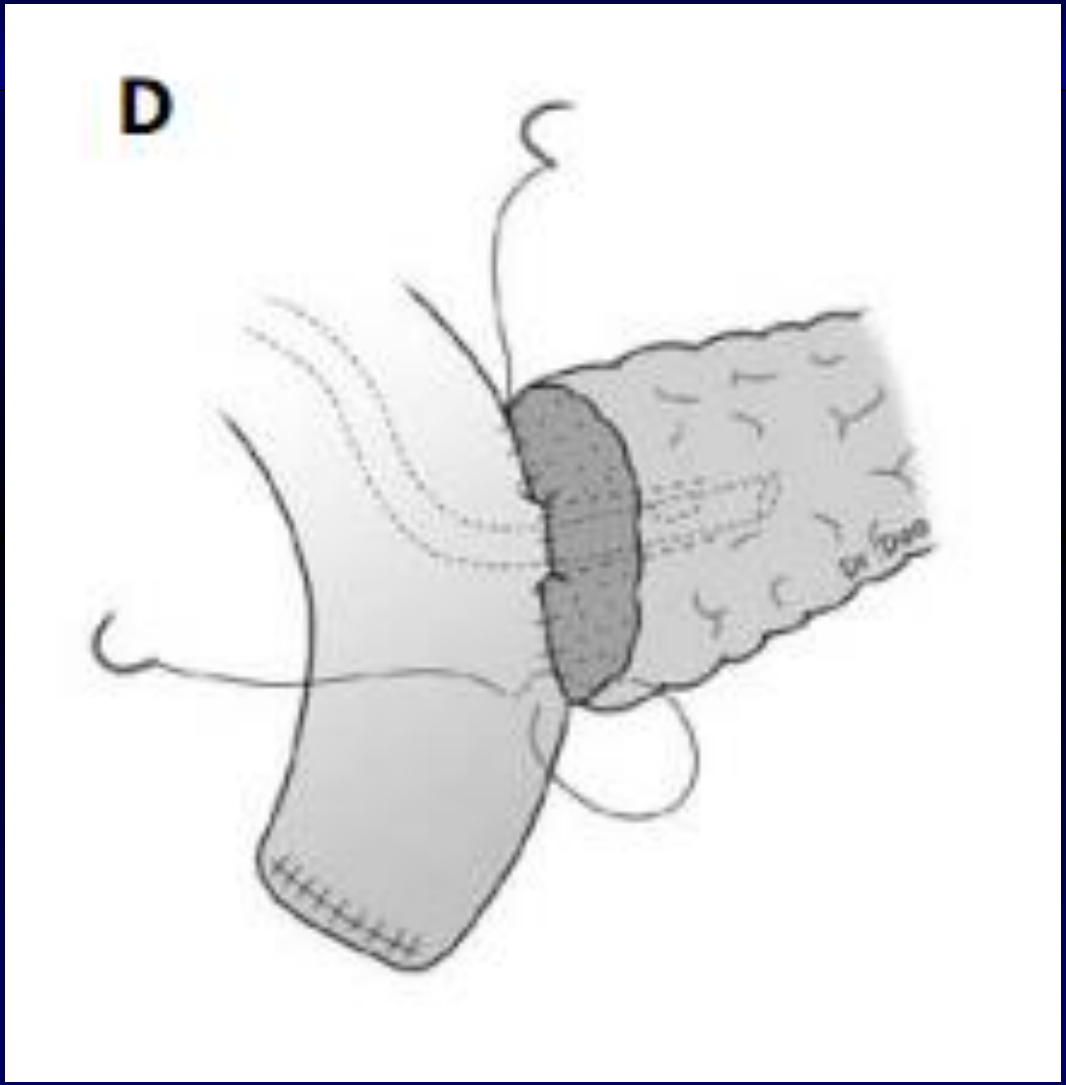








Pancreatojejunostomy



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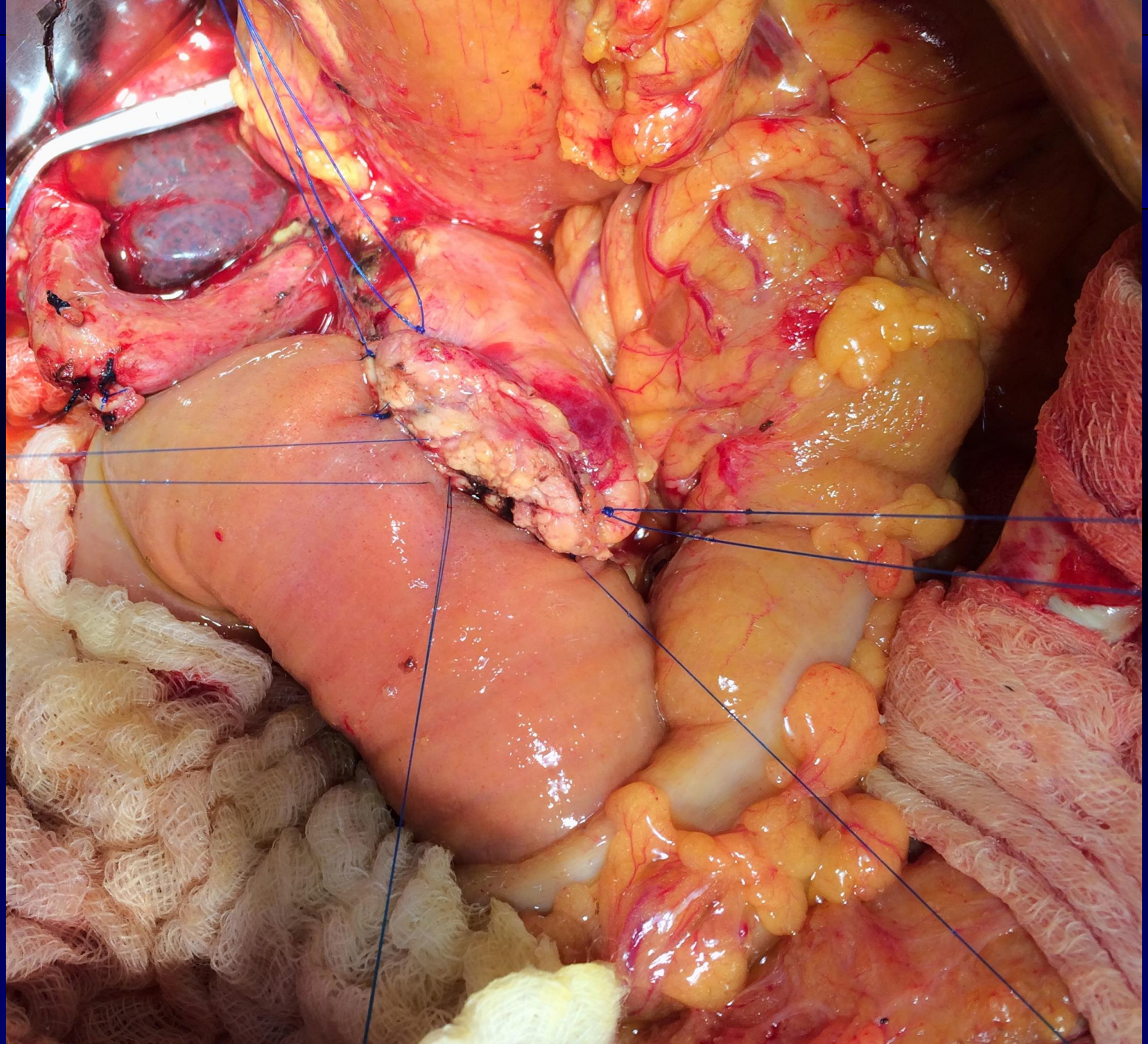
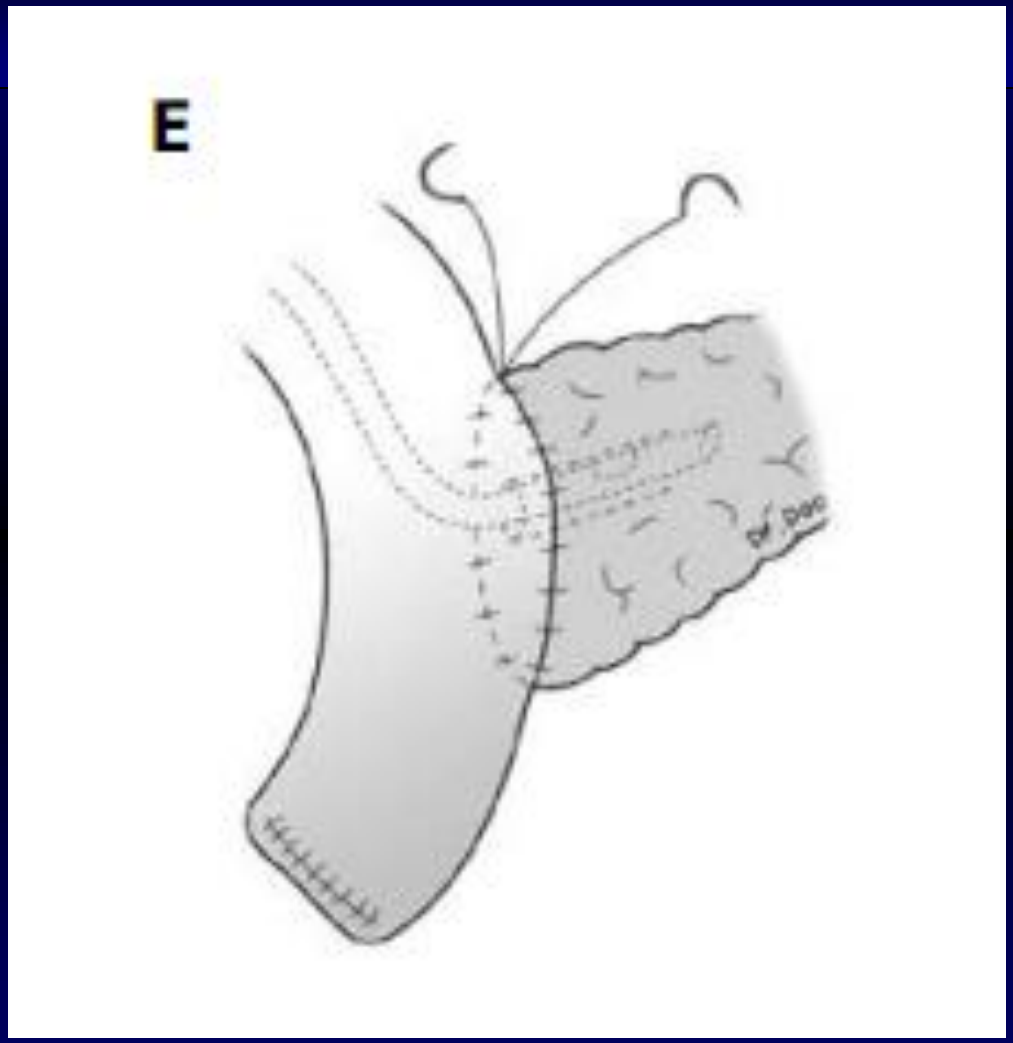
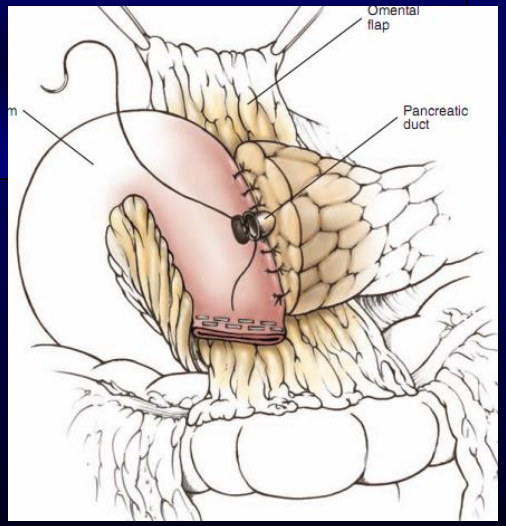


Pancreatojejunostomy





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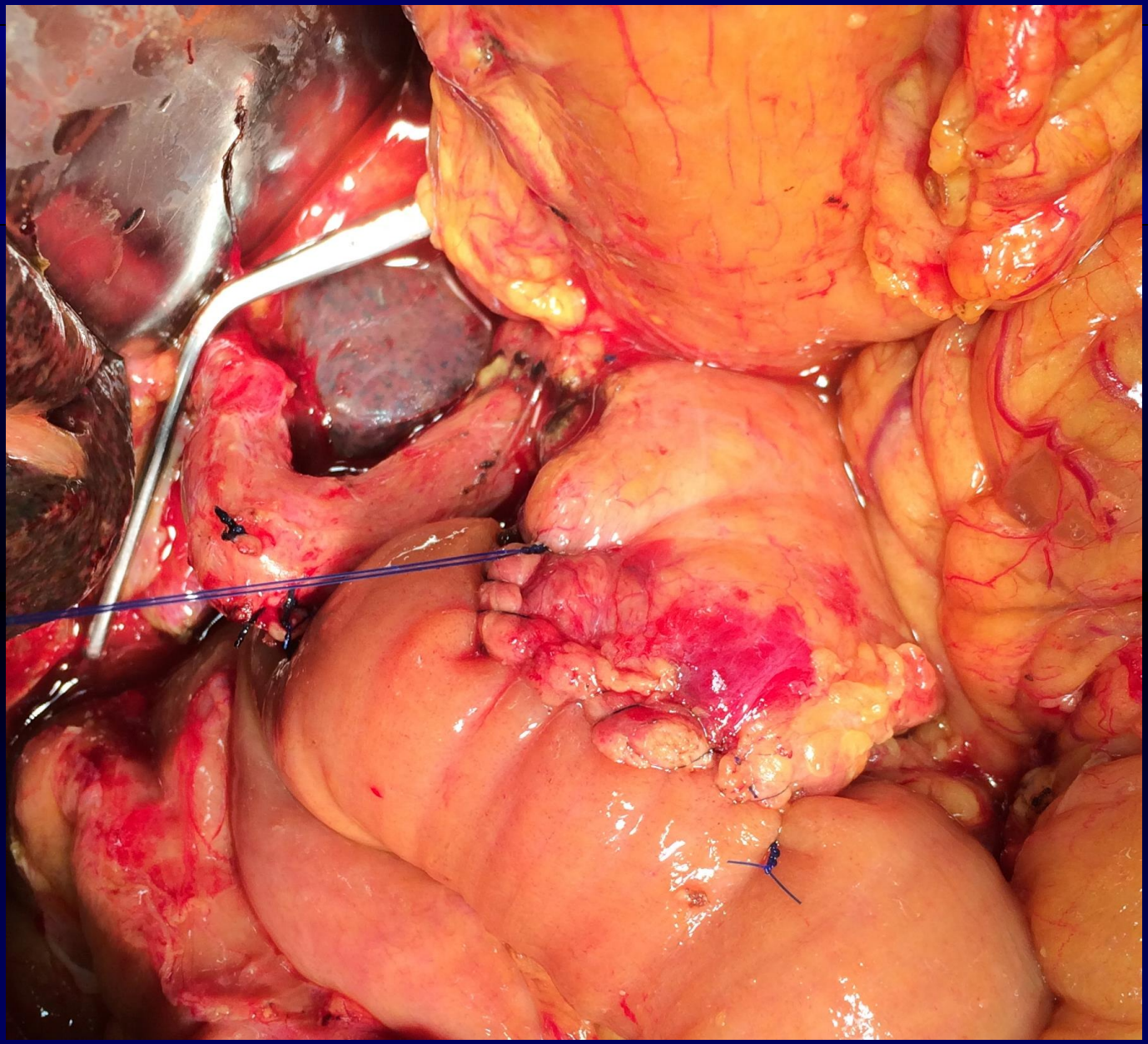

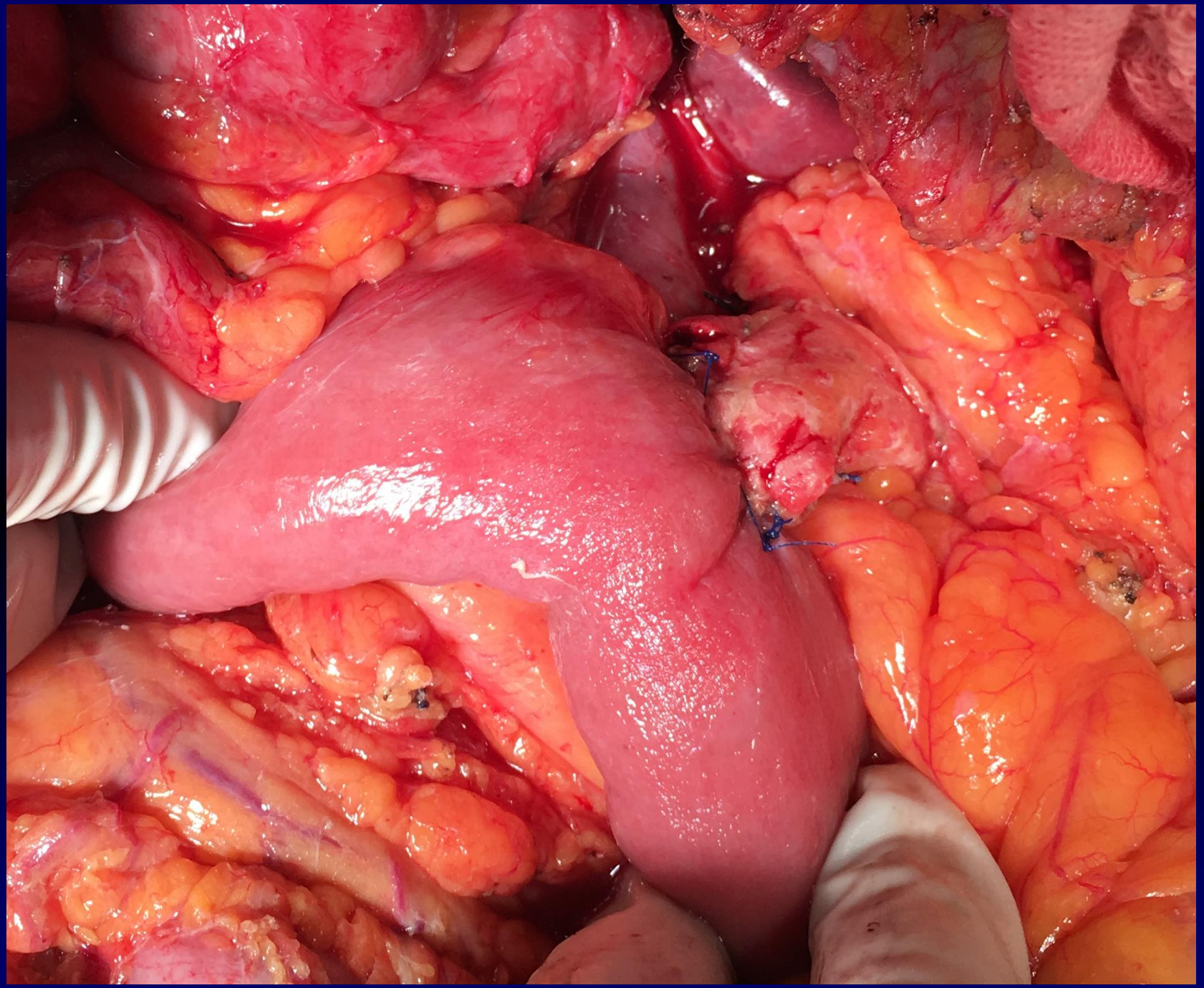

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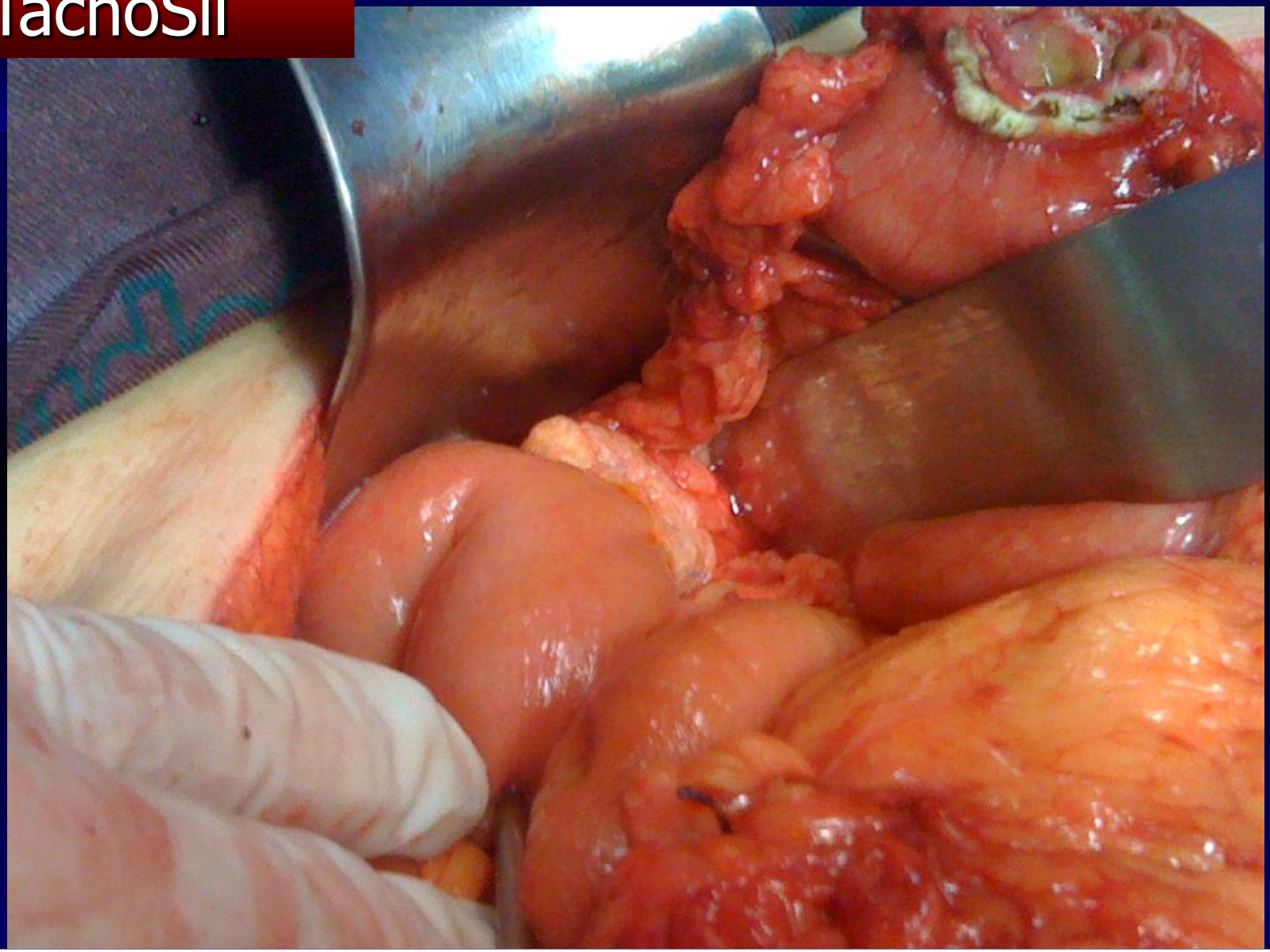
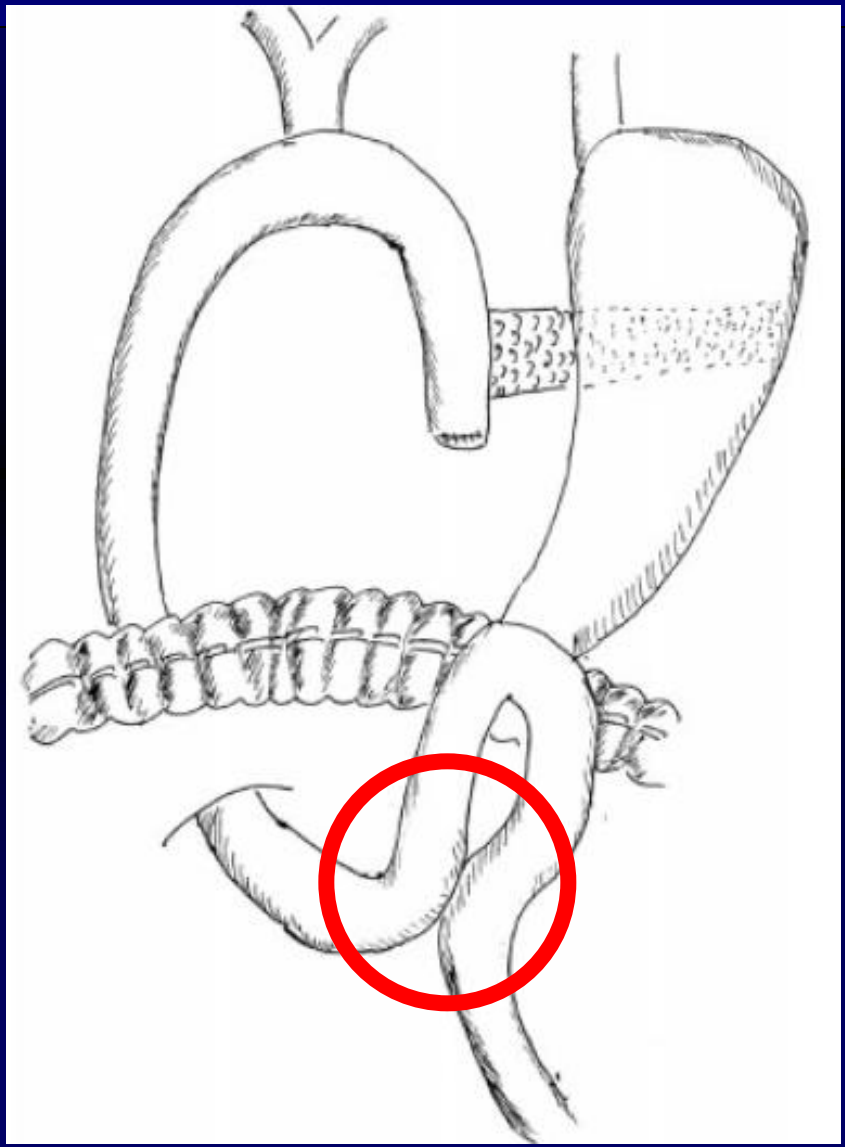


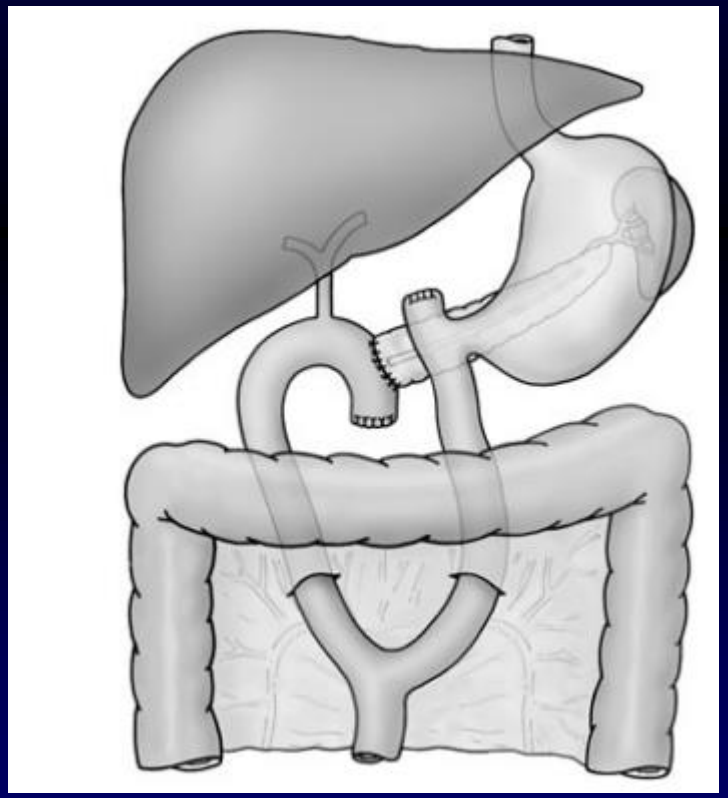
Braun anastomose



Pancreatojejunostomy

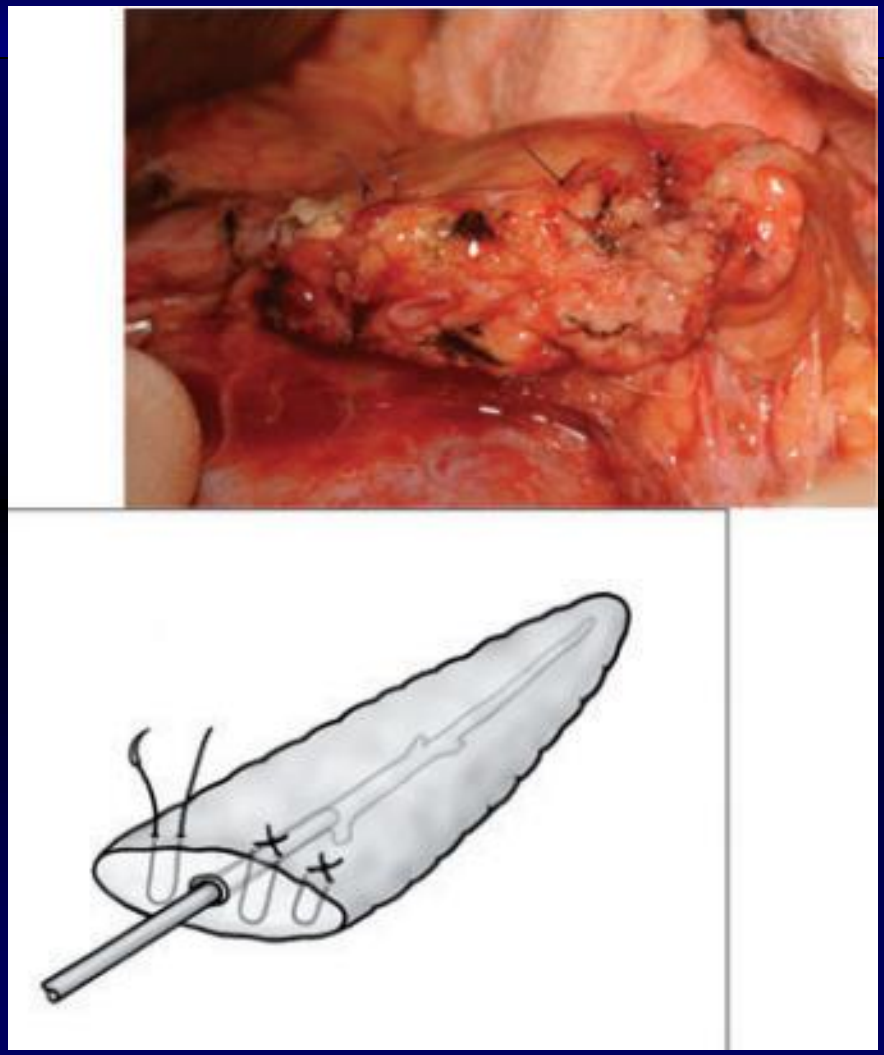
ORIGINAL ARTICLE

Modified Cattell's pancreaticojejunostomy, buttressing for soft pancreases and an isolated biliopancreatic loop are safety measurements that improve outcome after pancreaticoduodenectomy: a pilot study



Hilal MA A, et al. HPB 2009; 11:154-60

SOFT PANCREAS



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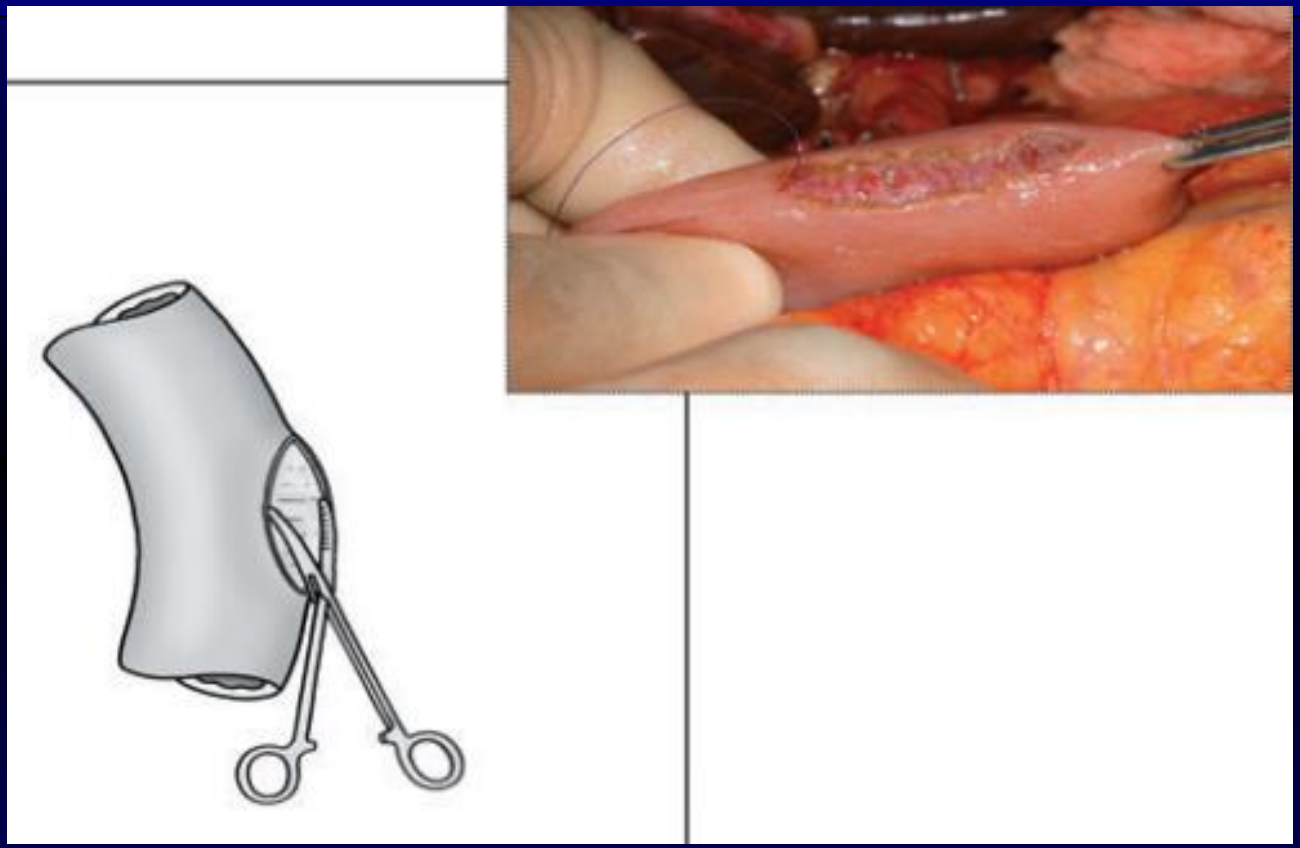

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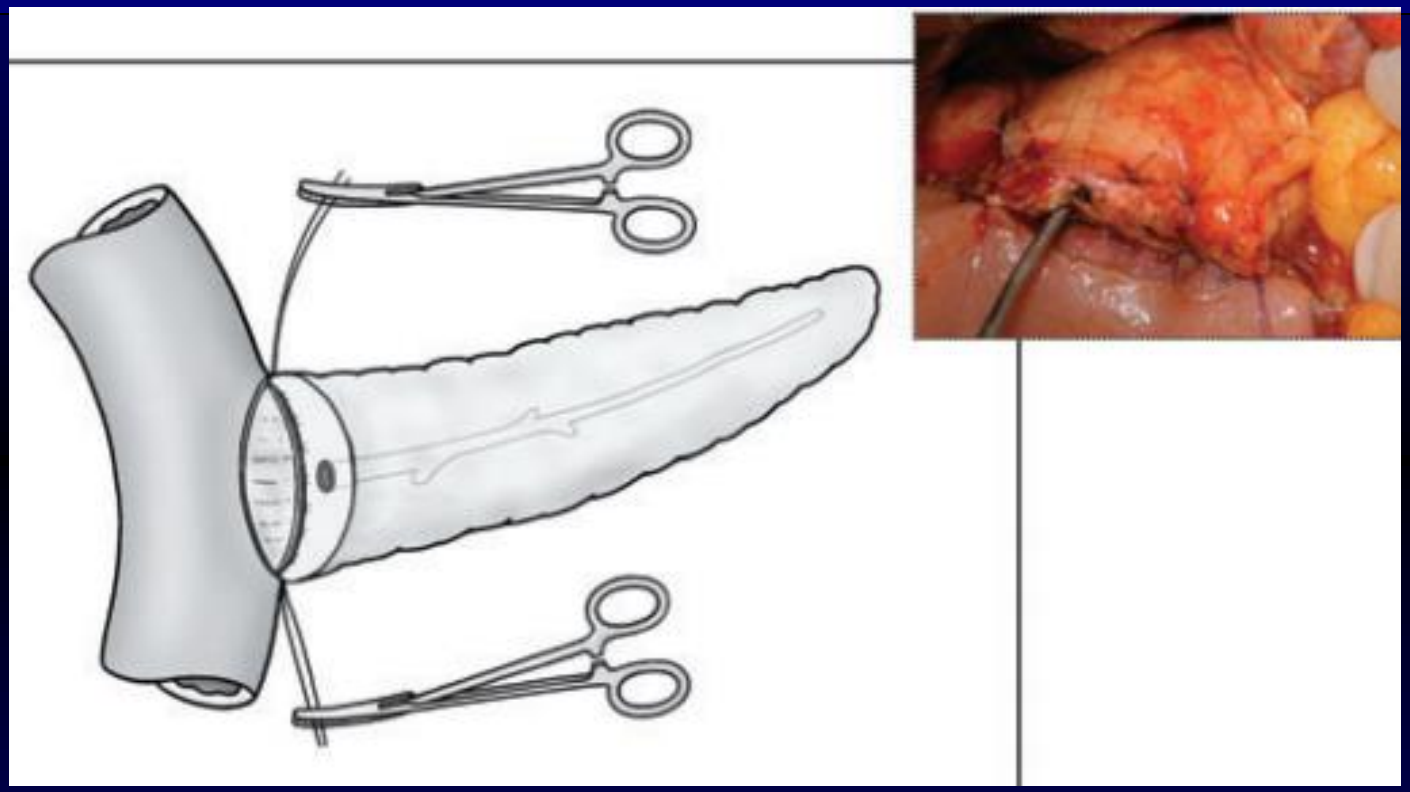

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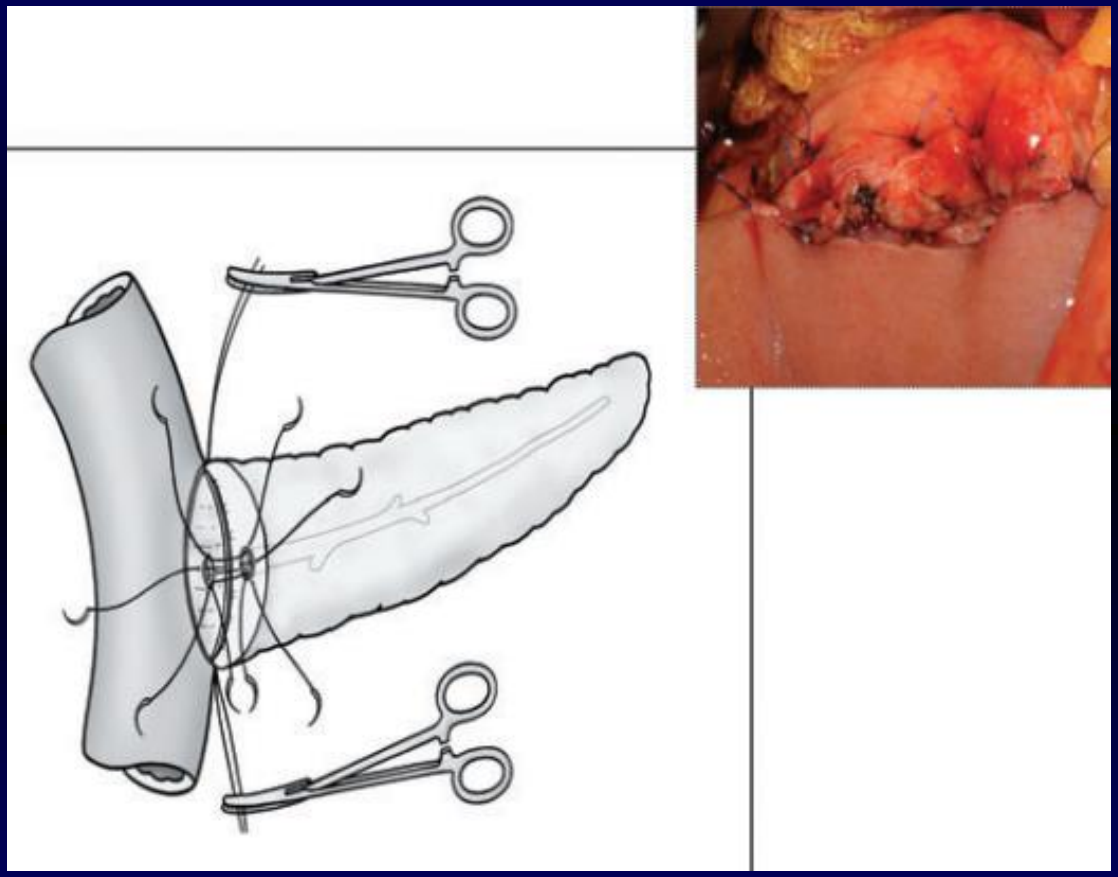

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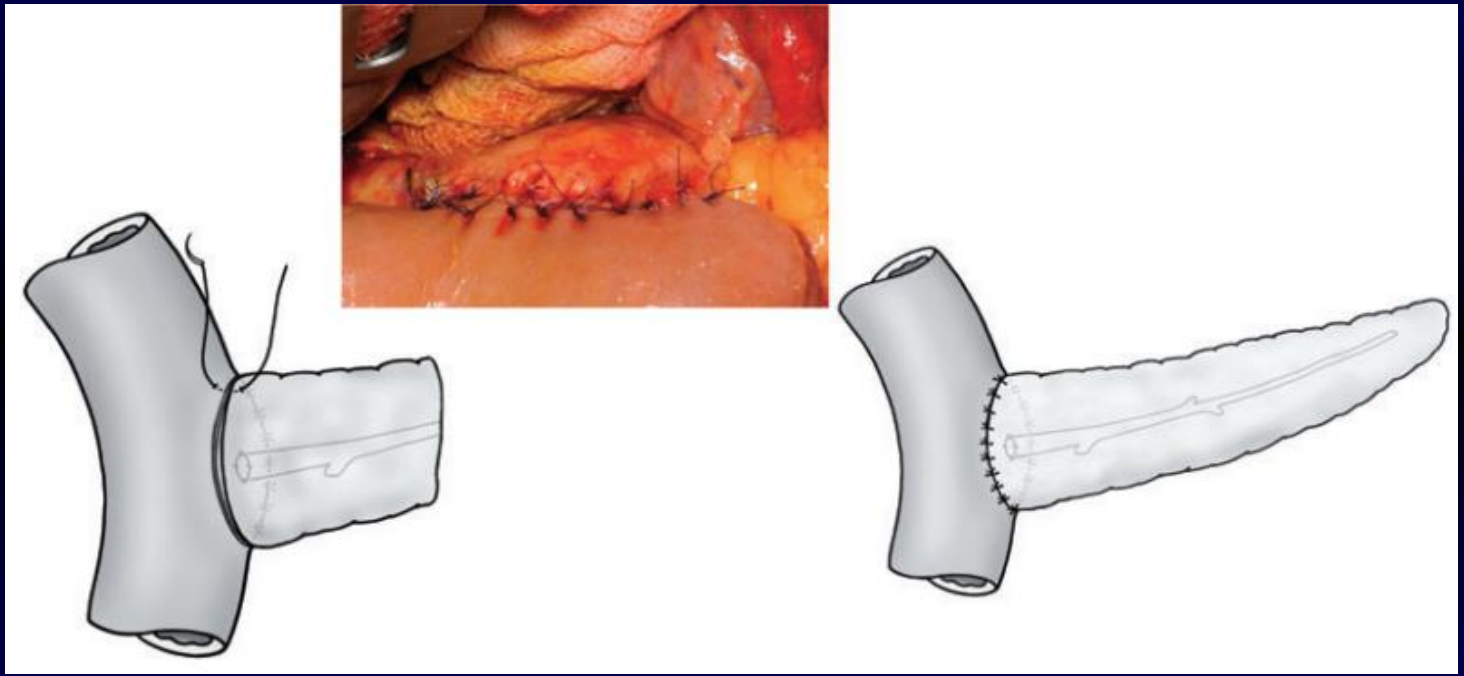


Hilal MA A, et al. HPB 2009; 11:154-60

INVAGINATED
OR
DUCT-TO-MUCOSA?

Pancreatojejunostomy

(a) Multivariate analysis of factors predictive of pancreatic fistula.

Predictive factor	Odds ratio	*P*-value
Invaginated pancreaticojejunostomy	3.30	.01
Closed suction drainage	2.24	.05
Diagnosis of pancreatitis	0.22	.05
Pre-op endoscopic biliary stent	0.34	.05

(c) Multivariate analysis of factors predicting pancreatic fistula in 294 patients with periampullary adenocarcinoma subgroup.

Predictive factor	Odds ratio	Stats
Invaginated pancreaticojejunostomy	11.78	.0002
Pre-op endoscopic biliary stent	0.194	.04
Gender (Female)	0.238	.03
Pre-op diabetes	0.146	.07

Schmidt CM, et al. HPB 2009;11:1-8

G Chir Vol. 35 - n. 9/10 - pp. 213-222
September-October 2014

original article

Surgical treatment of the pancreatic stump: preventive strategies of pancreatic fistula after pancreatoduodenectomy for cancer

R. TERSIGNI[1], M. CAPALDI[1], P. IALONGO[2], L.R. GRILLO[3], A. ANSELMO[4]

PANCREATOJEJUNOSTOMY ONLY

Tersigni R, et al. G Chir 2014;35:213-22

TABLE 1 - MANAGEMENT OF PANCREATIC STUMP IN 150 PTS. SUBMITTED TO PD FOR CANCER.

Operations	n°	Years	Groups
End-to-end PJ anastomosis	32	2002-2004	A
End-to-side PJ anastomosis	44	2005-2007	B
Duct occlusion	33	2008-2010	C
Duct-to-mucosa anastomosis	41	2011-2012	D
All	150		

PJ: pancreatic jejunostomy.

TABLE 2 - POSTOPERATIVE COURSE, COMPLICATIONS AND OUTCOME IN 150 PTS. SUBMITTED TO PD FOR CANCER.

Main abdominal complications	A (32) E-EPJ	B (44) E-SPJ	C (33) PDO	D (41) DMA	Overall morbidity 40 (26.6 %)
Pancreatic fistula	5 (15.6%)	5 (11.3%)	15(45.4%)	0	25 (16,6%)
Grade A	4	2	10	0	16 (64%)
Grade B	2	1	3	0	6 (24%)
Grade C	1	1	1	0	3 (12%)
Biliary fistula	0	0	0	0	–
Abdominal collections	3	2	3	0	8 (5,3%)
Hemorrage	2	1	1	0	4 (2,6%)
Acute pancreatitis	0	1	0	0	1 (0,7%)
Bowel obstruction	1	1	0	0	2 (1,3%)
Post-op mortality	5	3	1	0	9 (6 %) *

* *Post-op mortality in the last 100 consecutive cases: 1%.*

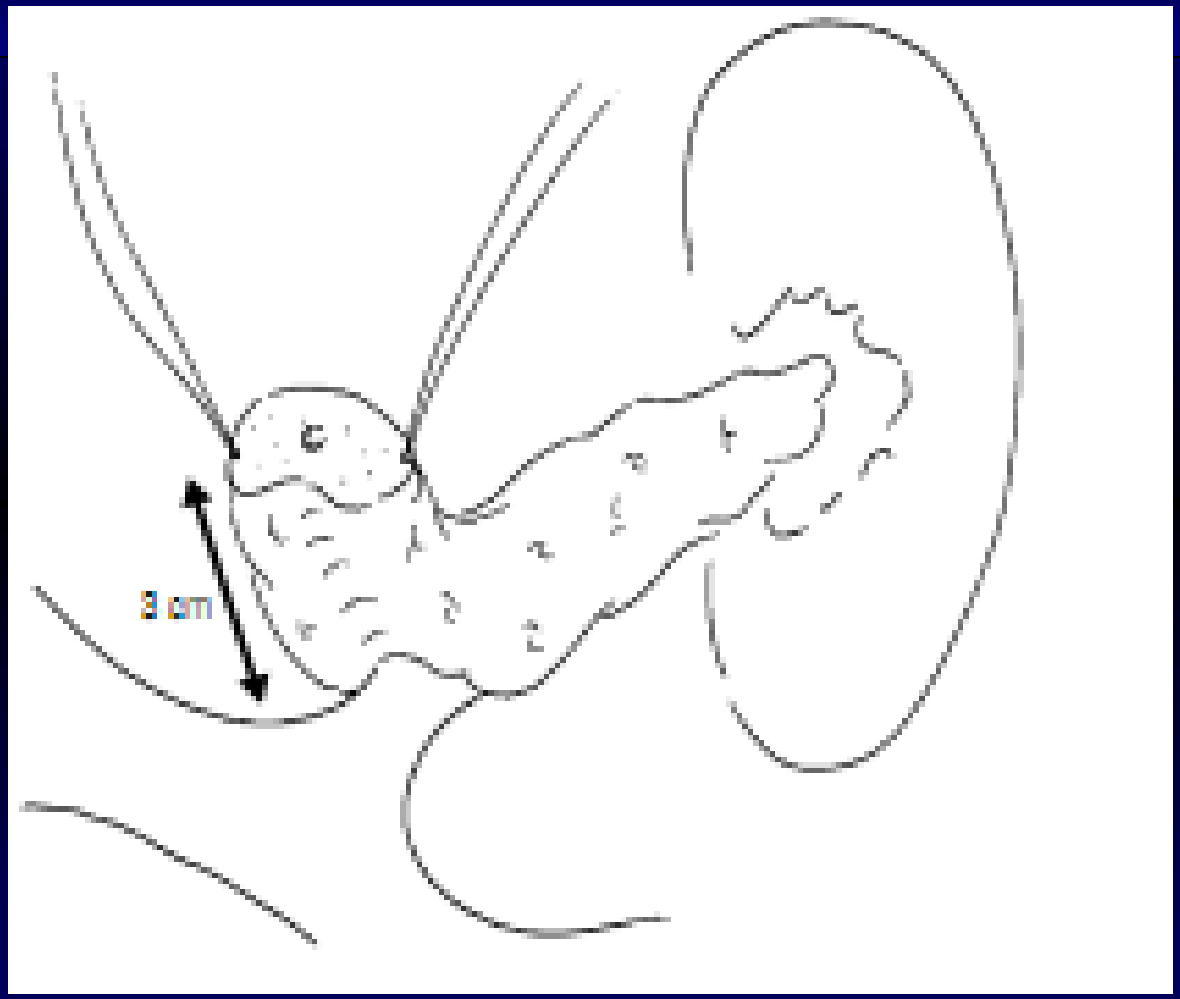
Tersigni R, et al. G Chir 2014;35:213-22

CONCLUSION

DUCT-TO-MUCOSA

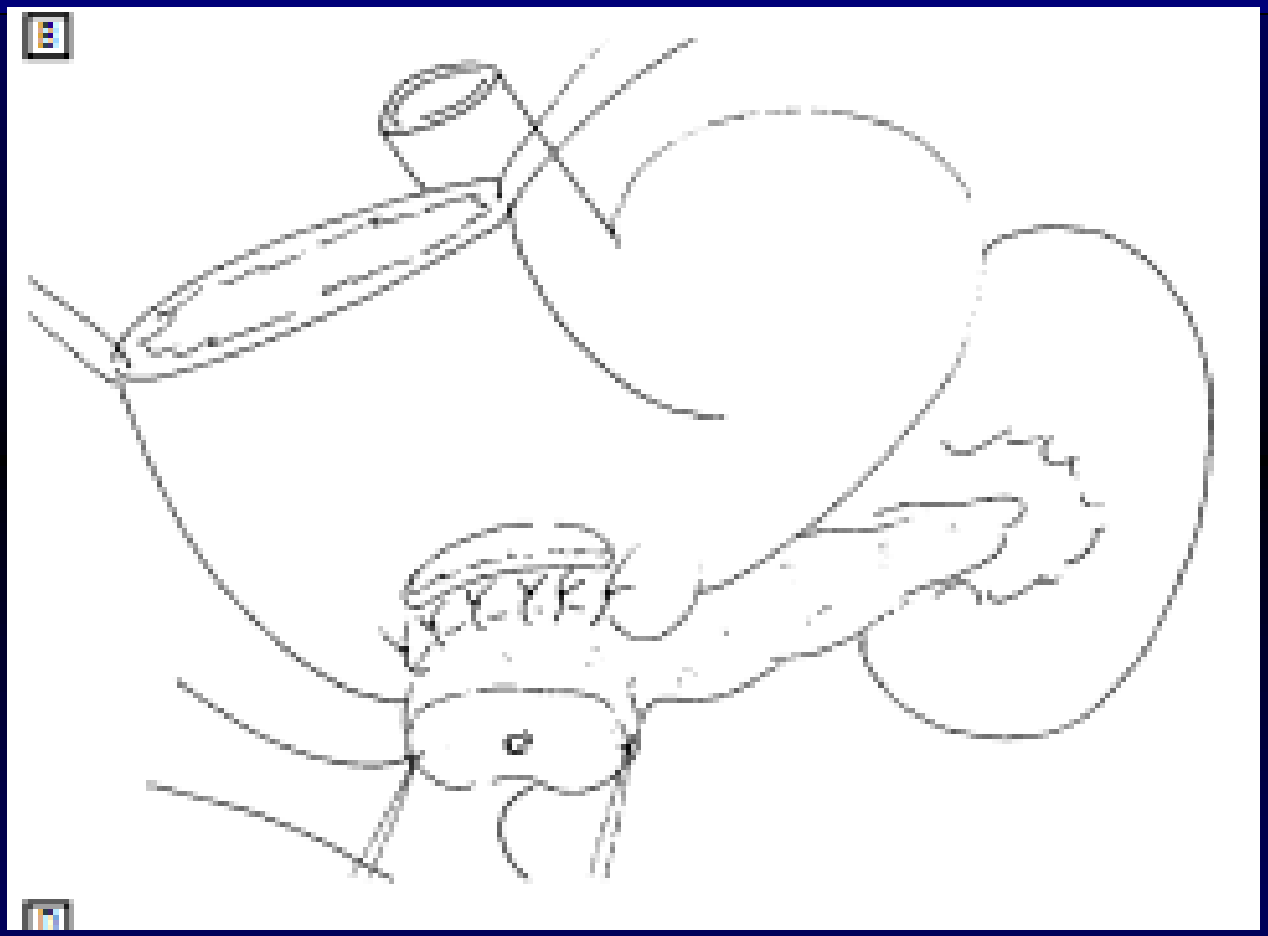
PANCREATO-GASTROSTOMY

PANCREATO-GASTROSTOMY



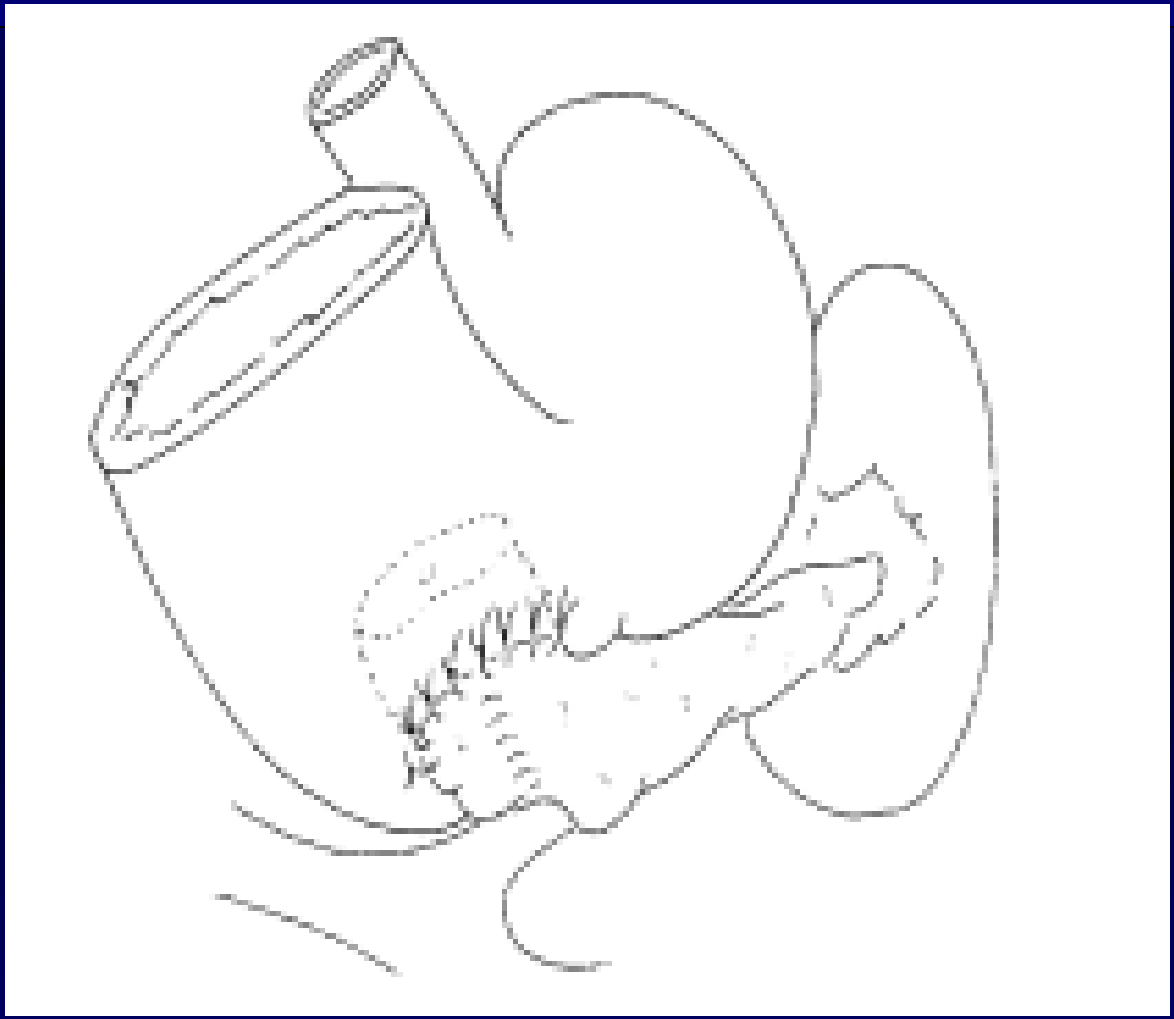
Oussoultzoglou E, et al. Arch Surg 2004; 139:327-35

PANCREATO-GASTROSTOMY



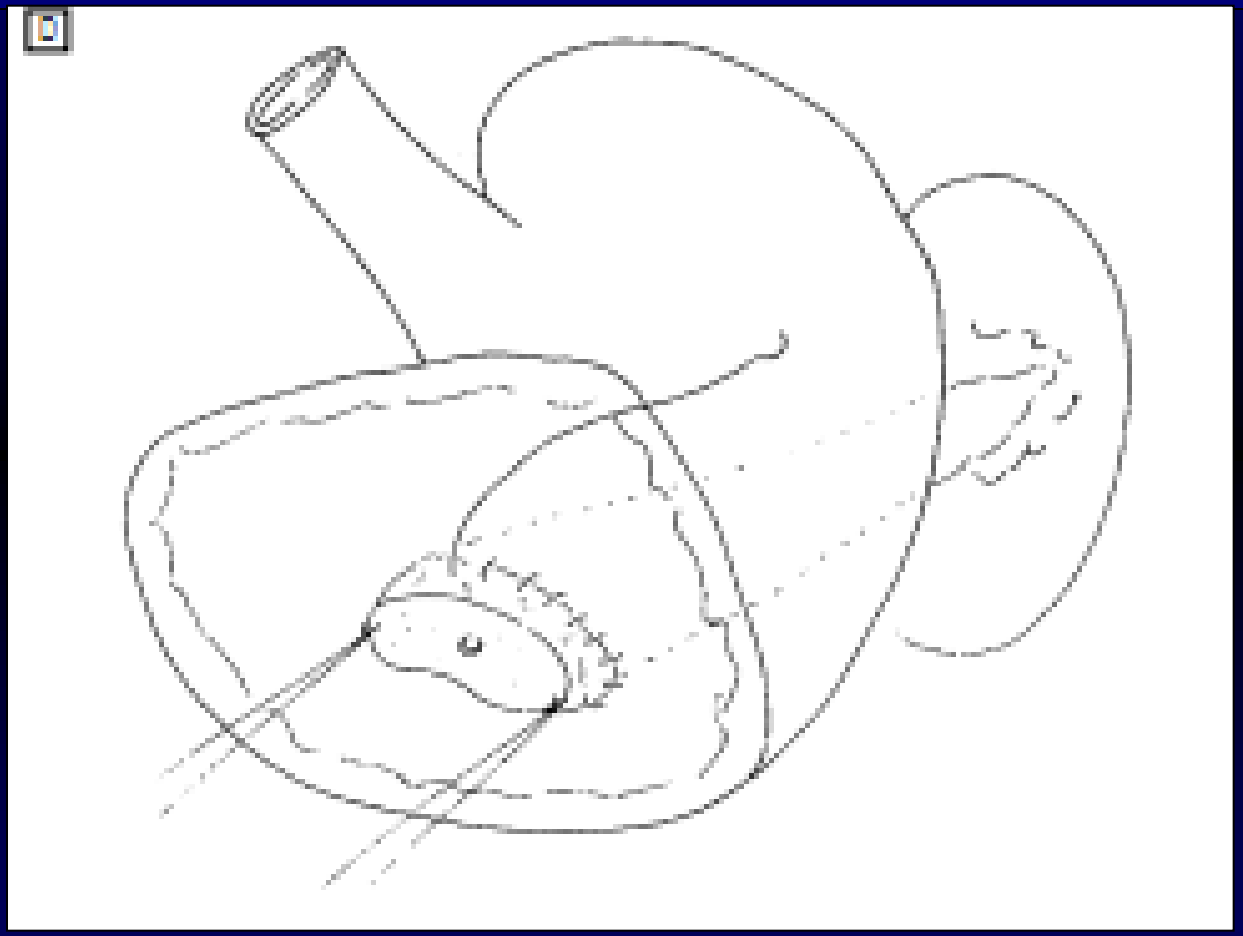
Oussoultzoglou E, et al. Arch Surg 2004; 139:327-35

PANCREATO-GASTROSTOMY



Oussoultzoglou E, et al. Arch Surg 2004; 139:327-35

PANCREATO-GASTROSTOMY



Oussoultzoglou E, et al. Arch Surg 2004; 139:327-35

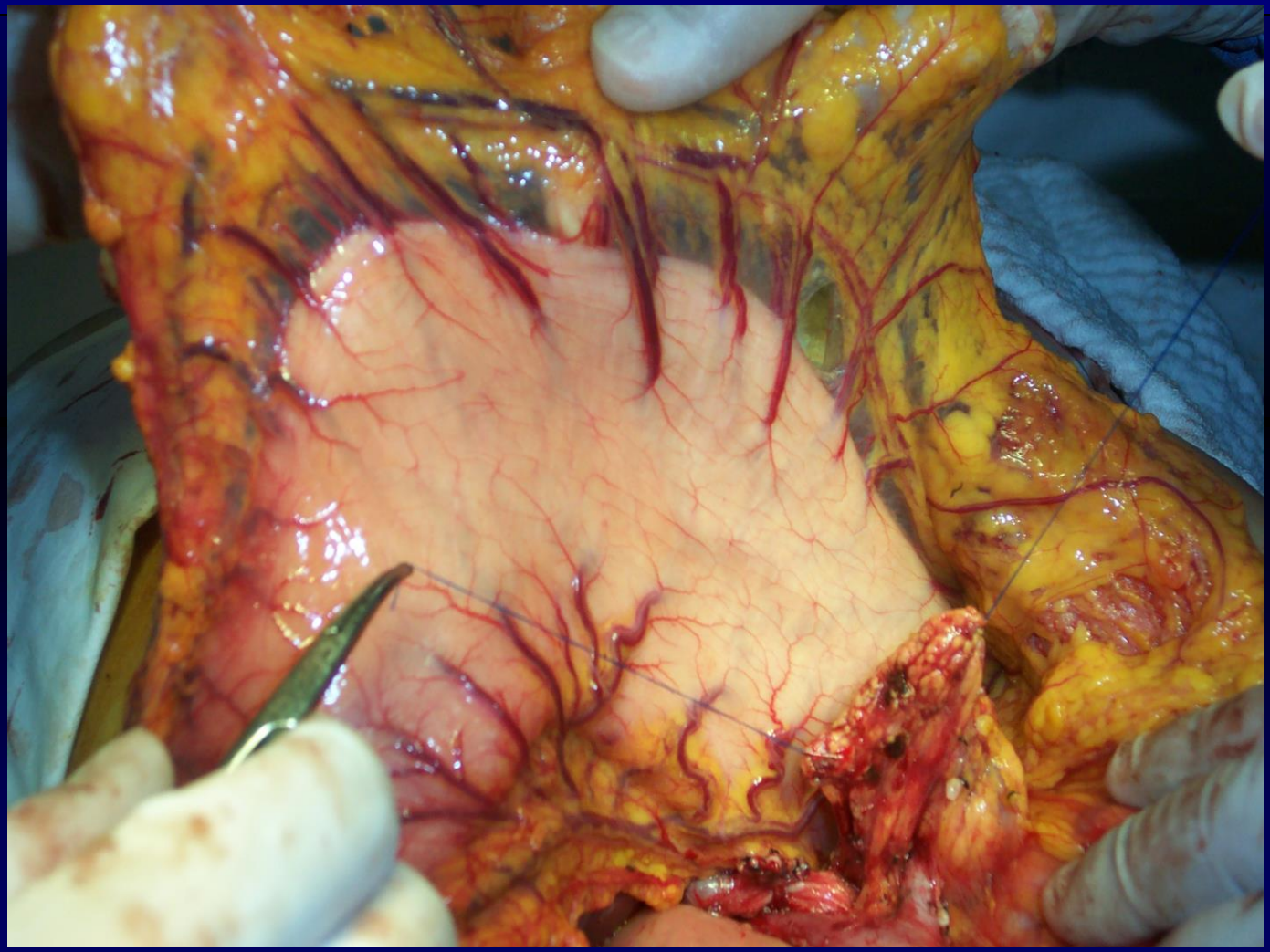
PANCREATO-GASTROSTOMY

Montenegro TECHNIQUE

Pancreatogastrostomy
Montenegro Technique

Courtesy from Roland Montenegro Costa

Pancreatogastrostomy
Montenegro Technique



Courtesy from Roland Montenegro Costa

Pancreatogastrostomy
Montenegro Technique

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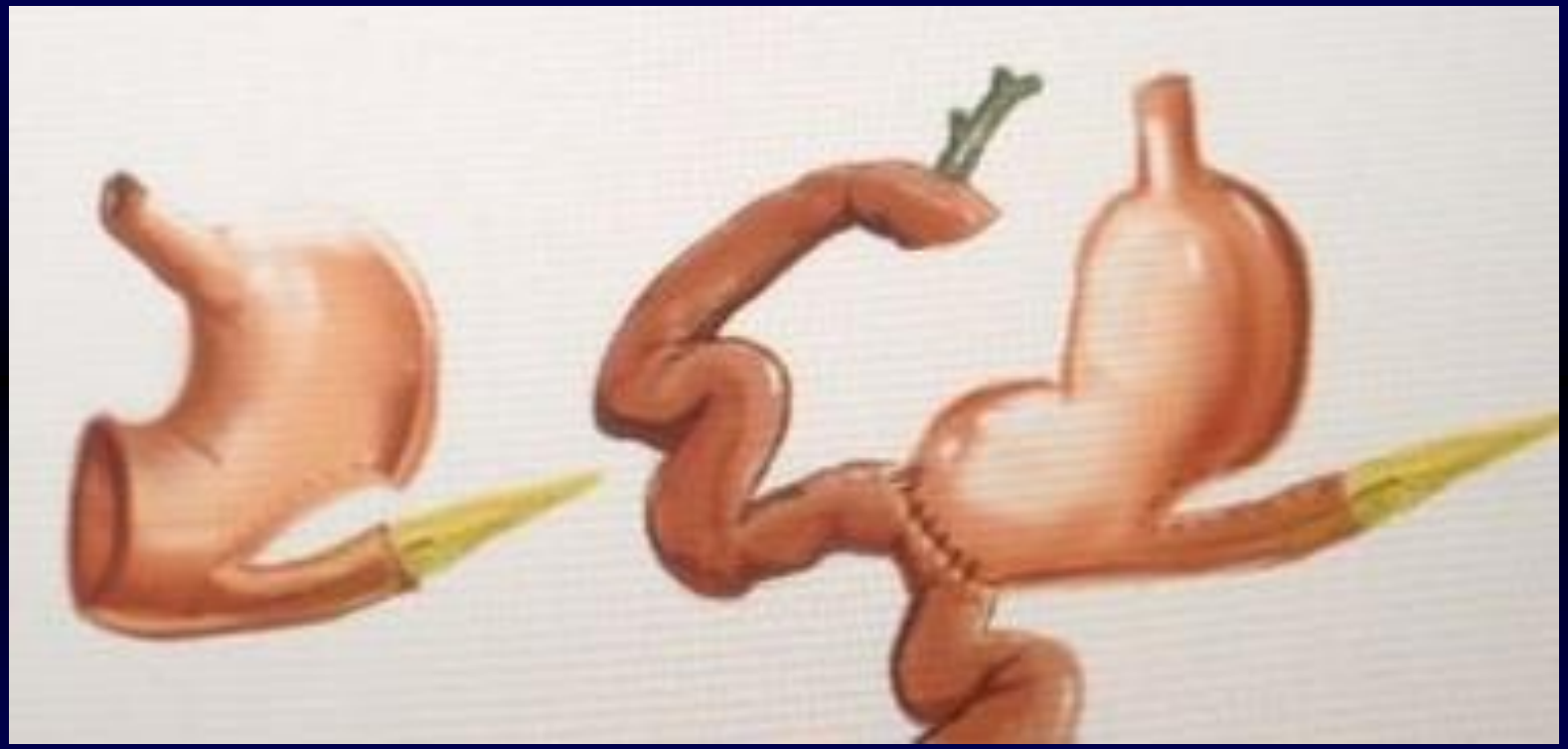
Pancreatogastrostomy
Montenegro Technique



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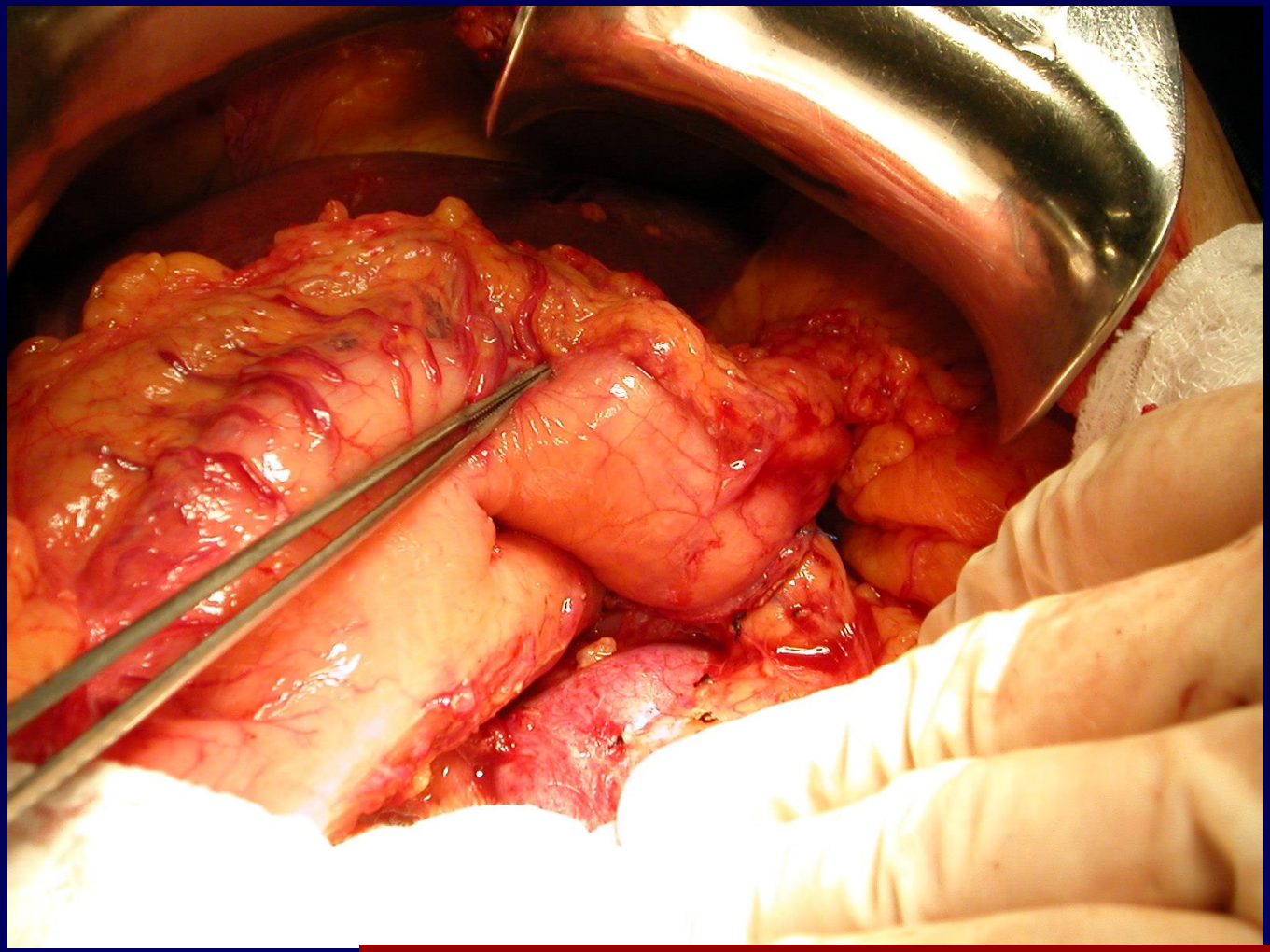
Pancreatogastrostomy
Montenegro Technique



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Pancreatogastrostomy
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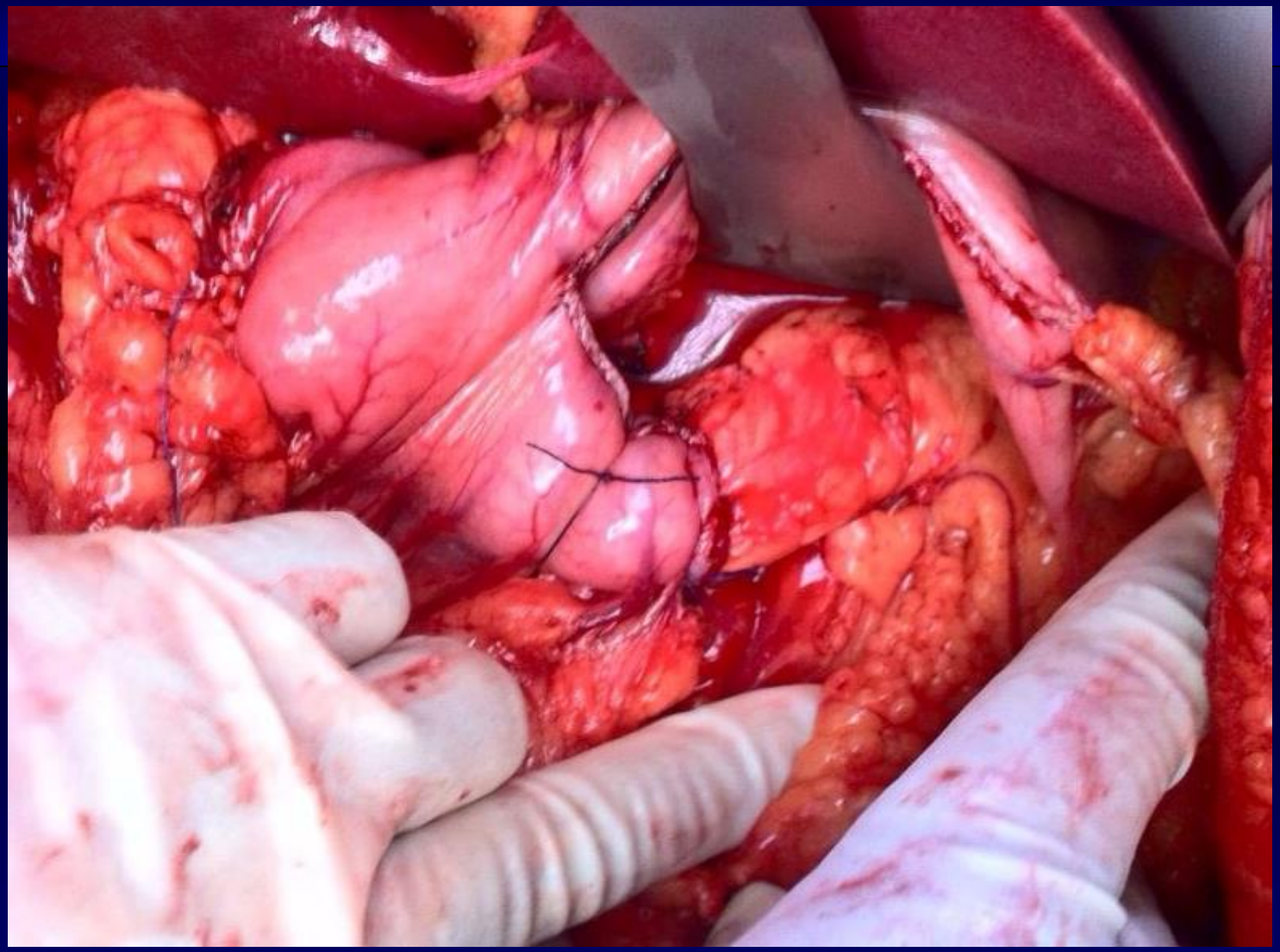
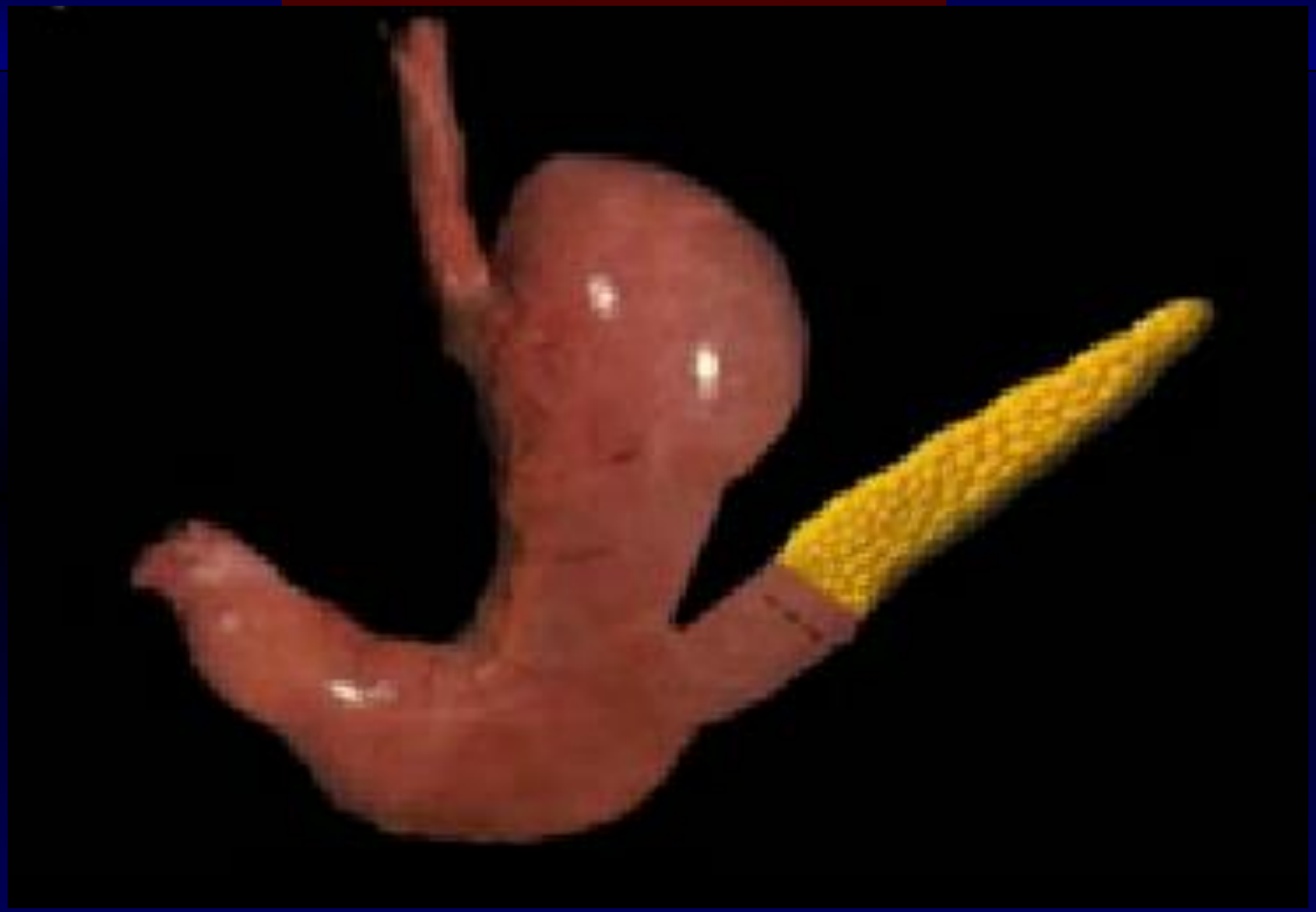


Courtesy from Roland Montenegro Costa

Pancreatogastrostomy
Montenegro Technique



Courtesy from Roland Montenegro Costa

PANCREATOGASTROSTOMY OR PANCREATOJEJUNOSTOMY?

Pancreatogastrostomy or pancreatojejunostomy?

Table 3. POSTOPERATIVE FACTORS AND COMPLICATIONS

	PG (n = 73)	PJ (n = 72)	p Value
Delayed gastric emptying*	16 (22)	16 (22)	NS
Wound infection	14 (19)	11 (15)	NS
Pancreatic fistula†	9 (12)	8 (11)	NS
Cholangitis	4 (5)	6 (8)	NS
Pneumonia	5 (7)	2 (3)	NS
Intra-abdominal abscess	4 (5)	2 (3)	NS
Cardiac arrhythmia	3 (4)	2 (3)	NS
Bile leak	1 (1)	3 (4)	NS
Urinary tract infection	2 (3)	1 (1)	NS
Postoperative pancreatitis	1 (1)	1 (1)	NS
Peptic ulcer	2 (3)	0 (0)	NS
Duodenojejunostomy leak	0 (0)	2 (3)	NS
No. of patients with above complications	36 (49)	31 (43)	NS
No. of patients commencing total parenteral nutrition postoperatively	21 (29)	31 (43)	NS
Total output from pancreatic drains (mL)	1224 ± 166	1200 ± 177	NS
Postoperative hospital stay (days)	17.1 ± 1.6	17.7 ± 1.5	NS

Yeo CJ, et al. Ann Surg 1995;222:580-592

Pancreatogastrostomy or pancreatojejunostomy?

TABLE 3. Specific Complications Observed in 151 Cases of Pancreaticoduodenectomy

	Group PG (n = 69)	Group PJ (n = 82)	*P*
Complicated patients	20 (29%)	32 (39%)	NS
Single complication	15 (75%)	10 (31%)	0.002
Multiple complications	5 (25%)	22 (68%)	
Pancreatic fistula	9 (13%)	13 (16%)	NS
Biliary fistula	0	7 (8.5%)	0.01
Enteric fistula	4 (6%)	7 (8.5%)	NS
Pancreatitis of the cuff	1 (1.5%)	4 (5%)	NS
Intra-abdominal fluid collection	7 (10%)	22 (27%)	0.01
Abdominal bleeding	3 (4%)	6 (7%)	NS
Delayed gastric empting	2 (3%)	10 (12%)	0.03
Reoperations	5 (7%)	5 (6%)	NS
Mortality	0	1 (1%)	NS

Bassi C, et al. Ann Surg 2005;242:767-73

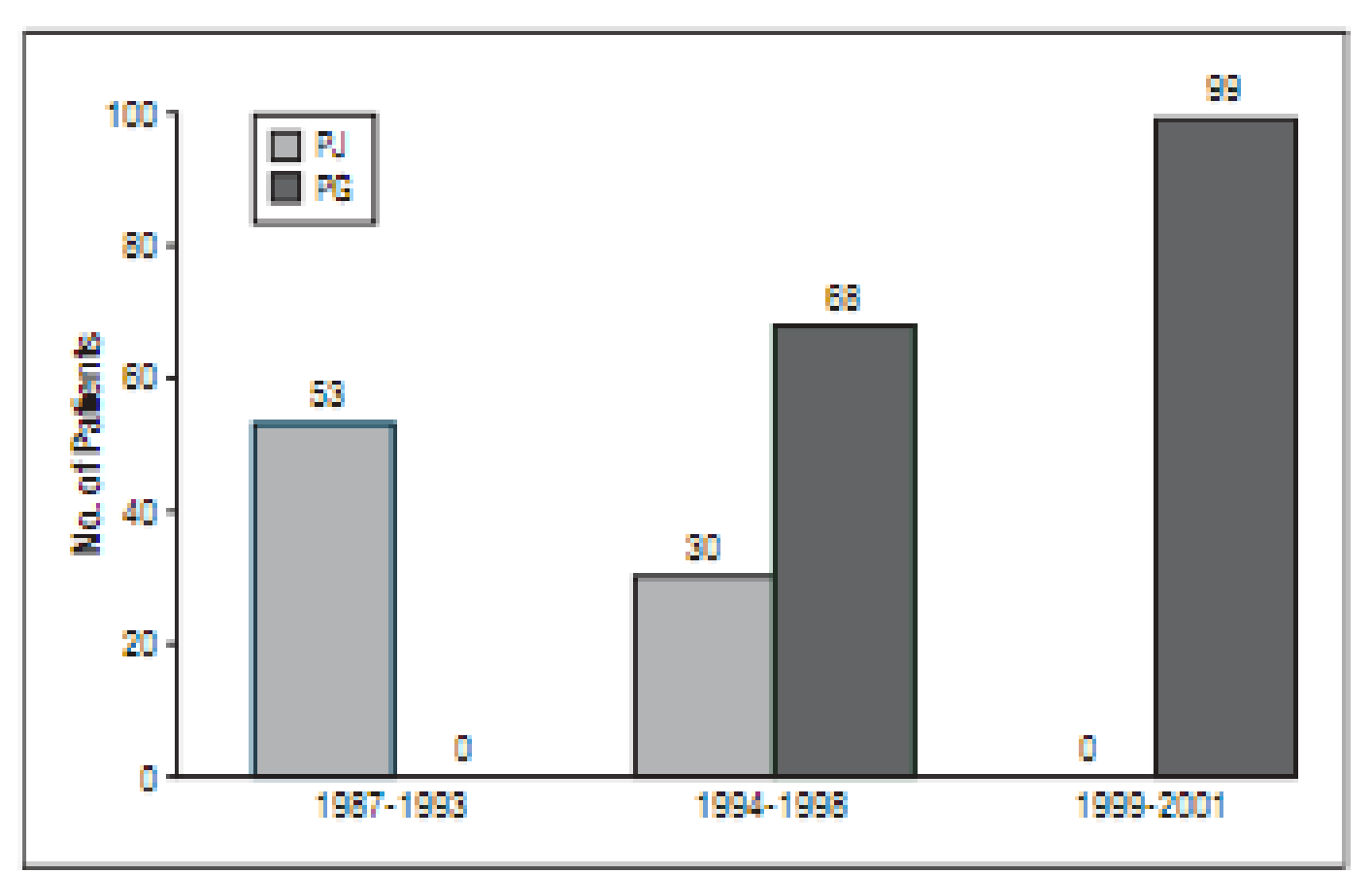
Pancreatogastrostomy or pancreatojejunostomy?

Table 3. Comparison of Postoperative Outcomes in Patients Undergoing Pancreaticogastrostomy (PG) and Pancreaticojejunostomy (PJ)*

Outcome	PG Group (n = 167)	PJ Group (n = 83)	*P* Value
Major complications			
Pancreatic fistula†	4 (2.3)	17 (20.4)	<.001
Delayed gastric emptying	6	6	.20
Postoperative erosive hemorrhage due to pancreaticfistula	0	3	.03
Postoperative hemorrhage from the operative field	1	1	.61
Gastrointestinal bleeding from pancreatic cut edge	3	1	.72
Other gastrointestinal bleeding	1	0	.47
Wound infection	5	2	.49
Sepsis	16	14	.09
Intra-abdominal collection	7	6	.30
Biliary leakage	1	2	.21
Leakage of gastrojejunostomy	0	2	.10
Obstruction of the hepaticojejunostomy	1	0	.47
Liver necrosis	1	0	.47
Portal vein thrombosis	1	0	.47

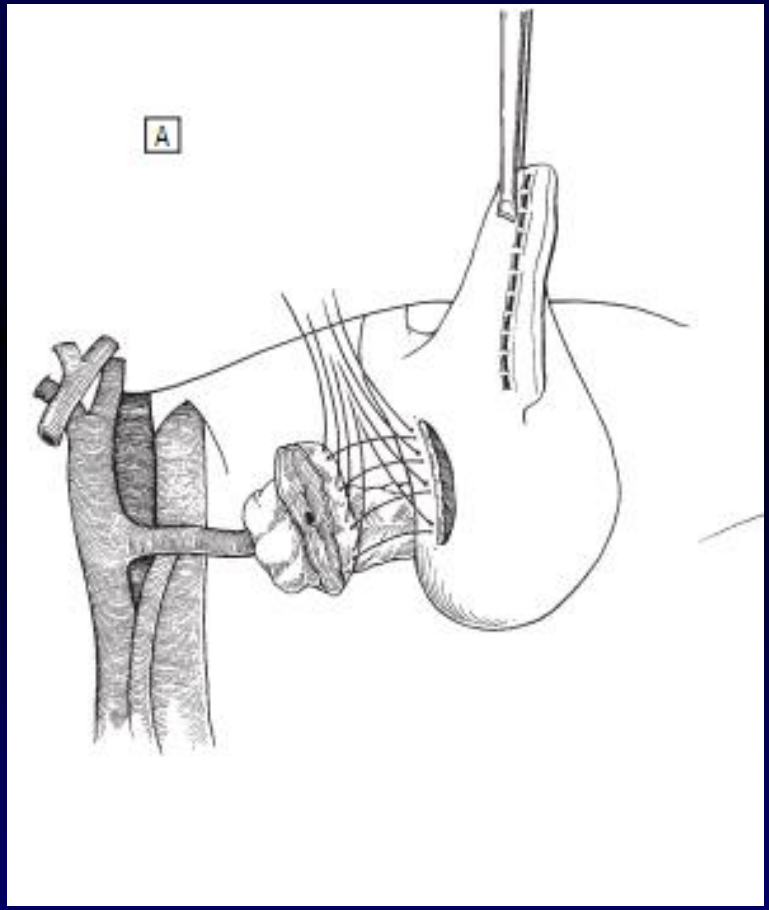
Oussoultzoglou E, et al. Arch Surg 2004; 139:327-35

Pancreatogastrostomy or pancreatojejunostomy?

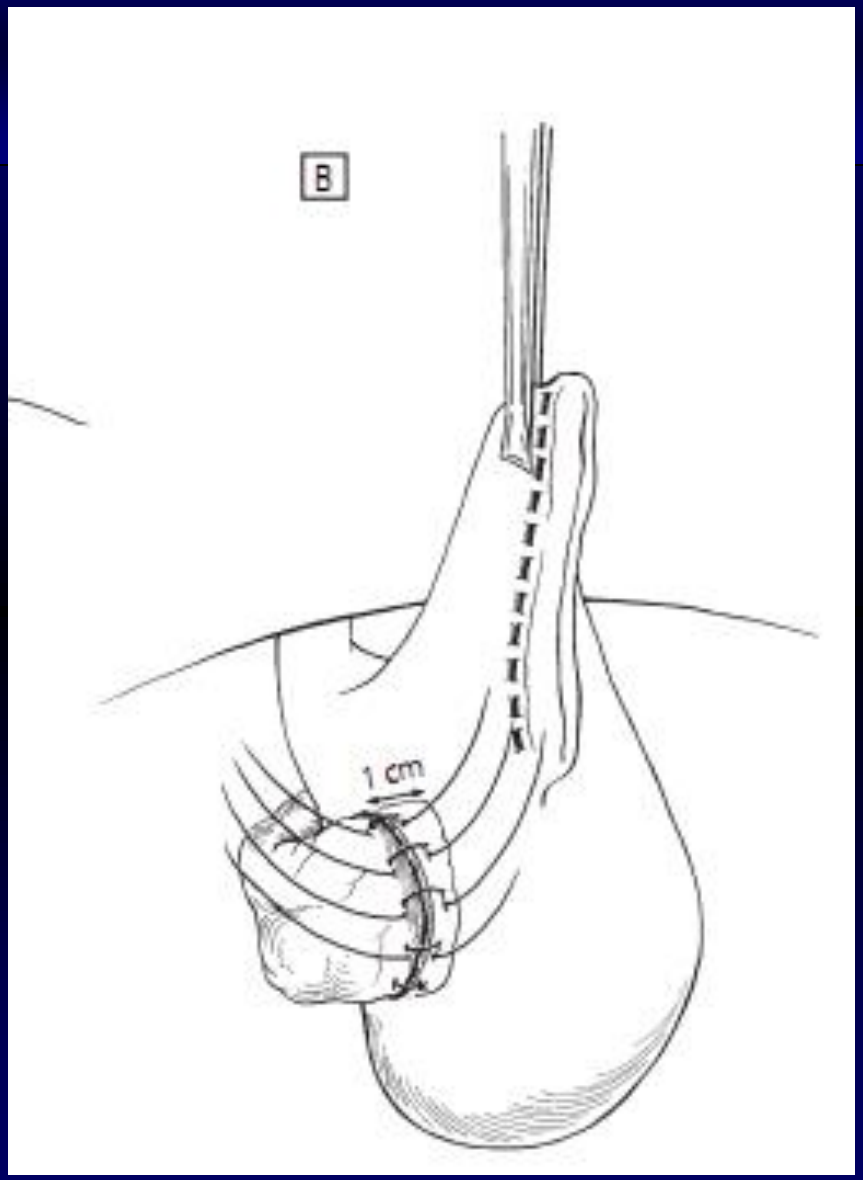


Oussoultzoglou E, et al. Arch Surg 2004; 139:327-35

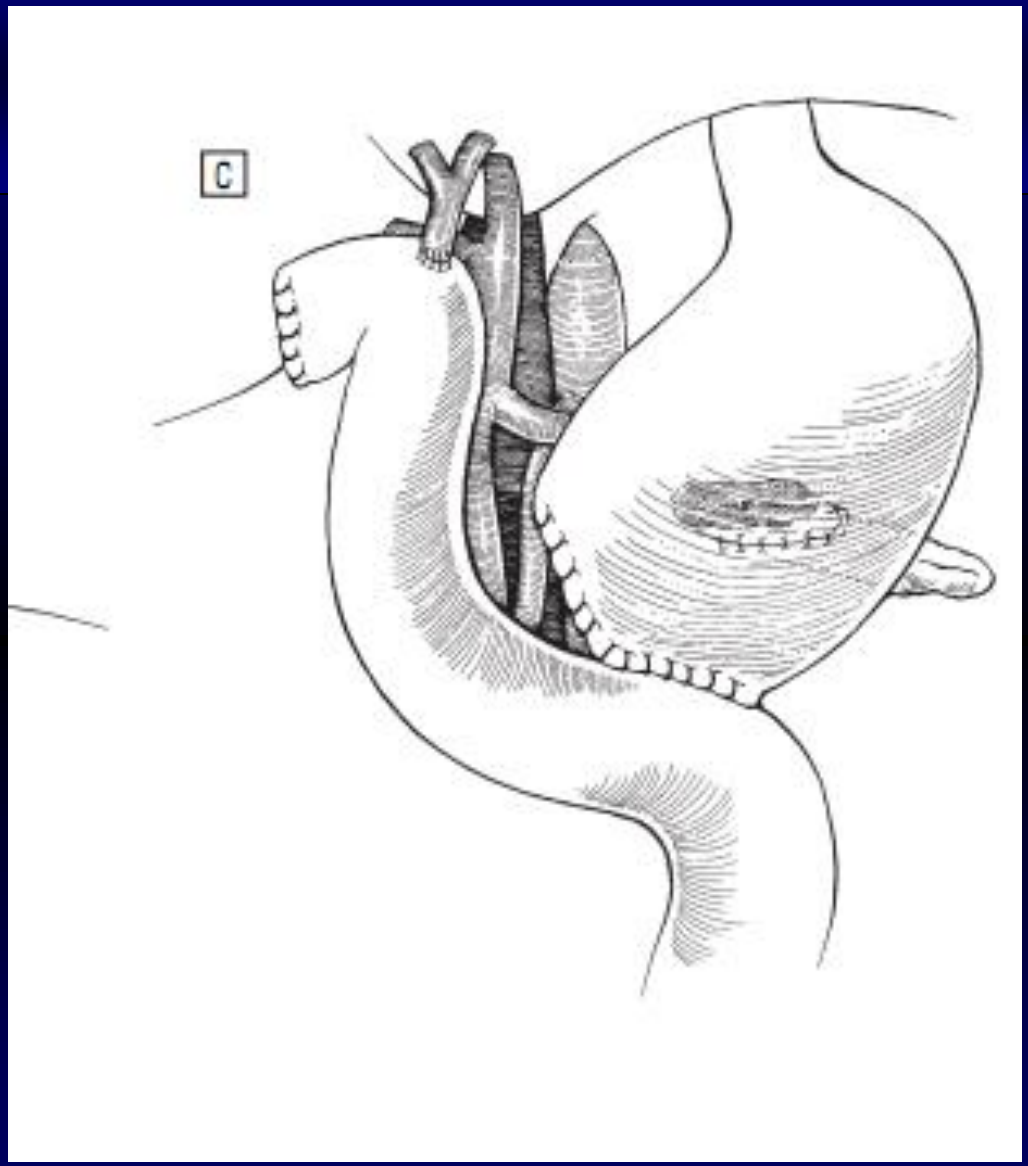
Critical Analysis of a Large Series of Pancreaticogastrostomy After Pancreaticoduodenectomy



Aranha GV, et al. Arch Surg 2006;141:574-80



Aranha GV, et al. Arch Surg 2006;141:574-80



Aranha GV, et al. Arch Surg 2006;141:574-80

Table 3. Postoperative Complications

Complication	Patients, No. (%)
Mortality	2 (0.9)
Pancreatic leak	32 (13.6)
Intra-abdominal abscess	14 (6)
Delayed gastric emptying	14 (6)
Wound infection	13 (5.5)
Cardiac complications	8 (3.4)
Small intestinal obstruction	5 (2.1)
Pulmonary complications	5 (2.1)
Hemorrhage	4 (1.7)
Gastric leak	3 (1.3)
Bile leak	2 (0.9)
Reexploration	3 (1.3)
Miscellaneous	18 (7.7)

Aranha GV, et al. Arch Surg 2006;141:574-80

DOI:10.1111/hpb.12299 HPB

REVIEW ARTICLE

The impact of pancreaticojejunostomy versus pancreaticogastrostomy reconstruction on pancreatic fistula after pancreaticoduodenectomy: meta-analysis of randomized controlled trials

Julie Hallet[1,2], Francis S. W. Zih[1], Raymond G. Deobald[1,2], Adena S. Scheer[1,2], Calvin H. L. Law[1,2], Natalie G. Coburn[1,2] & Paul J. Karanicolas[1,2]

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DOI:10.1111/hpb.12279 HPB

REVIEW ARTICLE

Pancreaticogastrostomy is associated with significantly less pancreatic fistula than pancreaticojejunostomy reconstruction after pancreaticoduodenectomy: a meta-analysis of seven randomized controlled trials

Fu-Bao Liu[1*], Jiang-Ming Chen[2*], Wei Geng[1], Sheng-Xue Xie[2], Yi-Jun Zhao[1], Li-Quan Yu[2] & Xiao-Ping Geng[2]

[1]Department of Surgery, First Affiliated Hospital of Anhui Medical University, Hefei, China and [2]Department of Surgery, Second Affiliated Hospital of Anhui Medical University, Hefei, China

Hallet J, et al. HPB 2015;17:113-22
Liu FB, et al. HPB 2015;17:123-30

Study or Subgroup	PG Events	PG Total	PJ Events	PJ Total	Weight	Risk Ratio IV, Fixed, 95% CI	Year
Fernández-Cruz *et al.* (2008)[31]	2	53	10	55	8.0%	0.21 [0.05, 0.90]	2008
Wellner *et al.* (2012)[32]	6	59	7	57	16.5%	0.83 [0.30, 2.31]	2012
Figueras *et al.* (2013)[15]	7	65	19	58	27.8%	0.33 [0.15, 0.73]	2013
Topal *et al.* (2013)[9]	13	162	33	167	47.7%	0.41 [0.22, 0.74]	2013
Total (95% CI)		**339**		**337**	**100.0%**	**0.41 [0.27, 0.62]**	
Total events	28		69				

Heterogeneity: $\chi^2 = 2.92$, d.f. = 3 ($P = 0.40$); $I^2 = 0\%$

Test for overall effect: $Z = 4.21$ ($P < 0.0001$)

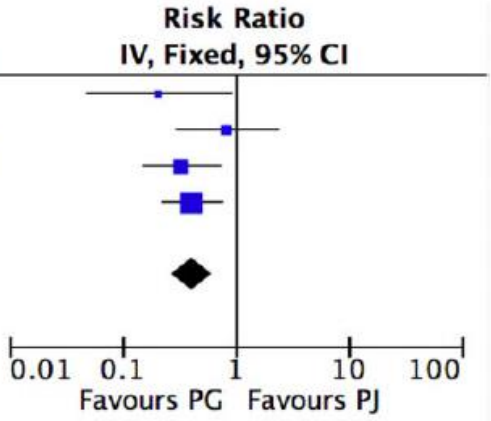


Figure 2 Comparison of the occurrence of pancreatic fistula after pancreaticogastrostomy (PG) with that after pancreaticojejunostomy (PJ). IV, inverse variance; 95% CI, 95% confidence interval

Hallet J, et al. HPB 2015;17:113-22

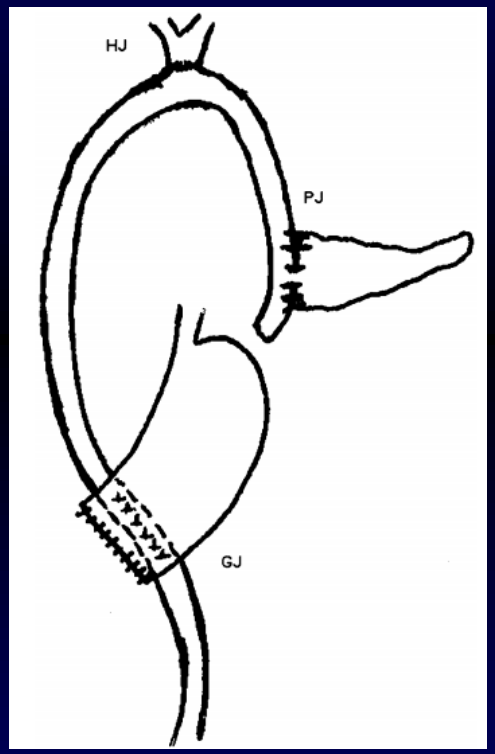
Conclusions

This study observed that PG is associated with a lower risk for PF compared with PJ. This benefit appeared to be greater in high-risk patients. Surgeons should consider reconstructing the pancreatic remnant following PD with PG, particularly in patients at high risk for PF.

PANCREATOGASTROSTOMY

Hallet J, et al. HPB 2015;17:113-22

Classic or Isolated Roux loop?



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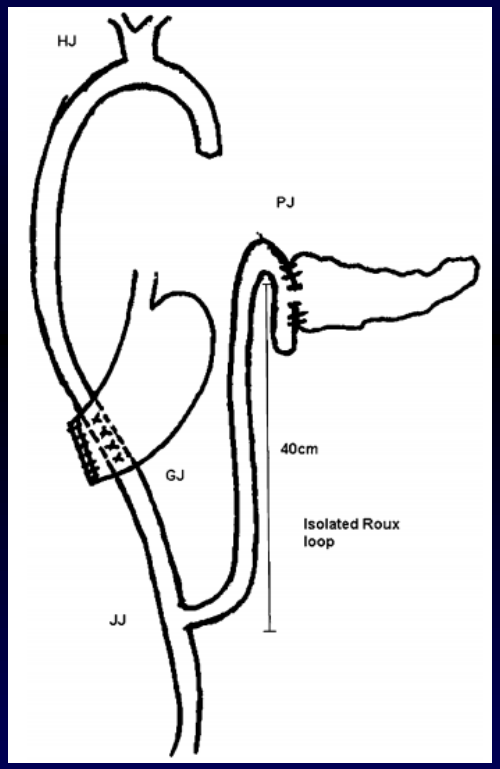

Perwaiz A, et al. HPB 2009; 11:326-331

Classic or Isolated Roux loop?

Table 2 Comparison of clinical outcomes between the two groups (n = 108)

Outcome	Total (n = 108)	Group 1 (IPJ) n = 53	Group 2 (CPJ) n = 55	P-value (group 1 vs. group 2)
Overall complications	32 (29.6%)	17 (32%)	15 (27.3%)	0.674
Nature of complications				
Pancreatic fistula	11 (10.1%)	5 (9.4%)	6 (10.9%)	0.800
DGE	9 (8.3%)	5 (9.4%)	4 (7.2%)	0.739
Wound infection	8 (7.4%)	5 (9.4%)	3 (5.4%)	0.484
Bleeding	4 (3.7%)	2 (3.7%)	2 (3.6%)	1.000
Operative mortality	4 (3.7%)	2 (3.7%)	2 (3.6%)	1.000
Mean duration of surgery, min (95% CI, OR)		442 (300–510) ± 32.0	370 (240–500) ± 38.5	0.005
Mean hospital stay, days (95% CI, OR)		10.1 (5–27) ± 3.7	9.5 (4–26) ± 5.0	0.483

Perwaiz A, et al. HPB 2009; 11:326-331

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Isolated roux loop pancreaticojejunostomy vs single loop pancreaticojejunostomy after pancreaticoduodenectomy

Lileswar Kaman*, Sudip Sanyal, Arunanshu Behera, Rajinder Singh, Rabindra Nath Katariya

Department of General Surgery, Post Graduate Institute of Medical Education and Research, Chandigarh 160012, India

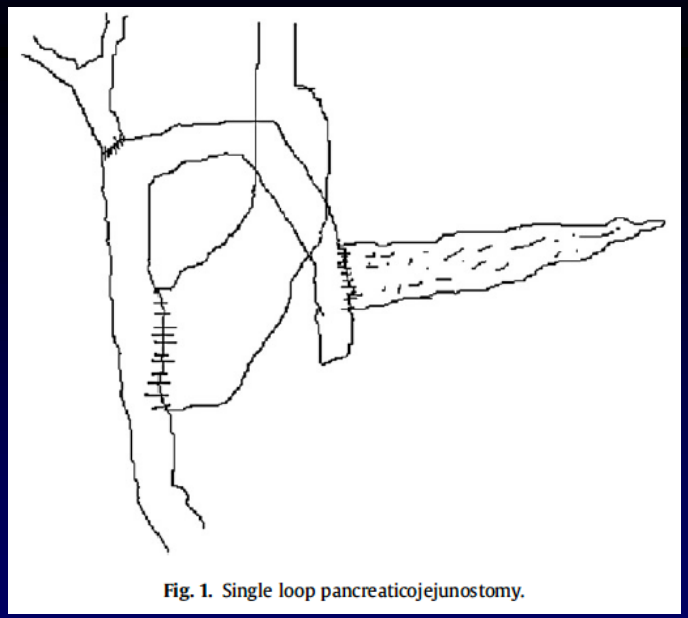

Fig. 1. Single loop pancreaticojejunostomy.

X

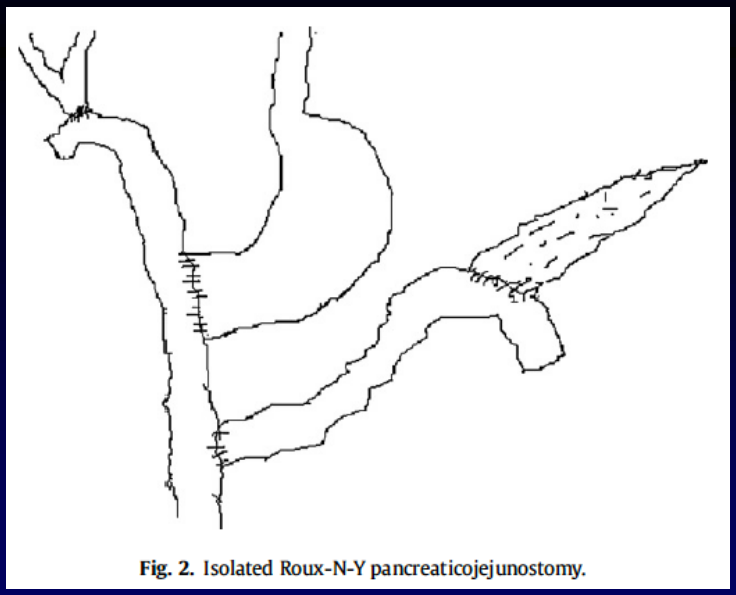

Fig. 2. Isolated Roux-N-Y pancreaticojejunostomy.

Kaman L, et al. Int J Surg 2008; 6:306-310

CONCLUSION

Our study has not found any significant difference in the incidence of pancreatic fistula following either method of reconstruction,

NO DIFFERENCE

Kaman L, et al. Int J Surg 2008; 6:306-310

DOI:10.1111/hpb.12472 HPB

REVIEW ARTICLE

Systematic review on the use of matrix-bound sealants in pancreatic resection

F. Jasmijn Smits[1], Hjalmar C. van Santvoort[1,2], Marc G. H. Besselink[2], Inne H. M. Borel Rinkes[1] & I. Quintus Molenaar[1]

[1]Department of Surgery, University Medical Center Utrecht, Utrecht, The Netherlands, and [2]Department of Surgery, Academic Medical Center, Amsterdam, The Netherlands

Abstract

Background: Pancreatic fistula is a potentially life-threatening complication after a pancreatic resection. The aim of this systematic review was to evaluate the role of matrix-bound sealants after a pancreatic resection in terms of preventing or ameliorating the course of a post-operative pancreatic fistula.

Methods: A systematic search was performed in the literature from May 2005 to April 2015. Included were clinical studies using matrix-bound sealants after a pancreatic resection, reporting a post-operative pancreatic fistula (POPF) according to the International Study Group on Pancreatic Fistula classifi-

Smits FJ, et al. HPB 2015; 17:1033-9

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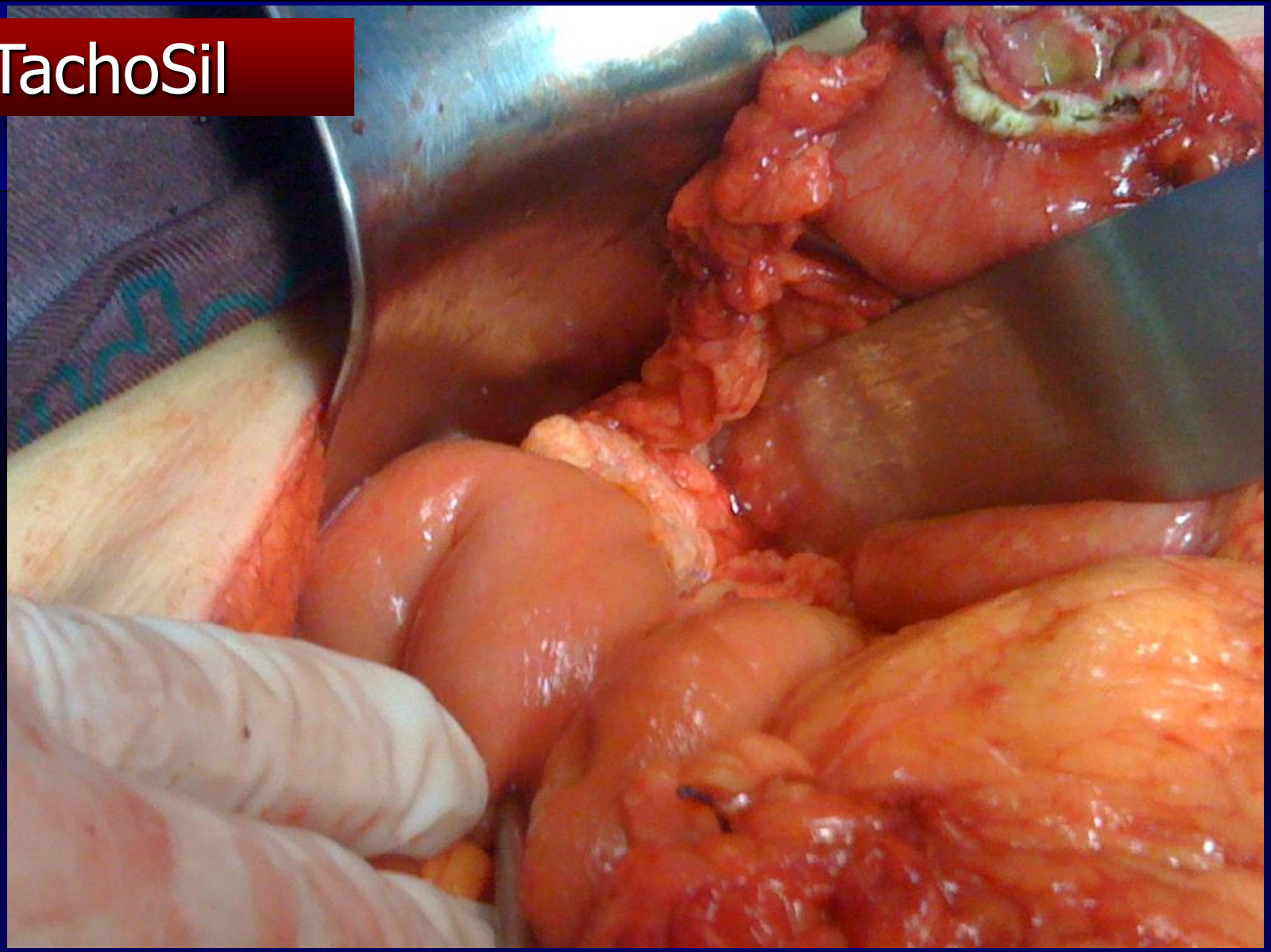

CONCLUSION

In conclusion, the present literature does not support the routine use of sealants after a pancreatic resection because there was no effect on a clinically relevant fistula. Larger well-

NO DIFFERENCE

Smits FJ, et al. HPB 2015; 17:1033-9

DOI:10.1111/hpb.12314 HPB

ORIGINAL ARTICLE

Prophylactic octreotide for pancreatoduodenectomy: more harm than good?

Matthew T. McMillan[1], John D. Christein[2], Mark P. Callery[3], Stephen W. Behrman[4], Jeffrey A. Drebin[1], Tara S. Kent[3], Benjamin C. Miller[1], Russell S. Lewis Jr[1] & Charles M. Vollmer Jr[1]

[1]Departments of Surgery, University of Pennsylvania Perelman School of Medicine, Philadelphia, PA, [2]Departments of Surgery, University of Alabama at Birmingham, Birmingham, AL, [3]Departments of Surgery, Beth Israel Deaconess Medical Center, Harvard Medical School, Boston, MA, and [4]Departments of Surgery, University of Tennessee Health Sciences Center, Memphis, TN, USA

Abstract

Background: Most accrued evidence regarding prophylactic octreotide for a pancreatoduodenectomy (PD) predates the advent of the International Study Group of Pancreatic Fistula (ISGPF) classification system for a post-operative pancreatic fistula (POPF), and its efficacy in the setting of high POPF risk is unknown. The Fistula Risk Score (FRS) predicts the risk and impact of a clinically relevant (CR)-POPF and can be useful in assessing the impact of octreotide in scenarios of risk.

McMillan MT, et al. HPB 2014; 16:954-62

Conclusion

In this assessment of octreotide for a PD, the largest to date, it appears that when looking through the prism of risk adjustment, not only is octreotide ineffective at mitigating a CR-POPF, it might actually potentiate risk. To conclude, these data suggest that octreotide should not be used as a fistula mitigation strategy.

Modified Shrikhande technique for pancreatic anastomosis

Orlando Jorge M TORRES[1], Roberto C N da Cunha COSTA[1], Felipe F Macatrão COSTA[1], Romerito Fonseca Neiva[1], Tarik Soares SULEIMAN[1], Yglésio L Moyses S Souza[1]

[1]Department of Gastrointestinal Surgery, Hepatopancreatobiliary Unit. Federal University of Maranhão, São Luiz, MA, Brazil; [2]

HEADINGS: pancreatoduodenectomy; pancreatic anastomosis; surgical technique

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Correspondence to:

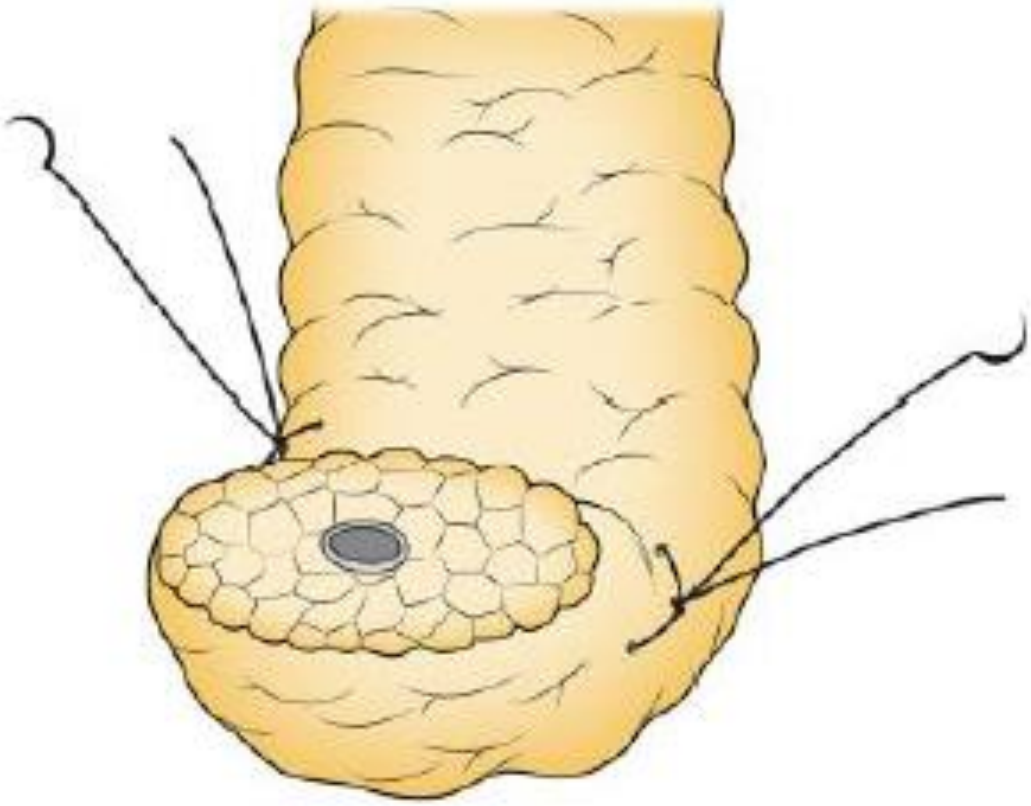

Figure 1

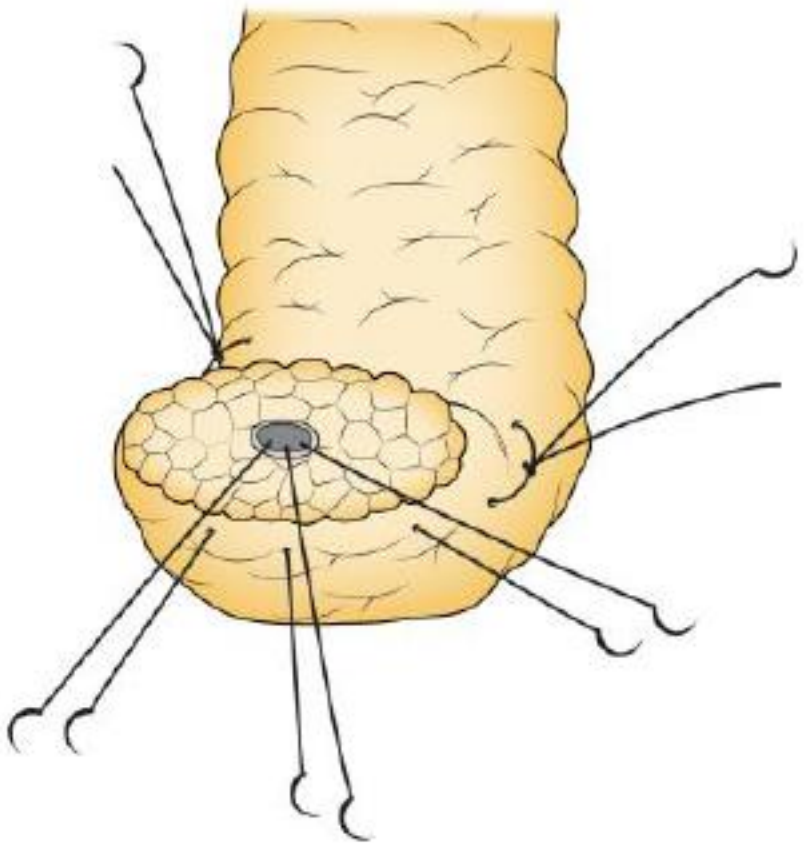

Figure 2

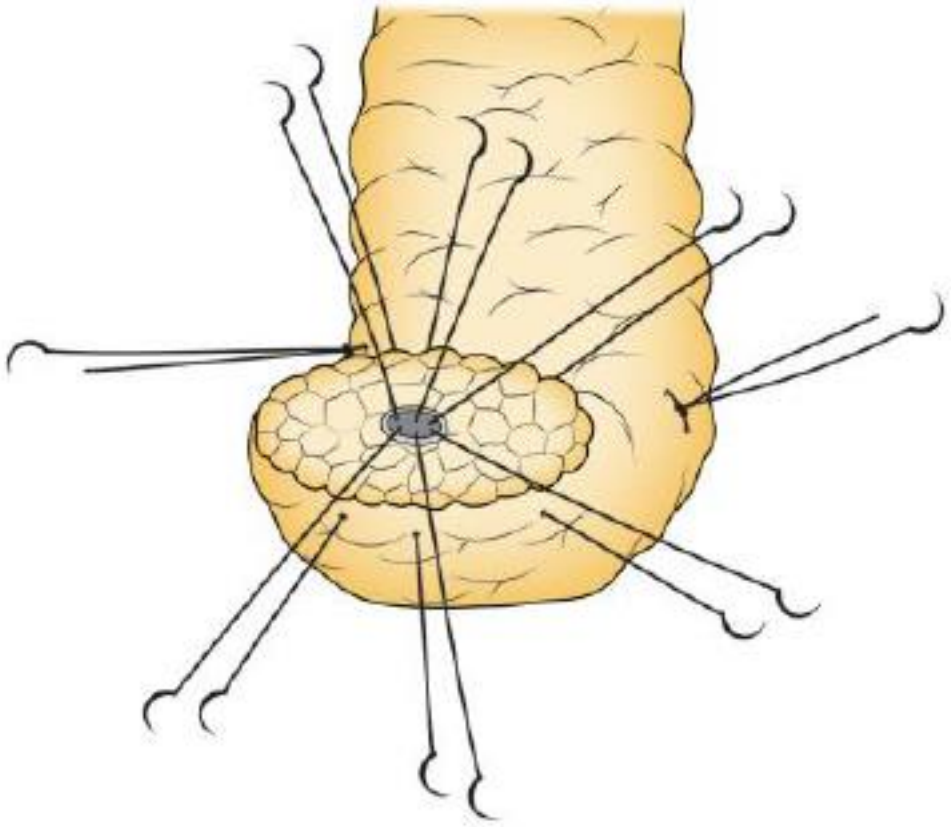

Figure 3

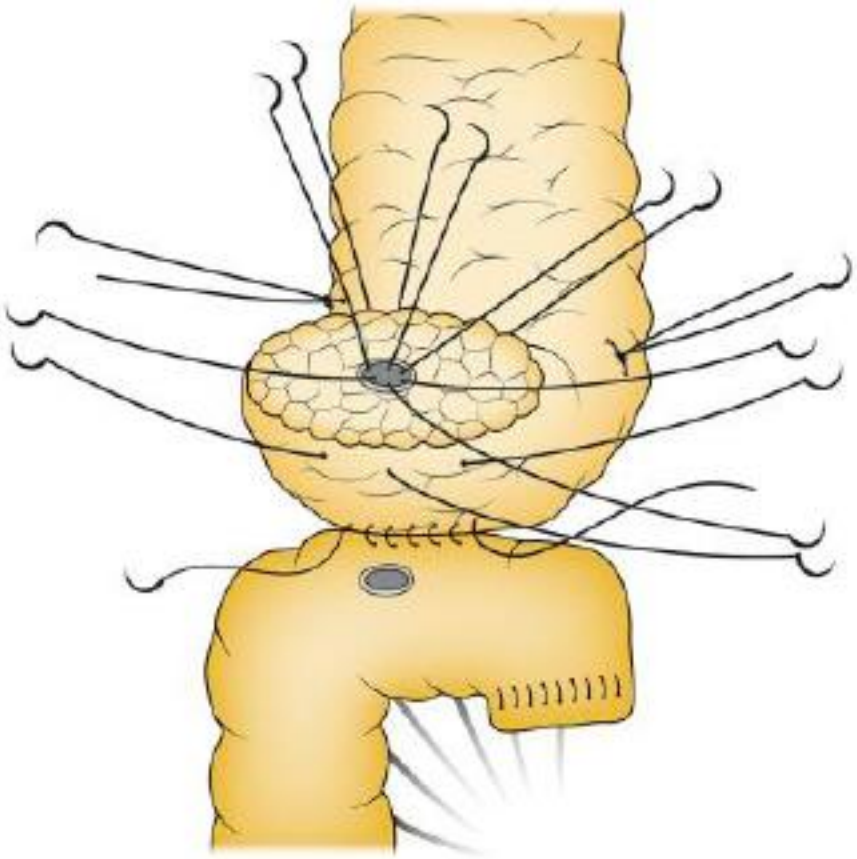

Figure 4

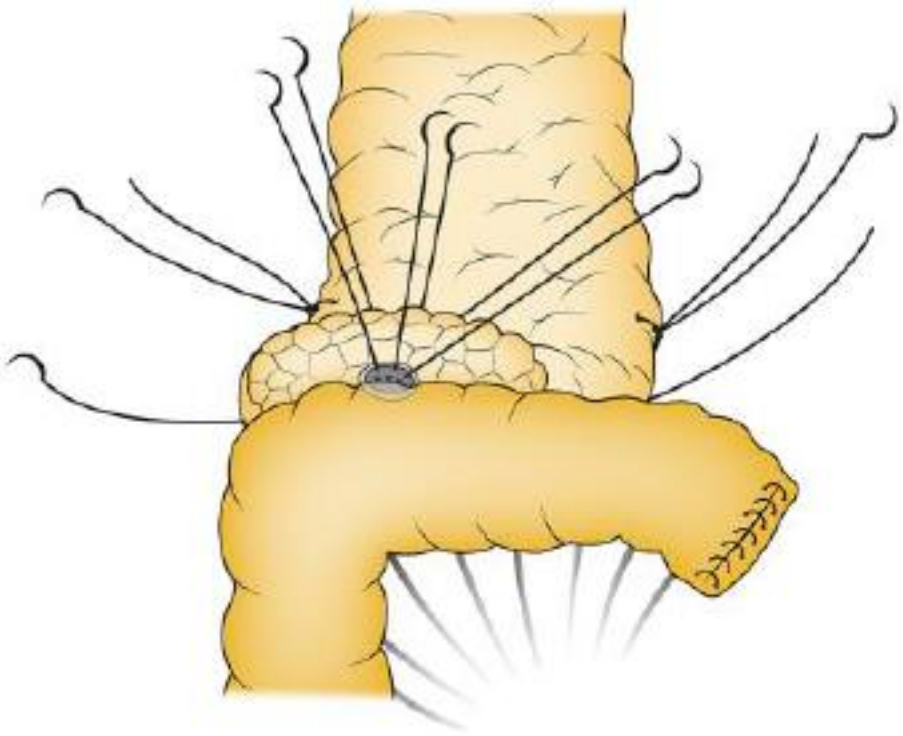

Figure 5

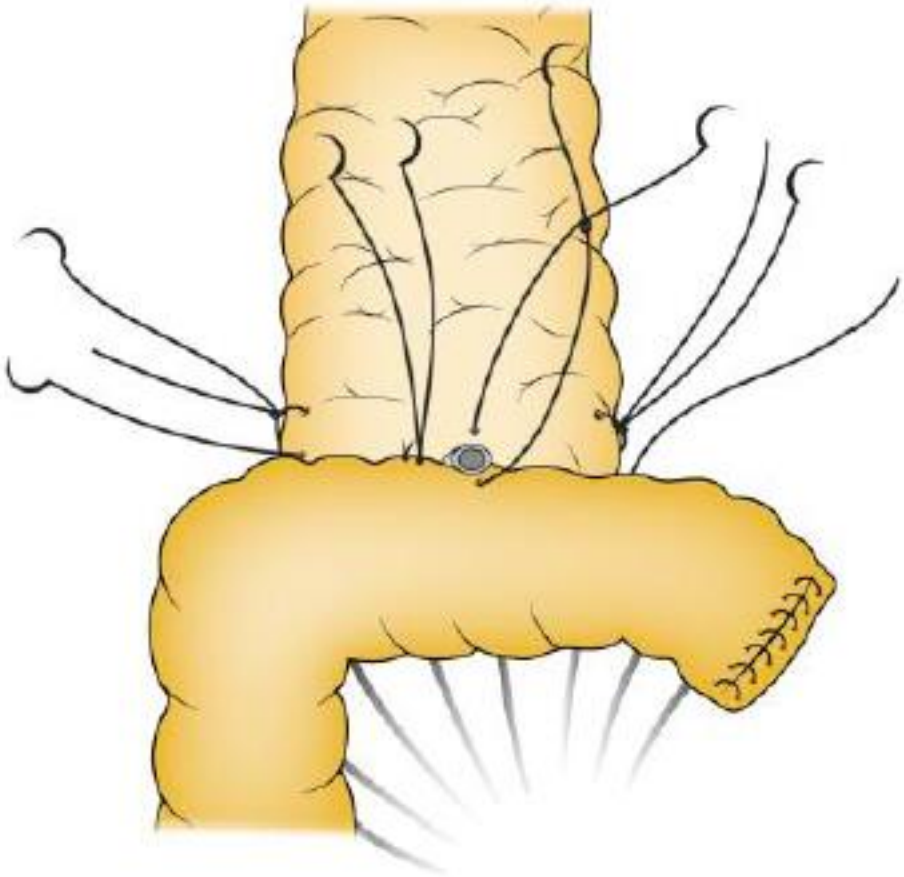

Figure 6

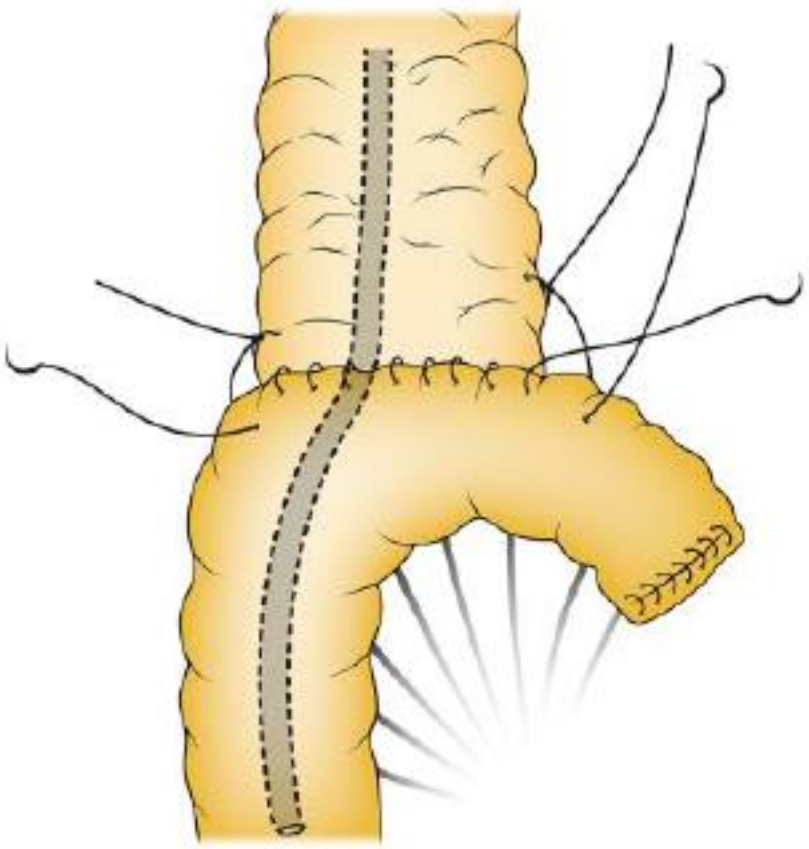

Figure 7

Table 1- Characteristics of the patients

Characteristics	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Age	61	47	28	40	70	20	59	60	70	60	56	36	76	38	70	64	52
Sex	M	M	F	F	M	M	F	F	F	F	F	F	F	F	F	F	F
Diagnosis	AV	AD	FT	AD	AD	NE	AD	IP	AD	AD	AD	AV	NE	AD	CC	AD	NE
Pancreas text	S	F	S	F	F	S	F	F	F	F	F	S	S	F	F	F	S
Duct size (mm)	≤3	≤3	≤3	>3	>3	≤3	>3	>3	≤3	≤3	>3	≤3	>3	>3	>3	>3	≤3
Op. time (min)	315	484	310	499	393	590	485	343	395	400	355	406	475	340	380	350	365
Transfusion	Y	N	Y	Y	N	N	N	N	Y	Y	N	N	Y	N	N	N	N
UCI time (d)	19	2	8	4	3	4	6	4	4	5	5	4	10	4	5	2	3
Fistula grade	A	-	A	-	-	A	A	-	-	-	-	-	-	-	-	-	-
LoS (d)	37	10	13	11	9	13	12	8	16	12	19	14	20	13	14	7	8
Mortality	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N

Op: operative; ICU: Intensive Care Unit; LoS: length of stay; AD: adenocarcinoma; PA: ampulla of Vater tumor; CC: distal cholangiocarcinoma; FT: Frantz tumor; NE: neuroendocrine tumor; IP: IPMN; text: texture; S: soft; F: firm; Y: yes; N: no; d (days).

RESULTS

In the period from July 2016 to June 2017, a total of 17 patients underwent pancreatoduodenectomy with this technique. The characteristics of the patients are presented in Table 1. There were 13 women patients (76.5%), and the median patient age was 54.1 years (range, 20-76 years). Ductal adenocarcinoma was observed in nine patients (52.9%); soft texture of the pancreas was present in six patients (35.2%); and duct size larger than 3 mm was found in nine patients (52.9%). Increased amylase in abdominal drainage (biochemical leak) was identified in four patients (23.5%), and resolved spontaneously within a week. Grade B or C fistula was not observed. No mortality occurred in this series.

Thank you for your attention!

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