"Overview of pancreatic diseases and surgical management"

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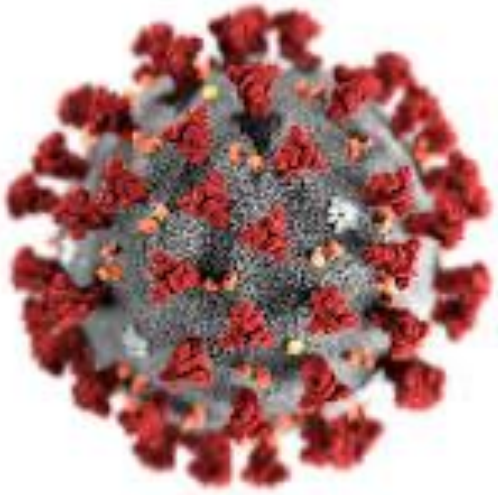
“Declaration”

No disclosures

Disclaimer



Pancreas


WHY SO SERIOUS?

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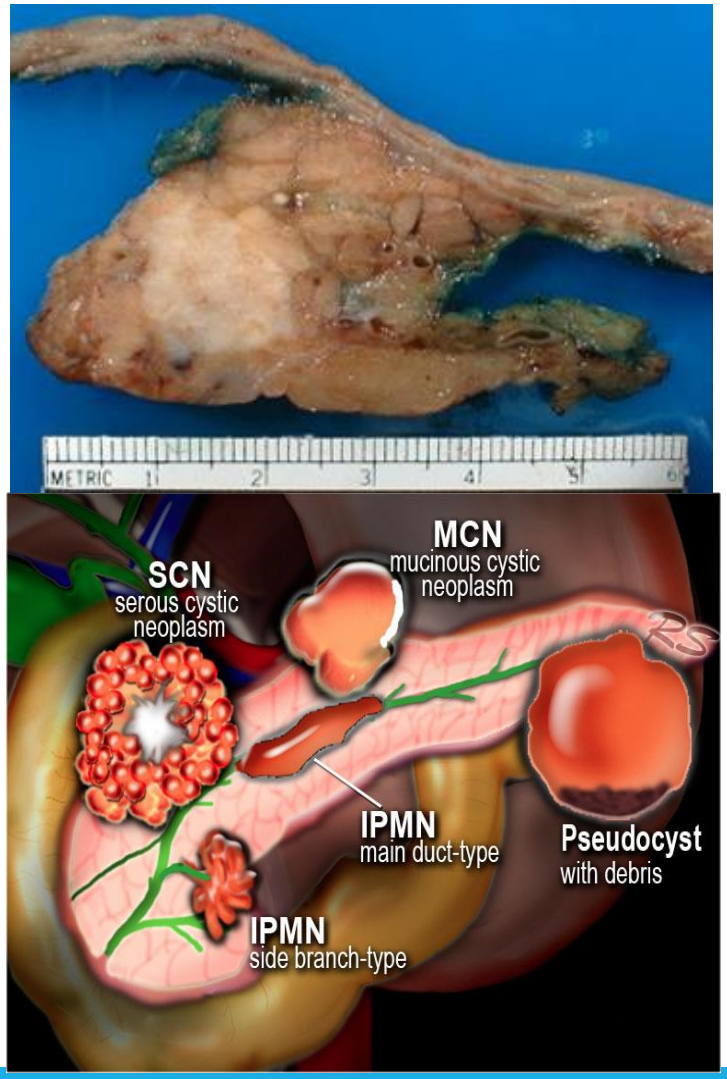

METRIC
SCN
serous cystic neoplasm
MCN
mucinous cystic neoplasm
IPMN
main duct-type
Pseudocyst
with debris
IPMN
side branch-type

Objectives

Understanding of the Surgical Anatomy

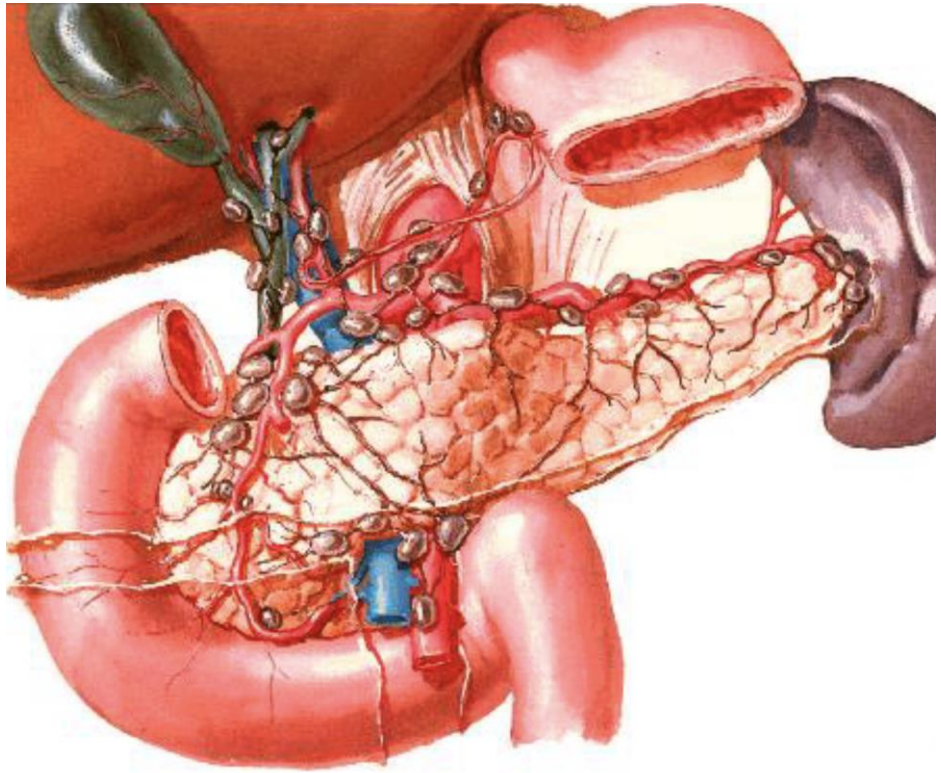
Highlight pancreatic disease - Acute Pancreatitis / Chronic Pancreatitis / Pancreatic Cancer

Surgery of the Pancreas

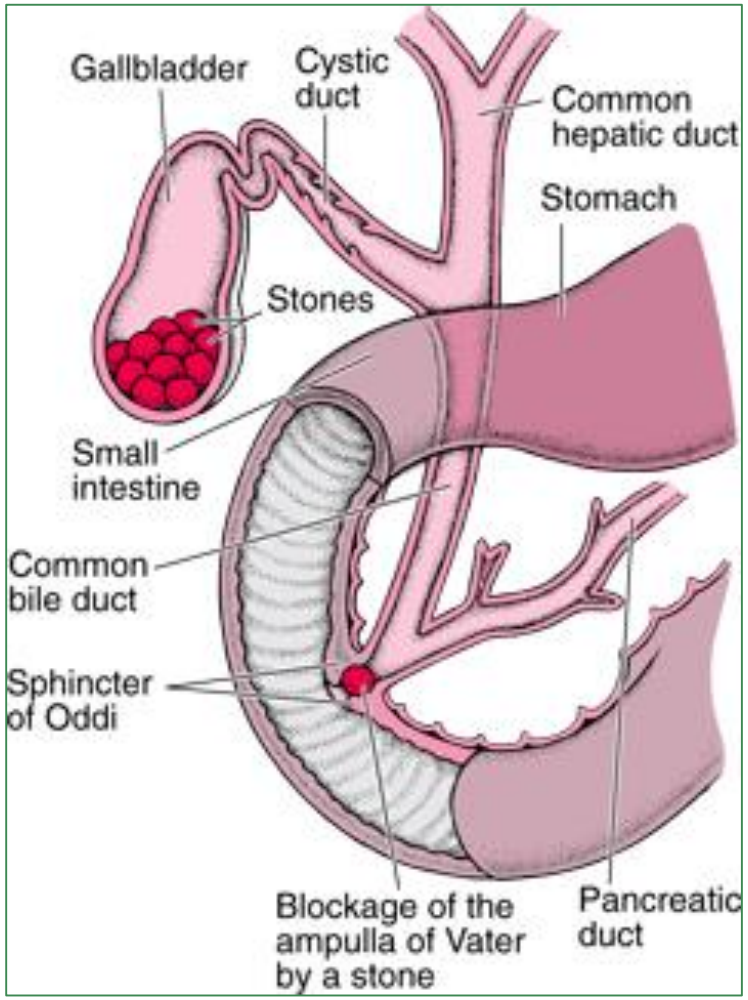
Complications of such surgery

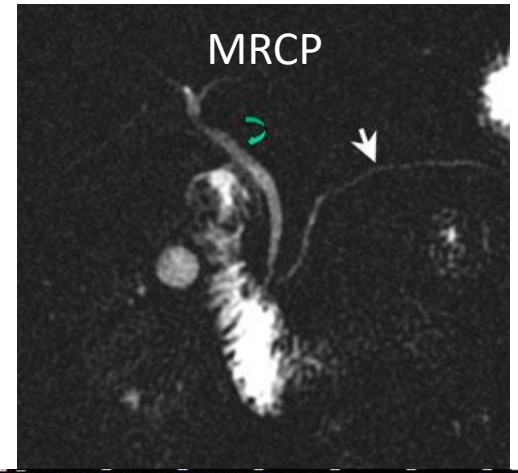
Take Home Message!

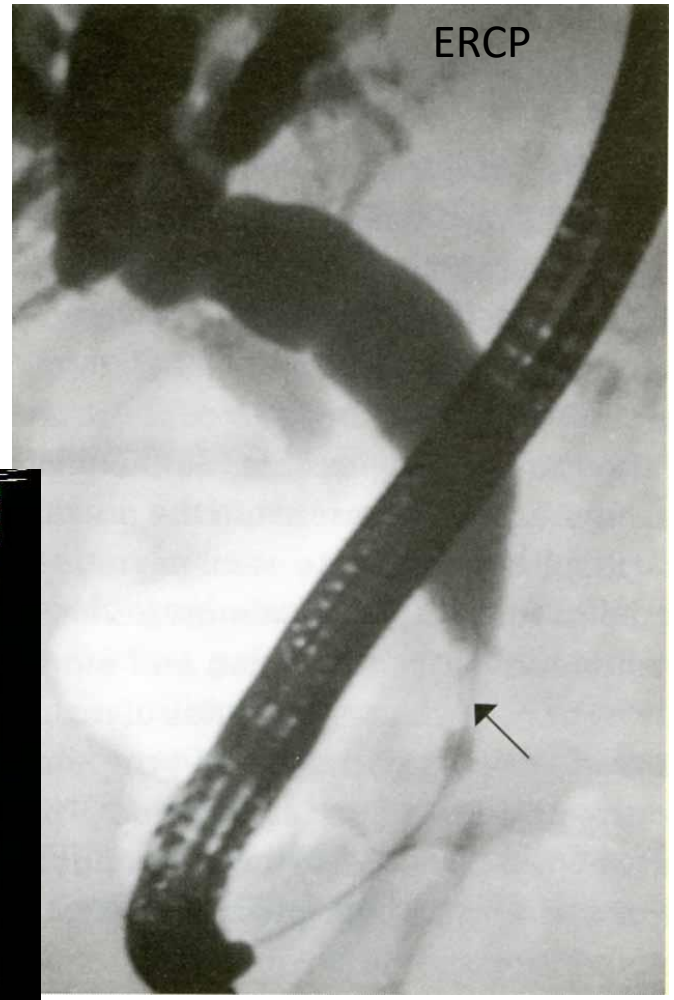
Understanding of the Surgical Anatomy



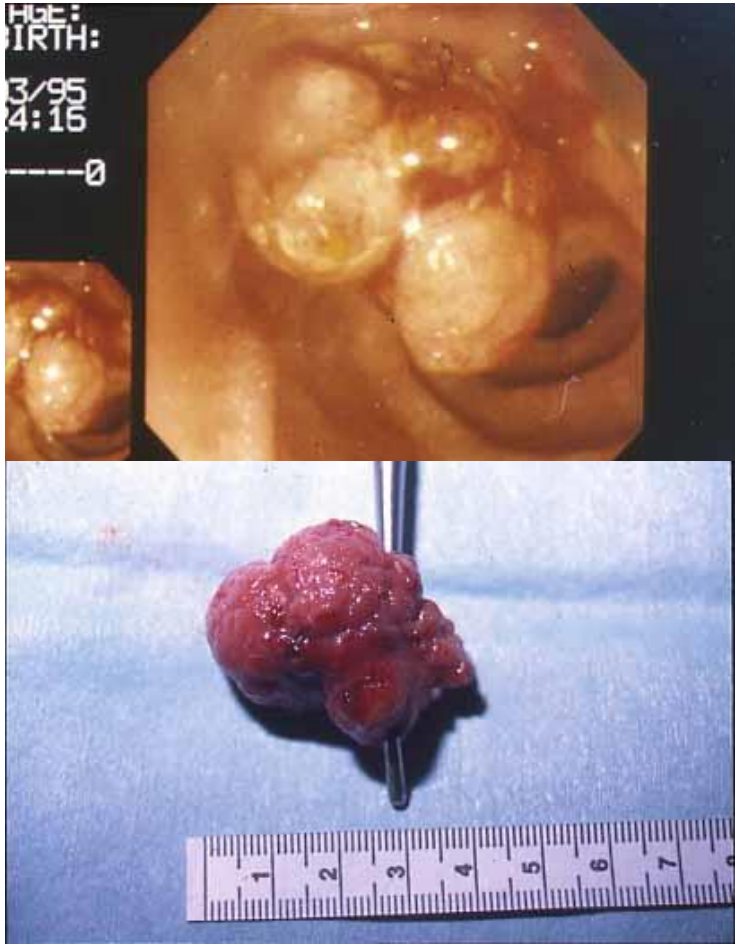
Understanding of the Surgical Anatomy

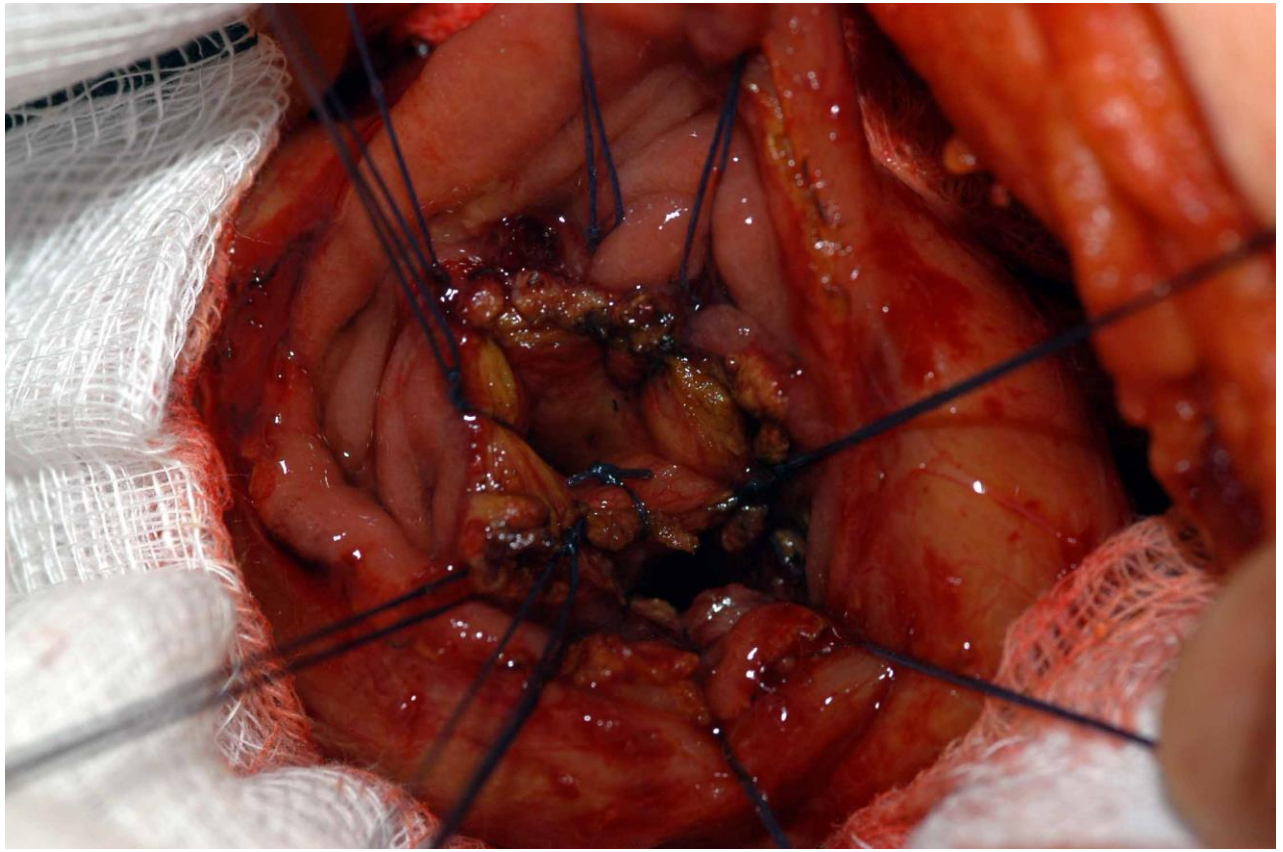






Understanding of the Surgical Anatomy: Ampulla

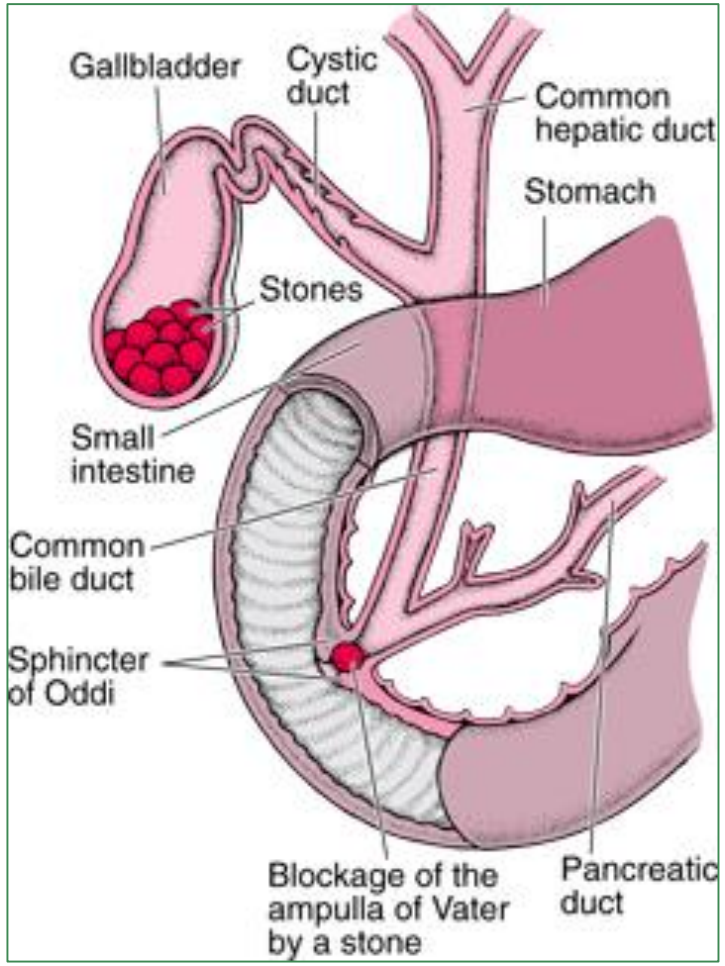




Highlight pancreatic disease: Gallstone Acute pancreatitis

- Increasing prevalence with age
- 12% men and 24% woman
- 10 – 30% become symptomatic
- Risk factors for mixed / cholesterol calculi
    - Family history
    - Obesity
    - Diabetes
    - Ileal resection
    - Sudden weight loss

Gallstone Journey



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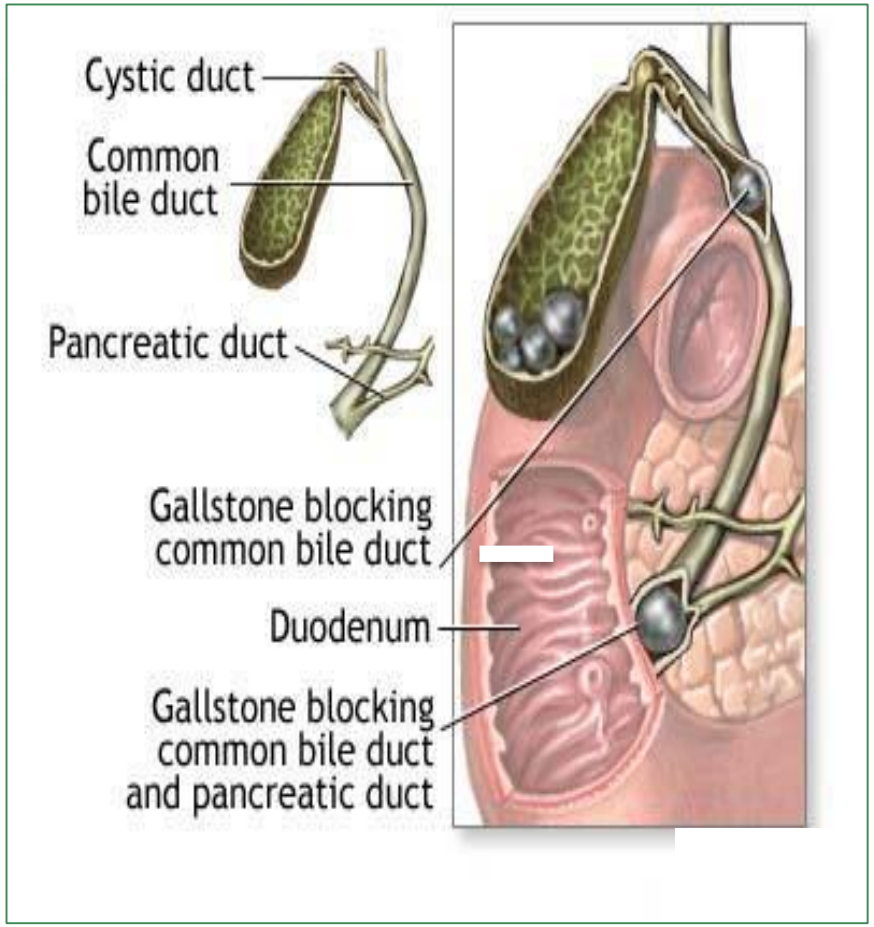
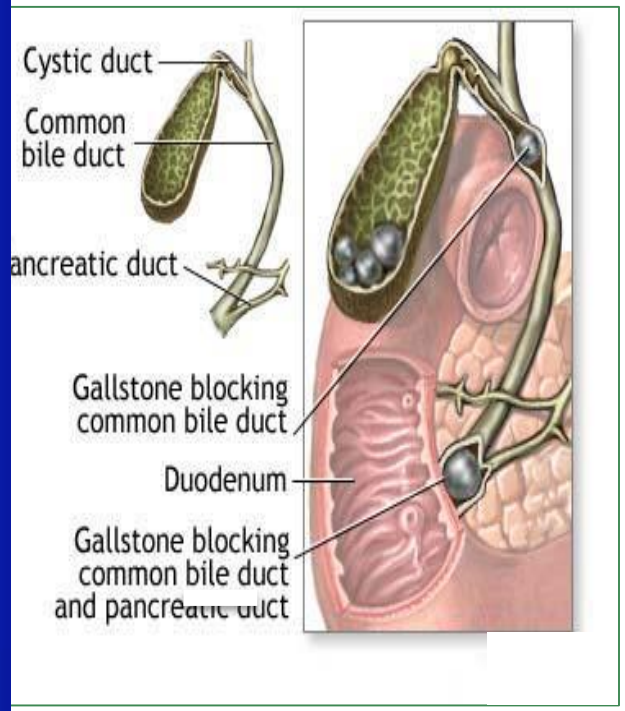
Gallstone disease: diagnosis and management

Clinical guideline [CG188] Published date: October 2014

Choledocholithiasis

- Bile duct stones
  - Usually arise in gallbladder
  - Frequently multiple & enlarge in-situ
- Calculus impaction leads to jaundice
- Can be asymptomatic or lead to ascending cholangitis

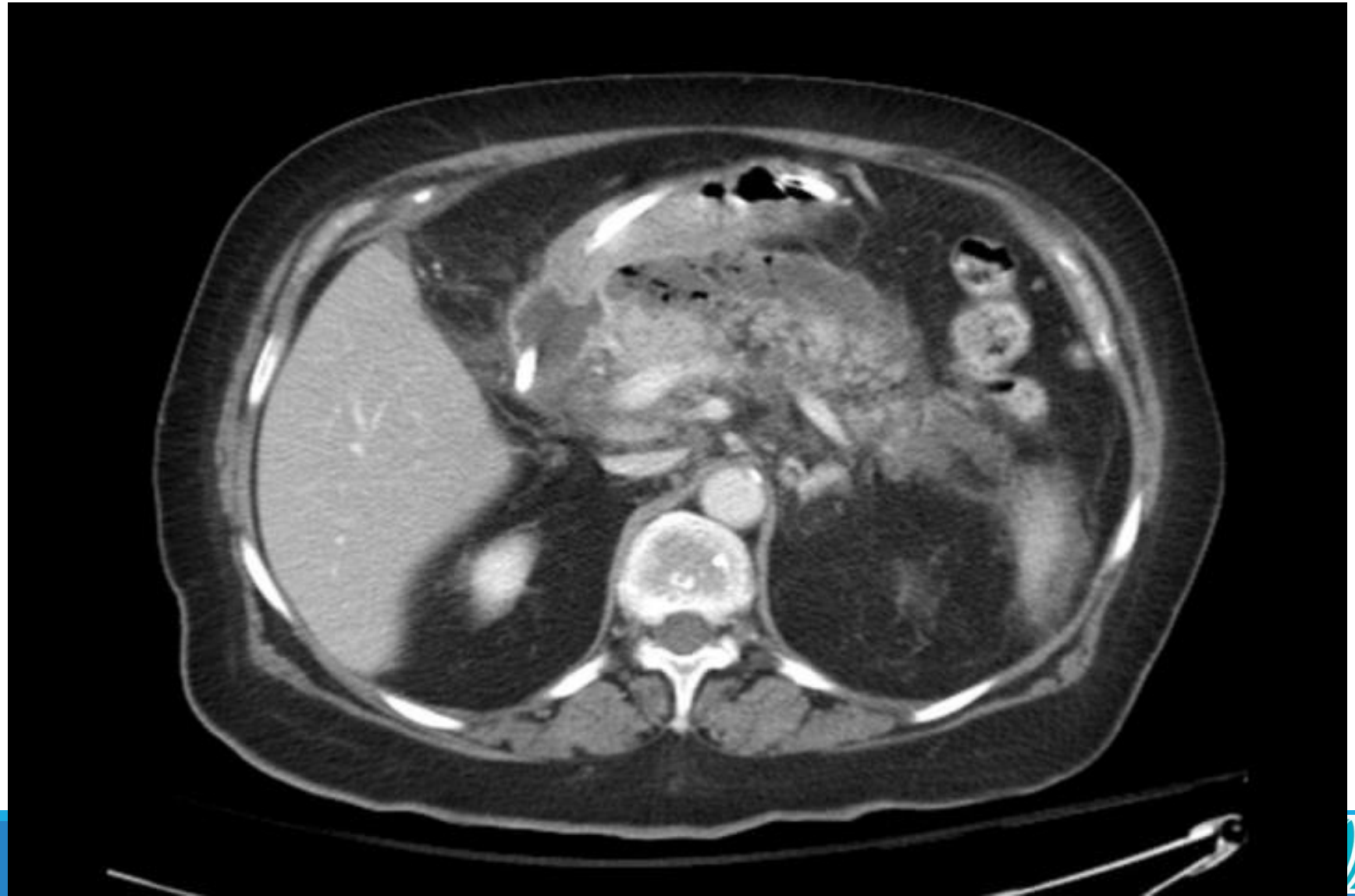



Cystic duct
Common bile duct
ancreatic duct
Gallstone blocking common bile duct
Duodenum
Gallstone blocking common bile duct and pancreatic duct

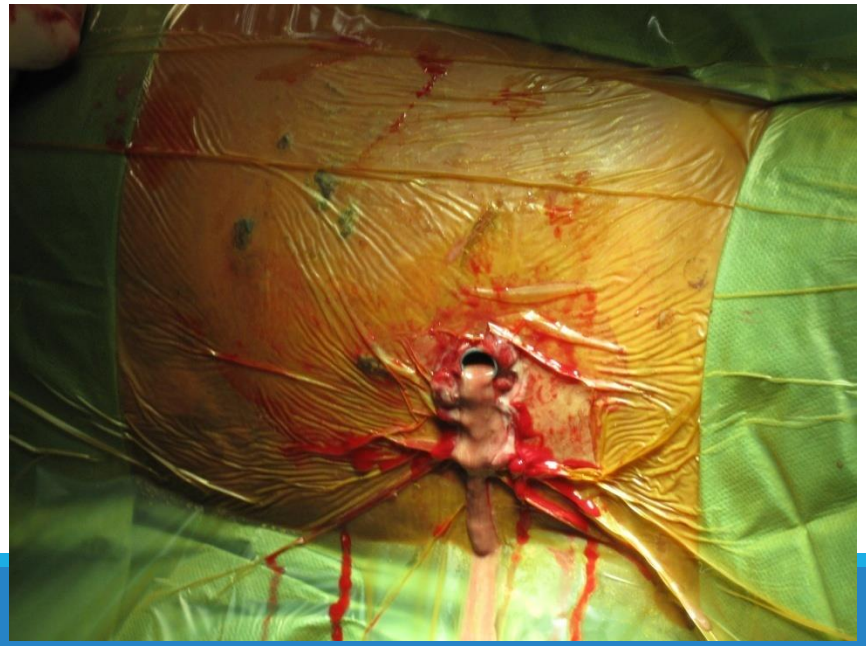
Pancreatitic Necrosis

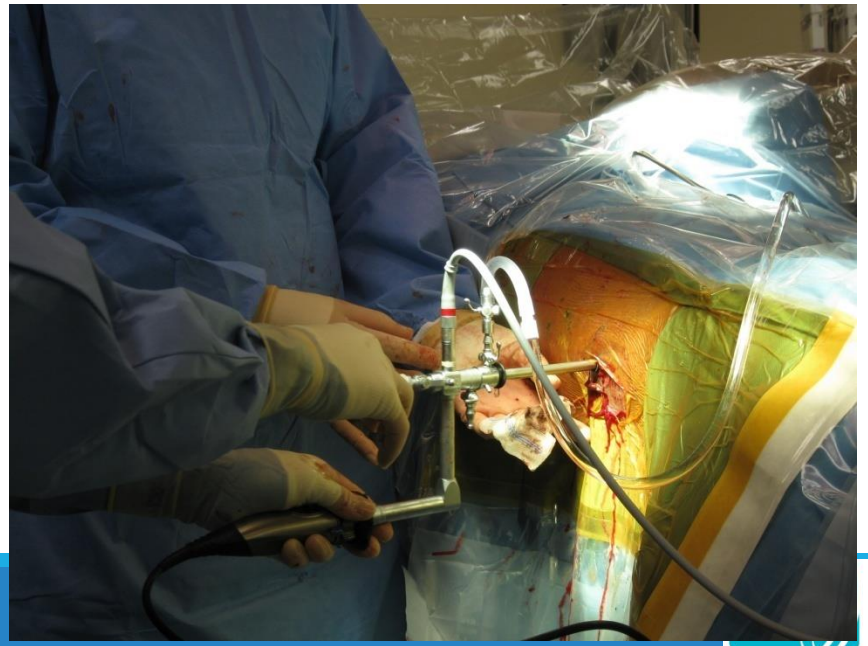
Mortality 30% plus

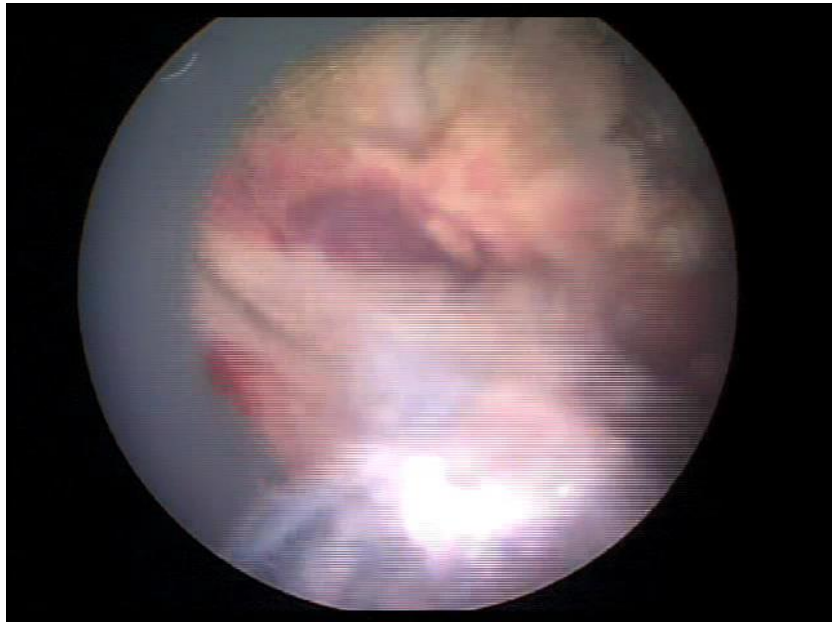
Necrosectomy - step up approach

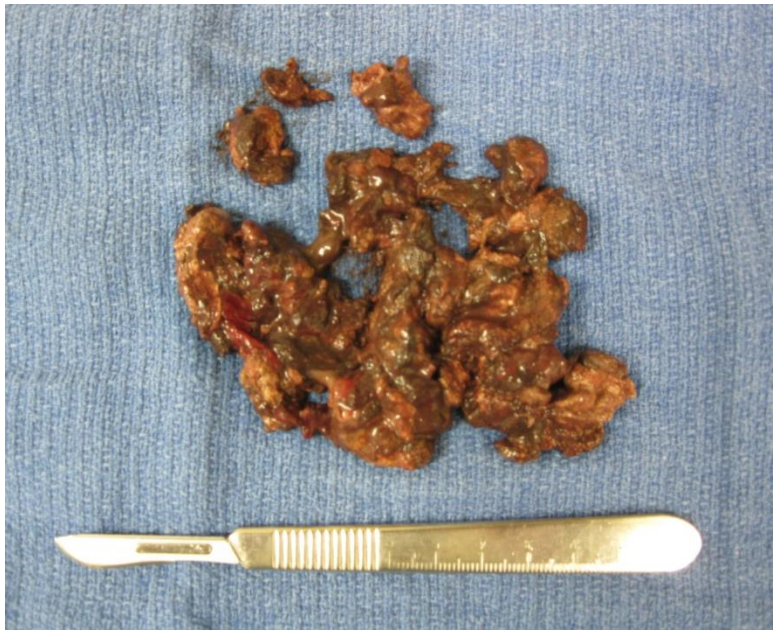


Minimally Invasive Retroperitoneal Necrosectomy (MIRP)

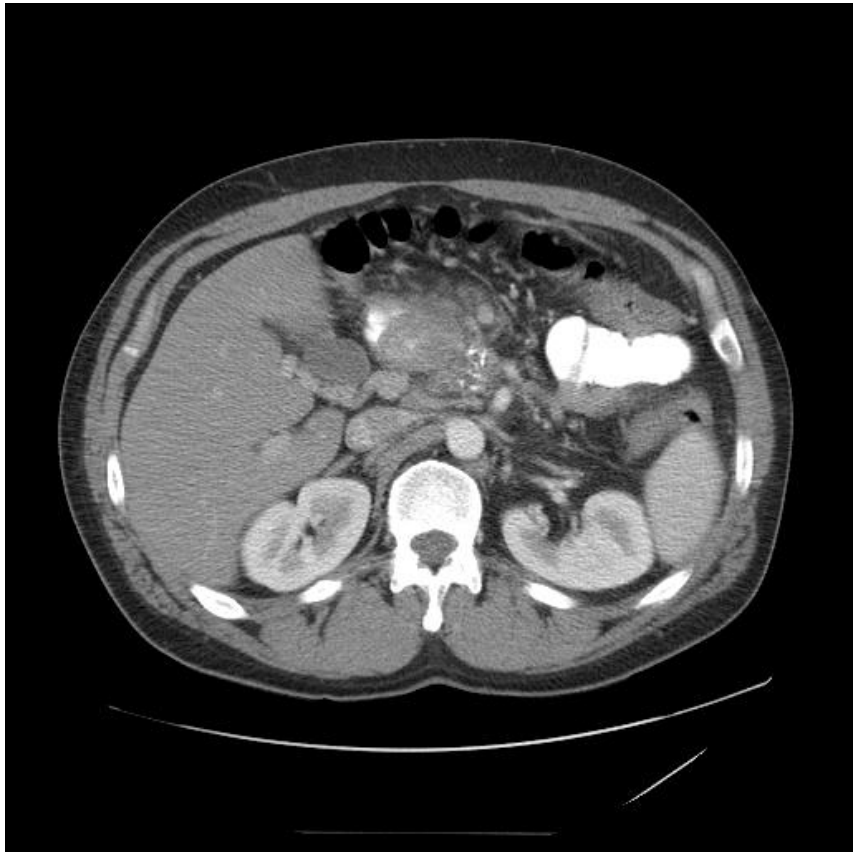






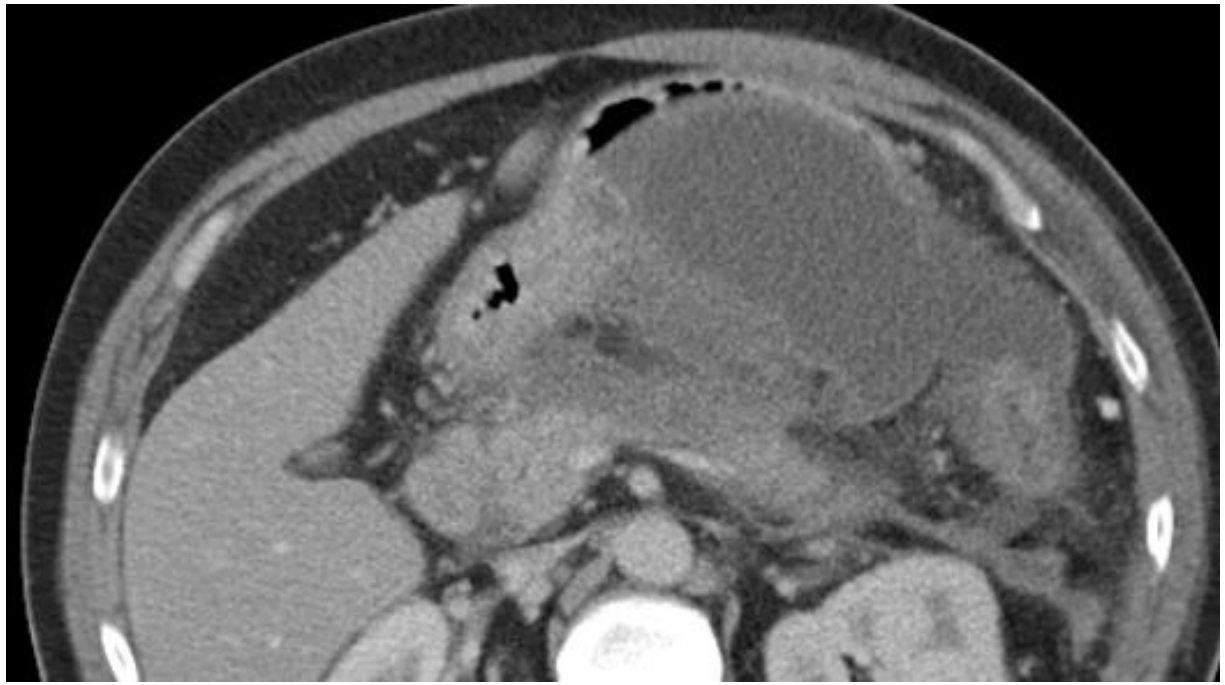


Pancreatic Pseudocyst



Laparoscopic cystgastrostomy

72 yo M w/ pseudocyst 7 wks after episode of severe gallstone pancreatitis.



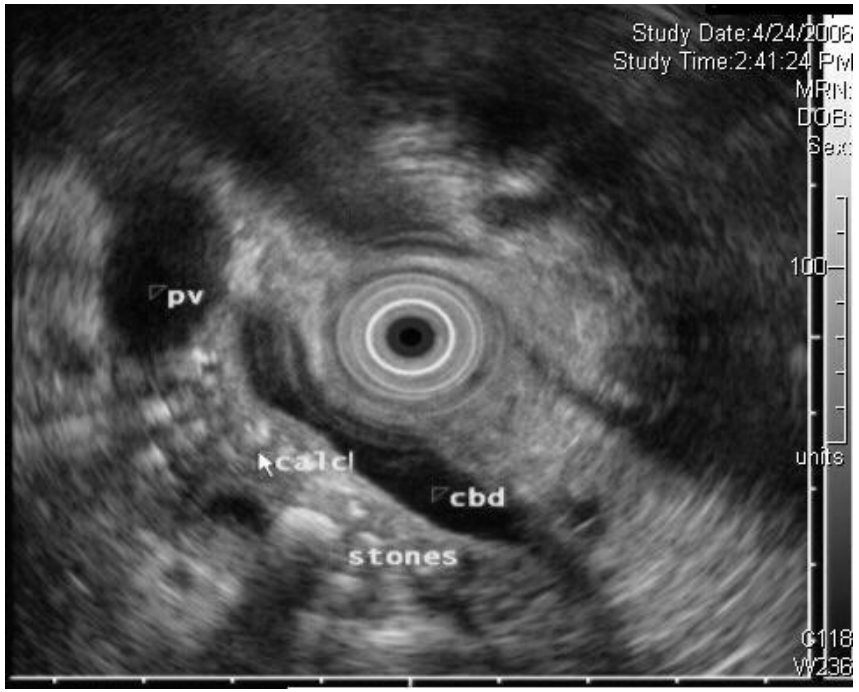
Bleeding in Acute Pancreatitis;

GDA or splenic vessels

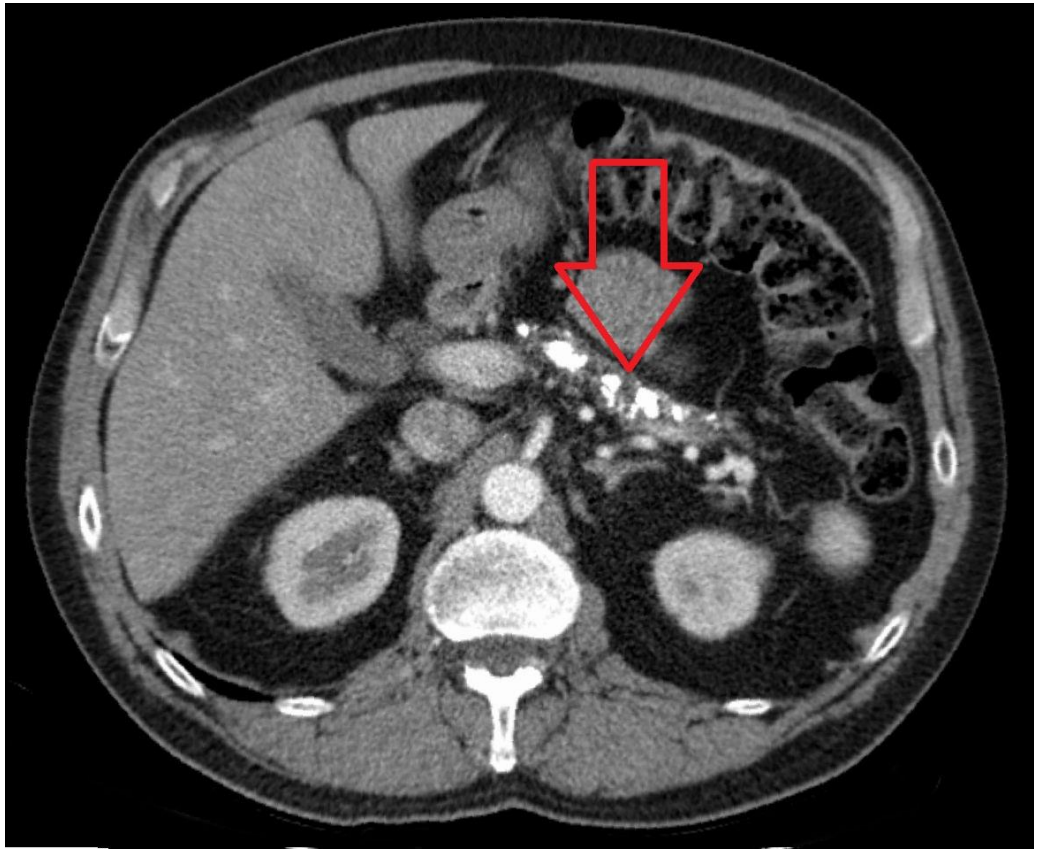
Angiography and coiling

If unstable packing

Chronic Pancreatitis



Chronic Pancreatitis



Abdominal Pain

Weight loss

Malnutrition

Diabetes

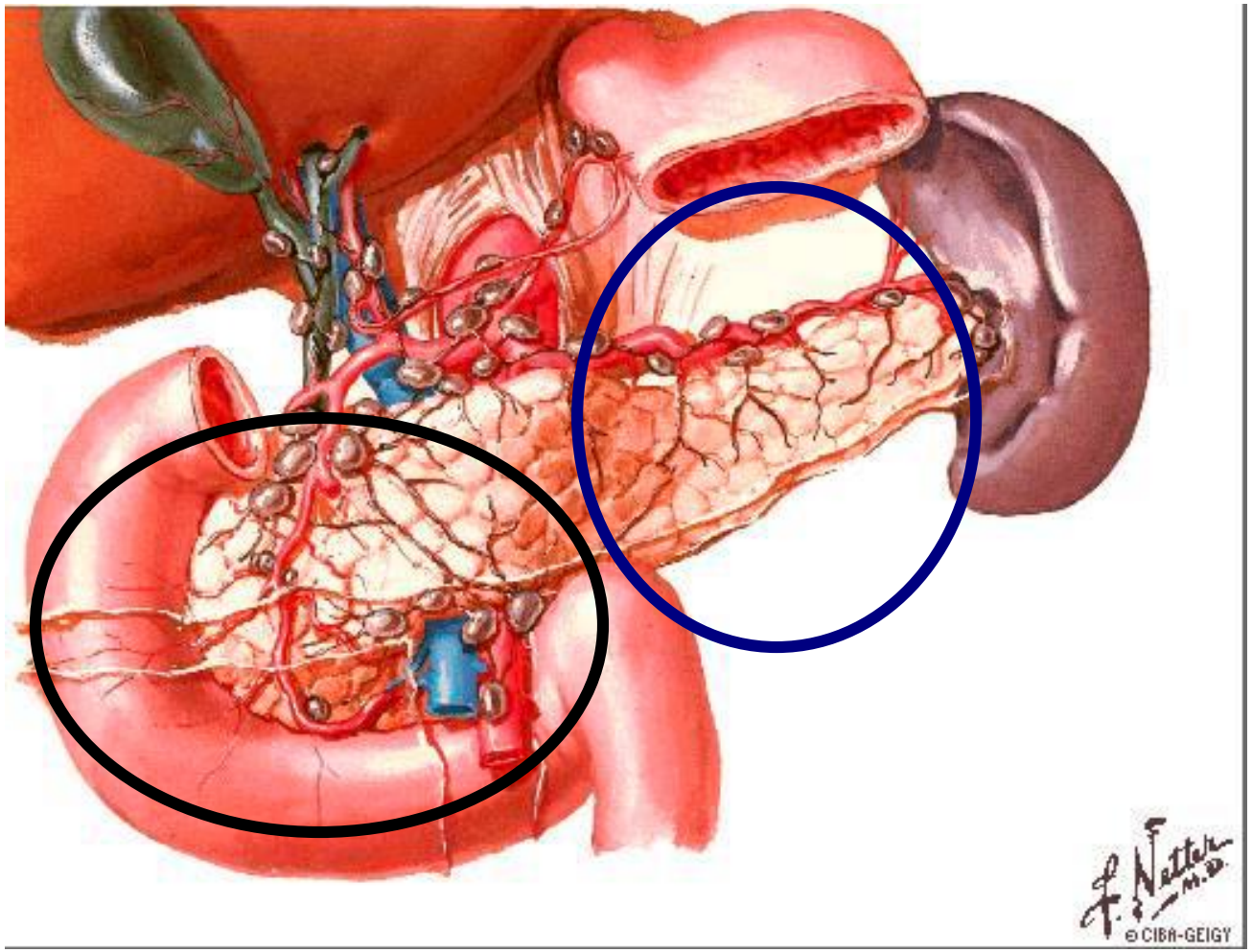
Narcotic addiction

IGT

Jaundice

Pancreatic cancer

Pancreatic cancer



1. Head of Pancreas

2. Body and Tail

Pancreatic cancer

Fourth leading cause of cancer-related death

> 9000 deaths annually in UK

In 2018, 10,449 people were newly diagnosed with pancreatic cancer in the UK (266 per year NI))

Overall 5-year survival approx 7%

Only approx 25% alive after 1 year

Often called the “silent disease” because it usually doesn’t cause symptoms in early stages

Aetiology

Cause unknown

Smoking & alcohol?

Diabetes? (5 years greater than 2x increase)

Hereditary pancreatic cancer – susceptibility locus has been found in relation to chromosome 4q32-34.

Familial breast cancer gene (BRCA2)

Chronic pancreatitis

NG12: Suspected Cancer referral guideline for pancreatic cancer

Refer people using a suspected cancer pathway referral for pancreatic cancer if they are aged 40 and over and have jaundice.

Consider an urgent direct access CT scan, or an urgent ultrasound scan if CT is not available, to assess for pancreatic cancer in people aged 60 and over with weight loss **and** any of the following:

- diarrhoea
- back pain
- abdominal pain
- nausea
- vomiting
- constipation
- new-onset diabetes.

Surgical Treatment

Resection possible in only approx 20%

- local invasion
- metastases
- advanced cachexia

Resection – Whipple procedure

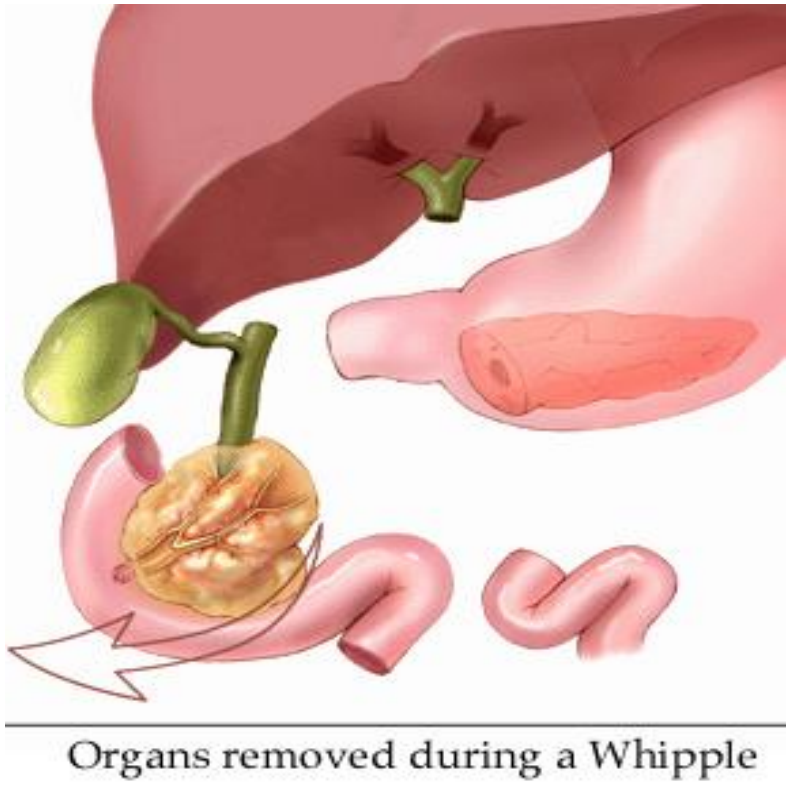
Unresectable – biliary bypass ± gastric bypass

Fast Track Whipples!

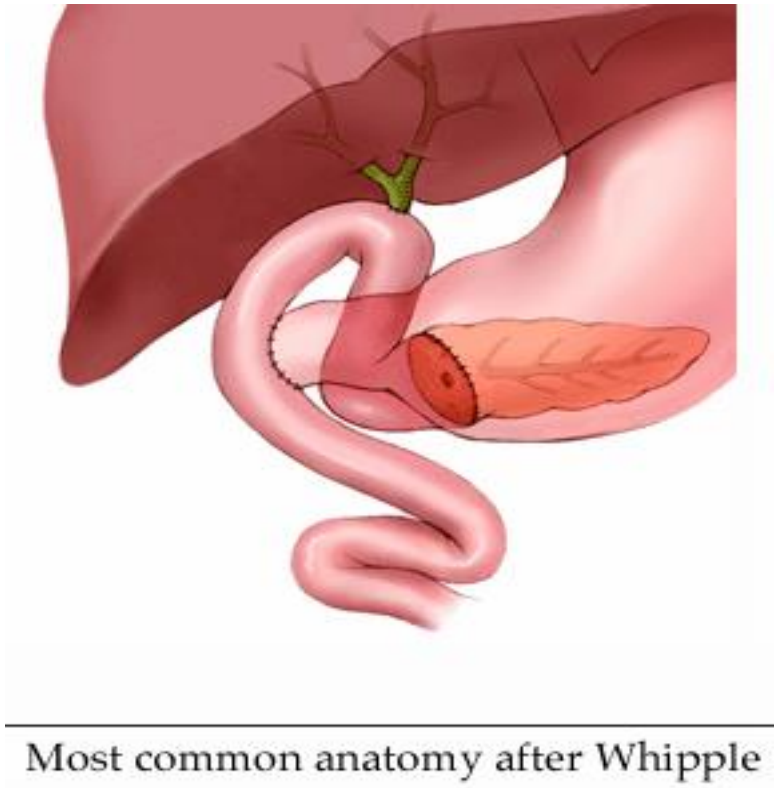
- Bilirubin less than 250µmol/l
- Anaesthetically fit
- Nutritionally reasonable
- No major renal impairment

- LOGISTICS
- Impossible during Covid19 pandemic
- ??Neoadjuvant for resectable disease??

Allen Oldfather Whipple (1881-1963)



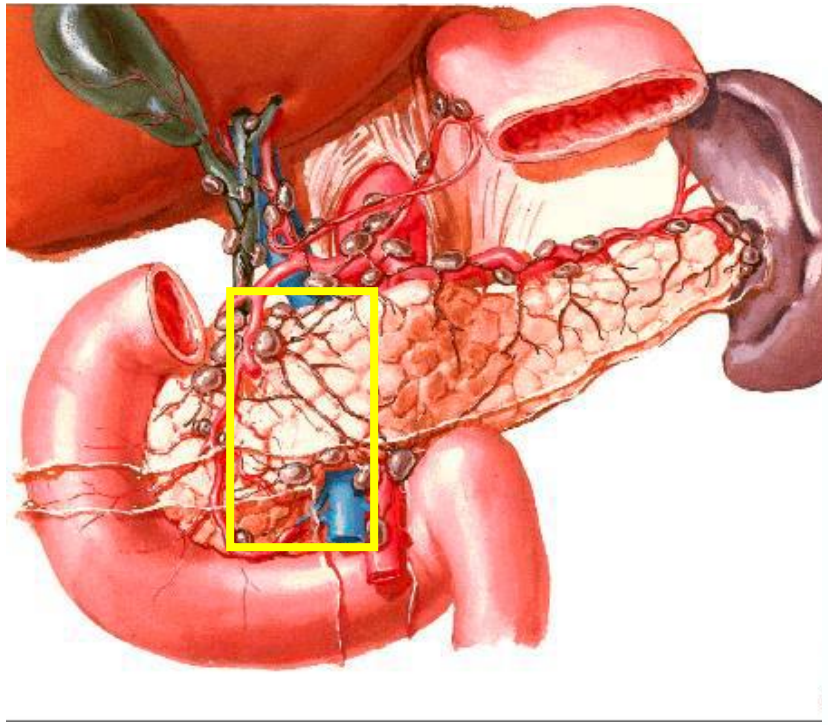
Organs removed during a Whipple

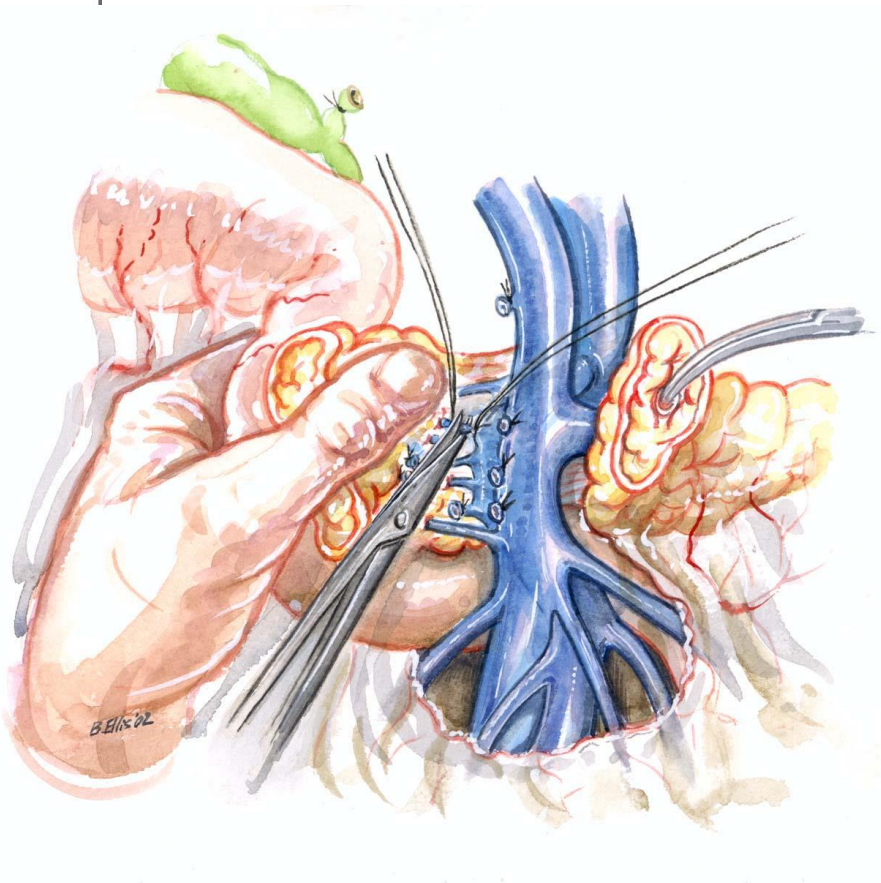


Most common anatomy after Whipple

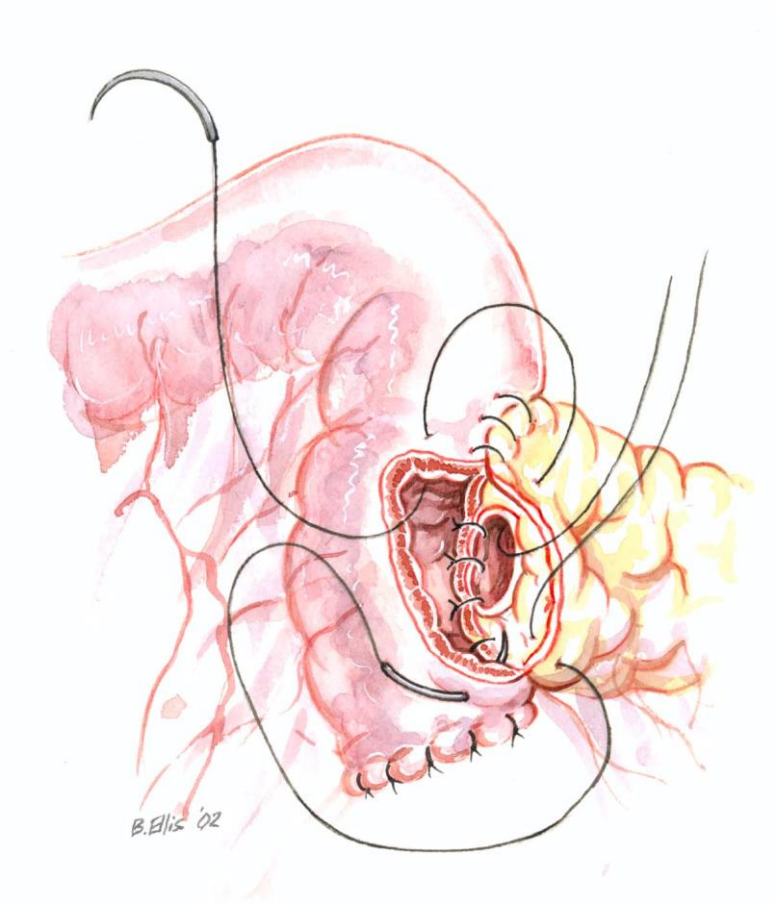
Original paper. Whipple AO, Parsons WB, Mullins CR. Treatment of Carcinoma of the Ampulla of Vater. Ann Surg 1935; 102: 763-769.

Whipple pancreaticoduodenectomy





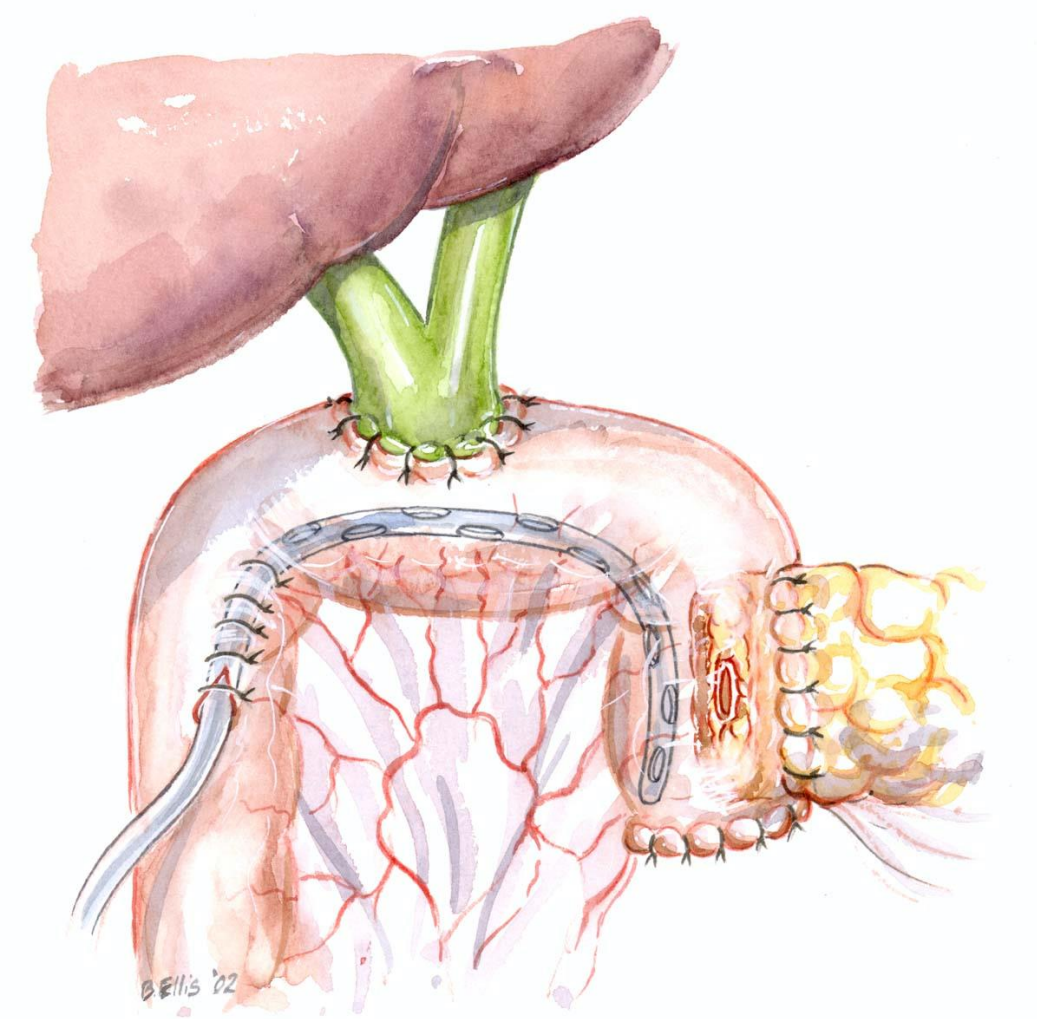
Pancreatic Anastomosis



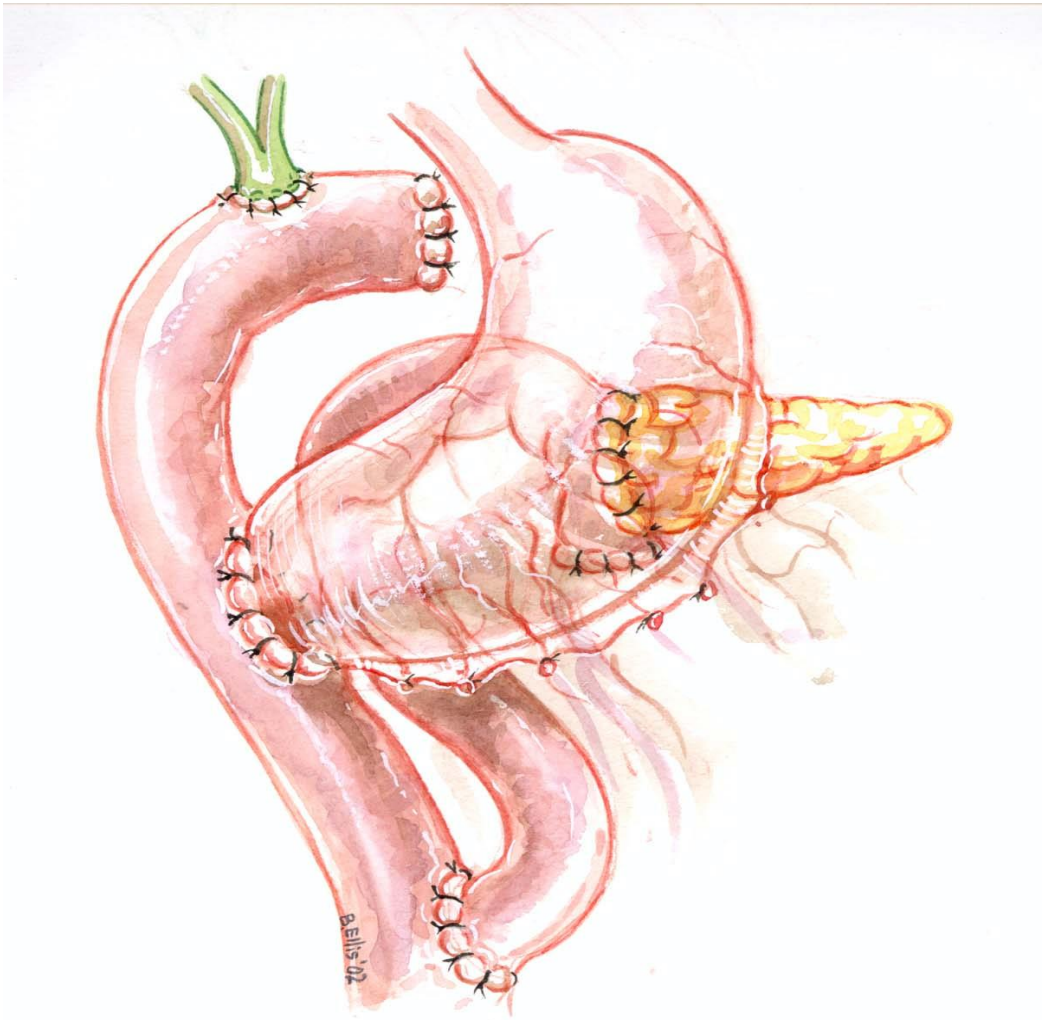
3 pillars of Medicine;

Good history
Complete examination
DON'T mess with the pancreas!

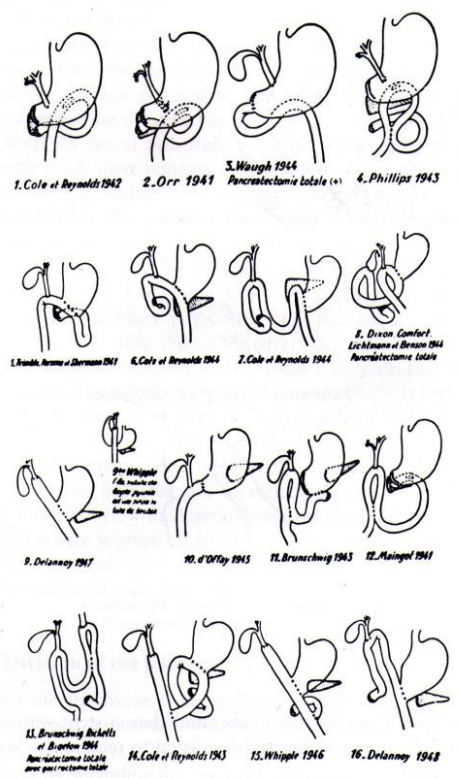
Biliary Anastomosis

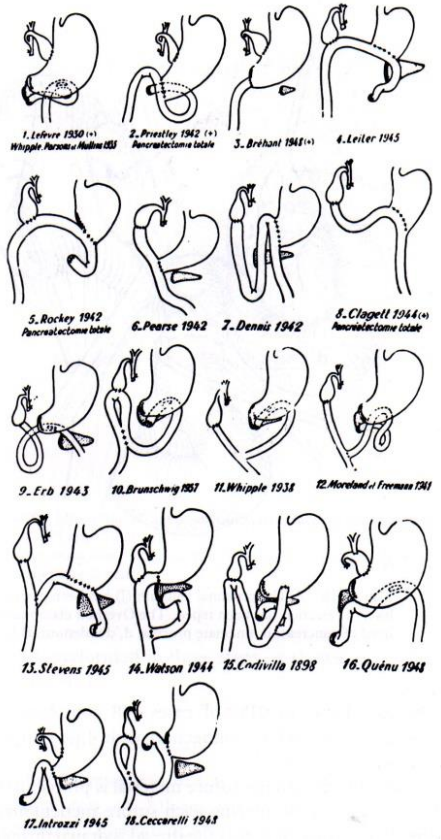


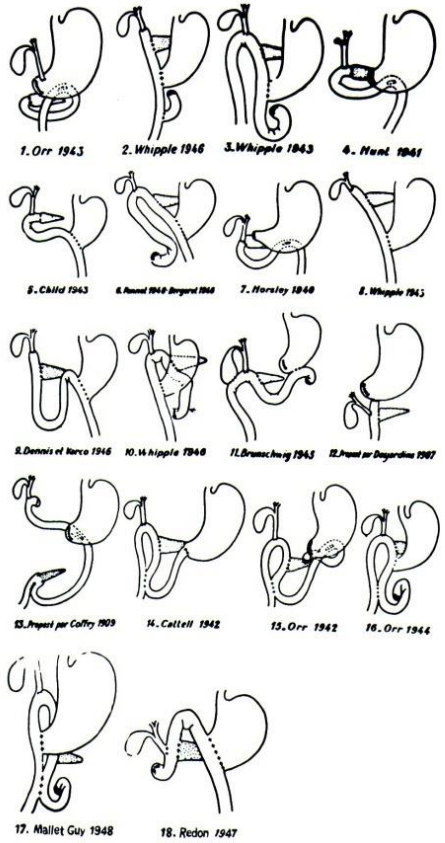
Gastric Anastomosis

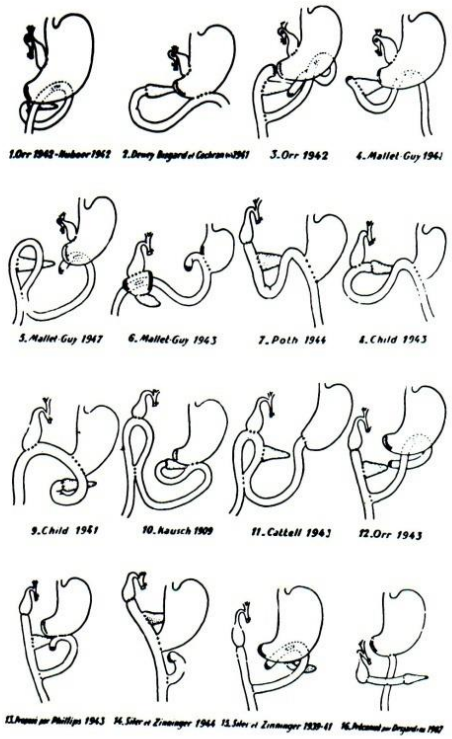


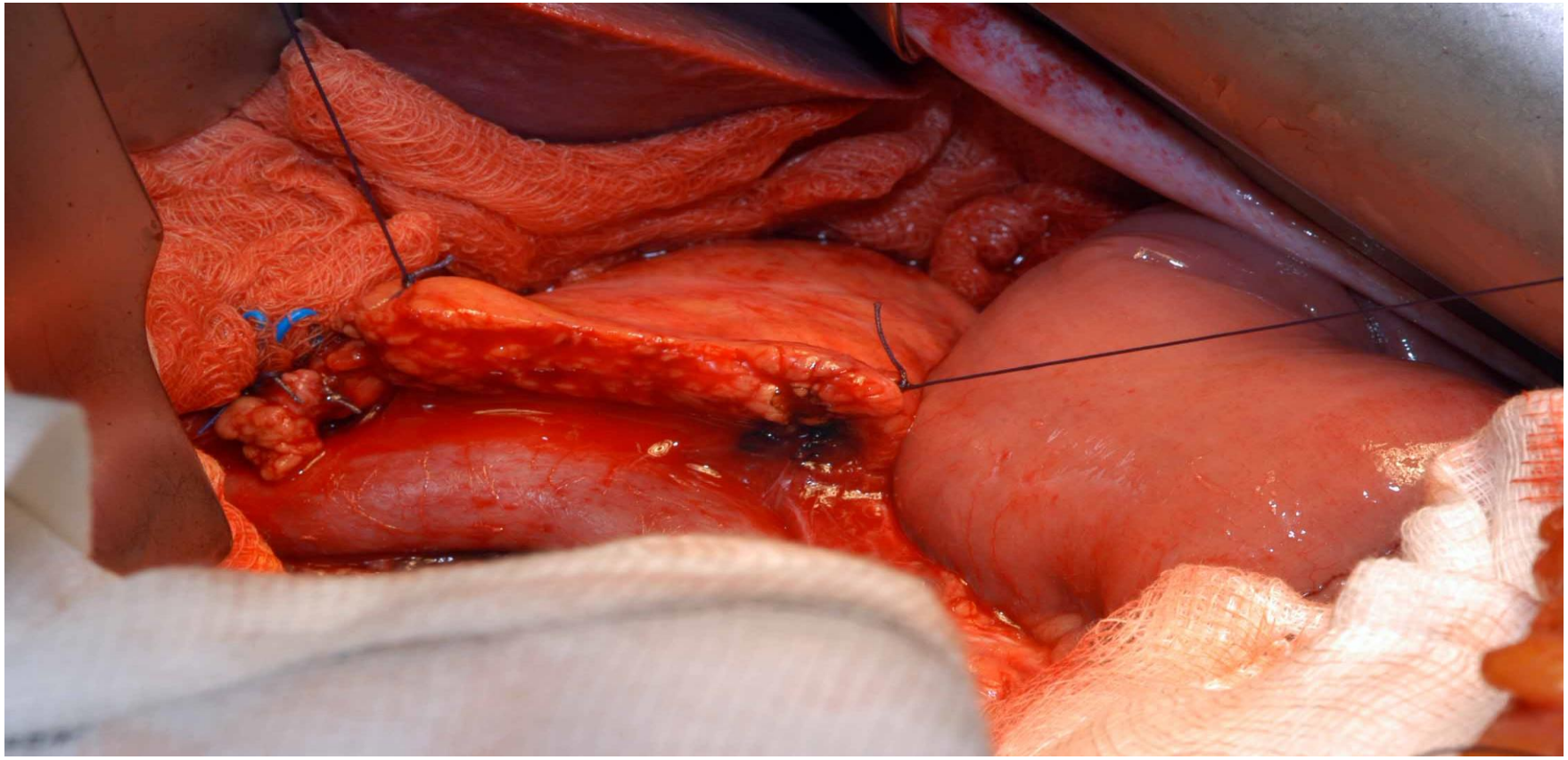
“Not one size fits all!”

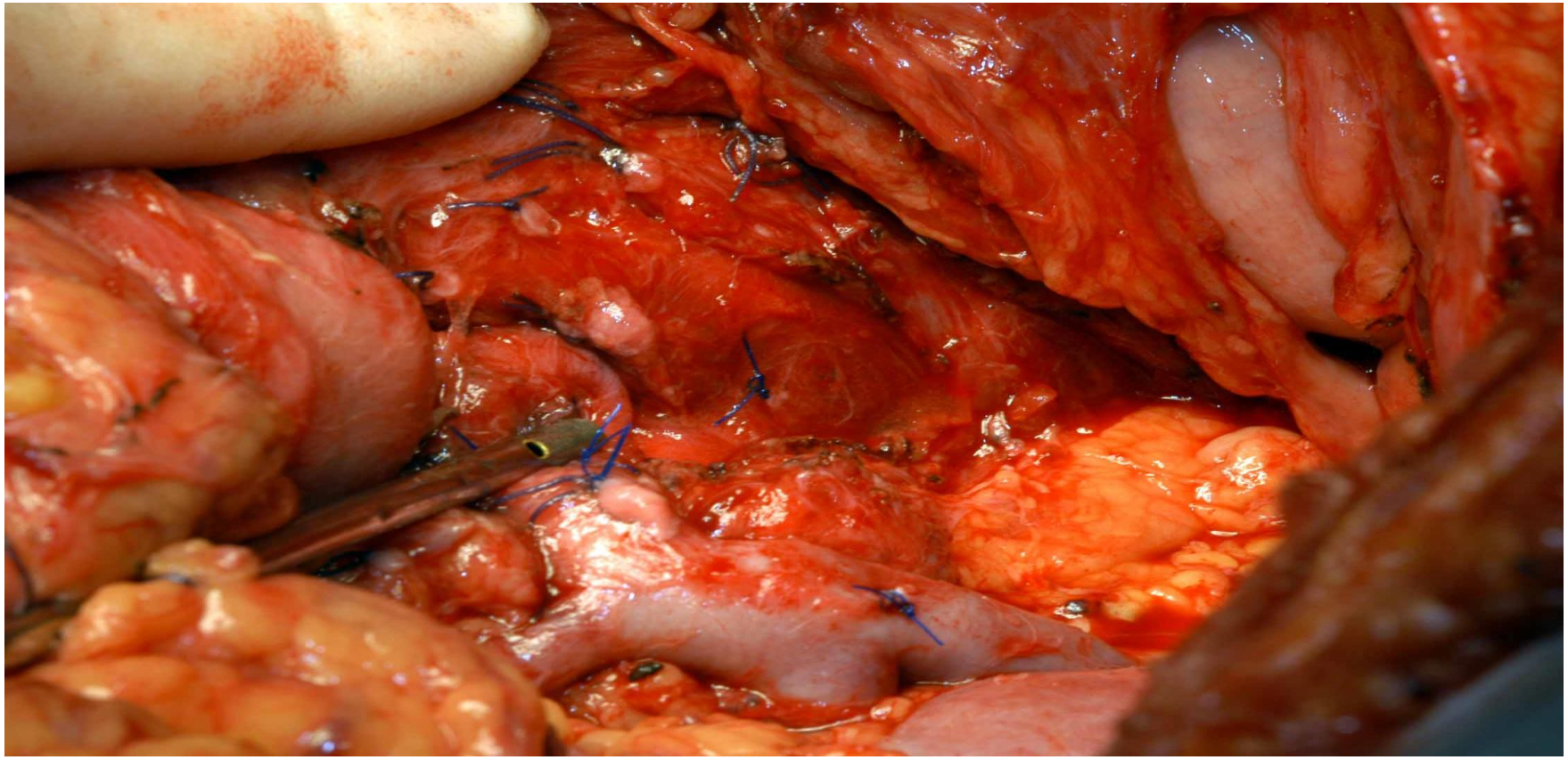


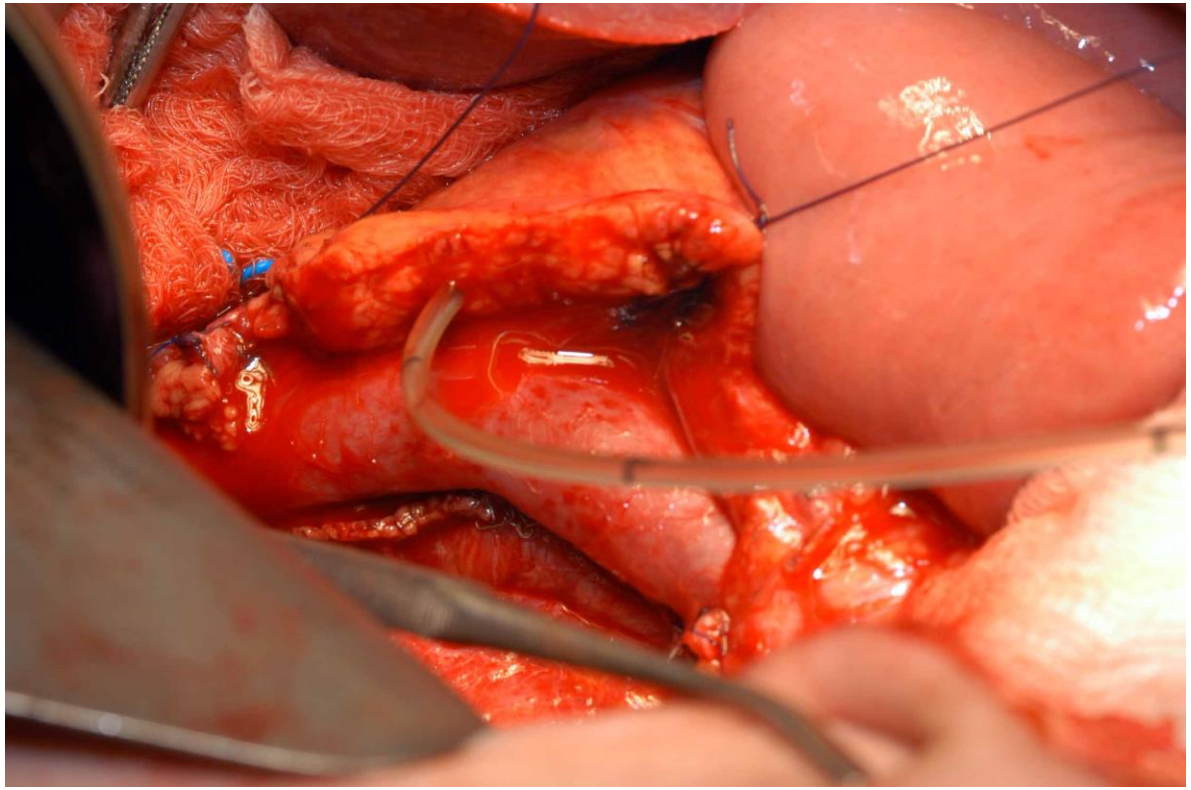












Surgery - resectability

Borderline:

Arterial abutment (< 180°)

Reconstructable SMV/portal involvement

Reconstructable hepatic artery

stage III (minimal T4)

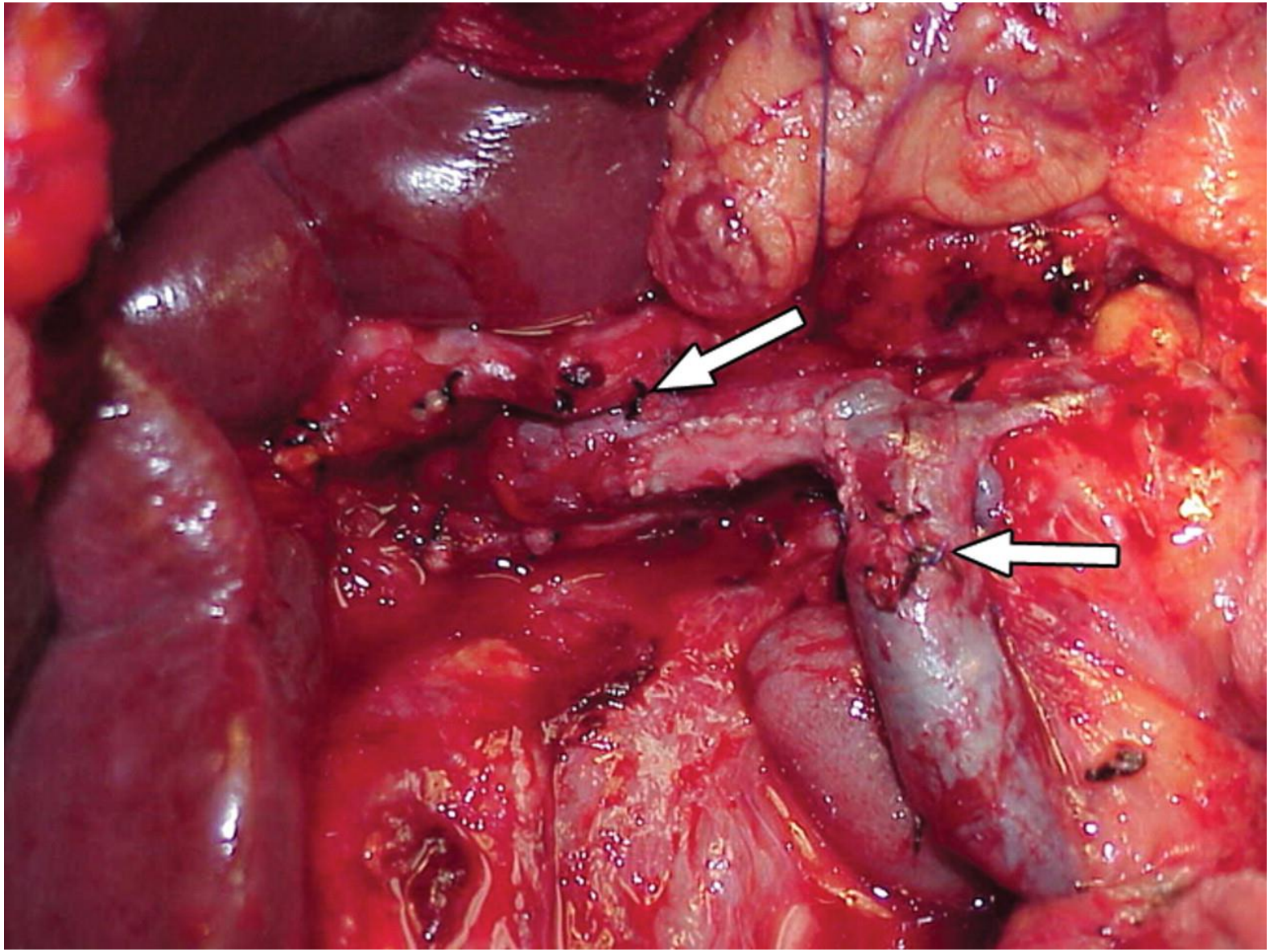
Venous resection

Includes greater numbers for resection

no significant impact on perioperative morbidity, mortality, or the incidence of positive histologic margins

Survival similar to patients following pancreaticoduodenectomy without the need for venous reconstruction

Extended lymphadenectomy is not preferred



Complications

Up to 30%

Include: pancreatic fistula

intraabdominal sepsis

delayed gastric emptying

No difference between Classical or pylorus preserving Whipples[1]

1. Diener et al. Ann of Surg; 2007;245(2);187-200

Risks

Long operation: 5 to 10 hours

Clean-contaminated

Blood loss

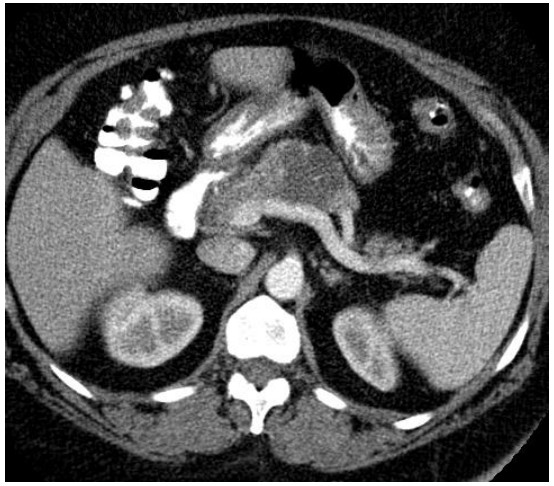
Temperature

Diabetes

Obstructive Jaundice

Age

Indications for Laparoscopic Pancreatic Resections



Cystic neoplasms

Neuroendocrine tumors

Adenocarcinoma

Treatment - palliation

Palliative in majority

Vital to have Nurse Specialist / Palliative Care Team Involvement

Relief of obstructive jaundice

- ERCP + sphincterotomy +stent
- percutaneous stent

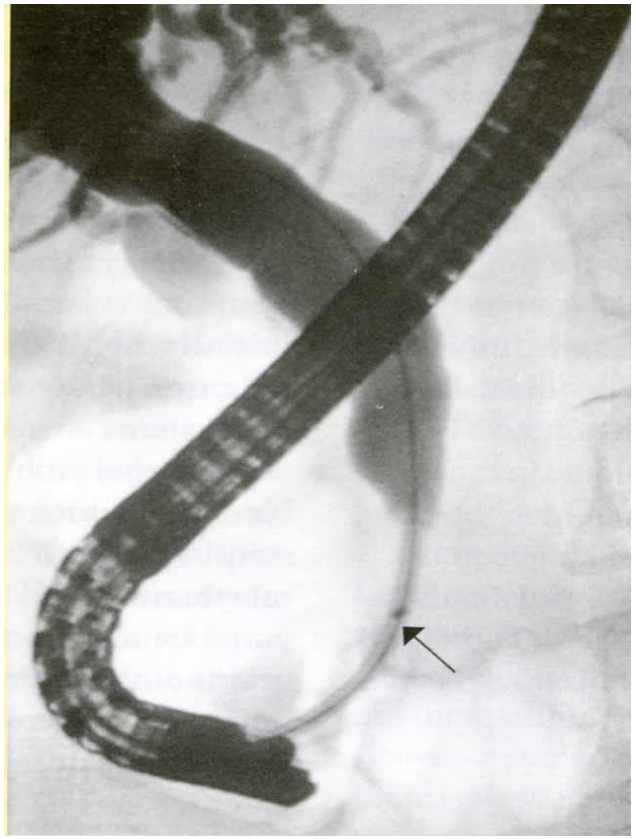
Relief of gastric outlet obstruction

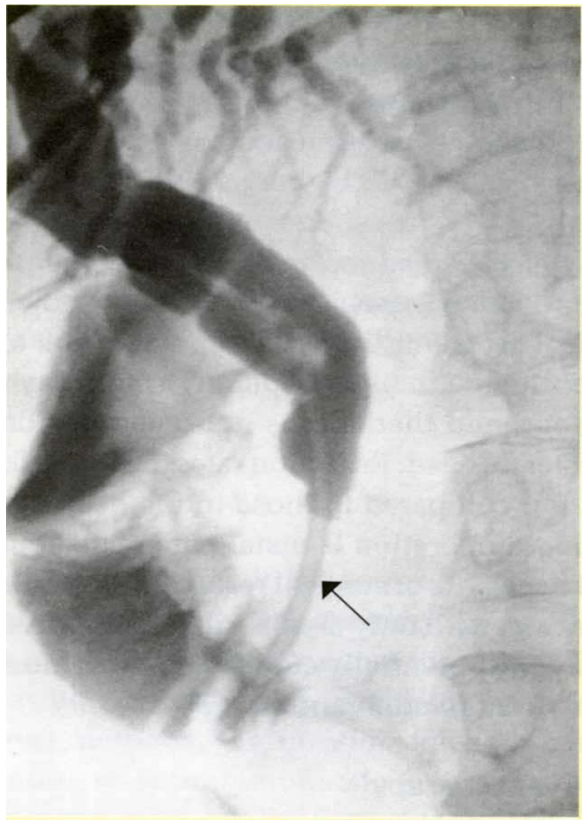
- gastroenterostomy
- stent

Relief of pain

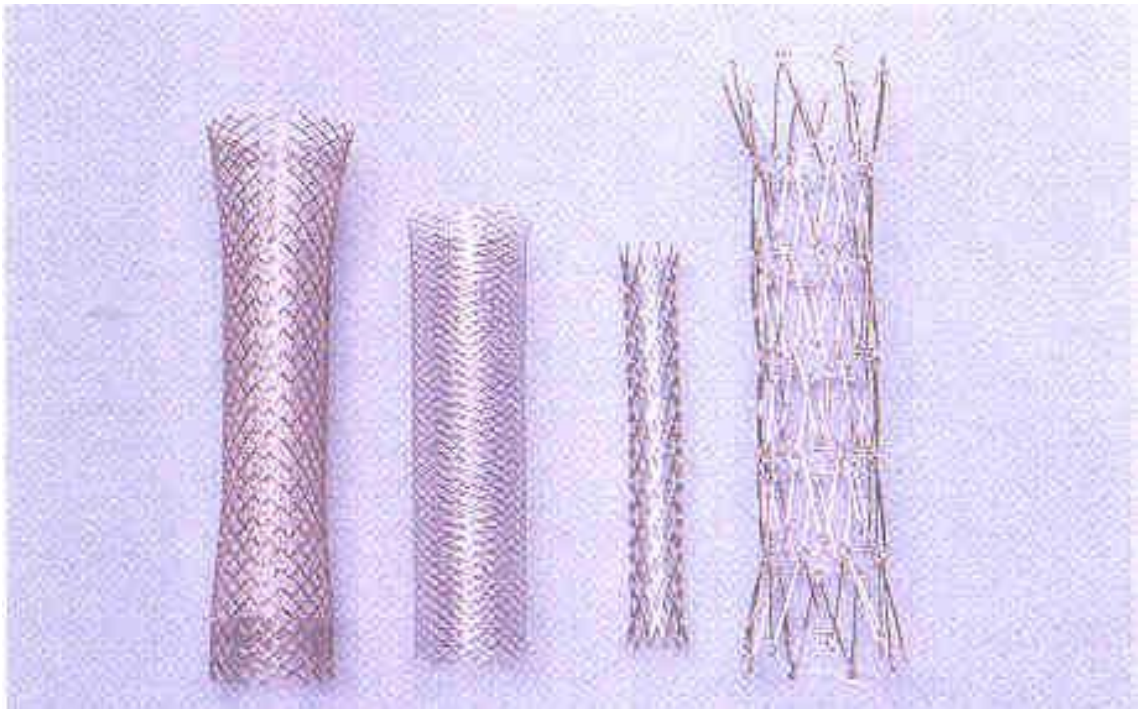
Control of nausea

Endoscopic stent

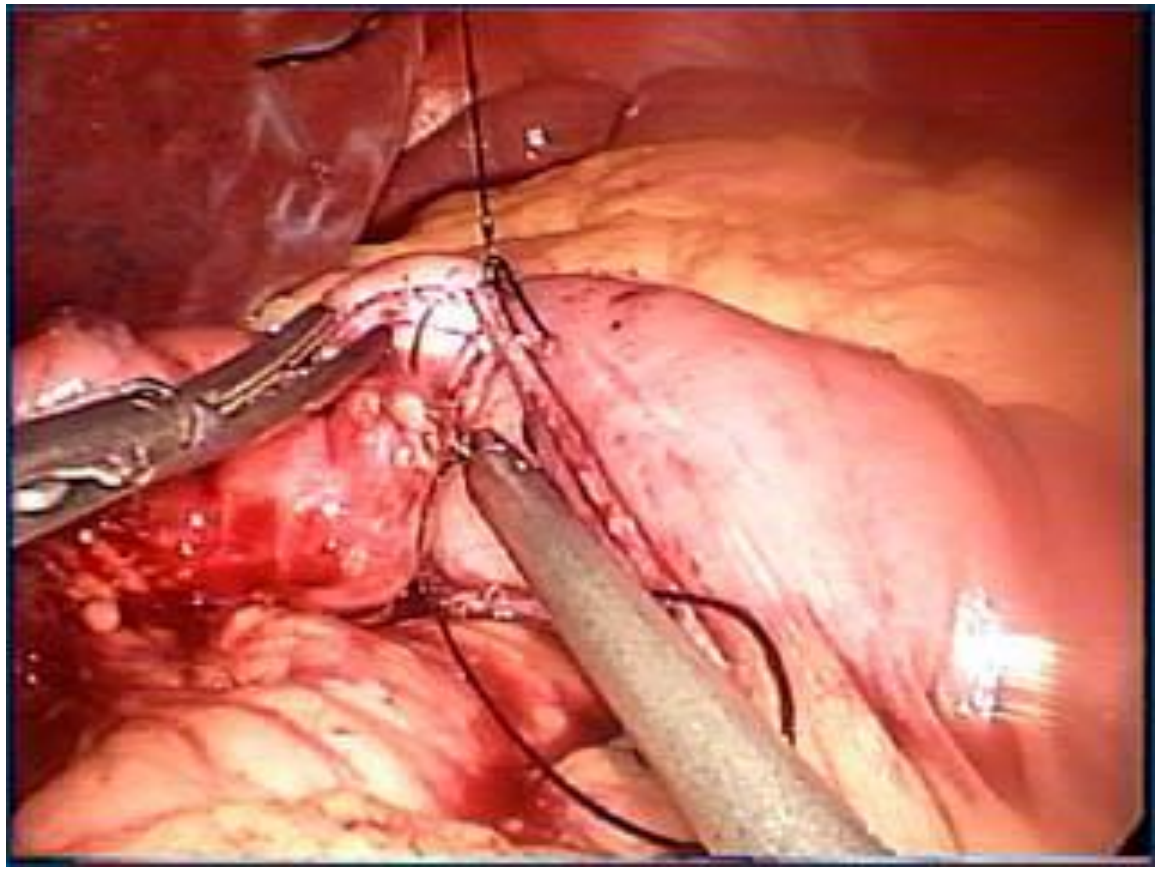




Metal Stent



Laparoscopic Gastrojejunostomy



Assessment of pancreatic function

Loss of pancreatic parenchyma can lead to new onset endocrine and exocrine insufficiency, conditions that greatly affect postoperative QoL, cardiovascular health and nutrition status

Endocrine Function – assessment of beta cell function to diagnose diabetes

Exocrine Function – direct assessment using faecal elastase or CCK test.

Complications

MALNUTRITION:

Poor dietary intake

Malabsorption – exocrine/endocrine/vitamin deficiency

Increased catabolism – acute inflammation/infection

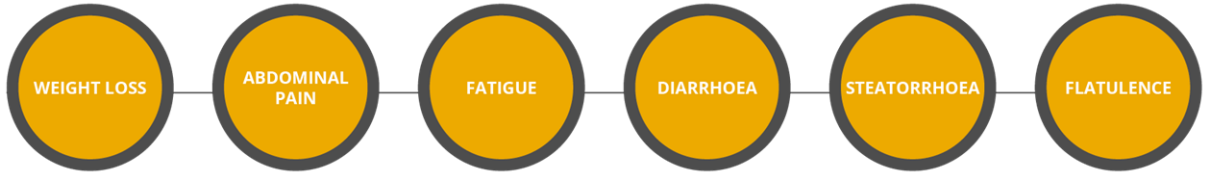
Surgical effects – ileus/DGE/Pancreatic fistula/Chylous ascites

Pancreatic Exocrine Insufficiency (PEI)

Significant reduction of exocrine secretion postoperatively

Leads to malabsorption of fat, protein and carbohydrates

Results in



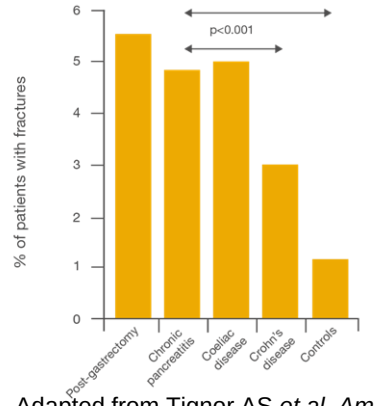
Sikkens et al 2014 observed 75% pf patients had PEI at presentation increasing to 92% within 2 months

Complications from maldigestion and malabsorption may have a progressive and detrimental effect on a patient's wellbeing and increase morbidity and mortality.

Complications include:

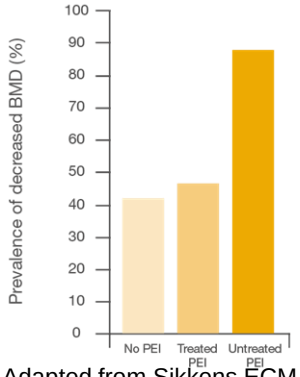
Low bone mineral density in chronic pancreatitis patients is a consequence of vitamin D deficiency, secondary to PEI

Low bone mineral density may result in a significantly higher risk of low trauma fractures, especially in the vertebrae, hip and wrist



Fractures are more common in conditions with PEI

Adapted from Tignor AS *et al*. *Am J Gastroenterol.* 2010



Treatment of PEI prevents reduction in bone mineral density

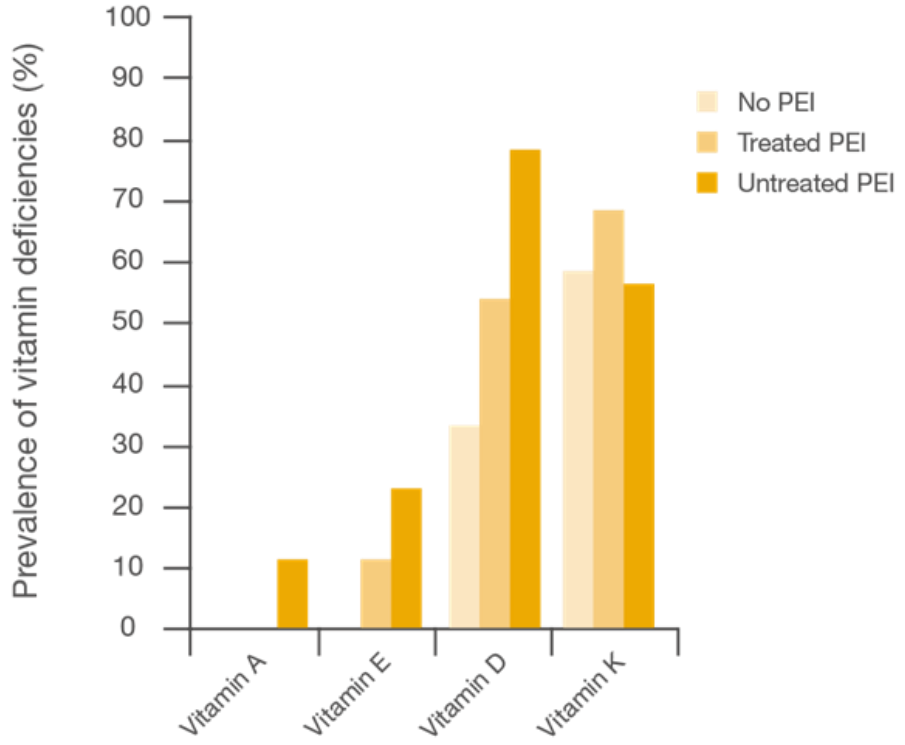
Adapted from Sikkens ECM *et al*. *Pancreatology* 2013

As a result of malnutrition, patients can develop nutritional deficiencies, especially of fat soluble vitamins such as vitamins A, D, E, and K.

Vitamin deficiency can lead to serious health problems:

- Decreased immune competence (Vitamin A)
- Osteopenia/osteoporosis (Vitamin D)
- Neurological disorders (Vitamin E)
- Blood coagulation disorders and osteopenia/osteoporosis (Vitamin K)

Treating PEI reduces the prevalence of vitamin deficiencies



Management of malabsorption

Frequent small meals

Fluids separate from meals

Limit avoid high fat foods

Pancreatic enzyme supplements

- Creon 75 – 80 000 Units with meals, 25 – 50 000 Units with snacks

Diabetes

Of 1165 patients who underwent pancreatic resectional surgery

41.8% had preexisting diabetes

Out of the remaining 678, at a median of 3.6 months, 40.4% developed diabetes

Elliott IA et al. Perm J 2017;21:16

Delayed Gastric Emptying (DGE)

Most common complication following pancreatic surgery

Represent inability to return to a standard diet by the end of one week postoperatively and includes prolonged NG intubation of patients

Grades of DGE

	NG Tube required	Unable to tolerate oral intake	Vomiting/Gastric distension	Use of Prokinetics
A	4-7 days or reinsertion >POD 3	7	+/-	+/-
B	8-14 days or reinsertion >POD 7	14	+	+
C	>14 days or reinsertion >POD 14	21	+	+

DGE

DGE is a complex phenomenon

Associated with prolonged morbidity

- Delay in resumption of oral intake
- Prolonged hospital stay
- Increased costs

Frontiers in Surgery 2016;3:25

Increased risk associated with

- Pancreatic fistula
- Sepsis
- Reoperation

HPB 2013; 15(10): 763

Antecolic (AC) versus Retrocolic (RC) Anastomosis

6 RCT of 588 patients

DGE was not statistically significantly different between AC and RC groups

Other complications were not dependent on the route of reconstruction

Joliat GR et al. Dig Surg 2016;33(1):15-25

HHS Public Access

Author manuscript

Cochrane Database Syst Rev. Author manuscript; available in PMC 2015 November 11.

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Pylorus-preserving pancreaticoduodenectomy (pp Whipple) versus pancreaticoduodenectomy (classic Whipple) for surgical treatment of periampullary and pancreatic carcinoma

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Belfast Health and Social Care Trust

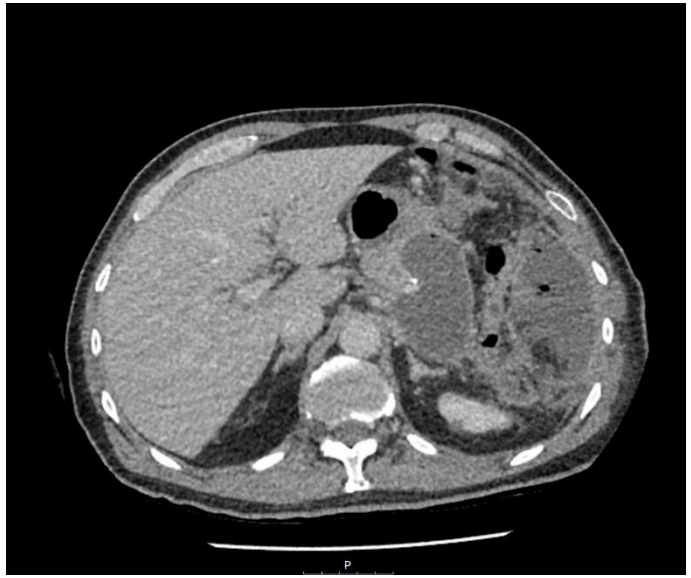
Pancreatic Fistula

Most dreaded complication of pancreatic surgery

Multitude of factors contribute

- Surgical techniques
- Gland texture
- Pancreatic duct size
- Stent placement

Kanda et al 2011



Clinical Presentation

Non-specific abdominal symptoms

Pyrexia

Elevated WCC/CRP

Drain effluent

Drain amylase

DGE

Grading of pancreatic fistula

Parameter	Grade A	Grade B	Grade C
Clinical conditions	Well	Often well	Ill appearing/bad
Specific treatment*	No	Yes/no	Yes
US/CT (if obtained)	Negative	Negative/positive	Positive
Persistent drainage (after 3 weeks)**	No	Usually yes	Yes
Re-operation	No	No	Yes
Death related to POPF	No	No	Possibly yes
Signs of infections	No	Yes	Yes
Sepsis	No	No	Yes
Readmission	No	Yes/no	Yes/no

Fistula Risk Score

Risk factor	Parameter	Points
Gland texture	Firm	0
	Soft	2
Pathology	Pancreatic adenocarcinoma or pancreatitis	0
	Ampullary, duodenal, cystic, islet cell, metatastic, or other	1
Pancreatic duct diameter (mm)	Greater than or equal to 5	0
	4	1
	3	2
	2	3
	Less than or equal to 1	4
Intraoperative blood loos (mL)	Less than or equal to 400	0
	401–700	1
	701–1000	2
	Greater than 1000	3

Management of Pancreatic Fistula
1. Nutrition

POPF leads to increased catabolic process and basal energy expenditure

High output fistula (>200mls/24 hours) is associated with fluid, electrolyte imbalance and nutritional depletion.

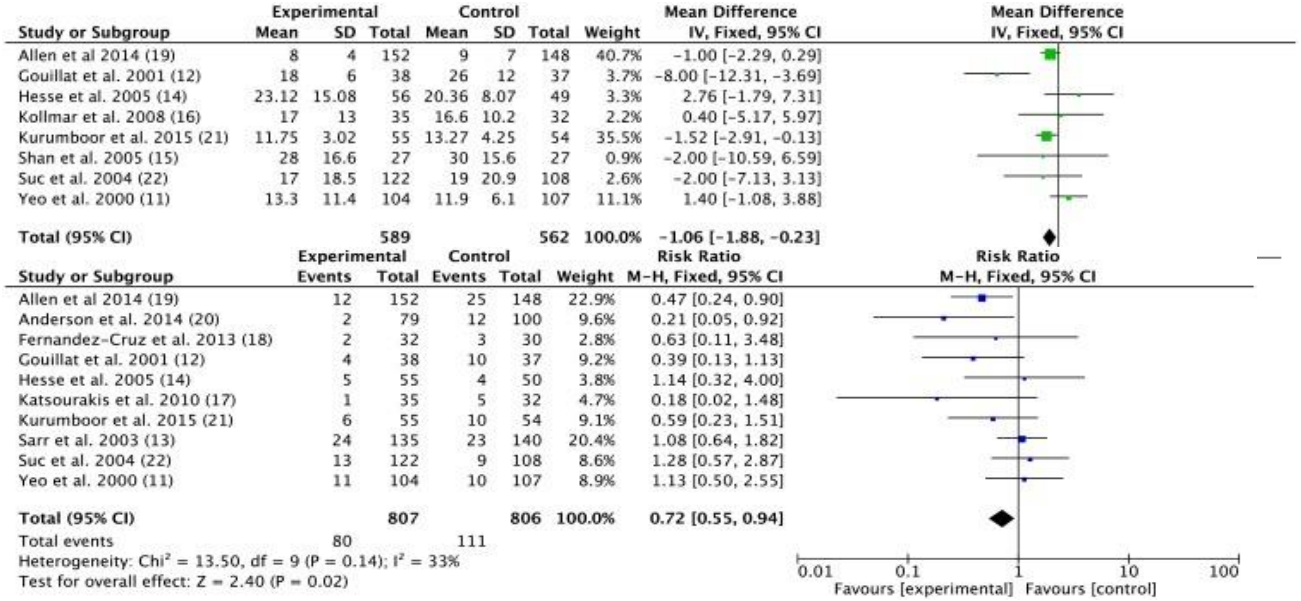
Klek et al found eneteral nutrition has more than a two fold probability of fistula closure, shortened time to closure and faster recovery

2. Somatostatin Analogues

Powerful inhibitor of somatostatin

Anticipated effects are to reduce output of digestive fistulae

Some studies show a perioperative protective effect with reduced incidence of pancreatic fistula and duration of postoperative stay



Study or Subgroup	Experimental Mean	SD	Total	Control Mean	SD	Total	Weight	Mean Difference IV, Fixed, 95% CI
Allen et al 2014 (19)	8	4	152	9	7	148	40.7%	-1.00 [-2.29, 0.29]
Gouillat et al. 2001 (12)	18	6	38	26	12	37	3.7%	-8.00 [-12.31, -3.69]
Hesse et al. 2005 (14)	23.12	15.08	56	20.36	8.07	49	3.3%	2.76 [-1.79, 7.31]
Kollmar et al. 2008 (16)	17	13	35	16.6	10.2	32	2.2%	0.40 [-5.17, 5.97]
Kurumboor et al. 2015 (21)	11.75	3.02	55	13.27	4.25	54	35.5%	-1.52 [-2.91, -0.13]
Shan et al. 2005 (15)	28	16.6	27	30	15.6	27	0.9%	-2.00 [-10.59, 6.59]
Suc et al. 2004 (22)	17	18.5	122	19	20.9	108	2.6%	-2.00 [-7.13, 3.13]
Yeo et al. 2000 (11)	13.3	11.4	104	11.9	6.1	107	11.1%	1.40 [-1.08, 3.88]
Total (95% CI)			**589**			**562**	**100.0%**	**-1.06 [-1.88, -0.23]**

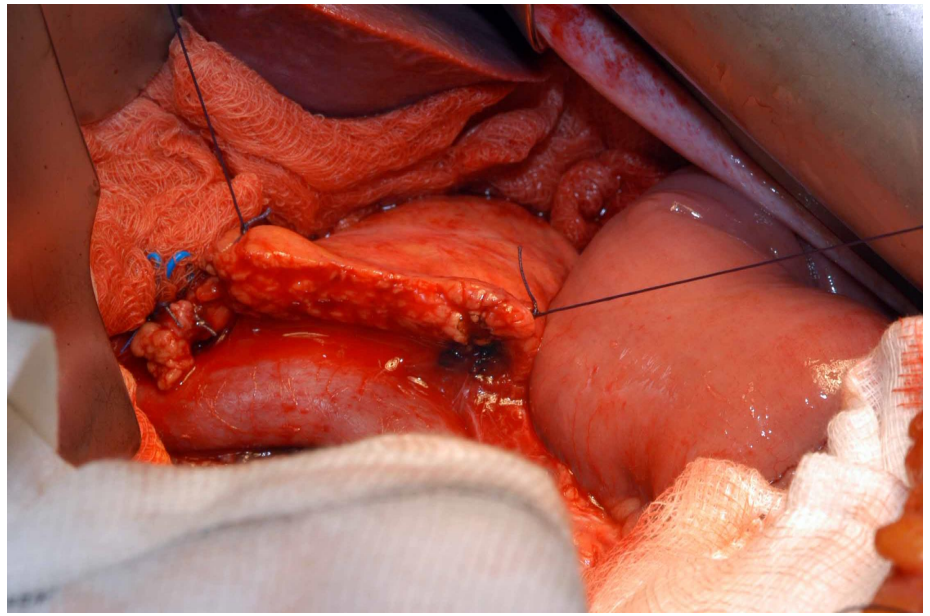
Study or Subgroup	Experimental Events	Total	Control Events	Total	Weight	Risk Ratio M-H, Fixed, 95% CI
Allen et al 2014 (19)	12	152	25	148	22.9%	0.47 [0.24, 0.90]
Anderson et al. 2014 (20)	2	79	12	100	9.6%	0.21 [0.05, 0.92]
Fernandez-Cruz et al. 2013 (18)	2	32	3	30	2.8%	0.63 [0.11, 3.48]
Gouillat et al. 2001 (12)	4	38	10	37	9.2%	0.39 [0.13, 1.13]
Hesse et al. 2005 (14)	5	55	4	50	3.8%	1.14 [0.32, 4.00]
Katsourakis et al. 2010 (17)	1	35	5	32	4.7%	0.18 [0.02, 1.48]
Kurumboor et al. 2015 (21)	6	55	10	54	9.1%	0.59 [0.23, 1.51]
Sarr et al. 2003 (13)	24	135	23	140	20.4%	1.08 [0.64, 1.82]
Suc et al. 2004 (22)	13	122	9	108	8.6%	1.28 [0.57, 2.87]
Yeo et al. 2000 (11)	11	104	10	107	8.9%	1.13 [0.50, 2.55]
Total (95% CI)		**807**		**806**	**100.0%**	**0.72 [0.55, 0.94]**
Total events	80		111			

Heterogeneity: $Chi^2 = 13.50$, $df = 9$ ($P = 0.14$); $I^2 = 33\%$
Test for overall effect: $Z = 2.40$ ($P = 0.02$)

Pancreatic Fistula

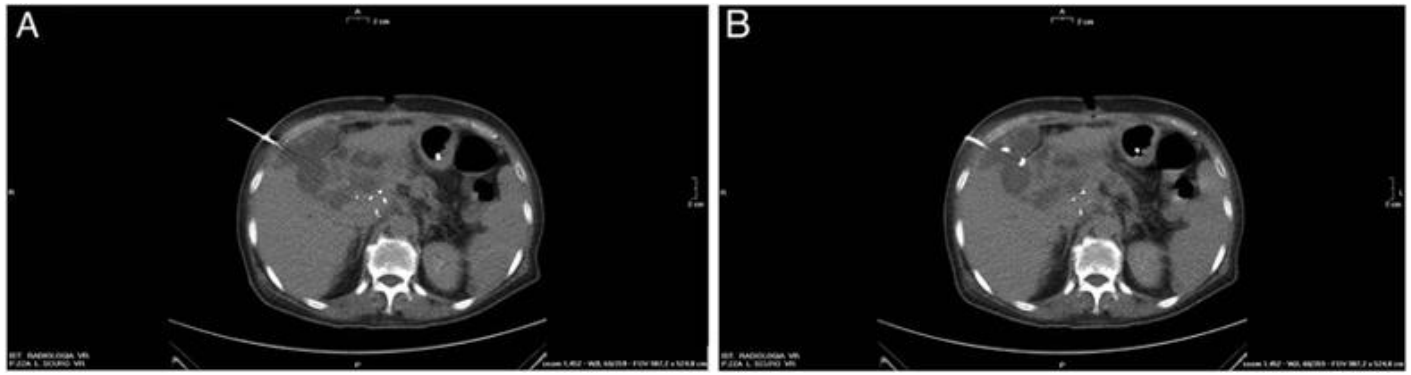
North American studies failed to demonstrate any benefit

Some studies advocate its use in selective cases – soft pancreas and small PD



3. Role of intraperitoneal drains and IR

	Drain	No Drain
Mortality at 30 days	1.5%	2.3%
Mortality at 90 days	0.8%	4.2%
Intra-abdominal infections	7.9%	8.2%
Radiological interventions	10.9%	12.1%
Wound infections	9.8%	9.9%



Zhang W et al. Cochrane Database Syst Rev 2018;2[illegible]

4. Surgical management

Most POPF are managed conservatively, however some require re-operative surgical intervention

Consider in cases of deteriorating general condition despite maximum care, sepsis inaccessible by radiological drain, suspected peritonitis and necrosis, serious bleeding from pseudoaneurysm when IR fails or is contraindicated

Surgical options

- Debridement and drainage
- Attempted repair of pancreato-eneteric anastomosis
- Construction of new anastomosis
- Completion pancreatectomy

Pancreatic Cancer

Unusual presentation Type 3C diabetes, Upper back pain with unexplained weight loss

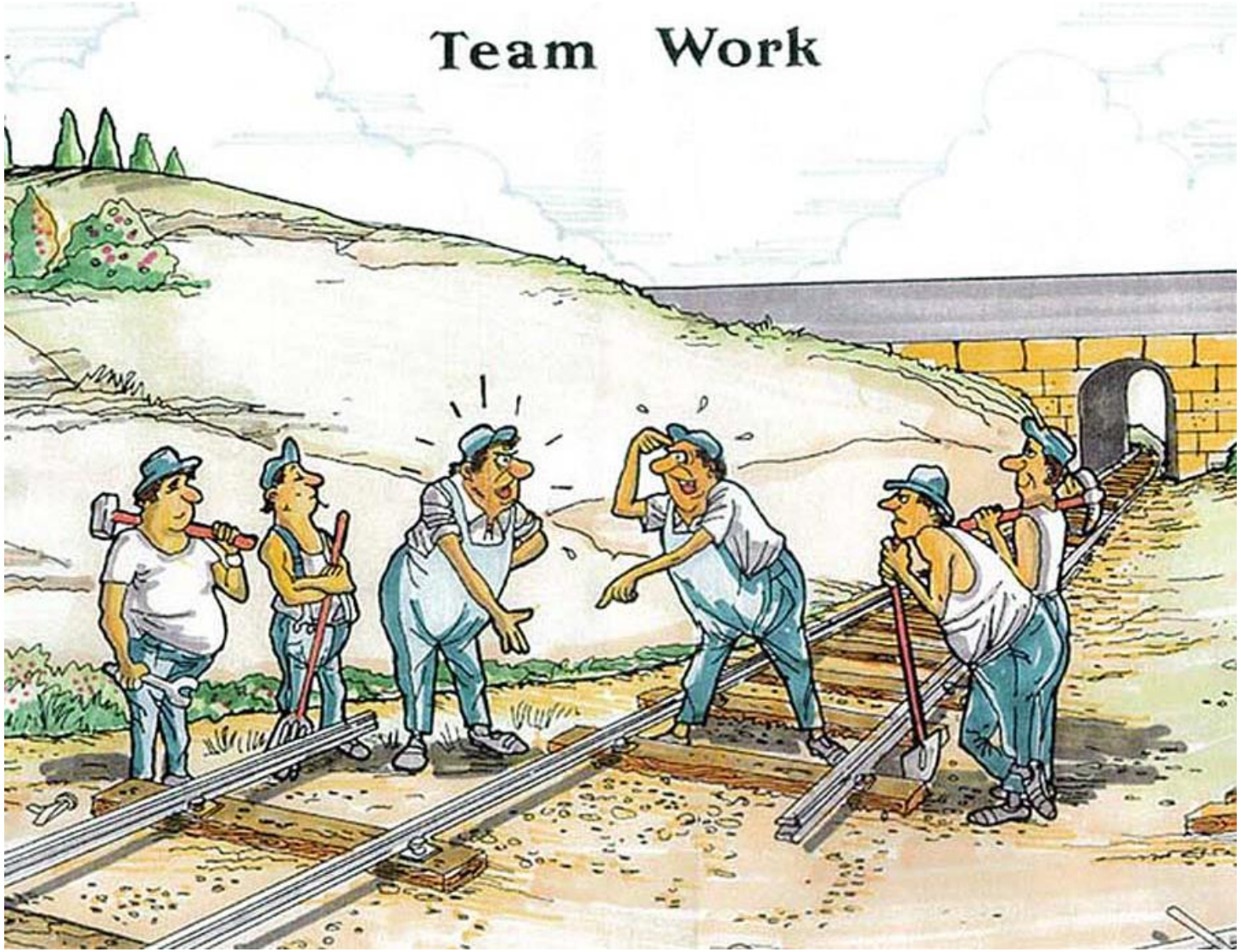
Ca19-9 not good for diagnosis [ANXIETY]

Post operative:

Creon 75 – 80 000 Units with meals, 25 – 50 000 Units with snacks

PPI

Monitor for Diabetes Onset



Take Home Message

"The management of pancreatic diseases and the complications regarding surgical management require a full multidisciplinary team approach"

#TimeMatters