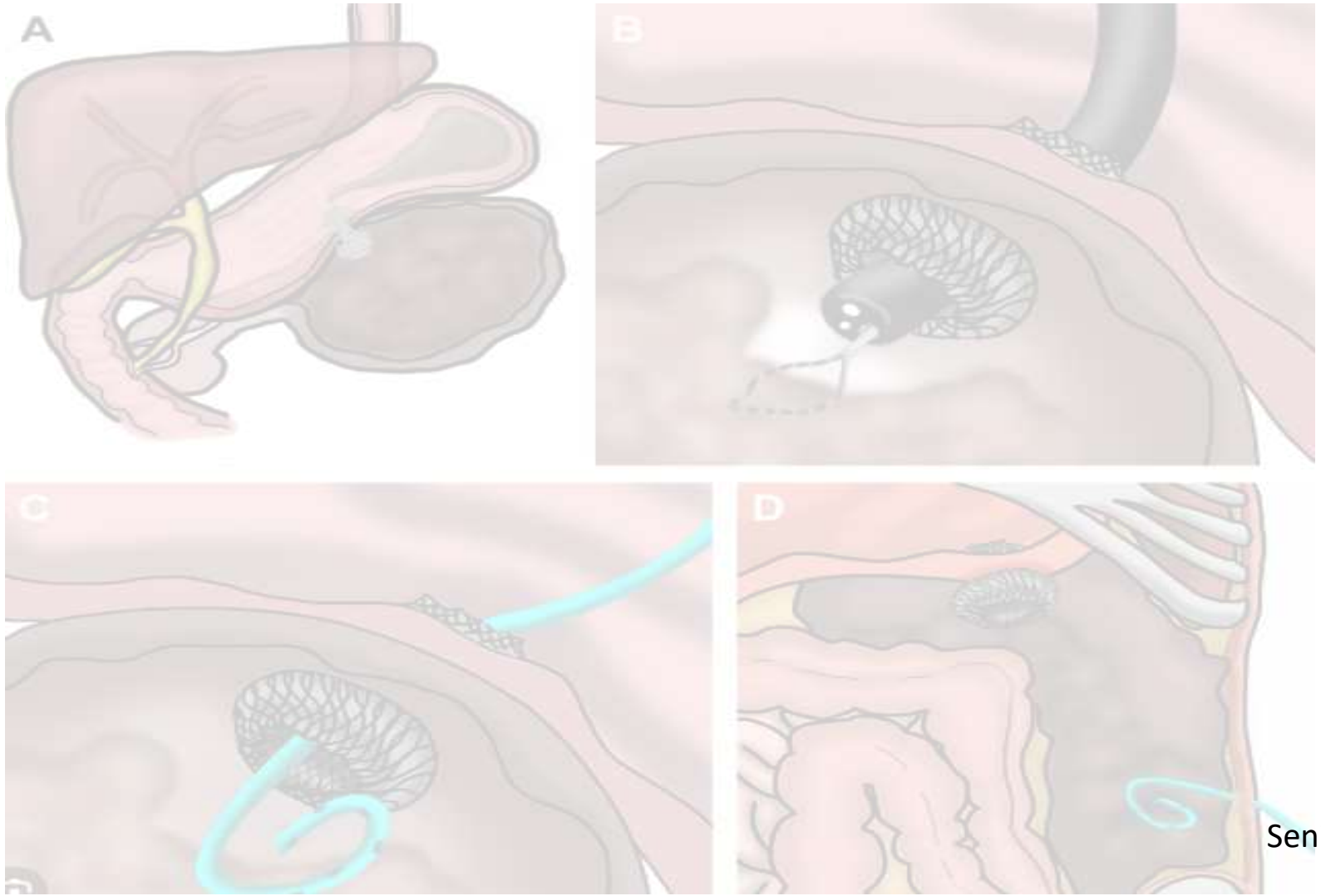
PERCUTANEOUS DIRECT ENDOSCOPIC NECROSECTOMY

DPU SUPER SPECIALTY HOSPITAL
(A Unit of Dr. D.Y. Patil Medical College, Hospital & Research Centre)
PIMPRI, PUNE



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Case

- 56 yr male
- Type 2 Diabetes Mellitus
- No addiction
- Referred from an outside facility with Ryle's tube, Foley catheter, and intra-abdominal drain in situ, and was on supplemental oxygen support

Presentation

- h/o Abdominal pain
  - Acute onset, progressive
  - Generalized , more on the upper abdomen
  - Moderate to severe intensity
  - Radiating to back
  - Increased on meals
  - nausea and vomiting
- Breathlessness
  - Insidious , progressive , initially on exertion to breathless at rest
- Decreased urine output
- Fever

15 days

Imaging

CECT A/p : (outside hospital)

Acute necrotizing pancreatitis

CTSI 10/10

Right para-colic gutter collection of **22 cm * 12 cm** with necrotic debris within.

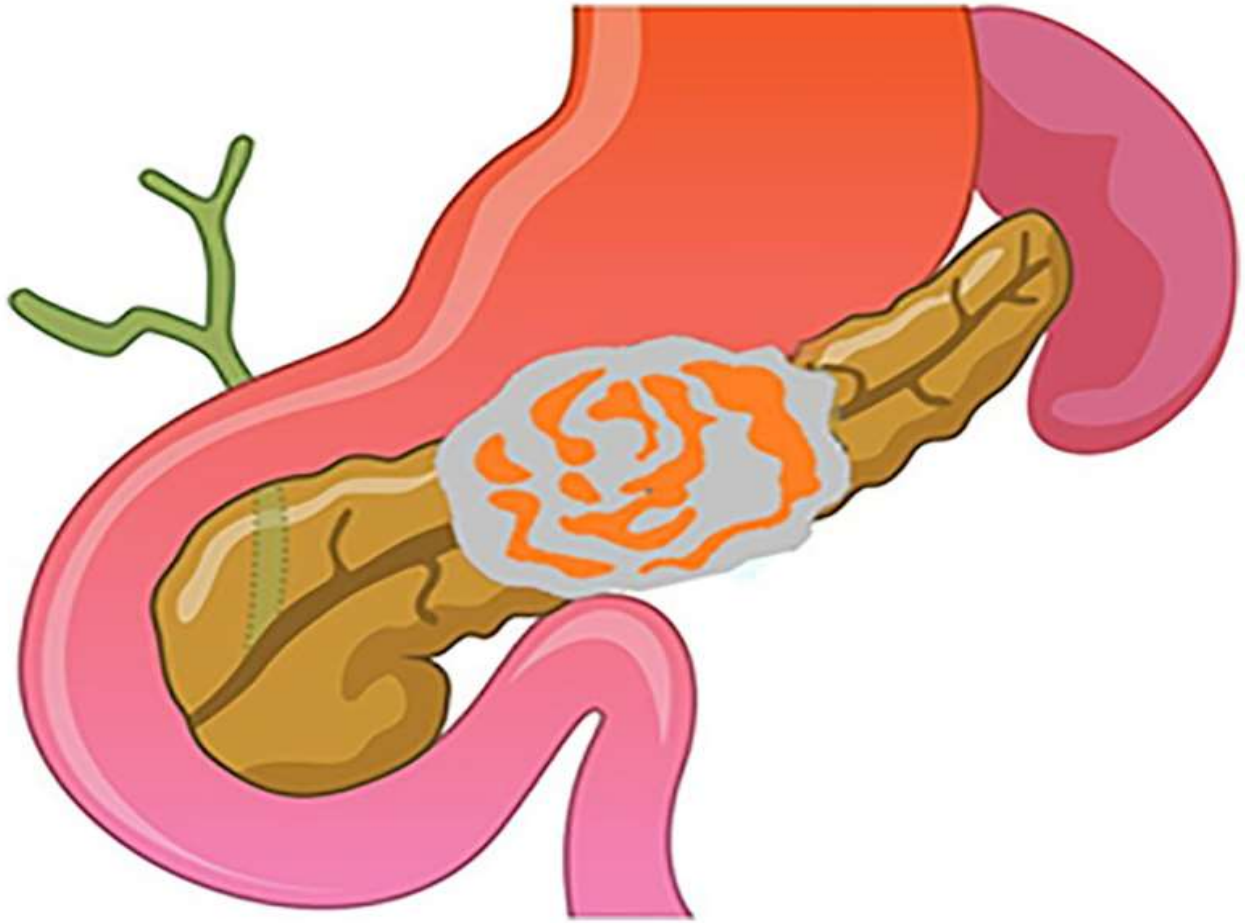
B/L mild-moderate pleural effusion.

Per-cutaneous drain = 24 Fr was placed on day 7 of pancreatitis.

Daily drain output > 300ml.

Diagnosis

- Acute severe necrotizing pancreatitis
  - PFC and right paracolic gutter infected collection.
  - Systemic complication - ARDS and AKI
  - 2nd week of pancreatitis (At admission to our hospital)



Vitals

- Ectomorphic male, restless, tachypneic, apprenhension
- P = 120 bpm
- BP = 90/60mmHg
- RR= 28/min
- SpO2 = 80 % @ RA,
  - 95 % @ 8L/O2/min

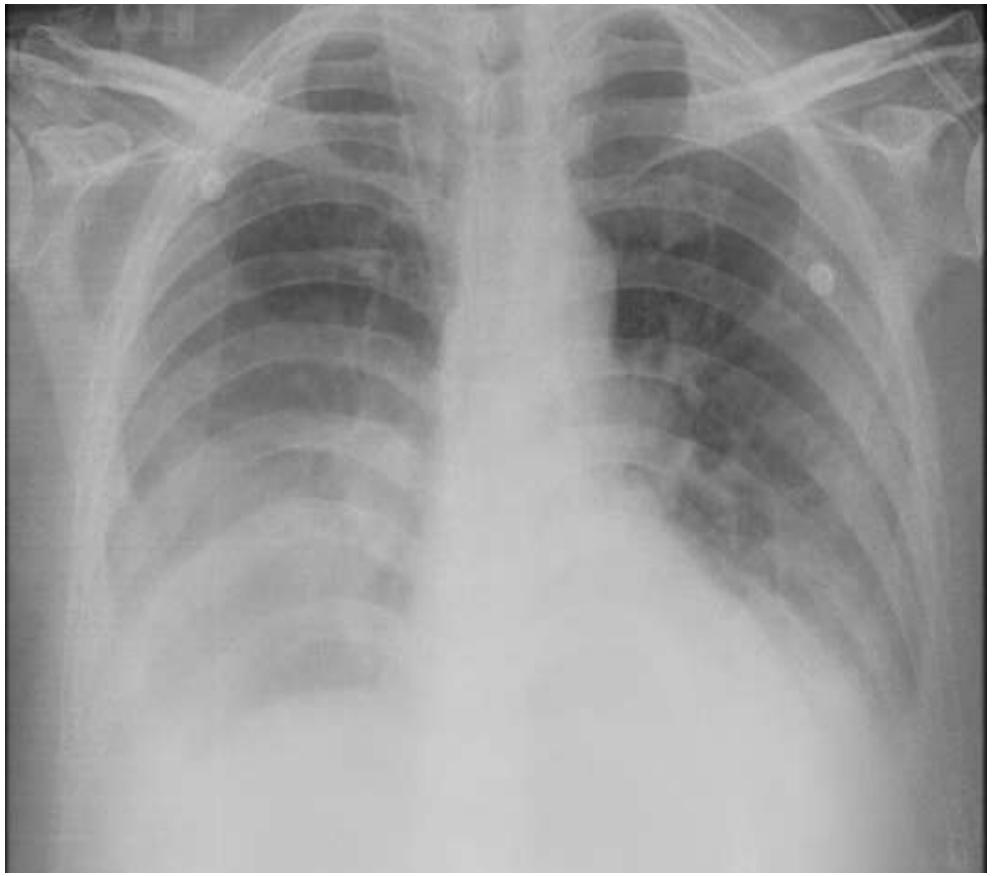
General examination

- Pallor + ,
- Bipedal oedema +
- No Icterus, Clubbing, lymphadenopathy

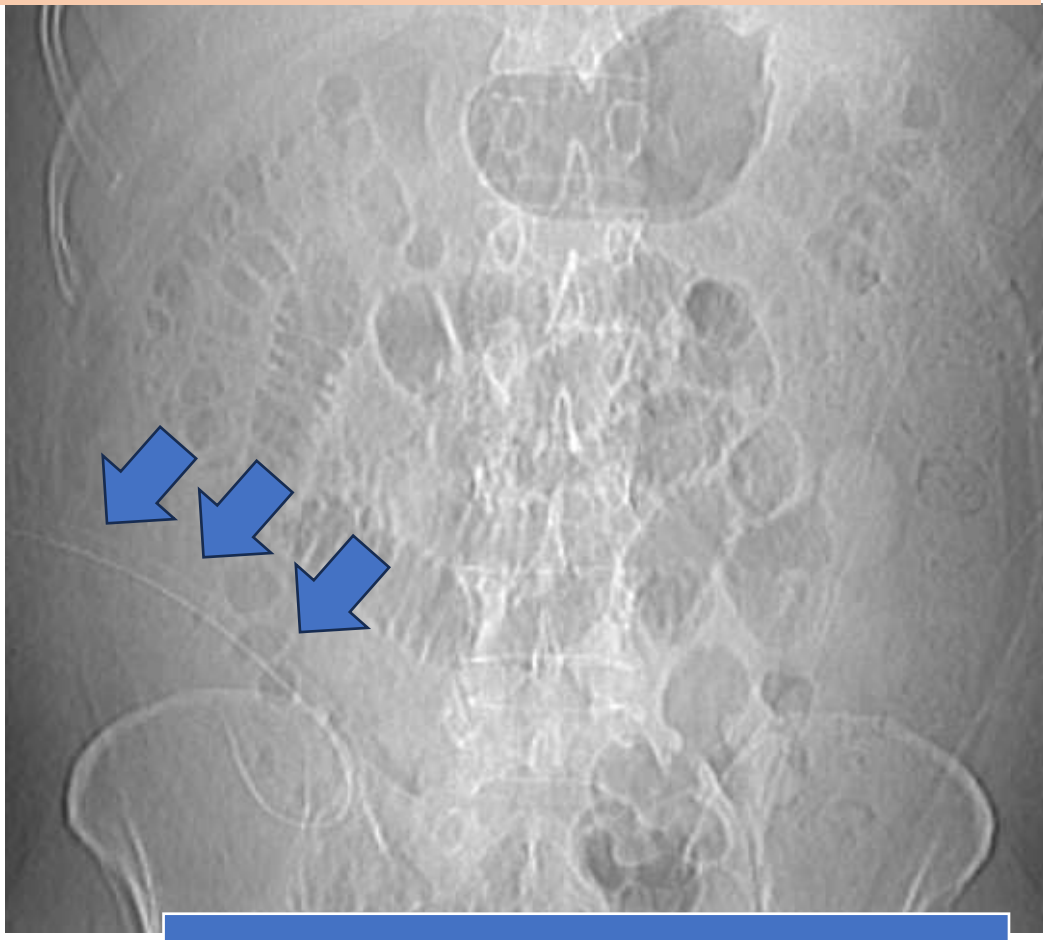
Systemic

- P/A – Right para-colic gutter drain in-situ. No hepatosplenomegaly. **Palpable bulge** noted in right side of the umbilicus.
- RS – B/L moderate pleural effusion.

Imaging



Bilateral pleural effusion



Right paracolic drain

LAB PARAMETERS

DPU

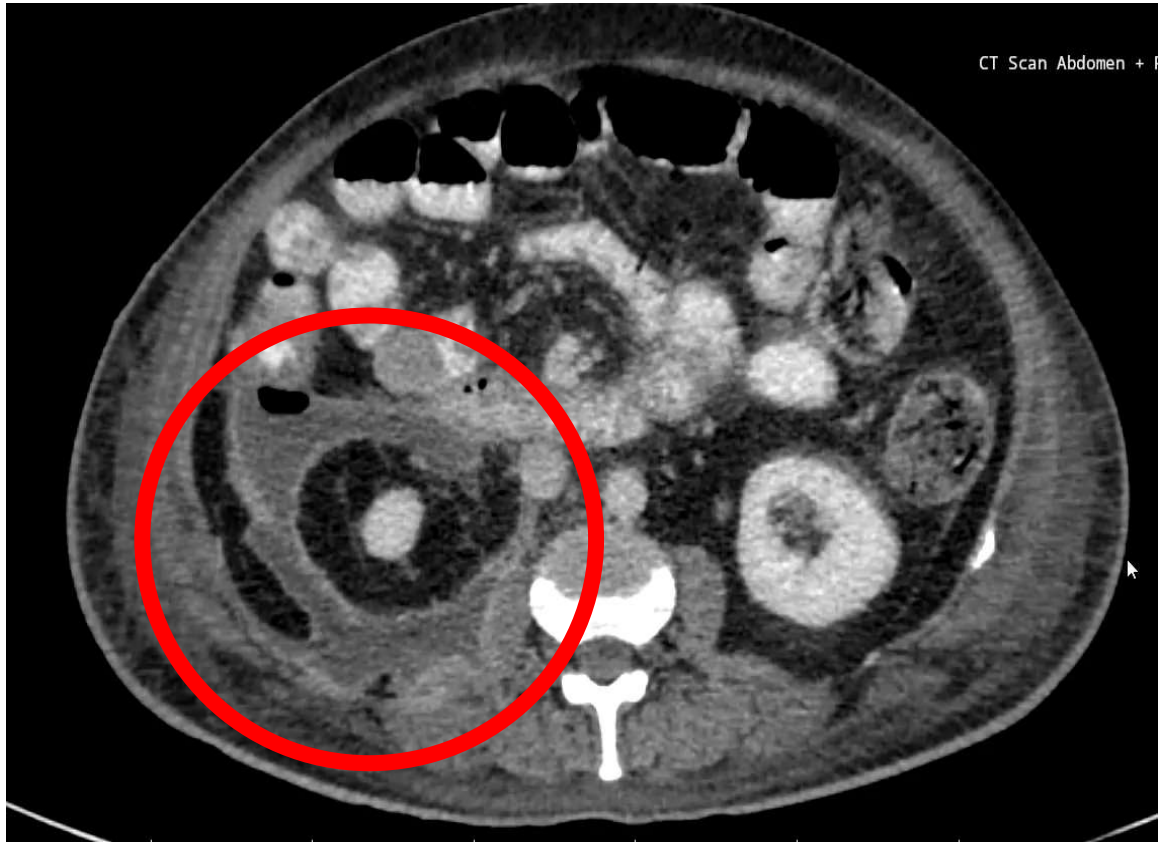
	5 Days prior (Outside hospital)	Day 0 2/3/2025	Day 3 5/3/2025
Hemoglobin (gm/dL)	11.3	7.6	7.1
TLC(/µl)	11300	8000	8300
Platelet	168000	448000	417000
UREA **CREATININE**	**31** **0.8**	**53** **1.36**	**56** **1.9**
Sr Amylase /Lipase	1150/ 960	50/64	
CRP	**240**	**154.2**	**119**
Procalcitonin	24	12.63	4.41

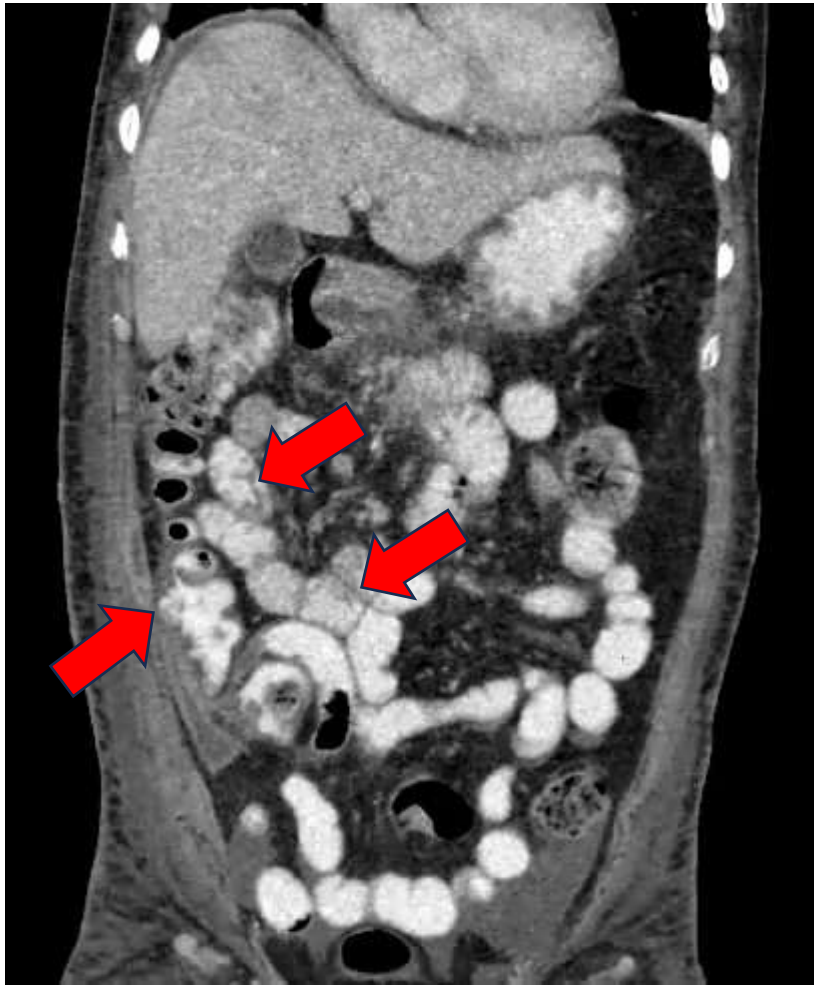
Total Bili/DB	0.89/0.20	1.00/0.59	Total Bili/DB
AST(SGOT) ALT(SGPT)	38 36	30 20	AST(SGOT) ALT(SGPT)
ALP GGT	182	123 109	ALP GGT
Total protein Albumin	5.90 3.5	5.5 2.6	Total protein Albumin

2/3/2024	Drain Culture : Klebsiella Sensitive : **Meropenem**/Doxycycline/Colistin	Urine : E . Coli	Blood Culture : No growth

Daily drain output was >300ml/day.

CECT Abdomen pelvis (2/3/2025) – 2nd week of pancreatitis





MRCP(12/3/2025)

- Pancreas appears normal.
- Small well defined thin walled collections (1 mm thickness) in head body and tail (< 1.5 cm)
- Fluid collection noted in right anterior & posterior pararenal spaces (maximum thickness 24 mm & 28 mm respectively) showing multiple hypointense debris.
- The peripheral margins of the collection shows diffusion restriction with low ADC value suggestive of pus &/or blood.
- No evidence of PD leak.

Progression

Day 15 of admission

Abdominal Pain

Fever

Increased drain output

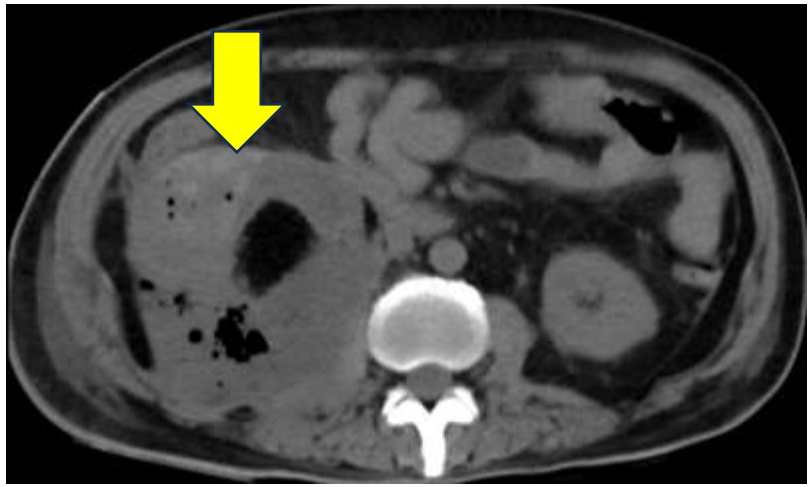
LAB PARAMETERS

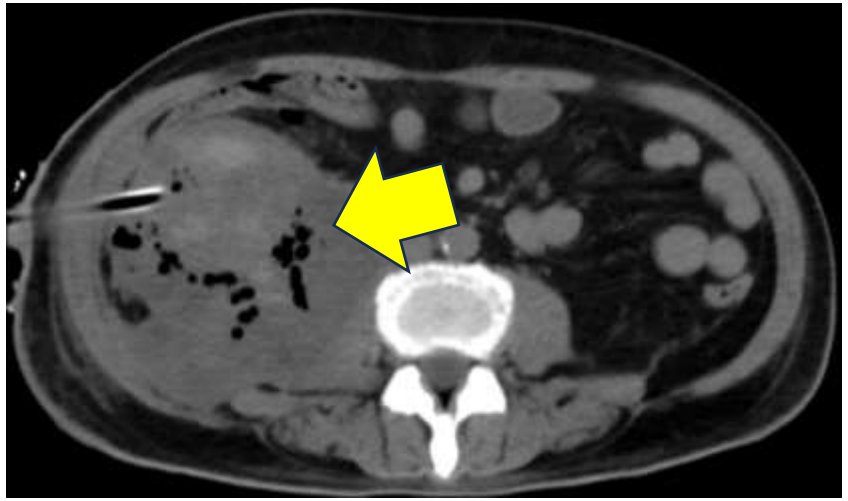
	5 Days prior to admission	Day 0 @ DPU 2/3/2025	Day 1 3/3/2025	Day 3 6/3/2025	Day 6 8/2/2025	Day 15 17/3/2025
Hemoglobin (gm/dL)	11.3	7.6	7.1	8.1	8.5	8.2
TLC(/µl)	11300	8000	8300	9300	7900	**23420**
Platelet	168000	448000	417000	300000	353000	439000
Sr Amylase /Lipase	1150/ 960	50/64			71 93	
CRP	**240**	**154.2**	**119**		**61**	**210**
Procalcitonin	**24**	**12.63**	**4.41**		**0.38**	**2.42**

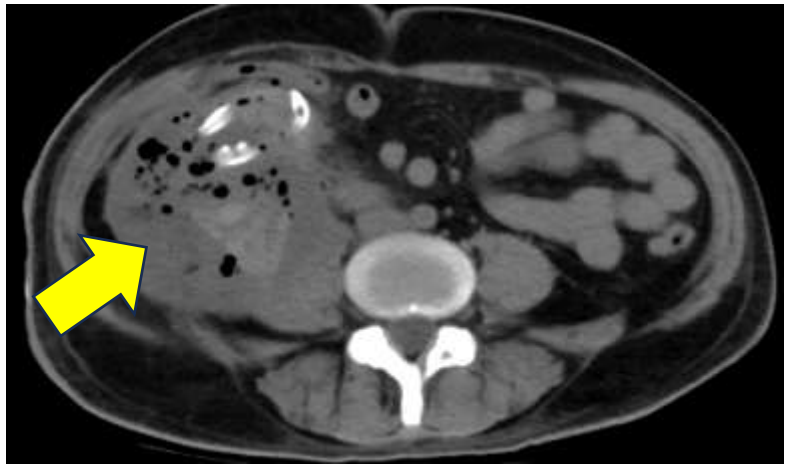
Total protein **Albumin**	**5.90** **3.5**	**5.5** **2.6**			**5.8** **2.5**	**5.4** **1.9**
UREA **CREATININE**	31 0.8	53 1.36	56 1.9	60 1.4	17 0.62	52 0.82

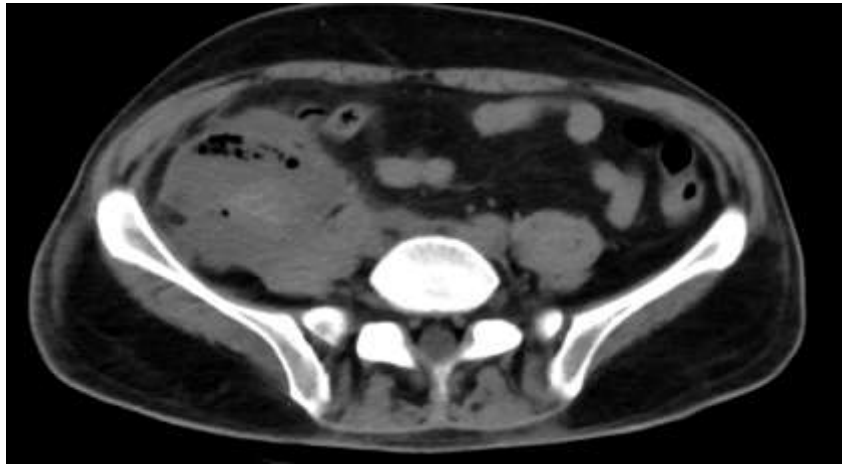
17/3/2025	**Drain : Klebsiella ; Senisitive colistin**	**Urine culture: No growth**	**Blood culture : No growth**

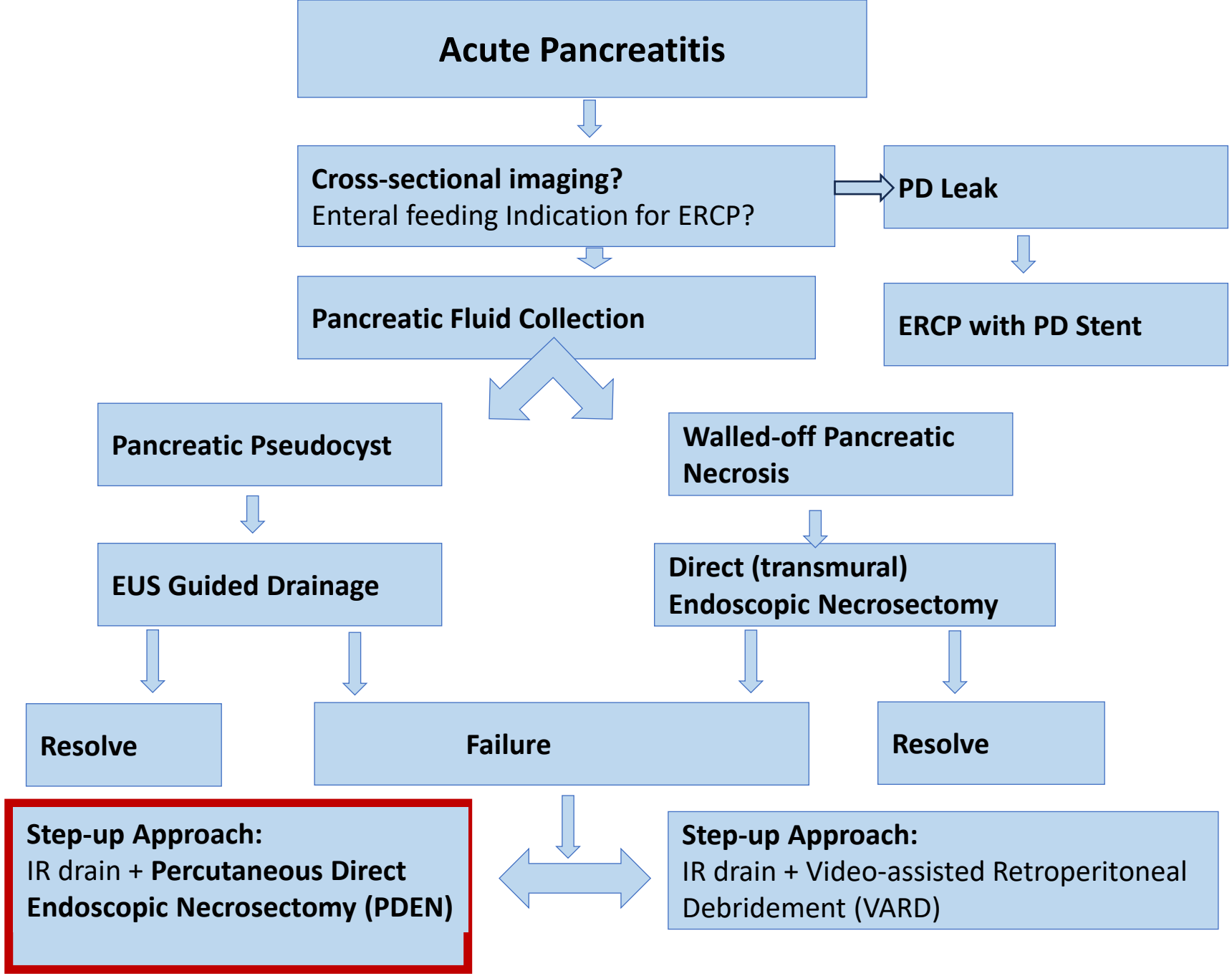
CECT Abdomen pelvis (17/3/2025) – 4 weeks of pancreatitis





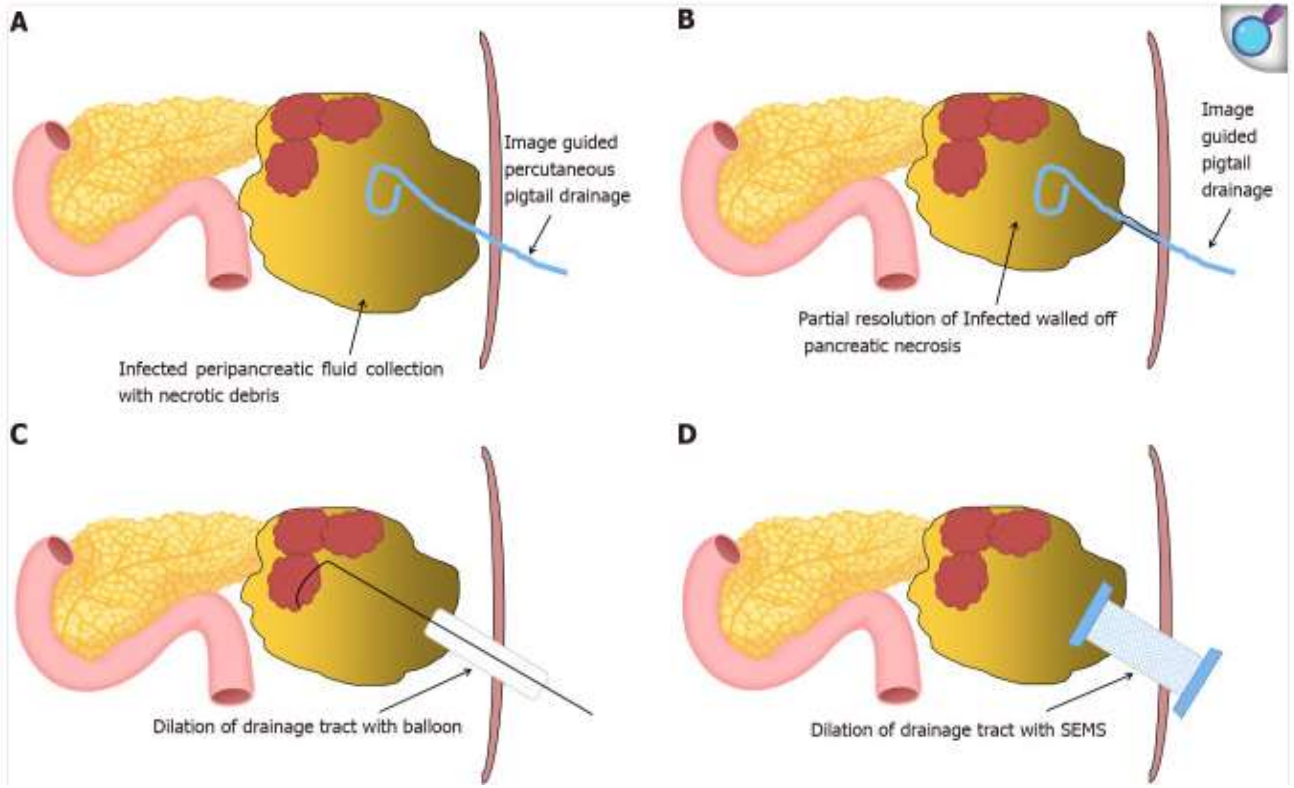





Acute Pancreatitis
Cross-sectional imaging?
Enteral feeding Indication for ERCP?
PD Leak
ERCP with PD Stent
Pancreatic Fluid Collection
Pancreatic Pseudocyst
Walled-off Pancreatic Necrosis
EUS Guided Drainage
Direct (transmural) Endoscopic Necrosectomy
Resolve
Failure
Resolve
Step-up Approach:
IR drain + Percutaneous Direct Endoscopic Necrosectomy (PDEN)
Step-up Approach:
IR drain + Video-assisted Retroperitoneal Debridement (VARD)

Schematic representation of steps involved in

Percutaneous direct endoscopic necrosectomy (PDEN)



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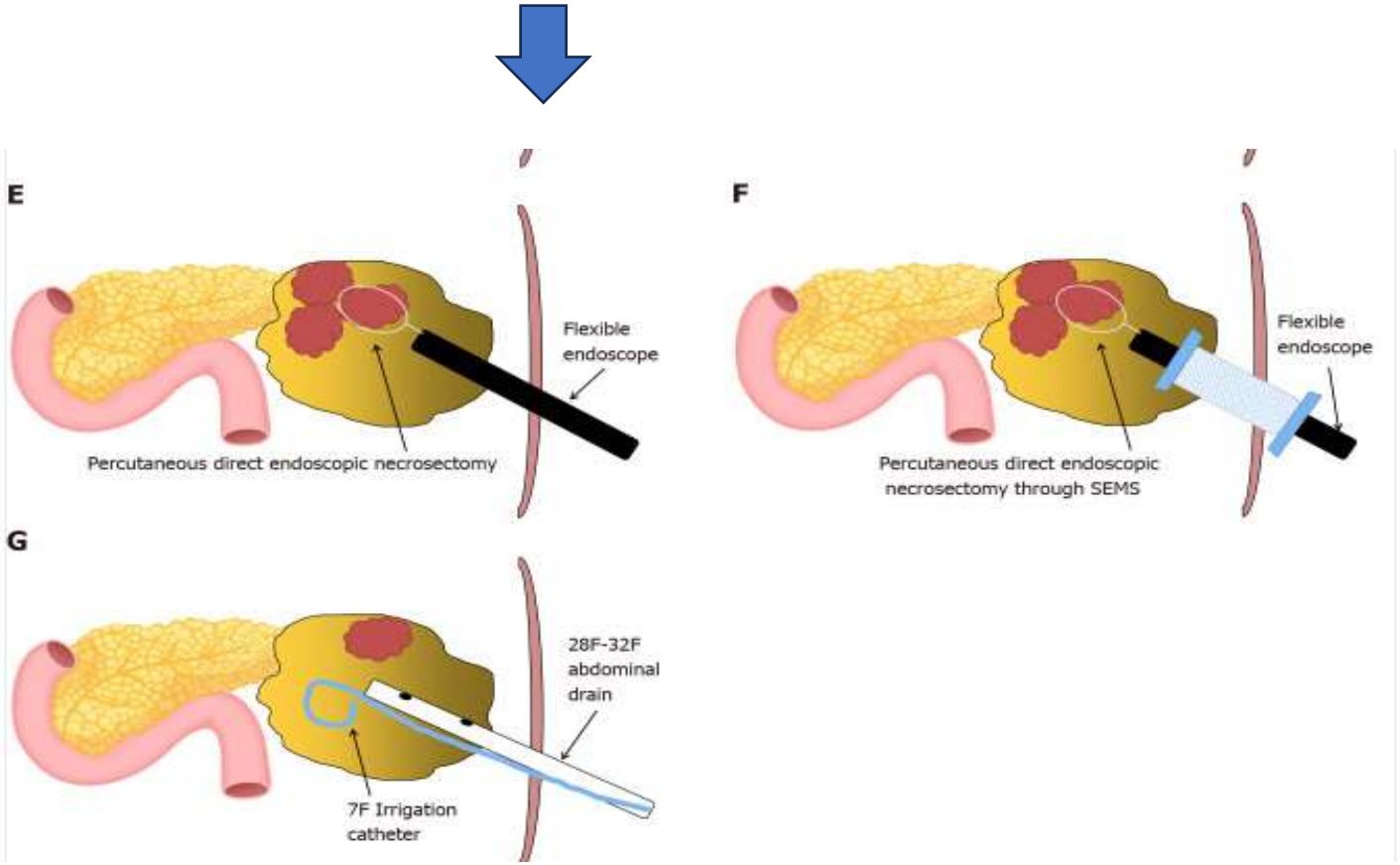
Schematic representation of steps involved in

Percutaneous direct endoscopic necrosectomy (PDEN)



Endoscopic mesh

Endoscopic Rat tooth forceps

Video : Percutaneous Direct Endoscopic Necrosectomy (PDEN)

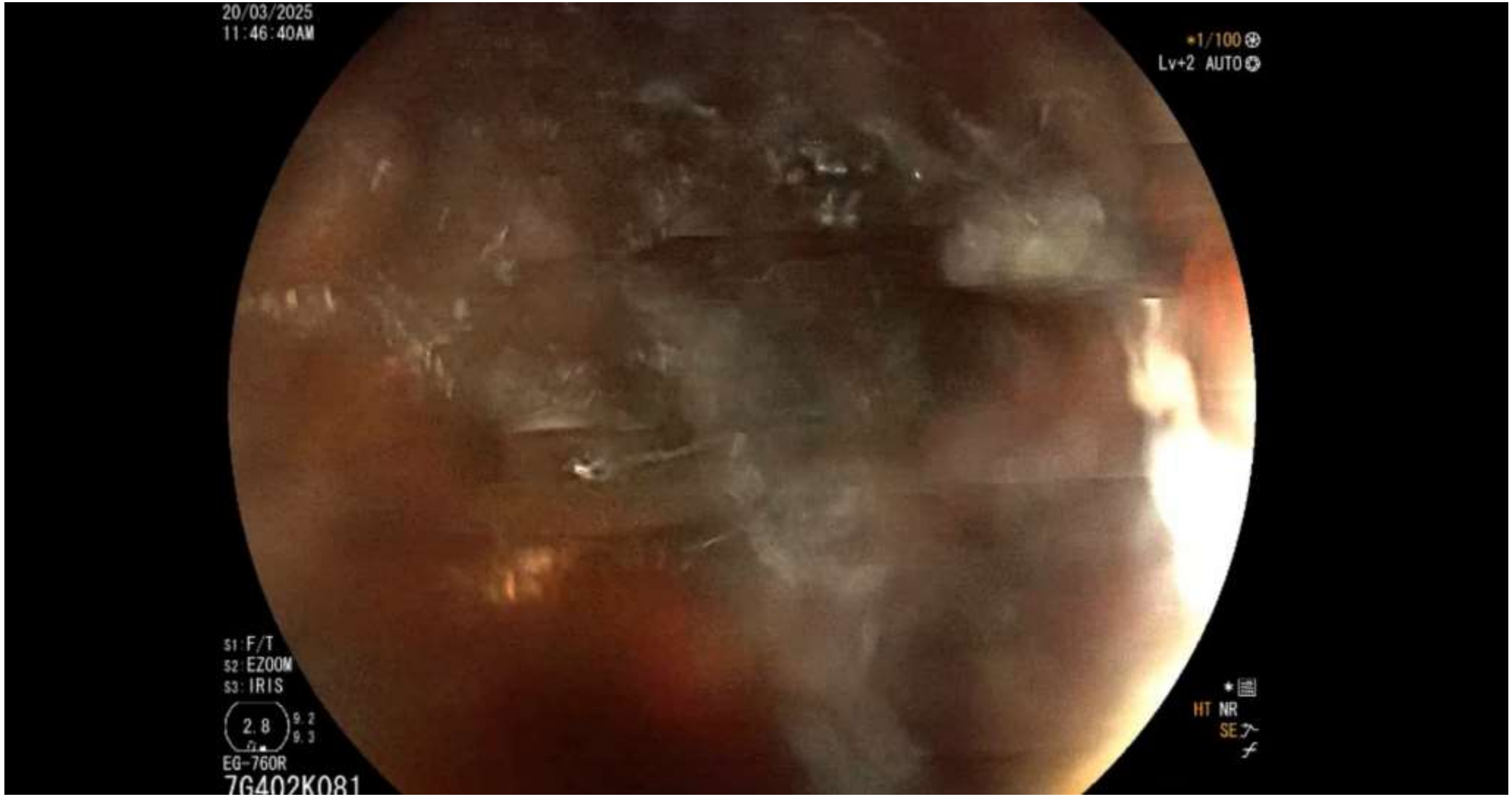
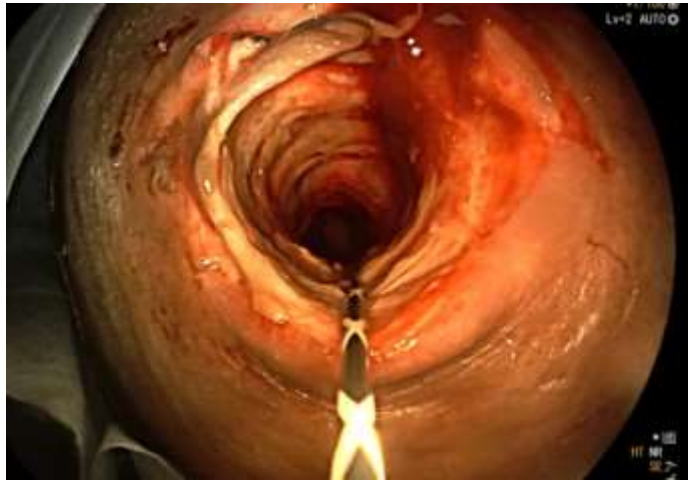
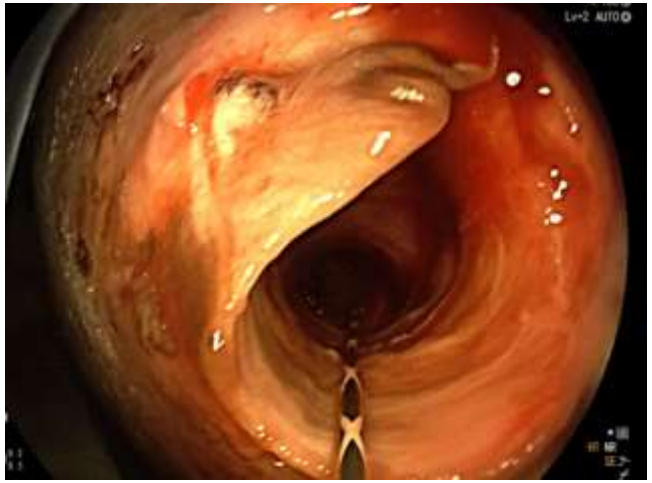
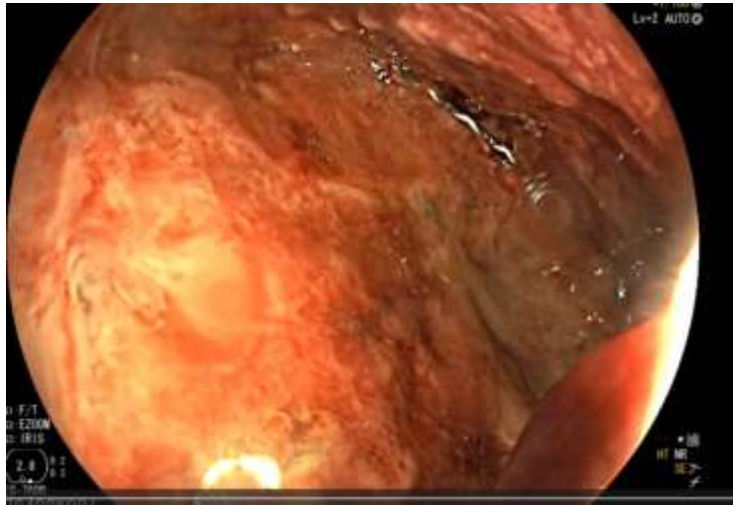
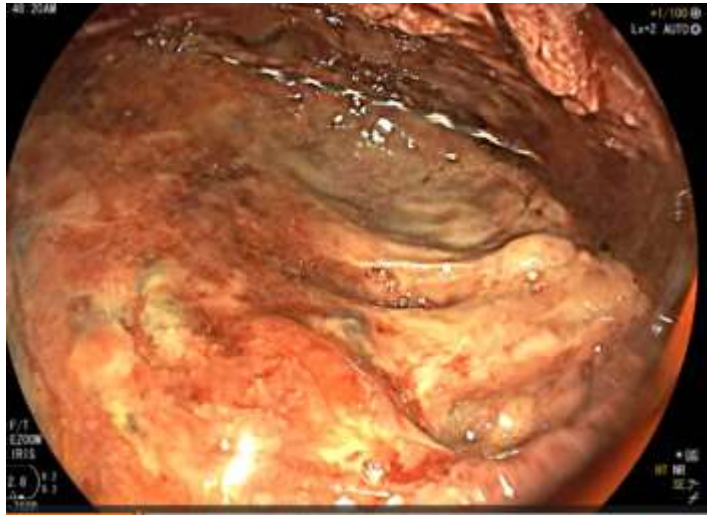
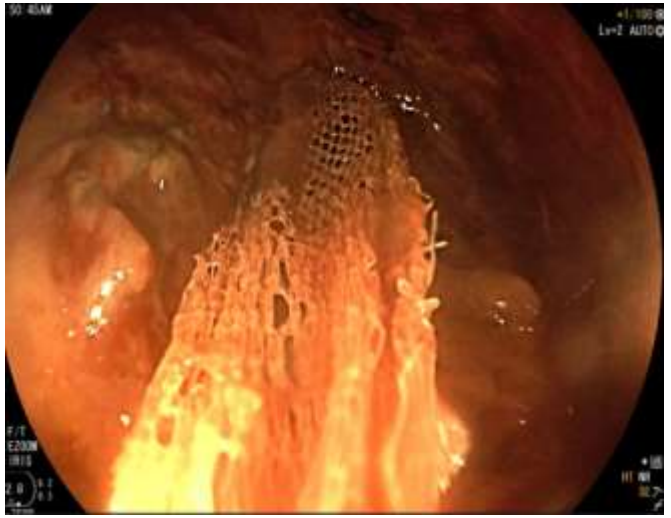
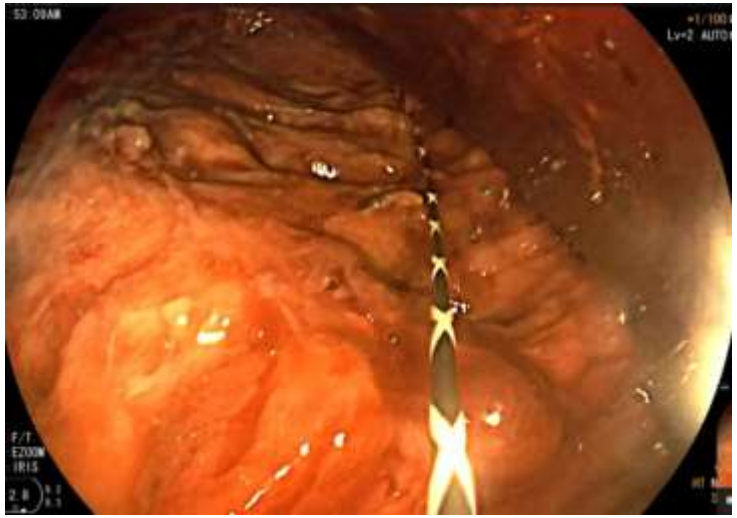
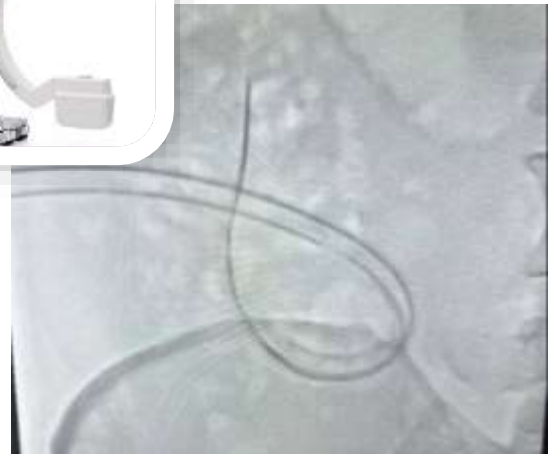
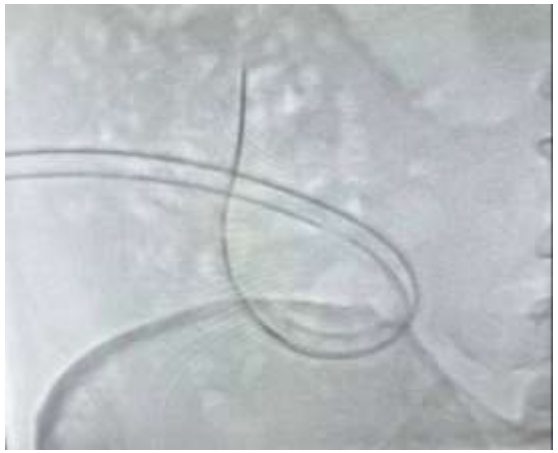


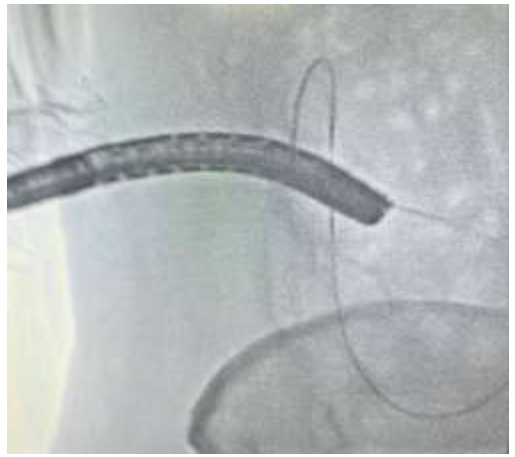
Photo : Percutaneous Direct Endoscopic Necrosectomy (PDEN)

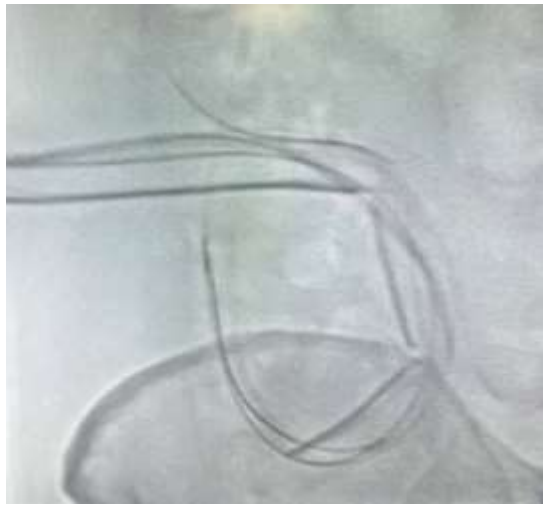







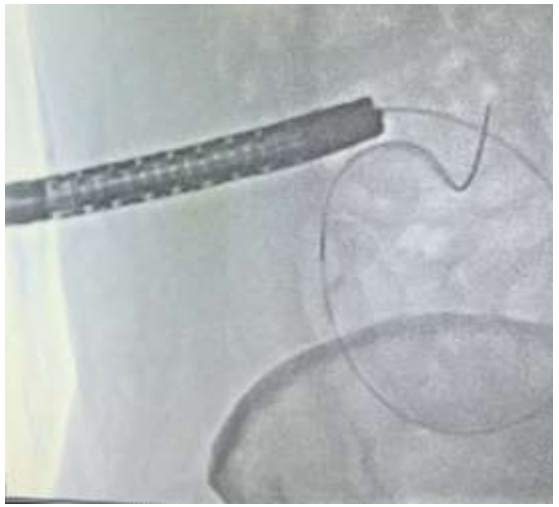
Fluoroscopic Images : Percutaneous Direct Endoscopic Necrosectomy (PDEN)

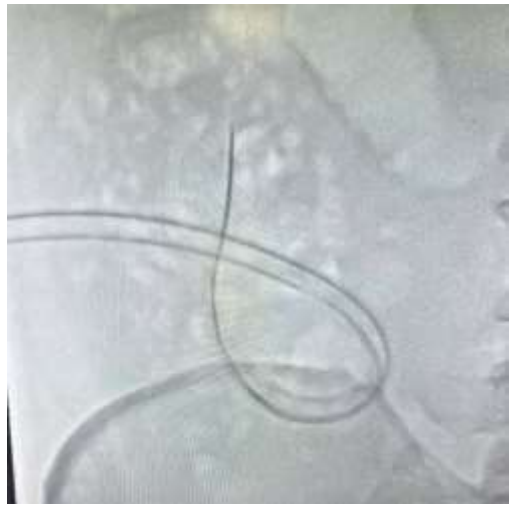








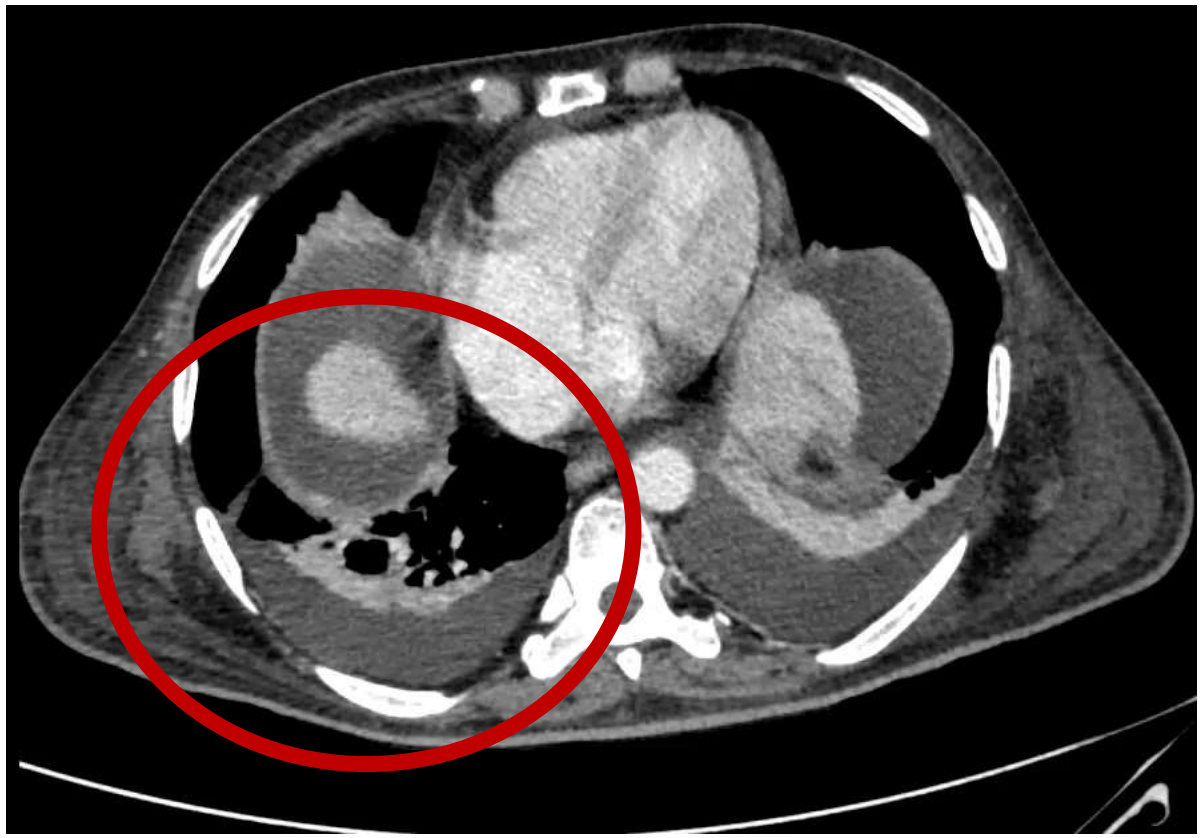


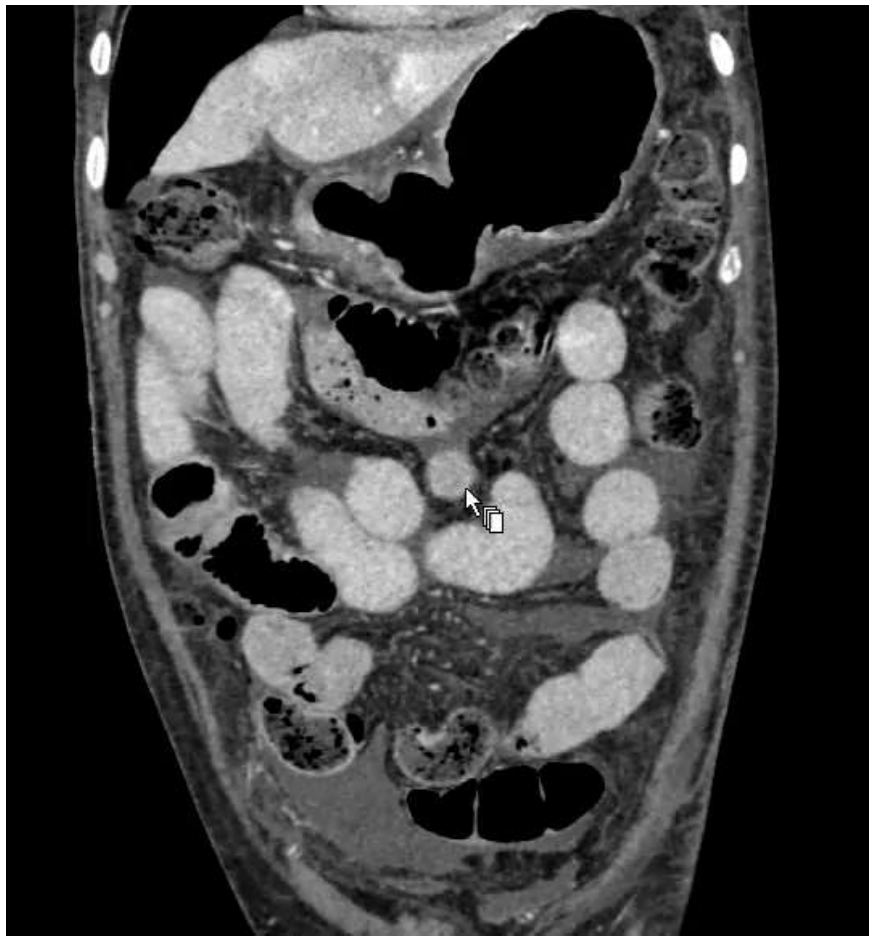


LAB PARAMETERS

	Day 15 17/3/2025	Day 21 23/3/2025	Day 28 30/3/2025
Hemoglobin (gm/dL)	8.2	6.9	6.5
TLC(/µl)	23420	17200	16700
Platelet	439000	243000	313000
CRP	210	108	111
Procalcitonin	2.42		0.46
Total protein Albumin	5.4 1.9		4.9 2.3

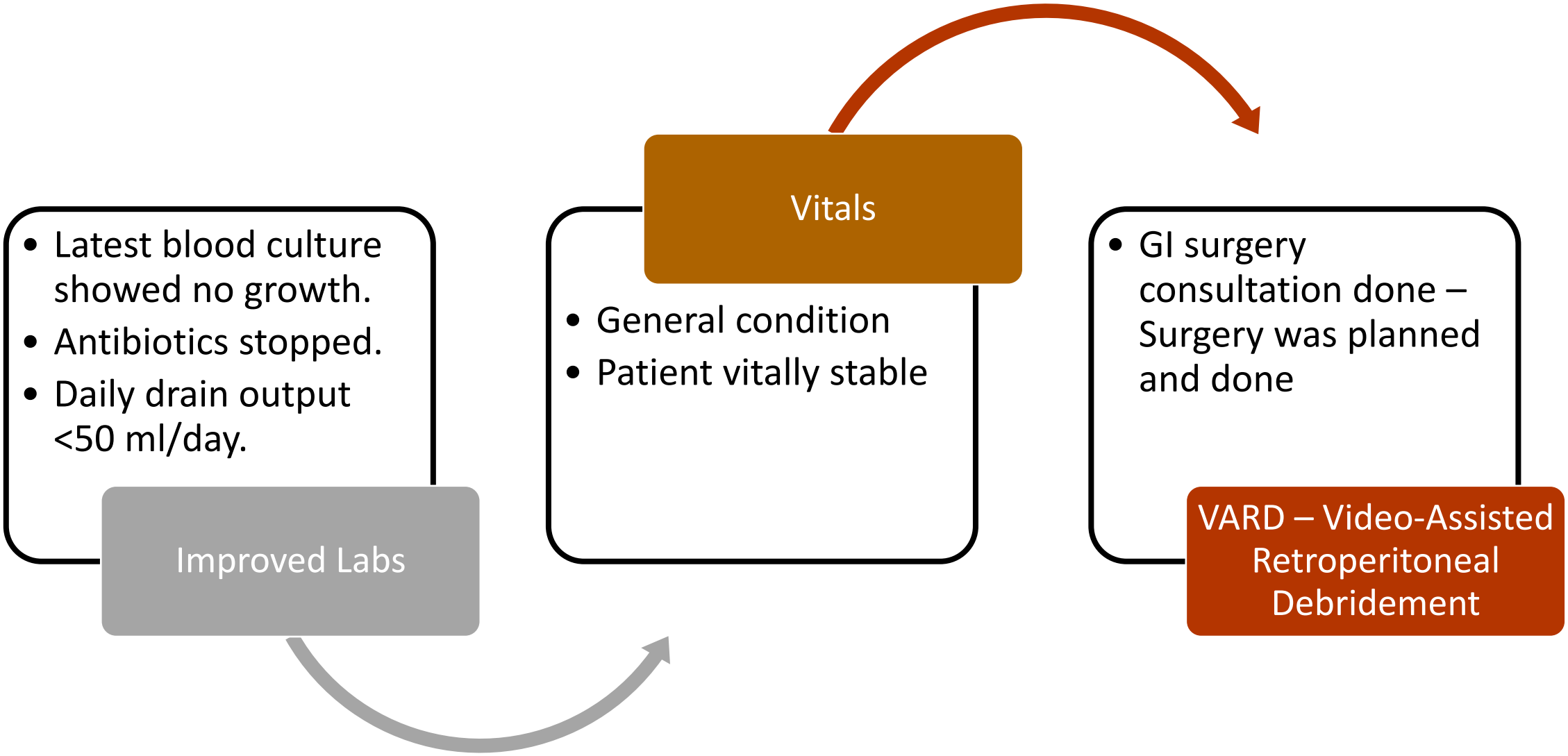
CECT Abdomen pelvis (30/3/2025) - 6th week of pancreatitis



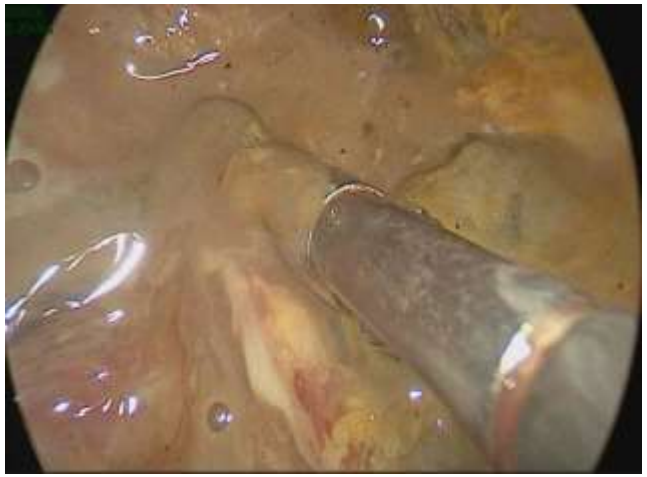
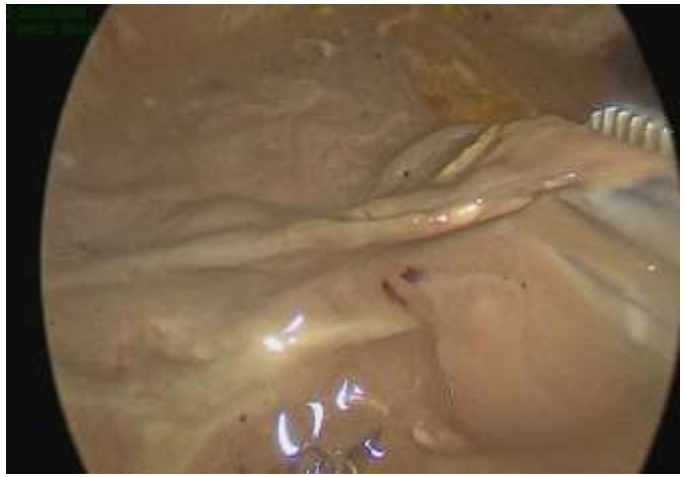
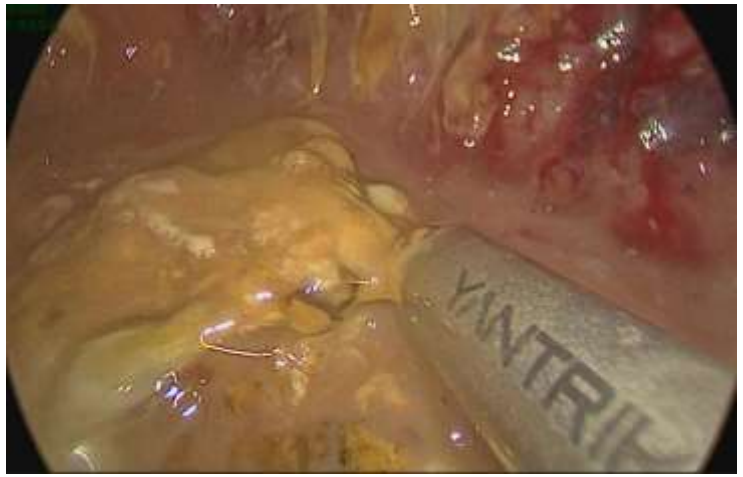


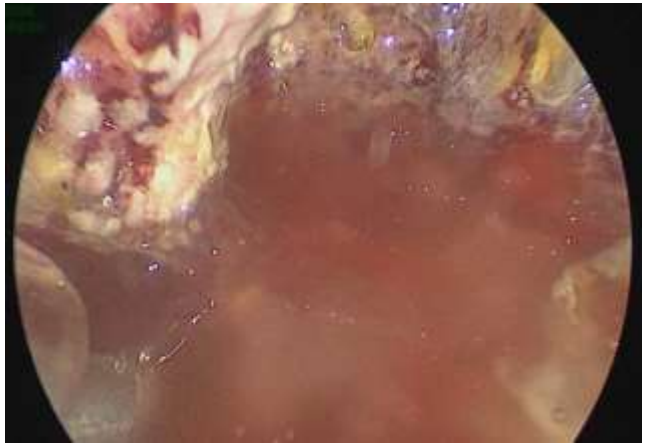
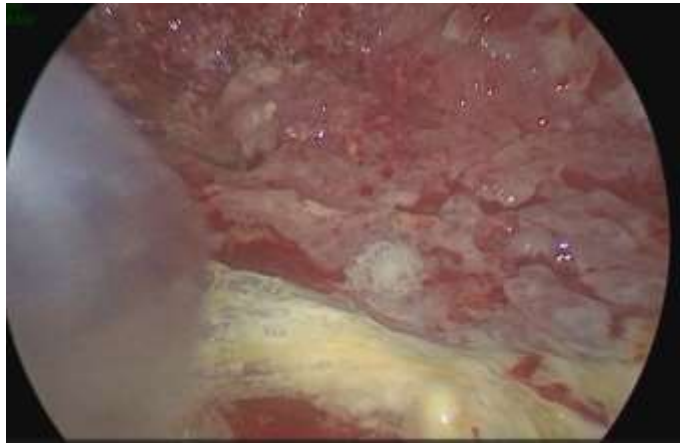
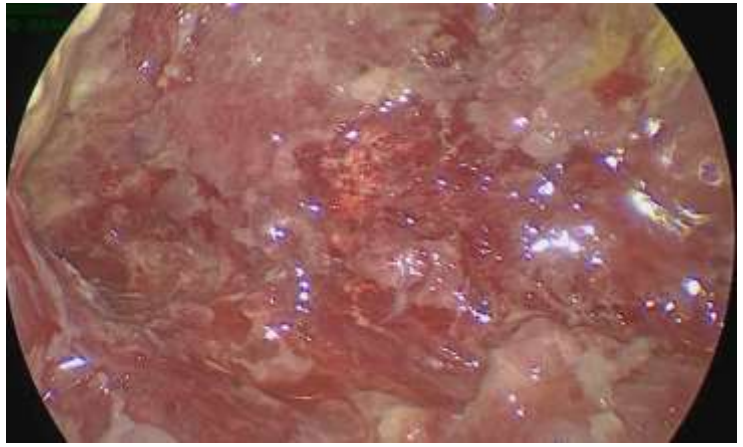
LAB PARAMETERS

	Day 6 8/2/2025	Day 15 17/3/2025	Day 21 23/3/2025	Day 28 27/3/2025	Day 35 7/4/2025
Hemoglobin (gm/dL)	8.5	8.2	6.9	6.5	7.8
TLC(/µl)	7900	**23420**	**17200**	**16700**	**6400**
Platelet	353000	439000	243000	313000	425000
Total protein **Albumin**	5.8 2.5	5.4 1.9		**4.9** **1.9**	**5.6** **3.1**
UREA **CREATININE**	17 0.62	48 0.82	26 0.5	**21** **0.43**	**21** **0.43**
CRP	**61**	**210**	**108**	**111**	**36**
Procalcitonin	0.38	2.42			


Vitals
• General condition
• Patient vitally stable
• GI surgery consultation done – Surgery was planned and done
VARD – Video-Assisted Retroperitoneal Debridement
• Latest blood culture showed no growth.
• Antibiotics stopped.
• Daily drain output <50 ml/day.
Improved Labs

GI Surgery - Video-Assisted Retroperitoneal Debridement (VARD)

Acute Necrotising Pancreatitis

Prevalence

Approximately 10%–20%

Disease

Prolonged course

Poor Prognosis

Mortality rate

20-30%

Approach

Multidisciplinary,

Minimally invasive “step-up” approach is considered the cornerstone.

Jain S, Padhan R, Bopanna S, Jain SK, Dhingra R, Dash NR, Madhusudan KS, Gamanagatti SR, Sahni P, Garg PK. Percutaneous endoscopic step-up therapy is an effective minimally invasive approach for infected necrotizing pancreatitis. Dig Dis Sci. 2020;65:615–622. doi: 10.1007/s10620-019-05696-2.

Endoscopic transmural drainage is not feasible in:

- Early PFCs (<2–4 weeks) without a mature wall
- PFCs in paracolic gutters or pelvis
- WOPN distant from stomach/duodenum

Aim of drainage:

- Control infection quickly
- Stabilize the patient

Jain S, Padhan R, Bopanna S, Jain SK, Dhingra R, Dash NR, Madhusudan KS, Gamanagatti SR, Sahni P, Garg PK. Percutaneous endoscopic step-up therapy is an effective minimally invasive approach for infected necrotizing pancreatitis. Dig Dis Sci. 2020;65:615–622. doi: 10.1007/s10620-019-05696-2.

Percutaneous direct endoscopic pancreatic necrosectomy (PDEN)

- Minimally invasive technique
- Debridement of infected necrotic material
- A flexible endoscope
- Via matured sinus tract connecting the WOPN and skin

Indications (PDEN)

< 2-4 week-

1) **Infected acute pancreatic or peripancreatic collection:-**Requiring **early percutaneous intervention.**

2) Persistent infection:-Despite **percutaneous drainage**, infection continues.

> 2-4 week- Infected walled off pancreatic necrosis unsuitable for transmural drainage:

- (1) Location (Paracolic/pelvic extension);
- (2) Distance > 1 cm;
- (3) Coagulopathy;
- (4) Multiple collaterals

Vyawahare MA, Gulghane S, Titarmare R, Bawankar T, Mudaliar P, Naikwade R, Timane JM. Percutaneous direct endoscopic pancreatic necrosectomy. World J Gastrointest Surg. 2022 Aug 27;14(8):731-742. doi: 10.4240/wjgs.v14.i8.731. PMID: 36157371; PMCID: PMC9453331

PDEN : Procedure

PDEN is performed using CO_2 insufflation.

Key step: Irrigation with sterile normal saline to evacuate pus and liquefied necrosis.

Instruments used: Rat-tooth forceps, snare, polyp/dormia basket, or automated rotor device.

Precaution: Remove only loose debris with gentle traction to avoid bleeding or perforation.

Post-session care:

- Insert 30–32 F drain to keep tract dilated.
- Insert 7–8 F irrigation catheter for saline wash.

Number of sessions depends on amount of solid necrotic debris.

Goals of PDEN:

- Symptom relief and necrotic debris removal
- Visualization of healthy granulation tissue

Drain management: Gradual replacement with smaller catheters weekly to close sinus tract after symptom resolution.

Percutaneous direct endoscopic pancreatic necrosectomy (PDEN)

- Critically ill patients where laparoscopy access is not possible
- Bed side.
- No intraperitoneal transmission (retroperitoneal approach)
- Access various extensions deep within the abdomen.
- Carried out under deep sedation; general anaesthesia avoided.

Vyawahare MA, Gulghane S, Titarmare R, Bawankar T, Mudaliar P, Naikwade R, Timane JM. Percutaneous direct endoscopic pancreatic necrosectomy. World J Gastrointest Surg. 2022 Aug 27;14(8):731-742. doi: 10.4240/wjgs.v14.i8.731. PMID: 36157371; PMCID: PMC9453331

Acknowledgement

- **Department of Interventional Radiology**
- **Department of Gastrointestinal surgery**
- **Department of Radio-Diagnosis**
- **Department of Anaesthesiology**


THANK YOU!