



Revise your 'Revised Atlanta Classification'!

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Background ¹⁻⁴

- The **Atlanta Classification** was first devised in **1992**, in order to provide a consistent way of classifying **acute pancreatitis** and **standardising the terminology** used by the various clinical teams involved.
- With practice, greater evidence base and better knowledge of the disease process, in addition to improvement in imaging techniques, some of the terms and definitions in this were rendered ambiguous, confusing or inaccurate. The classification was therefore **revised in 2012**.
- Despite this being well-established, it is still not routinely used in radiology reports by all Radiologists and there is still a great deal of variation and inaccuracy in the terms used. In particular, the term '**pseudocyst**' is commonly and inappropriately used to describe the majority of pancreatic collections, sometimes leading to inappropriate management.
- There are **two main types of pancreatitis**, **interstitial oedematous** pancreatitis and **necrotizing** pancreatitis and **four fluid collection types**, with specific definitions. The collection type depends on 2 main factors – (1) presence or absence of **necrosis** and (2) **time** since onset of pancreatitis (less or more than 4 weeks).
- This educational poster aims to emphasise the accurate use of these terms as this has significant implications on management, and the different forms of pancreatitis and their respective collection types bear different prognoses.

Aims

- To provide a refresher to reporters of the different nomenclature and definitions in the Revised Atlanta classification system of acute pancreatitis – in particular we aim to emphasise the 4 distinct type of pancreatitis-related collections defined.
- To use example cases to illustrate how the different entities appear on imaging.
- To gain insight into management – including how different collections may differ in their management with radiological, endoscopic and surgical interventions - in order to understand relevance of distinction between collection types.

Diagnostic Criteria

The Revised Atlanta Classification states **2 or more** of the following **3 criteria** should be present in order to diagnose acute pancreatitis¹:

- 1) Abdominal **pain** suggestive of pancreatitis,
- 2) Serum **amylase** or lipase level - $\geq \times 3$ upper normal value, or
- 3) Characteristic **imaging** findings.

Disease *Types*

- The Atlanta Classification subdivides acute pancreatitis into 2 broad forms^{1,2,4}:

**INTERSTITIAL
(o)edematous
pancreatitis (*IEP*)**

- Swollen, oedematous pancreas
- Still **enhances uniformly**.

**NECROTISING
pancreatitis (*NP*)**

- Areas of **non-enhancement** or **hypoenhancement** in pancreas.

Subtypes depending on site of necrosis^{1,2}:

- ***Parenchymal*** necrosis
- ***Peripancreatic*** necrosis
- ***Combination*** of the above – ***most common***

Disease *Phases* ^{1,4}

EARLY

< 1 week

- Imaging appearances may underestimate the disease severity – especially if imaging is obtained in the first 72 hours. Features such as necrosis usually take a few days to become established.
- Poor correlation between imaging findings and clinical severity in this phase – severity should be determined by clinical parameters here (e.g. signs of organ failure).

LATE

> 1 week

(may last weeks to months)

- Generally only occurs in severe cases, mild cases often do not progress to late stage.

Disease *Severity* ^{1,4}

MILD	MODERATELY SEVERE ***	SEVERE
✗ NO ORGAN FAILURE	✓ TRANSIENT ORGAN FAILURE • < 48 hours	✓ ORGAN FAILURE • > 48 hours
✗ NO local complications	+/- local <u>or systemic</u> complications	✓ Local <u>or systemic</u> complications
<u>LOW</u> mortality	<u>LOW</u> mortality	<u>HIGH</u> risk of mortality • up to 30% • ICU support
	*** An addition to the 1992 classification – this was a subset recognised as having complications leading to <u>significant morbidity</u> , but little <u>mortality</u> .	

- 'Local complications'¹ = e.g. pancreatic and peripancreatic collections.
- 'Systemic complications'¹ = often exacerbation of pre-existing comorbidities secondary to acute pancreatitis – e.g. AKI on CKD.
- 'Organ Failure'¹ = defined in line with standardised scoring systems, e.g. **MODIFIED MARSHALL Scoring System**^{3,4} – **score of 2 or more**, in at least 1 of 3 organ systems (respiratory, renal, cardiovascular).

Types of Fluid Collection

- 4 distinct types of collection are set out, depending on^{1,2,4}:
 - **INTERSTITIAL** vs **NECROTISING** disease
 - **TIME** - **≤ 4 weeks** vs **> 4 weeks**

INFECTED COLLECTIONS¹

- Any collection of the 4 can be sterile or infected.
- Only real imaging feature of infection is presence of **GAS**.**
- ...Otherwise clinical features/deterioration.
- Wall enhancement is **NOT** a reliable feature and as discussed on subsequent slides, is invariably seen in the non-infected collections present at >4 weeks (both pseudocyst and WON, in IEP and NP respectively).

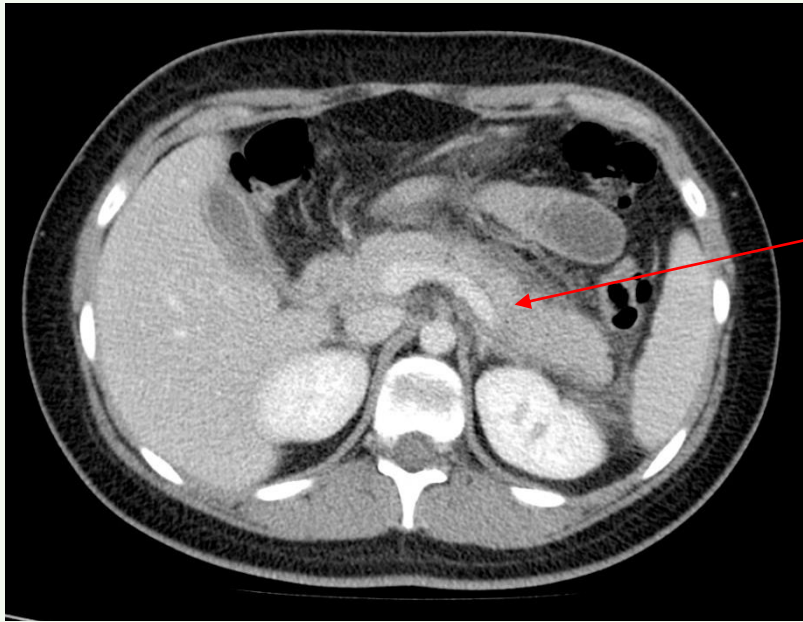
****NB.** *If there has been intervention – e.g. percutaneous drainage, then gas may well be present, even if not infected.*

Collections – in **INTERSTITIAL** Pancreatitis

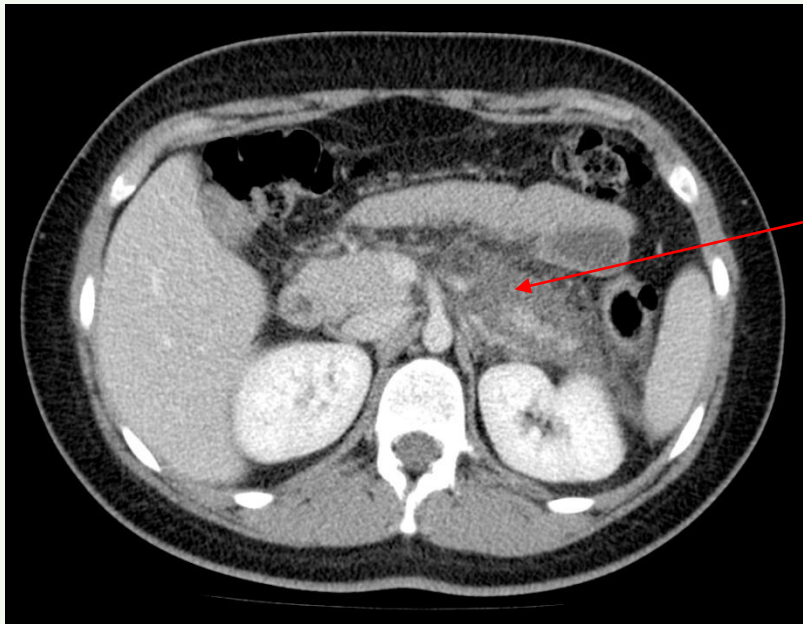
- **BEFORE 4 weeks** = Acute PERIPANCREATIC Fluid Collections (APFC)
 - Non-encapsulated fluid collections = **NO enhancing capsule**
 - Fluid is **homogenous**
- **AFTER 4 weeks** = **PSEUDOCYSTS**
 - **Encapsulated** collection
 - Homogenous fluid content only
 - Can be peripancreatic or remote

*** **NO NECROSIS!** ***

Pancreatic parenchyma may be oedematous but should be uniformly enhancing.



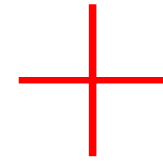
Swollen, oedematous pancreas – but still uniformly enhancing.



Scrolling down, the surrounding fluid is of homogenous density and has no capsule.

≤ 4 WEEKS

= **INTERSTITIAL**,
no necrosis

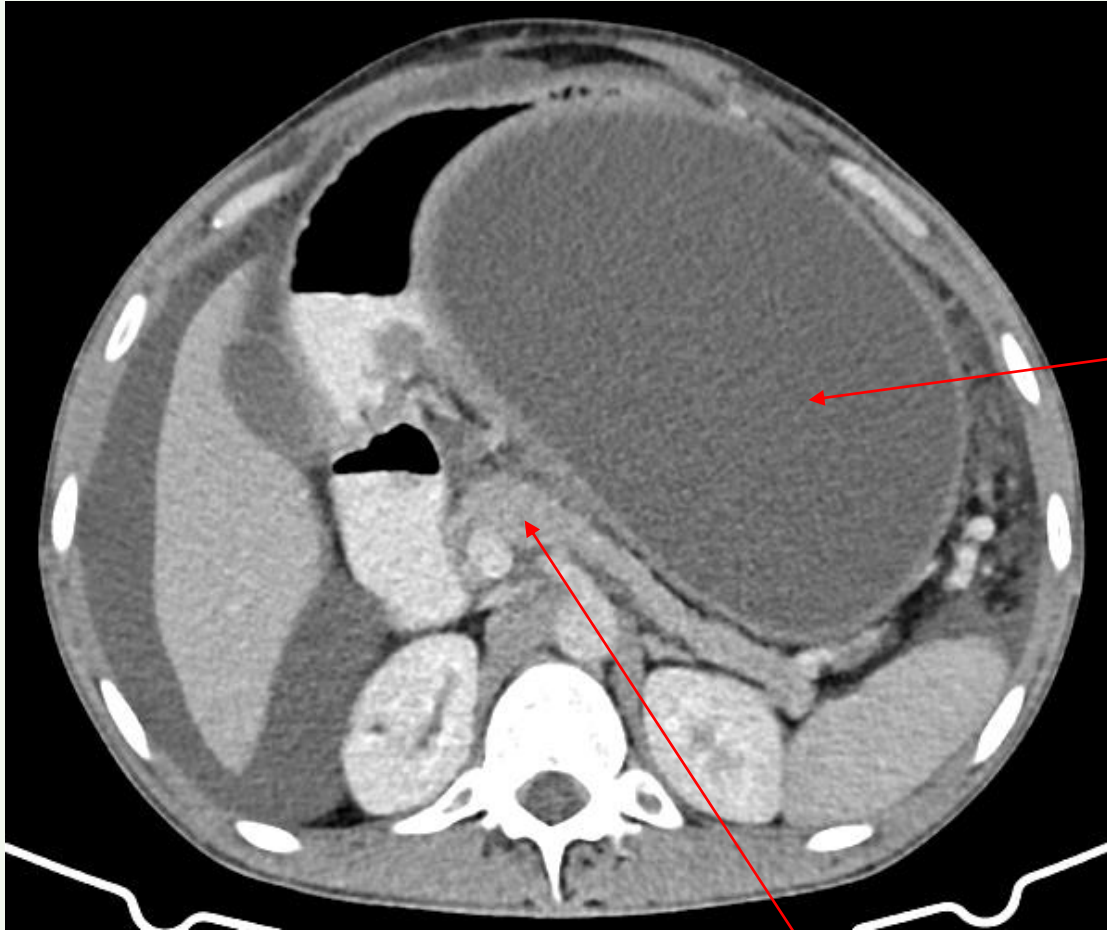


NON-ENCAPSULATED,
HOMOGENOUS



**ACUTE
PERIPANCREATIC
COLLECTION**

Case courtesy of Michael P Hartung, Radiopaedia.org, rID: 94344 ⁶

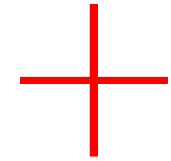


Massive collection, enhancing wall, homogenous fluid content.

No evidence of necrosis on current or previous imaging – normal parenchymal enhancement.

> 4 WEEKS

= **INTERSTITIAL**,
no necrosis



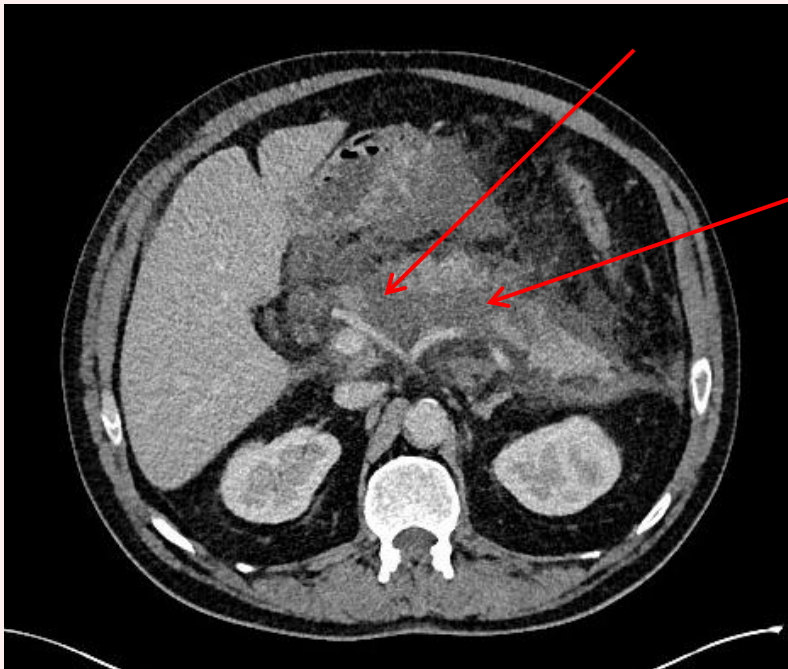
ENHANCING CAPSULE,
HOMOGENOUS CONTENT



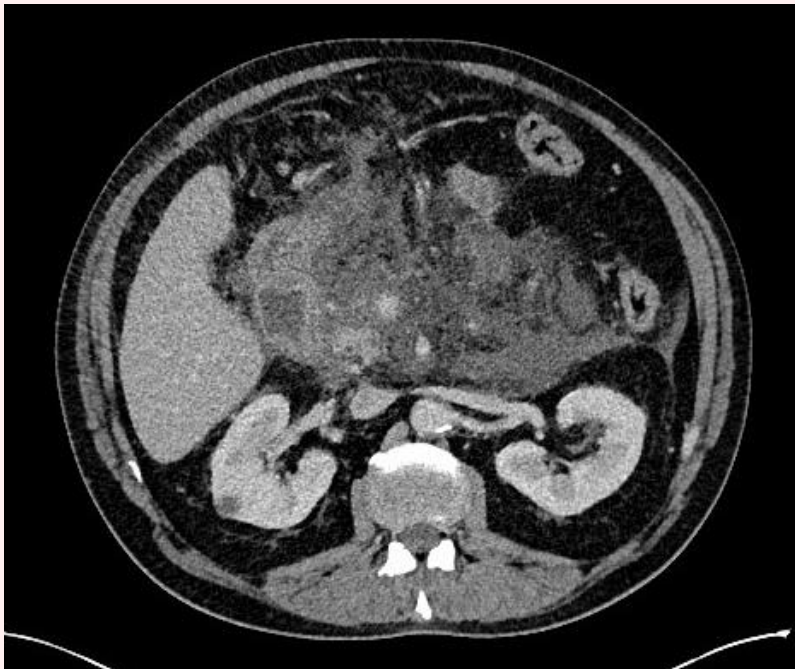
PSEUDOCYST

Collections – in **NECROTISING** Pancreatitis

- **BEFORE 4 weeks** = **Acute NECROTIC Collections** (ANCs)
 - **Non-encapsulated** fluid collections = **NO enhancing capsule**
 - **Heterogenous, non-liquefied** material
- **AFTER 4 weeks** = **WALLED-OFF NECROSIS (WON)**
 - **Encapsulated** collection
 - **Heterogenous** - solid necrotic debris within



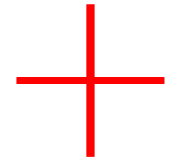
Hypoenhancing
areas =
NECROSIS
(Arrows)



Scrolling down -
heterogenous
material
surrounding – with
no capsule.

≤ 4 WEEKS

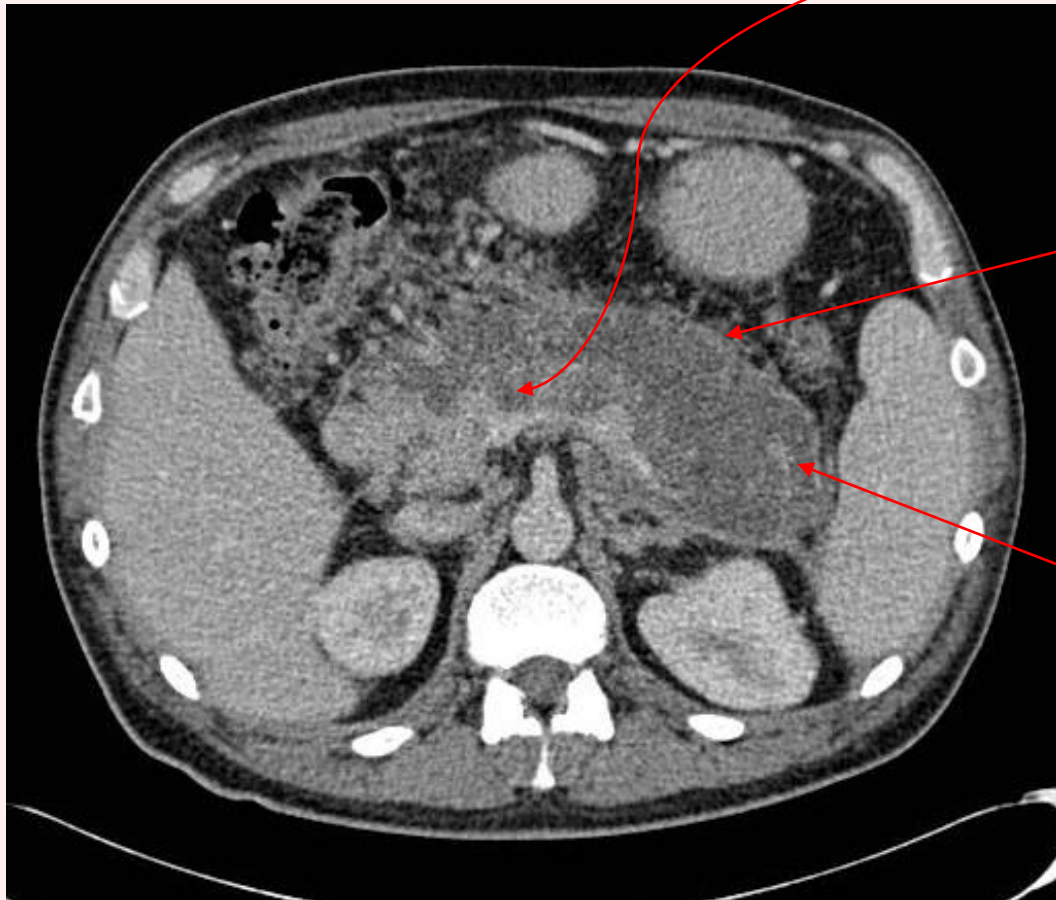
= **NECROSIS**



**NON-ENCAPSULATED,
HETEROGENOUS**



**ACUTE NECROTIC
COLLECTION**



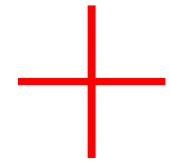
Hypoenhancing areas in pancreas = NECROSIS

Enhancing wall

Heterogenous content of collection – including some solid debris.

> 4 WEEKS

= **NECROSIS**



ENHANCING CAPSULE, HETEROGENOUS CONTENT



WALLED-OFF NECROSIS

A different case – showing progression of features to WON

Management

- \leq 4 weeks = **CONSERVATIVE**
 - Drainage **NOT** advised in early period before fluid walls off.
- $>$ 4 weeks – encapsulated collections = various options:
 - 1) **Conservative:**
 - Any collection can be managed conservatively if the clinical picture suggests so, many will involute on their own.
 - However, if drainage is required (usually superimposed infection) then the approach is very different in pseudocyst vs WON - see below.
 - 2) **Non-surgical interventions:**
 - a) **PSEUDOCYST** -> **percutaneous** drainage (radiologically guided) or **endoscopic** (e.g. Axios™), if inaccessible percutaneously. See subsequent section.
 - b) **WON** -> **ENDOSCOPIC** – e.g. Axios™ stent. **NOT SUITABLE FOR PERCUTANEOUS DRAINAGE.**
 - 3) **Surgical options:**
 - Surgical drainage, necrosectomy – performed less commonly now due to endoscopic options currently available. Generally reserved for when collection is not accessible (e.g. in a location distant from stomach).

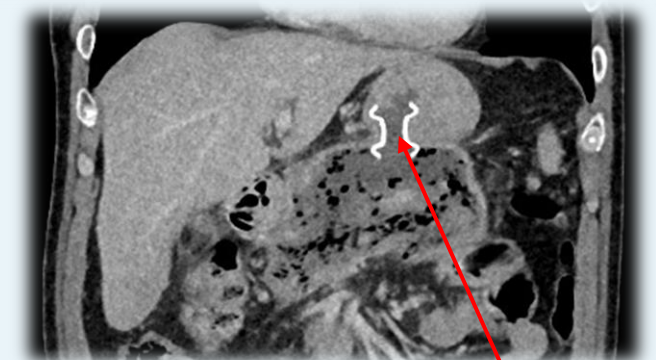
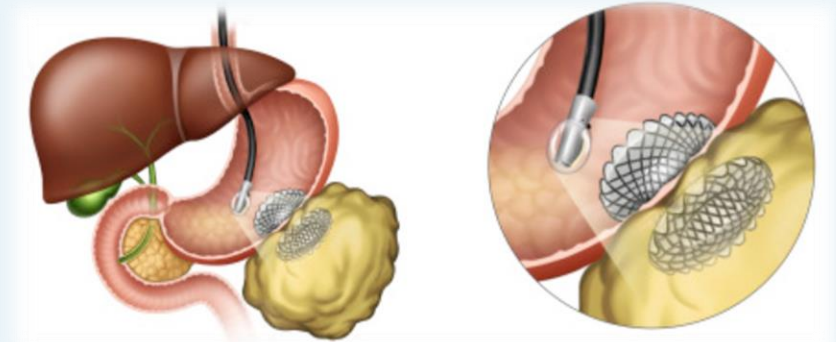
Prognosis ^{1, 8-9}

- Worse in necrotising pancreatitis and its associated sequelae (i.e. of the collections at $>$ 4 weeks, WON (NP) has a worse prognosis than pseudocyst (IEP)).

'LAMS' – Lumen-Apposing Metal Stents

Schematic diagram (*below*) showing a LAMS.¹⁰

- LAMS (generic name), of which Axios™ (brand name) is most commonly used.
- Such stents are inserted endoscopically and placed between the posterior wall of the stomach and the peripancreatic collection, to allow drainage of material into the stomach (which will then pass down the GI tract).
- Uses:
 - **Pseudocyst** – e.g. if not accessible percutaneously.
 - **WON** – essentially the only interventional option here, besides surgery.
- Routinely removed 6 weeks following insertion.
- In the case of WON, will invariably become clogged due to nature of material and will therefore require several endoscopies before the routine removal at 6 weeks to 'manually' clear the lumen and retrieve as much material as possible.
- **NB.** If Axios™ is used for pseudocyst – then can be inserted and left. Content is thin fluid, will drain easily and not block lumen. Routine removal at 6 weeks as above.

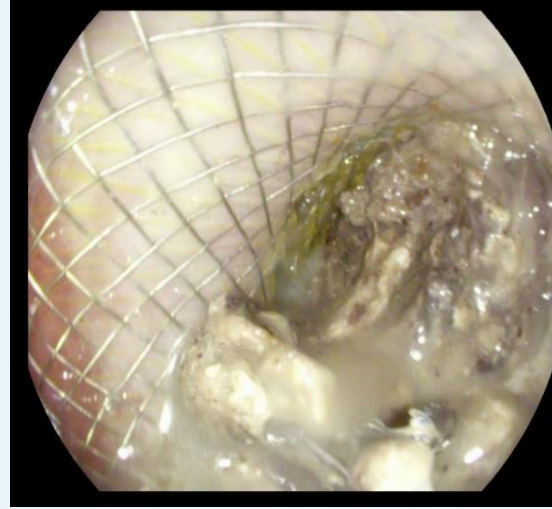
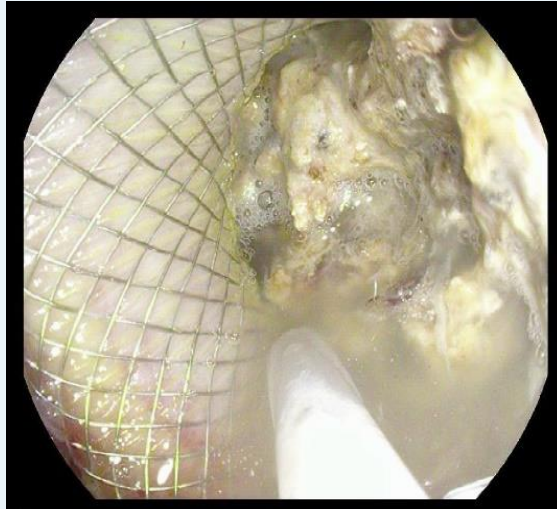
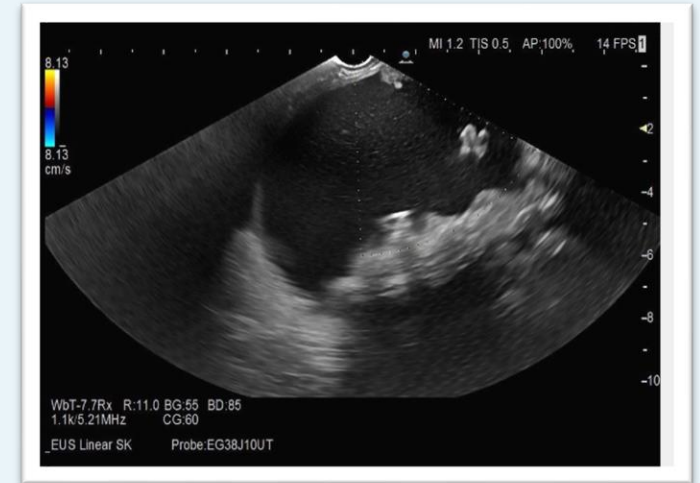
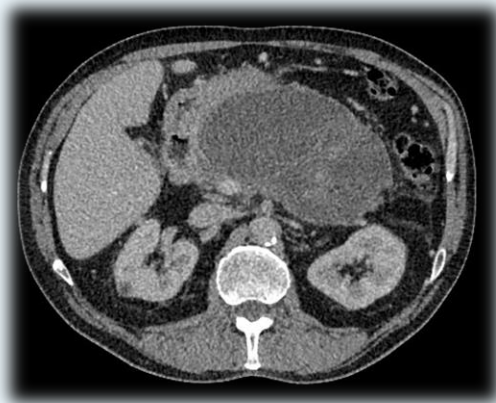


Above: A coronal image of patient with Axios™ stent – superior end is seen in stomach and inferior aspect is seen within (infected) WON with air.

The journey of this same patient is shown on the subsequent slide.

Example Case

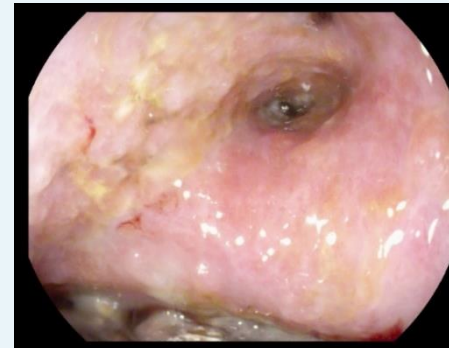
...A CT of a patient at our institution demonstrating WON (*left image* – heterogenous encapsulated collection) subsequently developed gas within this suggesting infection (*centre*). As with CT, the EUS image (*right*) shows the collection to be non-homogenous, which a significant amount of echogenic debris within (*arrow*).



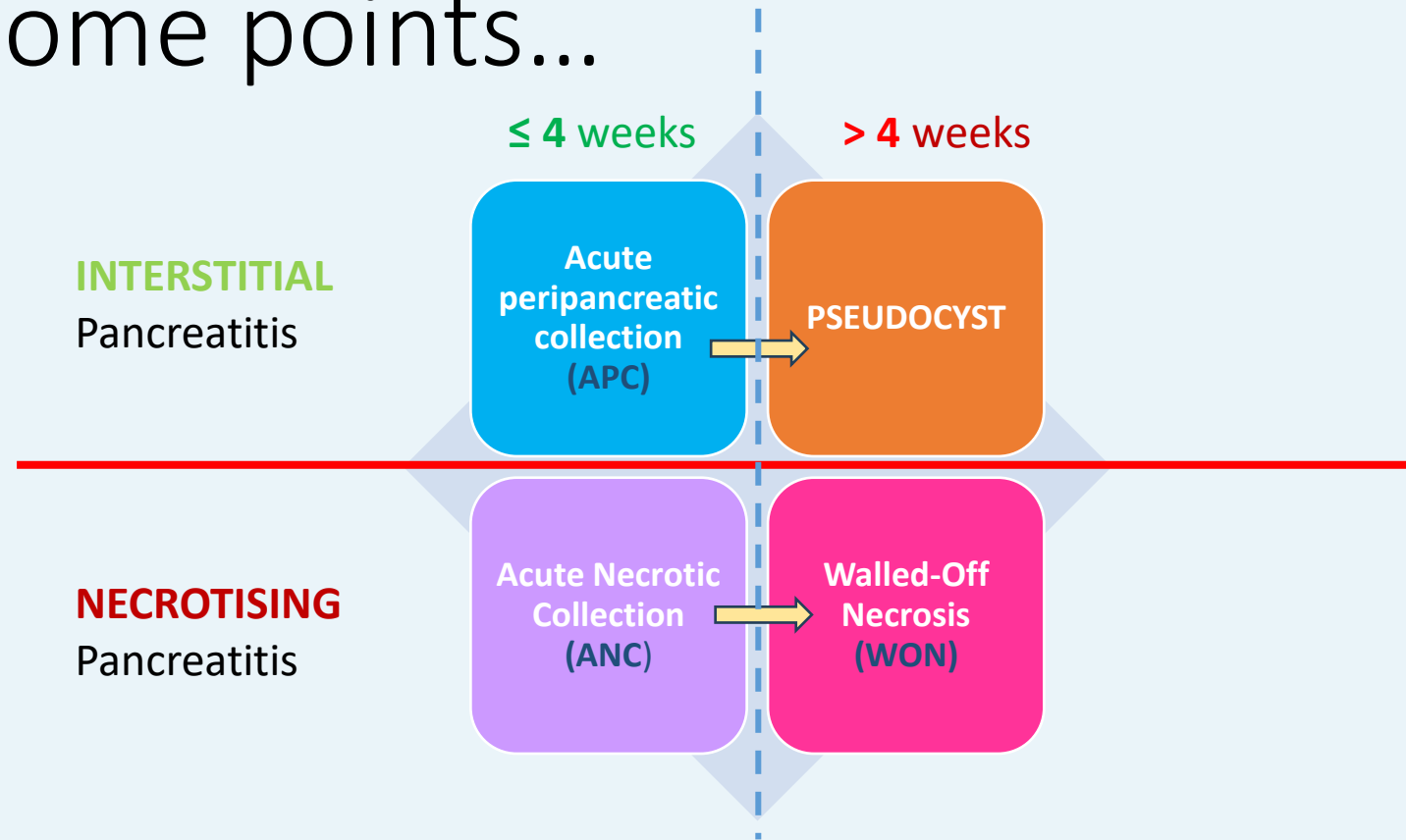
EUS images (*above*), with view looking down lumen of Axios™ stent. This demonstrates just how thick and semi-solid the debris in WON can be, and how easily the stent can become occluded.

In between insertion and routine removal of the stent 6 weeks later, endoscopy is invariably required to apply various mechanical methods to clear the blockage – e.g. snare, net, suction, biopsy forceps. (In our institution we routinely pre-emptively do this ever 2 days. In some centres, this may be done on development of symptoms of blockage (i.e. sepsis)).

Images (*right*) show the extensive debris lining the WON cavity (*top image*). Some bleeding noted on attempting to remove debris. The image below shows the same cavity lining after having been ‘cleaned’.



Take home points...



- WON and PSEUDOCYSTS have very different content and their management differs. Significant debris means **WON** is **NOT** suitable for percutaneous drainage. If Axios™ stent is used in WON then will invariably require re-endoscopy to clear occluded stent lumen and drain the semisolid material.

Updates to the 1992 Edition:

- The 4 distinct collection categories.
- **Terms removed** – ‘pancreatic *abscess*’ and ‘*acute pseudocyst*’. ^{1, 2, 4}
- ‘Moderately severe’ category – as discussed in severity section.

Conclusion

- There are very clear definitions outlined by the Revised Atlanta Classification, which were set up to allow clear communication between all members of the multidisciplinary team involved in diagnosis and management of patients with acute pancreatitis. As Radiologists, we are often the first to make the diagnosis on imaging - therefore we need to be very precise in our choice of words.
- 'Pseudocyst' in particular seems to be overused for any collection in the context of pancreatitis. Hopefully an appreciation of the difference in management – in particular, drainage in pseudocyst vs WON – should help emphasise why we have to be accurate in the way we describe these.

References

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