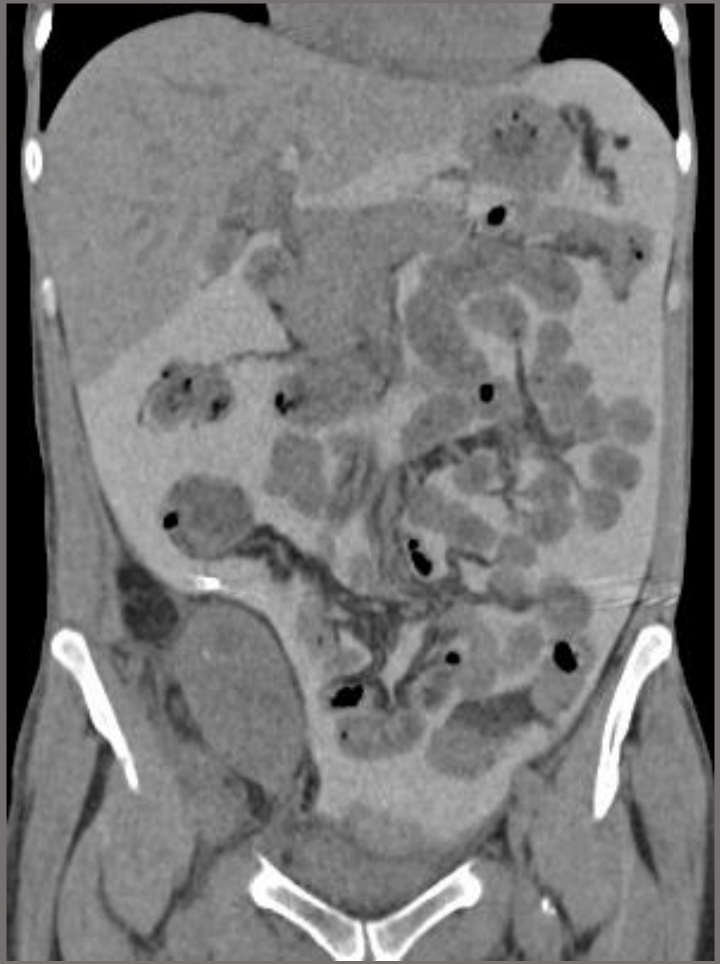

Pictorial review demonstrating the imaging findings of abdominal internal hernias :

revisiting the relevant peritoneal compartments and anatomy.

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Introduction

- Internal hernias involve protrusion of the abdominal viscera through an opening/aperture in the peritoneum or mesentery within the abdominal compartment

- Classifications of apertures can be confusing depending on what is viewed as an abnormal recess or a normal variant. However generally they fall into the following groups:
  - Anatomical foramen/fossae e.g. foramen of Winslow
  - Congenital foramen/fossae secondary to anomalies of rotation and peritoneal fusion
  - Acquired foramen/fossae secondary to surgery, trauma, inflammation

Relevance

- Clinical diagnosis is ***challenging*** due to the diverse range in presentation:
  - Symptom duration relates to the duration and reducibility of the hernia and the presence or absence of incarceration and strangulation
  - If the obstruction can reduce spontaneously patients will often complain of intermittent abdominal pain
  - Alternatively patients can present acutely with non specific features or clinical features of small bowel obstruction with strangulation which can rapidly progress to bowel necrosis. Mortality is reported to exceed 50% if strangulation is present.

- Prompt detection which is normally via CT is therefore vital to aid urgent surgical intervention.

Learning objective

- Internal herniation is not a uncommon cause of small bowel obstruction but it can be particularly difficult to diagnose on imaging
- The altered anatomy secondary to internal herniation can be difficult to appreciate on CT, particularly on axial sequences
- In addition the foramen and fossae which lead to internal herniation are not directly visualised and indirect signs are needed to help identify these
- Improved awareness of the relevant anatomy and radiological appearances of the types of IH will aid in radiological diagnosis
- We present example cases of surgical proven or radiologically suspected IH from our institute from 2006-2017, reviewing the radiological signs with reference to the relevant anatomy

Epidemiology

- Overall incidence of internal hernias (IH) is approximated at 0.2–0.9%
- The incidence of small bowel obstruction secondary to internal herniation is reported up to 6%
- Prevalence is rising, specifically trans-mesenteric type due to increased utilisation of Roux-en-Y technique. In this subset of patient internal hernias are reported to account for 50% of cases of small bowel obstruction which is equal to obstruction secondary to adhesions.

Teaching Point

Closed loops obstruction, stretching and engorgement of vessels, and beaking of the obstructed loops are not specific to IH and are also seen in small bowel obstruction secondary to adhesions and volvulus.

A saclike appearance increases the sensitivity that a closed loop obstruction is due to IH. A sac like appearance is sacculation of the small bowel loops secondary to encapsulation within the hernial sac. This is seen when the herniated small bowel prolapses through one layer of the mesentery (intra-mesenteric), as opposed to both layers of the mesentery (trans-mesenteric) and is therefore not seen with all types of hernias.

It can also be seen with right-paraduodenal IH.

Classification of internal herniation

Traditionally described by Meyers based on location:

1. Paraduodenal (53%)
2. Pericaecal (13%)
3. Foramen of Winslow (8%)
4. Transmesenteric and Transmesocolic (8%)
5. Sigmoid related (6%)
6. Tranomental (1-4%)
7. Supravesical and pelvic (6%)

Further classification and nomenclature exist for example:

1. <u>Lesser sac hernias</u> have been described and include foramen of Winslow, trans-mesocolic, greater omentum, lesser omentum and combined lesser sac hernia
2. <u>Roux en Y related hernias</u> include trans-mesenteric hernia, trans-mesocolic related hernia and Peterson hernia
3. Small bowel related mesenteric hernia (synonymous with transmesenteric IH)

Aetiology of internal hernias

- Peritoneal recesses/fossae are related to rotation of the gut and attachment of abdominal viscera to the posterior abdominal wall during foetal development. In addition the presence of vessels raise segments of serosal folds
- The majority of internal hernias result from congenital anomalies of peritoneal fusion +/- congenital anomalies of intestinal rotation

Paraduodenal IH and duodenal recesses

- Normal coalescence of the duodenum to the parietal peritoneum occurs between the 3rd and 4th parts of duodenum at the level of the DJ flexure by means of two serosal folds:
    1. Superior duodenal fold
    2. Inferior duodenal fold
- Several fossae have been described. The two most important are the paraduodenal recess and mesentericoparietal recess giving rise to the left and right paraduodenal internal hernia respectively
- Due to the complex nature of the rotation of the gut and resorption of the mesentery, these recesses may enlarge or recede and individual variations may lead to the development of different recesses in this area

Left Paraduodenal Internal Hernia

- Account for 75% of paraduodenal hernias
- Previously stated as the most common IH although post Roux En Y hernias are now increasing in prevelance
- Left paraduodenal hernias occur due to small bowel loops prolapsing into paraduodenal recess (Fossa of Landzart)
- Clinical presentation is classically of post-prandial pain dating back to childhood

Anatomy : Left Paraduodenal Internal Hernia

Paraduodenal recess/Fossa of Landzart
2-12% of the population

- left side of the 4^{th}/ascending part of duodenum.
- Anteriorly bound by the paraduodenal fold which has a right free margin containing IMV and ascending branch of left colic artery.
- Recess is formed by the raising of this serosal vascular fold +/- failure of peritoneal fusion of this mesentery and descending mesocolon to posterior abdominal wall

Paraduodenal fold

Sickle shape fold of peritoneum sometimes found between left side of DJ flexure and medial border of left kidney.

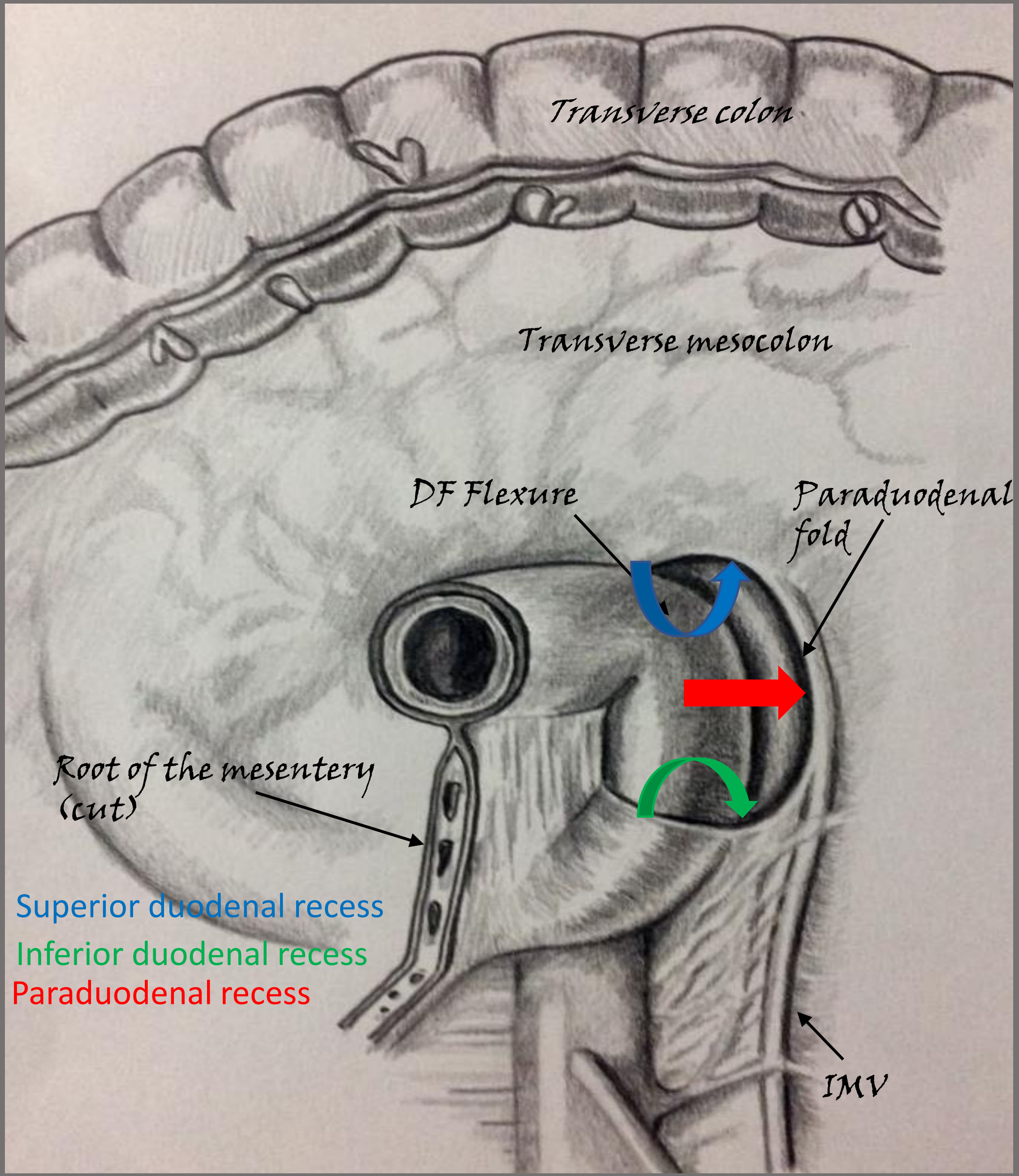


Figure 1: Illustration demonstrating the paraduodenal fold with respect to the paraduodenal fossa. Image courtesy of Fern Dalton

Left Paraduodenal Hernia: Paraduodenal fossa of Landzert

DEFECT/HERNIAL ORIFICE

- Paraduodenal fossa lies to the left of 4th /ascending part of duodenum

ABNORMAL LOCATION OF BOWEL LOOPS

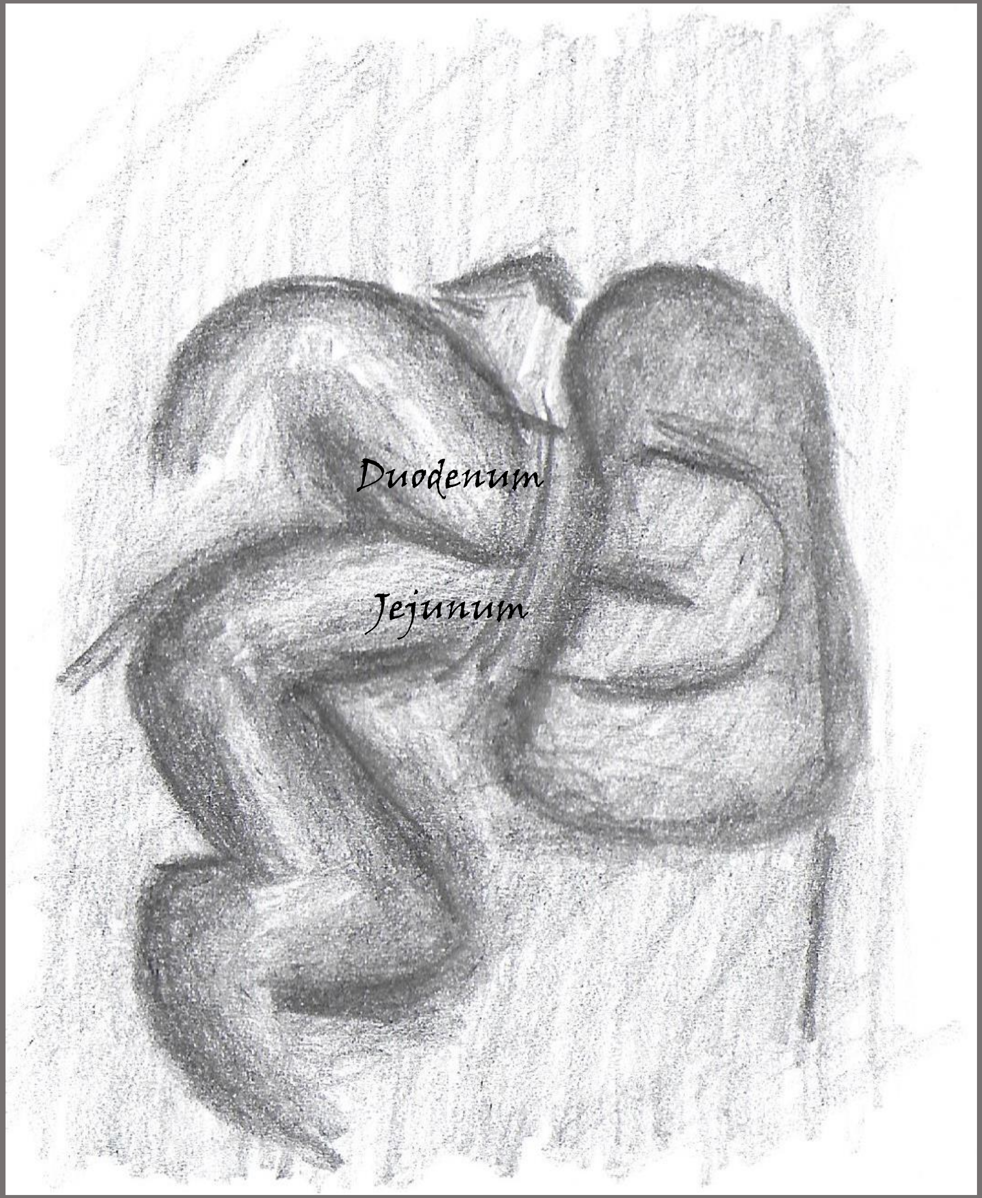
- Cluster of jejunal loops in left upper quadrant; left of the 4th/ascending part of duodenum in one or more of the following places:
  1. Between stomach and pancreas to the left of the Ligamentum of Trietz
  2. Behind pancreatic tail in theanterior pararenal space
  3. Between transverse colon and left adrenal gland

DISPLACEMENT OF KEY ANATOMICAL STRUCTURE

- The following structures may be displaced inferiorly:
  1. Stomach with mass effect on the posterior aspect
  2. Transverse colon
  3. DJ Flexure

DISPLACEMENT OF VESSEL

- IMV and ascending branch of the left colic artery run along the lateral edge of the fossa and may be displaced laterally
- Anterior displacement of IMV is sometimes seen



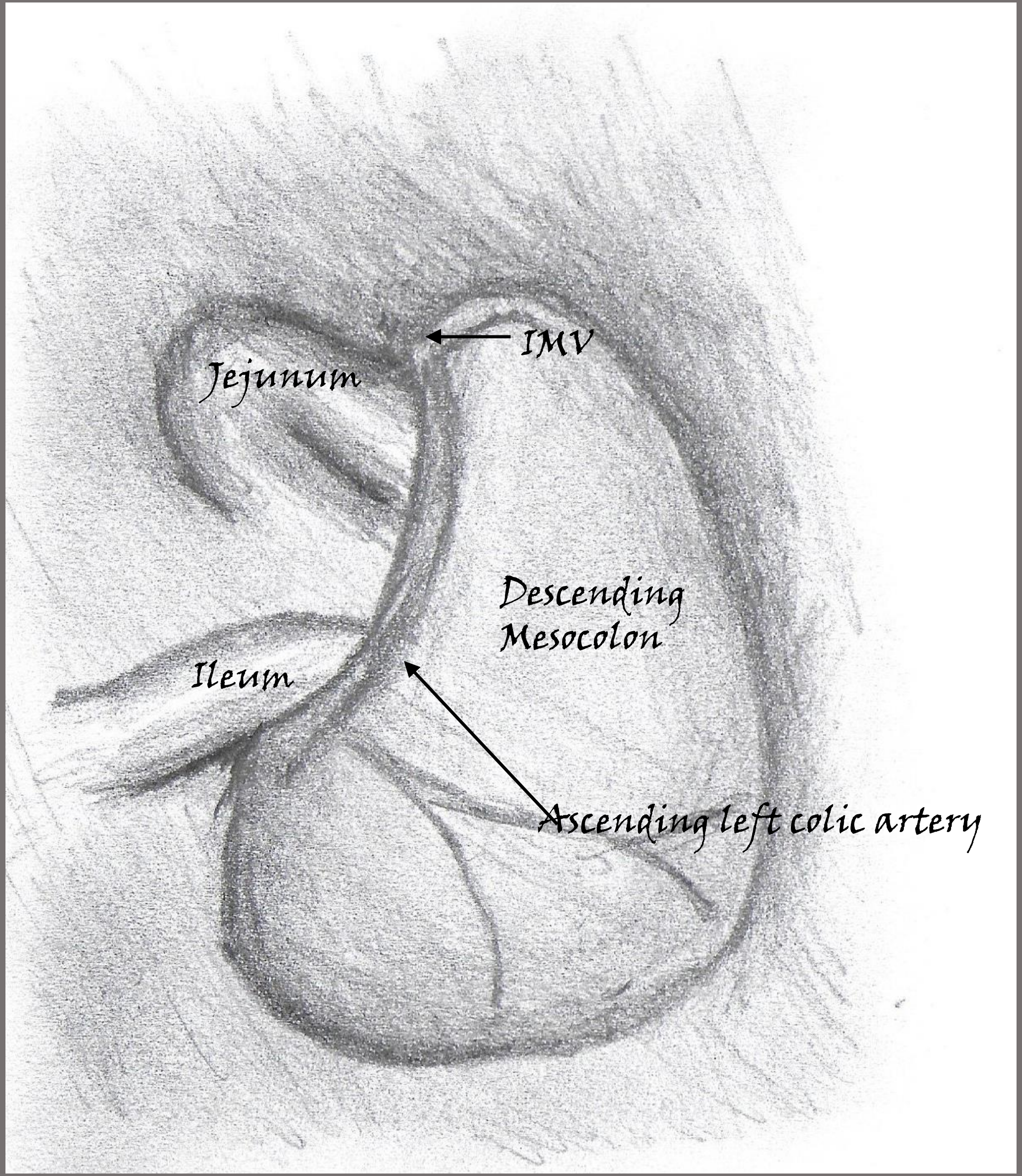


Figure 2 and 3:Diagrammatic illustration of a left paraduodenal hernia. As the small bowel herniates in extends behind the descending mesocolon. Images courtesy of Mark Tranter.

Figure 5

Axial image in the same patient more inferiorly which demonstrates small bowel loops in the anterior para-renal space (arrow). The descending colon which is usually positioned here was displaced anteriorly.

Figure 6

Coronal image re-demonstrating small bowel loops in the anterior para-renal space.

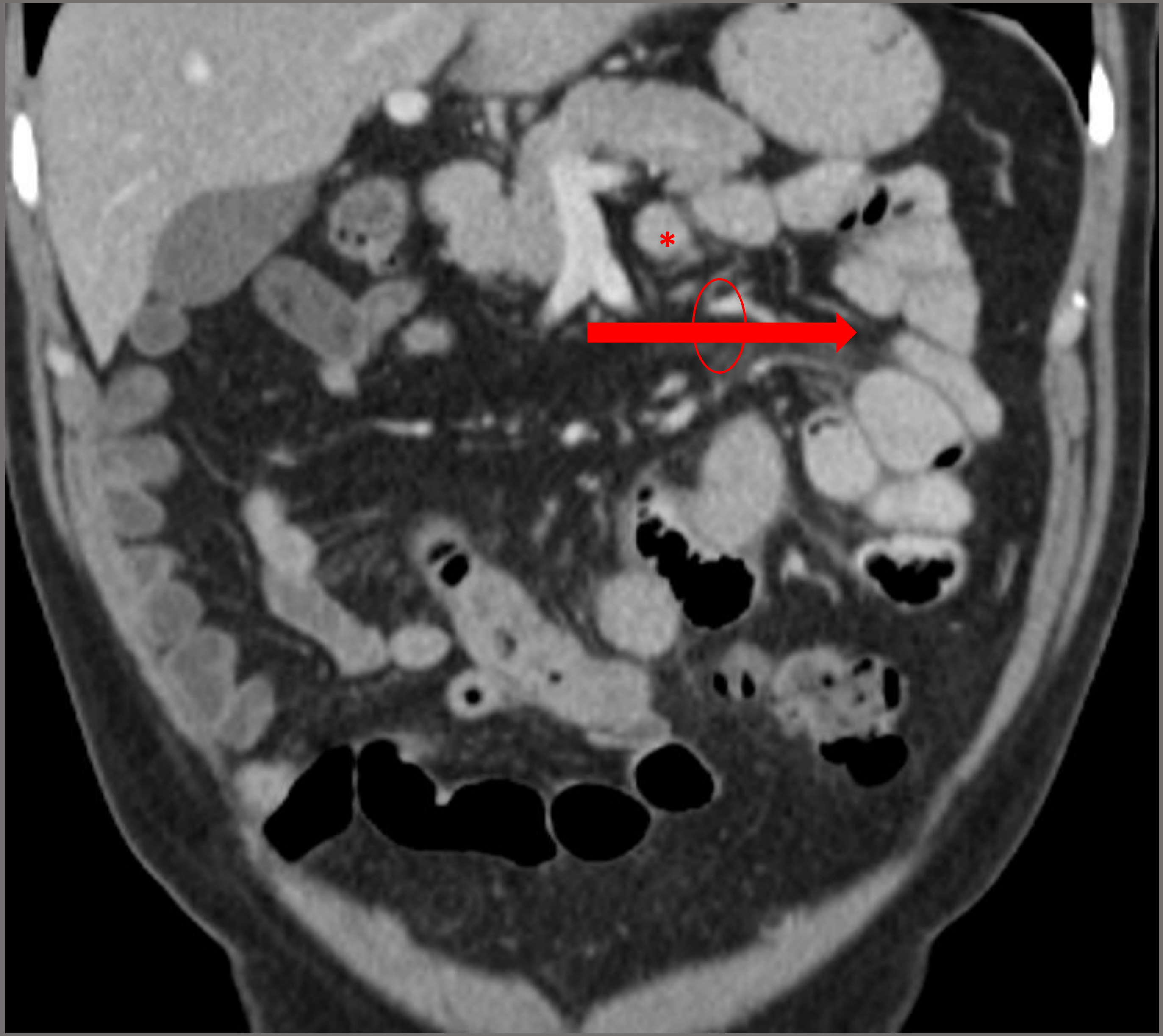


Figure 8:

Note mesenteric congestion as the loops enter the paraduodenal fossa/fossa of Landzart.

As previously described this fossa is situated to the left of the ascending duodenum/DJ flexure (asterix) and is illustrated on this coronal image (circle).

The arrow demonstrates the direction of the herniated loops.

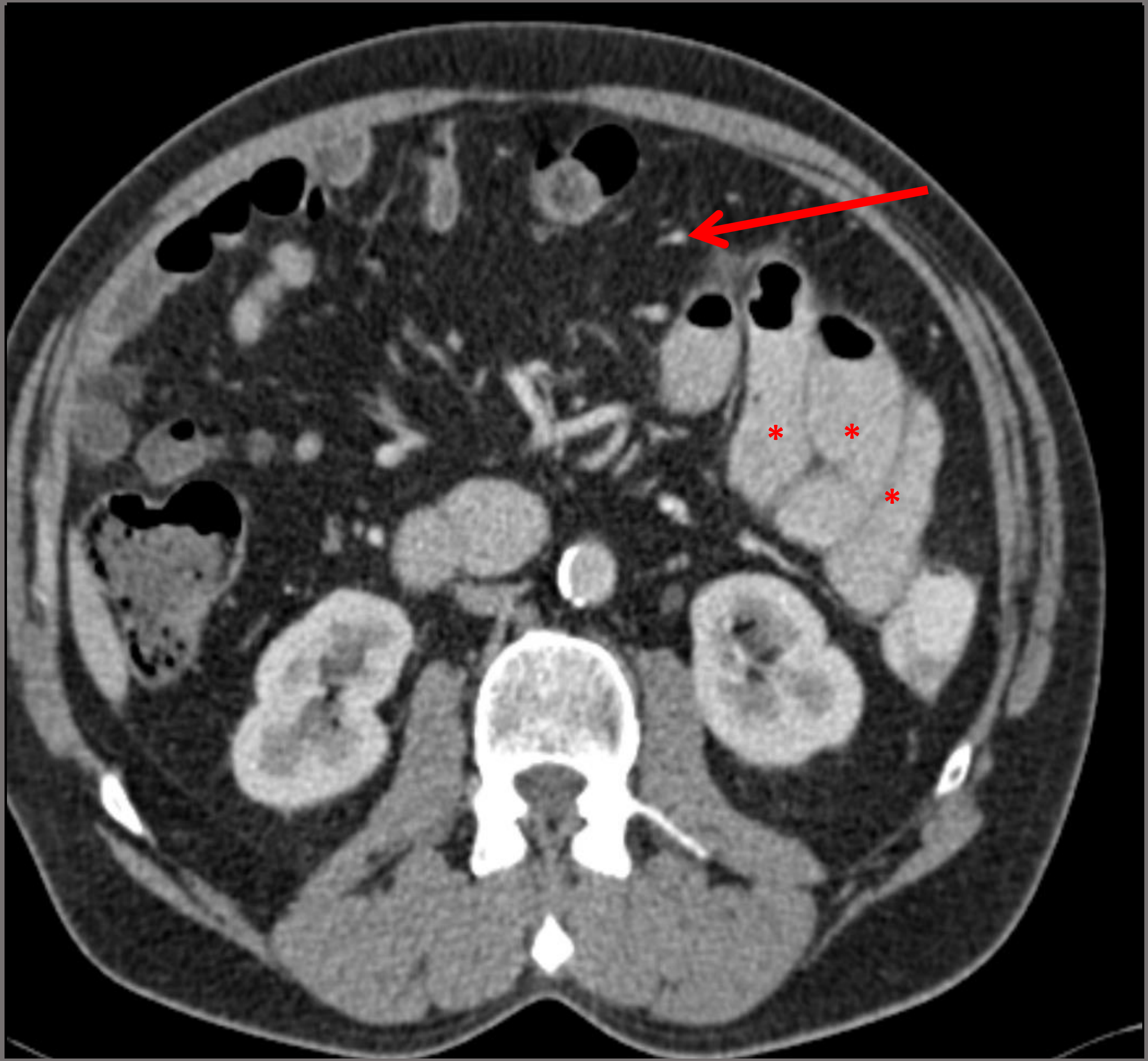


Figure 10:

Axial image in the same patient demonstrating the IMV (arrow) displaced anteriorly which has looped around the herniated small bowel loops (asterix) and taken a unusually long course to join the SMV.

This confirms a left paraduodenal hernia.

Right Paraduodenal Internal Hernia

- Account for 25% of paraduodenal hernias
- Small bowel loops prolapse into the Mesentericoparietal recess/Fossa of Waldeyer
- Also usually a history of post-prandial pain dating back to childhood
- This is a congenital unusual fossa

Anatomy : Right Paraduodenal Internal Hernia

Mesenterico-parietal recess/Fossa of Waldeyer
1-3% of the population

- Situated inferior to the 3rd part of duodenum and behind the upper part of the mesentery.
- Fossa is observed in the first part of the meso-jejunum although is not commonly present
- Immediately behind a fold in the mesentery raised by the superior mesenteric artery
- Invaginates the upper part of the mesentery of the small intestine towards the right—hence associated with non rotation

Mesenterico-parietal recess right PDH

Paraduodenal recess left PDH

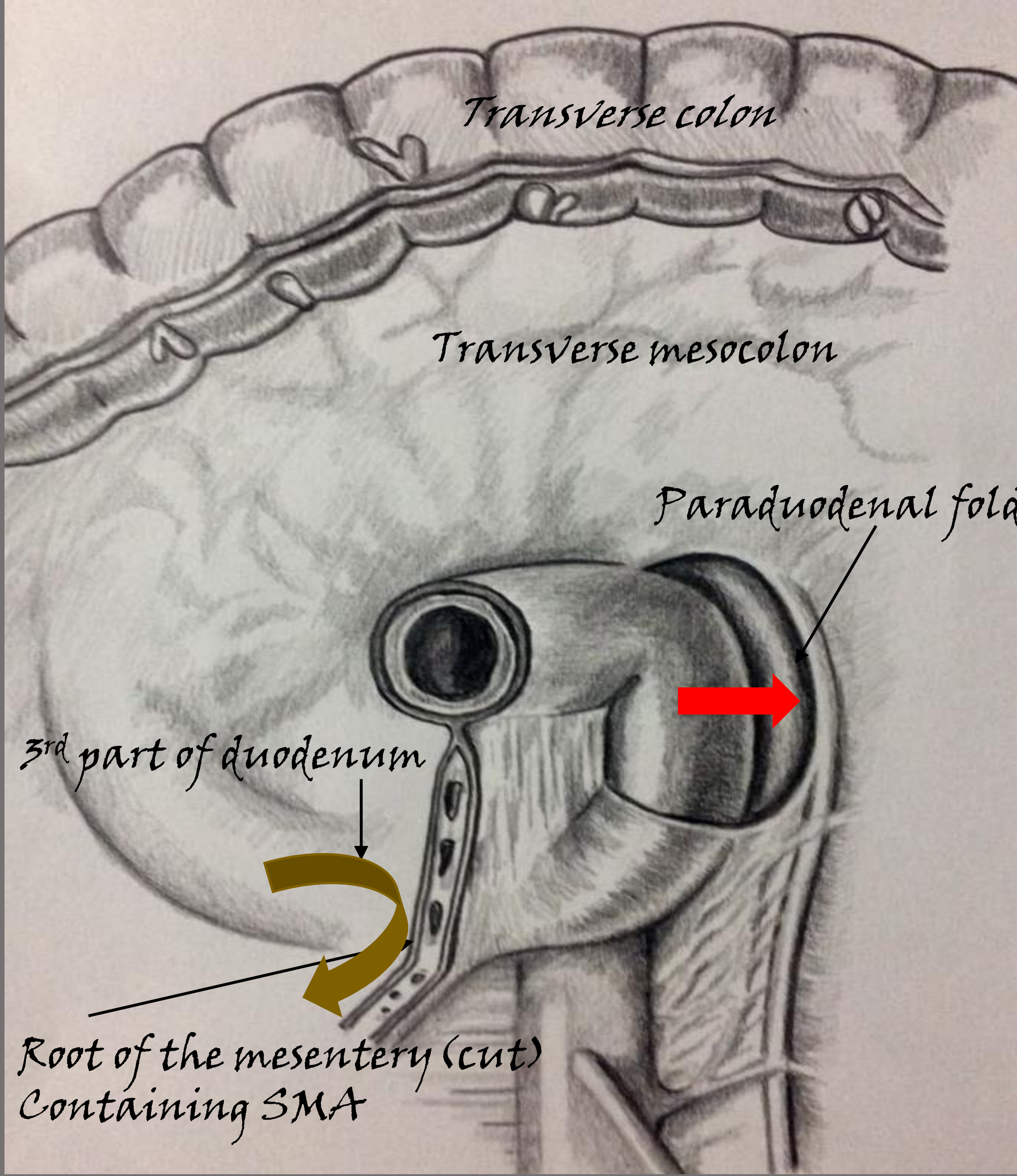


Figure 11: Illustration demonstrating the duodenum with respect to the duodenal recesses. Image courtesy of Fern Dalton

Right Para-duodenal hernia: Mesentericoparietal recess/Fossa of Waldeyer

DEFECT/HERNIAL ORIFICE

- Mesentericoparietal recess is situated inferior to 3rd\transverse part of duodenum

ABNORMAL LOCATION OF BOWEL LOOPS

- Right of mid-abdomen
- Lateral and inferior to 2nd part/descending duodenum
- Small bowel loops extend into right half of transverse mesocolon +/- behind ascending mesocolon

DISPLACEMENT OF KEY ANATOMICAL STRUCTURE

- None described

DISPLACEMENT OF VESSEL

- Hernial orifice is located posterior to SMA
- Presence of the superior mesenteric artery and ileocolic artery are in free edge of hernial sac anteriorly.
  - Displaced anteriorly if there is sufficient mass effect
- Jejunal branches of the SMA and SMV looping posteriorly and to the right of the parent vessel to supply the herniated loops is occasionally seen

uodenal Internal Hernia

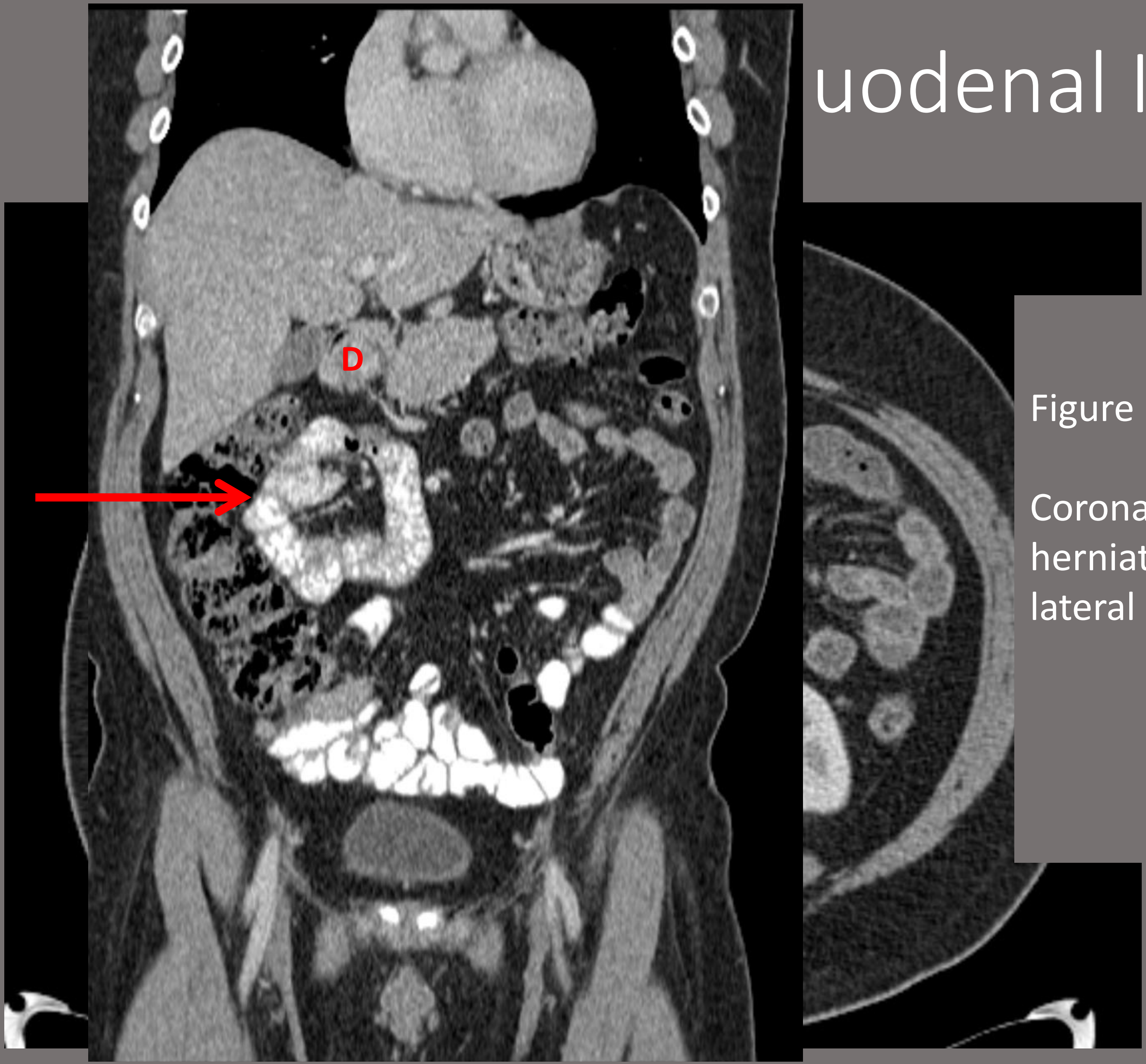


Figure 13:

Coronal image in the same patient demonstrates the herniated small bowel loops (arrow) positioned lateral and inferior to the 2nd part of duodenum (D).

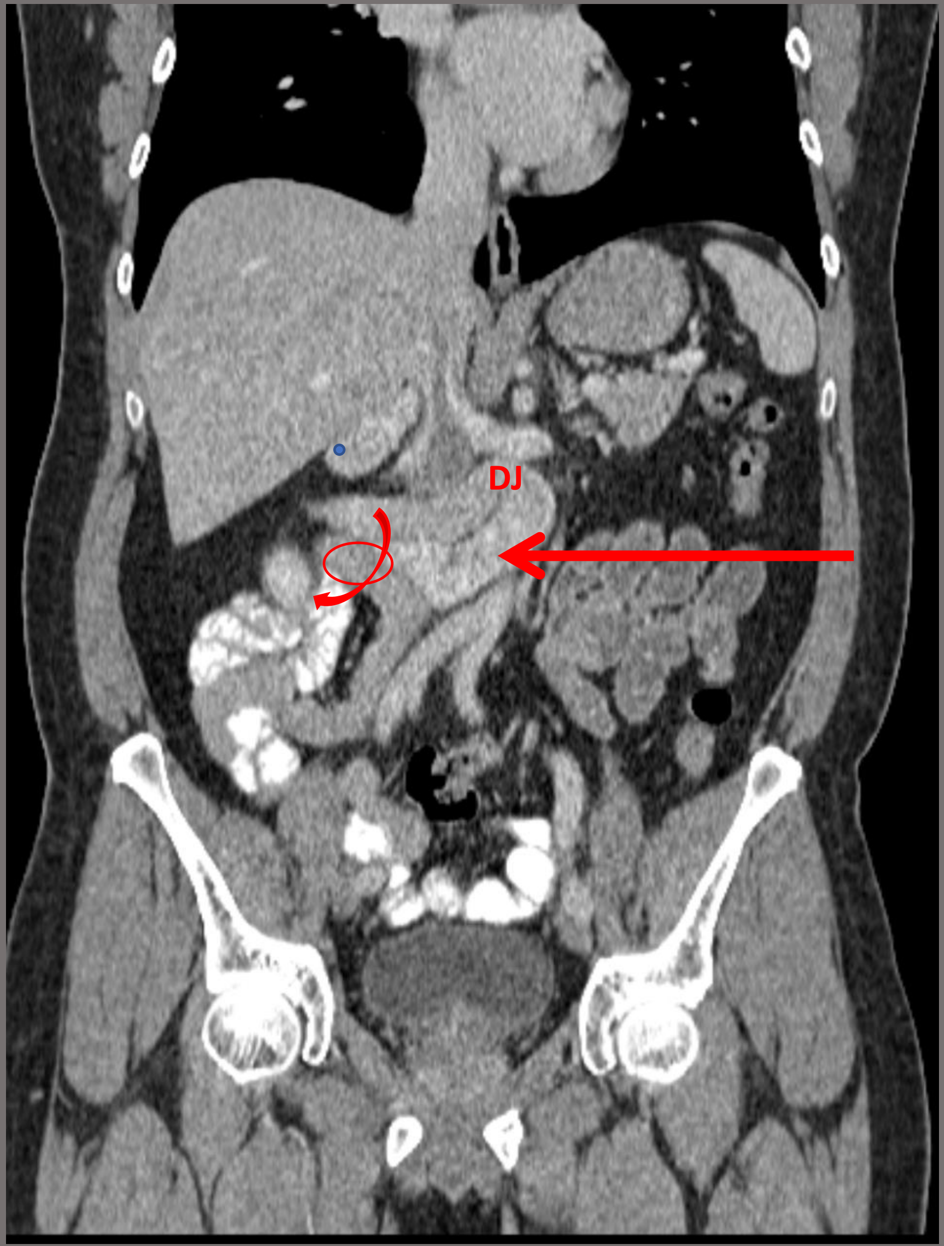


Figure 14:

The DJ flexure (DJ) was low lying at the L2/L3 level with proximal jejunum traversing to the right side in keeping with non-rotation (arrow).

The position of the mesentericoparietal recess (circle) is situated inferior to the 3rd/transverse part of the duodenum as previously described. Curved arrow shows the direction of the herniated loops.

Image 16:

Sagittal slice demonstrating the same.

Small bowel loops (asterix) occupy the anterior pararenal space posterior to the ascending colon (AC).

The right colic (arrow RC) and ileocolic (arrow IL) artery lie anterior to the herniated loops.

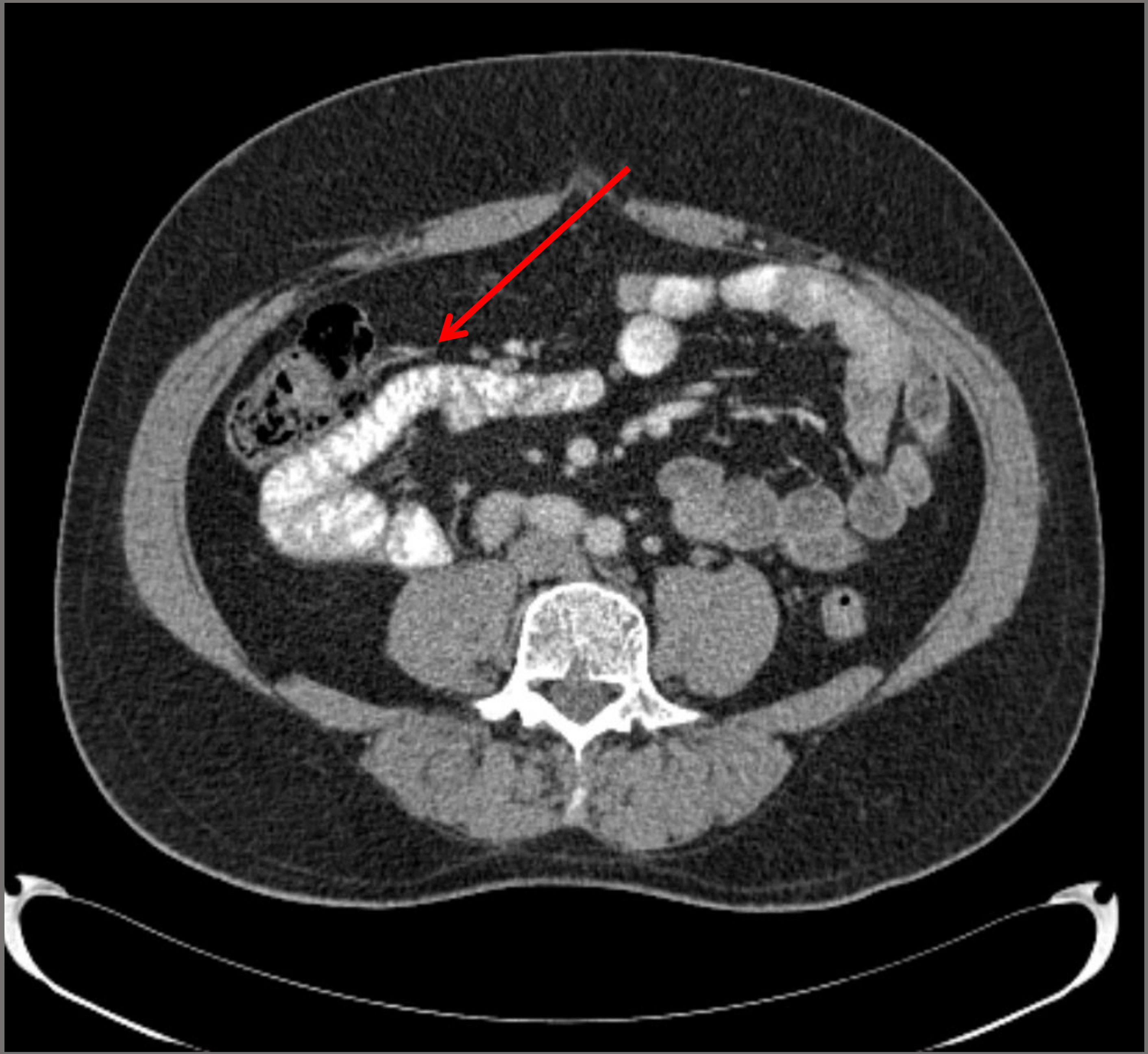


Figure 17:

Axial slice more inferiorly demonstrates the ileocolic artery (arrow) in the anterior free edge of the hernial sac.
A characteristic landmark observed.

This patient did not have radiological signs of bowel obstruction.

Pericaecal Internal Hernia

- Account for 13% of all internal hernias

- Four main pericaecal fossae although there can be more if there has been an abnormality in the rotation and fusion process:
  1. Superior ileocaecal recess
  2. Inferior ileocaecal recess
  3. Retrocaecal recess (largest recess)
  4. Paracaecal recess synonymous with the paracolic gutter

Anatomy: Pericaecal IH

Ileum prolapsing into the retrocaecal recess is the most common cause for pericaecal IH. Ileal loops prolapse through a defect in the caecal mesentery and then further prolapse to lie in the right paracolic gutter.

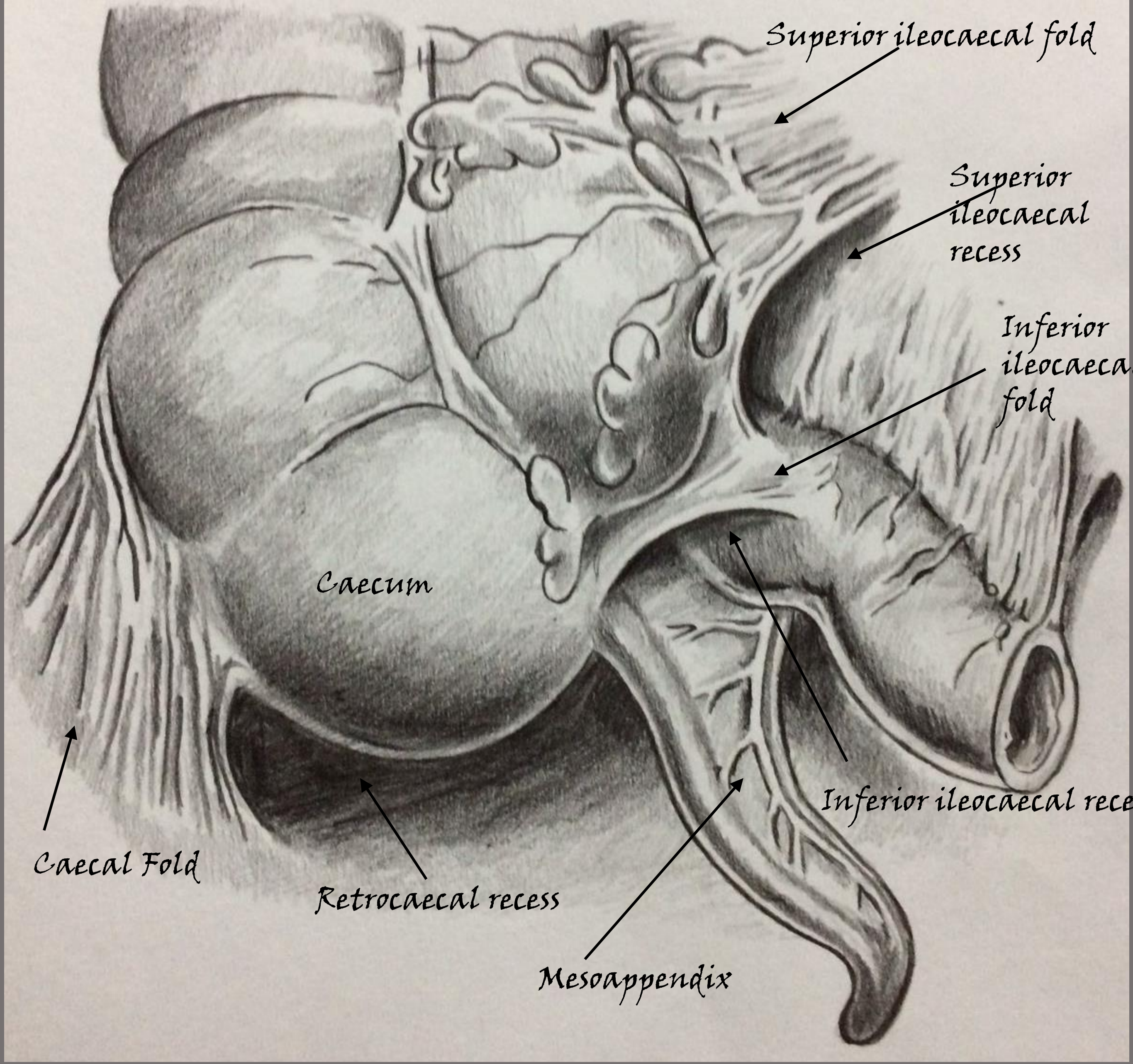


Figure 18: Diagrammatic illustration demonstrating the peri-caecal fossae. Image courtesy of Fern Dalton

Retrocaecal recess and paracolic gutter

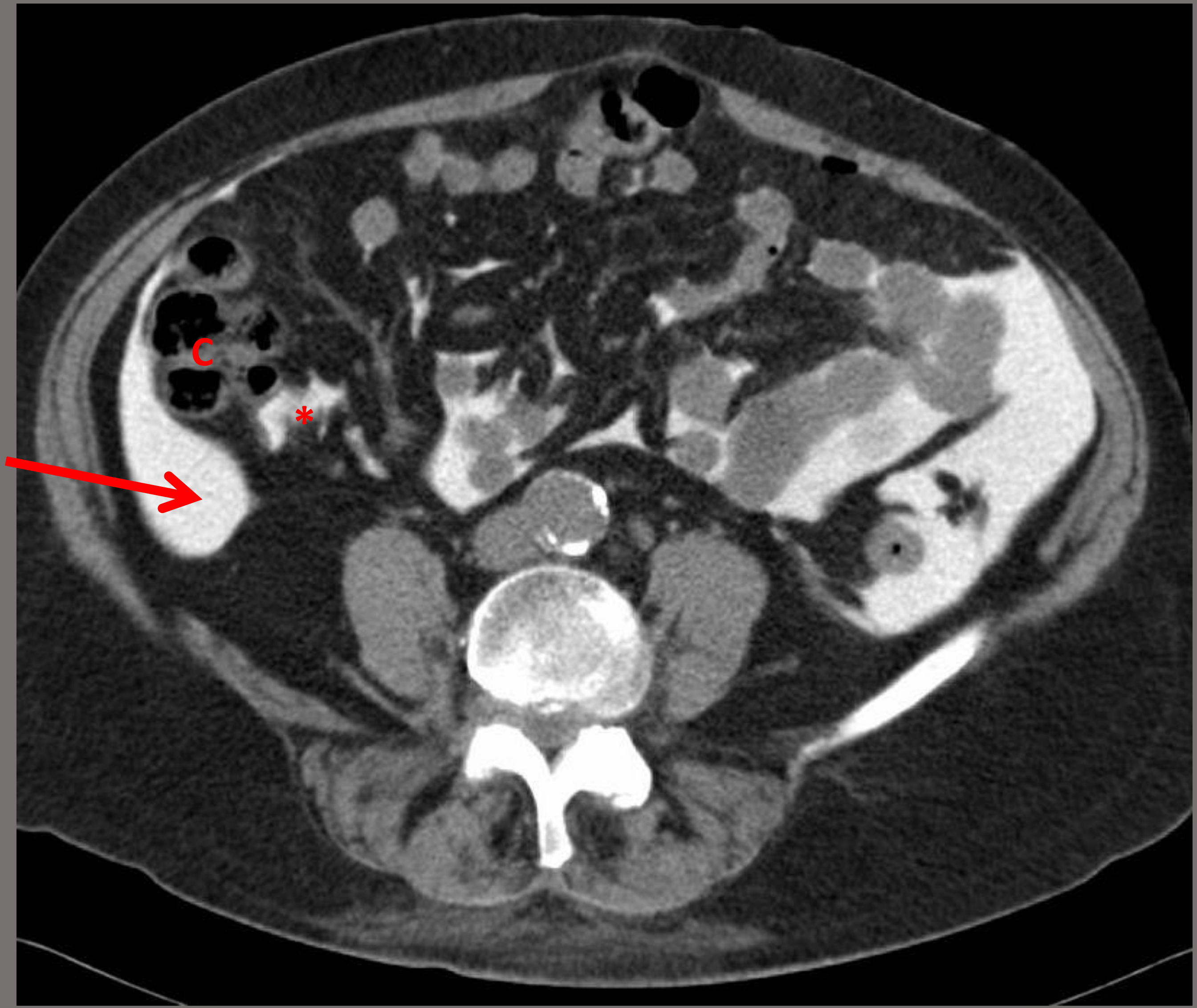


Figure 19: Peritoneogram demonstrating the retrocaecal recess and paracolic gutter. Image courtesy of A Clark.

Retrocaecal recess (asterix):

- The largest of the four recesses:
- Anterior boundary posterior wall of the caecum (C)
- Posterior boundary parietal peritoneum.
- Superior boundary visceral peritoneum coating the posterior wall of the cecum
- Folds of the caecal peritoneum bind it medially and laterally

Paracolic gutters (arrow):

- Lateral depressions of the peritoneum investing the caecum
- Lies lateral to the caecum and colon
- On the right side it is continuous with the hepatorenal fossa superiorly and pelvis inferiorly

Pericaecal internal hernia

DEFECT/HERNIAL ORIFICE

- Most commonly the retrocaecal fossa located posterior to caecum although IH into other fossae have been described

ABNORMAL LOCATION OF BOWEL LOOPS

- Characteristic location of small bowel lateral and posterior to the caecum these usually advance further to lie in paracolic gutter

DISPLACEMENT OF KEY ANATOMICAL STRUCTURE

- Caecum is displaced anteriorly and medially

DISPLACEMENT OF VESSEL

- None

Case 3: Pericaecal Internal Hernia

Figure 21 : demonstrating beaking of the afferent loop as it enters the hernia sac (arrow). A second transition point situated inferiorly (arrow) which is the efferent loop. Two transition points therefore denotes a closed loop obstruction. Obstructed small bowel loop situated laterally within the hernia (asterix).

Foramen Of Winslow

- Accounts for 8% of internal hernias
- Symptoms of proximal obstruction
- Symptoms often preceded by change in intra-abd straining
- Can contain caecum, ascending colon and occasi omentum
- Herniated contents occupy the lesser sac, and it i hernia, of which foramen of Winslow is the most

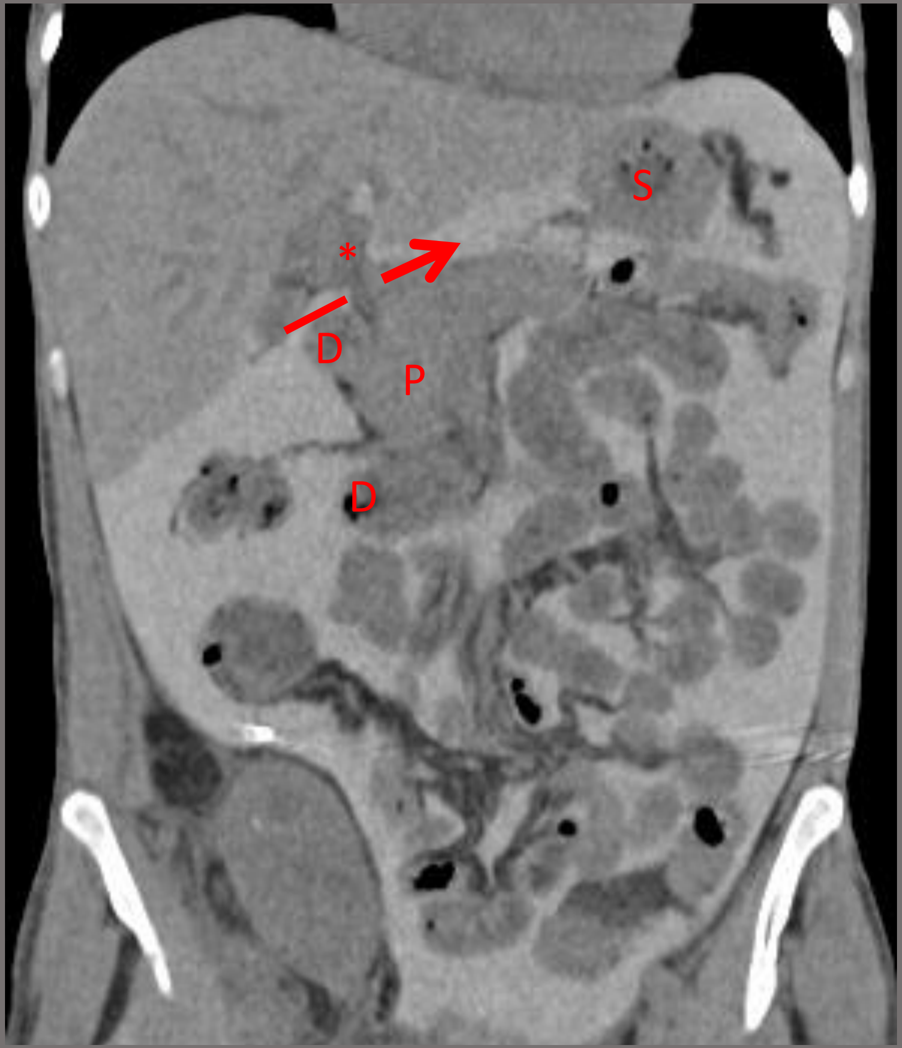
Teaching Point

In addition to the Foramen of Winslow hernias can prolapse into the lesser sac via the greater omentum, lesser omentum and transverse mesocolon.

Anatomy: Foramen Of Winslow

normal communication between the greater and lesser sacs.

- Anterior boundary hepato-duodenal ligament containing portal triad (Asterix)
- Posterior boundary IVC
- Superior boundary caudate lobe of liver
- Inferior boundary duodenum (D)



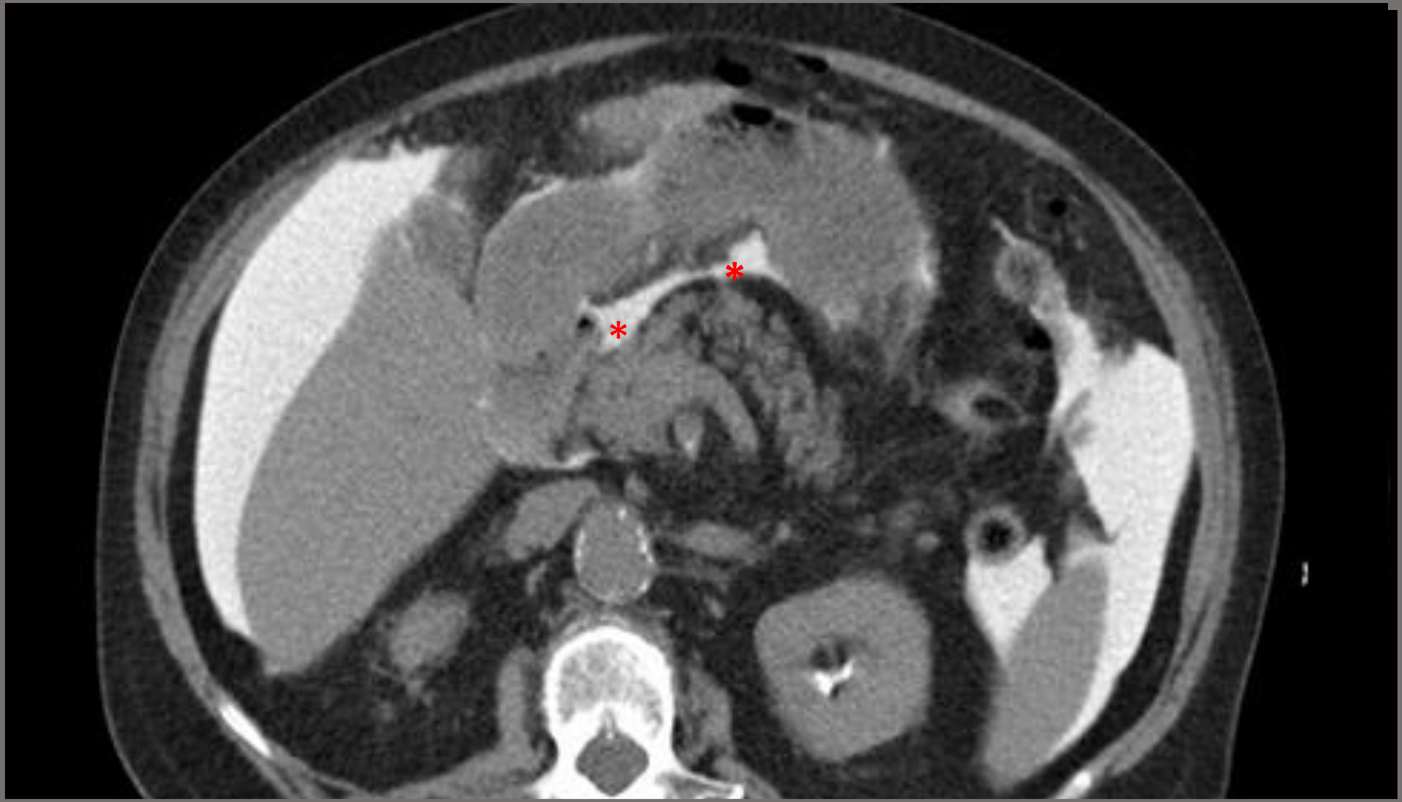


Figure 25: axial image from a peritoneogram demonstrating contrast in the lesser sac between pancreas and stomach (asterix). Image courtesy of A Clark.

Foramen of Winslow internal hernia

DEFECT/HERNIAL ORIFICE

- Foramen of Winslow

LOCATION OF BOWEL LOOPS

- Medial and posterior to the stomach in lesser sac
- Beaking of small bowel loop between liver hilum and IVC as it enters the hernial orifice

DISPLACEMENT OF KEY ANATOMICAL STRUCTURE

- There may be anterior and lateral displacement of the stomach

DISPLACEMENT OF VESSEL

- Stretching of mesenteric vessels through the foramen of Winslow is diagnostic if seen

Transmesenteric Internal Hernia

- Through or into an abnormal defect in the mesentery

- Two patient populations:
  1. Paediatrics and the defect in congental. This is the most common type of IH in this set of patients. Defects arise near the terminal ileum or the ligament of Treitz
  2. Adults and the defect is usually acquired secondary to previous surgery (especially Roux En Y surgery), trauma or inflammation

Transmesenteric Internal Hernia

In the Meyers classification transmesenteric hernias can be sub-divided into:

1. Transmesocolic: most common IH post Roux En Y and occurs in up to 3% of patients
2. Small bowel mesentery related hernia. If post Roux En Y IH it occurs at or around the jejuno-jejunostomy site usually in the left upper quadrant and has a varied imaging appearance
3. Peterson Hernia also occurs post Roux en Y

- Transmesenteric IH is more prone to strangulation and ischaemia, therefore patients present with signs and symptoms of small bowel obstruction
- Although symptom onset is more acute than other types of IH, if the hernia reduces spontaneously symptoms can be intermittent

Transmesenteric IH :Transmesocolic

- Transmesocolic hernias are herniations through or into an abnormal defect in the transverse mesocolon
- Although transverse mesocolon related hernias without a history of surgery exist they are uncommon. In the absence of previous surgery the herniated small bowel loops are situated in the lesser sac (and can be classified as a type of lesser sac hernia)
- Transmesocolic hernias can occur post Roux En Y due to a surgically created defect in the transverse mesocolon. They are the most common IH post Roux En Y. This defect is made to allow passage of the Roux loop to the stomach (retro-colic Roux En Y procedure)

Figure 27: Coronal reformat from a peritoneogram demonstrating the transverse mesocolon en face (arrow).

Transmesenteric internal h

DEFECT/HERNIAL ORIFICE

- Transverse mesocolon

DISPLACEMENT OF KEY ANATOMICAL STRUCTURE

- Displace the transverse colon anteriorly and inferiorly
- If small bowel loops are situated in the lesser sac the stomach will be displaced anteriorly

Teaching Point

Remember : IH through the transverse mesocolon can cause lesser sac hernias

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Teaching Point

The location of the hernia described here does not relate to a transmesenteric hernia that occurs post Roux En Y which occurs near the Jenuno-jenunostomy.

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Teaching Point

Although these sign have been described other authors state the findings of transmesenteric IH are non specific and differentiating small bowel obstruction secondary to a transmesenteric hernia from small bowel obstruction from other causes, especially adhesive band complicated by volvulus is difficult.

The non specific findings include closed loop obstruction, engorgement and stretching of vessels which may be displaced and clustering of small bowel loops.

In addition the hernial defect can occur anywhere in the abdomen.

Anatomy: Small bowel mesentery

Figure 28: Axial slice from a peritoneogram demonstrating the small bowel mesentery. Image courtesy of A Clark

The small bowel mesentery is a fan shaped fold of peritoneum connecting the loops of jejunum and ileum to the posterior abdominal wall.

Axial slice from a peritoneogram demonstrates the small bowel mesentery (asterix) interleaved between small bowel loop and containing vein, arteries and lymphatics.

Anatomy small bowel mesentery

The root of the SBM is contiguous:

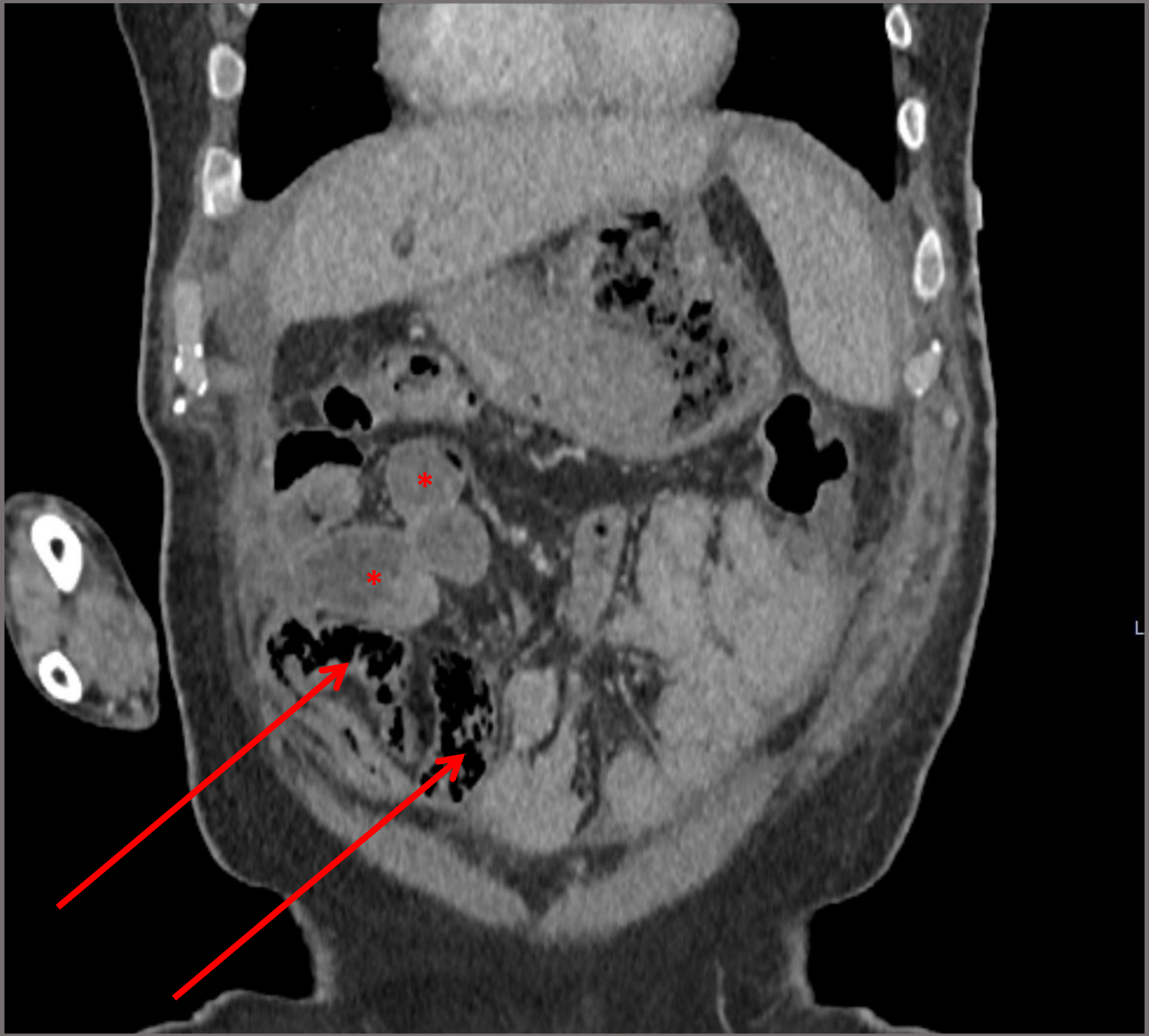
1. Superiorly to the hepatoduodenal ligament around the SMV and portal vein
2. Anteriorly to the transverse mesocolon, the gastrocolic trunk marks the border between them
3. Postero-laterally to the ascending and descending mesocolons (anterior pararenal space) . IMV is the landmark for the latter.

Figure 30: Coronal Image from a peritoneogram demonstrating the root of the small bowel mesentery.

Case 4: Transmesenteric internal hernia

Figure 32:

Axial CT image in the same patient demonstrates the encapsulation of the small bowel loops more clearly with the presence of a hernia sac (arrow).



Teaching Point

Given that a hernial sac is observed this suggest the hernia is of the intra-mesenteric type with small bowel herniating through only one layer of the peritoneum. As opposed to the transmesenteric type when the small bowel herniate through both layers of peritoneum and no hernial sac is visualised.

If a sac is visualised you can be confident the obstruction is due to IH.

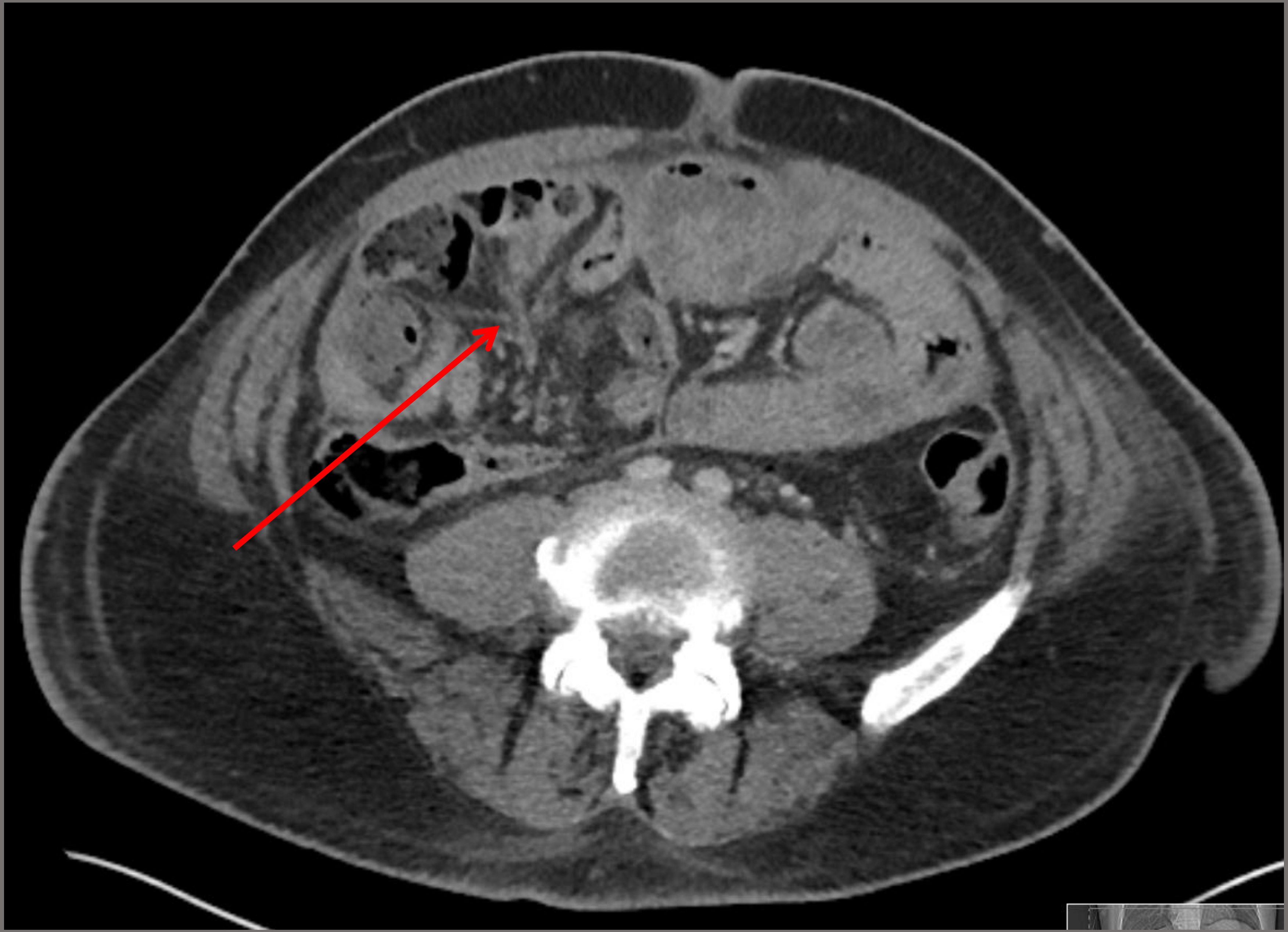


Image 34:
Axial CT image in the same patient, note the pulling and indrawing of vessels (arrow) within the cluster of small bowel loops.

Case 5:Transmesenteric internal hernia

Image 36:

Axial image more inferiorly demonstrates the second transition point (arrow) after which the small bowel is collapsed.

Also note congestion within the small bowel mesentery which is seen with small bowel obstruction.

Image 37:

Coronal image demonstrated pulling of the mesenteric vessels into the hernial sac (circle).

The hepatic flexure (asterix) is displaced centrally and inferiorly which is another characteristic sign of transmesenteric herniation.

Curved arrow demonstrates the direction of the herniated small bowel.

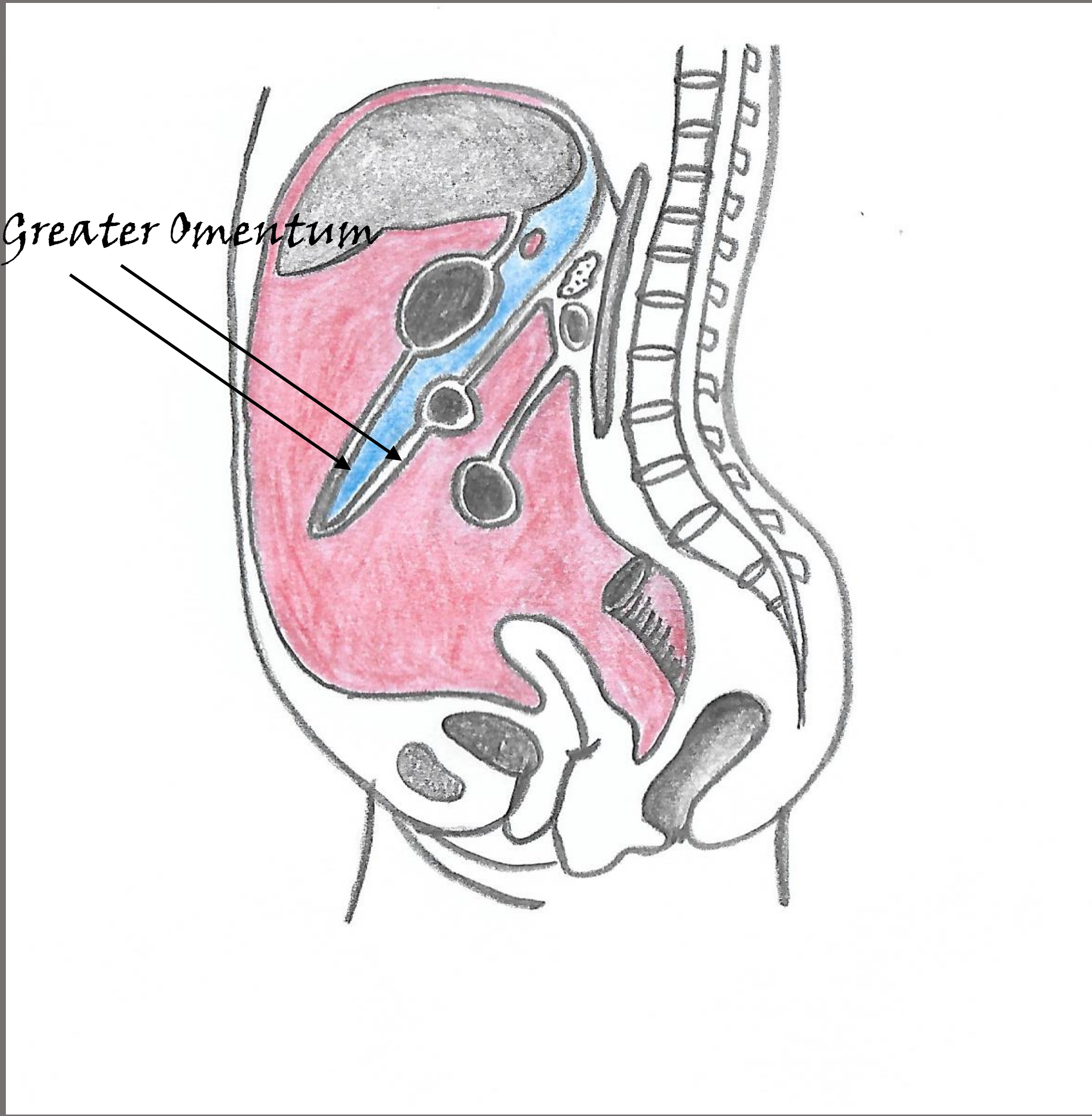
Small volume free fluid is also noted in the pelvis.

Transomental Internal Herniation

- Transomental IH are usually herniations through or into an abnormal defect in the greater omentum
- Alternatively it can be through the lesser omentum or a combined lesser sac IH (involving defects in both the lesser and greater omentum)
- CT findings of a transomental IH through the greater omentum are often identical to those of a transmesenteric hernia and are non-specific
- However, a closed-loop obstruction with intestine located in the anterior portion of the peritoneal cavity is a characteristic feature because the direction of herniated small bowel is usually posterior to anterior
- As the greater omentum borders the lesser sac a greater omental IH can also lead to herniated small bowel loops being situated in the lesser sac as previously stated

Anatomy: Greater Omentum

- Anatomically, the greater omentum hangs down from the greater curvature of the stomach and the proximal part of the duodenum, covering the small intestine like an apron and attaching to the superior aspect of the transverse mesocolon
- This omentum comprises two leaves, each consisting of the two peritoneal layers which are normal fused



Case 6: Transomental Internal Hernia

Image 40:

Axial image re-demonstrating the ischaemic small bowel loops with pronounced mesenteric congestion.

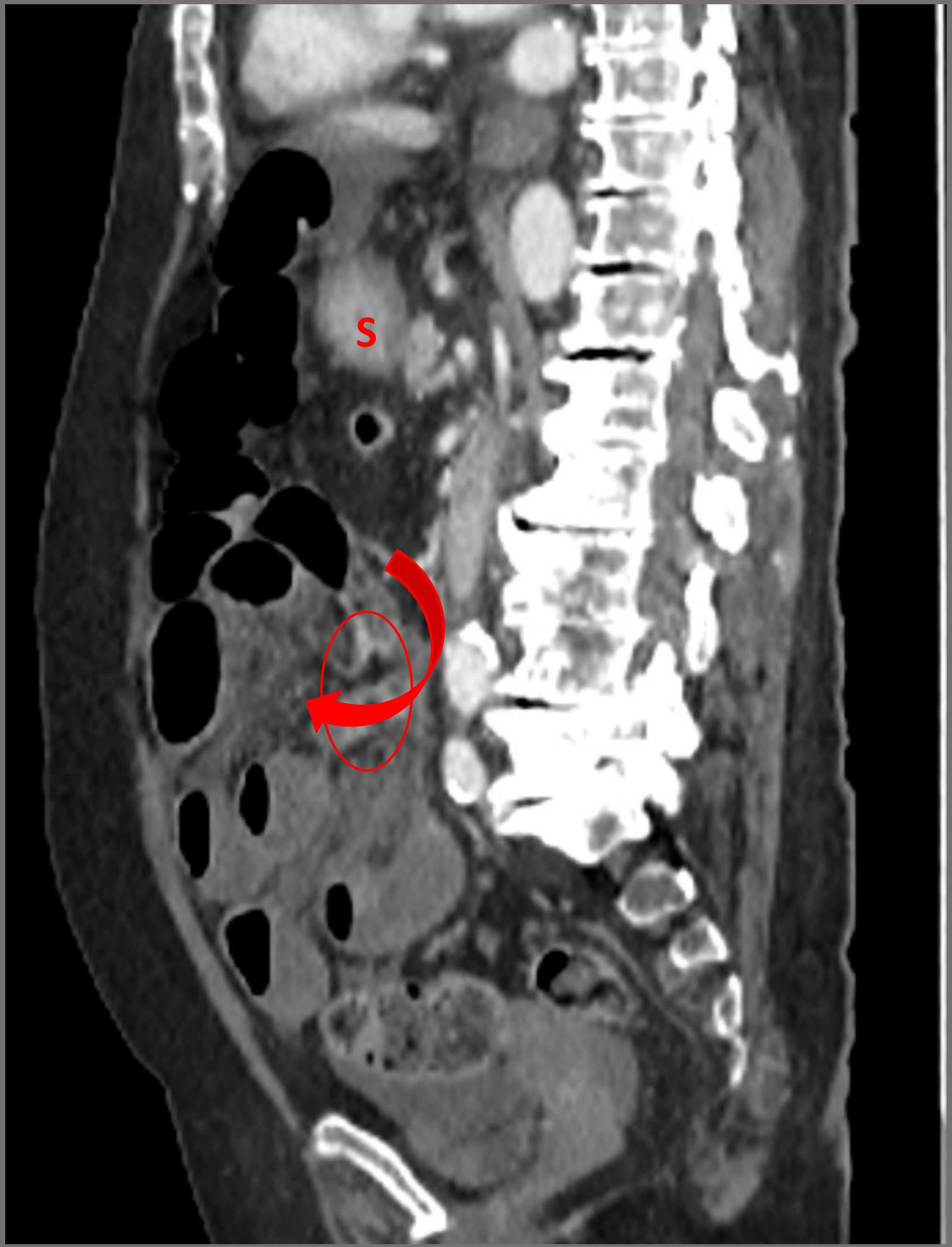


Image 41:

Sagittal image in the same patient re-demonstrating the probable hernia orifice (circle) . This is located in line with the stomach (S) in the sagittal plane and was thought to represent a defect in the greater omentum.

Direction of the herniate loops is from anterior to posterior, as demonstrated by the arrow.

As previously described imaging features can be identical in trasmesenteric hernia.

This patient was deemed not fit for surgery.

Case 7: Combined lesser sac IH

A 40 year old lady was admitted with small bowel obstruction and underwent CT examination.

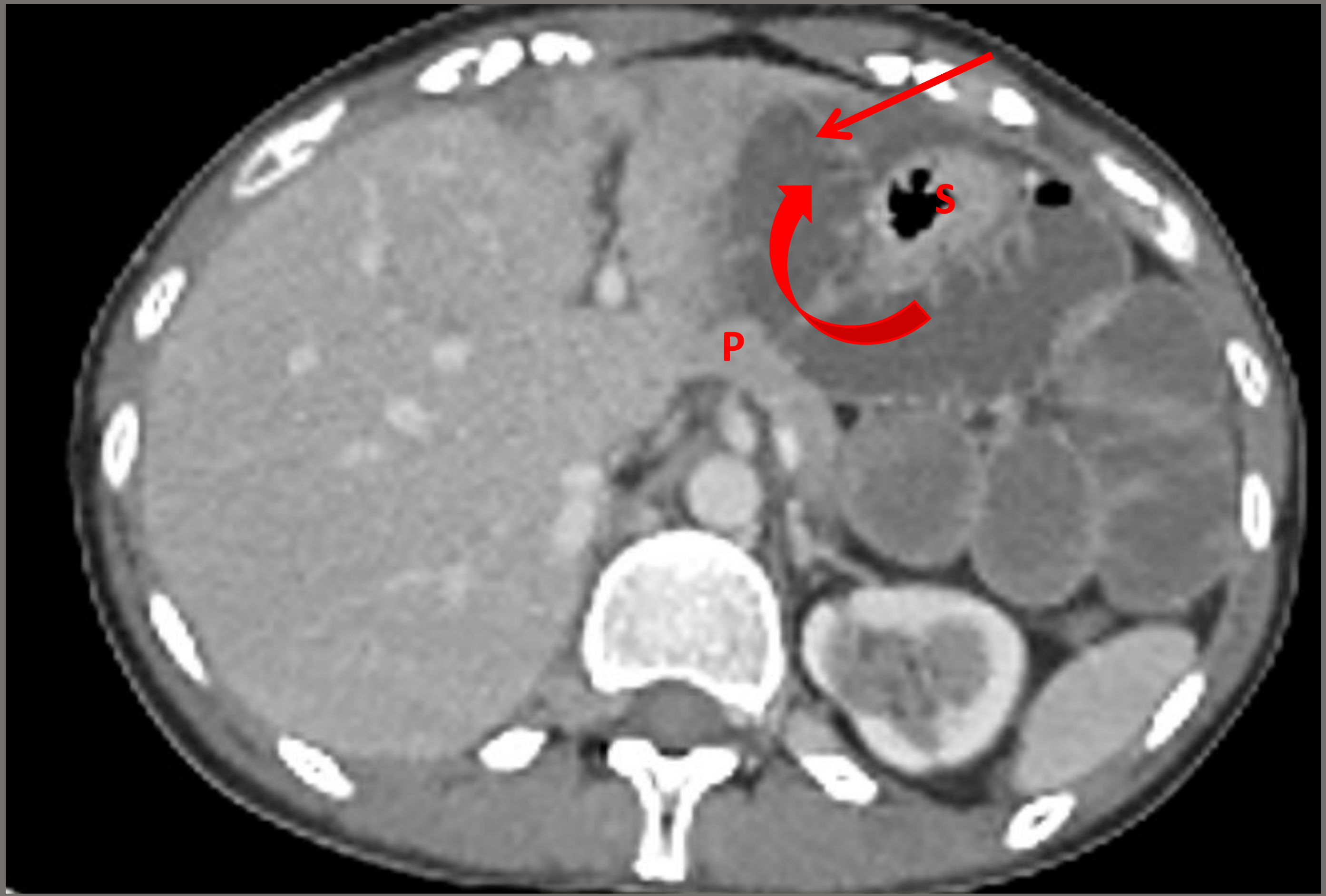
Past medical history included a left hemi-colectomy due to Hirsprung's disease with complex abdominal anatomy.

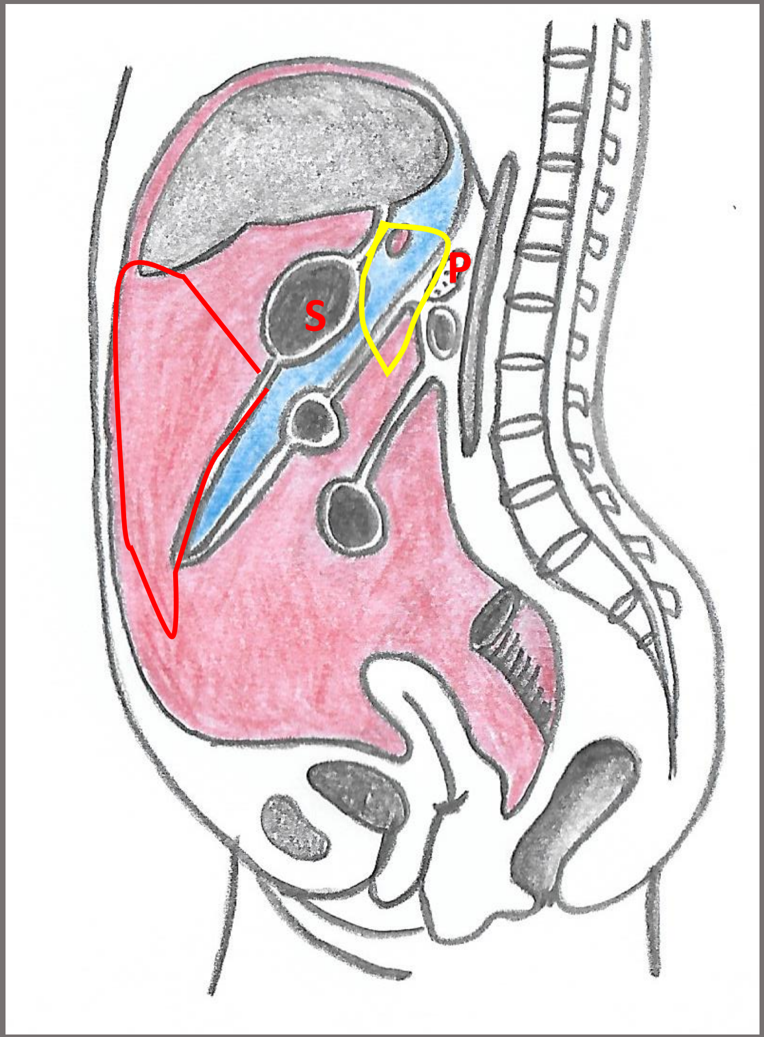
Image 42: Axial CT demonstrates small bowel obstruction with a transition point within the expected region if the lesser omentum (arrow).

Obstructed small bowel loops (asterix) lay within the lesser sac posterior to stomach (S).

Curved arrow demonstrated the direction of the herniated bowel.

Image 43a: Coronal diagram demonstrating small bowel loops (asterix) within the lesser posterior to stomach (S) and anterior to pancreas (P). Image 43b axial slice demonstrating the 2nd transition point in the expected region of the lesser which was in close proximity to the 1st transition point. However the small bowel remained dilated beyond this point (straight arrow). Curved arrow demonstrated the direction of the small bowel loops.





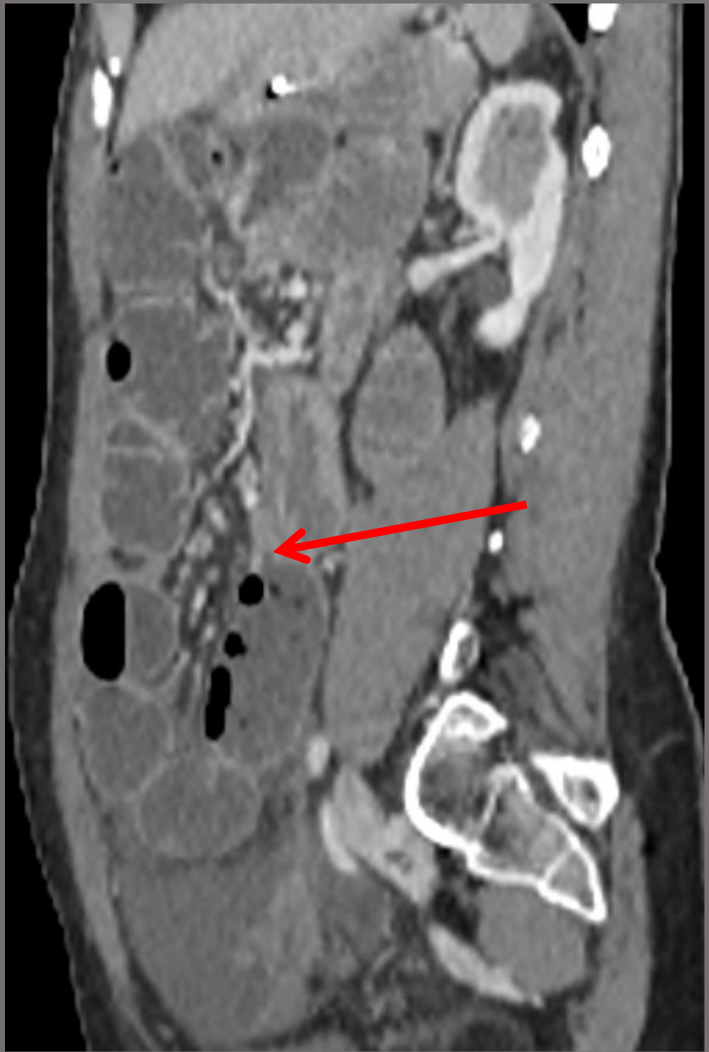


Figure 44a,44b: Sagittal image and diagrammatic illustrating demonstrating the obstructed loops after exiting the lesser sac and can be seen here trapped within the two layers of the greater omentum filling the anterior aspect of the greater peritoneal cavity (red line). S demonstrates stomach. Note the proximal obstructed small bowel previously illustrated located within the lesser sac (yellow line).

Figure 44c: Further sagittal slice more laterally demonstrated a 3rd transition point (arrow) with beaking around the distal aspect of the greater curvature of stomach as the small bowel exited the greater omentum.

Figure 45:

Coronal image re-demonstrating the 3rd transition point (arrow) as it exits the greater omentum. After which the distal small bowel is collapsed.

Surgery confirmed a combined lesser sac IH with small bowel situated between the layers of the greater omentum and jejunum within the lesser sac.

Defects were identified within the greater and lesser omentum.

Broad ligament Internal Hernia

- A broad ligament hernia is a herniation through or into an abnormal opening in the left or right broad ligament of the uterus
- This is the most common sub-type of a pelvic IH
- It can be congenital or acquired however a high proportion of broad ligament IH occur in multiparous women
- Herniation through both peritoneal layers of the broad ligament is the most common therefore no hernial sac is present
- The herniated small bowel loops the lie lateral to the uterus in the pelvic cavity

Anatomy: Broad Ligament Internal Herniation

- The broad ligament extend from the uterus to the lateral pelvic wall
- The space between the two peritoneal layers of the broad ligament is known as the parametrium
- The superior free edge of the broad ligament is formed medially by the fallopian tube and laterally by the suspensory ligament of the ovary.
- Landmark vessels of the broad ligament are the tubal and ovarian branches of the ovarian and uterine vessels, which run inside the superior portion of the ligament.
- The uterine artery and venous plexus, which run along the inferior border of the broad ligament, are also key vessels

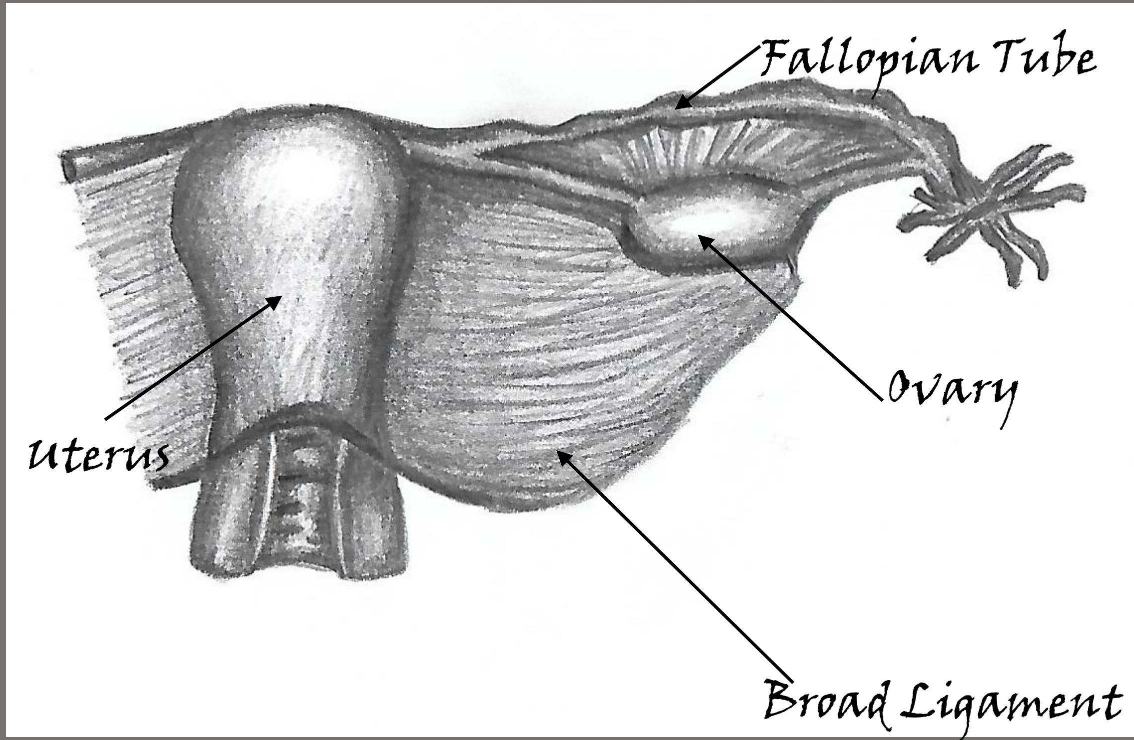


Figure 46: Diagrammatic illustration of the broad ligament. Image courtesy of Mark Tranter

Case 8: Broad ligament Internal Hernia

Figure 47:

Axial CT slice in the same patient more inferiorly demonstrates obstructed small bowel loops posterior and lateral to the uterus within the hernial sac (asterix).

Anterior displacement of the uterus (U).

Note congested, radially orientated small bowel vasculature observed in closed loop obstruction.

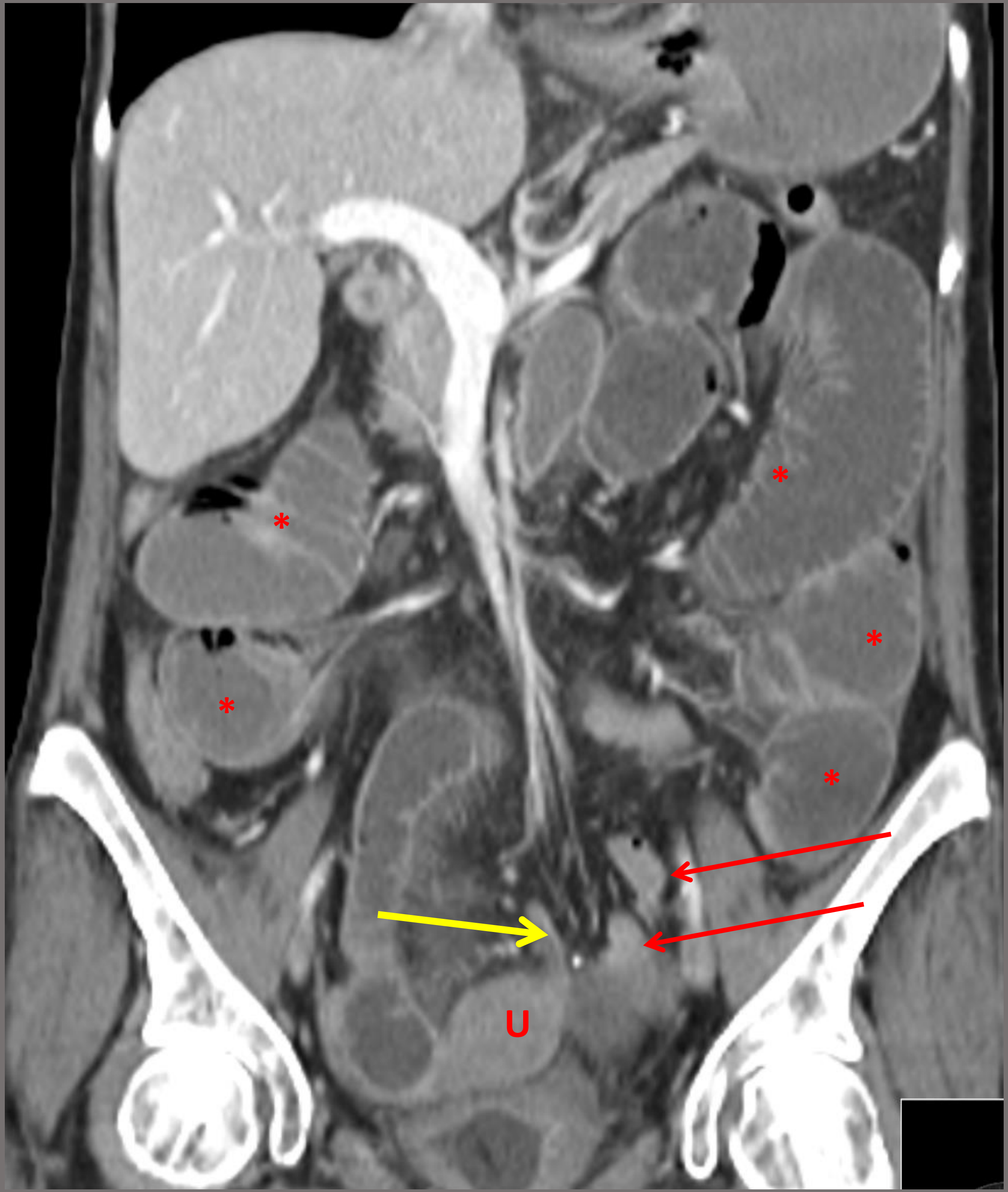


Figure 48: Coronal slice in the same patient.

Multiple proximally dilated small bowel loops are visualised (asterix).

The two transition points (arrows) are demonstrated in close proximity to each other denoting a closed loop obstruction. These are located in the region of the left broad ligament.

The left ovary and fallopian tube (arrow) are displaced superiorly.

U denotes the uterus.

Sigmoid mesocolon related hernias

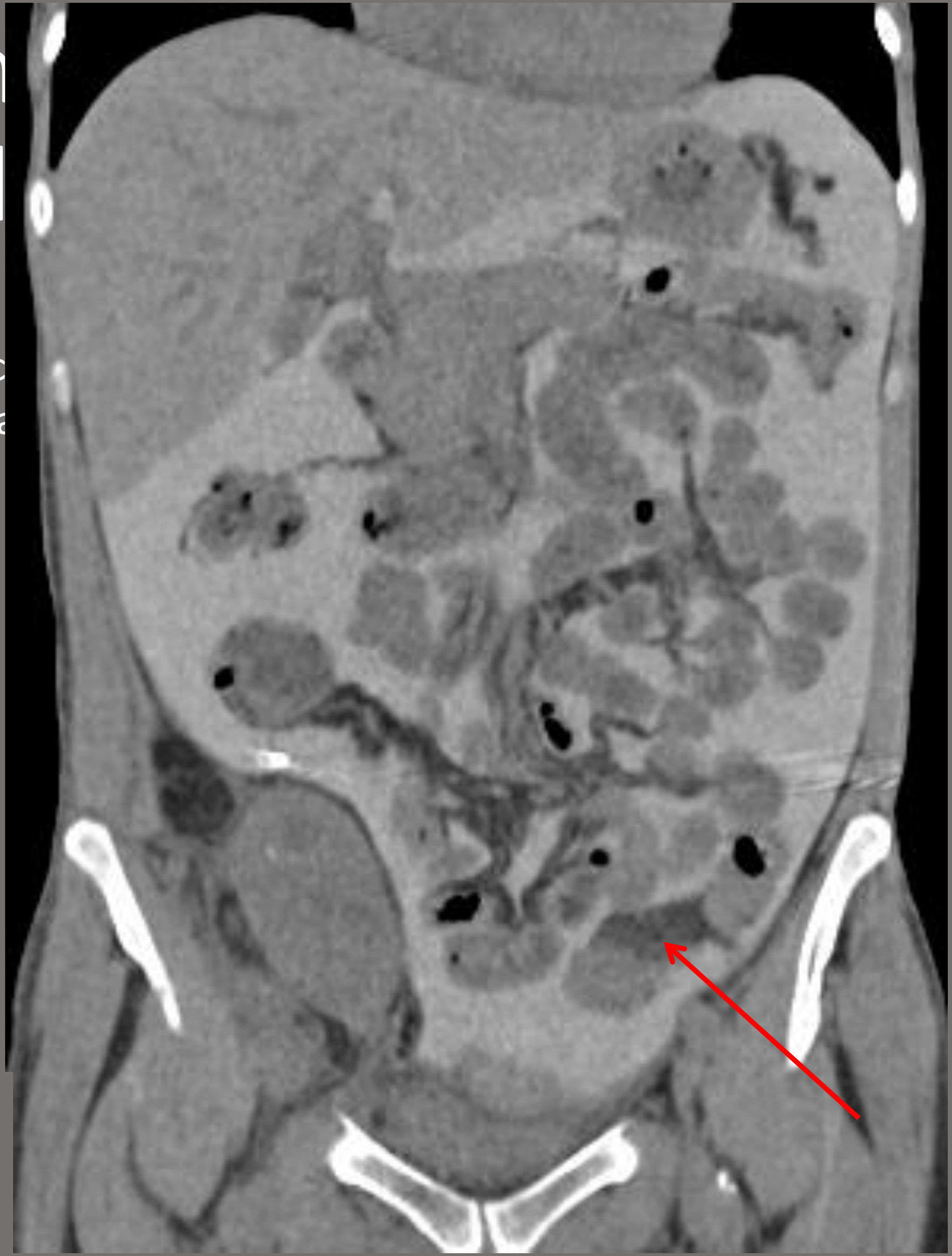
- Three types of sigmoid related IH have been described by Benson and Killen:

1. Transmesocolic
2. Intramescolic
3. Intermesocolic

- Transmesocolic and Intramesocolic are true defects in the sigmoid mesentery, depending on whether the small bowel has herniated through one or both layers of peritoneum.
- Intermesocolic is a common fossa seen in up to 70% of the population. Nevertheless if large enough it can allow small bowel loops to herniate into it.
- The imaging features described are the same for all types, however a hernial sac will be seen with intramesocolic sigmoid related hernias as only one layer of peritoneum is breached.

Anatom
Internal

The sigmoid mesoc
posterior abdomina



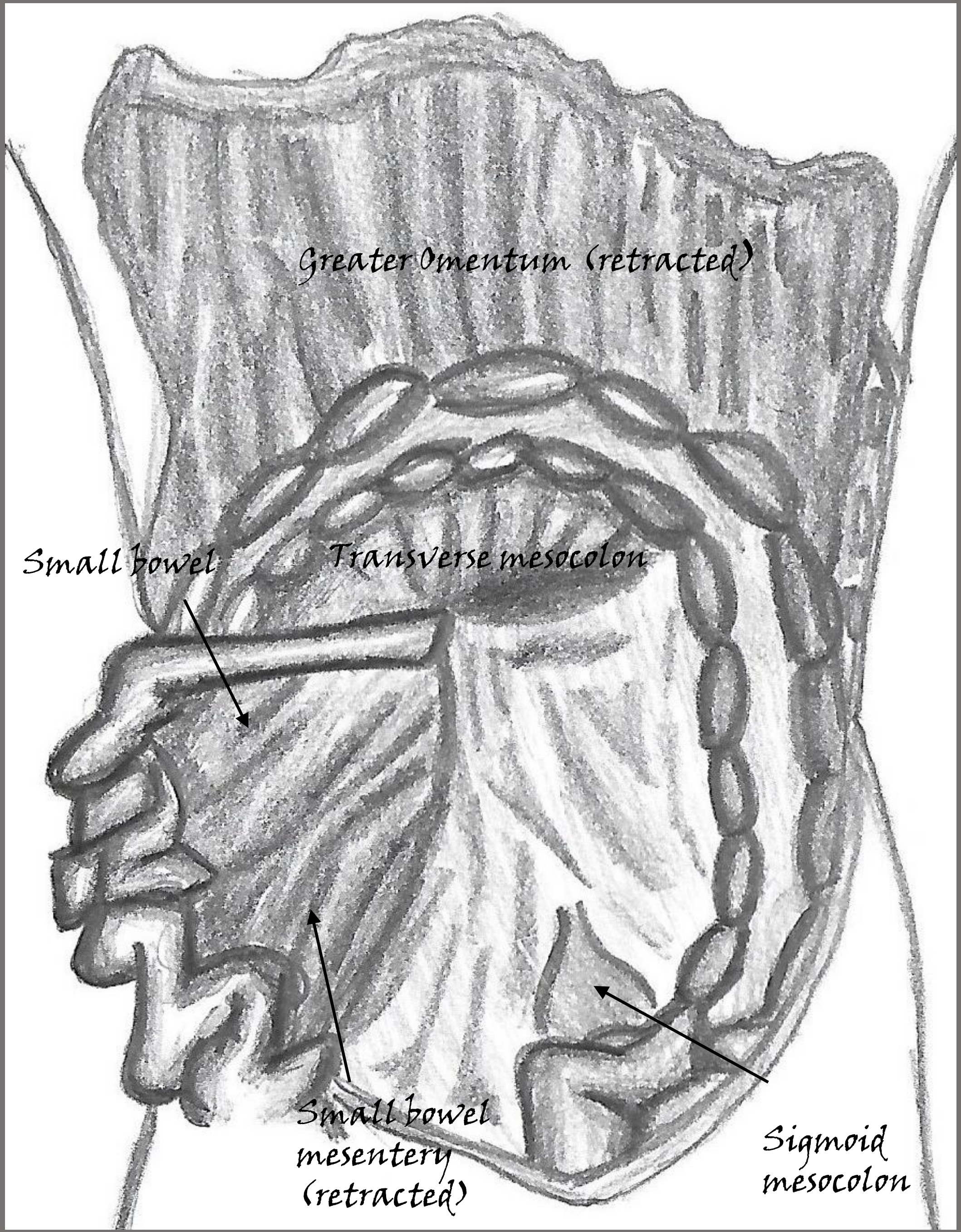


Figure 50: Coronal image from a peritoneogram demonstrating the sigmoid mesocolon.

Sigmoid mesocolon related internal hernia

DEFECT and LANDMARK

- In the sigmoid mesocolon

ABNORMAL LOCATION OF BOWEL LOOPS

- Between sigmoid colon and left psoas muscle
- U or C shaped cluster of small bowel posterior and lateral to the sigmoid colon

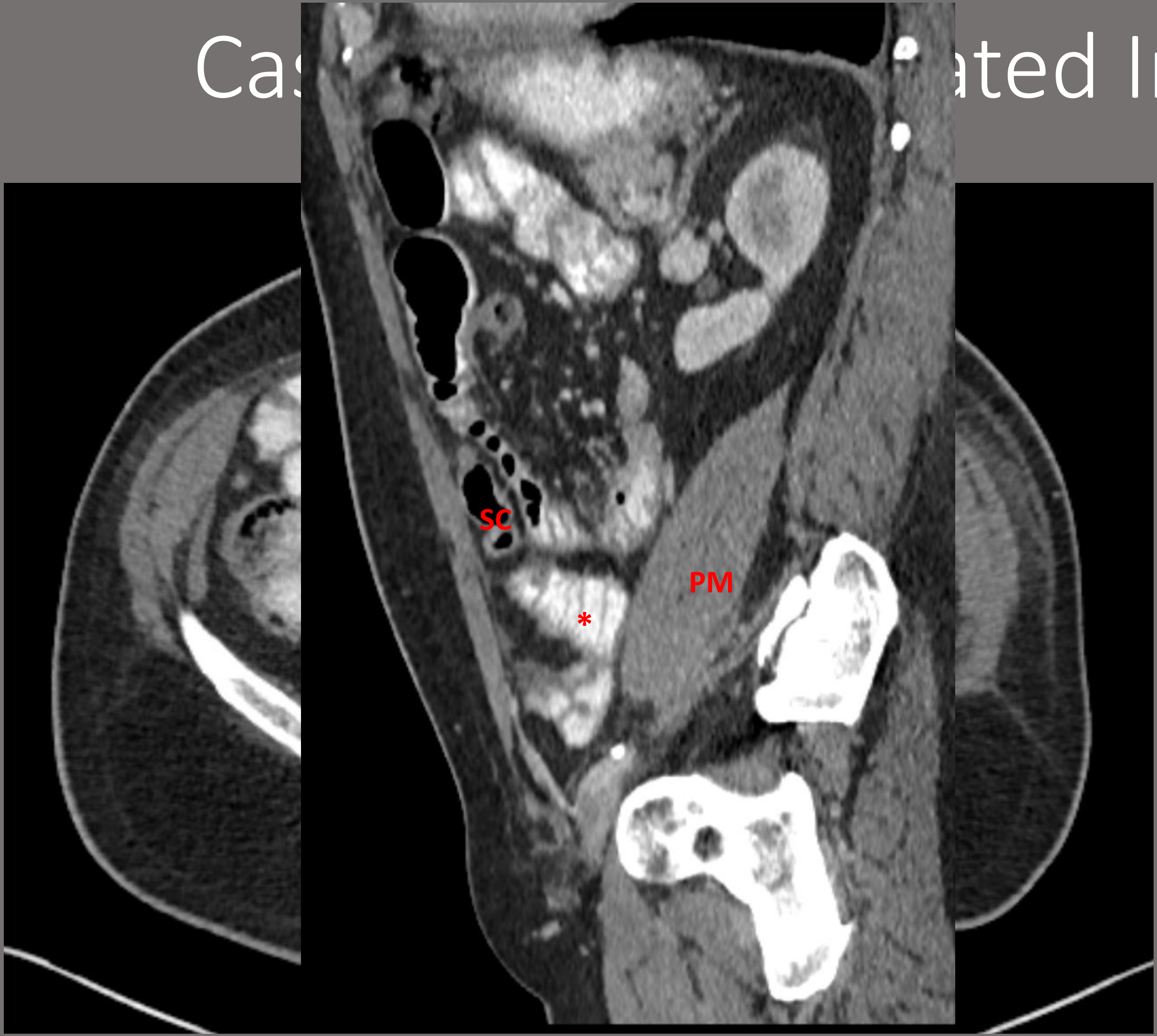
DISPLACEMENT OF KEY ANATOMICAL STRUCTURE

- Sigmoid colon displaced antero-medially

DISPLACEMENT OF VESSEL

- None specific but splaying of the sigmoid vessels and identifying the sigmoid vessels will help with identification of the sigmoid mesentery

Cas … ated Internal Hernia



A 75 year old man complained of recurrent abdominal pain.

Figure 51a/51b Axial and sagittal CT images demonstrate the characteristic location of small bowel loop between the sigmoid colon (SC) anteriorly and psoas muscle (PM) posteriorly.

Note mild dilatation of the small bowel loops within the hernial sac (asterix).

Image 52:

Sagittal slice demonstrates clustering appearance of the herniated small bowel loops (asterix) with stretching and drawing in of vessels (arrow) within the hernia sac.

Image 53: Coronal slice demonstrating the afferent and efferent loops (arrow) as they enter the hernial orifice (circle). The small bowel (asterix) within the hernia is mildly dilated but there was no proximal small bowel dilatation. Curved arrow demonstrates the orientation of the hernia.

Image 54: Coronal slice from the same patient more posteriorly demonstrated the sigmoid vessels/IMV (arrow) extending superiorly as the apex of the sigmoid mesentery extend superior-posteriorly to the posterior abdominal wall.

Conclusion

Summary of Learning Points

- Some IH such as left paraduodenal, right paraduodenal and pericaecal IH have characteristic imaging findings
- However other types of IH particularly transmesenteric and transomental IH have non-specific imaging features making differentiating these from other causes of small bowl obstruction difficult
- In the acute setting, detection of a closed loop obstruction with identification of the two transition points will help identify the hernial orifice
- Ancillary signs although non specific are pulling and stretching of mesenteric vessels and a clustered appearance of the small bowel
- However sacculation or visualisation of a hernial sac can allow one to be confident there is internal herniation

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Thank you for taking the time to review our educational exhibit.

We hope you have found it useful.

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