

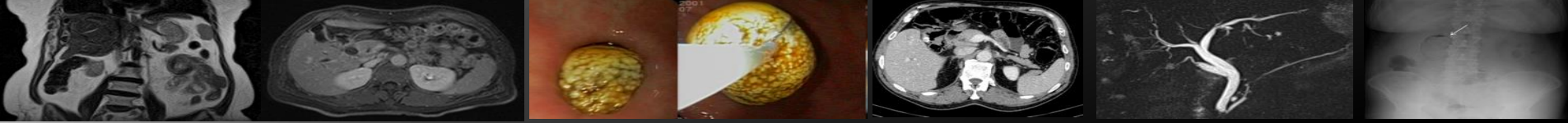
Educational Poster

They may eventually find a way out: unusual gallstone related complications

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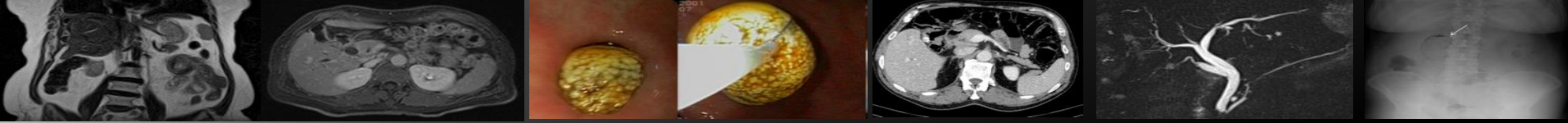
Centro Hospitalar Tondela-Viseu E.P.E. - Portugal





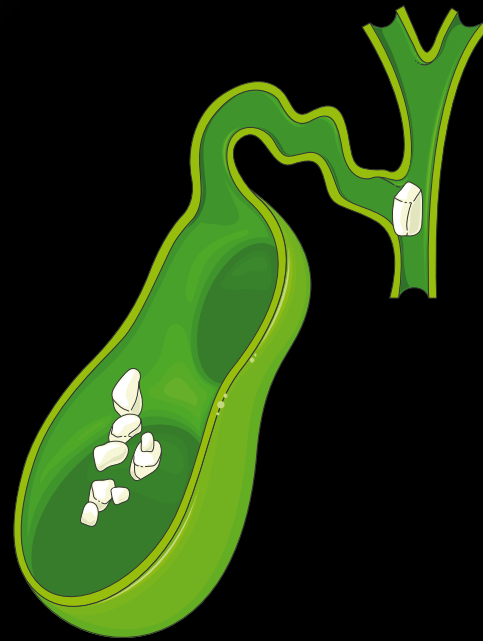
Learning Objectives

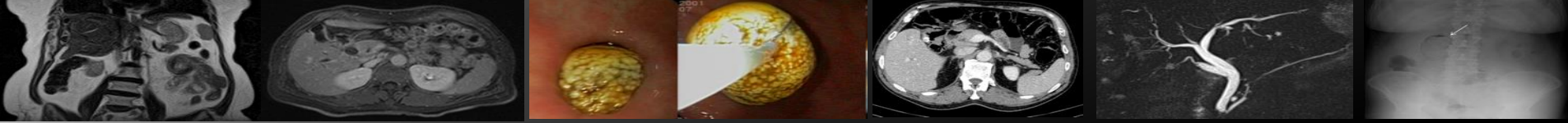
- To depict imaging aspects of unusual complications associated with gallstones using a series of patients evaluated at our institution.



Background

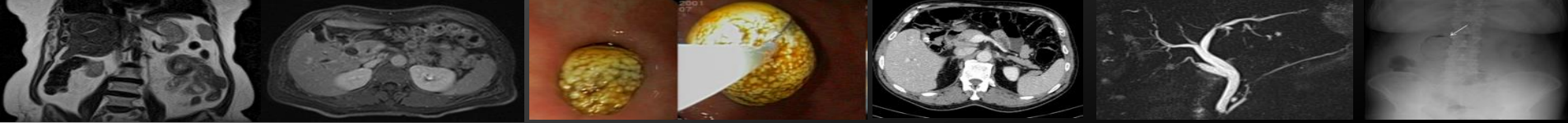
- There is a relatively low limit (<3mm) for the diameter from which calculi may not be able to go through the usual tubular structures.





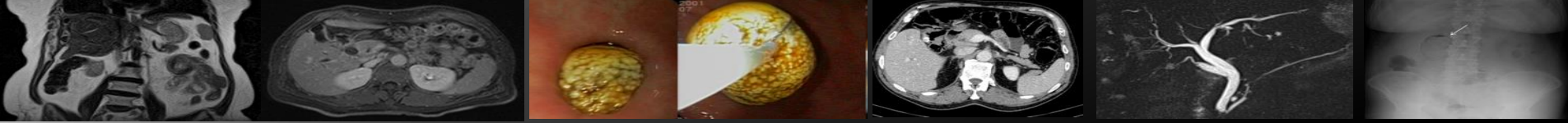
Background

- Understandably, there is a tendency to search for an obstructing calculus in the gallbladder neck or cystic duct when there is a suspicion of acute cholecystitis since 90-95% of cases have this etiology.
- However, one should be alert to other calculi related complications, certainly less common but that may have serious consequences in an acute abdomen context.



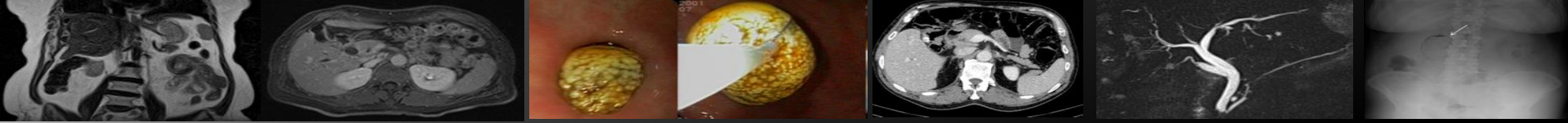
General imaging findings

- Following an episode of cholecystitis or during the event itself, gallstones can sometimes erode the gallbladder and/or compress neighbouring structures.
- Getting to know the causes and imaging features is paramount.
- Fistulization, perforation, gallstone ileus are some unexpected complications that gallstones can present with and be part of a complex clinical condition.



General imaging findings

- Analysing ancillary imaging findings such as pneumobilia, focal defects in the gallbladder wall and small bowel loop dilation are key when one is trying to differentiate these conditions.



Imaging findings – Gallbladder perforation

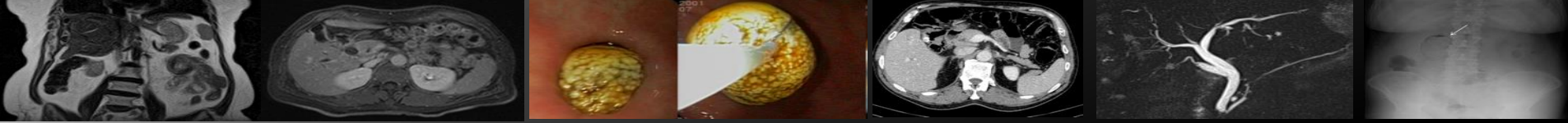
Occurs in 5 to 10%
of patients with
acute cholecystitis



Equivocal signs
and symptoms



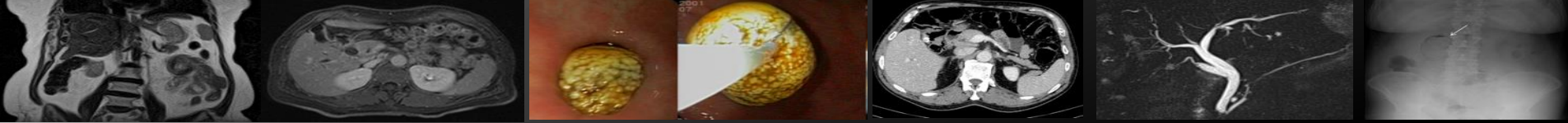
Crucial role of
imaging



Gallbladder perforation classification (according to Niemeyer)

Type 1

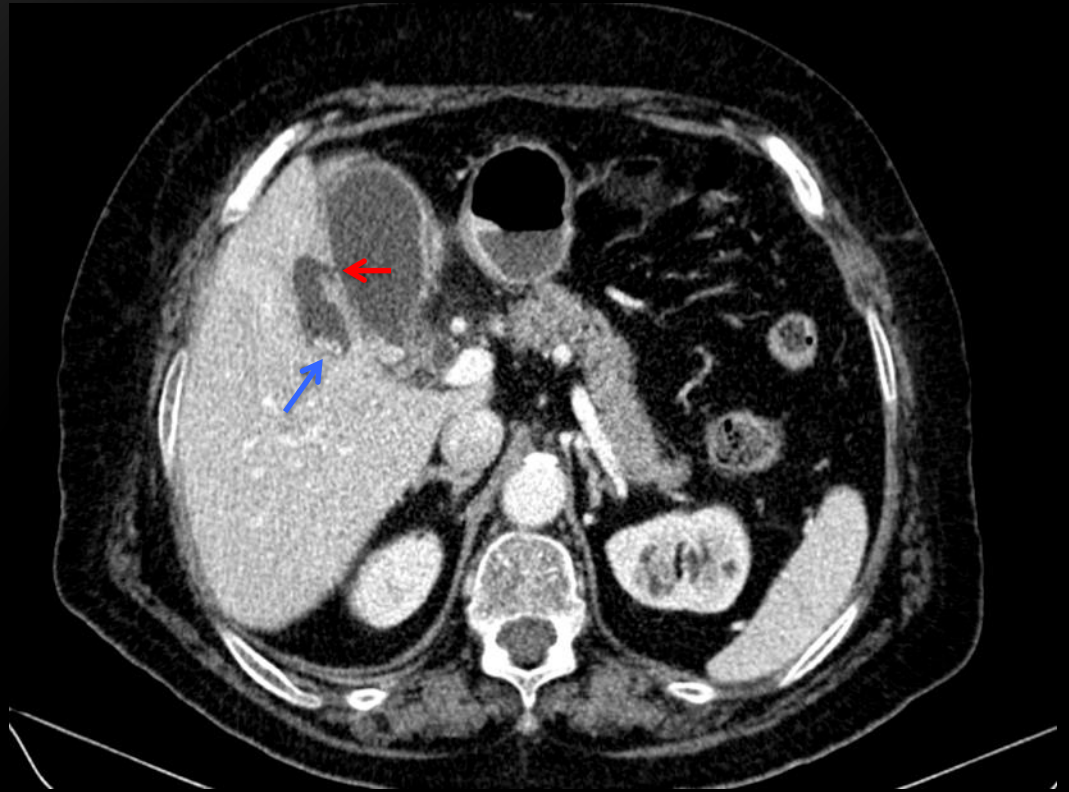
- Acute free perforation into the peritoneal cavity
- Less common type
- Results in peritonitis
- High mortality rate (40%)



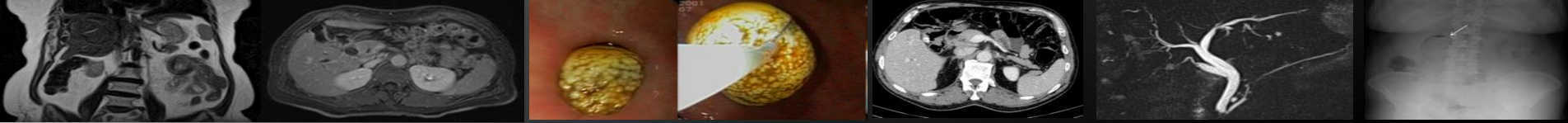
Gallbladder perforation classification (according to Niemeyer)

Type 2

- Most frequent site of perforation: fundus → least blood supply
- Subacute perforation → pericholecystic abscess
- Most common type



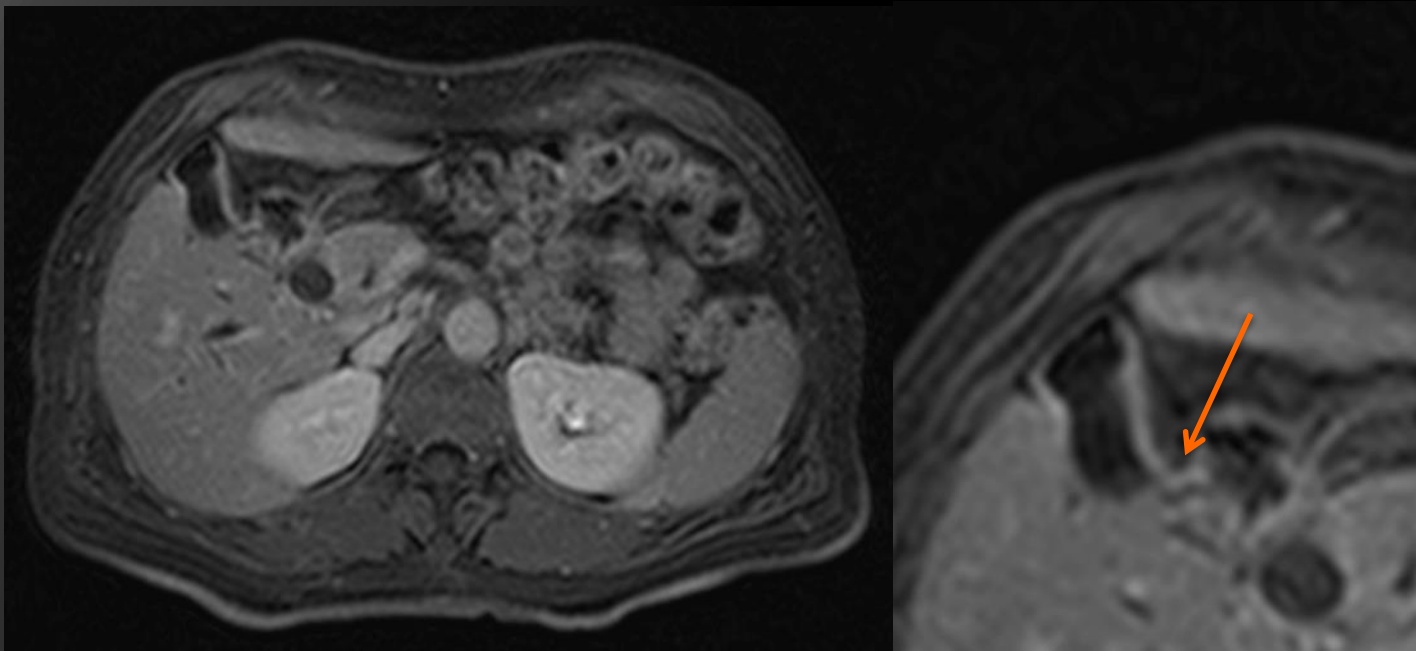
Contrast enhanced CT (CECT) - axial view. Type 2 gallbladder perforation. There is a gallbladder focal wall defect (red arrow) and a bile density collection with small calculi inside (blue arrow). The gallbladder is mildly dilated and partially filled with calculi.



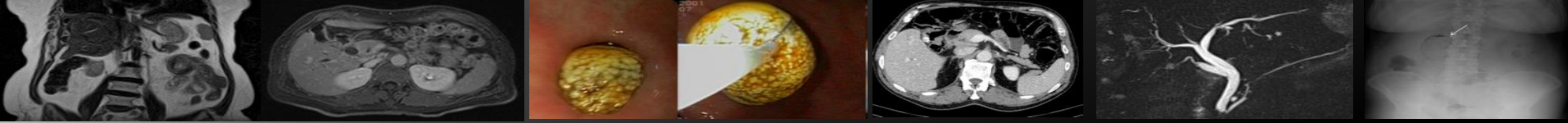
Gallbladder perforation classification (according to Niemeyer)

Type 3

- Chronic perforation with the formation of a cholecysto-enteric fistula.

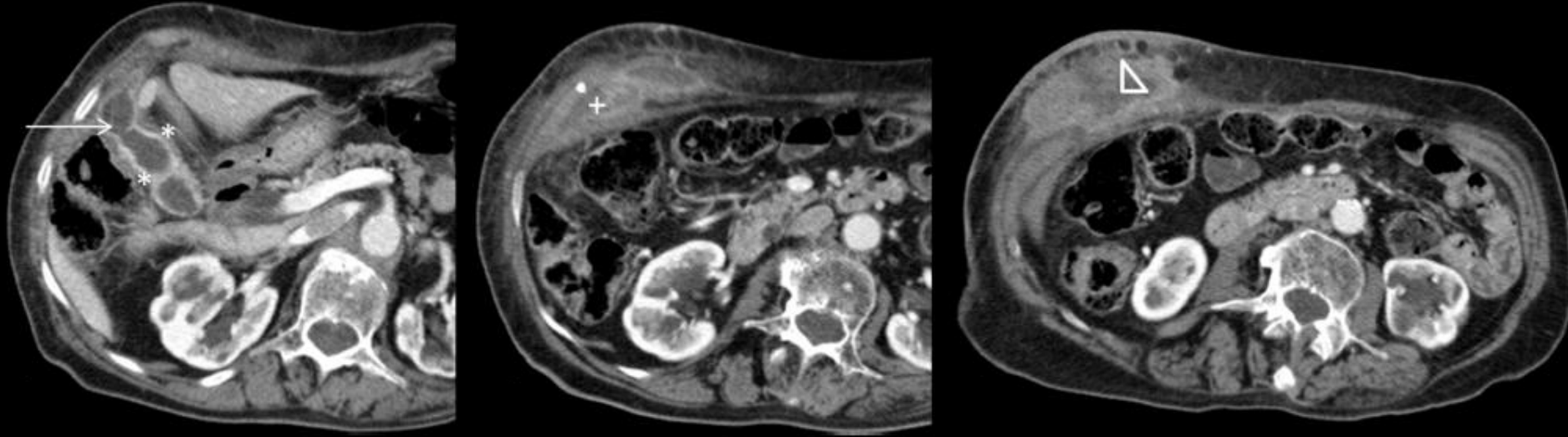


MR T1 FS axial image post Gd – late phase. Type 3 gallbladder perforation. There a thin walled enhancing fistulous tract between the gallbladder infundibulum and a jejunal bowel loop - orange arrow.

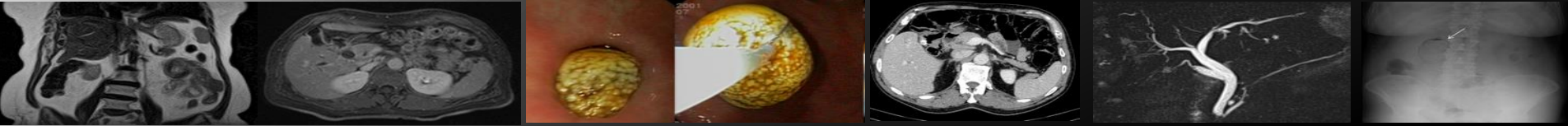


Imaging findings – Gallbladder perforation

Cholecystocutaneous fistulization – A very rare finding



CECT axial views. Patient that developed a cholecystocutaneous fistula. There is a hyperenhancing and thickened gallbladder wall (*), with a focal discontinuity in the fundus (arrow), from which we can see a complex fistulous tract communicating with the muscular plane (+). From there, we can see further extension to the subcutaneous tissue with surrounding fat stranding (arrowhead).



Imaging findings – Gallbladder ileus

Cholecystitis



**Adhesions
to adjacent
bowel**

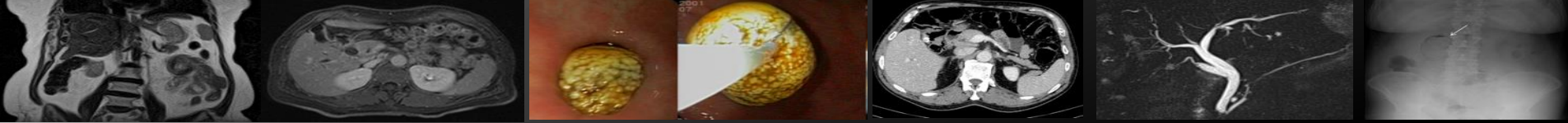


**Gallstone
erodes walls**



Fistula

- Duodenum (++)
- Stomach
- Colon
- Jejunum
- Skin



Imaging findings – Gallbladder ileus

Obstruction of small bowel due to an impacted gallstone (>2.5cm)

1 to 5% of cases of non malignant small bowel obstruction

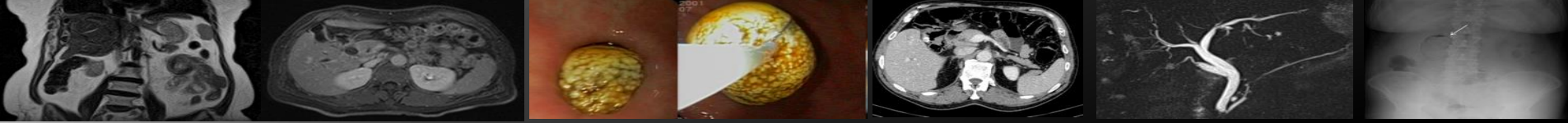
Rare complication associated with a subclinical or milder episode of cholecystitis

Rigler's triad:

- **1. Small bowel obstruction**
- **2. Ectopic gallstone at point of transition**
- **3. Pneumobilia**

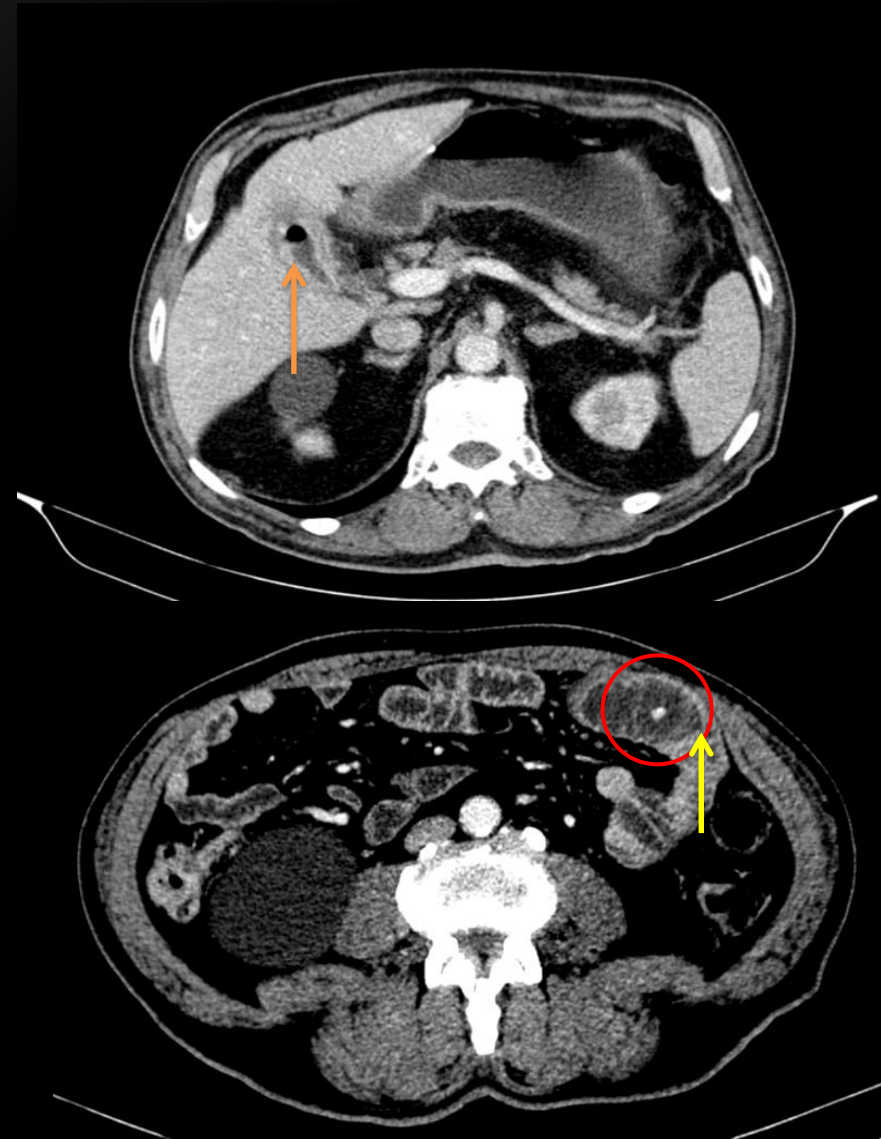
Minority of gallstones calcify (12.5%) → easy to overlook the gallstone

Diagnosis by CT
Sensitivity: 93%
Specificity: 100%



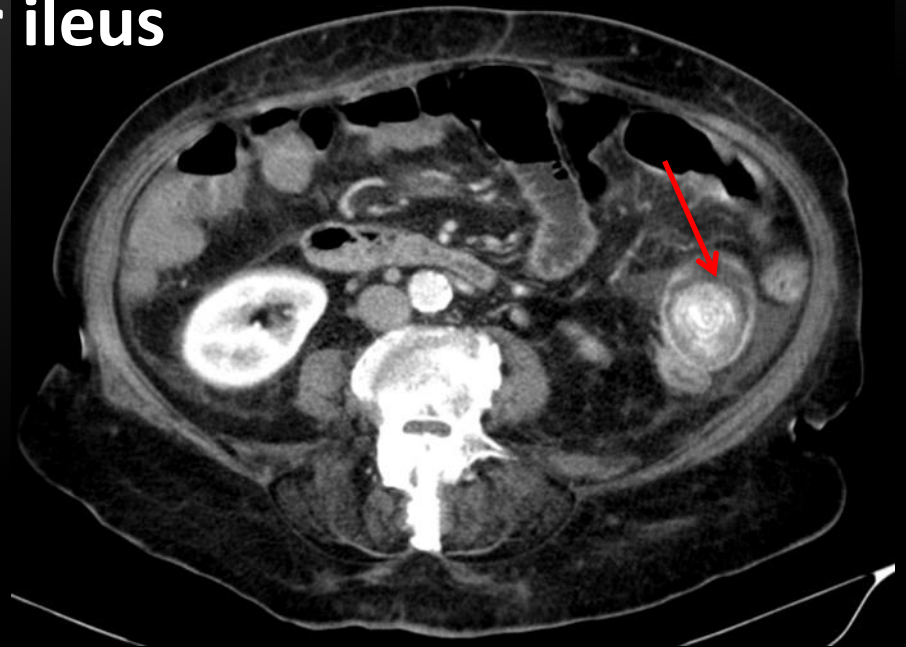
Imaging findings – Gallbladder ileus

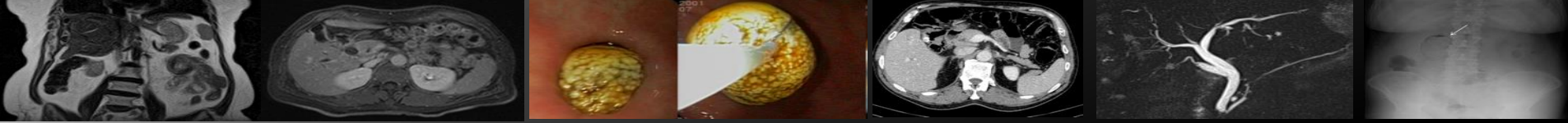
CECT - axial views. Gallstone ileus. Note the pneumobilia in the picture above (orange arrow) and the point of transition in the picture below (yellow arrow) with an obstructing partially non calcified gallstone in the jejunum (red circle).



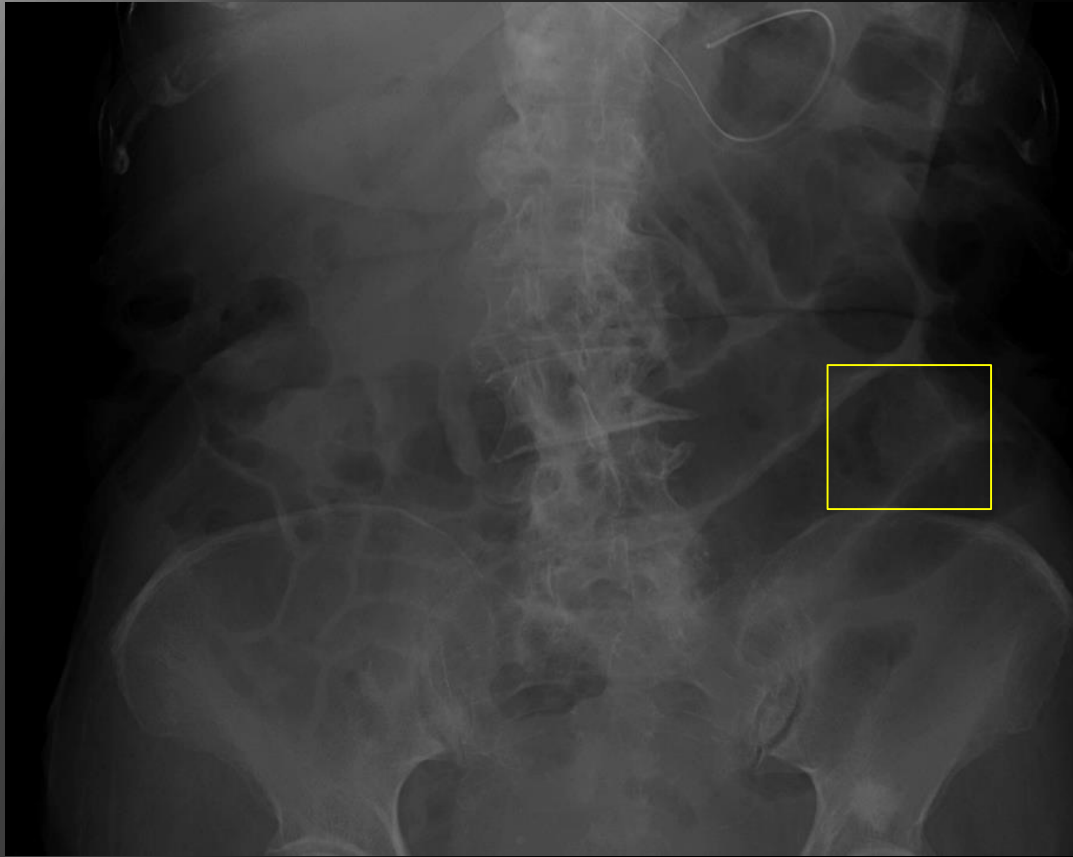
Imaging findings – Gallbladder ileus

CECT: sagittal and axial views. There is a big, “onion” looking calculus impacted in jejunum (red arrows). Point of transition is clearly observed in the sagittal view causing bowel obstruction and dilation. There is pneumobilia (blue arrow) and a small amount of free intraperitoneal fluid surrounding the bowel.

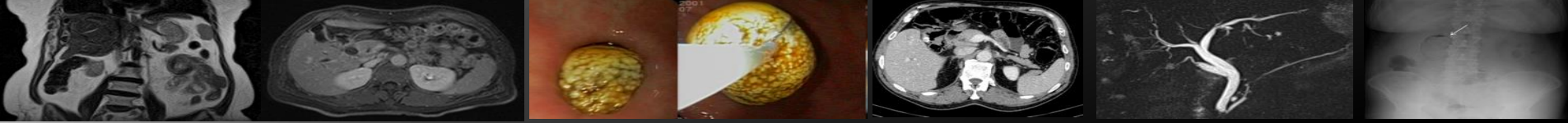




Imaging findings – Gallbladder ileus

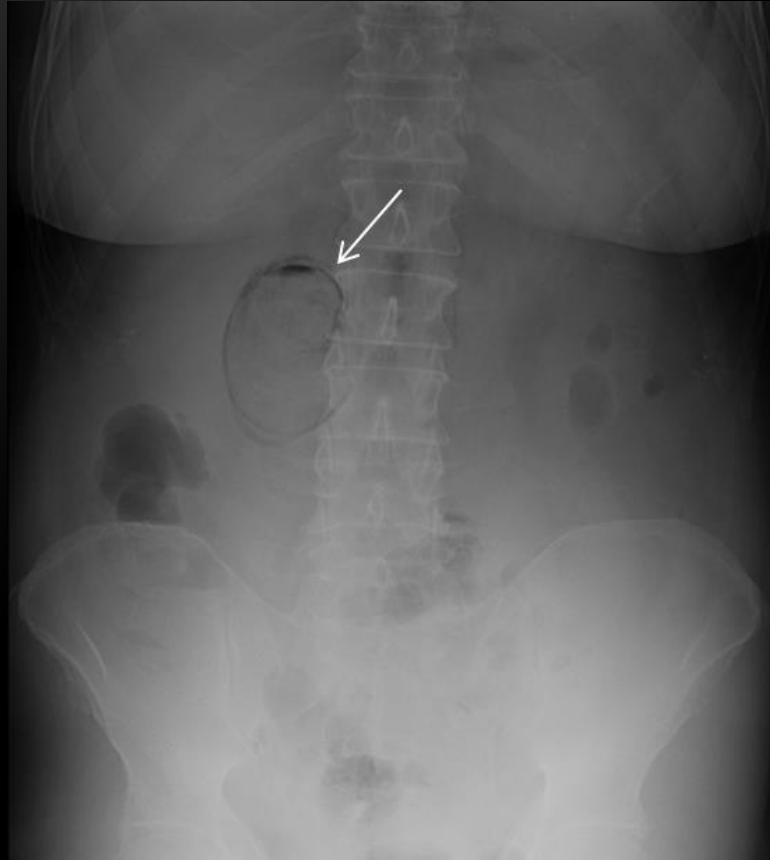


Plain abdominal radiograph showing dilated small bowel loops indicating an obstruction. With a closer look one can see a calcified oval structure corresponding to an impacted calculus (yellow square) .

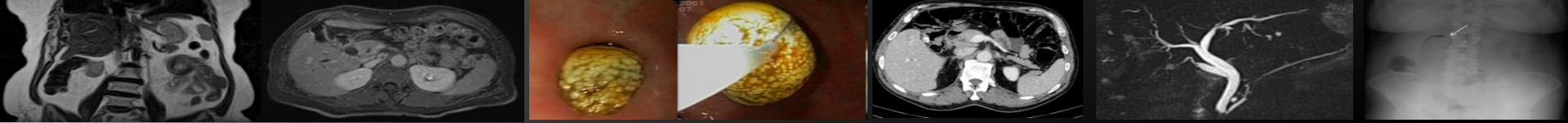


Imaging findings – Gallbladder ileus: a potential pitfall

The presence of pneumobilia, for example, is an ancillary imaging finding that provides a clue to the previously described diagnosis. However, this can correspond to other pathological processes such as emphysematous cholecystitis.



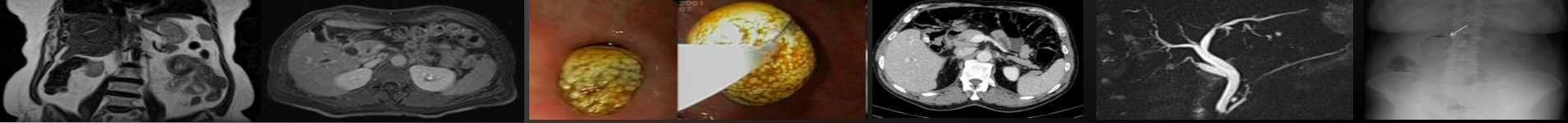
Plain abdominal radiograph of a woman showing gas within the gallbladder fossa, delineating the gallbladder wall. This case was proven to be an emphysematous cholecystitis.



Imaging findings – Bouveret Syndrome



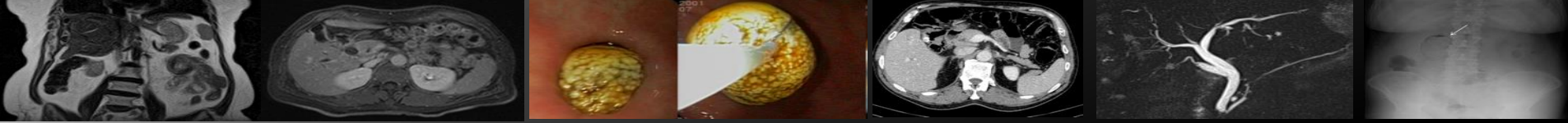
CECT: axial and coronal views. Bouveret Syndrome. Patient with incoercible vomiting and multiple illnesses. The image analysis revealed the presence of a fistulous tract between the gallbladder and the duodenum (arrow). There were also signs of gastric outlet obstruction (+), and the suggestion of a large non-calcified gallstone with air (* - Mercedes Benz sign) impacted in the duodenum.



Imaging findings – Bouveret Syndrome



The patient underwent an ERCP that confirmed the diagnosis and fragmented the stone posteriorly.

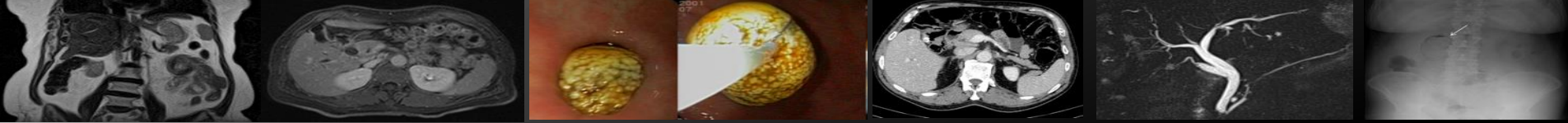


Imaging findings – Mirizzi Syndrome

- Results of impaction of a large gallstone at the cystic duct
- Rare: occurs in about 0.1% to 0.7% of patients who have gallstones

4 conditions that **must** be present for the syndrome to occur:

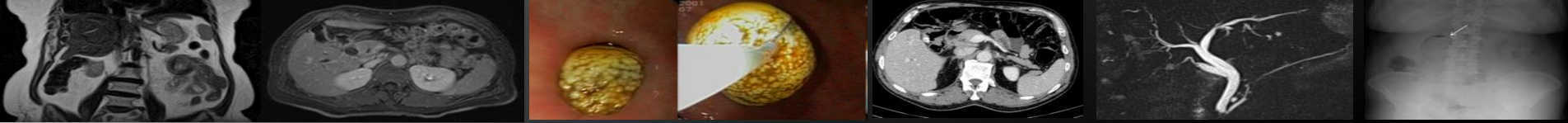
1. Cystic duct parallel to common bile duct
2. Impaction of a stone in the cystic duct or gallbladder
3. Obstruction of the CBD due to stone/inflammation
4. Intermittent/constant jaundice occasionally causing cholangitis



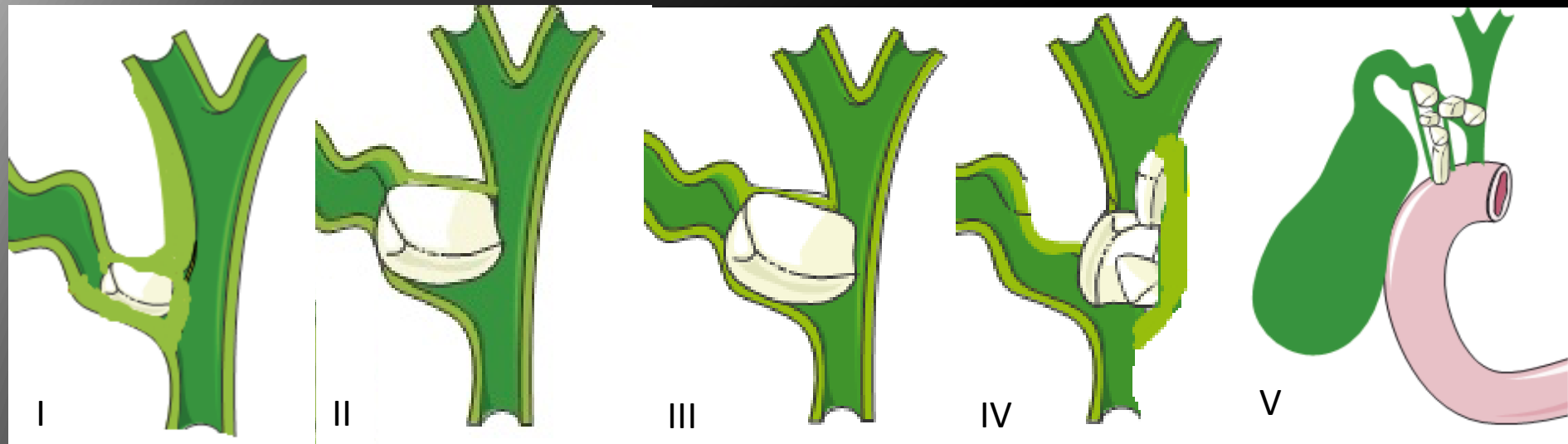
Imaging findings – Mirizzi Syndrome

Preoperative imaging is needed before surgery: endoscopic retrograde pancreatography may be done to confirm.

MR
cholangiopancreatography
is a non invasive way to
confirm the diagnosis.



Beltran and Csendes - Mirizzi syndrome classification



Type I: external compression of the common bile duct;

Type II: a cholecysto-biliary fistula involving less than one third the circumference of the bile duct;

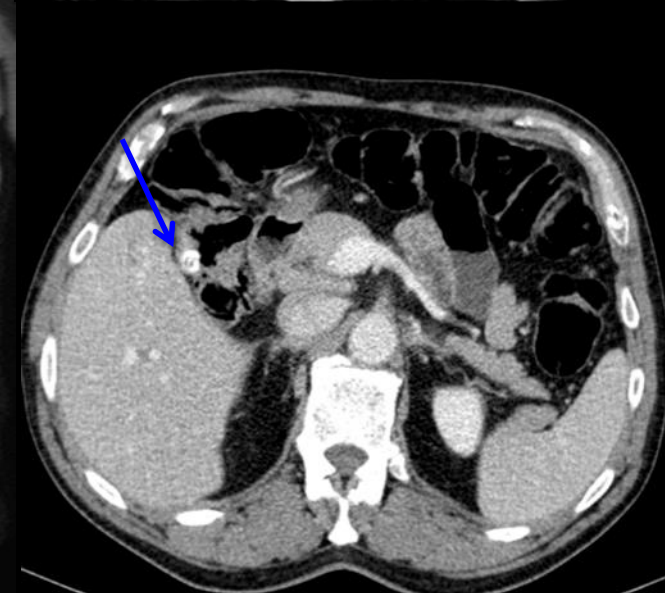
Type III: a fistula is present involving up to two thirds the circumference of the bile duct;

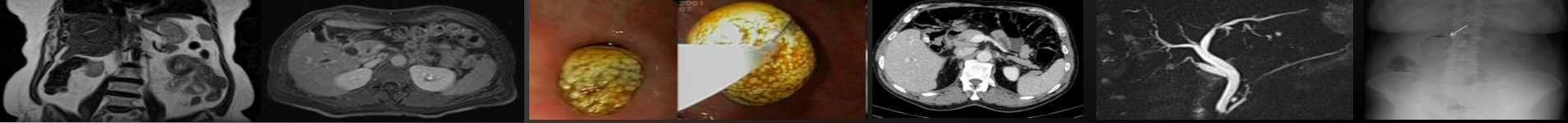
Type IV: a fistula is present with complete destruction of the wall of the bile duct.

Type V: includes the presence of a cholecysto-enteric fistula together with any other type of Mirizzi.

Imaging findings – Mirizzi Syndrome

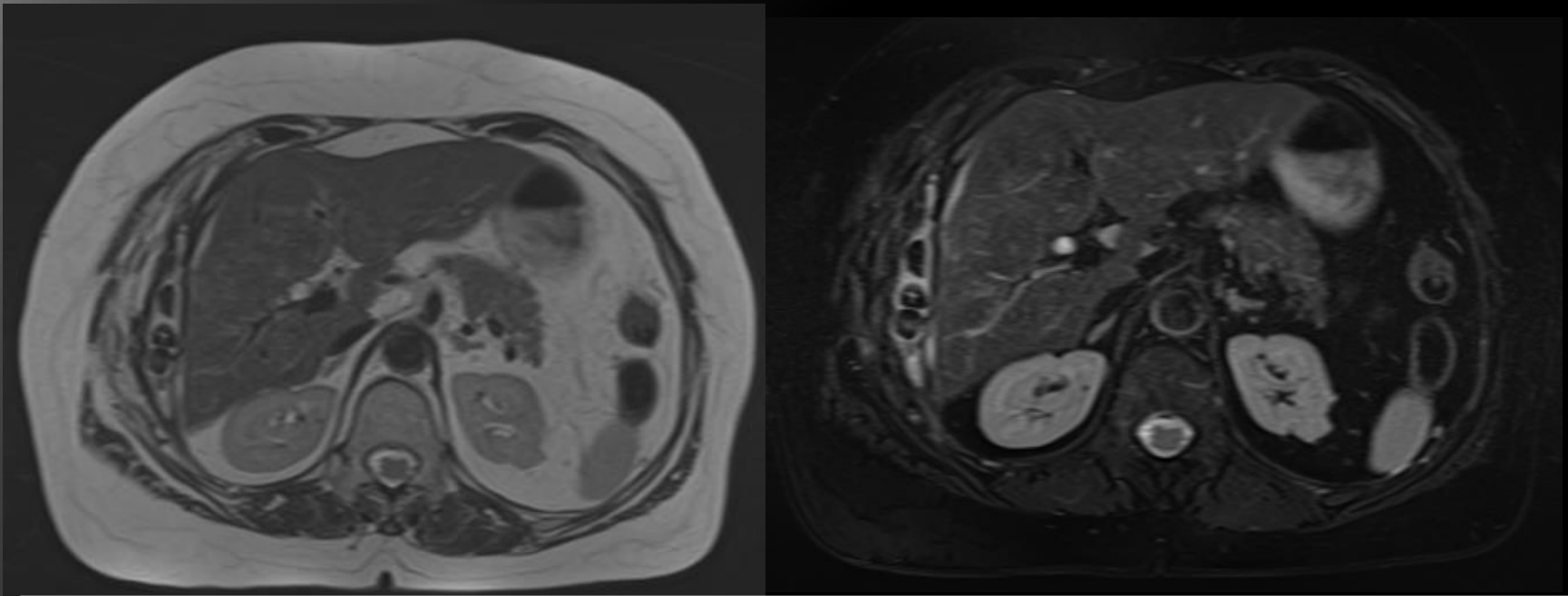
Mirizzi syndrome type V (Beltran and Csendes). From left to right: CECT: coronal view; MR coronal T2-weighted image; MRCP thick slab; CECT axial view. There is compression of the extrahepatic bile duct by a big calculus (yellow arrow), pneumobilia (purple arrow) and moderate intrahepatic bile duct dilation (orange arrow). Dilation of the common bile duct is due to a impacted calculus (red arrow). We can also observe a gallstone in the bowel (blue arrow).



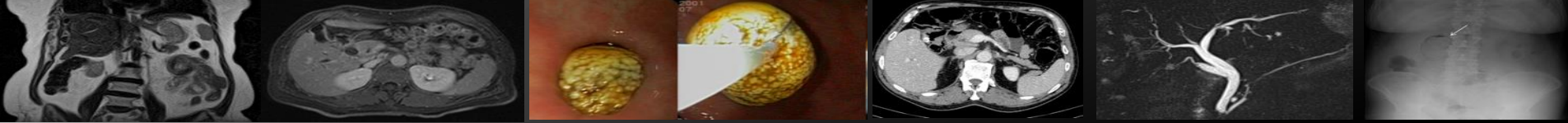


Imaging findings – Dropped gallstones

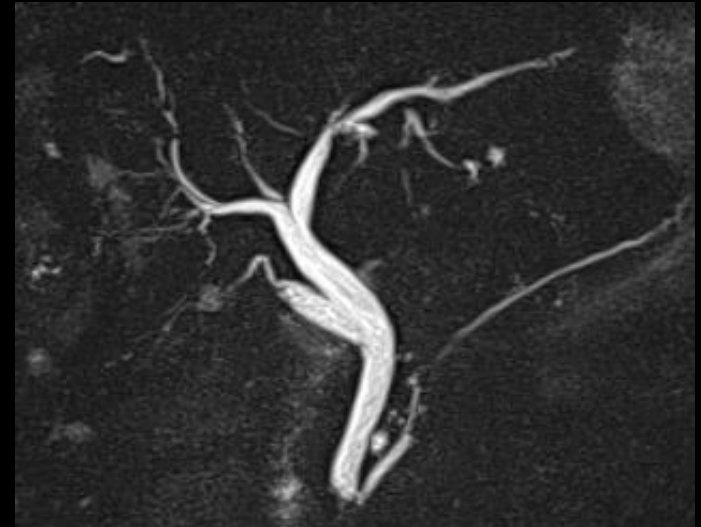
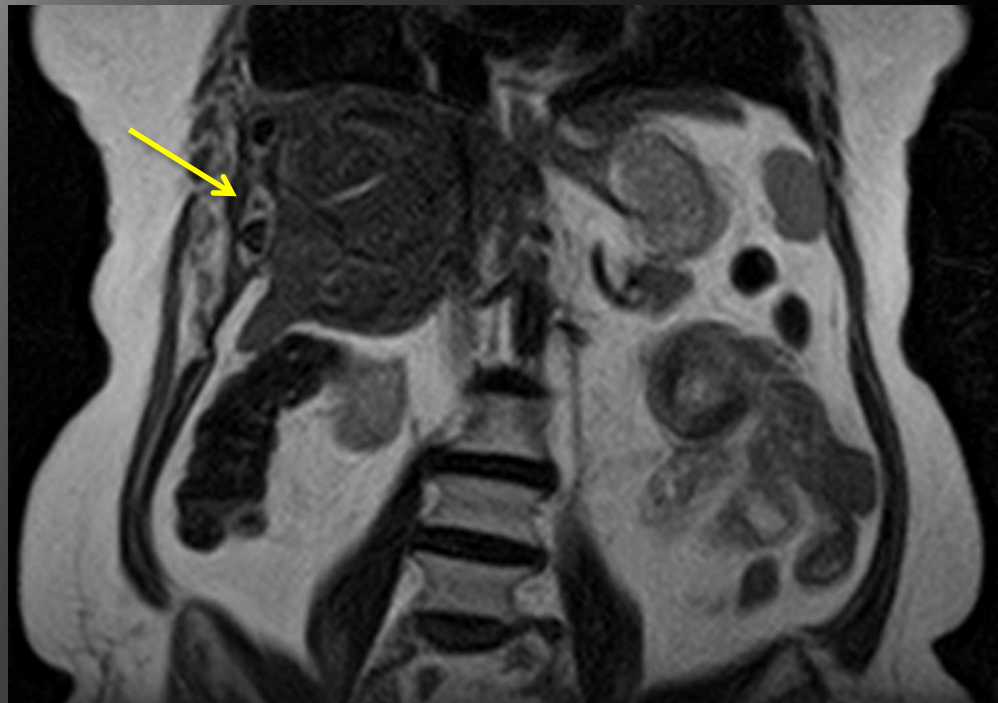
- Spillage of gallstones into the abdominal cavity (dropped gallstones) may occur during laparoscopic cholecystectomy. Although most often clinically silent, they can eventually cause symptoms due to the formation of an abscess or a fistulous tract.



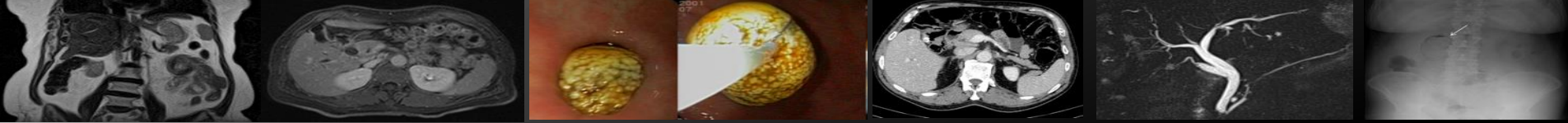
Dropped gallstones in a 62 year old female submitted to a laparoscopic cholecystectomy 8 years before. MR imaging: T2 (left) and T2 FS (right) axial images revealed the presence of several gallstones near the right liver lobe, looking “encapsulated” and with surrounding fluid (seen on T2 FS)



Imaging findings – Dropped gallstones

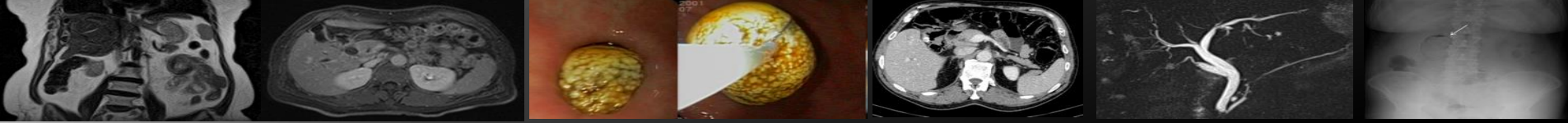


Further imaging of the patient described in the previous slide. Left: MR coronal T2 image depicting the extent and volume of the dropped gallstones – yellow arrow. Right: thick slab MRCP which shows the absence of gallbladder and regularly dilated bile ducts.



Conclusions

- In an emergency context, contrast enhanced CT is the best imaging modality in the characterization of these unusual clinical conditions.
- MRCP can also play a role in select cases.
- The analysis of the precise location of the calculus and the presence of relatively specific ancillary imaging findings may be crucial in the further orientation of the patients.



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