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Beware of right lower quadrant pain: How ultrasound can help your differential diagnosis

Learning objectives

To list the spectrum of main pathologic processes that can cause acute right lower quadrant abdominal pain. To describe and illustrate key ultrasound findings useful for the diagnosis of several causes of right lower quadrant pain in the emergency setting, focusing some operator-dependent techniques that can improve diagnostic accuracy.

Background

Right lower quadrant (RLQ) pain is a frequent cause of patients presenting to the emergency department. Appendicitis is the most common cause of RLQ pain, but many conditions, some of which do not necessitate surgery, may mimic appendicitis, including other infectious or inflammatory conditions (such as infectious ileitis or colitis, Crohn's disease, diverticulitis and mesenteric adenitis), bowel obstruction (secondary to adhesions, hernias, intussusception or neoplastic masses) or perforation, omental infarction, epiploic appendagitis, as well as genitourinary tract conditions (such as acute urinary colic, focal cystitis, ovarian cysts, hydro or pyosalpinx, ovarian torsion, and ectopic pregnancy).

Ultrasonography (US) is often the first imaging study performed in patients with abdominal pain. Although a limitation of this modality is its operator dependency, in experienced hands ultrasonography can often provide a confident diagnosis, therefore avoiding the need for more expensive examinations (such as CT) as well as saving time in conditions in which the outcome is largely affected by early detection.

US TECHNIQUE

Sonographic examination of the right lower quadrant (namely, of the intestine in this topography) is usually performed after a standard examination of the solid abdominal organs.

The first diagnosis that should be excluded, for it is the most common cause of RLQ pain, is appendicitis.

A linear array transducer, usually 5 or 7 Mhz (for average or thin patients), is typically employed. The patient is initially examined in the supine position.

Scanning should be initiated in the region of maximal pain indicated by the patient in order to expedite the sonographic evaluation.

If no abnormality is found, then transverse and longitudinal images are obtained of the abdomen, including the right lower quadrant and the right lateral abdomen extending from the subhepatic location to the right pelvis. In all areas examined, gentle, gradual pressure is used to compress the anterior abdominal wall, slowly but firmly, with the ultrasound transducer to displace normal bowel loops (in an effort to locate an inflamed appendix) - *graded compression sonography*. If an apparently normal appendix is identified, a careful survey of the entire length of the appendix should be performed to avoid a false negative examination when inflammation is confined to the tip of the appendix.

The *left hand of the operator* can also be used to *compress the opposite side* of the right lower quadrant abdomen in the *anterior or anteromedial direction*. Simultaneous anterior and posterior graded compression causes reduction of the depth of sound penetration, thereby approaching retrocolic or retrocecal spaces in obese or muscular patients and thus increasing the spatial resolution.
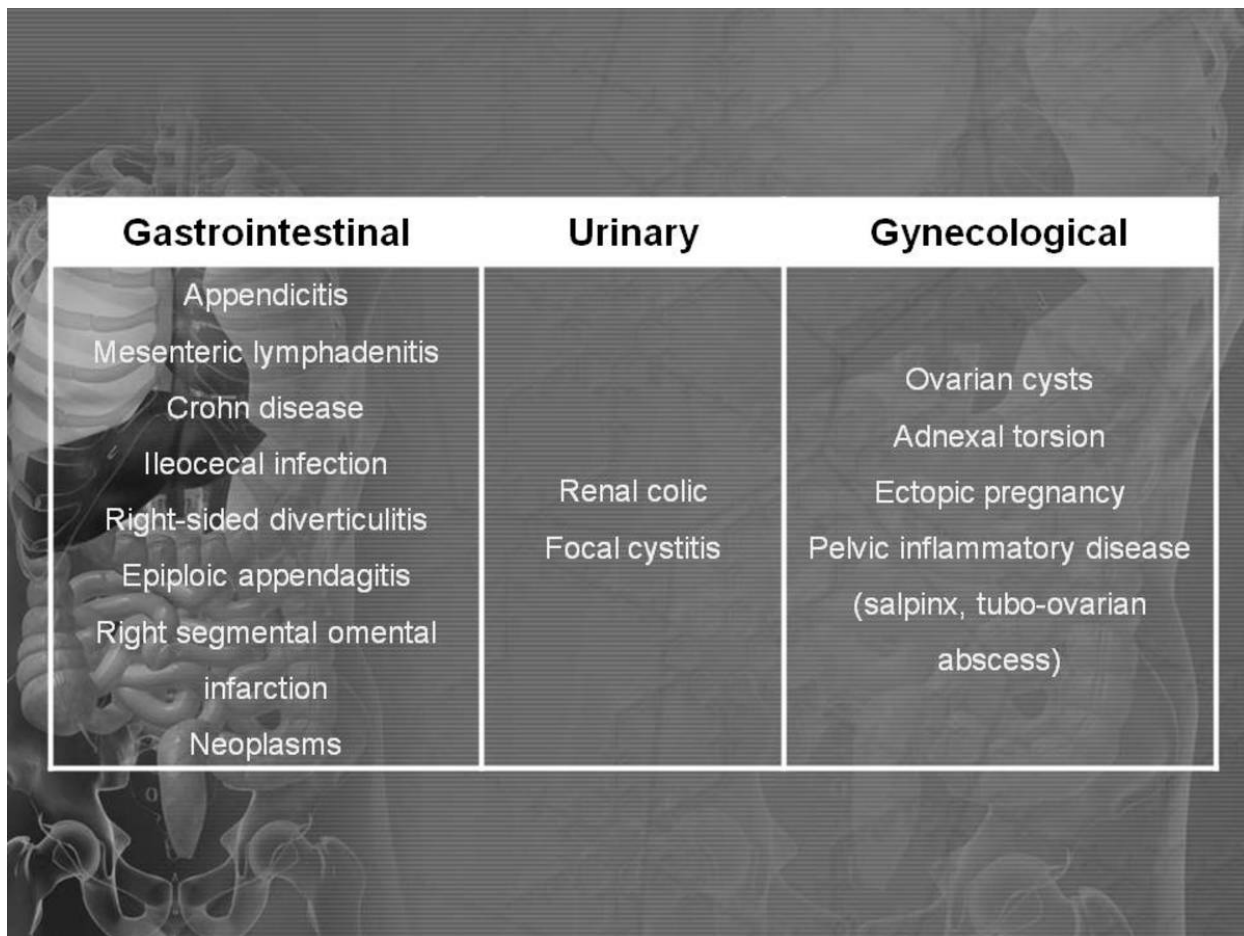
The patient can also be asked to *position to the oblique lateral decubitus*. With this position the cecum and terminal ileum are displaced medially, which sometimes is useful for the visualization of the appendix.

If a normal appendix is identified, the examination should continue with a low frequency convex transducer, scanning in transverse and longitudinal planes, in order to try to demonstrate other abnormalities (other intestinal abnormalities, urogenital problems, etc).

Color Doppler US can be used to assess inflammatory disease when present and to support the suspicion of a tumor. The perienteric soft tissues are assessed for the presence of enlarged lymph nodes and for inflammation or infiltration of the perienteric fat.

Imaging findings OR Procedure details

A list of the most common entities to put to diagnostic consideration in patients with RLQ pain may be divided into: gastrointestinal, urinary and gynecological.

Fig.: RLQ pain most common causes.
References: C. Ruivo; Radiology, Hospitais da Universidade de Coimbra, Coimbra, PORTUGAL

GASTROINTESTINAL CONDITIONS

Appendicitis

Ultrasound has a sensitivity and specificity of approximately 75-90% and 78-100% respectively for the diagnosis of acute appendicitis.

The features of <u>appendicitis</u> on ultrasound include a *thick-walled, distended (diameter > 6 mm), aperistaltic and non-compressible blind ending tubular structure arising from the base of the caecum*. The visualization of *appendicoliths*, appearing as bright echogenic foci with distal acoustic shadowing, is another contributory finding. Similarly, there may be *increased echogenicity of the periappendiceal fat*.

Patients should be asked to point with a single finger to the site of maximal pain or tenderness, thus helping to identify a potentially aberrantly located appendix. Localized pain with compression of the transducer - positive sonographic McBurney sign - is a helpful secondary sign when appendicitis is suspected. In addition, whenever *small amounts of free fluid* are noted *in the RLQ*, this should raise the suspicion of a local pathological process, including appendicitis.

Color Doppler US proves useful in equivocal cases, demonstrating a hyperemic wall; however this finding is lost with gangrenous appendicitis.

If the diagnosis of appendicitis is overlooked, acute appendicitis may progress to gangrenous appendicitis.

Sonographic features of <u>gangrenous appendicitis</u> include *increasing echogenicity of the mesentery*, *free fluid in the right lower quadrant* and *eventual loss of the appendicular color flow*.

Eventually the appendix may rupture. The inflammation may be walled off in the right lower quadrant as a focal <u>abscess</u>. In other situations fluid may spread through the abdomen, but most commonly spreading into the pelvis. An appendicitis abscess sonographically appears as a *thick-walled fluid filled structure*. There may be a *'dirty' shadow* if air is present in the abscess.

Mesenteric lymphadenitis

Mesenteric lymphadenitis is a self-limited benign inflammation of the lymph nodes by infectious or inflammatory processes. It is most common in children and adolescents younger than 15 years old, with associated enteric disease most often occurring in those younger than 5 years. Clinically, it mimics appendicitis, presenting with acute right lower quadrant abdominal pain, tenderness, fever and leucocytosis.

Graded compression ultrasound demonstrates *painful enlarged mesenteric lymph nodes* (maximum anteroposterior diameter > 4 mm) in the right lower quadrant, often in clusters of 5 or more nodes. The nodes are *more rounded and hypoechoic* than normal, and are *typically larger and more numerous* with mesenteric adenitis than with appendicitis. The appendix is sonographically normal. Other findings include: *intestinal hyperperistalsis*, *nodular or circumferential thickening of the bowel wall* (namely mural thickening of the terminal ileum # 8 mm - associated ileitis), *mesenteric thickening*, *fluid-filled loops*, *cecal involvement* and *free fluid*.

The diagnosis of mesenteric adenitis is one of exclusion; confirmation is based on a benign clinical course, and management is conservative.

Fig.: Mesenteric adenitis. Sonogram of the RLQ shows cluster of enlarged mesenteric lymph nodes. Appendix was normal (not shown) and no other abnormalities were found. CT images depict several enlarged mesenteric lymph nodes in a young patient with acute right lower quadrant pain, in the absence of other detectable abnormalities.
References: C. Ruivo; Radiology, Hospitais da Universidade de Coimbra, Coimbra, PORTUGAL

Ileocecal infection
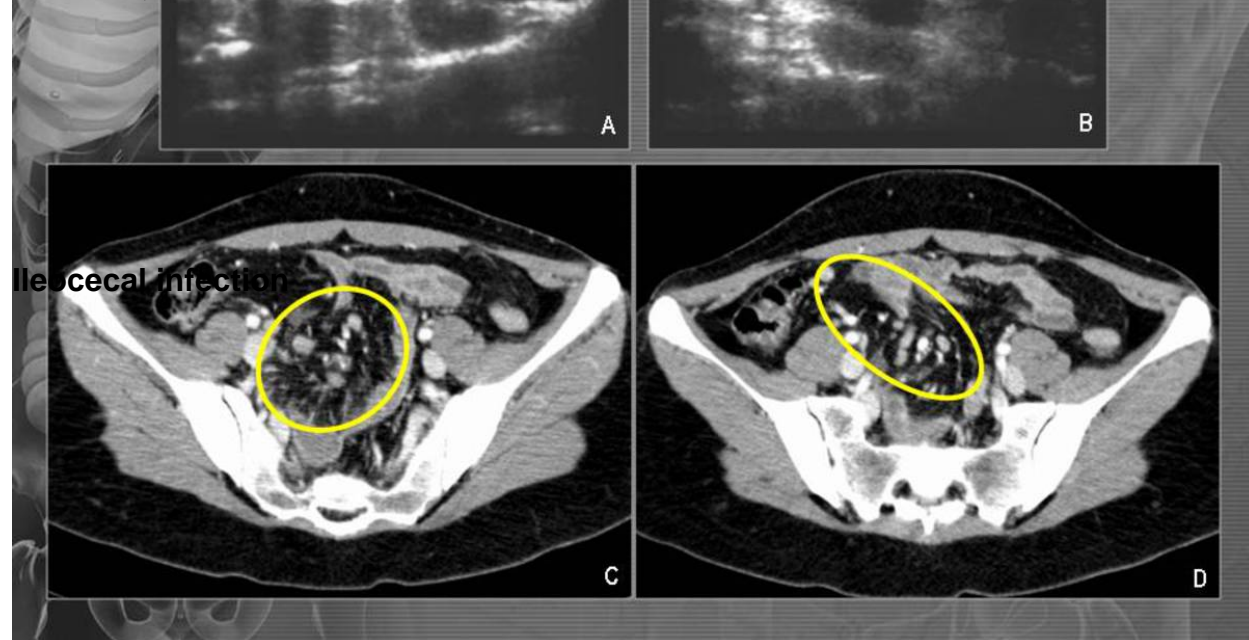
Ileocecitis caused by Campylobacter, Salmonella or Yersinia without profound diarrhoea can clinically mimic acute appendicitis. This bacterial infection is self-limiting and therefore it is important that differentiation is made with acute appendicitis.

Characteristic sonographic features include: marked thickening of the mucosa and submucosa of the ileum and cecum is visible, without associated inflammation of the surrounding fat. Mild to moderately enlarged mesenteric lymph nodes can be visualised. A normal appendix must be confidently visualized on images before a diagnosis of ileocecal infection is assigned.

Crohn disease

Crohn disease's most striking sonographic feature is *marked concentric diffuse mural thickening* of the affected intestine, more often the *terminal ileum*, with *preservation of layer differentiation*, which may be associated with *hyperemia of mural vessels* on color Doppler studies. Incomplete or total loss of layering mirrors the level of inflammation, transmural edema, or fibrotic change.

Because of the transmural involvement, the *perienteric fat* becomes inflamed, appearing *echogenic and thickened*, which leads to *separation of adjacent bowel loop*s. Over time, the perienteric fat tends to proliferate ("creeping" fat), which contributes to its masslike appearance in Crohn disease.

Mesenteric adenopathy is seen in about 20% of patients.

Fistulas are common and produce hypoechoic tracts extending from the bowel wall to adjacent structures. Bubbles of gas are occasionally observed within these tracts during realtime imaging.

Other complications that can also be detected by US are abscesses and mechanical bowel obstruction.

Right-sided diverticulitis

Right-sided diverticulitis is a relatively uncommon disorder that tends to occur in younger patients than left-sided diverticulitis, is more common in women, and is thought to be more common in the Asian population. Two types of diverticula have been described in right colon on the basis of aetiology and pathological features: multiple diverticula (acquired) and solitary caecal diverticula (congenital).

At US, there is *segmental hypoechoic mural thickening* and *adjacent inflammation of the surrounding pericolonic fat*. The inflamed diverticulum can often be identified as an *outpouching arising from the right colon within an area of asymmetric mural thickening*; stronger echoes arising from the structure may represent gas or a faecolith within the diverticular lumen. These features, especially if a normal sonographic appearance of the appendix is found, are highly specific for right-sided diverticulitis.

Focal tenderness can be elicited, and color Doppler US may show increased flow in the adjacent pericolonic fat.

Epiploic appendagitis

Epiploic appendages are small outpouchings of fat-filled, serosa-covered structures present on the external surface of the colon projecting into the peritoneal cavity. The appendages are situated along the entire colon and are more abundant and larger in the transverse and sigmoid colon.

Torsion or venous thrombosis of an epiploic appendage causes ischemia or infarction, resulting in localized inflammation. Epiploic appendagitis s a benign and self-limiting condition presenting with acute abdominal pain that can mimic appendicitis if the cecum or ascending colon is affected.

Sonographic findings include a *hyperechogenic*, *noncompressible ovoid mass* with a *subtle hypoechoic rim* that is usually located directly under the abdominal wall at the site of maximum tenderness. Doppler studies typically reveal *absence of blood flow in the appendage*. The *adjacent pericolonic fat* also becomes *echogenic and masslike* when inflamed.

Right segmental omental infarction

Right-sided omental infarction is a rare self-limiting disorder that presents with localized RLQ pain, thus may clinically mimic acute appendicitis. It is the primary differential diagnosis of epiploic appendagitis. The right lower portion of the omentum is thought to have a congenitally anomalous and fragile blood supply in some individuals, which makes it more susceptible to infarction.

Findings at US consist of a *solid*, *moderately echogenic*, *noncompressible*, *ovoid or cakelike mass* located in the *omental fat between the umbilicus and the right colon* corresponding to the point of maximal tenderness; it shows *no vascularity* on color Doppler imaging.

Fig.: Right-sided omental infarction in a man with acute RLQ pain. US images show heterogeneous and hyperechogenic fat in the right iliac fossa. No other pathologic findings were found. CT scan (not shown) confirmed the diagnosis. *References:* C. Ruivo; Radiology, Hospitais da Universidade de Coimbra, Coimbra, PORTUGAL
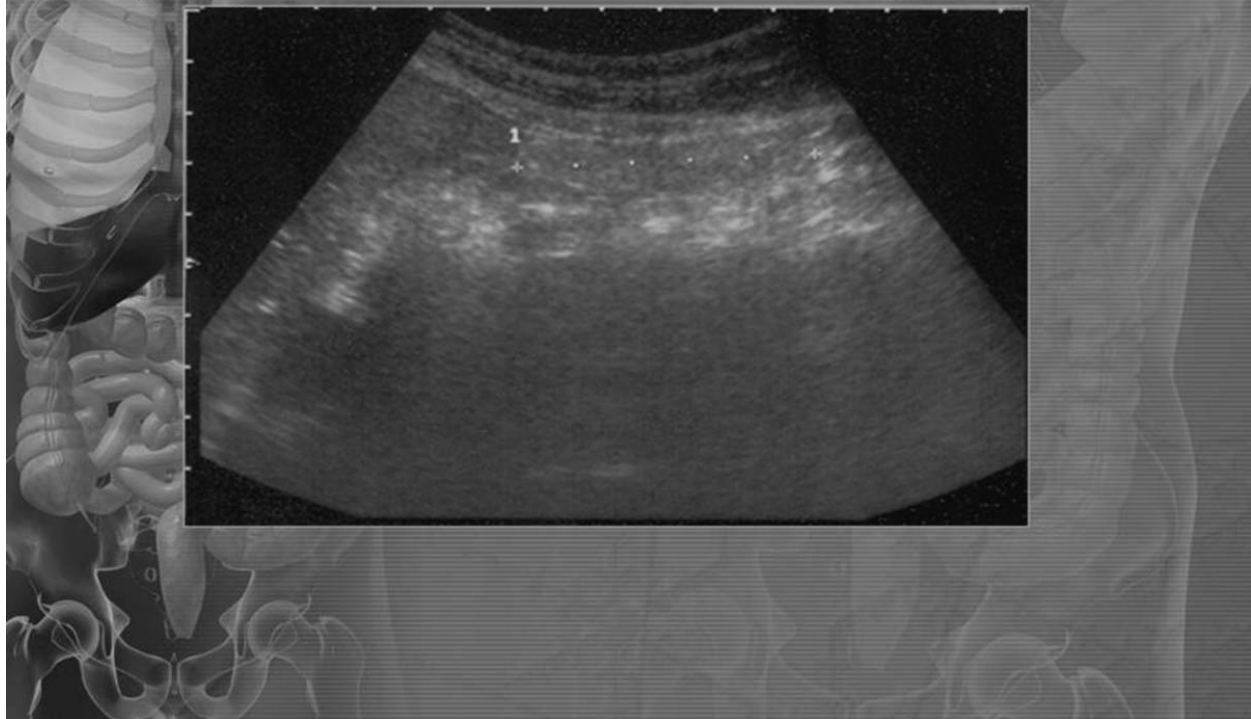
Acute complications of colon carcinoma

Occasionally, right colonic neoplasms may present with acute RLQ pain. The acute symptoms are usually caused by complications of carcinoma, such as intussusception, obstruction or perforation.

Neoplasms generally appear as hypoechoic masses that cause asymmetric mural thickening and have less internal vascularity than inflammatory lesions. The finding of a short involved segment of bowel with marked abrupt asymmetric thickening of the bowel wall and disruption or loss of a wall layer pattern associated with regional malignant lymphadenopathy is strongly suggestive of malignant involvement.

Differentiation from appendicitis/appendiceal abscess or perforated carcinoma may be difficult if the normal appendix is not seen or if a prominent soft-tissue mass component is present, respectively. Perforated cecal carcinoma should be included in the differential diagnosis in patients more than 50 years old.

Intussusception results from the internal telescoping or invagination of a segment of intestine (intussusceptum) into another (intussuscipiens). An intraluminal mass is the lead point of an intussusception in approximately 80% of cases in adults. As the intussusception invaginates. a portion of its mesentery is drawn along with it and caught between the intussusceptum and intussuscipiens. At sonography, intussusception characteristically appears as the target, doughnut, or bull's-eye sign - classical multi-layered sandwich of interposed bowel wall and mesenteric fat. It may be also visible signs of proximal bowel obstruction, and sometimes a mass corresponding to the pathologic lead point.

Fig.: 4-year-old with intussusception. US images of the RLQ shows a hypoechoic structure with a kidney-like condiguration in longitunal section (A) and multilayered appearance in transverse section. This was proven to be na intussusception due to ileal lymphoma. CT scan image shows typical appearance in this imaging modality.
References: **C. Ruivo; Radiology, Hospitais da Universidade de Coimbra, Coimbra, PORTUGAL**

Bowel obstruction is a common cause for acute abdominal pain, and both the small bowel or colon can be obstructed. Bowel obstruction can be caused by a hernia, malignancy or inflammation, but is mostly caused by postoperative adhesions. Sonographic findings include fluid-filled dilated bowel loops and, in mechanical obstruction and if the obstruction is not complete or high-grade, hyperperistalsis with to-and-fro bowel fluid movement during realtime imaging may also be seen. The cause of obstruction, such as band adhesions, a hernia, malignancy or inflammation, may also be suggested by ultrasound.
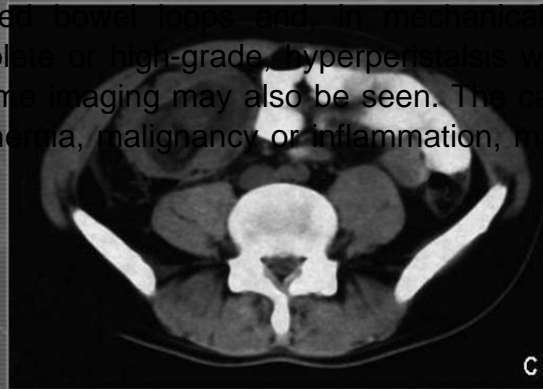
GENITOURINARY

Acute Renal Obstruction

Acute renal obstruction may cause RLQ pain when there is an underlying distal ureteral stone. A confident sonographic diagnosis is made when hydronephrosis is seen and a hydroureter is present proximal to a shadowing stone.

Focal cystitis

Patients with cystitis usually present with dysuria, hematuria or urinary incontinence. Rarely, they may also present with RLQ pain, namely when the inflammation is more pronounced in a portion of the bladder(on the right side). Ultrasound findings include focal wall thickening, echogenic urine, or a fluid-debris level.

GYNECOLOGICAL

In the evaluation of these disorders, transvaginal sonography is superior to a transabdominal approach because of the proximity of the transducer to the internal genital organs. The most common gynecologic disorders that present with acute pelvic pain are ovarian cysts, pelvic inflammatory disease, adnexal torsion, and ectopic pregnancy.

Ovarian cysts

Functional ovarian cysts, from corpus luteal or follicular origin, with or without hemorrhage are common in women of childbearing age. Acute pelvic pain is caused by acute hemorrhage, adnexal torsion, intraperitoneal rupture, or an enlarging hemorrhagic cyst.

Sonographic findings of hemorrhagic ovarian cysts depend on the age of the cyst, varying with the temporal relationship between clot formation and clot lysis. Findings include a heterogeneous hypoechoic mass with internal echoes, thin and thick septations, fluid-debris level, echogenic retracting clot, or irregular nodular wall. Acute intracystic hemorrhage may appear isoechoic to the ovarian stroma and mimic an enlarged ovary by appearing isoechoic to the ovarian stroma; however, they lack internal vascularization with color Doppler US. Enlarged cysts are less likely to spontaneously resolve, and they may be complicated by adnexal torsion or rupture into the peritoneal cavity.

Fig.: (A) and (B) Hemorrhagic cyst of right ovary in a 19-year-old woman with RLQ pain. Sonograms show a fine network within right ovarian cyst which showed no internal vascularization on color Doppler US. (C) and (D, E). Sonograms of other two patients with complicated cysts of the right ovary presenting with RLQ pain.
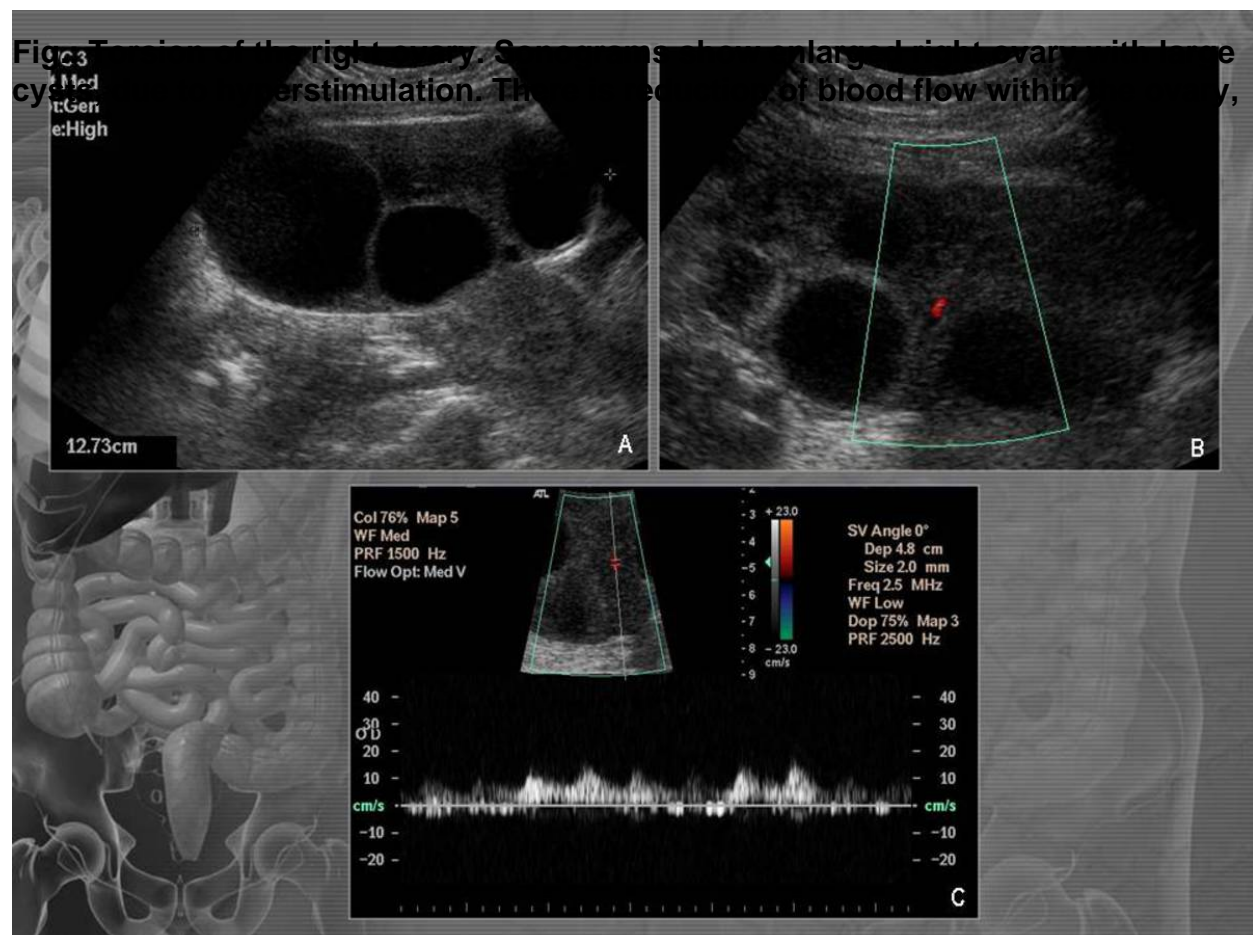
References: C. Ruivo; Radiology, Hospital da Universidade de Coimbra, Coimbra, PORTUGAL

Adnexal torsion

Ovarian torsion results from partial or complete rotation of the ovarian vascular pedicle and is most commonly associated with underlying cysts or tumors. It initially compromises
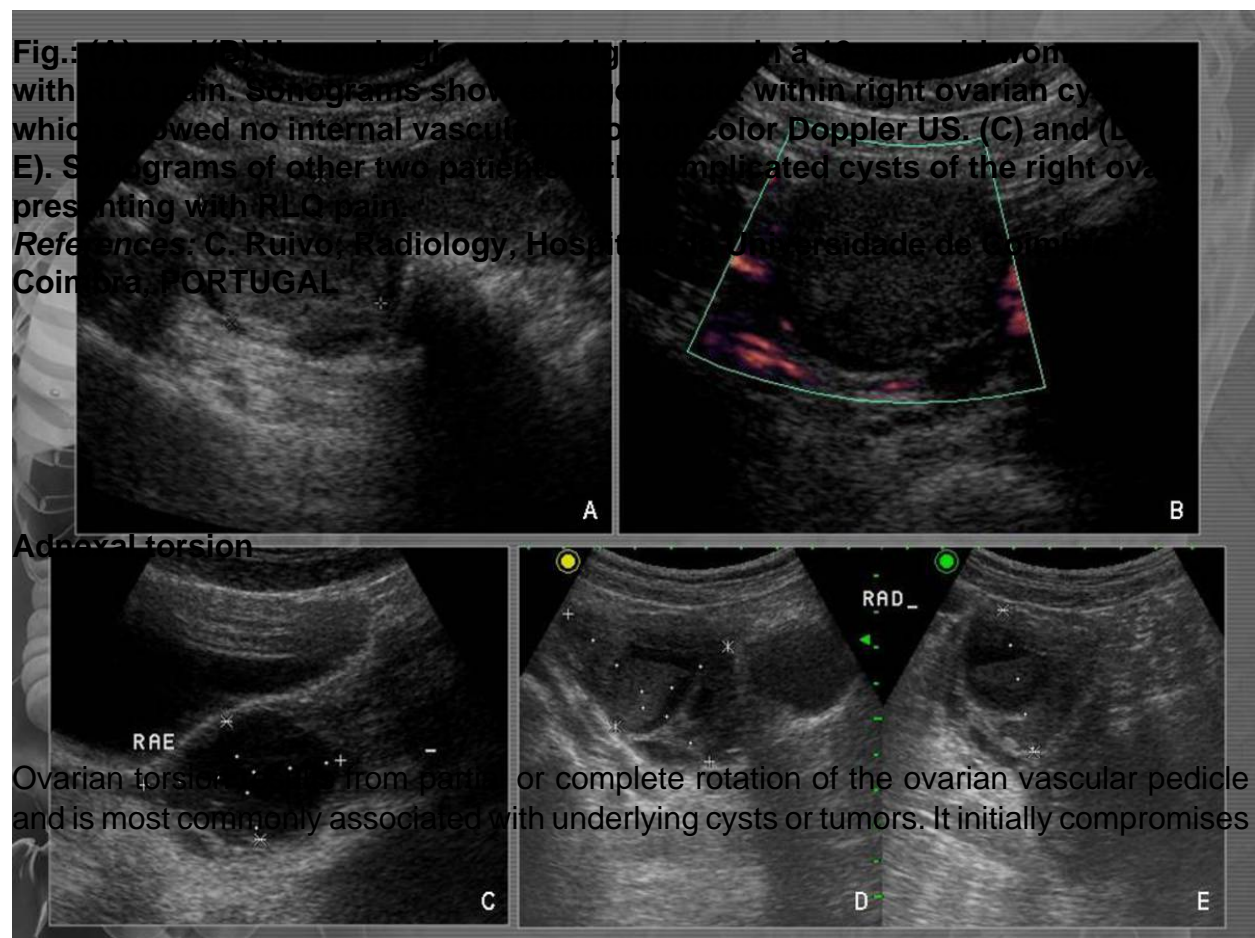
the lymphatic and venous drainage, with eventual loss of arterial perfusion. The sonographic findings of tuboovarian torsion vary depending on the degree of vascular compromise and the presence of an adnexal mass. Typical features include an enlarged echogenic ovary containing prominent cortical peripheral follicles that may be located in an extrapelvic location. The ipsilateral fallopian tube is normally torsed with the ovary and rarely appears as an echogenic tubular structure leading from the uterus to the torsed ovary. Free intraperitoneal fluid in the pelvis may result from lymphatic and venous congestion or infarction with intraperitoneal hemorrhage. Usually absent or diminished central venous flow is noted on color Doppler sonography; the preservation of central venous flow in tuboovarian torsion is suggested to be an indicator of ovarian viability. The presence of intraovarian artery flow does not exclude torsion and may simply reflect early or partial torsion resulting from extrinsic compression and occlusion of the ovarian vein with an intact arterial supply. Low-velocity *(<5* cm/sec) arterial flow may also be preserved at the periphery of the ovary, presumably as a result of its dual blood supply.

Fig. 3 Torsion of the right ovary. Sonograms show enlarged right ovary with large cyst from hyperstimulation. The color doppler shows no blood flow within the ovary,

where a vascular structure suggesting a parvus-tardus waveform pattern was identified.
References: **C. Ruivo; Radiology, Hospitais da Universidade de Coimbra, Coimbra, PORTUGAL**

Ectopic pregnancy

The diagnosis of ectopic pregnancy must be considered in all sexually active women who present with pelvic pain during their reproductive years. Patients classically present with the clinical triad of pain, vaginal bleeding and an adnexal mass. Clinical correlation and awareness of the serum # hcg level is important at the time. The absence of an intrauterine pregnancy beyond 6weeks of gestation with a #-HCG level > than 1000 mIU/ml is highly suspicious.

Ectopic pregnancy may be accurately diagnosed by identifying an extrauterine yolk sac or living embryo. Visualization of an echogenic adnexal or tubal ring separate from the ovary that has prominent peripheral color Doppler sonography flow is strongly suggestive of the diagnosis. The vaginal probe also can be used to determine the site of maximum tenderness, which frequently corresponds to the location of the EP. Although most EPs are located between the ovary and the uterus, they may implant anywhere in the pelvis, and it may be necessary to extend the examination to include the regions adjacent to the uterine fundus, the cul-de-sac, and the lateral margins of the pelvis.

Fig.: Ectopic pregnancy in an adolescent. US images show a gestational sac outside the uterus in the right adnexa. There was no echogenic free fluid that could raise suspicion to associated hemoperitoneum as a complication of ruptured adnexal pregnancy.
References: C. Ruivo; Radiology, Hospitais da Universidade de Coimbra, Coimbra, PORTUGAL
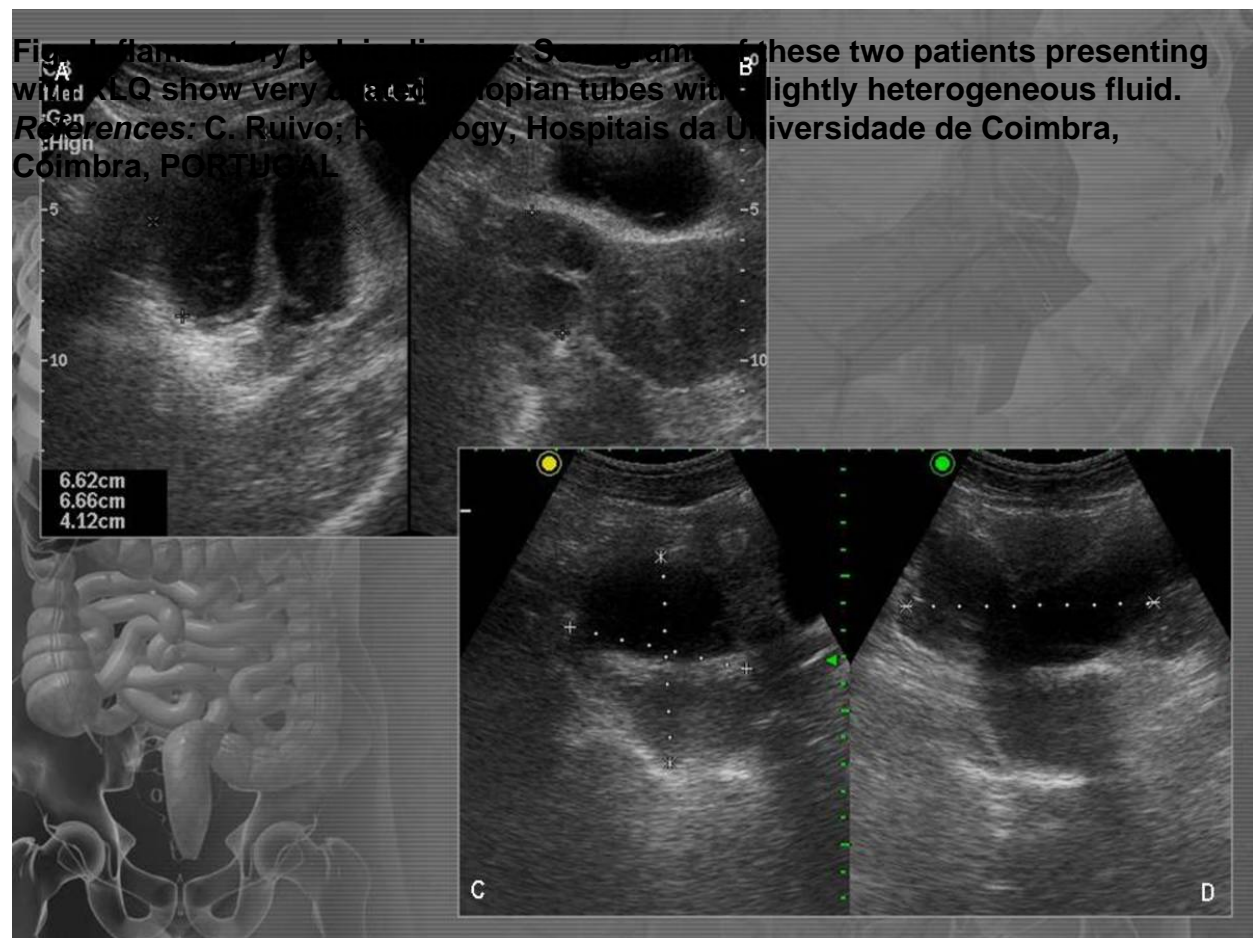

Pelvic inflammatory disease

Pelvic inflammatory disease is the most common cause of acute pelvic pain and at times presents with a surgical abdomen, mimicking appendicitis or perforated viscus. Acute complications of pelvic inflammatory disease include tubo-ovarian complex and abscess, pyosalpinx, and p
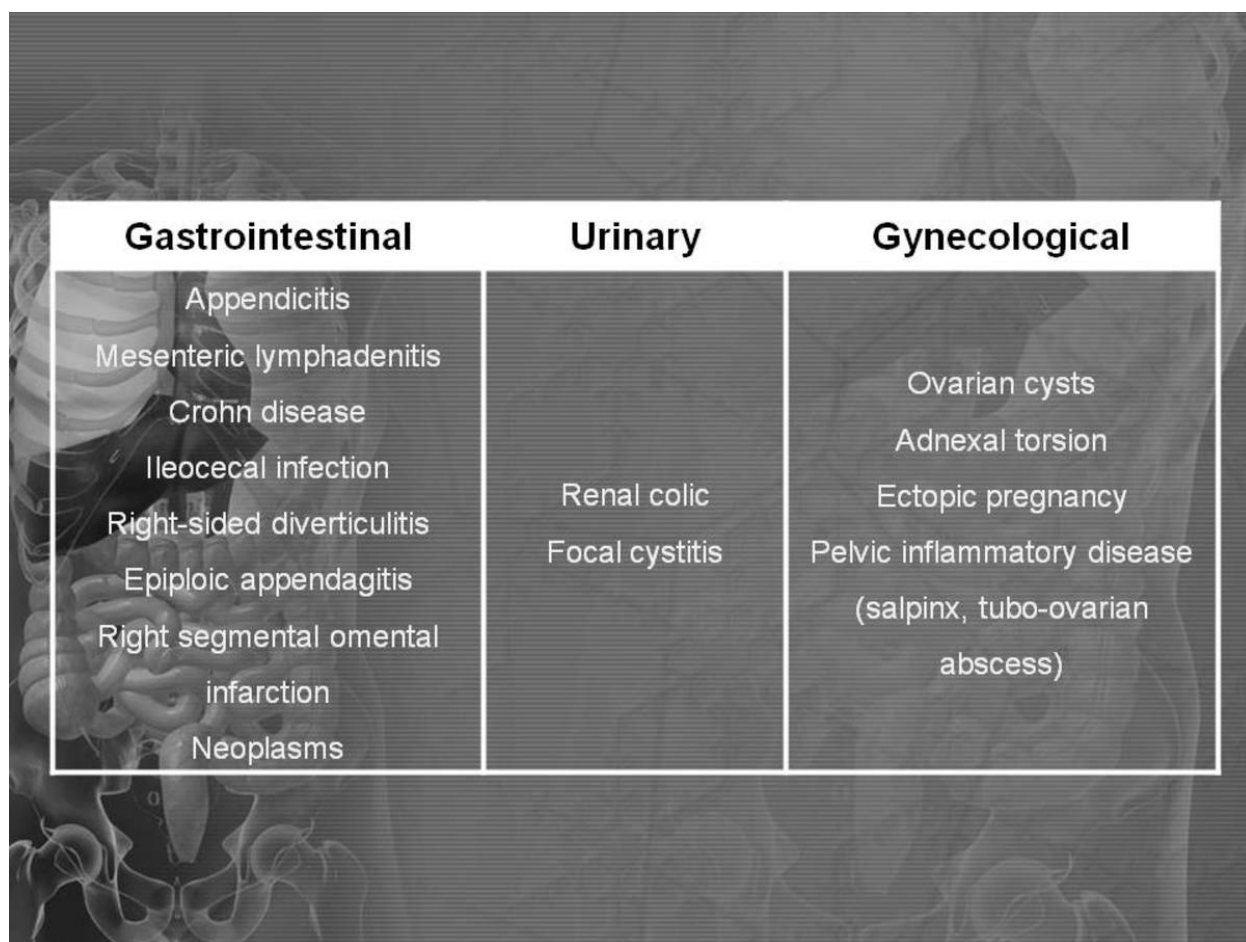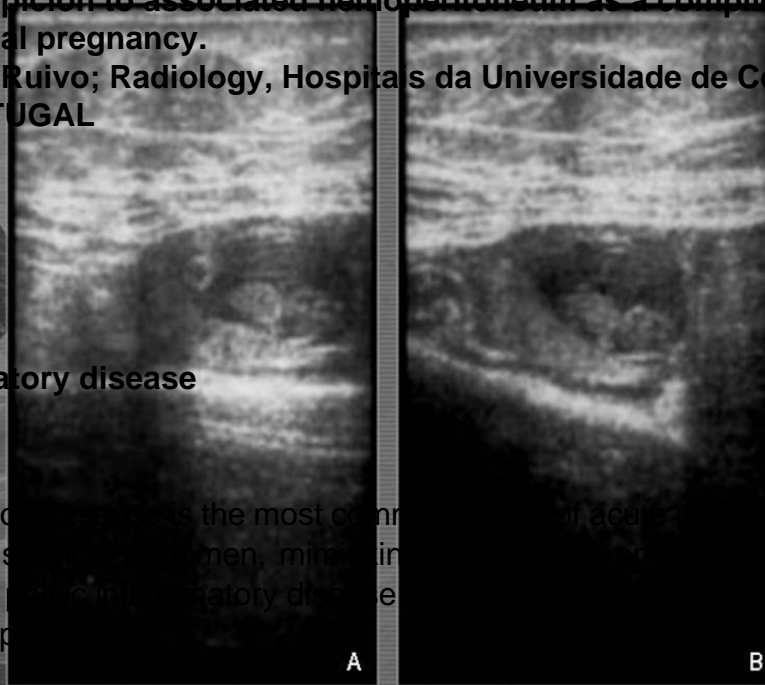
The imaging findings vary according to the severity of the disease and may be normal in early conditions. Hydrosalpinx, especially when involvement is limited to the right fallopian tube, may be confused with a dilated appendix. The diagnosis of pyosalpinx is suggested if sonography shows a dilated fallopian tube containing echogenic debris or a fluid-debris level. In more advanced stages, findings may include enlargement of the internal genital organs with indistinct contours and free pelvic fluid. Ascending extrauterine disease may cause tuboovarian complexes, which originate as a combination of dilated inflamed fallopian tubes and enlarged inflamed ovaries, or frank tuboovarian abscesses which, in turn, result in complex pelvic fluid collections that often contain internal septations, mural irregularity, scattered low-level internal echoes, and fluid-debris levels.


Fig.: Inflammatory pelvic disease: Sonograms of these two patients presenting with RLQ show very dilated fallopian tubes with slightly heterogeneous fluid.
References: C. Ruivo; Radiology, Hospitais da Universidade de Coimbra, Coimbra, PORTUGAL

Images for this section:

Gastrointestinal	Urinary	Gynecological
Appendicitis Mesenteric lymphadenitis Crohn disease Ileocecal infection Right-sided diverticulitis Epiploic appendagitis Right segmental omental infarction Neoplasms	Renal colic Focal cystitis	Ovarian cysts Adnexal torsion Ectopic pregnancy Pelvic inflammatory disease (salpinx, tubo-ovarian abscess)

**Fig. 1:** RLQ pain most common causes.
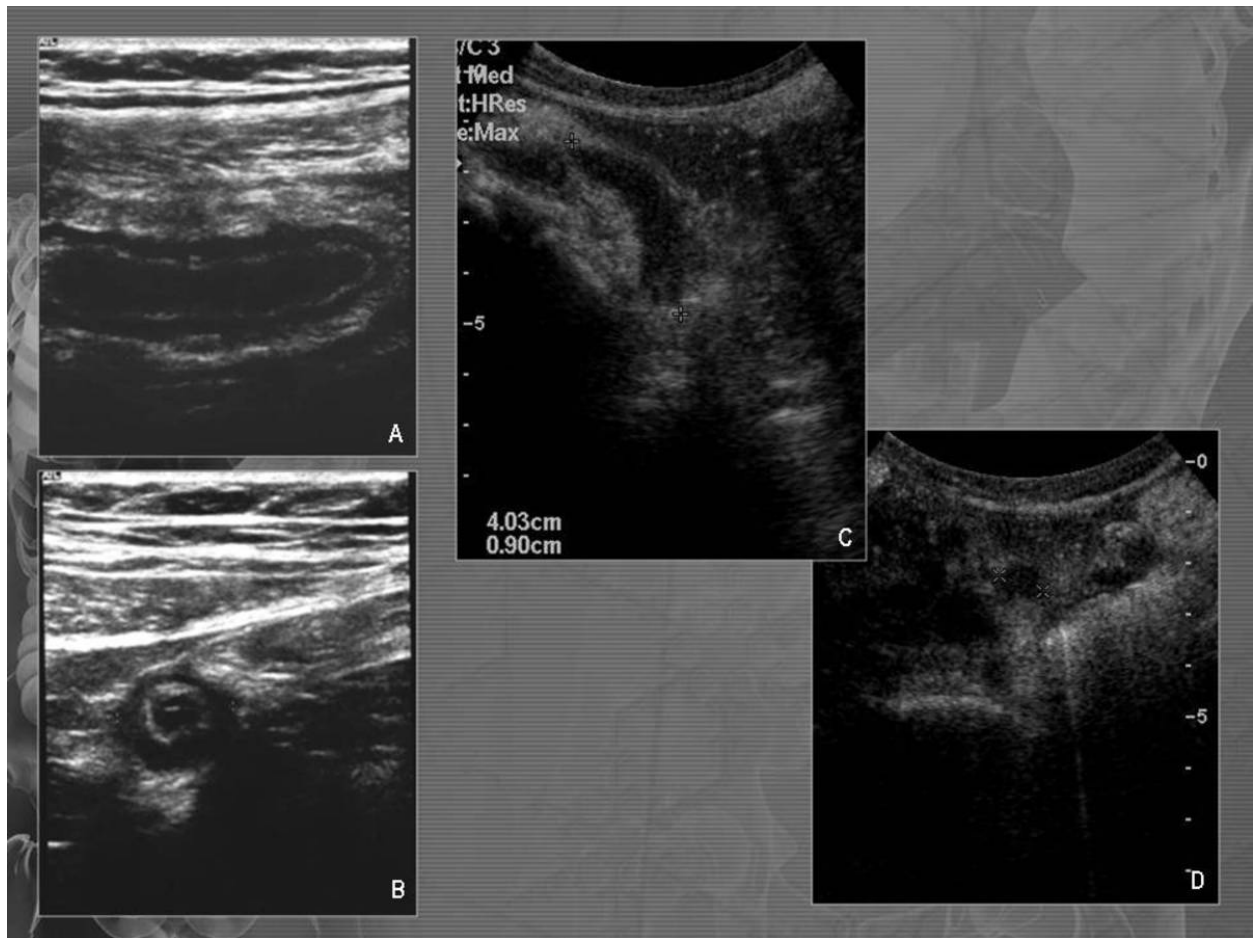
Fig. 2: Appendicitis. Longitudinal (A) and transverse (B) sonogram shows enlarged blind-ended tubular structure with target apprearance (B), surrounded by hyperechoic inflamed fat, in a 19-year-old patient presenting with abdominal pain. In (C) e (D) an inflammed appendix is also shown.
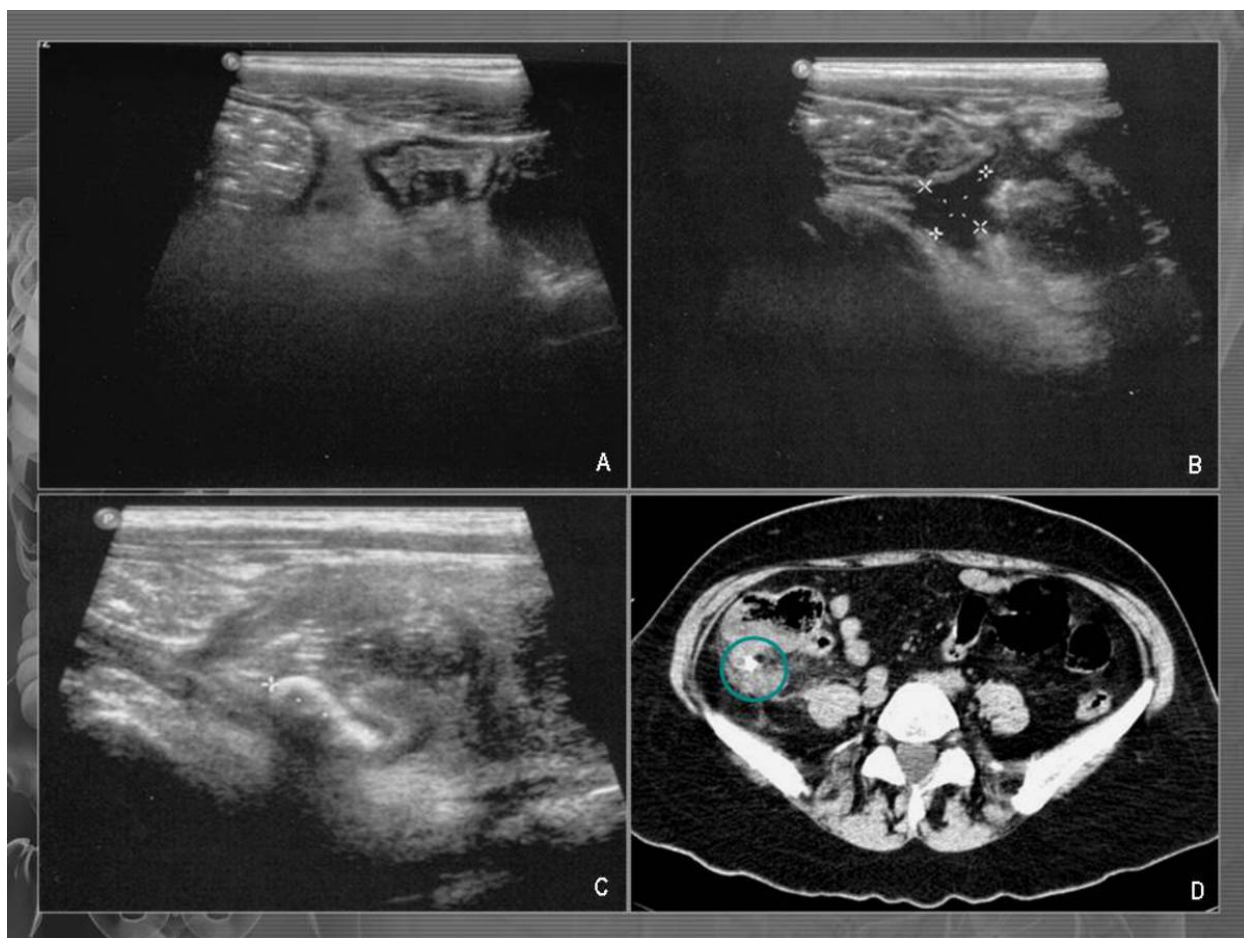
Fig. 3: 25-year-old female with history of appendicectomy. Sonograms show increased echogenicity of the pericecal fat (A), and a small amount of free fluid in the RLQ (B). There is an intraperitoneal appendicolith (C) (confirmed on CT - circle in (D)).
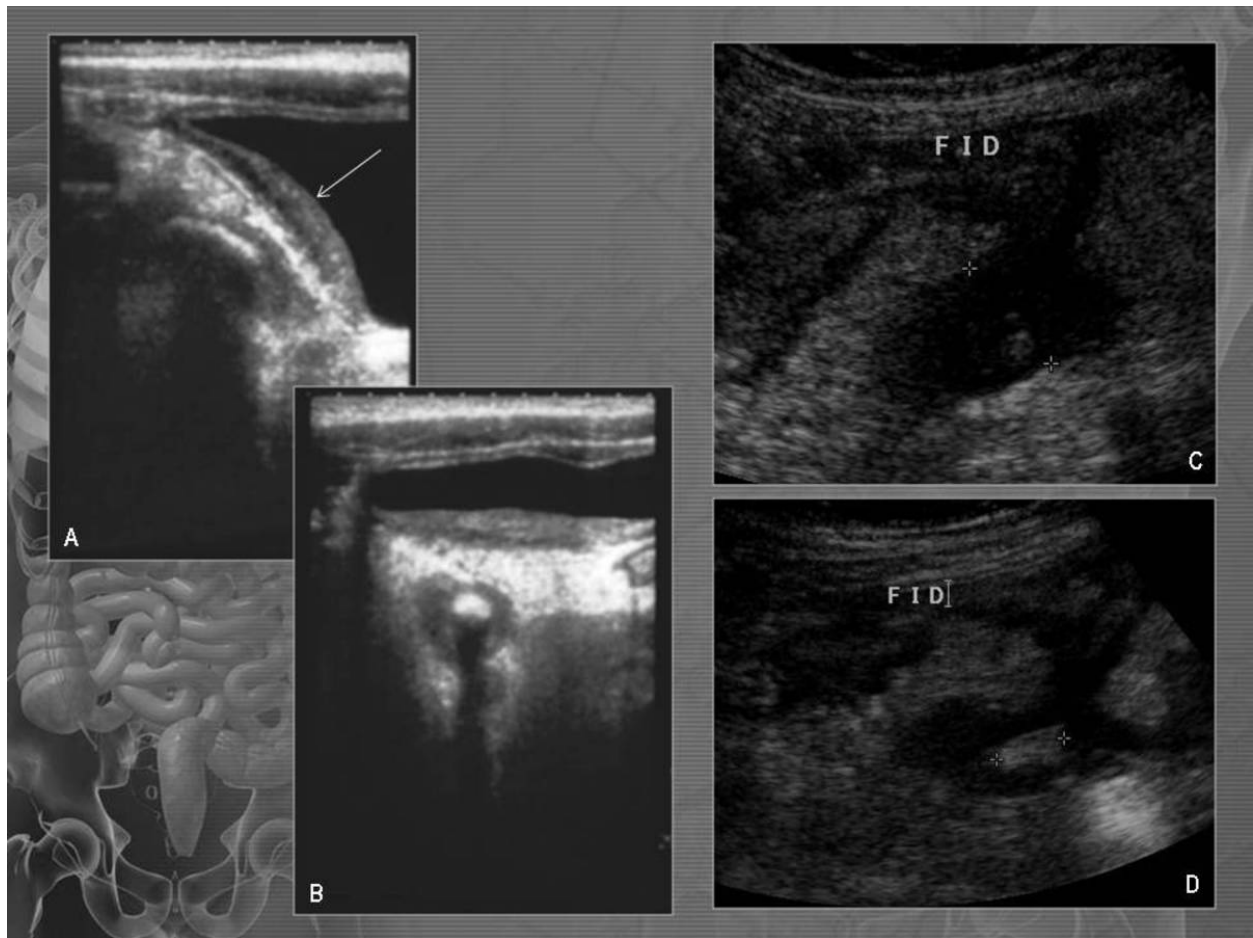
Fig. 4: Surgically proven appendicitis. US images of these two patients show hyperreflective and inflamed mesenteric fat in the RLQ surrounding the appendix, which contains a appendicolith casting a distal acoustic shadow. In the first patient shown ((A) and (B)) there is also a focal thickening of the bladder (arrow in (A)) due to spread of the inflammation to the adjacent organs.
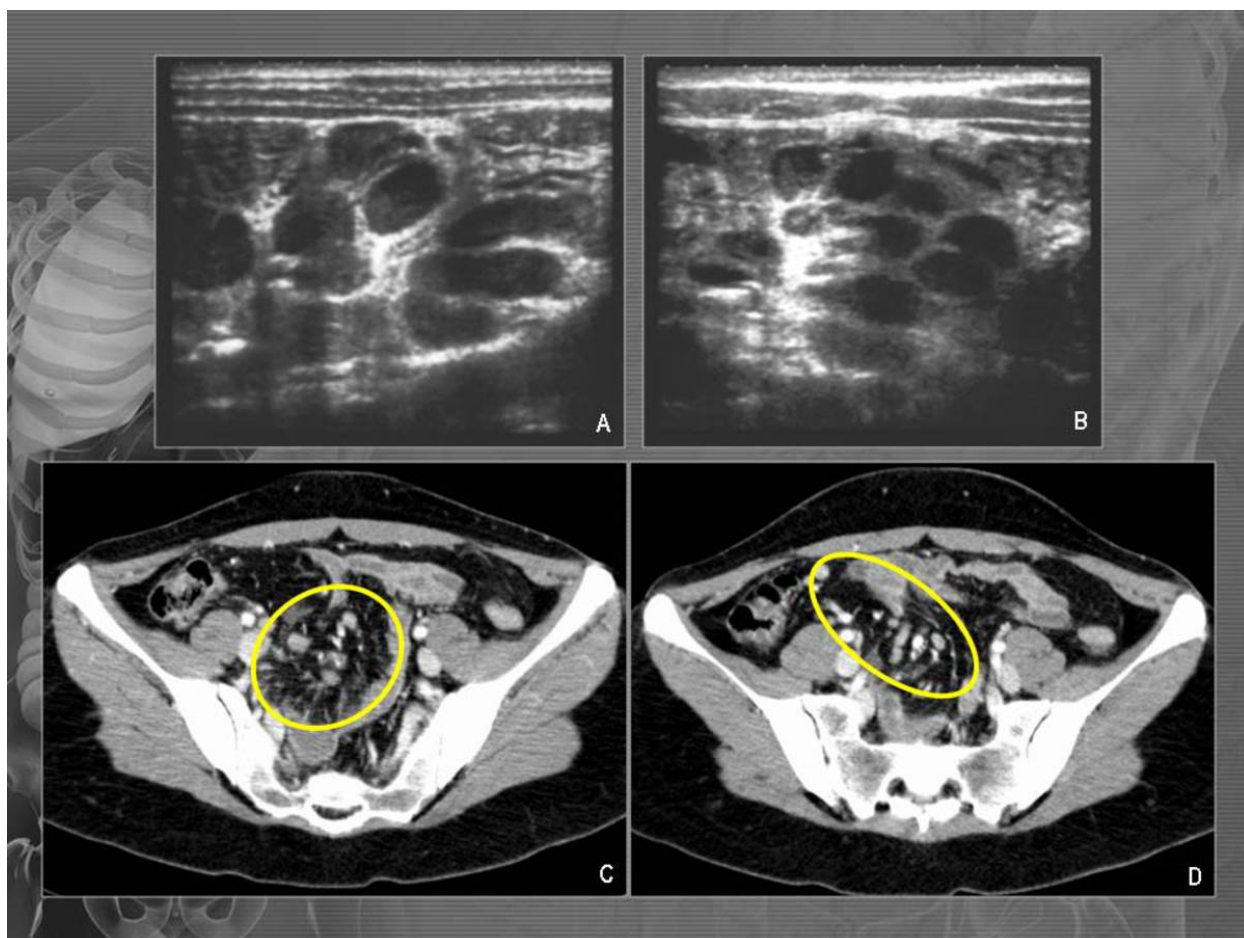
Fig. 5: Mesenteric adenitis. Sonogram of the RLQ shows cluster of enlarged mesenteric lymph nodes. Appendix was normal (not shown) and no other abnormalities were found. CT images depict several enlarged mesenteric lymph nodes in a young patient with acute right lower quadrant pain, in the absence of other detectable abnormalities.
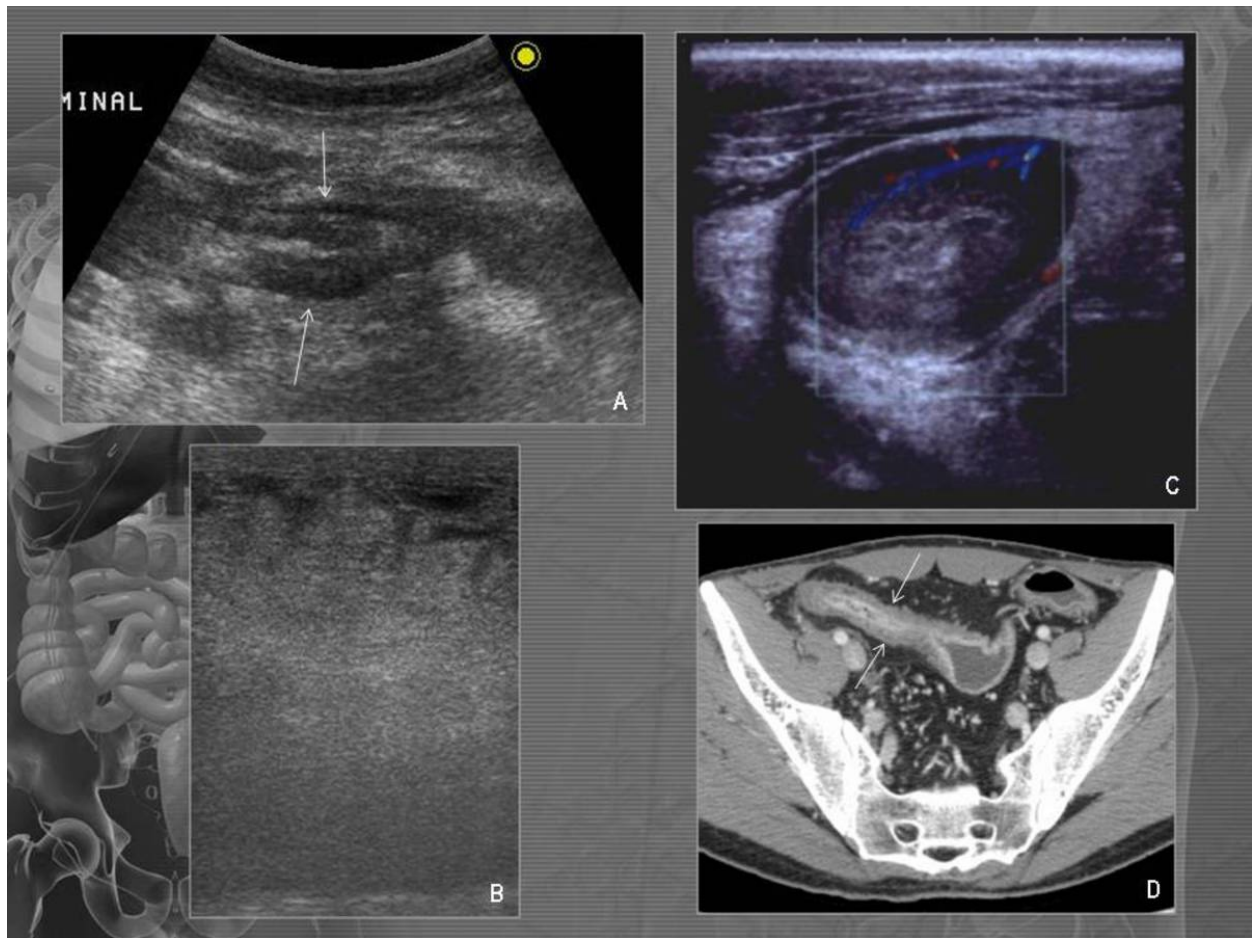
Fig. 6: Crohn disease. (A) and (B) 27-year-old female presenting with RLQ pain in the emergency department. Sonograms show marked thickening of the terminal ileum (arrows in (A)), with preservation of layer differentiation. There is marked increased echogenicity and thickening of the surrounding mesenteric fat (B). The US image in (C) shows mural concentric thickening of the cecum, with hyperemia of mural vessels on color Doppler US. Note also a small amout of free fluid and hyperechogenicity of the surrounding fat. (D) Contrast-enhanced CT image depicts a thick-walled ileal loop with mucosal enhancement, consistent with active Crohn disease.
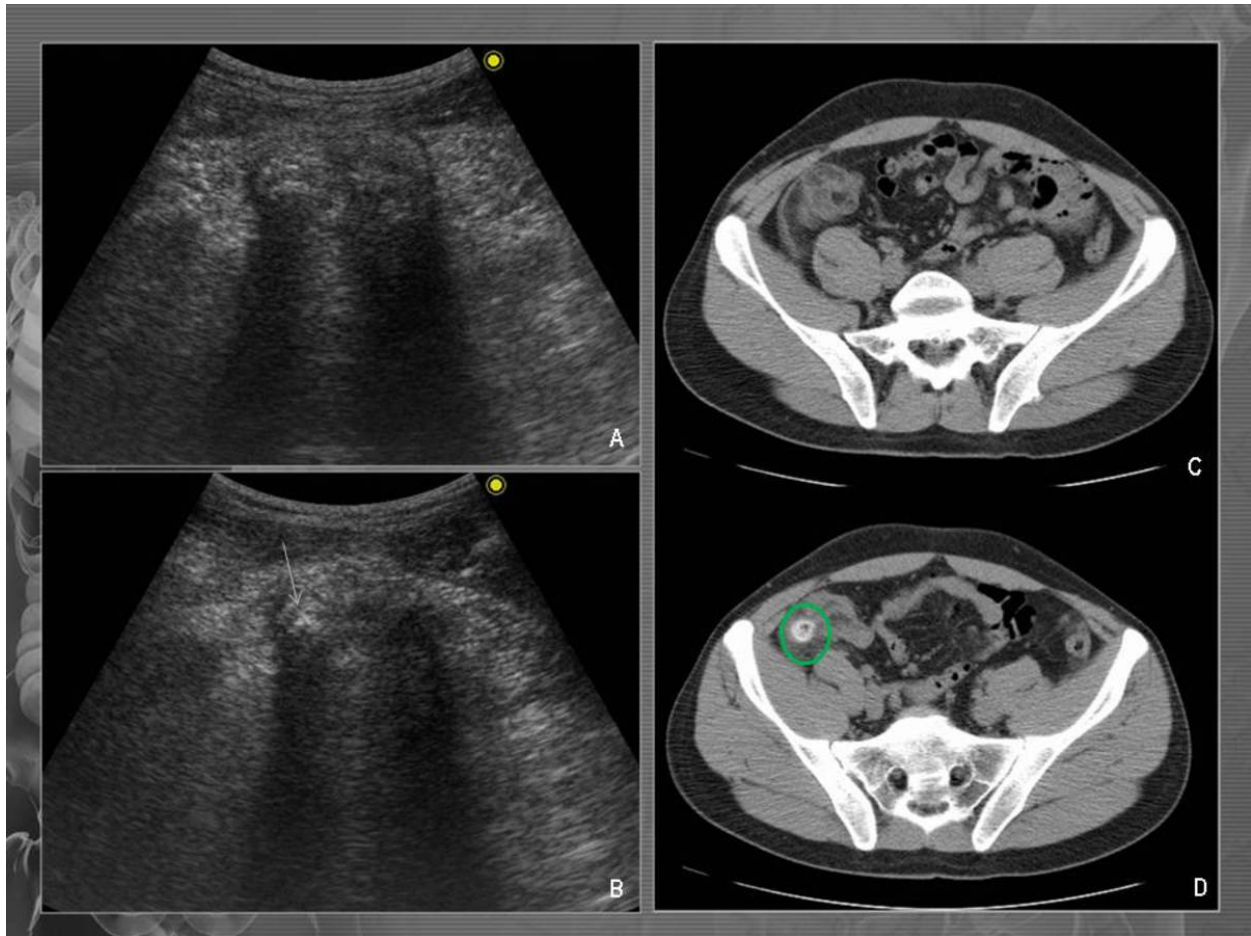
Fig. 7: Right-sided colonic diverticulitis. Sonograms (A) and (B) show an inflammed diverticulum with a calcified fecalith arising from the cecum, surrounded by hyperechoic fat. (C) and (D) Unenhanced CT scan images show thickening of the cecal wall and adjacent fat stranding. The calcified fecalith is also seen (circle in (D)).
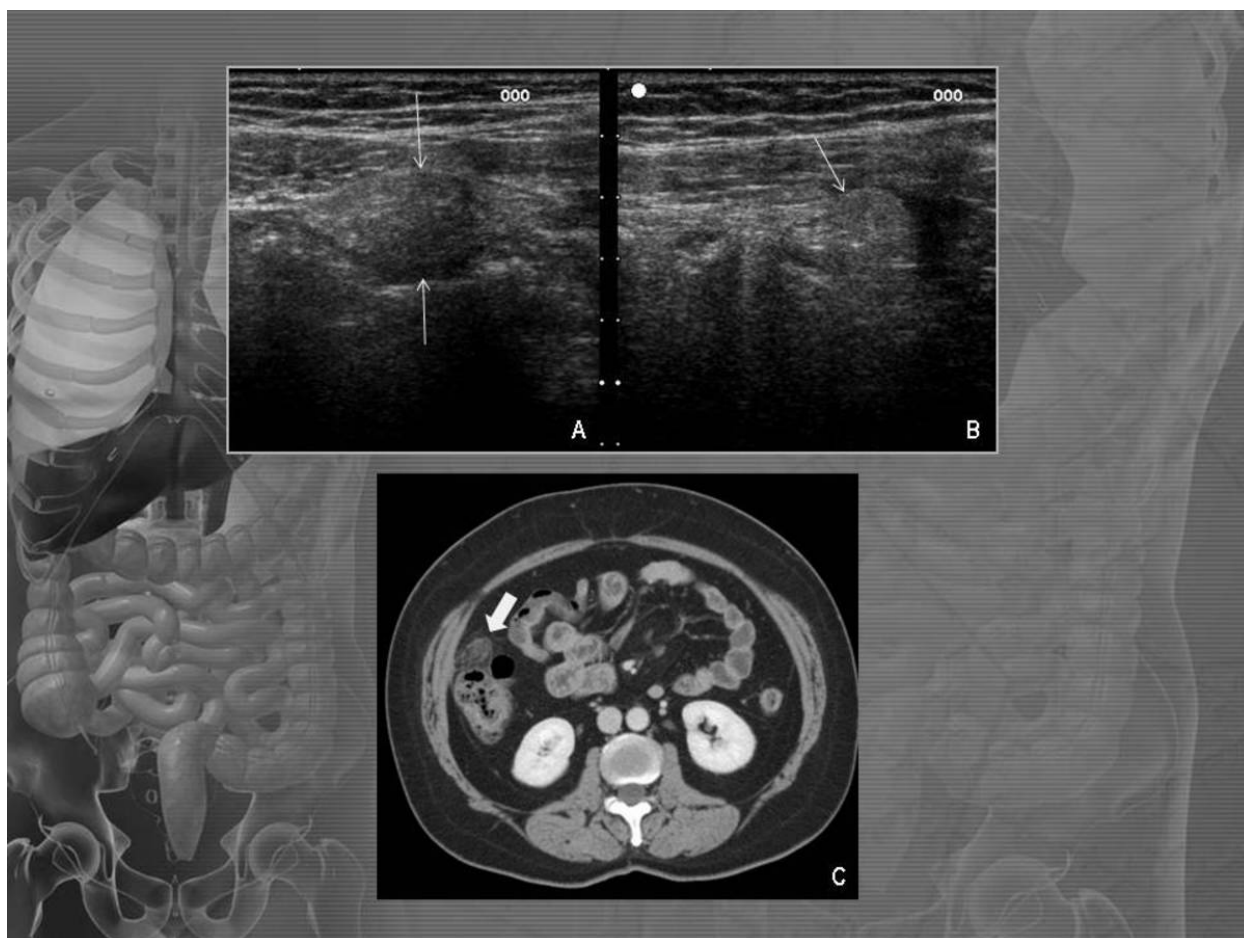
Fig. 8: Epiploic appendagitis in a young-adult patient. (A) and (B) Sonograms of RLQ revealed hyperechoic inflammed fatty oval mass adjacent to the colon (arrows), at the spot of maximum tenderness referred by the patient. Contrast-enhanced CT transverse image (C) show a rounded mass adjacent to the ascending colon (arrow) displaying a central density of fat and a denser peripheral rim.

Fig. 9: Right-sided omental infarction in a man with acute RLQ pain. US images show heterogeneous and hyperechogenic fat in the right iliac fossa. No other pathologic findings were found. CT scan (not shown) confirmed the diagnosis.

Fig. 10: Perforated colonic carcinoma in a 88 year-old elderly male patient presenting to the emergency department with RLQ pain and palpable mass. (A) and (B) US images show a hypoechoic mass causing asymmetric mural thickening of the bowel wall (arrows). (C) and (D) Contrast-enhanced CT revealed heterogeneously enhancing, asymmetrically thickened cecum. Note also fluid collection adjacent to the tumor and extending toward the abdominal all, peritoneal free fluid and inflammatory stranding of omentum. Perforated adenocarcinoma of cecum and ascending colon was identified at surgery.
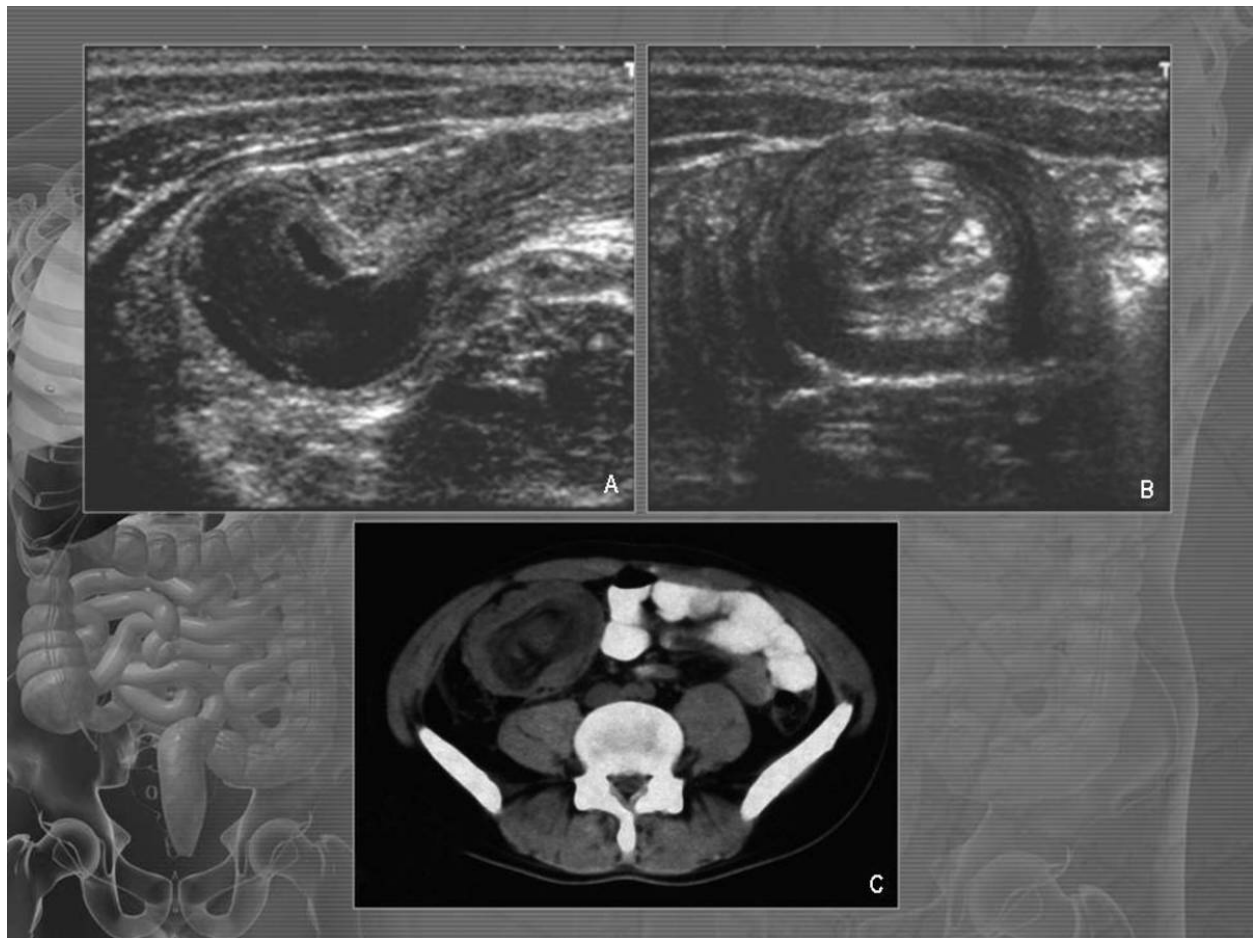
Fig. 11: 4-year-old with intussusception. US images of the RLQ shows a hypoechoic structure with a kidney-like condiguration in longitunal section (A) and multilayered appearance in transverse section. This was proven to be na intussusception due to ileal lymphoma. CT scan image shows typical appearance in this imaging modality.
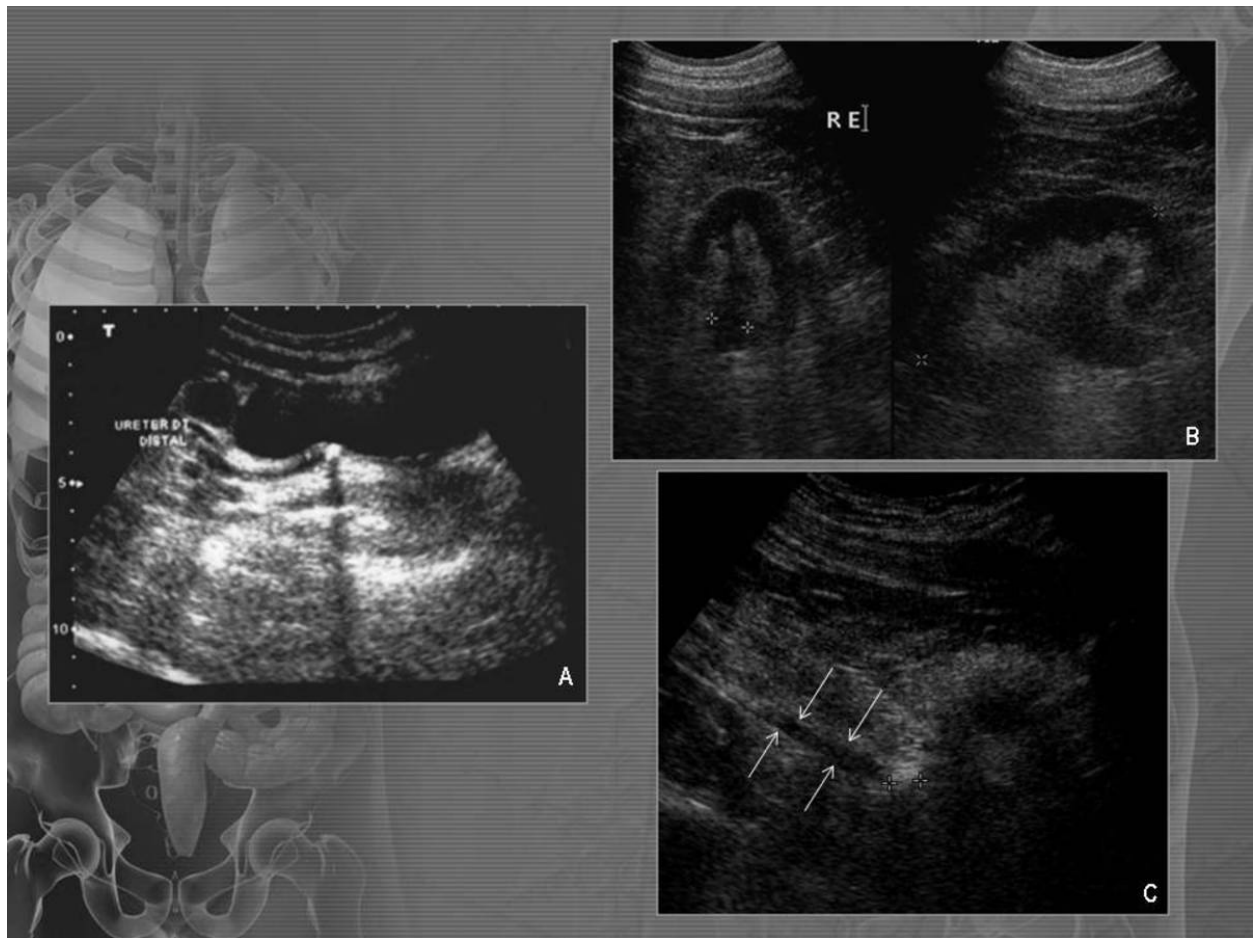
Fig. 12: Acute renal obstruction in two patients. (A) Sonogram shows right-sided hydroureter caused by an obstructing calculus at the vesico-ureteral junction. (B) and (C) US images depict another case of renal colic, showing left-sided hydronephrosis (B) and hydroureter caused by an obstructing stone (C) at the distal ureter.
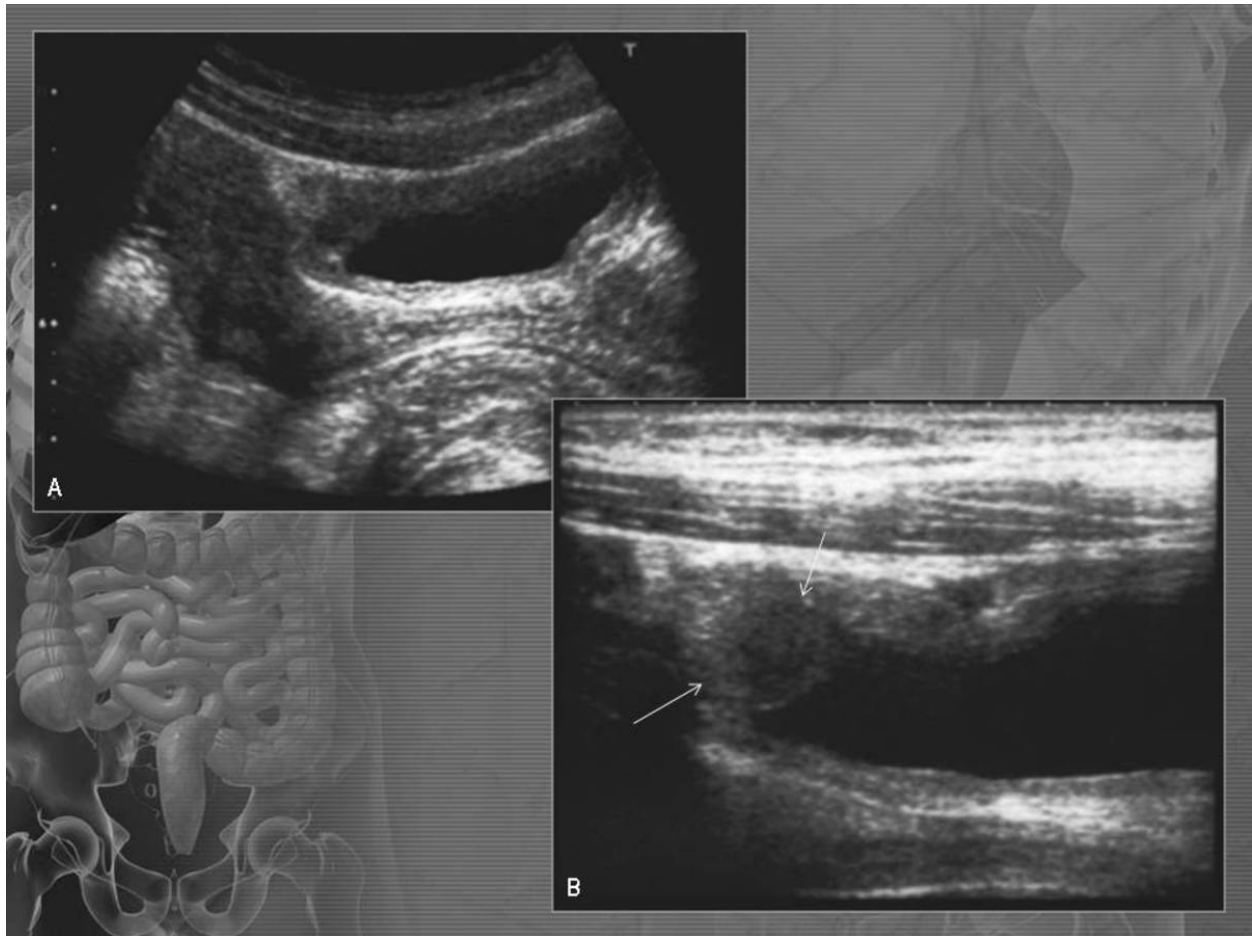
Fig. 13: 16-year-old girl with focal cystitis. Sonograms show focal hypoechogenic and oval thickening of the bladder wall (arrows).
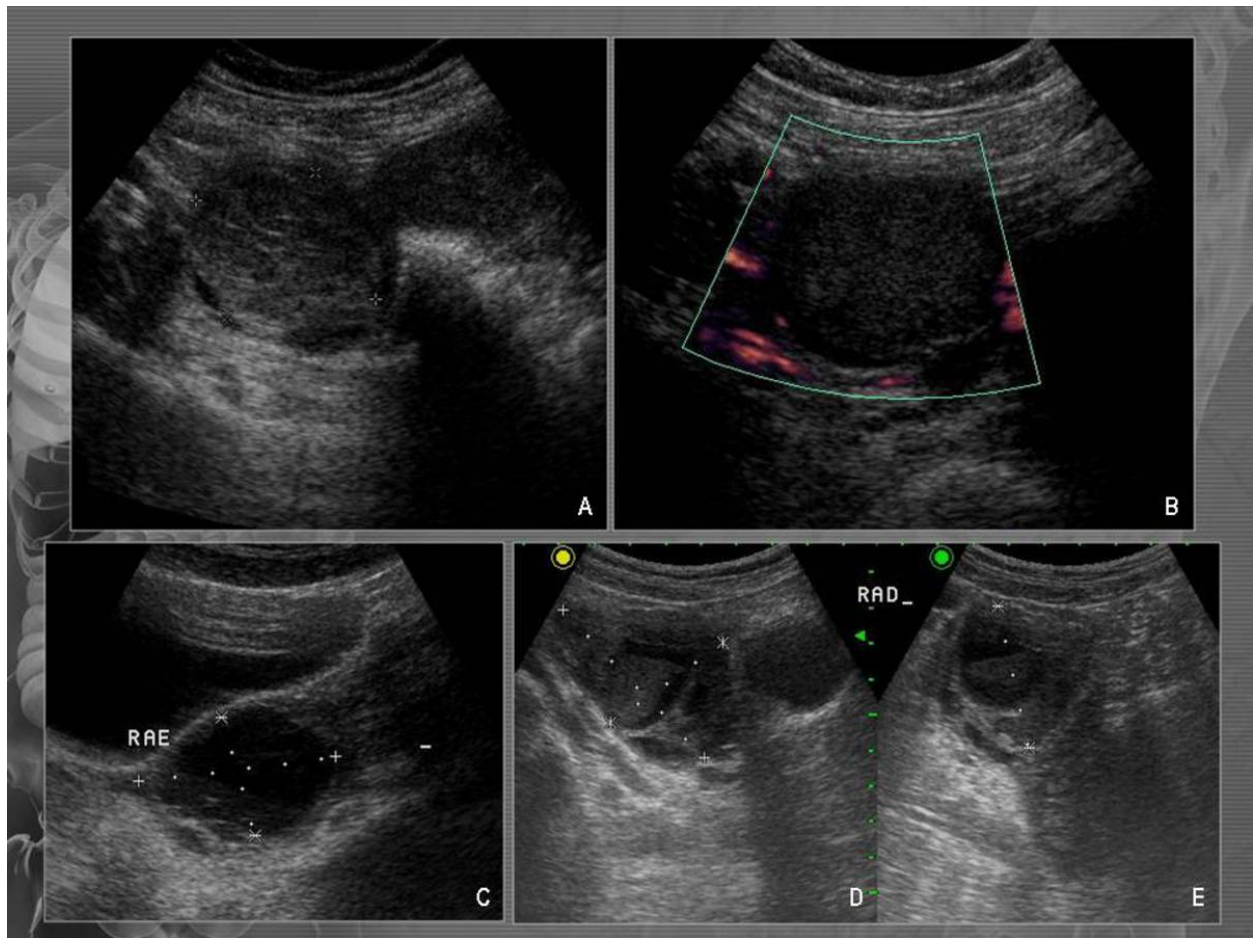
Fig. 14: (A) and (B) Hemorrhagic cyst of right ovary in a 19-year-old woman with RLQ pain. Sonograms show echogenic clot within right ovarian cyst, which showed no internal vascularization on color Doppler US. (C) and (D-E). Sonograms of other two patients with complicated cysts of the right ovary presenting with RLQ pain.
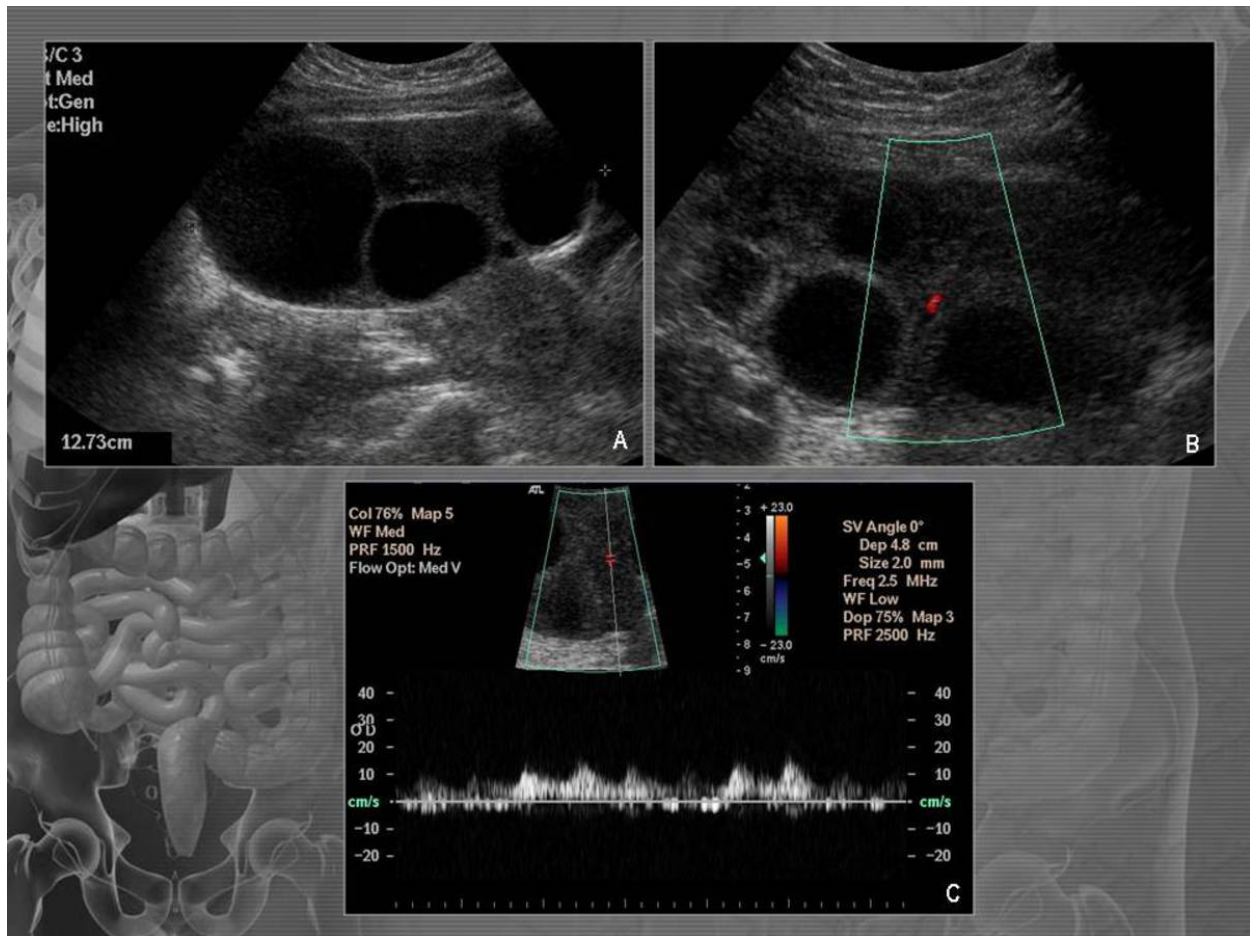
Fig. 15: Torsion of the right ovary. Sonograms show enlarged right ovary with large cysts, due to hyperstimulation. There is reduction of blood flow within the ovary, where a vascular structure suggesting a parvus-tardus waveform pattern was identified.
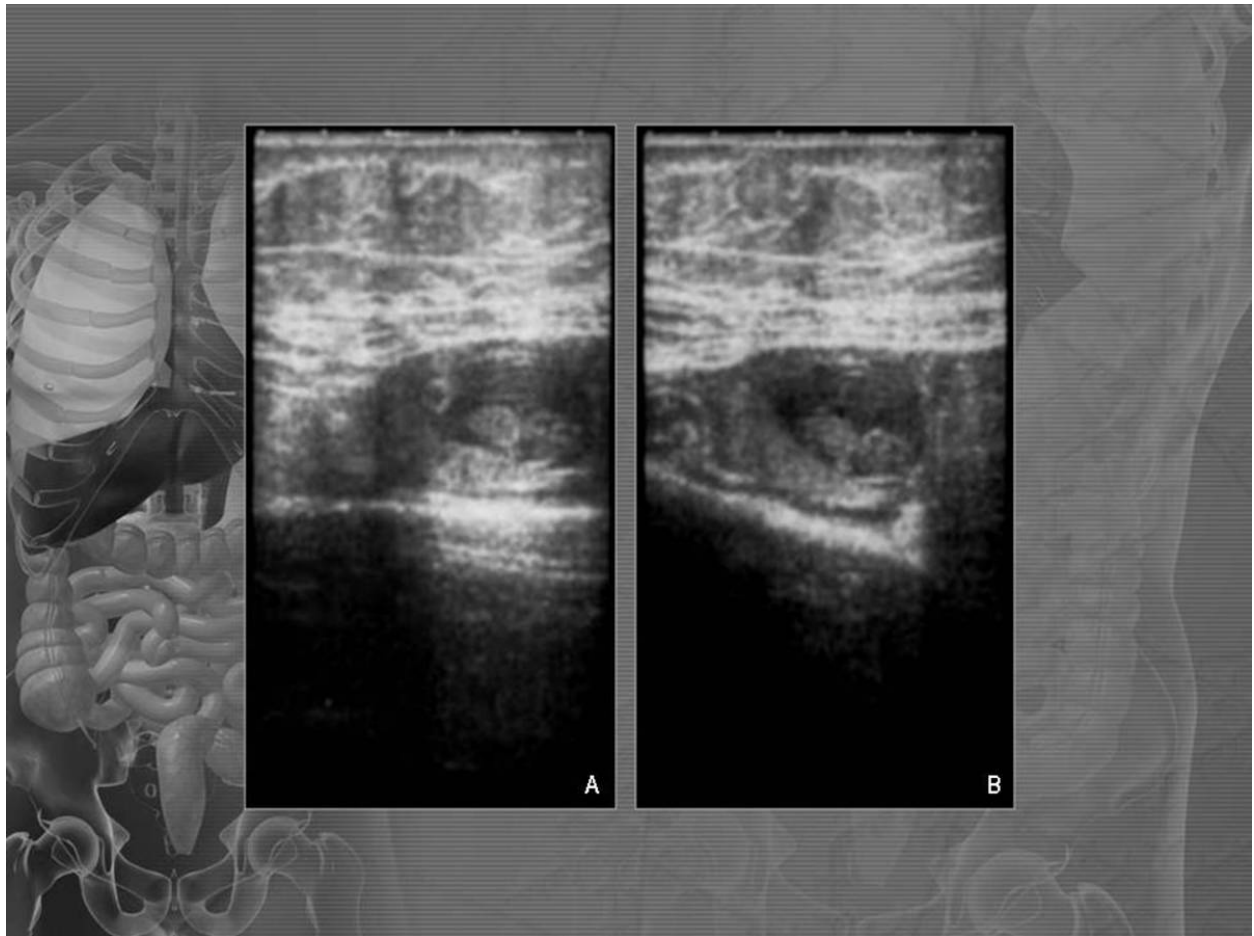
Fig. 16: Ectopic pregnancy in an adolescent. US images show a gestational sac outside the uterus in the right adnexa. There was no echogenic free fluid that could raise suspicion to associated hemoperitoneum as a complication of ruptured adnexal pregnancy.

Fig. 17: Inflammatory pelvic disease. Sonograms of these two patients presenting with RLQ show very dilated fallopian tubes with slightly heterogeneous fluid.
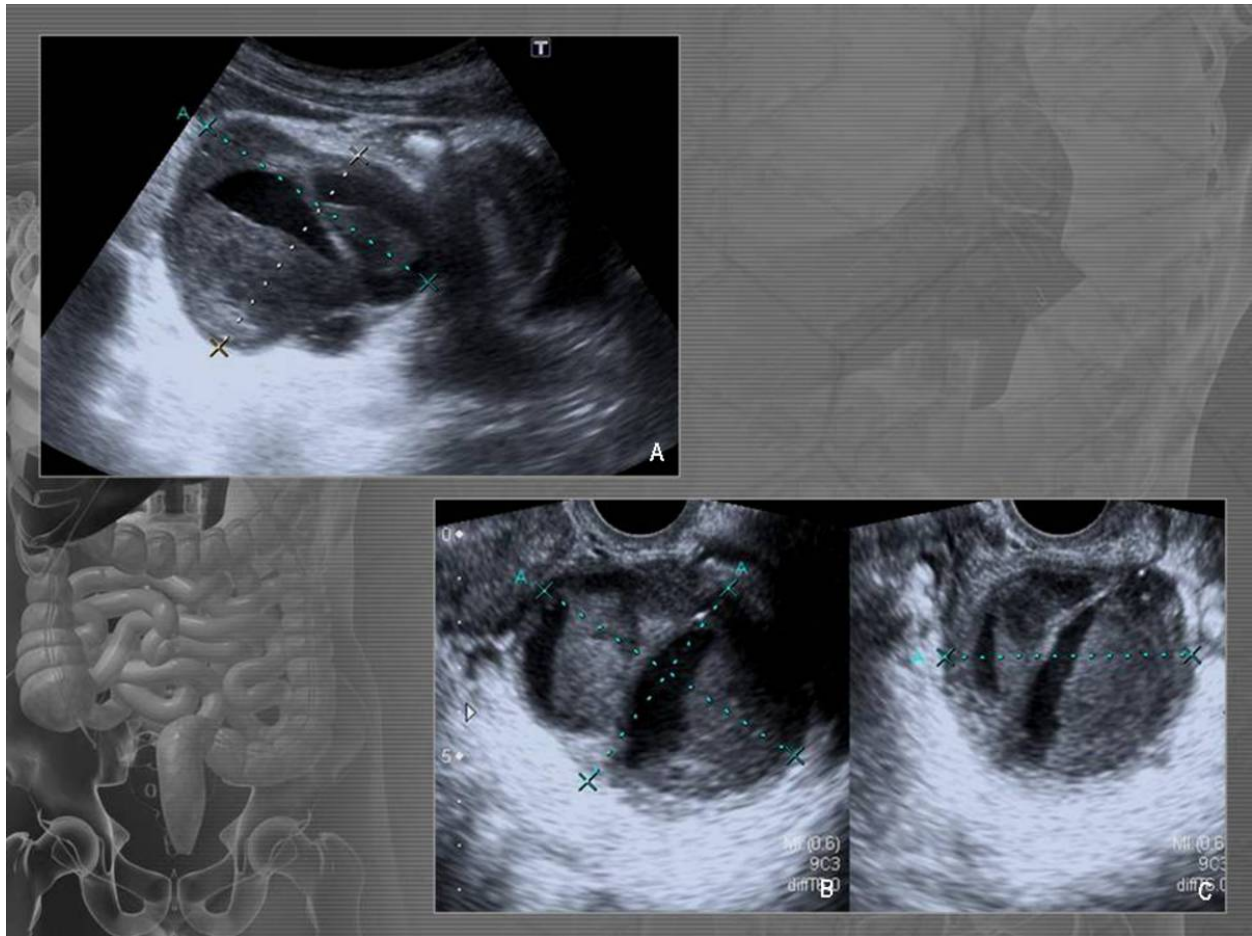
Fig. 18: Tubo-ovarian abscess. Transvaginal US images of this 39-year-old woman show a thick-walled complex multilocular mass in the left adnexal region.

Conclusion

Ultrasound is the first line imaging modality of choice for evaluation of RLQ pain in the emergency department.

Awareness of the US appearances of diseases that can manifest with RLQ pain is essential to achieve an accurate and early diagnosis, allowing appropriate patient management.

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