CONTINUING EDUCATION PROGRAM: FOCUS...

Infection of the right iliac fossa

I. Millet, C. Alili, E. Pages, F. Curros Doyon, S. Merigeaud, P. Taourel*

Medical Imaging Department, hôpital Lapeyronie, 371, avenue du Doyen Gaston-Giraud, 34295 Montpellier cedex 5, France

Abstract Febrile pain in the right iliac fossa is one of the most common reasons for consulting at an emergency service. Within this framework, the main diagnosis that is considered is appendicitis, the main complication of which is perforation. However, a certain number of other conditions can be responsible for this clinical picture, primarily including digestive tract and mesentery disorders including mesenteric lymphadenitis, Crohn’s disease, infectious enterocolitis, small intestine or colonic diverticulitis, ischaemic colitis or cancer of the caecum. This article illustrates the imaging semiology of the various right colonic, iliac, mesenteric and appendicular conditions that could potentially cause an infection of the right iliac fossa. It specifies the indications of ultrasound and CT scans, respectively, which depend on the age of the patient and the clinical signs and symptoms. Though the CT scan is commonly used in abdominal emergencies in general, and particularly in clinical pictures of infection of the right iliac fossa, ultrasound remains recommended as first line imaging when confronted with suspected appendicitis or lymphadenitis in a young subject or in the monitoring of Crohn’s disease.

Infections of the right iliac fossa are a very common cause of consultation at an emergency room. Their signs and symptoms include pain that is typically located in the right iliac fossa, but is sometimes more diffuse, and fever. Pain in the right iliac fossa is the primary location of febrile abdominal pain. While a clinical picture of abdominal pain in the right iliac fossa is not necessarily an indication for imaging, the presence of a true infectious syndrome, i.e. confirmed by fever and/or laboratory test signs (increased white blood cells and CRP levels), should lead in all cases to an imaging examination. The imaging examinations that are suggested are ultrasound and CT scan. Ultrasound should be preferred in children, pregnant women and more generally in young patients, with use that should be more extensive of the endovaginal route in women when the appendix cannot be visualized via the transparietal route in order to look for a pelvic appendix. CT scans are more often

* Corresponding author.
E-mail address: p-taourel@chu-montpellier.fr (P. Taourel).

2211-5684/$ — see front matter © 2012 Éditions françaises de radiologie. Published by Elsevier Masson SAS. All rights reserved.
http://dx.doi.org/10.1016/j.diii.2012.04.026

© 2020 Elsevier Masson SAS. Tous droits réservés. - Document téléchargé le 31/01/2020 Il est interdit et illégal de diffuser ce document.
used in first line imaging for clinical pictures that have progressed or are more diffuse, or in elderly subjects. It is also performed in second line imaging if the ultrasound is not successful. The constraints for performing the scan for pain in the right iliac fossa have been well codified recently by Zins [1] by answering the following questions: is an injection necessary? What is the interest today of a scan focused on the right iliac fossa and in particular on the appendix? Is oral or rectal opacification necessary? Is the “low dose” scan valid in this indication? What cut thickness and what reading technique is recommended? In our department, scans are carried out automatically with injection of a contrast medium during the portal phase without digestive opacification. The cuts concern both the abdomen and pelvis and are always analysed axially and coronally with cuts reconstructed in 2.5 mm thickness and with the possibility of accessing millimetric cuts if there is the shadow of a doubt to increase spatial resolution. The plain survey of the abdomen is no longer indicated in a clinical picture of infection of the right iliac fossa in general and in the diagnosis of appendicitis in particular, and this has been formally stated in a recent report of the French National Authority for Health [2]. In practice, MRI has only limited use in this indication, and is reserved for when ultrasound is not successful in pregnant women. Painful septic clinical pictures of the right iliac fossa can be related to digestive diseases, but also urinary diseases (acute pyelonephritis, complicated renal infarction) or gynaecological diseases (salpingitis, tubal-ovarian abscess, complicated ovarian torsion). In this article, only the digestive causes of septic clinical pictures of the right iliac fossa will be discussed. Of these causes, the first to be mentioned is acute appendicitis, which accounts for more than one quarter of non-traumatic acute abdominal pain resulting in hospitalization in a surgical department, and approximately 40 to 50% of abdominal surgical procedures carried out urgently. An infectious syndrome can be missing from a case of appendicitis and a normal number of white blood cells and normal CRP levels do not make it possible to rule out this diagnosis [3]. However, a high temperature and hyperleukocytosis with polynuclear neutrophils are worth four points out of ten in the classic Alvarado score, which is a clinical/biological score for the prediction of appendicitis, and the extent of the elevation in CRP levels is a marker of the severity of appendicitis that can potentially be useful in predicting perforation of the appendix [4].

**Acute appendicitis**

**Semiology of simple acute appendicitis**

Ultrasound examinations (Fig. 1), like CT scans, screen for appendicular and extra-appendicular signs.

**Appendicular signs**

The appendix is dilated, measuring more than 6 mm in diameter on the ultrasound under mild compression [3,5,6] and more than 10 mm on the CT scan [7–9], with a thick wall measuring more than 3 mm in diameter. This wall is enhanced on the CT scan and de-differentiated in the evolved forms on the ultrasound. A stercolith is visualized more often on the CT scan than on the ultrasound. The rearranged appendix is not compressible on the ultrasound and this compression manoeuvre increases pain.

**Extra-appendicular signs**

The peri-appendicular and peri-caecal fat is infiltrated and hyperechogenic on the ultrasound and dense on the CT scan, sometimes with a localized thickening of the caecal wall. There can also be non-specific peri-caecal ganglions.

**Semiology of complicated appendicitis**

Perforation of the appendix is encountered in 30% of acute appendicitis cases. Its diagnosis can have an impact by changing therapeutic conduct: first, possible radiological draining, then modification of the surgical technique with laparotomy. The semiology of complicated appendicitis has mainly been described with CT scans [10—13]. The signs that make it possible to diagnose complicated acute appendicitis are the presence of extra-luminal gas (Fig. 2) and the presence of an extra-appendicular stercolith. These signs have very good positive predictive value for the diagnosis of complicated appendicitis. The presence of an abscess lacks sensitivity for appendicular perforation, while the visualization of a parietal enhancement defect lacks specificity. There is often contrast uptake and localized thickening of the parietal peritoneum opposite the infectious location, which demonstrates a peritoneal reaction. The scan is certainly superior to ultrasound for the assessment of complicated acute appendicitis. It makes it possible to distinguish the appendicular phlegmon with significant and poorly-limited infiltration of the fat and the abscess, characterised by a hypodense collection, the walls of which are enhanced. It also makes it possible to individualise an appendicular lump, which is sometimes clinically suspected in a poorly-delimited mass of the right iliac fossa. The definition of the appendicular lump remains strict: it is the adhesion of adjacent viscera (ileum, bladder, greater omentum) to the infectious location. The therapeutic impact of this diagnosis is certain, as it is the main, or even the only case where surgery is contraindicated as an emergency and will be carried out later after antibiotherapy and diet control. It is therefore important for the radiologist to use the words phlegmon, abscess and lump advisedly. The other complications of acute appendicitis are rarer. Diffuse bacterial peritonitis can sometimes be observed in children when the greater omentum is incompletely developed and does not bar the abdomen. Pyelonephritis is a rare and serious complication resulting in septic thrombosis of the upper mesenteric vein with, in typical cases, an infiltration of the fat around the vein with the thrombosis or of gas inside the thrombus.

**Diagnostic traps**

Despite the high sensitivities and specificities of ultrasound and CT scan examinations for the diagnosis of appendicitis, which are greater than 90% in most prospective studies, there are a certain number of false negatives and false positives in imaging.
Infection of the right iliac fossa

Figure 1. Acute uncomplicated appendicitis on an ultrasound in longitudinal cuts (a) and axial cuts (b). There is an increase in appendicular diameter, with a parietal thickening of the inflamed appendix and good parietal differentiation. The hyperechogenicity of the peri-appendicular fat should be noted (arrow).

Figure 2. Acute complicated appendicitis, axial cuts (a, b) and sagittal reconstruction (c). There are two complications of the acute appendicitis in these cuts. First, signs of appendicular perforation with the presence of air in the extra-digestive position (c, head of the arrow), and the existence of thickening of the parietal peritoneum (a, arrow). An appendicular stercolith is well individualized (b and c, white arrow). In addition, there is an agglutination of the small intestine loops on the abnormal appendix, bearing witness to an appendicular lump.
False negatives

The location of the appendicitis is not unambiguous, which explains why the classic markers used to screen for it, particularly in ultrasound, in front of the psoas muscle and outside the iliac vessels, can be tripped up (Fig. 3). In ultrasound, false negatives are mainly encountered in obese subjects or those with air distension of the abdomen, in retro-caecal appendicitis, in plunging pelvic appendicitis and in perforated appendicitis where the appendicular structure is no longer recognizable. By contrast, on CT scans, false negatives can be observed in thin subjects where there is no fat to silhouette the appendix and when the pathological appendix is confused with a digestive loop. Finally, on ultrasounds like on CT scans, appendicitis located at the appendicular point can be misjudged [14]. In the same way, on ultrasounds like on CT scans, appendicitis can be confused with small intestine or colonic inflammatory diseases if there is digestive parietal reactive thickening caused by the peri-appendicular inflammatory reaction (Fig. 4).

The non-visualisation of the appendix can be a cause of false negatives, since in clinical practice the non-visualisation of the appendix, on the ultrasound as well as the CT scan, can lead to the conclusion that there is no appendicitis. It must be kept in mind that in effective teams with ultrasound and with CT scans, the follow-up of patients with an appendix that was not seen on the imaging reveals appendicitis in approximately 5% of cases in ultrasound [3] and even more exceptionally on CT scans [15,16]. The normal appendix is more easily observed with a CT scan than with ultrasound, its diameter is less than or equal to 6 mm under compression on the ultrasound, while it can measure up to 10 mm on the CT scan due to the absence of compression. The light is most often filled with air in a normal appendix, even if there is sometimes intra-appendicular fluid. In practice, for an appendix measuring between 6 and 10 mm in diameter on the CT scan, a lack of parietal abnormalities, a lack of infiltration of the fat and the air content of the appendix are good reasons for ruling out appendicitis [14].

Figure 3. Retro-caecal appendicitis in axial (a) and sagittal (b) cuts. The abnormal appendix is located behind the caecum and clearly outside the right iliac psoas muscle.

Figure 4. Appendicitis with a peri-appendicular inflammatory reaction and thickening of the meso-sigmoid root, associated with a thickening of the sigmoid colon and a diverticulosis that should not support the diagnosis of sigmoid diverticulitis (a, b).
False positives

They can be related to the identification of a normal or abnormal tubular structure (digestive loop, dilated ureter, gonadic vein with thrombosis) as an abnormal appendix. There can be reactive appendicular thickening during infections conditions around the appendix, for example, the utero-annexial location, or inflammatory conditions, such as ileo-caecal Crohn’s disease.

Ultrasound or CT scan

Most studies that compared ultrasound to CT scans [17—20] for the diagnosis of appendicitis reported that CT scans were superior in terms of sensitivity and specificity. Besides in children for whom, particularly in France, ultrasound is the examination that is carried out first, and in women of childbearing potential, there is a tendency to widely develop CT scans in this indication. However, taking into account the imperious necessity of controlling the dose of medical radiation, particularly in young subjects, it seems judicious to us to carry out ultrasound as the first-line examination, especially when the clinical picture is more localised. CT scans should be performed if there is a discrepancy between the clinical picture and the ultrasound, or right away in subjects with a peritoneal picture, in elderly subjects in whom appendicitis, even complicated appendicitis, can be only mildly symptomatic, or in subjects with diffuse pain for whom a CT scan would be more apt to rule out the diagnosis of appendicitis and to confirm an alternative diagnosis.

The impact of imaging on the course of treatment

The diagnosis of appendicitis supported only by clinical and laboratory data is sometimes difficult, as normal laboratory test results do not make it possible to rule out appendicitis. Referring only to clinical and laboratory test data will lead to two major problems: the first, which was the French attitude for a long time, is to perform too many ‘prophylactic’ appendectomies, with a rate of 15% of healthy appendices removed, reaching up to 40% in women of childbearing potential, with a risk of attachment and adherences in the long term. Even if this attitude has recently changed with a rate of appendectomies that has decreased by 35% between 1999 and 2009, France is still the third country in Europe in terms of the annual incidence of appendectomy, with wide disparities depending on the regions [21]. The second problem, which is more developed in Anglo-Saxon countries, is prolonged monitoring with acute appendicitis operated on during the perforation stage. Imaging makes it possible to clearly avoid these two problems and its use should be specified by the French National Authority for Health, whose report on decision making data with imaging as the first piece of information is to be published in September 2012. The indication of imaging appears even more obvious to us as pain goes along with a septic syndrome that could orient the physician towards complicated appendicitis. Medical imaging makes it possible to precisely assess the complications of appendicitis, which has an impact on treatment and which the clinical examination cannot do, as there is no parallelism between the intensity of the anatomic lesions and the clinical seriousness. It is therefore possible to discover highly evolved pre-perforative lesions during the procedure, even though the clinical symptoms were not very intense [22]. In addition, in one of three patients with a clinical picture that is compatible with appendicitis, the imaging makes it possible to diagnose an extra-appendicular lesion. Finally, in addition to making it possible to diagnose appendicitis, the imaging can have an impact on the procedure that is carried out (coelioscopy or laparotomy, location of the approach), for which it is useful to specify whether it is appendicitis, complicated or not, to differentiate the phlegmon, abscess and piastra, to identify a mechanical occlusion of the small intestine by agglutination of the loops on the source of the infection or by small intestine extrinsic parietal reaction (Fig. 5), and finally, to know the location of the appendix and especially its caecal implantation base, particularly to guide the coelioscopy orifice.

Non appendicular diseases

The differential diagnoses of acute appendicitis in a painful septic clinical picture of the right iliac fossa are numerous. We have chosen to only discuss the most common in relation to mesenteric or digestive tract diseases. Most of these non appendicular diseases are recognized on CT scans which, in clinical practice, remain the most effective diagnostic method in the evaluation of an acute abdominal syndrome [23].

Mesenteric lymphadenitis

Mesenteric lymphadenitis is the most common cause of pseudo-appendicular syndrome in children. Reasons for

Figure 5. Acute appendicitis responsible for mechanical occlusion of the small intestine by ileal extrinsic parietal reaction. The abnormal appendix is clearly seen in the coronal cut, with an ileal reactive parietal thickening causing a mechanical occlusion of the small intestine that was removed following the appendectomy.
suggesting this diagnosis are as follows: recent history of rhino-pharyngitis, fever higher than 39 °C (too high for uncomplicated appendicitis) and pain in the right iliac fossa, but with no real justification. The diagnosis is based on the ultrasound, which rules out acute appendicitis and demonstrates adenopathy. However, the presence of mesenteric ganglia does not make it possible to establish the diagnosis of mesenteric lymphadenitis. More than three ganglia, their small diameter of greater than 5 mm and often reaching 10 mm (Fig. 6) and the absence of a surrounding inflammatory or infectious condition such as appendicitis, diverticulitis or Crohn’s disease make it possible to confirm the diagnosis of primary mesenteric lymphadenitis [24,25].

Crohn’s disease

Crohn’s disease has a peak of discovery between 15 and 30 years of age. It is typically revealed in one out of three patients due to an appendicular clinical picture, and its diagnosis is often still established upon appendectomy or due to complications after an appendectomy. The diagnosis must be suggested in imaging when confronted with a symmetrical circumferential thickening of the terminal ileum and/or the right colon (Fig. 7), sometimes associated with images of transmural ulceration that is better seen on the ultrasound. Fat is often the location of a sclerolipomatous reaction, with an appearance of hypertrophy of the mesenteric fat. The ultrasound evaluates gastrointestinal parietal damage well, with inconstant loss of parietal differentiation. The maintenance of parietal differentiation with an oedema of the muscle mass is more of a sign of an active disease, while a de-differentiated wall or intraparietal fat would correspond to a chronic disease [26]. The scan clearly shows the sclerolipomatosis, with the comb tooth-like appearance of the right mesenteric vessels related to the ‘vascular jejunisation’ of the ileum. In more evolved forms, there is an abscess, a phlegmon or fistulae, particularly enterocentric. Damage to the right colon is classic, and damage to the appendix is possible, which can make the differential diagnosis with appendicitis difficult. Even if the scan is the examination that is the most effective in the diagnosis of Crohn’s disease, and especially in the assessment of all the complications, ultrasound and now entero-MRI have an important role in this extension assessment, but especially in the monitoring of Crohn’s disease, in order to reduce the dose of radiation in young patients.

Infectious enterocolitis

Infectious enterocolitis is a classic condition that causes a septic clinical picture, sometimes with less intense pain, and diarrhoea that is reminiscent of a clinical picture of viral gastroenteritis. Ileo-caecal damage should be suggestive of yersiniosis, campylobacter jejuni and salmonella [27]. Many cases do not require imaging due to the rapid and favourable course of the signs and symptoms, with an episode of infectious diarrhoea that resolves spontaneously. If imaging is performed, it shows ileal and caecal circumferential thickening [8] that is more or less associated with adenomegaly and infiltration of the peri-digestive fat (Fig. 8).

Neutropoenic colitis

Neutropoenic colitis occurs in patients receiving chemotherapy for neoplasia, often acute leukaemia. It manifests via pain in the right iliac fossa, fever, diarrhoea and sometimes a peritoneal clinical picture. The damage is generally caecal, even if the rest of the right colon and terminal ileum can also be affected. The scan performed as first line imaging in a septic patient receiving chemotherapy shows a thickening of the caecal walls with marked infiltration of the peri-caecal fat, and in evolved forms, pneumatosis (Fig. 9), or even signs of digestive perforation. A symmetrical thickening of the caecal walls in an immunosuppressed patient should first be suggestive of the diagnosis of neutropoenic colitis [23,28].

Colonic diverticulitis

Colonic diverticulitis is a common disease. It can cause a painful clinical picture of the right iliac fossa via two mechanisms. The first is that of a sigmoid loop located in the right iliac fossa, with a classic clinical picture of sigmoid diverticulitis. The second is that of caecal diverticulitis. In both cases, a thickening of the colonic wall, diverticula and infiltration of the peri-colonic fat can be observed. It should be noted that in diverticula of the right colon [29], one single inflammatory diverticulum is often found with a thick
Infection of the right iliac fossa

Figure 8. Axial cut (a) and coronal reconstruction (b). Infectious caecitis caused by salmonella with marked thickening of the caecal wall. Infiltration of the peri-caecal fat is moderate and damage is limited to the caecum.

wall that is classically centred by a stercolith (Fig. 10). The scan is thus of great interest in clearly demonstrating the intra-diverticular location and not the intra-appendicular location of the stercolith, confirming diverticulitis, and in individualizing a normal appendix.

Meckel’s diverticulum and ileal diverticula

These are relatively rare locations for diverticula, the presentation of which is often that of a pseudo-appendicular clinical picture. The acquired ileal diverticula [30] are most often located on the mesenteric boundary of the terminal ileum, while Meckel’s diverticulum is located on the anti-mesenteric boundary, at approximately one meter from Bauhin’s valve. The scan, in Meckel’s diverticulum [31], shows a blind formation of variable size that links into the gastrointestinal tract and has a thickened, enhanced wall with infiltration of the peri-diverticular fat.

Epiploic appendagitis

Epiploic appendicitis is a common and now well recognized cause of pain in the right iliac fossa (like in the left iliac fossa), with a clinical picture of highly localized pain.

Figure 9. Axial cut (a) and coronal reconstruction (b). Neutropoenic colitis in an immunosuppressed patient. Thickening of the caecal walls with caecal pneumatosis and peri-caecal effusion. It should also be noted that there is no enhancement of the right colonic wall up to the level of the right colonic angle.
I. Millet et al.

Figure 10. Axial cuts (a, b) and coronal reconstruction (c). Diverticulitis of the right colon located in the right colonic angle, with a colonic diverticulum filled with a voluminous stercolith and a very marked infiltration of the fat around the diverticulum. The normality of the appendix on the lowest axial cut should be noted (b).

However, the septic syndrome is often absent. When this diagnosis is kept in mind, ultrasound imaging, like the CT scans, easily detect the presence of an oval-shaped mass with a fatty density appended to the colon, of variable size, surrounded by a dense ring with infiltration of the fat and typically a localized thickening of the parietal peritoneum causing the severe localized pain.

Ischaemic colitis

Ischaemic colitis is often accompanied by fever. Even if left damage is classic, a certain epidemiological context promotes right ischaemic colitis [32]: elderly subjects and renal insufficiency. The CT scan shows a right colonic circumferential thickening, associated or not with infiltration of the peri-digestive fat and present in the "wet" forms but absent in the dry forms. In approximately 10% of cases, parietal pneumatosis is also present. The diagnosis is suggested by a clinical context of an elderly subject at cardiovascular risk with abdominal pain sometimes to the right, accompanied by lower digestive bleeding.

Malignant tumours

A certain number of tumours of the ileo-caecal region can reveal themselves due to right iliac fossa pain, a palpable mass and a septic syndrome, particularly in elderly subjects. Of these tumours, adenocarcinoma of the caecum is dominant, which, in elderly subjects, can remain symptom-free for a long time and then reveal themselves in a clinical picture of over-infection or perforation [33]. The CT scan in this type of elderly patient must be performed as first line imaging and shows a caecal circumferential mass that is often asymmetrical, short, with significant parietal thickening, greater than 10 mm (Fig. 11), marked inflammation of the peri-caecal fat, localized pneumoperitoneum in case of tumoural perforation and often peri-caecal adenomegaly.
Diagnostic strategy when confronted with a septic syndrome of the right iliac fossa

The diagnostic strategy when faced with a septic syndrome of the right iliac fossa is based on imaging with the ultrasound and CT scan. The combination of pain and a septic syndrome make imaging necessary and urgent. The choice between the ultrasound and the CT scan depends on a certain number of factors: age and sex, epidemiological context, clinical signs and symptoms and the degree of expertise of the radiologist caring for the patient. The age and sex of the patient with this clinical symptomatology is an essential factor for two reasons: first, the ultrasound should be very clearly preferred in children and in pregnant women due to their sensitivity to exposure to X-rays. Second, the incidence of the different diagnoses depends on the age of the patient. Therefore, in adolescents and young subjects, appendicitis is the main cause of pain of the right iliac fossa, requiring surgery, and mesenteric lymphadenitis, which is very common in children, is the first differential diagnosis. On the other hand, in subjects over 75 years of age, appendicitis accounts for only 4% of abdominal pain and sigmoid diverticulitis with a dolichocolon and a sigmoid loop in the right iliac fossa or caecal tumours are encountered much more frequently. The epidemiological context is obviously useful for orienting the physician towards these diagnoses: a context of immunosuppression, for example, would suggest screening for neutropenic colitis or infectious enterocolitis, a history of the same kind of episodes would suggest Crohn’s disease, a history of appendectomy would obviously make the diagnosis of appendicitis very improbable, even if damage to the appendicular stump remains theoretically possible. The evolved character of the clinical picture and/or very diffuse character would encourage the performance of the CT scan as first line imaging, which is more effective for the assessment of complications of appendicitis (phlegmon, abscess, lump) and to confirm in certain number of differential diagnoses. Similarly, if there is a peritoneal syndrome or occlusive syndrome accompanying the septic syndrome of the right iliac fossa, a CT scan must be carried out as first line imaging.

Finally, in practice, the more specific skills of the radiologist caring for the patient are an aspect to be taken into consideration. The operator-dependence of the ultrasound is without a doubt a cliché notion, as the clinical orientation, CT scan, and surgery are also operator-dependent. Nevertheless, learning to perform a CT scan in the diagnosis of right iliac fossa pain in particular and in abdominal emergencies in general is easier than learning to perform an ultrasound, and, in addition, the CT scan has the advantage of being able to be re-read. This is also certainly one of the practical reasons why the ultrasound is used less than the CT scan in abdominal emergencies in general and more particularly in right iliac fossa pain.

Conclusion

Right iliac fossa pain in a septic clinical picture is a very common clinical situation. Unlike isolated pain, a precise diagnosis must be established as often as possible and imaging has very broad indications. If appendicitis is suspected, particularly in a young subject, an ultrasound should be performed as first line imaging. It is most often sufficient to confirm or rule out appendicitis. When confronted with an evolved clinical picture, or when there are signs of seriousness from the start (immunosuppressed patient, peritoneal syndrome, major septic syndrome), a CT scan must be performed as first line imaging, and especially if the subject is elderly. These two examinations must not oppose each other, but rather complete each other, as the CT scan makes it possible to better assess a gastrointestinal disease and to be free of zones that cannot be visualized.
on the ultrasound, but an ultrasound as second line imaging also has certain interest for better studying and better characterizing parietal thickening, particularly in a thin subject who has little fat, and to evaluate parietal differentiation. For 20 years now, these two examinations have completely changed the treatment of right iliac fossa pain in general, and appendicitis in particular, for the treatment of which a plain survey of the abdomen is no longer useful.

**TAKE-HOME MESSAGES**
- Ultrasound is most often sufficient for the diagnosis of appendicitis in a young subject.
- A diagnosis of appendicitis is not sufficient. It must be specified whether the appendicitis is complicated or not.
- An appendicular phlegmon, abscess and lump have specific definitions. These terms must be used correctly.
- When confronted with a thickening of the ileal and appendicular walls, Crohn’s disease with an appendicular location must be suggested.
- The observation of mesenteric ganglions is not sufficient for establishing a diagnosis of mesenteric lymphadenitis. The ganglions must be numerous, small with a diameter greater than 5 mm and there must not be any surrounding digestive damage in order to establish this diagnosis.
- A septic clinical picture of the right iliac fossa in an elderly subject is most often related to colonic damage: sigmoid diverticulitis with sigmoid loop in the right iliac fossa, ischaemic colitis or caecal cancer.

**Clinical case**

This 75-year-old patient has right iliac fossa pain associated with a 38 °C fever and an inflammatory syndrome as shown by laboratory test results. This patient is receiving anticoagulants and has a history of appendectomy. A CT scan was performed urgently (Fig. 12).

**Questions**

1. Describe the abnormalities in Fig. 12 a and b.
2. Describe the abnormalities in Fig. 12 c and d.
3. What is your diagnosis?

**Answers**

1. Cuts a and b carried out during the arterial phase in the ostium of the inferior mesenteric artery show, in figure a, normal opacification of the ileo-caeco-appendicular artery, which is not opacified in figure b, making it possible to confirm the obstruction of the artery.
2. Figures c and d show a parietal thickening of the ileal loop, not enhanced in the portal phase and less enhanced than the adjacent small intestine loops during the late phase.
3. The diagnosis is that of ischaemic ileitis with an embolism located in the ileo-caeco-appendicular artery. The patient was operated on urgently with a resection of the small intestine confirming this diagnosis.

This case is interesting for four reasons:
- to illustrate the insufficiency of the clinical information in patients seen in an emergency service. If the patient was receiving anticoagulants, it is because he was suffering from cardiac arrhythmia due to atrial fibrillation. These data were not mentioned in the request for medical imaging, in which it was simply mentioned that he was receiving anticoagulants. The patient interview before the CT scan was performed with the on-call radiologist brought up this cardiac arrhythmia, which was known to the patient, which justified a useful arterial phase to demonstrate the embolism in the ileo-caeco-appendicular artery;
- to show these images of peripheral embolism that is easy to diagnose if screened for;
- to show signs of ischaemic ileitis with a gastrointestinal parietal thickening, but especially a lack of enhancement or moderate and late enhancement;
- finally, to insist on the fact that digestive ischemia can have a varied presentation, be accompanied by fever and an inflammatory syndrome, and that if the physician expects a very evolved clinical picture of peritonitis or collapse to look into this diagnosis, it is often too late, and the extensive digestive ischemia does allow for a small intestine resection.
Infection of the right iliac fossa

Figure 12. Two cuts joining at the low abdominal level during the arterial phase (a, b); cut at the upper pelvic level during the portal phase (c); cut at the same level during the late phase (d).

Disclosure of interest

The authors declare that they have no conflicts of interest related to this article.

References


