Emergency MDCT in case of right lower quadrant pain (RLQ)
Aims and objectives

Right lower quadrant includes diseases of the cecum, terminal ileum, ileocecal valve and appendix. It can be involved in a variety of different diseases such as inflammation or tumors. High resolution images obtained with MDCT can improve and speed-up the diagnostic triage in patients with RLQ pain. This report is based on review of 135 MDCT cases performed in emergency patients presented with RLQ pain.

Methods and materials

Retrospective study included 135 patients with RLQ pain admitted to the emergency department of a hospital from 2009 till 2013. The median age of patients was 35.5 y (18-85 y). The results of abdominal MDCT were compared to surgery in 93 cases. The unenhanced MDCT were performed in 36% cases, intravenous contrast enhancement - in 64 %.

Results

The most common causes of RLQ pain were inflammatory diseases such as appendicitis and its complications (39%). They were followed by primary malignancies of ileocelecal area (32.6%). The rare causes of RQL were cecal diverticulitis, mucocele of the appendix, isolated infarction of the cecum, intestinal intussusception, secondary malignant involvement of ileocecal area and right-sided tuboovarial abscess. The accuracy of MDCT for clarification of RLQ pain etiology was 98%.

Appendicitis - the inflammation of appendix, due to its luminal obstruction or superimposed infection. Acute appendicitis is the most common cause of acute abdominal pain.

Acute appendicitis manifests as:

- enlargement of the appendix to a diameter greater than 7 mm
- the tip of the appendix is often the first site of inflammation.
- periappendiceal fat stranding;
- thickened wall with enhancement;
- appendicolith may be present
- enlarged lymphnodes
- sometimes, focal thickening of the terminal ileum or cecum.
Differentiation of perforated appendicitis from nonperforated appendicitis is an important issue. Signs of perforation:

- extraluminal air near the appendix indicates perforation Fig. 1 on page 5
- A focal defect in the wall of the inflamed appendix Fig. 2 on page 6,
- an appendicolith outside the appendix Fig. 3 on page 5,
- a periappendiceal fluid collection,
- In such cases, the appendix may be difficult to see.

**Abscess** - When the appendicitis is not identified in time, it may lead to perforation and a formation of an abscess.

- Abscess is a fluid collection with peripheral enhancing rim;
- can be localized intra- or extraperitoneal, or in the pelvis;
- may contain gas. Fig. 4 on page 7

**Mucocele**

Mucocele of the appendix is a rare lesion, characterized by distension of the lumen due to accumulation of mucoid substance. Typical CT findings are thin walled cystic mass in RLQ with calcification within wall or lumen. Fig. 5 on page 8

**Diverticulitis of caecum**

The diverticula are small colonic outpouchings with irregular wall thickening. CT findings of acute diverticulitis consist of asymmetric or circumferential colonic wall thickening associated with focal pericolic fat stranding and demonstration of diverticula. Inflamed diverticula are usually located at the level of maximum pericolic inflammation and maximum wall thickening.

Visualization of a normal appendix or of inflammatory changes involving the ascending colon at a level distal to the ileocecal valve favors the diagnosis of diverticulitis over appendicitis.

Pericecal lymph nodes adjacent to the focal area of cecal thickening are more commonly seen in patients with cancer than in those with diverticulitis. In differentiating between diverticulitis and right colic carcinoma, an inflamed diverticulum. Fig. 6 on page 9

**Infectious Enterocolitis** - infectious terminal ileitis is usually caused by Yersinia, Campylobacter, or Salmonella organisms. The clinical presentation is shown with acute diarrhea symptoms, nausea and vomiting. Symptoms may be indistinguishable from those of appendicitis when right lower quadrant pain is the major complaint.

The characteristic CT features include:
• circumferential wall thickening of the terminal ileum and cecum
• moderate or marked enlargement of the mesenteric lymph nodes in the right lower quadrant. Fig. 7 on page 10

**Colon carcinoma** - is present with asymmetric or circumferential mural thickening of the cecum, pericecal lymph nodes adjacent. Cecal adenocarcinomas may demonstrate mild local infiltration. The wall thickening is more severe relative to pericolic infiltration than in most acute inflammatory diseases, particularly diverticulitis. The distal ileum may be affected and abnormally thickened as a result of tumor extension or, less commonly, a nontumoral process (congestion and edema). Fig. 8 on page 10

**Intussusceptions**

Is invagination or telescoping of a proximal segment of the bowel into lumen of the distal segment. Adult intestinal intussusception is represented by prolapse of a part of the intestine into the adjoining intestinal lumen. Fig. 9 on page 11

**Tuboovarial abscess**

A tuboovarian abscess is an inflammatory mass involving the fallopian tube, ovary, and other adjacent pelvic organs. Tuboovarian abscess is usually a complication of pelvic inflammatory disease. Imaging findings include thickening of the distended fallopian tube and visualization of normal appendix. Fig. 10 on page 11

**Secondary Malignant Involvement**

Neoplastic lesions may spread to the caecum hematogenously, by means of direct invasion, or by means of intraperitoneal. Metastases to caecum are typically not confined and often occur in patients with a history of primary malignancy that is compatible with such metastases. Fig. 11 on page 12 Direct invasion from the right ovary or retroperitoneal area usually involves the cecum and distal.

**Isolated Infarction of the cecum**

The causes of colonic ischemia can be classified in terms of occlusive and nonocclusive states.

The specific CT findings include right ileocolic artery occlusion or arterial embolism and portal or mesenteric venous gas. Without intravenous contrast enhancement the CT findings are unspecific and include bowel wall thickening, perifocal fat stranding and enlargement of the mesenteric lymph nodes; thus can be mistaken for other inflammatory and noninflammatory diseases.
Fig. 1: Axial MDCT in acute appendicitis. The appendix is enlarged with periappendiceal fat stranding. In the tip of the appendix is a focal defect in the wall with extraluminal gas (red arrow).
Fig. 3: Coronal MDCT without enhancement shows focal defect in the wall with an appendicolith outside the appendix (red arrow).
**Fig. 2:** Axial MDCT with intravenous contrast enhancement in acute appendicitis. The appendix is 12mm in diameter with thick enhanced wall (green arrow). There is a focal defect in the wall and the extraluminal gas at the base of the inflamed appendix (red arrow).
Fig. 4: Appendicitis with appendiceal rupture and pelvic abscess. Sagittal MDCT with intravenous contrast enhancement shows enlarged appendix with focal wall defect (red arrow) and fluid collection with enhancing rim in pelvis (green arrow).
Fig. 5: Mucocele of the appendix. Oblique MDCT with intravenous contrast enhancement shows thin walled cystic mass at the tip of the appendix (green arrow).
**Fig. 6:** Axial MDCT shows diverticula (red arrow) with enhanced wall and focal pericolic fat stranding. Oblique MDCT shows no inflammatory changes of the appendix.

**Fig. 7:** Coronal MDCT with peroral contrast enhancement (MIP 5mm) shows circumferential wall thickening of the terminal ileum with mural stratification (red arrow) and enlargement of the mesenteric lymph nodes (green arrow).
**Fig. 8:** Coronal MDCT after peroral contrast administration shows circumferential mural thickening of the cecum (green arrow). Axial MDCT with intravenous contrast enhancement shows circumferential mural thickening of the cecum with perifocal fat stranding (red arrow).

**Fig. 9:** Non-obstructive short segment intussusception. Axial and sagittal images show bowel within bowel (small green arrows).
Fig. 10: Sagittal MDCT of a 42-years-old woman shows fluid collection with enhancing rim (red arrows) and loose fluid the pelvis. The green arrow shows normal appendix. Axial MDCT shows normal appendix (green arrow) and fluid in pelvis.

Fig. 11: The oblique and the axial reformated images (venous phase) in 61-year-old women show cecal soft-tissue mass (red arrows), causing the small bowel obstruction. The histopathological study demonstrated the metastasis of leiomyosarcoma.
Conclusion

MDCT could be used as a method of choice for diagnostic workup of emergency patients admitted to a hospital with acute RLQ pain.

Personal information

References