

MANAGEMENT OF CLINICALLY INDEFINITE RIGHT ILIAC FOSSA LESIONS

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ABSTRACT

Many diseases can cause lesions in right iliac fossa with indefinite clinical presentations. Improper diagnosis, missed lesions and unexpected morbidity may follow variable clinical puzzles.

Objective: The aim of this study was to assess the clinically indefinite right iliac fossa lesions and to evaluate the role of multislice CT to improve their diagnostic accuracy and surgical management.

Methods: Fifty two patients with indefinite clinical presentations related to right iliac fossa lesions were assessed before and after multiplanner reformatted images of multislice CT. The impact on diagnostic accuracy and surgical management was evaluated.

Results: Variable lesions were detected in these patients. CT showed different radiological diagnostic signs. The diagnosis of clinically indefinite lesions was improved by MDCT with sensitivity 95.8%, specificity 83.3% and accuracy 94.4%.

Conclusions: This study showed the great variability of lesions in the right iliac fossa and of therapeutic surgical procedures. Not every pain is due to appendicitis; and hasty diagnosis must be avoided. Multislice CT and multiplanner reformatted images were markedly valuable in providing diagnostic signs, guiding to select further valuable investigations, staging of tumors, assessment of operability, planning the proper surgical management and avoiding unnecessary surgical intervention for lesions that can be treated by non-surgical measures.

Key words: Right iliac fossa lesions – multislice CT – diagnostic accuracy- radiological signs.

INTRODUCTION

Lesions in the right iliac fossa have a significant clinical importance. Although acute appendicitis is the most frequent lesion in the right iliac fossa, suspicion of other lesions must be kept in mind. The clinical presentation may give a picture of an indefinite or a misleading diagnosis which constitutes a real clinical problem. Improper or missed diagnosis of these lesions will result in wrong management and consequent complications. In addition, many studies reported rare lesions in right iliac fossa which can be challenging.⁽¹⁻⁷⁾

Consequently, it is necessary to improve the management of right iliac fossa lesions. In this study, these lesions were assessed and the role of multislice CT to improve the diagnostic accuracy and surgical management of right iliac fossa lesions was evaluated.

METHODS

In this study, 52 patients with clinically indefinite presentations of right iliac fossa lesions were studied in Alexandria University Hospital. These patients were selected from 413 patients who presented with abdominal pain. This study was approved by the Ethics Committee in Faculty of Medicine, Alexandria University. Informed consent was taken from each patient.

The patients were subjected to the following:

- Detailed history, thorough clinical examination and routine laboratory investigations.

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-Abdominal multidetector CT (MDCT) for all patients with ingestion of 1000ml water during one hour before examination. The upper abdomen was scanned before contrast administration. Then the whole abdomen was scanned after 40 seconds delay (to image the portal phase) by administration of 100 ml iopromide at a rate of 3-4 ml/second. The protocol used for small bowel was as follows: oral contrast administration with 1000 ml water and 1000 ml mannitol; both taken continuously over 45 minutes before imaging. The patients were imaged in supine position at 40 (portal phase) and 55-70 seconds (enteric phase) after IV administration of 100-120 ml iopromide. In selected cases with suspected colonic lesions, 1-2 liters of water were injected per rectum to provide water enema distending the colon.⁽⁸⁾

-Other investigations were used for complete evaluation of the patients according to their conditions. These included colonoscopy for eight patients with biopsy of 5 patients with detected lesions, ultrasound-guided biopsy of an abdominal mass for one patient and diagnostic laparoscopy for seven patients.

-Evaluation of the impact of multidetector CT (MDCT) on diagnosis and treatment.

-Planning the surgical and non-surgical treatment according to the previous data.

-Histo-pathological examination was performed for excised masses

-Correlation of the preoperative clinical data, CT imaging and operative data and histopathology to confirm the final diagnosis.

RESULTS

Fifty two patients were studied. Thirty one were females and twenty one were males. Their ages ranged from 18 to 63 years with a median of 32 years.

Clinical presentations:

The patients had variable clinical presentations with indefinite or preliminary clinical diagnosis after history, examination and routine laboratory investigations. Presentations of true right iliac fossa lesions are as shown in tables (I-IV).

Abdominal multi-slice CT findings:

CT showed different diagnostic radiological signs. Forty six patients were proved to have true right iliac fossa lesions; their data are shown in tables (I-IV) in correlation with the clinical and operative data.

Other five patients had lower abdominal pain with normal CT data. They were proved to have no right iliac fossa lesions (statistically true negative result). In another patient with vague abdominal pain, CT showed a suspicion of mass in terminal ileum. No lesion was proved in right iliac fossa (statistically false positive result)

CT images of selected patients for bowel (ileal, cecal, appendicular) and extra-bowel lesions are shown in figures.(1-4)

Impact of CT on surgical management

Lesions of 32 patients (69.56% of true lesions) were diagnosed with confirmation by CT (including 18 appendicitis, 3 perforated appendicitis with peritonitis, 3 appendicular masses, 1 psoas abscess, 1 ileocecal intussusception, 2 ovarian cysts, 2 patients with Crohn`s disease, 1 extraperitoneal lipoma and 1 parietal wall hematoma.); and lesions of 12 patients (26.1% of true lesions) were probable by CT (including 4 cecum carcinoma, 2 lymphoma, carcinoid tumor , gastro-intestinal stromal tumor, desmoid tumor, interloop intestinal abscess, perforated typhoid ulcer and ileocecal tuberculosis). The probable diagnosis was then confirmed by

operative data and/or biopsy.

Lesions of 2 patients (4.3 % of true lesions) could not be definitely diagnosed by CT (including one patient with acute appendicitis, and another patient with post-appendectomy adhesions).

CT was also valuable for staging of tumors, visualizing tissue planes around the lesions, guiding further investigations as colonoscopy with biopsy and diagnostic laparoscopy.

In the current study, MDCT could improve the diagnosis of clinically indefinite right iliac fossa lesions with sensitivity 95.8%, specificity 83.3%, positive predictive value 97.8%, negative predictive value 71.4% and accuracy 94.4%. In addition, CT helped to determine the treatment by surgical intervention for 39 patients (84.8% of true lesions) and non-surgical treatment for 7 patients (15.2 % of true lesions), and consequently avoiding unnecessary or hazardous surgical intervention for appendicular mass, Crohn`s disease, ileo-cecal tuberculosis, advanced lymphoma. Also, the surgical procedures could be planned preoperatively for 22 patients (47.8% of true lesions). Data of operative diagnosis are shown in tables (I-IV) in correlation with clinical and CT data.

Surgical procedures were variable and included: right hemicolectomy for 7 patients to treat cecum carcinoma, carcinoid tumor and lymphoma in cecum and ileocecal intussusception; appendectomy for 19 patients; formal exploration and appendectomy for 3 patients with peritonitis due to perforated appendicitis; resection anastomosis of ileum for inter-loop abscess and for gastro-intestinal stromal tumor originating at the distal ileum; excision of a desmoid tumor and closure of the defects using a mesh; removal of an extra-peritoneal lipoma; repair of a perforated typhoid ulcer in terminal ileum; excision of one ovarian cyst and marsupialization of other cyst; drainage of a psoas abscess and a parietal hematoma; and laparoscopic adhesiolysis for post-appendectomy adhesions.

Table I: Data of appendicular lesions.

Number of patients	Clinical presentations	CT findings & diagnosis	Operative data (unless treated non-operatively)
19	Acute suprapubic or lumbar pain	*Appendix had dilated lumen, enhancing thick wall * Stranded peri-appendicular fat in 18 patients (acute appendicitis) *Seen in most cases to be retrocecal or pelvic in position. (Fig 1A)	Retrocecal or pelvic appendicitis
3	Generalized peritonitis of unknown cause	*Pelvic collection containing air foci. *Oedematous thickened appendix. *Dislodged appendicolith. (perforated appendicitis) (Fig 1B)	Peritonitis due to perforated appendicitis
3	Vomiting & vague lower abdominal pain 3-5 days ago.	*Focally amalgamated small bowel in right iliac fossa region. *Inflamed stranded surrounding omentum and peritoneal fat. (appendicular mass) *The appendix itself could not be identified separable from this amalgam (Fig1C)	Non operative treatment of appendicular mass

Table II: Data of cecal lesions.

Number of patients	Clinical presentations	CT findings & diagnosis	Operative data (unless treated non-operatively)
3	Unexplained anemia & vague abdominal pain with right iliac fossa mass felt in 2 patients	*Irregular cecal wall thickening *Short segmental involvement *Enlarged draining lymph nodes *Mild pericolic fat stranding (suspected cecum carcinoma)	Cecal mass proved by biopsy to be cecal carcinoma.
1	Acute pain in right iliac fossa on top of vague abdominal pain	*Irregular enhancing mural mass at medial aspect of the cecum in vicinity of the appendicular orifice (Fig 2 A) *Signs of appendicitis (suspected cecal cancer with appendicitis)	Cecal mass proved by biopsy to be carcinoma of cecum with secondary appendicitis
1	Abdominal colics and abdominal mass in right iliac fossa	*Diffuse mural thickening with intact lumen, no enhancement. *Dilated bowel. * Solid nodal enlargement. (probable cecal lymphoma) (Fig 2 B)	Thickened cecal wall proved by biopsy to be cecal lymphoma
1	Acute intestinal obstruction of unknown cause	*Bowel-within-bowel pattern containing fat and mesenteric vessels. *Pathologic leading point of fat density lesion within the lumen of the ascending colon. (intussusception). (Fig 2 C)	Ileocecal intussusception due to submucous lipoma

Table III: Data of ileal lesions.

Number of patients	Clinical presentations	CT findings & diagnosis	Operative data (unless treated non-operatively)
2	Recurrent attacks of pain in right iliac fossa exacerbated 6-8 days ago & chronic diarrhea	*Mural edema, stratified enhancement, narrowed lumen. *Creeping non stranded fat, *Comb sign. *Skip lesions *Long segment involvement. (Crohn`s disease) (Fig 3A)	Crohn`s disease (non operative treatment)
1	Attacks of abdominal pain & diarrhea	*Enhancing high density focal wall thickening of distal ileum *Mesenteric desmoplastic reaction as stellate shape mesenteric stranding extending towards adjacent bowel loops. (suspected carcinoid tumor) (Fig 3B)	Mass in terminal ileum proved by postoperative histopathology to be carcinoid tumor.
1	Chronic vague abdominal pain , abdominal mass and vomiting	*Ileal heterogeneous mass, mainly extraluminal, with no obstruction. *Heterogeneous enhancement with central areas of necrosis (probable GIST) (Fig 3C)	A mass originating from the ileum and its mesentery proved to be gastrointestinal stromal tumor (GIST)
1	Attacks of abdominal colic, dull aching pain, distension & vomiting. Palpable right iliac fossa mass.	*Non enhancing circumferential mural thickening of ileum. *Aneurysmal bowel dilatation *No obstruction. (probable lymphoma) (Fig 3D)	Not operated due to advanced stage of ileal lymphoma; proved by ultrasound-guided biopsy.
1	Fever, generalized abdominal and right iliac fossa pain since 6 days then peritonitis	*Intra-peritoneal fluid collection *Thick oedematous terminal ileum (suspected perforated typhoid ulcer)	Perforated typhoid ulcer in terminal ileum
1	Acute right iliac fossa pain. Appendectomy one year ago.	*Small mass of omentum. *Adherent nearby intestinal loops with fluid collection (probable interloop abscess)	Inter-intestinal (inter-loop) abscess at distal ileum
1	Chronic abdominal pain, diarrhea and weight loss	*Short segmental involvement. * high level of caecum. * Necrotic caseating lymph nodes, * Stranded mesentery & pericolic fat. *Asymmetric mural thickening (probable ileocecal tuberculosis)	Non surgical treatment of ileocecal tuberculosis proved by colonoscopy and biopsy.

Table IV: Data of extra-bowel lesions.

Number of patients	Clinical presentations	CT findings & diagnosis	Operative data (unless treated non-operatively)
1	Painful abdominal swelling following blunt trauma	*Subcutaneous hyperdensity. *Stranding at the right iliac fossa (parietal hematoma)	Parietal haematoma due to blunt trauma
1	Painless parietal abdominal mass	*Parietal wall mass with homogenous mild enhancement. *Involved subcutaneous fat. * No intra-abdominal extensions. (probable desmoid tumor) (Fig 4 A)	Abdominal wall mass proved by biopsy to be desmoid tumor.
1	Lumbar pain, fever and history of renal stone operation	*Cystic lesion along the right psoas till the iliacus muscle *Thick enhancing wall. (Ilio-psoas abscess) (Fig 4 B)	Ilio-psoas abscess
1	Lower abdominal heaviness and urinary frequency	*Purely encapsulated fatty lesion *Smoothly displacing bowel loops and uterus (extratropertoneal lipoma) (Fig 4C)	Extra-peritoneal lipoma attached at right iliac fossa.
1	Right iliac fossa pain. Appendectomy 8 months ago	*No abnormal radiological findings	Post-appendectomy adhesions.
2	Acute lower right abdominal pain	*Adnexal cysts.(ovarian cysts) *With intra-peritoneal collection in one.	Ovarian cysts, one of them was ruptured



Fig 1 Appendicular lesions. A:Retrocecal appendicitis, B: Perforated appendicitis & peritonitis, C: Appendicular mass.

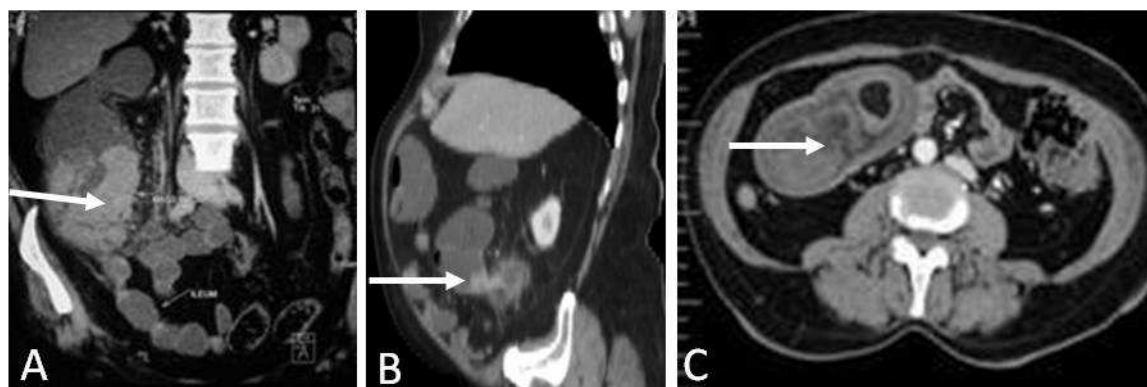


Fig 2: Cecal lesions. A: Cecal carcinoma with secondary appendicitis, B: Cecal lymphoma, C: Ileocecal Intussusception.

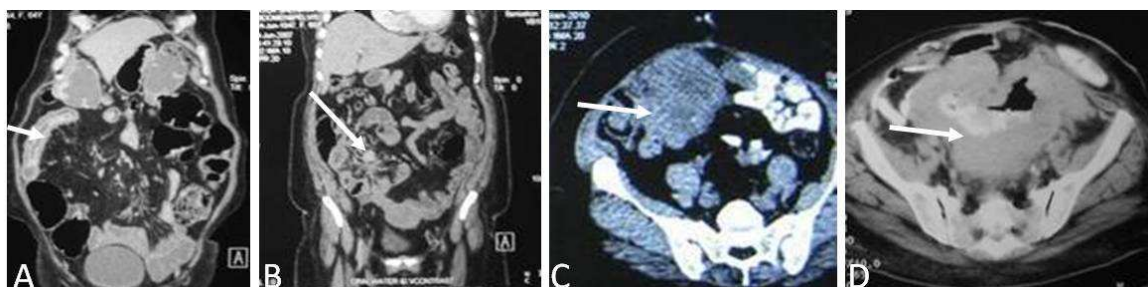


Fig 3: Ileal lesions. A: Crohn's disease of ileum, B: Carcinoid tumor, C: Gastrointestinal stromal tumor of ileum, D: Advanced ileal lymphoma



Fig 4: Extra-bowel lesions. A: Desmoid tumor, B: Ileo-psoas abscess, C: Extra-peritoneal lipoma.

DISCUSSION

Lesions in the right iliac fossa have surgical and radiological importance. Frequently, these lesions form dilemmas or puzzles in clinical diagnosis and planning the surgical treatment. In this study, 52 patients were studied. The selected patients had clinical presentations which could not confirm clinical diagnosis of the diseases. The diagnosis was indefinite when based on history, clinical examination and laboratory investigations.

Pain and other manifestations related to right iliac fossa usually raise the suspicion of acute appendicitis; and urgent surgical intervention after hasty diagnosis may be faced by unexpected diagnosis or associated with missed lesions. In addition, appendicitis itself may be deceiving with consequent increase of the diagnostic dilemma in patients with right iliac fossa pain.⁽⁹⁻¹²⁾

Malignancy may be deceiving or missed at presentation. Cecum cancer was reported to present as appendicular abscess; the tumors can be asymptomatic till the abscess formation. The tumor can make a cecal perforation either by direct infiltration or by intestinal obstruction. Colonic malignancy mimicking an appendicular mass was reported. Missed lesions or finding unexpected pathology including cancer which needs special experience may be confronted with adverse

consequences. So, proper preoperative diagnosis of right iliac fossa lesions is mandatory.⁽¹³⁻¹⁹⁾

Multi-detector CT allows imaging of larger areas with thinner sections than has been previously possible and yields multiplanar reformatted (MPR) images, thin collimation and fast scanning which allow coverage of the whole abdomen within one suspended respiration phase with the use of multiphase IV contrast administration. Thus, MDCT plays an important role in the evaluation of patients with a variety of diseases.⁽²⁰⁻²²⁾

The introduction of multi-detector CT has transformed an axial imaging modality into a volumetric one and allowed the radiologists to display findings in any desired plane. The multi-planner capability of MDCT allowed accurate localization of the origin of the lesion thus we succeeded to classify the lesions encountered in the current study into ileocecal (as cecal carcinoma) and extra-bowel lesions (as desmoid tumor). MDCT of the small bowel helps to identify and stage most of the common diseases of the small bowel, such as Crohn's disease, ischemia, obstruction and tumors. Bowel distention is a key element for accurate diagnosis of small bowel pathology.⁽²³⁻²⁶⁾

In this study, the MPR capability of MDCT in addition to the use of negative oral contrast and multiphase contrast imaging allowed us to

adequately assess the bowel wall thickness (degree of thickening, focal or circumferential, regular or irregular), pattern of wall enhancement (stratified, target sign, halo sign or non enhancing), extent of pathology, adjacent mesenteric and omental fat (stranded or intact), lymph nodes enlargement (size, shape, necrosis, calcification), associated findings (as mesenteric engorged vessels: comb sign, calcifications, fat proliferation "creeping fat sign") and complications (abscess, fistula, sinus, track). These mentioned parameters were documented and detailed in many other studies.⁽²²⁻²⁸⁾

The impact of abdominal CT to improve the diagnostic accuracy was assessed in this study. Analyzing CT findings in each case revealed various radiological diagnostic signs and allowed us to reach a confident diagnosis in 32 patients and raising possibilities of suspected or probable diagnosis in 12 patients. In some of these cases a list of differential diagnosis was reported and the final diagnosis coincided with one of the reported differential.

Lesions in 2 patients (4.3 % of true lesions) could not be definitely diagnosed by CT (including one patient with acute appendicitis, and one patient with post-appendectomy adhesions). On reviewing these cases we found that:- the patient with appendicitis showed border line diameter increase of the appendix with very subtle enhancement and stranding of the nearby fat. Similar missed diagnoses were reported in literature.⁽²⁹⁻³¹⁾ The patient with post appendectomy adhesions showed totally unremarkable CT features.

In this study, CT could improve the diagnosis of right iliac fossa lesions with sensitivity 95.8%, specificity 83.3%, positive predictive value 97.8%, negative predictive value 71.4% and accuracy of 94.4%. The coronal planes of MDCT added much details and data about the lesions. CT was valuable for staging of tumors, visualizing tissue planes around the lesions, guiding further investigations as colonoscopy with biopsy and diagnostic laparoscopy.

Many studies reported the diagnostic value of CT for right iliac fossa lesions. Non-contrast helical CT was reported to have a sensitivity of 93%, specificity of 92%, accuracy of 95%, positive predictive value of 89% and negative predictive value of 95% in the diagnosis of acute appendicitis.⁽³²⁻³⁴⁾

In this study, the pathology of detected lesions was variable; not every pain in the right iliac fossa was due to acute appendicitis. Although acute appendicitis was the most common lesion in right iliac fossa, many other diseases were found to affect the right iliac fossa (as mentioned in the results) and constituted clinical dilemmas by unusual or indefinite presentations.

Many other studies reported rare cases of different lesions which could form challenges in diagnosis

and treatment. Reported rare lesions in right iliac fossa include: torsion and gangrene of an appendix epiploica, small spigelian hernia which was diagnosed by laparoscopy, Meckel's diverticulitis associated with gastrointestinal stromal tumor, omental torsion, tuberculosis of iliac bones, malignant tumors of the appendix and solitary cecal diverticulum.^(1-7,19, 35,36)

The treatment of right iliac fossa lesions include surgical or non-surgical measures according to the disease. The proper surgical decision is crucial and can be life-saving. However, surgical intervention may not be indicated or even causes more harm than benefit. Crohn's disease can present as appendicitis-like disease; and intestinal fistula may follow improper surgical intervention. Also, surgical intervention for appendicular mass may cause intestinal injury, while intervention for advanced cancer can be unnecessary and may increase morbidity.^(9-12,37)

In this study, variable surgical procedures were performed. CT helped to determine the treatment by surgical intervention for 39 patients (84.8% of true lesions) and non-surgical treatment for 7 (15.2 % of true lesions) patients, and consequently avoiding unnecessary or hazardous surgical intervention for appendicular mass, Crohn's disease, ileo-cecal tuberculosis, advanced lymphoma. Also, the surgical procedures could be planned preoperatively for 22 patients.

Conclusions

This study showed the great variability of lesions in the right iliac fossa with different clinical presentations. The clinical presentations can be indefinite or unusual which form challenges in diagnosis and treatment. Although acute appendicitis was the most common lesion, many other diseases could cause right iliac fossa lesions. So, hasty diagnosis must be avoided. A variety of surgical procedures and techniques were necessary for management of these variable lesions.

By MDCT, the diagnosis of clinically indefinite lesions was improved with sensitivity 95.8%, specificity 83.3% and accuracy 94.4%. Abdominal MDCT with multiplanar reformatted images improved the diagnosis and treatment of clinically indefinite right iliac fossa lesions by providing diagnostic radiological signs, guiding to select further valuable investigations, staging of tumors, assessment of operability, planning proper surgical management and avoiding unnecessary surgical intervention for lesions that can be treated by non-surgical measures.

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