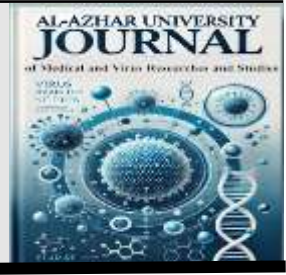




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Role of Ultrasound in Assessment of Iliac Fossae Pain with Complementary CT if Needed

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Abstract

To determine the role of ultrasound in diagnosis of different causes of iliac fossae pain and situations when CT is needed to confirm diagnosis. This study was carried out on fifty patients presented by iliac fossae pain, all patients were subjected to history taking followed by ultrasound examinations. CT examination was carried out for selected patients when ultrasound results weren't conclusive for confirmation of diagnosis in disputed cases. The imaging findings were correlated with the operative data and pathological results when available. In this study 14 patients (28%) were males and 36 patients (72%) were females with age ranging from 9 months up to 60 years all are presented by iliac fossae pain ,40% presented by left iliac fossa pain and 60% presented by right iliac fossa pain. Based on imaging findings on present study,16 patients were diagnosed with adnexal cysts and CT was done for one case with dermoid cyst to reach final diagnosis. Appendicitis was correctly diagnosed in 13 patients, only one patient of them was confirmed by CT to have appendicitis .Ectopic pregnancy discovered in 5 patients , intussusception in 3 patients,3 patients were diagnosed with psoas abscess and ultrasound guided biopsy was performed to confirm diagnosis for them ,3 patients diagnosed as having tubo-ovarian abscess one case confirmed by CT and ultrasound guided biopsy was done for the other 2 cases, two patients with colonic masses both confirmed by CT, one case with crohn`s disease and CT was performed to detect all complications, one patients diagnosed by lower ureteric stone, one patient with rectus muscle hematoma, one patient with mesenteric cyst and one patient had mid cyclic menstrual pain after induction therapy. Ultrasound was conclusive for diagnosis in 39 patients (78%) of all cases presented by iliac fossa pain whereas complementary CT was needed for 6 patients (12%) of cases to reach final diagnosis and 5 patients (10%) of cases were confirmed by ultrasound guided biopsy so Ultrasound is recommended as a primary imaging modality for patients with iliac fossae pain.

Key Words: Ultrasound, CT, Iliac fossae, Pain.

1. Introduction

Abdominal pain including right and left iliac fossae pain is a third common cause promoting the patients to attend hospitals [1]. Right iliac fossa region is the commonest site of abdominal pain and commonest cause forcing the patients to seek medical advice [2]. The presentation of pain is often non-specific and includes wide range of differential diagnosis, however 40% of cases are benign and without obvious cause but in cases which requires urgent interference any delay will result in increasing the rate of morbidity and mortality so it's important to differentiate life threatening conditions from stable ones [1]. Ultrasound being bed side, widely available, low cost, dynamic test allowing assessment of bowel motility with Doppler facilities that yields useful information about organ vascularity and with no ionizing radiation exposure is considered the primary imaging modality for patients with abdominal pain [3]. The iliac fossae regions are named for iliac fossae of hip bone and most of the structures which causes iliac fossae pain and masses are not actually lying in the concavity of the iliac bone, the most important structures lying in the right iliac fossa regions are appendix, cecum, part of ascending colon part of small intestine and right ovary in females [4]. While the left iliac fossa corresponds to the anatomical region of left sided colon (descending and sigmoid colon) and left ovary in females [5]. The most common causes of iliac fossae pain are Acute Appendicitis, bowel diseases including: Crohn's disease, ulcerative colitis, diverticulitis, colitis, colonic tumors and intussusception. Gynecological causes including: ovarian torsion, ectopic pregnancy, hemorrhagic ovarian cysts, pyosalpinx and hydrosalpinx. Urological causes as vesicoureteric junction and lower ureteric stones. Miscellaneous causes including was done with moderately distended bladder as initial assessment of solid organs, gallbladder and the pelvic viscera to give a panoramic view, using a

Omental infarction, Rectus sheath hematoma and psoas abscess [6]. The aim of this study is to determine the role of ultrasound as a primary imaging modality in detecting the different etiologies of iliac fossae pain either right or left in order to differentiate life threatening surgical conditions from stable ones as well as determining the conditions at which CT is mandatory to confirm diagnosis when ultrasound results are not conclusive.

2. Patients and Methods

It was a prospective study carried out on 50 patients with iliac fossae pain. The patients were referred from Surgery, Obstetrics and Gynecology departments to Radiology Department at Al-Zahraa Hospital for US examination after getting approval from ethical committee. A written informed consent was taken from patients after proper explanation of the study. The study was conducted for a period of six months from February 2022 to July 2022

2.1 Inclusion criteria:

All patients either male or female with age ranging from 9 months to 60 years presented with iliac fossae pain were included except in cases when CT was needed it was restricted on patients with no contraindication for radiation.

2.2 Exclusion criteria:

Patients with contraindication to radiation exposure in cases when CT was mandatory in order to reach for conclusive diagnosis as pregnant females or patients with renal impairment.

2.3 Technique of Ultrasound examination:

Using Philips clear view 650 US device, abdominal and pelvic ultrasound scanning

curvilinear probe (3-3.5 MHz). After that a more targeted assessment of each iliac fossa was performed with graded compression ultrasonography using (3.5-

7.5 MHz) Linear array. A transvaginal sonography was done using high frequency endovaginal probe (5-7.5MHz) after the patient voids urine for married females only to confirm the diagnosis .

2.4 CT technique (when complementary CT was required):

- Using 160 slice MDCT, TOSHIBA Aquilion PRIME, (made in Japan). - Unenhanced CT scan for six patients (CT scan was performed as a single breath-hold helical scan from the superior endplate of the T12 to the symphysis pubic, axial slices were spaced at 3-mm intervals, with 3-mm coronal and sagittal reconstructions)
- IV contrast material injection was needed for only five patients (non-ionic iodinated contrast media was injected in a dose 1-2 ml /Kg BW, at a flow rate of 4 3ml/sec and in a total volume of 80-120 ml with a powerful automatic injector through a catheter or a cannula via the antecubital vien before the scanning.
- Post-processing techniques- :

- Coronal & sagittal reformat were obtained .
- **3D** reformat using VR and MIP technique Curved plane reformat was performed for vessels .
- Images were viewed at a standard soft tissue window for abdomen viewing .

3. Results

As shown in figure (1), a total number of 50 patients 14 males (28%) & 36 females (72%) with age ranged from 9months to 60 years. As shown in figure (2) sonographic findings of the examined cases shows that gynecological lesions are the most observed counting about 50% followed by appendicitis 26% .

As shown in figure (3) ultrasound results alone were conclusive for diagnosis in 78% of cases (39 patient). However,12% of cases (6 patients) underwent complementary CT to reach or to confirm diagnosis, US guided biopsy was taken from 10% of cases (5 patients) to complete the diagnosis

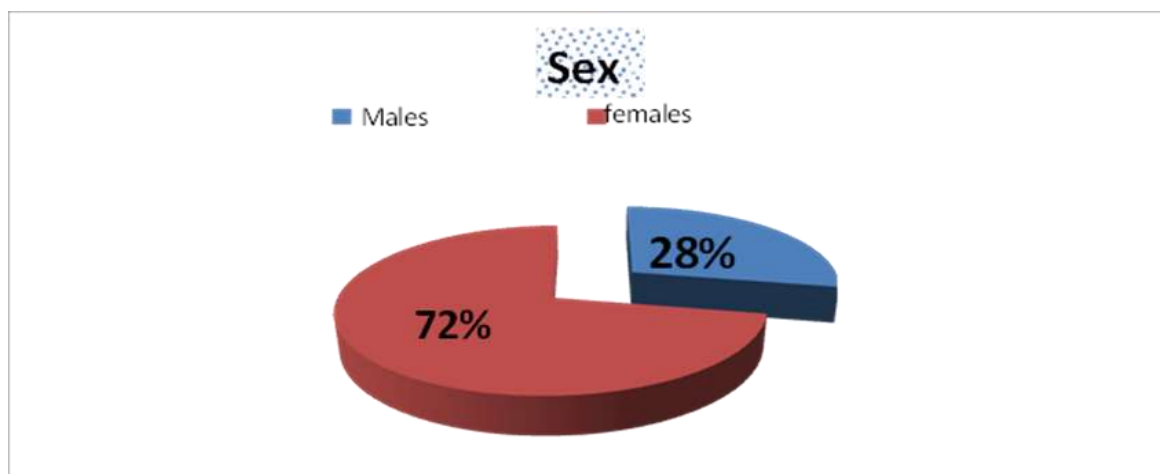


Figure. (1): Pie chart showing sex distribution among 50 study cases with a female predominance of 72%.

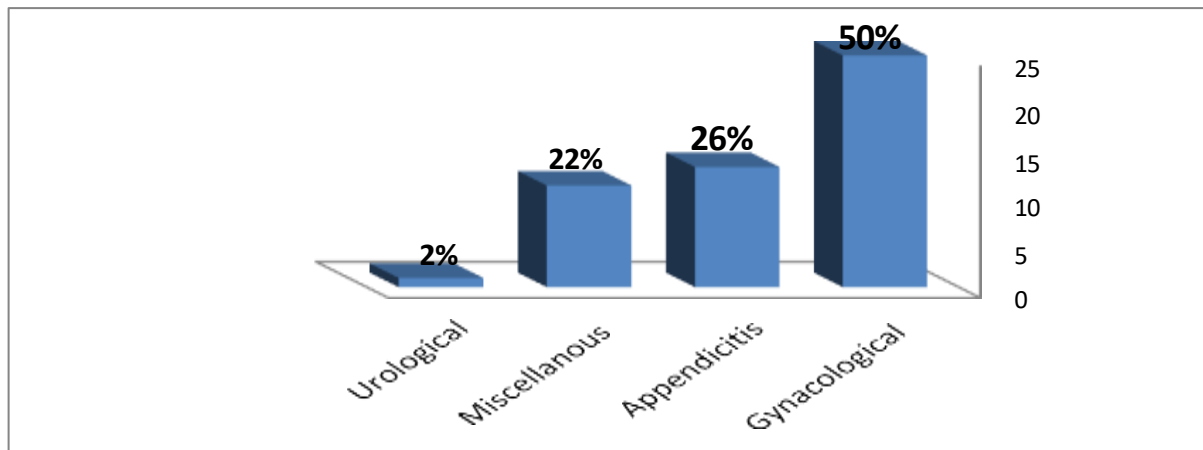


Figure. (2): Number and percentage of the examined cases with the predominance of gynaecological causes.

Table. (1): The following table illustrates the sonographic findings of the gynaecological causes.

Cysts	Ectopic pregnancy	Menstrual pain	Tubo-ovarian Abscess (inflammation)	Total
16	5	1	3	25
64%	20%	4%	12%	100%

Table (2): Enumeration of the discovered miscellaneous causes.

Intussusception	Psoas muscle abscess	Colonic mass	Crohn`s disease	Sub hepatic cyst	Rectus muscle hematoma
3 patients	3 patients	2 patients	1 patient	1 patient	1 patient

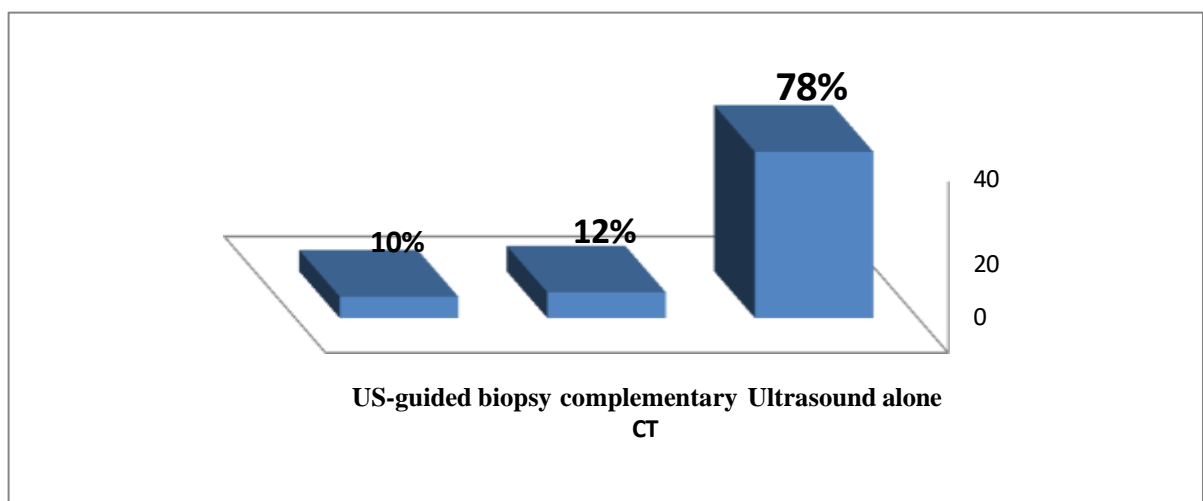


Figure. (3): Different image modalities used to diagnose the patients.

4. Cases:

Case (1):

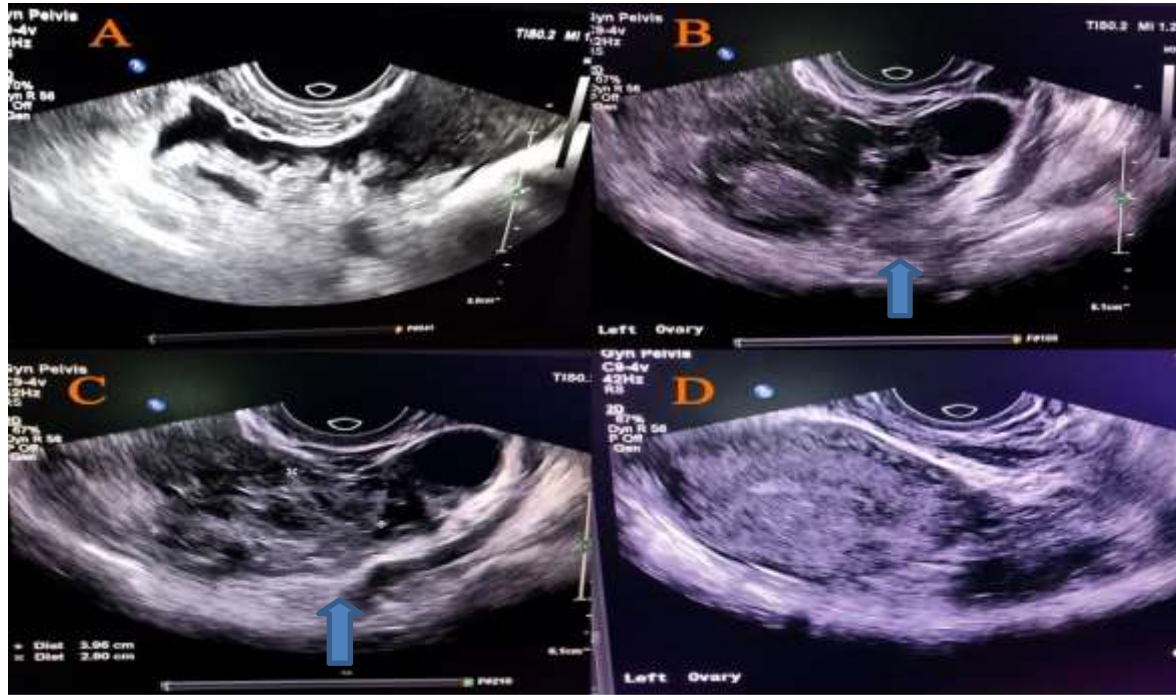


Figure. (4): Transvaginal sonographic images of female patient 31 years old presented with acute left iliac fossa pain and vaginal spotting as well as positive BHCG revealed: Mild amount of free fluid noted in the pelvis (A), left adnexa shows rather defined heterogeneous mainly hyperechoic lesion measuring about (3.8x2cm) that couldn't be totally separated from the left ovary (B,C) (blue arrows). Uterus shows thickened endometrium with no visible intrauterine sac (D), no fetal pole noted. It was diagnosed as left adnexal disturbed ectopic pregnancy.

Case (2):



Figure. (5): US images (A and B) longitudinal and transverse scan respectively of appendix: male patient 32years old presented by acute right iliac fossa pain showing blind ended tubular rounded non compressible, non-peristaltic structure with transverse diameter about 9 mm surrounded by free fluid and edematous mesenteric fat. Color Doppler application shows a relative increase in blood flow. It was diagnosed with acute appendicitis.

Case (3):

Figure. (6): Ultrasound images of right iliac fossa: female patient 9 months old presented by swelling of right iliac fossa region with a history of passage of red currant jelly stool few hours ago showed multilayered rounded lesion with AP diameter about 3.5cm surrounded by free fluid with alternating hyperechoic core and hypoechoic layers giving doughnut or target sign appearance. It was diagnosed as intussusception.

5. Discussion

Ultrasound is an imaging modality of choice for triage patients presented with abdominal pain as being bed side test and widely available, the lower cost and lack of radiation exposure are the most important advantages of US compared to CT. Furthermore, US is a real-time dynamic examination and this characteristic provides dynamic information about bowel motility and changes in position as well as for detection of blood flow [7].

This study revealed that the commonest cause of acute abdominal pain is appendicitis resembling 37% from patients who presented by acute pain. This result is consistent with which has been reported by (Danse et al. 2019) and (Burai et al. 2019) [8] , [2] that acute appendicitis is the most common diagnosis in patients presented by acute abdominal pain and appendectomy is the most common emergency abdominal surgery.

Patients presented by abdominal pain due to gynecological causes showed that the

most observed presentation was ovarian cyst in 16 patients resembling 64% of gynecological causes which is matched with (Burai et al. 2019) [2] who stated that ovarian cysts is the most observed gynecological causes of iliac fossa pain.

Five patients represented by acute abdominal pain with positive BHCG were diagnosed by US as ectopic pregnancy , at all cases no intrauterine sac was noted, an extra uterine sac with visible cardiac pulsation was seen only in one patient and in the others adnexal hematoma with free fluid were the observed findings, these findings are consistent with which has been reported by (Lee et al ,2018) [9] who stated that absence of intrauterine sac with positive BHCG and presence of extra uterine sac directly confirm ectopic pregnancy, as well as visualization of adnexal hematoma and free fluid in the pelvis also helps in diagnosis.

(Bor, et al 2016) [10] stated that the role of ultrasound is limited in cases of colonic diseases as image quality may be poor in obese patients and overlying gas may obscure the demonstration of relevant

structures, US signs are sometimes non-specific and so definite diagnosis is not possible which is matched with current study as two patients diagnosed as having colonic masses, 9

one of them was detectable by US but the site and extent of lesion couldn't be clearly identified so complementary CT with oral and IV contrast was done to determine exact site and extent of lesion as well as for staging, in the other case marked gaseous distension limit the study and the lesion couldn't be detectable by initial US study, complementary CT with IV contrast was done and the colonic mass was detected, therefore CT provide more information on the nature of thickening of bowel loop, stage of the tumor and help determine management for the patient as reported by (White, et al 2014) [6].

In current study only one patient (2%) was diagnosed by left vesicoureteric stone, however (Burai et al. 2019) [2] stated that the lower ureteric stone is the third cause of patients presented by iliac fossae pain. (Al-sadhan et al, 2020) [11] reported that US helps in detection of psoas collection and CT with IV contrast considered the gold standard for diagnosis, yet in current study US guided aspiration biopsy with insertion of Pig tail for drainage was done instead to confirm diagnosis of psoas abscess.

6. Conclusion

Ultrasound being widely available, bedside, low cost test with no radiation exposure as well as its additive Doppler facilities and being dynamic test is recommended as a primary imaging modality during investigating the patients complaining of iliac fossa pain either right or left and it was conclusive for diagnosis in 39 patients (78%) of all cases presented by iliac fossa pain.

Although Ultrasound sometimes don't provide a conclusive diagnosis alone but when combined with laboratory data and clinical examination it will act as a guide for the next step of investigation.

On the other hand, Ultrasound as being operator dependent as well as patient's related factors as obesity and gaseous distension, both degrade the quality of the ultrasound study which drive need of other imaging modalities to reach a definite final diagnosis.

CT is recommended when ultrasound results aren't conclusive but exposure to radiation should be considered in current study it provides a final diagnosis in 6 patients (12%) of cases.

References

1. Bourcier, J. E., Gallard, E., Redonnet, J. P., Majourau, M., Deshaie, D., Bourgeois, J. M., & Geeraerts, T. (2018). Diagnostic performance of abdominal point of care ultrasound performed by an emergency physician in acute right iliac fossa pain. *Critical ultrasound journal*, 10(1), 1-10.
2. Burai, M., Gameraddin, M. B., Suliman, A., Gareeballah, A., Alagab, F., & Elzaki, M. (2019). Pelvic ultrasonographic findings in patients with acute right iliac fossa pain. *International Journal of Health & Allied Sciences*, 8(1), 33.
3. Melissovas, I., Cokkinos, D. D., Antypa, E. G., & Roumbos, G. (2021). Not only appendicitis! Transabdominal ultrasound detects a variety of pathology in the iliac fossae. *Hellenic Journal of Radiology*, 6.3, 26-39
4. Ahmed, S. S., & Al-Najjar, S. A. (2020). The role of ultrasound in assessing acute right iliac fossa pain. *Zanco Journal of Medical Sciences (Zanco J Med Sci)*, 24(1), 46-53.
5. Pennec, V Le, E Hourn, G Schmutz, and J Pelage, 'Imaging in Infections of the Left Iliac Fossa', *Diagnostic and Interventional Imaging*, 93.6 (2012), 466-72

<<https://doi.org/10.1016/j.diii.2012.03.006>>

6. Ek, White, L Macdonald, G Johnson, and V Rudralingham, 'Pictorial Review Seeing Past the Appendix : The Role of Ultrasound in Right Iliac Fossa Pain' <<https://doi.org/10.1177/1742271X13514385>>
7. Mazzei, Maria Antonietta, Nevada Cioffi Squitieri, Susanna Guerrini, Amato Antonio, Stabile Ianora, Lucio Cagini, and others, 'Sigmoid Diverticulitis: US Findings', Critical Ultrasound Journal, 5.Suppl 1 (2013), S5 <<https://doi.org/10.1186/2036-7902-5-S1-S5>>
8. Danse, E, C A Dragean, S Van Nieuwenhove, V Passoglou, P Trefois, and L Annet, 'Imaging of Acute Appendicitis for Adult Patients', 2019 <<https://doi.org/10.31487/j.RDI.2019.03.08>>
9. Lee, Robert, Carolyn Dupuis, Byron Chen, Andrew Smith, and Young H Kim, 'Diagnosing Ectopic Pregnancy in the Emergency Setting', 37. January (2018), 78–87
10. Bor, Renáta, Anna Fábíán, and Zoltán Szepes, 'Role of Ultrasound in Colorectal Diseases', 22.43 (2016), 9477–87 11 <<https://doi.org/10.3748/wjg.v22.i43.9477>>
11. Al-sadhan, Nehal A, 'Point-of-Care Ultrasound Identification of Iliopsoas Abscess in Emergency Department: A Case Report', IV.3 (2020), 404–6 <<https://doi.org/10.5811/cpcem.2020.5.4525>>