

Imaging of acute appendicitis in pregnancy at King Hussein Hospital

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Abstract

Background: Acute appendicitis is one of the most common non obstetric surgical emergencies, which occur as 1 case per 1000 pregnant woman, it carries a challenging diagnosis due to changes in the abdomen and pelvic anatomy, and carries high risk of complications such as perforation and peritonitis.

Aim: To evaluate the diagnostic methods of different imaging modalities for acute appendicitis in pregnant women and their imaging features.

Keywords: Acute appendicitis, pregnancy, imaging modalities, ultrasonography, magnetic resonance imaging (MRI), computed tomography (CT)

Introduction

Acute appendicitis is considered the most common non obstetric surgical emergency among pregnant women, the incidence of acute appendicitis within the pregnant women is 0.1-0.3%, the diagnosis of appendicitis in pregnant patient is challenging and clinically difficult due to changes within the abdomen and pelvis due to enlarged uterus, the possibility of acute appendicitis gets increased in the second and third trimesters and the clinical findings will not seen in all of the cases.

Methods

This retrospective study include 450 patients, aged 18-43 years, all female pregnant patients, with history of abdominal pain at the Radiology department of King Hussein Medical center from period January 2025 to December 2025.

The computerized patient record system on the Hakeem platform was utilized to collect data, including patient's demographics (name and age) clinical examination and lab results.

The inclusion criteria consisted of:

1. Pregnancy confirmation at the time of the patient presentation.
2. Clinical and laboratory suspicion of appendicitis.
3. Imaging evaluation by Ultrasound (US), and or Magnetic Resonance Imaging (MRI).

Imaging studies were reviewed by at least two radiology specialists within the Picture Archiving and Communicating System (PACS® digital system) who assessed visualization of the appendix, diameter of the appendix, signs of inflammation or perforation.

The exclusion criteria included history of prior appendectomy or alternative positive diagnosis than appendicitis.

The patient's outcome will be grouped into normal appendix, acute appendicitis and complicated perforated appendicitis.

Results

Acute appendicitis was diagnosed in 32 patients, 27 (84%) patients had non perforated appendicitis and 5 (15%) patients had perforated appendicitis, The gestational age at the time of acute appendicitis diagnosis was first trimester in 8 (25%) patients, second trimester in 11 (34%) patients and third trimester in 13 (40%) patients. 28 (87%) patients showed pathologically proven acute appendicitis, 5 (15%) patients showed premature births, in our sample no maternal death or fetal loss recorded.

Discussion

Why diagnosis of acute appendicitis in pregnant women is challenging? The diagnosis of acute appendicitis in pregnant women is not straightforward due to non-specific presentation, anatomical changes associated with pregnancy manifested by the enlarged uterus, limitation of using imaging modalities and sometimes non-specific elevation of the inflammatory marker can lead to inappropriate management and diagnosis delay, leukocyte number is increased during pregnancy due to physiological causes which reduce the ability to utilize it during investigations.

The typical clinical signs of acute appendicitis including guarding and rebound in the right iliac fossa region, psoas sign, obturator sign and Rovsing sign, these signs are usually not seen within the pregnant patients,

Ultrasound (US) is considered the first line of imaging when suspected acute appendicitis in pregnant women, graded compression is used for the diagnosis which showed 50% sensitivity 96% specificity with 96.5% overall accuracy, however the use of graded compression is difficult during late second trimester and third trimester with the patient in supine position and large size of gravid uterus.

The advantages of Ultrasound in diagnosis of acute appendicitis are being inexpensive, widely available and results in no exposure to radiation.

Ultrasound examination is performed using linear transducer (5-12MHz) and for larger abdomen patient a curved transducer (1-5Mhz) is used. If the appendix appears non compressible in graded compression and measures more

than 7 mm with surrounded hyperechoic inflamed fat this is diagnostic for acute appendicitis.

If the appendix appears compressible and measures less than 7 mm with absent of surrounded inflammatory changes in this case the appendix will be considered normal, non-visualization of the appendix is also labeled as normal.

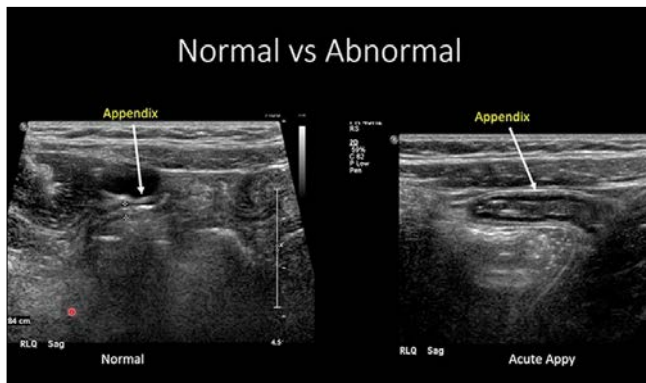


Fig 1: Normal and abnormal appendix (appendicitis) in pregnant woman.

Magnetic Resonance Imaging (MRI) is considered more sensitive and specific in diagnosis for acute appendicitis than Ultrasound, both 1.5 Tesla (T) MRI or 3T MRI machines can be used in the diagnosis process but for fetus safety purposes the 1.5T MRI is preferred.

The diagnosis of acute appendicitis in MRI is when the appendix showed diameter more than 7 mm associated with appendicular wall thickening more than 2 mm and peri appendicular edematous changes, fluid collection and or fat stranding.

While normal appendix in MRI is diagnosed when there is no evidence of inflammation even if the appendix itself is not visualized, the disadvantage of MRI that it is not always available in the emergency department.

In our study no pregnant patient with negative finding in MRI had diagnosis of acute appendicitis, the negative predictive value and sensitivity for acute appendicitis in MRI was 100%.

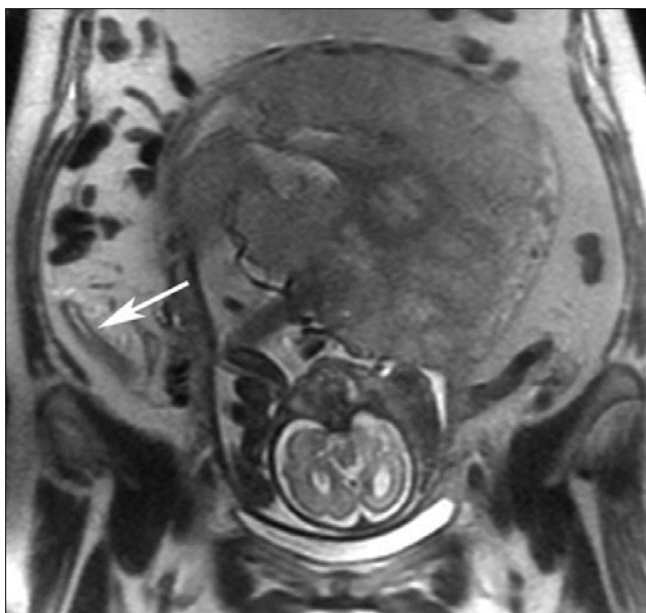


Fig 2: Acute Appendicitis within Sagittal MRI sequence in pregnant woman.

Computed Tomography (CT) regarding CT scans it is only used in emergency cases or when the MRI cannot be used or inaccessible, due to ionizing radiation caused by the CT scan the imaging acquired using as low as reasonably achievable (ALARA) principle to ensure the safety of the mother and fetus.

MRI is considered superior compared to CT scan due to its ability to obtain excellent soft tissue images without the need to use ionizing radiation, also ability to diagnose acute appendicitis without the need to give intravenous contrast materials.

Conclusion

Acute appendicitis in pregnant women is the most common non-obstetric surgical emergency, the clinical presentation and laboratory investigations are challenging and not straightforward due to changes caused by gravid uterus.

Ultrasound is first choice for imaging modality for diagnosis, and showed decrease of sensitivity and specificity in the second and third trimesters.

MRI should be used as first choice to diagnose acute appendicitis in pregnancy, it is safer than CT for both mother and fetus, showed 100% negative predictive value which will decrease the risk of negative surgical explorations and surgical complication for both mother and fetus.

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