

## Acute Appendicitis in Pregnancy in Baghdad Teaching Hospital

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### ABSTRACT

**Background:** Acute appendicitis is the most common surgical problem in pregnancy (non-obstetric emergencies in pregnancy) but it does not occur more often in pregnant women than in non-pregnant women, the incidence is 0.1% - 0.2%.

The aim of the study was to evaluate the clinical presentation of pregnant patients at different trimesters, the change in pain location during pregnancy and maternal complications during hospitalization.

**Patients & methods:** Sixty two pregnant patients with diagnosis of acute appendicitis from October 2010 to February 2012 in Baghdad Teaching Hospital - Medical City were followed up prospectively.

Analysis was done on relation of acute appendicitis to trimesters of pregnancy, site of pain changing according to trimesters, and whether maternal complications and abortion occurred during hospitalization.

**Results:** Sixty two pregnant patients with diagnosis of acute appendicitis underwent emergency appendectomy. The age range of the patients was

16-41 years, occurred most commonly in the second trimester, majority of pregnant patients with acute appendicitis were multigravidas. The most common presenting symptom was abdominal pain. Patients who did not have a scar of previous caesarean section, the change in the site of the appendix and maximum site of tenderness was more than those who had previous scar.

**Conclusion:** The diagnostic accuracy of acute appendicitis in pregnant women is vital. Early appendectomy prevents complicated conditions.

**KEYWORDS:** Pregnancy, Acute Appendicitis

### ARTICLE DETAILS

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### INTRODUCTION

Acute appendicitis is the most common surgical problem in pregnancy (non-obstetric emergencies in pregnancy) but it does not occur more often in pregnant women than in non-pregnant women. The incidence is 0.1%-0.2%, and is approximately the same incidence in all three trimesters.<sup>1</sup>

The pregnant patient with appendicitis presents unique challenges to both the surgeon and gynecologist. First, the diagnosis of pregnancy needs confirmation at the time of presentation. Secondly, the anemia and physiological changes that normally occur during pregnancy alter the physical findings and laboratory values that are often used for diagnosis of appendicitis. Thirdly, cases of appendicitis that occur during pregnancy can produce significant morbidity

and mortality if not promptly identified and treated. Fourthly, the treating surgeon has limitations in the use of certain diagnostic procedures because of possible teratogenicity like intravenous pyelography and X-ray abdomen. Finally the surgeon is treating two patients simultaneously, the mother and the fetus and must be aware of the potential effects of treatment on both patients at all times(Kort B et al).<sup>2</sup>

Of all surgical problems during pregnancy, appendicitis causes the greatest incidence of fetal loss.<sup>3</sup>

The particular dangers of appendicitis in pregnancy lie in the varied presentation of symptoms and the higher chance of delayed diagnosis.

Furthermore, increasing gestational age reduces diagnostic accuracy and is associated with increased rates of appendiceal

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perforation and hence complications. The outcome may be improved if prompt diagnosis is made, and surgical intervention combined with obstetric care is performed at an early stage of the disease.<sup>4</sup>

Diagnosis is based on physical examination, laboratory parameters, and Ultrasonography. However, pregnant women are more challenging because obstetric symptoms mimic true appendicitis. Early appendectomy is usually advised to prevent potential adverse impact on the fetus. In earlier studies, the accurate diagnosis rate in such conditions was about

64%.<sup>5</sup>

Classic obstetric teaching has been that upward change of pain location due to displacement of the appendix is secondary to a growing uterus.<sup>6</sup>

The presence of typical pain pattern, epigastric pain migrating to the right lower quadrant, needs to be validated. Nonetheless, ultrasonography helps clinicians detect appendicitis in gravid conditions.<sup>7</sup>

The Aim of the study is to evaluate the clinical presentation of pregnant patients at different trimesters, the changes in pain location during pregnancy, maternal complications during hospitalization.

### PATIENTS AND METHODS

A prospective study on 62 patients who were diagnosed as acute appendicitis during pregnancy in Baghdad teaching hospital from October 2010 to February 2012.

All patients who presented to the emergency department with acute abdominal pain were examined by the surgeon, some patients were referred from obstetric unit.

The following data were analyzed: gestational age, signs and symptoms on presentation, duration of symptoms, physical findings, laboratory parameters, ultrasonography, duration from admission till time of surgery and operative findings.

Analysis was done on relation of acute appendicitis to trimesters of pregnancy, site of pain changing according to trimesters, and whether maternal complications and abortion occurred during hospitalization.

Diagnosis of acute appendicitis was made by history, physical examination, laboratory parameters and ultrasonography; when the diagnosis of acute appendicitis was made patients were referred for surgery.

### RESULTS

All 62 patients with diagnosis of acute appendicitis underwent emergency appendectomy.

Sixty one patients had acutely inflamed appendix and one patient had perforated appendix.

The age range of the patients was 16 to 41 years, the mean age was

(23) years (Table 1).

**Table 1: Age distribution on the study**

Age (years)	No. of patients	Percentage (%)
16-20	13	20.96%
21-25	29	46.77%
26-30	9	14.51%
31-35	7	11.29%
36-41	4	6.45%
Total	62	100%

Majority of pregnant patients with acute appendicitis were multigravidas.

**Table 2: patients distribution according to gravida.**

Gravida	No. of patients	Percentage
Primigravida	22	35.48%
Multigravida	40	64.51%
Total	62	100%

The most common complaints were abdominal pain in 62(100%) patients while nausea, vomiting and anorexia in 54(87.09 %) patients.

Majority of pregnant patients with acute appendicitis 44(70.9%) were presented within 24 hours from onset of symptoms, while 18(29.03%) patients were presented within 48 hours.

Majority of pregnant patients with acute appendicitis 50(80.64%)

had migration of abdominal pain from the central part of abdomen to the right lower quadrant, while 12(19.35%) patients presented with right lower quadrant pain from the onset of symptoms.

The most common physical findings on initial physical examination were right lower abdominal tenderness in 59 (95.1%) patients and rebound tenderness in 57 (91.9%) patients.

**Table 3: presentation symptoms and signs in patients.**

Presentation		No. (percent %)
Abdominal pain	Right lower quadrant pain	46 (74.19%)
	Right upper quadrant pain	7 (11.29%)
	Diffuse	8 (12.9)
	Back pain	1 (1.61%)
Body temperature	Normal	24 (38.7%)
	37.5 - 38.5°C	33 (53.2%)
	>38.5°C	5 (8.06%)
Nausea, vomiting and anorexia		54 (87.09%)
Dysuria		9 (14.5)
Vaginal hemorrhage		1 (1.6%)
Tenderness (right iliac fossa)		59 (95.1%)
Rebound tenderness (right iliac fossa)		57 (91.9%)

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Guarding (right iliac fossa)	44 (70.9%)
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White blood cells count ranged from below 10000 cell/mm<sup>3</sup> to more than 15000 cell/mm<sup>3</sup> (Table 4).

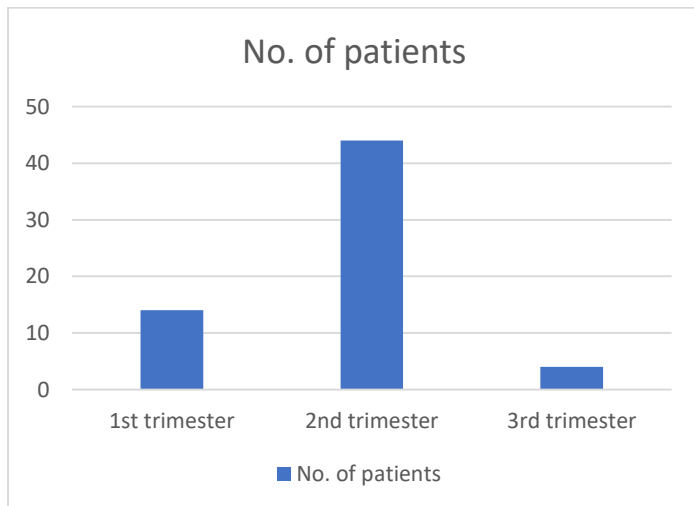
Abdominal ultrasound was performed in 62 patients and the diagnosis was acute appendicitis in 27 (43.5 %) patients. The positive criteria for acute appendicitis were a non-compressible appendix with an outer diameter greater than 6 millimeters and vascular on colored Doppler.

Other ultrasonographic findings are shown in (Table 4).

**Table 4: laboratory findings and ultrasound examination**

Investigations		No. (percentage%)
WBC (10 <sup>9</sup> /L)	<10	11 (17.7%)
	10-15	20 (32.3%)
	>15	31 (50%)
	Total	62 (100%)
Ultrasound examination	Non-diagnostic	34 (54.83%)
	Acute appendicitis	27 (43.5%)
	Peri-appendicular abscess	1 (1.61%)
	Total	62 (100%)

Acute appendicitis occurred most commonly in the second trimester 44 (77.96%) patients, while 14 (22.5%) patients in the 1<sup>st</sup> trimester and 4 (6.45%) patients in the 3<sup>rd</sup> trimester.



**Figure 1: No. of patients that presented with acute appendicitis according to trimesters.**

Regarding the changes in position of appendix and maximum site of tenderness in relation to trimester, the most common changes occurred during the 2<sup>nd</sup> trimester in 36 (58.06%) patients which is about 4-6 cm above Mc Burney point.

**Table 5: changes in position of appendix in relation to trimesters.**

Trimester	Changes in cm above Mc Burney point	No. of patients
1 <sup>st</sup>	<3 cm	10 (16.1%)
1 <sup>st</sup>	4-6 cm	4 (6.45%)
1 <sup>st</sup>	7-9 cm	0
1 <sup>st</sup>	Total	14 (22.58%)
2 <sup>nd</sup>	<3 cm	5 (8.06%)
2 <sup>nd</sup>	4-6 cm	36 (58.06%)
2 <sup>nd</sup>	7-9 cm	3 (4.83%)
2 <sup>nd</sup>	Total	44 (70.69%)
3 <sup>rd</sup>	<3 cm	0
3 <sup>rd</sup>	4-6 cm	1 (1.61%)
3 <sup>rd</sup>	7-9 cm	3 (4.83%)
3 <sup>rd</sup>	Total	4 (6.45%)
Total	<3 cm	15 (24.19%)
Total	4-6 cm	41 (66.12%)
Total	7-9 cm	6 (9.67%)
Total	Total	62 (100%)

	<3 cm	4-6 cm	7-9 cm	Total
1 <sup>st</sup> trimester	10 (16.1%)	4 (6.45%)	0	14 (22.58%)
2 <sup>nd</sup> trimester	5 (8.06%)	36 (58.06%)	3 (4.83%)	44 (70.69%)
3 <sup>rd</sup> trimester	0	1 (1.61%)	3 (4.83%)	4 (6.45%)
Total	15 (24.19%)	41 (66.12%)	6 (9.67%)	62 (100%)

Regarding the change in position of appendix and maximum site of tenderness in relation to previous scar of caesarian section, patients who did not have previous scar the changes were more than those who had previous scar (Table 6).

**Table 6: changes in position of appendix in relation to previous abdominal surgery.**

Changes in (cm) above Mc Burney point	Patients without previous abdominal surgery	Patients with previous abdominal surgery
	No. (percentage)	No. (percentage)
<2 cm	15 (24.1%)	10 (16.1%)
3-5 cm	23 (37.09%)	7 (11.2%)
6-8 cm	4 (6.45%)	3 (4.8%)
Total	42 (67.75%)	20 (32.25%)

Most of patients 48 (77.41%) underwent appendectomy within 2 hours from admission to hospital, while 14(22.58%) patients underwent appendectomy within 6 hours.

Regarding the maternal complications; they did not appear in our study apart from one patient developed vaginal bleeding (threatened abortion) in the first trimester and treated medically. There was neither maternal mortality nor abortion.

**Table 7: modified Alvarado score for pregnant patients.**

VARIABLES	SCORE
<b>SYMPTOMS</b>	
Right lower quadrant pain	2
Anorexia	1
Nausea/ vomiting	1
<b>SIGNS</b>	
Tenderness	2
Rebound tenderness in RIF	1
Pyrexia greater $\geq 37.5^{\circ}$ C	1
<b>INVESTIGATION</b>	
Leukocytosis	1
<b>TOTAL SCORE</b>	9

Regarding modified Alvarado score for pregnant patients, we found that the score ranged from 7 to 9.

## DISCUSSION

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In our study, the most common age groups were 23 years. Alberto et al<sup>8</sup>, also in his study found that the acute appendicitis in pregnancy was most common between age group of (20-25) years old. The same results about the age group of (21-25) year old was found in the study of Al-Obaidi M<sup>9</sup>. Another study like Lt Col S Chawla et al<sup>10</sup>, found that the mean age was 26.4 year.

Regarding symptoms:

### Abdominal pain

In our study, abdominal pain presented in all patients of acute appendicitis 62 ( 100% ). This result was also found by Al-Obaidi M<sup>9</sup> and another study like ZHANG Yan et al<sup>11</sup> was found that all pregnant women with confirmed appendicitis had abdominal pain.

Regarding the migration of pain from central part of abdomen to the right lower quadrant our study showed that 50 (80.64%) patients had this symptom; RUTH M. KING et al<sup>12</sup>, in his study also found that the pain was generally beginning in the upper abdomen and shifting to the right lower quadrant in 57 % of patients . Baer's<sup>6</sup> study suggested that somatic pain caused by acute appendicitis should migrate.

### Nausea, vomiting and anorexia

In our study, nausea, vomiting and anorexia presented in 54 (87.09%) patients. Nausea, vomiting and anorexia did not give clue to the diagnosis of acute appendicitis in pregnancy. Nausea, vomiting and anorexia is so common in normal pregnancy. This was found by liana et al<sup>13</sup>, and Therese et al<sup>14</sup> but it can't be ignored when accompanied by other symptoms and signs suggestive of acute appendicitis.

### Dysuria

In our study dysuria was found in 9 (14.5%) patients with greatest incidence in the second trimester. Therese et al<sup>14</sup> found that dysuria was present in (23.5%) of pregnancy with acute appendicitis with greatest incidence in the third trimester, so presence of dysuria doesn't exclude the diagnosis of acute appendicitis in pregnancy.

Regarding signs:

In our study, abdominal tenderness in the right lower quadrant was in 59 (95.1%) patients, and the rebound tenderness in right lower quadrant was in 57 (91.9%) patients.

Abdominal tenderness and rebound tenderness is shifted upwards and laterally with the advancement of pregnancy in relation to the position of appendix in pregnancy. (Alberto et al<sup>8</sup>)

The incidence of rebound tenderness decreases with advancement of pregnancy in the second half, this is found by WeingoldAB<sup>15</sup>.

In our study guarding was presented in 44(70.9%) patients. Guarding doesn't give clue to the diagnosis of acute appendicitis in pregnancy, this was also found by liana et al<sup>13</sup>. In our study, fever was presented in 38 (61.29 %) patients. Body temperature does not have any clinical relevance to support or exclude acute appendicitis (Hao- Yu Lin et al)<sup>16</sup>.

Fever is not a clear indicator of acute appendicitis in pregnancy and only about 50 % of patients had fever on admission (ZHANG Yan et al)<sup>11</sup>.

Regarding investigations:

### White blood cells:

Fifty one patients (82.3%) presented with elevated white blood cells count (above 10,000/ml).

White blood cells count doesn't give clue to the diagnosis of acute appendicitis in pregnancy because in normal pregnancy there may be relative leukocytosis (12,000-15,000/ml) (McComb P. Raimon H.<sup>17</sup>).

Tikiriti F<sup>18</sup>, also found that white blood cells count did not differentiate between normal pregnancy and acute appendicitis.

### General Urine Examination :

Eight patients (12%) had microscopic hematuria (RBC 6-10), and twelve patients had pyuria ( pus cells 8-10).

Pyuria is not a significant point against diagnosis of acute appendicitis in pregnancy so was supported by Weingold AB<sup>15</sup>.

### Ultrasonography

Abdominal ultrasound which gave positive findings about diagnosis of acute appendicitis was 27(43.5%) patients.

ZHANG Yan et al<sup>11</sup>, also found that the accuracy rate for abdominal ultrasound in confirming the diagnosis of appendicitis in pregnancy was 40%. Lim et al<sup>7</sup>, reported that the accuracy of sonography was 98%, although the accuracy of sonography for the diagnosis of appendicitis is very high, it is difficult during the second and the third trimesters of pregnancy due to the size of the gravid uterus.

Regarding the incidence of acute appendicitis in relation to trimesters, in our study acute appendicitis in pregnancy was more often in the second followed by the first then the third trimester.

Other study like Al-Obaidi M<sup>9</sup>, found that the incidence of acute appendicitis in pregnancy most commonly in the second followed by the third then the first trimester.

Black<sup>19</sup> noted no difference between one trimester and the next.

Burvell et al<sup>20</sup> found it three times more common in the first than in the third trimester and Dickison<sup>21</sup> reported 70-80 % in the first six months.

Regarding the change in position of appendix and maximum site of tenderness in relation to trimesters, in our study the most common changes occurred during the second trimester in 36 (58.06%) patients about 4-6 cm above the Mc Burney point. Al-Obaidi M.<sup>9</sup> showed that the shifting in position was less prevalent with advancing in pregnancy, a fact explained by that the appendix is pushed laterally and upward by enlarging uterus.

Regarding the change in position of appendix and maximum site of tenderness in relation to previous scar of cesarean section, in our study the most common change in position was about 3-5 cm above Mc Burney's point occurred in

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23(37.09%) patients who did not have previous abdominal scar, while the most common change in patients with previous abdominal scar was  $\leq 2$ cm above the Mc Burney's point in about 10 (16.1%) patients.

Hodjati H.<sup>22</sup>, found that the change in position of appendix and maximum site of tenderness in pregnant patients without previous abdominal scar was about 5-6 cm above the Mc Burney's point in 50% of patients, while in those with previous abdominal scar was about 3-4 cm above Mc Burney's point in 33.4% of patients.

It is obvious from the inflammatory response and later the adhesion will limit the cranial movement of cecum.

Regarding the comparison of the maternal complications & fetal mortality, in our study one patient developed vaginal bleeding (threatened abortion in the first trimester) and treated medically. There were no maternal mortality nor abortion. McComb P.,RLaimon H.<sup>17</sup> found that there was no maternal mortality, while fetal mortality occurred in 33% of patients with perforated appendicitis Al-Obaidi M.<sup>9</sup> also found that there was no maternal mortality, and fetal mortality occurred in 25% of patients with perforated appendicitis.

Regarding Modified Alvarado score for pregnant patients we found Alvarado score ranged from 7-9 .Saddique et al<sup>23</sup> also found that Modified Alvarado Score for pregnant patients was ranging between 7-9.

### CONCLUSION

1. The incidence of acute appendicitis in pregnancy is similar to the incidence in non-pregnant patients.
2. The symptoms of appendicitis mimic the normal symptoms of pregnancy, so careful history taking and physical examination remain important.
3. Suspected cases require general surgery and obstetric consultation to ensure the patient most qualified outcome.
4. Early appendectomy can prevent complications.

### RECOMMENDATIONS

1. In managing pregnant patient, one should be highly suspicious about possibility of acute appendicitis to prevent the further complications for mother and fetus.
2. In an atypical presentation of signs and symptoms of acute appendicitis judicious use of ultrasound and diagnostic laparoscopy is warranted to decrease morbidity associated with acute appendicitis, further study is recommended .
3. Laparoscopic appendectomy is well established during first and second trimesters, but it is challenging during third trimester of pregnancy.

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