



Appendicitis in pregnancy, higher rate of perforation compared to nonpregnant patients

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INTRODUCTION

Pregnant patients presenting with acute abdominal pain can create a diagnostic challenge. The clinical presentation of appendicitis can be obscured and may be associated with delayed diagnosis and management [1].

Appendicitis is the most common GI condition that requires non-obstetric surgery. It occurs in 1/500 to 1/1700 pregnancies, with the incidence unchanged by pregnancy [1-3].

Delay in diagnosis can lead to rupture, peritonitis, sepsis, pregnancy loss, and preterm birth.

Diagnosis of appendicitis in nonpregnant patients relies on CT imaging which has decreased the negative appendectomy rate from 23%, relying on clinical diagnosis, to 1.7% [4].

Use of CT in pregnancy is discouraged because of fetal exposure to ionizing radiation [5].

Ultrasound has been proposed as the initial imaging modality in pregnancy because it is repeatable, noninvasive, inexpensive, and does not use ionizing radiation [6].

MRI is proposed as a secondary test, when ultrasound is inconclusive, and has a high sensitivity, specificity, and positive and negative predictive values [7,8].

The perception is that pregnant patients with appendicitis present with signs, symptoms, and laboratory values that differ from nonpregnant patients.

This perception, combined with reliance on CT for diagnosis in the nonpregnant population, could result in delay in diagnosis and treatment among pregnant patients.

AIM

To compare clinical presentation and diagnostic evaluation to identify differences in treatment between pregnant and nonpregnant patients with appendicitis.

MATERIALS AND METHODS

Retrospective case-control study comparing 12 pregnant and 60 nonpregnant, age-matched patients who had an appendectomy for acute appendicitis (pathology confirmed) between January 1, 2011, and June 30, 2019. We compared maternal characteristics, laboratory test results, physical examination findings, diagnostic work-up, surgical modality, and surgical outcomes.

RESULTS

There was no difference in symptom profile and pain intensity at presentation between groups. More pregnant patients had right upper quadrant tenderness (83.3% versus 31%, p=0.03) and were more likely to have more than one imaging diagnostic modality (75% versus 15%, p<0.01).

In nonpregnant patients, CT was the main diagnostic modality (90%) whereas there was more variation in imaging for pregnant patients.

For pregnant patients, time from presentation to surgery (20.0 +11.8 hours versus 9.9 + 4.9 hours; p=0.01) and time from presentation to receipt of antibiotics (14.5 + 12.0 hours versus 5.9 +3.2 hours, p<0.01) were twice that of nonpregnant patients.

Surgery duration was similar between groups (pregnant: 54.8 + 31.3 minutes versus nonpregnant: 45.6 + 19.5 minutes, p=0.34).

All nonpregnant patients underwent laparoscopic appendectomy.

Seven pregnant patients underwent laparoscopy, three had laparotomy, and two began with laparoscopy that was converted to laparotomy.

More pregnant patients perforated (25% versus 3.3%, p=0.03).

	Pregnant (n=12)	Non-Pregnant (n=60)	p-value
Vital Signs			
Heart Rate	99.2 ± 15.0	89.4 ± 16.5	0.06
Systolic BP (mmHg)	124.8 ± 19.2	123.2 ± 13.7	0.7
Diastolic BP (mmHg)	73.2 ± 12.2	76.8 ± 10.9	0.30
Maximum temperature (°F)	99.7 ± 1.7	99.0 ± 0.9	0.17
Temperature >100.5° F	16.7 (2)	8.3 (5)	0.30
Laboratory Values			
WBC count, (x 1,000/μL)	13.0 ± 2.5	12.0 ± 3.9	0.43
Neutrophils (%)	80.8 ± 8.8 (n=10)	77.2 ± 10.7 (n=57)	0.32
Hemoglobin (g/dL)	12.0 ± 1.5	13.1 ± 1.2	<0.01
Hematocrit (%)	36.2 ± 4.2	39.7 ± 3.1	<0.01
AST (U/L)	16.4 ± 6.9 (n=12)	17.7 ± 6.8 (n=46)	0.56
ALT (U/L)	12.6 ± 7.0 (n=12)	12.5 ± 6.4 (n=46)	0.99
Amylase (U/L)	31.0 ± 13.3 (n=5)	40.6 ± 15.0 (n=28)	0.19
Lipase (U/L)	26.5 ± 37.3 (n=8)	15.0 ± 10.3 (n=31)	0.42
1 st Examiner			<0.01
Emergency Medicine	50.0 (6)	95.0 (57)	
Obstetrician	50.0 (6)	0 (0)	
Surgeon	0 (0)	1.7 (1)	
Diagnosed outpatient	0 (0)	3.3 (2)	
Physical Exam			
RLQ tenderness	81.8 (9) (n=11)	94.4 (51) (n=54)	0.20
RUQ tenderness	83.3 (5) (n=6)	31.0 (9) (n=29)	0.03
LUQ tenderness	50.0 (3) (n=6)	15.4 (4) (n=26)	0.10
LLQ tenderness	42.9 (3) (n=7)	41.4 (12) (n=29)	1.0
Rebound tenderness	40.0 (4) (n=10)	26.8 (11) (n=41)	0.45
Guarding	33.3 (3) (n=9)	46.8 (22) (n=47)	0.72
Epigastric tenderness	60.0 (3) (n=5)	17.4 (4) (n=23)	0.08
Diffuse tenderness	50.0 (4) (n=8)	16.7 (4) (n=24)	0.15
Abdominal distension	0 (0) (n=6)	8.1 (3) (n=37)	1.0

RESULTS

	Pregnant (n=12)	Non-Pregnant (n=60)	p-value
More than 1 ED visit	16.7% (2)	1.7% (1)	0.07
Seen initially as outpatient	8.3% (1)	28.3% (17)	0.27
Transferred from another hospital	25.0% (3)		0.004
Pain medication given	83.3% (10)	0% (0)	0.50
More than 1 imaging study	69.2% (9)	71.7% (43)	0.0001
How diagnosis made		13.9% (9)	0.001
CT	16.7% (2)	90% (54)	
MRI	33.3% (4)	0% (0)	
Ultrasound	33.3% (4)	3.3% (2)	
Clinical diagnosis	16.7% (2)	6.7% (4)	
Timing of interventions			
From presentation to first imaging study (hours)	8.0 ± 11.1	3.2 ± 2.0	0.16
From presentation to antibiotics (hours)	14.5 ± 12.0	5.9 ± 3.2	0.003
From initial imaging study to operating room (hours)	12.0 ± 8.9	6.7 ± 4.6	0.66
From presentation to operating room (hours)	20.0 ± 11.8	9.9 ± 4.9	0.01
Length of surgery (minutes)	54.8 ± 31.3	45.6 ± 19.5	0.34
Length of hospital stay (hours)	65.9 ± 39.1	28.4 ± 16.3	0.007
Type of surgery			
Laparoscopic	58.3% (7)	100% (60)	<0.0001
Laparoscopic converted to laparotomy	16.7% (2)	0% (0)	
Laparotomy	25.0% (3)	0% (0)	
Pathologic diagnosis			
Acute appendicitis	100% (12)	100% (60)	
Chronic appendicitis	0	5.0% (3)	1
Perforation	25.0% (3)	3.3% (2)	0.03

CONCLUSION

Despite having similar presentations, it took twice as long to treat pregnant patients with antibiotics and perform an appendectomy resulting in more perforations compared to nonpregnant patients.

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