

ORIGINAL ARTICLE

Acute appendicitis during pregnancy: case series of 20 pregnant women

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ABSTRACT

BACKGROUND: Acute appendicitis (AA) is the most common cause of acute abdomen during pregnancy. Most of the signs of appendicitis are also found during normal pregnancy period, however, and diagnosis of appendicitis during pregnancy remains challenging. The aim of the current study was to report our clinical experience of AA during pregnancy and investigate optimal management of this difficult situation.

METHODS: Records of 20 pregnant women with diagnosis of AA who underwent appendectomy between 2005 and 2015 were included in this study. Data were collected retrospectively. Patients were evaluated according to age, signs and symptoms, gestational age, physical findings, serum white blood cell count, ultrasound (US) findings, pathology reports, surgical technique, operation time, and complications.

RESULTS: Of 20 patients, 16 (80%) underwent open appendectomy and 4 (20%) underwent laparoscopic appendectomy. Mean age of patients was 29.6±5.6 years. Most common symptom was abdominal pain (95%). Six (30%) patients were in first trimester, 9 (45%) patients were in second trimester and 5 (25%) patients were in third trimester. US findings consistent with AA were found in 12 (60%) patients. Negative appendectomy rate was 30%. Maternal complication was seen in only 1 (5%) patient. No fetal complication was observed.

CONCLUSION: Accurate diagnosis and prompt surgical treatment of AA in pregnant women should be performed due to high rates of maternal and fetal complications.

Keywords: Acute appendicitis; appendectomy; pregnancy.

INTRODUCTION

Acute appendicitis (AA) is the most common cause of acute abdomen during pregnancy and accounts for 25% of non-obstetric surgery during pregnancy with an incidence of 1/500 to 1/2000 of all pregnancies.^[1,2] Diagnosis of appendicitis during pregnancy remains challenging. Physiological mild leukocytosis seen in pregnant women, change in location of appendix and low sensitivity rates of ultrasound (US) imaging cause

delay in diagnosis of appendicitis.^[3-5] Therefore, complications occur more frequently during pregnancy than in non-pregnant women.^[6] Although US is the most commonly and easily performed diagnostic tool for AA in pregnancy, recently magnetic resonance imaging (MRI) has been reported to be superior, with sensitivity and specificity rates of 96.8% and 99.2% respectively.^[7,8] Since most of the signs of appendicitis are also found during normal pregnancy period, decisions about surgery become more difficult with these patients. Surgery is unavoidable, but there are still questions about which technique to be used for appendectomy, laparoscopic or open surgery. Laparoscopic surgery for pregnant women has been found to be safe and accurate.^[9] However, while laparoscopic appendectomy during pregnancy is associated with low rate of intraoperative complications in all trimesters, it is associated with significantly higher rate of fetal loss compared to open appendectomy.^[10]

The aim of the current study was to report our clinical experience with AA during pregnancy and investigate optimal management of this difficult situation.

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MATERIALS AND METHODS

Our study consisted of records of 20 pregnant women with AA diagnosis who underwent appendectomy between September 2005 and September 2015 at Başkent University Adana Teaching and Research Center. Data were collected retrospectively from software database and patient files. Patients were evaluated according to age, signs and symptoms, gestational age, physical findings, serum white blood cell (WBC) count, US findings, pathology reports, surgical technique, operation time, and complications.

Statistical Analysis

SPSS software was used for statistical analysis (Version 17.0; SPSS Inc., Chicago, IL, USA). If continuous variables were normal, they were described as mean±standard deviation ($p>0.05$, Kolmogorov-Smirnov test; $n<30$, Shapiro-Wilk test), and if the continuous variables were not normal, they were described as median.

RESULTS

Twenty pregnant women underwent appendectomy during 10-year period of study. Of those, 16 (80%) underwent open appendectomy and 4 (20%) underwent laparoscopic appendectomy. Mean age of the patients was 29.6 ± 5.6 years. Most

common symptom, abdominal pain, was seen in 19 (95%) patients, and nausea was reported in 1 (5%) patient. In physical examination right lower quadrant pain (RLQP) was present in 7 (35%), both RLQP and rebound were present in 11 (55%), and RLQP with rebound and defense was present in 2 (10%) patients. At time of diagnosis, 6 (30%) patients were in first trimester, 9 (45%) patients in second trimester and 5 (25%) patients in third trimester. US findings consistent with AA were found in 12 (60%) patients. Average WBC count of patients was $14.2\pm 5.9 \times 10^3/\mu\text{L}$ (range: $3\text{--}30 \times 10^3/\mu\text{L}$). Mean operation time was 45.45 ± 21.03 minutes. Permanent pathology report of AA was found in 6 (30%) cases. Surgical site infection as postoperative complication was observed in only 1 patient (5%) with perforated appendicitis. No fetal complication was observed (Table 1).

DISCUSSION

Non-obstetric surgical intervention is performed on nearly 2% of all pregnant women annually worldwide.^[11,12] The most commonly performed non-obstetric operation (44%) on pregnant women is appendectomy.^[13] Diagnosis of commonly encountered signs of appendicitis is challenging due to physiological changes that occur during pregnancy. Mild leukocytosis and abdominal tenderness are common findings in pregnant women. Thus, delay in diagnosis can lead to perforation of the appendix. Perforation rate has also been found to be associated with advanced gestational age and delayed admission to the hospital.^[14] Therefore, prompt diagnosis and appropriate therapy are crucial for pregnant patients with acute abdomen in order to prevent fetal and maternal mortality and morbidity.^[15] In a study of 52 pregnant women who underwent appendectomy, perforation of the appendix was found to be the only predictive factor for maternal morbidity, and if interval between onset of symptoms and operation exceeds 20 hours, perforation is almost inevitable.^[16]

Although diagnosis of appendicitis is clinical, fetal growth makes it difficult by changing the location of the appendix. RLQ tenderness elevates superiorly in the second and third trimesters.^[17] Imaging studies are recommended in order to reduce delays in surgery due to diagnostic uncertainty and to reduce rate of negative appendectomies.^[18] US is typically the first radiological modality used to aid in diagnosis of appendicitis is US. However, US imaging has limitations even in non-pregnant population, and it is difficult to visualize appendix or secondary findings of appendicitis during pregnancy. US is reported to be valuable in evaluation of appendicitis in pregnant women, especially in the first trimester, but non-visualization rate of US is high, particularly in advanced pregnancy.^[19] In the present study, though most of the patients (70%) were in second and third trimesters, contrary to literature findings, US indicated AA with 40% accuracy in these patients. We believe that in experienced hands, US is a very useful diagnostic tool for AA in pregnancy, regardless of trimester. Another radiological modality, MRI, is also used for diagnosis

Table 1. Demographic characteristics of patients (n=20)

	n	%	Mean±SD
Age (Years)			29.6±5.6
Symptoms			
Abdominal pain	19	95	
Nausea	1	5	
Physical finding			
RLQP	7	35	
RLQP+rebound	11	55	
RLQP+rebound+defense	2	10	
Surgical technique			
Laparoscopic	16	80	
Open	4	20	
Gestational age			
1 st trimester	6	30	
2 nd trimester	9	45	
3 rd trimester	5	25	
White blood cell count ($\times 10^3/\mu\text{L}$)			14.2±5.9
Operation time (minutes)			45.45±21.03
Negative appendectomy	6	30	
Complication (SSI)	1	5	

SD: Standard deviation; RLQP: Right lower quadrant pain, SSI: surgical site infection.

of appendicitis in pregnant women due to high rate of appendix non-visualization in US scanning. MRI has been reported to have sensitivity and specificity rates as high as 91.7% and 95.3%, respectively,^[20] and can be used when surgical exploration is considered.

Negative appendectomy rates during pregnancy have been reported as between 3% and 23%.^[21,22] Terzi et al. found rate of 13%^[14] and Miloudi et al. reported negative appendectomy rate of 3.4%.^[23] Present study finding of 30% rate is higher than literature findings, but may be explained by inability to perform MRI or presence of physical findings that indicated urgent exploration.

Although treatment for appendicitis is surgery, technique to be used for the procedure continues to be a subject of investigation. Should we perform open or laparoscopic appendicitis? Which one is feasible? Some authors encourage laparoscopic approach,^[24] whereas some have found open appendectomy to be safer.^[10] In a hospital-based retrospective review of 65 pregnant women with suspected appendicitis, laparoscopic appendectomy was found to be a safe, feasible, and efficacious approach.^[25] Laparoscopy offers shorter hospital stay and reduced risk of thromboembolic events.^[26] Some authors state that even in perforated cases, laparoscopy appears safe in pregnant patients.^[27] There are also some limitations to use of laparoscopic appendectomy such as instance of diffuse peritonitis, advanced pregnancy with markedly enlarged uterus, or lack of experience of the surgeon or operating team.^[13] In the present study, laparoscopic appendectomy was performed in 20% of all patients without any complication; thus, we also believe that it is a safe and feasible approach for pregnant women with appendicitis.

Since perforated appendicitis is known to be associated with high rate of maternal and fetal morbidity and mortality, rapid and accurate diagnosis of appendicitis is particularly critical in pregnant patients. Risk of premature onset of labor has been reported to be between 8% and 33%.^[28,29] Fetal loss has been reported as between 0% and 12.1%.^[10,30] There was no case of fetal demise in this current study. This can be explained by the low rate of perforation (5%) in our study, found only in 1 patient.

Conclusion

Although diagnosis remains challenging, urgent surgical treatment of AA in pregnant women should be performed due to high rates of maternal and fetal complications. Radiological modalities such as US or MRI should be performed in cases of unclear diagnosis.

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Conflict of interest: None declared.

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ORJİNAL ÇALIŞMA - ÖZET

Gebelikte akut apandisit: 20 hamile kadın olgu çalışması

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AMAÇ: Hamilelikteki en sık akut karın nedeni akut apandisitir. Apandisit bulgularının çoğu normal hamilelik sürecinde olabileceğinden, gebelerde akut apandisit tanısı zordur. Çalışmamızın amacı, hamilelik döneminde karşılaştığımız akut apandisit olgularını aktarmak ve bu zor durumda uygun tedaviyi araştırmaktır.

GEREÇ VE YÖNTEM: 2005–2015 yılları arasında akut apandisit nedeniyle ameliyat edilen 20 hamile kadın hasta çalışmaya dahil edildi. Veriler geriye dönük olarak toplandı. Hastalar, yaş, bulgu ve semptomlar, gestasyon yaşı, fiziksel inceleme bulguları, ameliyat süresi ve komplikasyon açısından incelendi.

BULGULAR: On altı (%80) hastaya açık, dört (%20) hastaya laparoskopik apendektomi yapıldı. Ortalama yaş 29.6 ± 5.6 yılıdır. En sık semptom karın ağrısıydı (%95). Altı (%30) hasta 1. üç ayda, dokuz (%45) hasta 2. üç ayda ve beş (%25) hasta son üç ayda idi. On iki (%60) hastada ultrasonografide akut apandisit bulgusu saptandı. Negatif apendektomi oranı %30'du. Sadece bir (%5) hastada maternal komplikasyon saptandı. Hiç fetal komplikasyon saptanmadı.

TARTIŞMA: Yüksek maternal ve fetal komplikasyon oranlarından dolayı, gebelerde akut apandisitinin doğru tanısı ve hızlı cerrahi tedavisi yapılmalıdır.

Anahtar sözcükler: Akut apandisit; apendektomi; gebelik.

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