

Acute appendicitis in pregnancy

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Abstract

Introduction: The early diagnosis and management of appendicitis in pregnancy are essential in maternal and fetal morbidity and mortality. In this 20-year retrospective study, we aimed to assess the outcomes of pregnant patients diagnosed with acute appendicitis.

Methods: A single-center retrospective study was carried out. Randomly selected 2000 medical records of pregnant mothers referred as outpatients and hospitalized from 2002 to 2022 were retrieved. Six pregnant patients who were diagnosed and treated in Nawaloka Hospital with the diagnosis of acute appendicitis during 2002-2022 were examined retrospectively. Ethics Committee approval was received. No conflicting interest.

Results: The age range of our patients was 22 to 31 years, mean of 26 ± 3.4 . The mean gestational week was 20 ± 5.3 weeks, and most were in the second trimester 4 (68%). All patients were admitted with the complaint of abdominal pain, the majority of them had the right iliac fossa pain (RIF). All had elevated inflammatory markers. No computed tomography (CT) was performed. One patient was diagnosed clinically of having acute appendicitis without any imaging. Acute appendicitis was diagnosed in 3/5 patients who underwent ultrasound scan examination. The other two patients (one from 2nd trimester and one in the third trimester) were diagnosed with acute appendicitis on MRI examination. All patients underwent open appendectomy under general anaesthesia. No maternal or foetal morbidity or mortality was noted during pre or post-surgical and anaesthesia procedures. The mean hospital stay was 3.9 ± 0.9 days. All appendixes were pathologically proven to have acute appendicitis. Except for minor superficial surgical site infection rest of the mothers and foetus had no morbidity or mortality recorded in the follow-up.

Conclusion: Although appendicitis is not frequent during pregnancy, it is a disease that requires urgent surgical and obstetrics care for timely diagnosis and treatment.

Key words: abdomen, pregnancy, appendicitis, appendectomy, laparoscopy

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Introduction

Acute appendicitis is one of the commonest causes of the non-obstetric acute abdomen during pregnancy. The incidence of acute appendicitis in pregnancy is about one in 1500 - 5000^{1,2}. This condition is important in maternal and foetal mortality and morbidity³⁻⁵. Appendicitis can occur every trimester during pregnancy, but its incidence is higher in the second trimester⁶⁻¹¹.

Diagnosis of acute appendicitis is challenging due to many reasons. Since Pregnant women with acute appendicitis were usually admitted to obstetrics and gynaecology wards, and invariably pregnancy-related causes are considered initially. The physical examination, depending on the foetus's size, makes the diagnosis difficult, especially in the third trimester. Also, the inability to perform radiological imaging due to the risk of radiation and the lack of a specific haematological and serological test lead to delays in diagnosis. Even though ultrasonography is the most frequently the choice of radiological method to diagnose acute appendicitis in pregnant women, its specificity and sensitivity are not very high⁵. Furthermore, acute appendicitis in the third trimester is quite a challenging diagnosis since its abdominal signs and symptoms tends to mimic labour¹²⁻¹⁶.

Early diagnosis and management of appendicitis in pregnancy are essential in maternal and foetal morbidity and mortality. In this 20-year retrospective study, we aimed to assess the outcomes of pregnant patients diagnosed with acute appendicitis.

Methods

A single-centre retrospective study was carried out. Randomly selected 2000 medical records of pregnant mothers referred as outpatients and hospitalized from 2002 to 2022 were retrieved. Six pregnant patients who were diagnosed and treated in Nawaloka Hospital with the diagnosis of acute appendicitis from 2002 to 2022 were examined retrospectively. Age, gestational week, other medical and pregnancy-related diseases, presenting complaints, findings of physical examination, laboratory test results, preoperative ultrasonography results, operative notes, anaesthesia notes, maternal and foetal outcomes, length of hospital stay, post-surgical follow-up and pathology reports of the

patients were evaluated. Ethics Committee Approval was received from Nawaloka Research and Education unit. No conflict of interest.

Statistical analysis

Social Science Statistical Package (SPSS Inc., Chicago, IL, USA) computer software was used for the statistical analysis. The descriptive data were presented as mean, standard deviation and range.

Results

The age range of our patients was 22 to 31 years, mean of 26 ± 3.4 . All presented as emergencies. No other diseases were found in our patients. The duration of hospital admission from the onset of the abdominal pain was between 6 to 12 hours. The mean gestational week was 20 ± 5.3 weeks; one (16%) patient was in the first trimester, 4 (68%) patients were in the second trimester, and one (16%) was in the third trimester (Table 1).

All patients were admitted with complaints of abdominal pain; most of them had right iliac fossa pain (RIF). Of these, 4/6 (68%) patients had nausea, followed by vomiting and loss of appetite, of 1/6 (16%) each respectively. RIF tenderness and guarding were observed in all patients. Two of the patients had rebound tenderness. No computed tomography (CT) was performed. One patient was diagnosed clinically of having acute appendicitis without any imaging. Acute appendicitis was diagnosed in 3/5 patients who underwent ultrasound scan examination. The other two patients (one from 2nd trimester and one in the 3rd trimester) were diagnosed with acute appendicitis on MRI scan. The time to establish the final diagnosis of appendicitis from the time of the admission was 4 ± 0.5 hours (Table 1).

All patients underwent open appendectomy under general anaesthesia. No maternal or foetal morbidity or mortality was noted during pre or post-surgical and anaesthesia procedures. The mean hospital stay was 3.9 ± 0.9 days. All appendixes were pathologically proven to have acute appendicitis. Except for single minor superficial surgical site infection rest of the mothers and foetus had no morbidity or mortality recorded in the follow-up clinic visit (Table 1).

Table 1. The characteristics of the pregnant mothers diagnosed with acute appendicitis (N=6)

Variable	Number (%) or Mean \pm SD
Age (Years)	26 \pm 3.4
Trimester	
First	1/6 (16%)
Second	4/6 (68%)
Third	1/6 (16%)
Gestational (Weeks)	20 \pm 5.3
Presenting complaint	
Abdominal pain	6/6 (100%)
Right iliac fossa (RIF)	5/6 (84%)
Curcum-umbilical with radiation to RIF	1/6 (16%)
Nausea	4/6 (68%)
Vomiting	1/6 (16%)
Loss of appetite	1/6 (16%)
Physical findings	
RIF tenderness	6/6 (100%)
RIF Guarding	6/6 (100%)
RIF rebound tenderness	2/6 (32%)
Biochemical investigations	
White cell count	14,000 \pm 2436
C-reactive protein	30 \pm 6.7
Positive imaging findings	
Ultrasound scan (total n=5)	3/5 (60%)
USS (negative) and MRI scan (positive) (n=2)	2/5 (40%)
Type of surgical intervention	
Open appendectomy	6/6 (100%)
Surgical complications	
Minor superficial surgical site infection	1/6 (16%)
Pathological findings	
Findings compatible with appendicitis	6/6 (100%)
Length of hospital stay (LOS) (Days)	3.9 \pm 0.9

Discussion

Acute appendicitis is not an infrequent cause of non-obstetric acute abdominal in pregnancy, although its incidence is one out of 1500-5000 during pregnancy^{13,14}. It is more frequent in the second trimester of pregnancy¹⁵. In our study, the majority (68%) of the patients were in the second trimester.

In keeping with the literature, all patients were admitted with complaints of abdominal pain, and most of them had right iliac fossa pain (RIF). Of these, 4 (68%) patients had nausea, followed by vomiting and loss of appetite, one (16%) each. RIF tenderness and guarding were observed in all patients. Two of the patients had rebound tenderness. Although abdominal examination of pregnant appendicitis patients is similar to non-pregnant appendicitis, the challenges are encountered during the examination with the increase of abdominal distention and the displacement of the appendix with the increase in the weeks of gestation¹⁷⁻²⁰.

The leukocyte count and CRP elevation were seen in all the patients in our study. This was almost similar to the previous studies indicating up to 80% increase in leucocytes in pregnant appendicitis patients²⁰⁻²³. Ultrasonography is the most commonly used imaging test in pregnant patients. The sensitivity and specificity of ultrasonography are lower with the increasing gestational weeks since the enlarged uterus distorts the normal anatomical positions of the intra-abdominal organs⁵. In our study, no computed tomography (CT) was performed. One patient was diagnosed clinically of having acute appendicitis without any imaging. Acute appendicitis was diagnosed in 3/5 of patients who underwent ultrasound scan examination. The other two patients (one from 2nd trimester and one in the 3rd trimester) were diagnosed with acute appendicitis on MRI examination. Even though some of the literature indicated the use of laparoscopy as a diagnostic tool, we did not use laparoscopy as a diagnostic tool in our study²²⁻²³.

Even though the literature supports of laparoscopic approach, we chose the open surgical approach in all our patients under general anaesthesia, since we experienced that the time for surgery and duration of anesthesia is shorter and we believe that the possibility of any effects of pneumo peritoneum is not with the open technique²³. We did not encounter any maternal or fetal mortality. According to the literature, the perforation rate in pregnancy appendicitis is higher than in regular appendicitis patients due to delay, which

increases maternal and foetal mortality and morbidity rates. The overall appendicitis perforation rate has been reported to be 14% in pregnant patients²⁴. none of our patients was diagnosed with perforated appendicitis. The time to establish the final diagnosis of appendicitis from the time of the admission was 4±0.5 hours. While the mean hospital stay length was 3.9±0.9 days. In our study, except for a minor superficial surgical site infection, the mothers and foetus had no morbidity or mortality recorded in the follow-up clinic visit after two weeks. The negative appendectomy rate has been reported to be between 3%- 23% during pregnancy¹⁹. All appendixes were pathologically proven to have acute appendicitis.

Timely diagnosis of acute appendicitis in pregnancy is challenging due to many reasons. According to the literature, symptoms, such as abdominal pain and nausea, are also present during pregnancy; the abdominal examination is more difficult with the progression of the gestational week, patients who present with abdominal pain usually go to obstetricians first, and there is usually a delay in surgical referrals, only USG examination can be performed frequently where MRI is not freely available. Additionally, the clinical condition is confused with other conditions in the differential diagnosis, such as ovarian, uterine fallopian tubes, kidney and ureter, gallbladder, small bowel and ectopic pregnancy, etc. This may lead to an increase in mortality and morbidity in both mothers and foetus¹⁶⁻¹⁸.

Conclusion

Although appendicitis is not frequent during pregnancy, it is a disease that requires urgent surgical and obstetrics care for timely diagnosis and treatment. The collective approach becomes paramount since, following the diagnosis, patients require invasive procedures despite pregnancy to safeguard both mother and foetus.

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Authors' contributions

VA, HD and LG formulated the concept and design of the study, acquisition of data and analysis, and drafted the article. All authors reviewed the manuscript.

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Availability of data and materials

The data sets generated and analyzed during the current study are available from the corresponding author upon reasonable request.

Data collection and ethical approval

Nawaloka Research and Education Foundation, Nawaloka Hospital PLC, Colombo.

Competing interests

The authors declare that they have no competing interests.

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