Original Article

Appendicitis in pregnancy
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ABSTRACT

Objective: To highlight the problems related to acute appendicitis in pregnancy; difficulty in diagnosis; risk of appendiceal perforation and to lay down the principles of management.

Methods: All pregnant patients with diagnosis of acute appendicitis from January 1997 to December 2001 at Shifa International Hospital, Islamabad, Pakistan were reviewed retrospectively.

Result: There were 3812 deliveries during this period. Eleven had acute appendicitis. The age of these patients ranged from 17 to 44 years. Most of the 11 affected patients were in third trimester of pregnancy (n = 07), followed by second and first trimester (n = 02 each). Nausea and vomiting were the most common complaints experienced (81%), pain in right iliac fossa and right hypochondrium in three (27%) and fever in 2 (18%) patients. All underwent laparotomy, with ten (91%) positive and one (9%) negative appendix. Perforation was encountered in two patients (18%). No maternal or fetal loss was noted.

Conclusion: Nausea, vomiting and abdominal pain were commonest presenting symptoms in our patients. Two had perforated appendix. Early surgical intervention resulted in safe maternal and fetal

**Key Words:** Pregnancy, Acute Appendicitis and Perforation

**Introduction**

Incidence of appendicitis in pregnancy is not different from its incidence in general population [0.05 - 0.07 %] as gestation does not predispose to appendicitis [1, 2]. However, the incidence of ruptured appendix is 1.5 to 3.5 times greater in the pregnant than in the non-pregnant state [1]. In one study [3], the incidence of appendiceal perforation in pregnancy has been reported to be as high as 43% compared to 4-19% incidence in non-pregnant ladies [4]. This appears to be because of delay in diagnosis as the symptoms of appendicitis such as lower abdominal pain, nausea and vomiting are not uncommon accompaniments of pregnancy. The gravid uterus pushes the cecum upwards resulting in increased separation of visceral and parietal peritoneum and concomitant decrease in both the perception and localization of visceral pain [5]. Vague abdominal pain that persists for certain length of time in the absence of physical indicators has been reported to be directly related to an increased incidence of appendiceal perforation in pregnancy [3]. Peritonitis is more severe as a result of perforation since omentum fails to wall off the appendix in the expanding abdomen [6].

Apart from difficulty in diagnosis, the danger of appendiceal perforation is further mounted due to reluctance to operate in pregnant women. Maternal mortality of 2 % and fetal mortality, as high as 35 % has been reported if appendix gets perforated [7-8]. Studies have shown that evaluation of the factors that facilitate early diagnosis and treatment of acute appendicitis may decrease the resultant morbidity and mortality (9). This study was aimed at reviewing pregnant patients who had acute appendicitis in order to assess the factors which may contribute to early diagnosis and treatment and to find out the overall morbidity and mortality of the disease in our setup.
Materials and Methods

The study was conducted at Shifa International Hospital Islamabad, which is one of the private multidisciplinary hospitals and teaching institutions of the country. All the pregnant women who were diagnosed to have acute appendicitis and admitted to the Department of Obstetrics and Gynecology from January 1997 to December 2001 were included in this retrospective analytic study. Their medical records were reviewed to collect data on age, gravidity and parity, trimester of pregnancy, symptoms, vital signs and clinical findings. The results of laboratory tests, reports of ultrasonography, details of deliveries and signs suggestive of fetal distress along with postoperative complications, duration of hospital stay and outcome were also noted.

Results

There were 3812 deliveries during the study period. The age of the patients ranged from 17 to 44 years. Of these, 11 women were admitted following diagnosis of acute appendicitis. One of them turned out to be a negative appendectomy case while the rest had histologically confirmed appendicitis. The overall incidence of appendicitis in this series was 0.26 %. Seven of the eleven patients (63%) were in third trimester, two (18%) in each second and first trimesters of pregnancy. The two patients in third trimester of pregnancy had perforated appendix with diffuse peritonitis.

Nausea and vomiting was experienced by nine (81%) patients. Two patients had fever. Pain in right iliac fossa was symptom only in three (27%) patients, two of the patients reported pain in right flank while three patients experienced pain in right hypochondrium. Two patients, each with perforated appendix, had diffuse abdominal pain. These symptoms in relation to the duration of pregnancy are shown in Table 1. Physical examination of patients revealed that guarding and rebound tenderness
were present in eight of the eleven (72%) patients. Two of these had perforated appendix. Only two patients were febrile (18%) whereas leukocytosis (> 13,000/mm$^3$) was present in eight patients (72%). One patient had a leukocyte count of 10400 and the other had 7900 mm$^3$. These are shown in table-2. All patients underwent ultrasonography of abdomen before surgery. Appendicitis was diagnosed sonographically in only four cases (36%). The finding in others was non-specific and inconclusive.

Fetal distress was not evident in any of the patients. Only one patient with perforated appendix went into labor on the second postoperative day. She was in the 37th week of gestation and had an uneventful labor. All patients were taken to surgery and general anesthesia was used in all cases. The abdomen was opened with an adequate transverse incision at the point of maximum tenderness. One of the patients had a normal appendix. She was in the first trimester and had enlarged mesenteric lymph nodes, which revealed reactive hyperplasia on histological examination. Thus, in this series the incidence of negative appendectomy was 9% (1/11).

No mortality occurred in this series. Two of the patients had wound infection, which was treated with antibiotics, wound drainage and debridement. Two other patients had chest infection who were also treated with antibiotics. Only one patient in the 37th week of gestation had premature labour on the second postoperative day. The remaining patients had their delivery at term.

**Discussion**

Appendicitis in pregnant females results in grave consequences because the appendix tends to rupture early in pregnancy. Early diagnosis of appendicitis is possible only by the combined efforts of the obstetrician and the surgeon. The patient is given the advantage of suspicion in the form of intervention. It has been stated that abdominal pain and vomiting with poorly localized right-sided
tenderness and low-grade pyrexia in late pregnancy means appendicitis, unless proved otherwise (3), as abdominal pain has been the commonest presenting symptom (9,10). Nausea and vomiting was the commonest symptoms (81%) in the present study, although some have not found this to be helpful (2).

In the present study, there was equal incidence of pain in the right hypochondrium and right iliac fossa (27% each) compared with pain in the right flank (18%) and guarding and rebound tenderness were the most frequent signs (72%). Such signs should be investigated carefully and given cardinal importance keeping in view that these signs are elicited in a more lateral position of the abdomen because of presence of pregnant uterus in the patient [2,5]. Though acute appendicitis is most likely to occur between 2nd and 6th month of pregnancy, the incidence of perforation rises from 10% in the first trimester to 40% in the third trimester with increased risk of morbidity and mortality. Two of the patients with complaint of diffuse abdominal pain were found to have appendiceal rupture and both were in the third trimester. Thus, acute appendicitis in the last trimester has grave prognosis as the appendix is pushed progressively upward by the growing uterus and “walling off” of the infection becomes increasingly unlikely resulting in appendiceal rupture with widespread peritonitis [5].

Appendicitis also increases the likelihood of abortion or premature labor, especially if peritonitis develops. In the present study, there was no fetal loss and there was only one case of premature labor (37th week) occurring on the second postoperative day. The effects of surgical trauma on the fetal, placental and uterine elements, lasts for approximately one week after appendectomy (11).
Many conditions in pregnancy may simulate or be simulated by appendicitis; ovarian tumor with twisted pedicle, salpingitis, ectopic pregnancy, angular pregnancy, pyelitis, cholecystitis, duodenal ulcer and myoma undergoing red degeneration. If acute appendicitis can not be ruled out in the face of reasonably definite symptoms and signs, early appendectomy should be carried out [4], regardless of the stage of gestation. A negative appendectomy is justifiable keeping in view the morbidity and mortality associated with the impending risk of perforated appendix. It is also important that both hypoxia and hypotension are avoided during the operation and the period of recovery. The patients were given postoperative antibiotic cover against aerobes and anaerobes of the gut and tocolysis but even then one of the patients went into pre-term labor and subsequent delivery. Thus, appendectomy can precipitate the onset of labor in a small number of pregnant women.

The result of maternal and fetal outcome in the present study was 100% as it was carried out in a tertiary care set-up but one can expect that the outcome would have been different if the study were carried out at a place with fewer medical facilities. Prompt surgical intervention has helped prevent maternal and fetal loss in previous studies (12, 13) and our series confirms this. Admittedly, the number of patients in the present study was too small to draw conclusions. Further work is in progress to gather information based on a larger sample size than reviewed in the present study.

**Conclusion**

Our study showed that nausea, vomiting and abdominal pain were commonest presenting features of acute appendicitis in pregnant women. Two perforations were encountered. A combined obstetrical and surgical approach with early decision of surgery by giving the patient the benefit of doubt resulted in maternal and fetal safety.
TABLE 1. SYMPTOMS IN RELATION TO DURATION OF PREGNANCY

N=11

<table>
<thead>
<tr>
<th>PRESENTING SYMPTOMS</th>
<th>NO. OF CASES (%)</th>
<th>GESTATIONAL …..NO. OF CASES</th>
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<tbody>
<tr>
<td>Nausea/ Vomiting</td>
<td>09 (81)</td>
<td>3&lt;sup&gt;rd&lt;/sup&gt; trimester 07</td>
</tr>
<tr>
<td>Fever</td>
<td>02 (18)</td>
<td>3&lt;sup&gt;rd&lt;/sup&gt; trimester 02</td>
</tr>
<tr>
<td>Pain in right iliac fossa</td>
<td>03 (27)</td>
<td>2nd trimester 02</td>
</tr>
<tr>
<td>Pain in right hypochondrium</td>
<td>03 (27)</td>
<td>2nd trimester 03</td>
</tr>
<tr>
<td>Pain in right flank</td>
<td>02 (18)</td>
<td>2&lt;sup&gt;nd&lt;/sup&gt; trimester 02</td>
</tr>
<tr>
<td>Generalized pain</td>
<td>02 (18)</td>
<td>3&lt;sup&gt;rd&lt;/sup&gt; trimester 02</td>
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TABLE 2. PHYSICAL SIGNS AND RESULTS OF INVESTIGATIONS AND OPERATIONS N=11

<table>
<thead>
<tr>
<th>DIAGNOSIS</th>
<th>NO. OF PATIENTS</th>
<th>(%)</th>
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<tbody>
<tr>
<td>Guarding &amp; rebound tenderness</td>
<td>8 (72%)</td>
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</tr>
<tr>
<td>Leukocytosis: 13000/mm³ 10400/mm³ 7900/mm³</td>
<td>8 (72%)</td>
<td></td>
</tr>
<tr>
<td>Fever</td>
<td>2 (18%)</td>
<td></td>
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<tr>
<td>Suggestive USG</td>
<td>4 (36%)</td>
<td></td>
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<tr>
<td>Fetal distress</td>
<td>None</td>
<td></td>
</tr>
<tr>
<td>Negative appendectomy</td>
<td>1 (9%)</td>
<td></td>
</tr>
<tr>
<td>Non-perforated appendix</td>
<td>8 (72%)</td>
<td></td>
</tr>
<tr>
<td>Perforated appendix</td>
<td>2 (18%)</td>
<td></td>
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</tbody>
</table>

References

5. Hodjati H, Kazerooni T. Location of the appendix in the gravid patient: re-evaluation of the
established concept. Int J Gynecol Obstet 2003;81:245-7


