

## **Successful non-surgical management of acute, uncomplicated appendicitis in pregnancy: A case report**

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**Keywords:** Acute appendicitis, pregnancy, non-surgical management

### **Abstract**

*Acute appendicitis during pregnancy is one of the most common non-obstetric indications for surgery during pregnancy. Prompt surgical intervention for appendicitis is considered the standard of care. However, data on the utility of surgical management of uncomplicated cases of appendicitis is inconclusive and effectiveness of non-surgical management is currently understudied. We present a case that provides evidence for successful, antibiotic management of uncomplicated appendicitis as a means to reduce the burden of surgical complications on the pregnant population. This article also offers a critical analysis of current standard of care and assesses feasibility of nonsurgical management of acute, uncomplicated appendicitis in pregnancy for well-selected patients.*

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### **Introduction**

Acute appendicitis during pregnancy is one of the most common non-obstetric indications for surgery during pregnancy.<sup>1</sup> Confirmed cases of acute appendicitis impact approximately 1/800-

1/1500 of pregnancies.<sup>2</sup> Prompt surgical intervention for appendicitis is considered the standard of care. However, data on the utility of surgical management of uncomplicated cases of appendicitis, defined as inflamed but grossly intact, non-gangrenous, non-suppurative appendix without associated abscess or peritonitis, is inconclusive. This is particularly true in late pregnancy when the challenges of surgery during this time can lead to maternal and fetal complications.

Attempts at non-surgical management of uncomplicated appendicitis in the general population have been gaining popularity, and this paper explores conservative management in the pregnant population. Here, we describe a patient who presented with acute appendicitis in the third trimester and underwent antibiotic treatment that resulted in a normal pregnancy and spontaneous delivery without ante- or post-partum recurrence. This case may be used in support of conservative management of acute appendicitis to avoid the risks of surgery and associated maternal and fetal complications in late

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pregnancy.

### **Case**

A 20-year-old G3P0110 female at 31 weeks and 6 days gestation presented to the Labor and Delivery unit with a one-day history of right lower quadrant abdominal pain, nausea, and vomiting. She also noted persistent pain that felt like severe menstrual cramping, refractory to Tylenol. She reported feeling febrile but denied dysuria, flank pain, diarrhea, or constipation. She endorsed positive fetal movement, and denied vaginal bleeding, contractions, or loss of fluid at that time. Her medical history was complicated by history of severe pre-eclampsia, history of third trimester neonatal demise, and short interval pregnancy.

On admission, the patient was noted to be tachycardic and febrile to 38.3 degrees Celsius, with labs significant for mild leukocytosis. Respiratory panel, urine and blood cultures were negative, and lipase, amylase, and LFTs were within normal limits. Physical exam revealed mildly tender left lower quadrant and suprapubic regions of abdomen, positive Rovsing's sign, negative Murphy's sign, and negative costovertebral angle and fundal tenderness. Fetal heart rate tracing was reactive at this time. An abdominal ultrasound was obtained but the appendix was not visualized. This was followed by an MRI of the abdomen without contrast that showed a fluid-filled appendix ascending behind the uterus with the proximal appendix dilated up to 10 mm. A small appendicolith at appendiceal base was also observed as well as mild periappendiceal fat stranding. Surgery was subsequently consulted, who recommended

conservative, antibiotic management. Despite little data on this approach in pregnancy, recommendation was made due to patient resistance towards surgery, surgical risk in the third trimester, and difficult surgical access per MRI findings. Consequently, the patient was started on IV piperacillin and tazobactam for 36 hours with which her fever resolved. She was subsequently transitioned to oral cefuroxime and metronidazole and remained afebrile and with minimal abdominal pain throughout the rest of her admission. Non-stress tests were obtained daily and remained reactive during admission. Patient was discharged on hospital day 7 to complete a 5-day course of oral cefuroxime and metronidazole. At follow-up one week later, patient was asymptomatic and clinically stable. She continued to remain stable throughout the rest of pregnancy with only minimal and intermittent symptoms of dull, right lower quadrant abdominal pain.

The patient subsequently underwent induction of labor at 39 weeks gestation and had an uncomplicated, spontaneous vaginal delivery. She was evaluated by general surgery on post-partum day 1 with resolution of symptoms. Risks and benefits of surgery were discussed at that time, with ultimate recommendation to not undergo interval appendectomy. A decision was made to re-evaluate need for appendectomy after 8 weeks post-partum. The rest of her postpartum course was uneventful, and patient was discharged on hospital day two.

### **Discussion**

Non-surgical management of acute, uncomplicated appendicitis has gained recent interest. To date, six randomized control studies have evaluated antibiotic

versus surgical management of acute, uncomplicated appendicitis in the general population.<sup>3-8</sup> Results from these studies have shown that up to 90% of patients are able to avoid surgery during initial admission, and 70% are able to avoid surgery during the first year.<sup>4</sup> Additionally, conservative therapy has shown favorable recurrence rates.<sup>9, 10</sup> One study looking at recurrence in a cohort of patients who favorably responded to antibiotics on presentation, demonstrated a cumulative probability for relapse of appendicitis requiring appendectomy of 0.09 and 0.13 at 1 and 5 year follow-up time periods respectively.<sup>10</sup> Despite these promising results, acceptance of the non-operative approach to management has not been widely accepted due to limited data in non-inferiority trials and risk for recurrent appendicitis.<sup>4, 5</sup> Study of conservative management in the obstetric population is also promising yet limited. A 6-year prospective observational study to assess conservative management of uncomplicated, simple appendicitis in 1st and 2nd trimester pregnant women showed 25% (5/20) failure to initial antibiotic treatment.<sup>11</sup>

Appendicitis during pregnancy is diagnostically challenging due to pathologic features that can mimic normal physiologic changes in pregnancy and limitations in diagnostic imaging.<sup>12</sup> Although clinical presentation between pregnant and non-pregnant women with presumed acute appendicitis have shown to be similar, this is less likely in late pregnancy.<sup>12-13</sup> Therefore, risk of complications due to misdiagnosis and risk of ruptured appendix and fetal mortality are particularly worrisome, and surgical intervention has remained mainstay treatment for pregnant women as a

result.<sup>12,13</sup>

The negative laparotomy rate (20-35%) has been generally accepted due to difficulties of diagnosis in pregnancy and risk of fetal mortality with appendicular perforation.<sup>14, 15</sup> However, surgical intervention does not come without its own set of concerns. Risks such as preterm labor, uterine injury, decrease in uteroplacental blood flow due to increase in intraabdominal pressure, as well as concerns for effects of pneumoperitoneum on fetal physiology and fetal acidosis, should all be considered.<sup>16</sup> Additionally, animal models studying the impact of anesthetic agents during the third trimester have demonstrated potential for fetal neuronal and glial cell death.<sup>17</sup>

New data has also emerged regarding negative appendectomy and rates of fetal loss. One large population-based study demonstrated that the rate of negative appendectomy was higher compared to non-pregnant women and posed 23% risk for fetal loss in those with a normal appendix.<sup>15</sup> Additionally, it is unclear how antibiotic therapy followed by surgery due to treatment failure impacts fetal loss.

The first reported case of successful conservative treatment of uncomplicated appendicitis in pregnancy was described by Yefet and colleagues in 2013.<sup>18</sup> The patient was diagnosed at 23.5 weeks of gestation and was non-operatively managed due to patient refusal of surgery. She was treated with 3-day IV Gentamycin and Metronidazole followed by 14-day course of amoxicillin/clavulanic acid and had an uncomplicated course of pregnancy.<sup>18</sup> In this study, the antibiotics chosen were similar to what has previously been used

in cases of non-pregnant acute appendicitis and are widely considered safe to use in pregnancy.<sup>19</sup>

Another consideration in the implementation of conservative management of acute appendicitis is improvement of diagnostic accuracy.<sup>20</sup> CT is considered the gold standard in non-obstetric patients. However, the risk of radiation to mother and fetus are considered too harmful. Ultrasound followed by MRI has been shown to improve diagnostic accuracy and may help alleviate hesitation surrounding conservative management.<sup>20</sup> Ultrasound has been shown to be safe in pregnancy but has been shown to be limited in effectiveness in visualizing the appendix.<sup>21, 22</sup> One study showed that ultrasound visualized the appendix in only 7% of cases with 18% sensitivity and 99% specificity.<sup>22</sup> MRI, on the other hand, has been shown to have a greater sensitivity (100%) and specificity (98%) while posing minimal risk of radiation to mother and fetus. As a result, one study considers MRI as gold standard in diagnosis of appendicitis in pregnant women with inconclusive ultrasound.<sup>23</sup> The patient described in this case report underwent a similar diagnosis, and likely helped to further confidence in our decision to pursue conservative versus surgical management.

However, there may be situations where an MRI is not readily available and ultrasound results are inconclusive. One study assessed the utility of low dose CT with oral contrast in such settings and found that a low dose CT protocol was sufficient to assess or rule out the diagnosis of appendicitis without further imaging in 83% of patients.<sup>24</sup> Although this possesses concern for fetal radiation, it is assumed that a single-pass

CT scan of the abdomen and pelvis results in a 25 mGy exposure which increases the risk of childhood cancer by approximately 1%, a risk that can be weighed in the context of an individual patient case.<sup>25</sup>

In conclusion, this case contributes to growing evidence for feasibility of nonsurgical management of acute, uncomplicated appendicitis in pregnancy for well-selected patients, particularly in late pregnancy when surgery is more technically challenging. Further studies must be completed to both critically assess safety of conservative management and to also determine optimal class and duration of antibiotics to be used in managing appendicitis during pregnancy.

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