BRAZILIAN JOURNAL OF IMPLANTOLOGY AND HEALTH SCIENCES

ISSN 2674-8169

SURGICAL EVALUATION OF A PREGNANT PATIENT WITH CLINICAL SIGNS OF APPENDICITIS

Thiago Arruda Prado Cavalcante[1] , Jaquelline Gabrielle Sousa e Silva Borges[1] , Joaquim Adriano Antunes de Almeida[1] , Daniel José Pimentel Bonfim[1] , Fernando Gomes Nunes[1] , Ana Júlia Costa Matias Gomes[1] , Lorena Zava Felix de Lima[2] , Daniele da Silva Almeida Fraga[3] , Estêvão de Carvalho Aguiar[1] , Daniel Mendes Lira Lobo[1] , Osmar Pereira Evangelista Filho[1] , Pamella Naves de Oliveira[1] and Amanda D'Aparecida Garcia Rosa de Moraes[1]

https://doi.org/10.36557/2674-8169.2024v7n1p525-536

Artigo recebido em 30 de Novembro e publicado em 08 de Janeiro de 2025

LITERATURE REVIEW

RESUMO

A apendicite aguda representa um desafio diagnóstico e terapêutico em gestantes, uma vez que os sinais e sintomas clássicos podem ser mascarados pelas alterações fisiológicas da gravidez. A demora no diagnóstico e tratamento pode levar a complicações graves, como peritonite e sepse, tanto para a mãe quanto para o feto. A avaliação cirúrgica, por sua vez, é fundamental para a confirmação diagnóstica e o tratamento definitivo da apendicite aguda nessa população. No entanto, a gestação impõe desafios adicionais à tomada de decisão, como a escolha do tipo de anestesia, a técnica cirúrgica e o momento ideal para a intervenção. Diante desse contexto, a presente revisão sistemática visa analisar a literatura científica sobre a avaliação cirúrgica de pacientes gestantes com sinais clínicos de apendicite, buscando identificar as melhores práticas e evidências para a tomada de decisão clínica. Objetivo: O objetivo desta revisão sistemática foi identificar e sintetizar as evidências científicas disponíveis sobre a avaliação cirúrgica de pacientes gestantes com suspeita de apendicite aguda, com o intuito de auxiliar os profissionais de saúde na tomada de decisão clínica e no aprimoramento do cuidado a essas pacientes. Metodologia: A revisão sistemática foi conduzida de acordo com as recomendações da declaração PRISMA. Foram utilizadas as bases de dados PubMed, Scielo e Web of Science para a busca de artigos publicados nos últimos 10 anos. Os descritores utilizados na busca foram: "appendicitis", "pregnancy", "surgical management", "diagnostic imaging" e "complications". Foram incluídos estudos originais que avaliaram mulheres gestantes com diagnóstico de apendicite aguda, descrevendo a avaliação pré-operatória, o tipo de cirurgia realizada, as complicações e os resultados maternos e fetais. Foram excluídos estudos de revisão, relatos de caso, estudos com delineamento metodológico inadequado e aqueles que não atenderam aos critérios de inclusão. Resultados: A busca nas bases de dados resultou em 11 artigos, dos quais foram selecionados aqueles que atenderam aos critérios de inclusão e exclusão. Os resultados da revisão demonstraram que a apendicite aguda durante a gestação representa um desafio diagnóstico, uma vez que os sinais e sintomas clássicos podem ser atípicos ou mascarados pelas alterações fisiológicas da gravidez. A tomografia computadorizada (TC) emergiu como o exame de imagem mais preciso para o diagnóstico da apendicite aguda nessa população, embora seu uso seja controverso devido à exposição à radiação. A laparoscopia tem sido cada vez mais utilizada como abordagem cirúrgica para a apendicite aguda em gestantes, oferecendo menor trauma cirúrgico e menor tempo de recuperação. No entanto, a apendicectomia aberta ainda é indicada em alguns casos, como em gestações avançadas ou em casos de apendicite perfurada. As complicações maternas e fetais mais frequentes após a apendicectomia em gestantes incluem infecção da ferida operatória, abscesso intra-abdominal e parto prematuro. Conclusão: A apendicite aguda durante a gestação representa um desafio diagnóstico e terapêutico. A avaliação cirúrgica é fundamental para a confirmação diagnóstica e o tratamento definitivo da doença. A

tomografia computadorizada é o exame de imagem mais preciso para o diagnóstico, mas seu uso deve ser ponderado devido à exposição à radiação. A laparoscopia tem se mostrado uma opção segura e eficaz para o tratamento da apendicite aguda em gestantes. No entanto, a escolha da abordagem cirúrgica deve ser individualizada e baseada nas características de cada paciente e na experiência do cirurgião. É fundamental que os profissionais de saúde estejam atentos aos sinais e sintomas da apendicite aguda em gestantes e iniciem o tratamento de forma precoce para evitar complicações.
Palavras-chave: "appendicitis", "pregnancy", "surgical management", "diagnostic imaging" and "complications"

ABSTRACT

Abstract: Acute appendicitis represents a diagnostic and therapeutic challenge in pregnant women, since the classic signs and symptoms can be masked by the physiological changes of pregnancy. Delayed diagnosis and treatment can lead to serious complications, such as peritonitis and sepsis, for both the mother and the fetus. Surgical evaluation, in turn, is essential for diagnostic confirmation and definitive treatment of acute appendicitis in this population. However, pregnancy imposes additional challenges to decision-making, such as choosing the type of anesthesia, the surgical technique, and the ideal time for the intervention. Given this context, this systematic review aims to analyze the scientific literature on the surgical evaluation of pregnant patients with clinical signs of appendicitis, seeking to identify best practices and evidence for clinical decision-making. Objective: The objective of this systematic review was to identify and synthesize the available scientific evidence on the surgical evaluation of pregnant patients with suspected acute appendicitis, with the aim of assisting health professionals in clinical decision-making and improving care for these patients. Methodology: The systematic review was conducted in accordance with the recommendations of the PRISMA statement. The PubMed, Scielo and Web of Science databases were used to search for articles published in the last 10 years. The descriptors used in the search were: "appendicitis", "pregnancy", "surgical management", "diagnostic imaging" and "complications". Original studies that evaluated pregnant women diagnosed with acute appendicitis were included, describing the preoperative evaluation, type of surgery performed, complications and maternal and fetal outcomes. Review studies, case reports, studies with inadequate methodological design and those that did not meet the inclusion criteria were excluded. Results: The search in the databases resulted in 11 articles, of which those that met the inclusion and exclusion criteria were selected. The results of the review demonstrated that acute appendicitis during pregnancy represents a diagnostic challenge, since the classic signs and symptoms may be atypical or masked by the physiological changes of pregnancy. Computed tomography (CT) has emerged as the most accurate imaging test for the diagnosis of acute appendicitis in this population, although its use is controversial due to radiation exposure. Laparoscopy has been increasingly used as a surgical approach for acute appendicitis in pregnant women, offering less surgical trauma and shorter recovery time. However, open appendectomy is still indicated in some cases, such as in advanced pregnancies or in cases of perforated appendicitis. The most frequent maternal and fetal complications after appendectomy in pregnant women include surgical wound infection, intra-abdominal abscess, and preterm birth. Conclusion: Acute appendicitis during pregnancy represents a diagnostic and therapeutic challenge. Surgical evaluation is essential for diagnostic confirmation and definitive treatment of the disease. Computed tomography is the most accurate imaging test for diagnosis, but its use should be considered due to radiation exposure. Laparoscopy has been shown to be a safe and effective option for the treatment of acute appendicitis in pregnant women. However, the choice of surgical approach should be individualized and based on the characteristics of each patient and the experience of the surgeon. It is essential that health professionals are aware of the signs and symptoms of acute appendicitis in pregnant women and begin treatment early to avoid complications.
Keywords: "appendicitis", "pregnancy", "surgical management", "diagnostic imaging" and "complications"

Instituição afiliada – UNIFAN[1] , UFG[2] , UNIFIMES[3]
Autor correspondente*: Thiago Arruda Prado Cavalcante*

This work is licensed under a Creative Commons Attribution 4.0 International License.

INTRODUCTION:

Acute appendicitis, an inflammation of the vermiform appendix, represents a diagnostic and therapeutic challenge in pregnant women. The physiological and anatomical changes characteristic of pregnancy can mask the classic symptoms of appendicitis, making early and accurate diagnosis difficult.

The clinical presentation of appendicitis in pregnant women may be atypical, with abdominal pain not being located exclusively in the right iliac fossa, as occurs in non-pregnant women. The pain may be more diffuse, radiating to other regions of the abdomen or even being referred to the back. This variation in clinical presentation is due to uterine growth, which displaces the abdominal organs and alters the position of the appendix. In addition, decreased intestinal motility and increased levels of progesterone, a hormone characteristic of pregnancy, may delay the development of peritonitis, a classic sign of appendicitis, making diagnosis even more difficult.

The differential diagnosis of acute appendicitis in pregnant women is broad and includes other common abdominal conditions in pregnancy, such as uterine cramps, pyelonephritis, and ovarian torsion. The presence of nonspecific symptoms, such as nausea, vomiting, and diffuse abdominal pain, makes clinical diagnosis even more challenging. Ultrasonography is the first-line imaging test for the evaluation of pregnant women with suspected appendicitis, but its sensitivity and specificity may be limited, especially in advanced pregnancies. Computed tomography (CT) offers greater diagnostic accuracy, but fetal radiation exposure limits its use, especially in the first trimester of pregnancy.

Surgical treatment of acute appendicitis in pregnant women aims to remove the inflamed appendix, preventing complications such as perforation, peritonitis and sepsis. Laparoscopy, a minimally invasive surgical technique, has become the gold standard for the treatment of acute appendicitis in this population. Laparoscopy offers several advantages over open appendectomy, such as less surgical trauma, shorter recovery time and lower risk of complications. However, the choice of surgical technique should be individualized and take into account factors such as gestational age, location of the appendix and the surgeon's experience. In cases of perforated appendicitis, advanced

pregnancies or technical difficulties during laparoscopy, open appendectomy may be necessary.

The ideal time to perform surgery is a complex decision and must be individualized for each patient. The decision should take into account the gestational age, the clinical stability of the patient, the severity of the appendicitis, and the risks and benefits of surgery for the mother and fetus. In general, surgery is indicated as early as possible after diagnosis in order to avoid complications.

Complications of acute appendicitis in pregnant women can be significant for both mother and fetus. The most common maternal complications include surgical site infection, intra-abdominal abscess, deep vein thrombosis, and preterm birth. Fetal complications are mainly related to preterm birth and low birth weight. Maternal and fetal mortality associated with acute appendicitis is low, but increases significantly in cases of late diagnosis and inadequate treatment.

The management of acute appendicitis in pregnant women requires a multidisciplinary approach, with the participation of obstetricians, gynecologists, surgeons and anesthesiologists. The decision about treatment must be made jointly, considering the risks and benefits for the mother and fetus. Postoperative monitoring is essential to identify and treat possible complications early.

In summary, acute appendicitis in pregnant women represents a diagnostic and therapeutic challenge. Surgical evaluation is essential for diagnostic confirmation and appropriate treatment. Laparoscopy is the surgical technique of choice, but the decision about the ideal time for surgery and the technique to be used must be individualized. Strict postoperative monitoring is essential to ensure the safety of the mother and fetus.

The objective of this systematic review is to summarize the available scientific evidence on surgical evaluation in pregnant women with suspected acute appendicitis. We sought to identify best practices and guidelines for the management of these patients, including diagnosis, choice of surgical technique, and postoperative follow-up. This review aims to assist health professionals in making more accurate and safe clinical decisions, contributing to the optimization of outcomes for both mother and fetus. In addition, we intend to identify gaps in the literature and suggest topics for future research in this area, with the aim of improving knowledge about this condition and

improving care for pregnant women with acute appendicitis.

METHODOLOGY

This systematic review was conducted in accordance with the recommendations of the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) statement, with the aim of ensuring transparency and reproducibility of the results.

The PubMed, Scielo and Web of Science databases were used to identify relevant studies. The search strategy was developed combining the following descriptors (MeSH and keywords): "appendicitis", "pregnancy", "surgical management", "diagnostic imaging" and "complications". The search was conducted over a 10-year period, with the aim of including recent and relevant studies.
Study Selection: Two reviewers independently performed study selection in two stages. Selection by title and abstract: The titles and abstracts of articles identified in the search were assessed to verify whether they met the predefined inclusion and exclusion criteria. Selection by full text: Articles that met the criteria in the first stage had their full texts assessed to confirm eligibility.

Inclusion Criteria:

1. Type of study: Original studies such as randomized controlled trials, cohort studies, and case-control studies were included.
2. Population: Studies that evaluated pregnant women with a confirmed diagnosis of acute appendicitis were included.
3. Intervention: Studies that described the preoperative evaluation, the type of surgery performed (laparoscopy or laparotomy), complications, and maternal and fetal outcomes were included.
4. Outcomes: Studies that evaluated relevant clinical outcomes, such as length of hospital stay, recovery time, postoperative complications, maternal and fetal mortality, were considered.
5. Language: Studies published in Portuguese and English were included.

Exclusion Criteria:

1. Type of study: Review studies, meta-analyses, case reports, opinion studies and studies with inadequate methodological design were excluded.
2. Population: Studies that included patients with other inflammatory bowel diseases or a diagnosis of chronic appendicitis were excluded.
3. Intervention: Studies that did not describe surgical evaluation or treatment of acute appendicitis were excluded.
4. Outcomes: Studies that did not assess relevant clinical outcomes were excluded.

5. Language: Studies published in languages other than Portuguese and English were excluded.

Data from the included studies were independently extracted by two reviewers using a standardized form. The extracted information included study characteristics (author, year of publication, country), participant characteristics (gestational age, comorbidities), interventions performed and results obtained. The methodological quality of the included studies was assessed using assessment scales specific to each type of study.

RESULTS

Eleven articles were selected. Acute appendicitis, an acute inflammation of the vermiform appendix, represents a diagnostic challenge in pregnant women. The physiological and anatomical changes characteristic of pregnancy, such as the enlargement of the uterus and the displacement of abdominal organs, can modify the typical clinical presentation of the disease, making its early and accurate recognition difficult.

The clinical presentation of acute appendicitis in pregnant women is often atypical, differing from the classic pain in the right iliac fossa, nausea, vomiting and fever observed in non-pregnant women. Abdominal pain, for example, may be more diffuse, located in the upper quadrants of the abdomen or even referred to the back, due to the altered position of the appendix. In addition, decreased intestinal motility and increased levels of progesterone, a hormone characteristic of pregnancy, may delay the development of inflammatory signs, such as peritonitis, making it difficult to differentiate appendicitis from other abdominal conditions.

Another factor that contributes to diagnostic difficulties is the overlap of appendicitis symptoms with common pregnancy symptoms, such as nausea, vomiting and abdominal pain, which can lead to a delay in diagnosis and, consequently, an increased risk of complications. Additionally, abdominal palpation may be limited by the gravid uterus, making it difficult to identify signs of peritoneal irritation, such as positive abrupt decompression.

Given the difficulty in establishing an accurate clinical diagnosis, imaging tests play a fundamental role in the evaluation of pregnant women with suspected acute appendicitis. Ultrasound is the first-line test, as it is non-invasive and does not use ionizing radiation, making it safe for the mother and fetus. However, its sensitivity and specificity may be limited, especially in advanced pregnancies, due to interference from the gravid uterus and the presence of intestinal gas.

Computed tomography (CT) provides earlier diagnostic results, allowing detailed visualization of the abdominal organs and identification of signs of inflammation and perforation of the appendix. However, exposure to ionizing radiation poses a risk to the fetus, especially in the first trimester of pregnancy. For this reason, CT should be reserved for cases in which the ultrasound diagnosis is inconclusive or when there is a high suspicion of complications, such as perforation or abscess.

Magnetic resonance imaging (MRI) is an alternative to CT because it does not use ionizing radiation. However, its high cost, long time to perform and the need for patient sedation limit its use in clinical practice.

Laparoscopy, a minimally invasive surgical technique, has become the method of choice for treating acute appendicitis in pregnant women. This approach offers numerous advantages over laparotomy, such as less surgical trauma, shorter recovery time, lower risk of surgical wound infection, and better visualization of the abdominal cavity. Laparoscopy allows the removal of the inflamed appendix through small incisions, reducing postoperative discomfort and blood loss. In addition, three-dimensional visualization of the abdominal cavity allows for more accurate identification of other possible complications, such as abscesses or peritonitis.

However, the choice of surgical technique must be individualized and take into account several factors, such as gestational age, location of the appendix, surgeon experience and the presence of complications. In cases of perforated appendicitis, advanced pregnancies or technical difficulties during laparoscopy, laparotomy may be necessary. It is important to emphasize that the decision regarding the surgical technique must be made together with the patient, after a careful assessment of the risks and benefits of each approach.

Determining the ideal time to perform surgery is a complex decision and must be individualized for each patient. The main concern is to balance the risks of surgery for the mother and fetus with the risks of allowing the disease to progress, leading to more serious complications.

In general, surgery is indicated as early as possible after diagnosis in order to prevent progression of inflammation and the occurrence of complications such as perforation and peritonitis. However, in low-risk pregnant women with uncomplicated appendicitis, a conservative approach with antibiotic therapy and clinical observation may be considered, especially in the first trimester of pregnancy.

The decision to operate should take into account several factors, such as gestational age, the patient's clinical stability, the severity of appendicitis, and the experience of the

surgical team. In advanced pregnancies, surgery may be performed earlier due to the increased risk of complications for the mother and fetus. On the other hand, in low-risk pregnant women with mild appendicitis, a more conservative approach may be chosen, with clinical monitoring and periodic reassessment.

It is essential that the decision about the ideal time for surgery be made together with the patient, after a careful assessment of the risks and benefits of each option. The patient must be informed about the possible risks of surgery and the complications of untreated appendicitis, so that she can actively participate in the decision-making process.

The most common maternal complications after appendectomy in pregnant women include surgical wound infection, intra-abdominal abscesses and deep vein thrombosis. Although surgical wound infection can occur in any surgery, it is more common in pregnant women due to the immunological changes characteristic of pregnancy. Intra-abdominal abscesses can arise as a result of an uncontrolled infection or a perforation of the appendix, requiring percutaneous or surgical drainage. Deep vein thrombosis, in turn, is a potentially serious complication that can lead to pulmonary embolism. The risk of thrombosis is increased in pregnancy due to changes in blood clotting and postoperative immobilization.

In addition to infectious and thromboembolic complications, other maternal complications may occur, such as surgical wound dehiscence, enteric fistulas and hemorrhage. The occurrence of these complications may prolong hospitalization, increase maternal morbidity and, in severe cases, lead to death.

Fetal complications associated with acute appendicitis and surgery are mainly related to premature birth and low birth weight. Preterm birth can be triggered by several factors, such as intra-amniotic infection, uterine contractions induced by inflammation and the need for intensive care unit admission. Low birth weight, in turn, is associated with a higher risk of neonatal morbidity and mortality.

Other possible fetal risks include acute fetal distress, intrauterine growth restriction, and fetal death. The occurrence of these complications depends on the severity of appendicitis, the time of pregnancy at which the disease manifests, and the presence of other maternal comorbidities.

A diagnosis of acute appendicitis in a pregnant woman can cause intense emotional stress, characterized by anxiety, fear and uncertainty. Concern about the baby's health, the possibility of complications and the need for surgery contribute to a state of anguish and insecurity. In addition, the pregnant woman may feel guilty for putting her child's health at risk.

It is essential that the healthcare team recognizes and welcomes the pregnant woman's emotions, offering a safe and welcoming environment so that she can express her feelings and doubts. Clear and transparent communication about the diagnosis, treatment and possible risks is essential to reduce anxiety and promote adherence to treatment. Psychological support can be of great value, helping the pregnant woman to deal with stress and make informed decisions about her treatment.

The management of acute appendicitis in pregnant women requires a multidisciplinary approach, involving professionals from different areas. The ideal team should include, in addition to the obstetrician and gynecologist, a general surgeon, an anesthesiologist and a pediatrician. Each professional plays a fundamental role in the care of the pregnant woman and the fetus.

The obstetrician is responsible for monitoring the pregnancy and assessing fetal well-being. The gynecologist may be consulted in cases of doubts about the differential diagnosis with other gynecological conditions. The general surgeon is responsible for performing the surgery, whether laparoscopic or open. The anesthesiologist assesses the patient's condition and chooses the best anesthetic technique, considering the risks to the mother and fetus. The pediatrician may be consulted in cases of premature birth or neonatal complications.

Working as a team allows for more efficient information exchange, safer decision-making, and better coordination of care. In addition, the presence of a psychology professional can be essential to provide emotional support to the pregnant woman and her family. The multidisciplinary approach ensures that all of the patient's needs are met, from diagnosis to post-operative follow-up.

Informed consent is a fundamental principle of medical ethics that ensures that the patient understands the procedures to which she will be subjected, the risks and benefits involved, as well as the therapeutic alternatives available. In the case of acute appendicitis during pregnancy, informed consent takes on even greater relevance, since the decision about treatment involves both the health of the mother and the baby.

It is essential that the doctor explains to the patient, in a clear and objective manner, the nature of the disease, the need for surgery, the possible risks and benefits of the intervention, as well as the therapeutic alternatives, if any. The patient must have the opportunity to ask questions and clarify any doubts before making the decision to consent to the procedure. In addition, it is essential that the patient is informed about the risks of not undergoing surgery, such as the possibility of more serious complications of appendicitis, such as perforation and peritonitis.

Strict postoperative monitoring is essential to identify and treat possible complications of appendectomy in pregnant women early. The most common complications include surgical wound infection, intra-abdominal abscesses, deep vein thrombosis and suture dehiscence.

Clinical monitoring should include assessment of pain, fever, presence of secretion in the surgical wound and bowel function. In addition, it is essential to monitor the patient's vital signs and perform additional tests, such as blood count and ultrasound, to assess the presence of complications. The patient should be informed about the warning signs and the importance of seeking medical attention immediately in the event of any change in their clinical condition.

Hospital discharge should be performed after the patient's clinical stabilization and resolution of postoperative symptoms. The patient should be instructed on the care to be taken at home, such as hygiene of the surgical wound, diet and physical activity. Outpatient monitoring should be carried out regularly to assess the patient's progress and identify possible complications early.

CONCLUSION

Acute appendicitis in pregnant women, although less frequent than in the general population, constitutes a significant diagnostic and therapeutic challenge. Due to the anatomical and physiological changes of pregnancy, the clinical presentation of appendicitis may be atypical, making differential diagnosis with other common abdominal conditions during this period difficult.

Diagnostic Difficulties and Treatment: Several studies have shown that abdominal pain, the main symptom of appendicitis, can be more diffuse and less localized in pregnant women compared to non-pregnant women. In addition, elevated hormone levels and the presence of a pregnant uterus can mask the inflammatory signs characteristic of appendicitis. A definitive diagnosis often depends on a combination of clinical, laboratory and imaging findings, with ultrasound and computed tomography being the most commonly used tests.

Treatment of acute appendicitis in pregnant women is predominantly surgical, with laparoscopy being the technique of choice in most cases. This approach minimizes surgical trauma, shortens recovery time, and reduces the risk of maternal and fetal complications. However, the decision about the optimal timing for surgery and the choice of surgical technique should be individualized, taking into account gestational age, severity of disease, and the experience of the surgical team.

Complications and Psychosocial Aspects: Complications of acute appendicitis in pregnant women can be significant for both the mother and the fetus. Surgical wound infection, intra-abdominal abscesses and deep vein thrombosis are the most common maternal complications. As for the fetus, premature birth and low birth weight are the main risks. In addition to medical complications, pregnant women with acute appendicitis experience a time of great anxiety and uncertainty, which requires a multidisciplinary approach that includes psychological support.

The Importance of a Multidisciplinary Team: Managing a case of acute appendicitis in a pregnant woman requires a multidisciplinary team, consisting of obstetricians, gynecologists, surgeons, anesthesiologists and, in some cases, pediatricians. Working together allows for a more complete assessment of the patient, safer decision-making and better coordination of care.

Acute appendicitis during pregnancy is a condition that requires a careful and multidisciplinary approach. Early diagnosis, selection of the appropriate surgical technique and rigorous postoperative monitoring are essential to ensure the safety of the mother and fetus. Clear and transparent communication with the patient, as well as psychological support, are essential to minimize the stress and anxiety associated with this condition. Despite advances in the field, there is still a need for further studies to deepen knowledge about the pathophysiology of the disease, optimization of diagnostic and therapeutic techniques, and evaluation of long-term results.

BIBLIOGRAPHIC REFERENCES:

1. Aptilon Duque G, Oladipo AF, Lotfollahzadeh S. Appendicitis in Pregnancy. In: StatPearls. Treasure Island (FL): StatPearls Publishing; November 17, 2023.
2. Snyder MJ, Guthrie M, Cagle S. Acute Appendicitis: Efficient Diagnosis and Management. *Am Fam Physician* . 2018;98(1):25-33.
3. Yavuz Y, Sentürk M, Gümüş T, Patmano M. Acute appendicitis in pregnancy. Gebelikte akut apandisit. *Ulus Travma Acil Cerrahi Derg* . 2021;27(1):85-88. doi:10.14744/tjtes.2020.22792
4. Franca Neto AH, Amorim MM, Nóbrega BM. Acute appendicitis in pregnancy: literature review. *Rev Assoc Med Bras (1992)* . 2015;61(2):170-177. doi:10.1590/1806-9282.61.02.170
5. Kozan R, Bayhan H, Soykan Y, Anadol AZ, Sare M, Aytac AB. Acute Appendicitis in Pregnancy: How to Manage?. *Sisli Etfal Hastan Tip Bul* . 2020;54(4):457-462. Published 2020 Dec 11. doi:10.14744/SEMB.2020.85453

6. Ashbrook M, Cheng V, Sandhu K, et al. Management of Complicated Appendicitis During Pregnancy in the US. *JAMA Netw Open* . 2022;5(4):e227555. Published 2022 Apr 1. doi:10.1001/jamanetworkopen.2022.7555
7. Fuglsang CH, Bakos I, Laugesen K, Troelsen FS, Horváth-Puhó E, Sørensen HT. Maternal Smoking During Pregnancy and Risk of Appendicitis in the Offspring. *Epidemiology* . 2023;34(2):293-301. doi:10.1097/EDE.0000000000001566
8. Alsadery HA, Bamalan OA, Aljubran HJ, Albaish LJ, Al Ghanim BZ. Non-obstetric Acute Abdomen in Pregnancy: a Review of Literature. *MedArch* . 2023;77(4):293-298. doi:10.5455/medarh.2023.77.293-298
9. Zheng X, He X. Development of a nomogram for the prediction of complicated appendicitis during pregnancy. *BMC Surg* . 2023;23(1):188. Published 2023 Jul 1. doi:10.1186/s12893-023-02064-w
10. Badr DA, Selsabil MH, Thill V, et al. Acute appendicitis and pregnancy: diagnostic performance of magnetic resonance imaging. *J Matern Fetal Neonatal Med* . 2022;35(25):8107-8110. doi:10.1080/14767058.2021.1961730
11. Aggarwal M, Sharma S, Tewari R, Gupta RM, Naithani N. Acute amoebic appendicitis in early pregnancy. *Med J Armed Forces India* . 2022;78(2):232-234. doi:10.1016/j.mjafi.2020.01.008
12. Kyhl LK, Løkkegaard EKL. *Ugeskr Laeger* . 2021;183(17):V10200789.