



## Laparoscopic appendectomy in pregnant women: A literature review

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### **ABSTRACT**

Acute appendicitis is the leading cause of non-obstetric surgery in pregnant women. In the past, the main conduct was to seek the least possible intervention, at least until reaching a more advanced gestational age. However, recent studies show that early intervention has several benefits, both maternal and fetal. Today, it is understood that regardless of the trimester in which the pregnancy is, the diagnosis and treatment need to be made as soon as possible, seeking to avoid future complications. The main therapeutic method is laparoscopic appendectomy. This literature review seeks to bring together the main knowledge present in recent years about the positive and negative points of laparoscopic appendectomy in pregnant women, seeking to understand if it is in fact the best method currently present for this type of situation.

**Keywords:** Appendicitis, Laparoscopic appendectomy, Pregnant woman.



## 1 INTRODUCTION

Acute appendicitis is often associated with poor outcomes during pregnancy, including miscarriage, preterm birth, and perinatal morbidity and mortality, particularly when there is a delay in both diagnosis and treatment (LEE et al., 2019)

This disease is the most common cause of non-obstetric surgery during pregnancy. The wide variety of causes of abdominal pain, together with the difficulty of diagnosis due to limitations in the use of some imaging equipment such as computed tomography (CT) for pregnant women, make both early diagnosis and treatment a challenge for any health team (ANGERAMO et al., 2021).

As the main diagnostic method, ultrasonography (USG) is used, which points out some suggestive findings for the acute abdomen: appendix dilation  $\geq 7$  mm, appendix incompressibility, wall edema, and local fat densification (ROTTENSTREICH et al., 2022).

Although non-contrast magnetic resonance imaging is also described as a promising option for defining the diagnosis in pregnant patients with suspected acute appendicitis, most hospitals still do not have this technology to be used in the emergency room (ROTTENSTREICH et al., 2022).

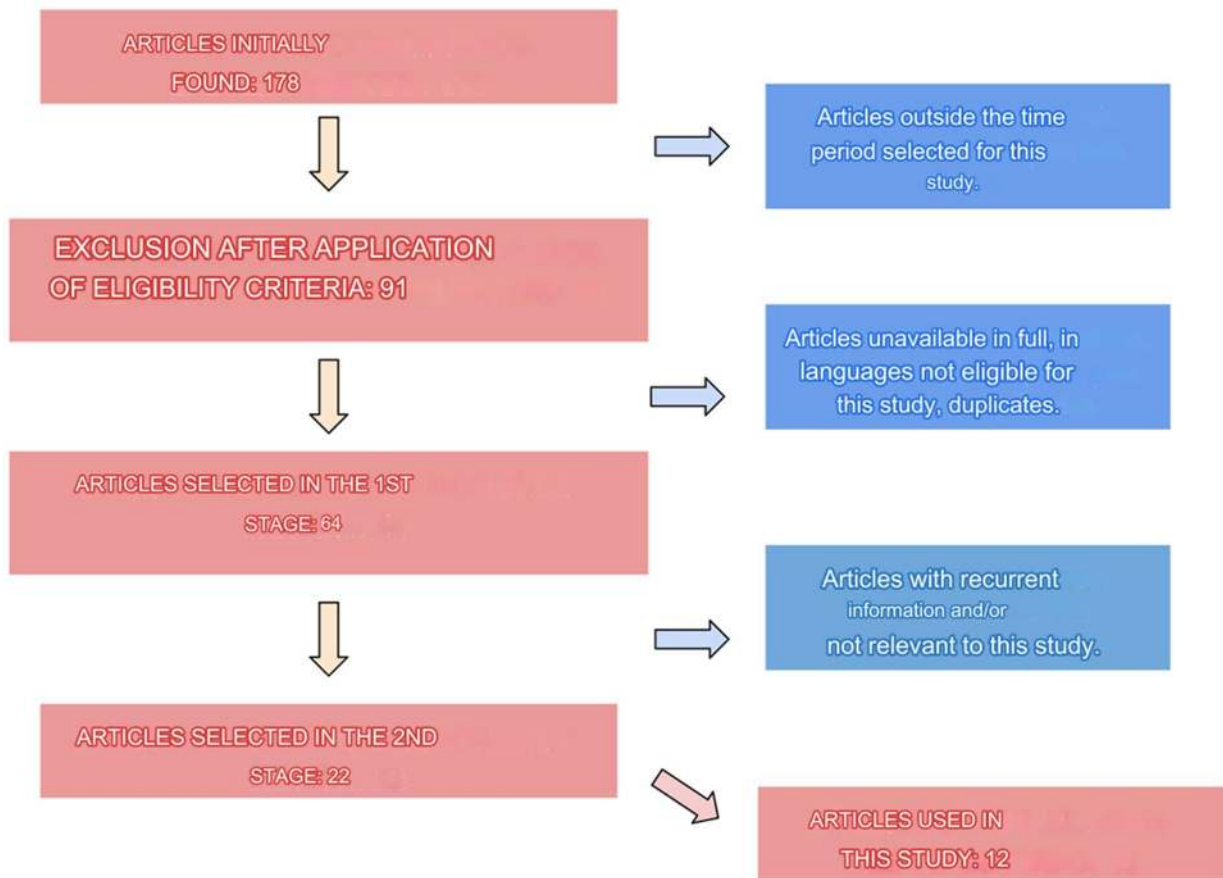
## 2 OBJECTIVE

The present study aims to review the most recent literature on the occurrence of acute appendicitis in pregnant women, with the main focus on understanding whether laparoscopic appendectomy is the best way to approach this disease.

## 3 METHODS

This study is characterized as a literature review, and is composed of articles found in electronic databases such as PubMed and Scielo. Articles written in Portuguese and English, published during the period from 2019 to 2024 and found from the descriptors "Appendectomy", "Pregnant", "Laparoscopic" and their corresponding terminologies in Portuguese were selected. They were crossed with the Boolean operator "AND". In addition to the previously mentioned criteria, the following inclusion criteria were also considered: articles available in full and articles with information pertinent to the study. The exclusion criteria were defined as: articles outside the selected time period, in languages other than Portuguese and English, unavailable in full, with information not pertinent to the topic addressed and duplicated.

Figure 1. Flowchart for the selection of articles used in this literature review.



#### 4 DISCUSSION

Early treatment is of paramount importance for a better prognosis, both obstetric and fetal, which has led several studies to place appendectomy as an option of choice for these cases. (KOZAN et al, 2020).

After the diagnosis is confirmed, the decision on the type of surgical approach to be performed will depend on the surgeon's experience and the availability of the necessary team and equipment (PEARL et al., 2017).

The duration of open and laparoscopic appendectomy is similar. Although laparoscopy requires more expensive tools and more experienced surgeons, studies have shown that due to the shorter postoperative hospital stay, hospital costs have been reduced and the level of patient satisfaction has increased (ZHANG et al., 2021).

A few years ago, the recommendation for approaching these patients who were not in an emergency situation was to postpone surgery during the first and third trimesters to minimize the risk of miscarriage and premature labor. Some authors suggested postponing the procedure until the gestational age limit of 26 to 28 weeks. Currently, these recommendations are not supported



and do not demonstrate good quality evidence. It is understood that the patient can undergo laparoscopic surgery in any trimester (PEARL et al., 2017).

Some of the advantages of the laparoscopic route apply to these surgeries performed in pregnant women, such as: shorter time to accept the oral diet, less need for analgesia, shorter in-hospital stay, and a faster return to daily activities (CHO et al., 2021).

Austin and Jaronczyk, 2021, published a case report where a patient in active labor arrived at the emergency department with severe, stabbing and constant pain in the lower right region of the abdomen, presenting no pain in other regions and denying associated symptoms such as vomiting and fever. It was verified that contractions were present, appearing every 5 minutes, with cervical dilation of 2 cm. An MRI was requested where appendicitis was found. After discussion between the obstetrician, the surgeon, the patient and her husband, it was decided to perform a laparoscopic appendectomy. After the successful surgery, the patient returned to the Obstetric Center for observation. Labor continued as expected and the patient had a normal delivery on the first day after surgery without complications, being discharged one day after delivery. (AUSTIN, 2021).

Most studies that cite the laparoscopic approach as the greatest holder of post-surgical risks also present large numbers of patients with pre-surgical complications, such as perforated appendix and peritonitis, so it is necessary to assess whether the risk stems from the technique or the complication of the disease (CHO et al., 2021).

According to Zhang et al, 2021, patients who underwent laparoscopic surgery had lower rates of operative site infection and returned to work more quickly than those approached laparotomy. In recent years, some clinical studies have shown that the two surgical modalities do not suggest significant differences in relation to obstetric outcomes.

Other advantages observed in laparoscopic appendectomy: lower fetal incidence of respiratory depression due to less use of analgesic drugs in the postoperative period, lower risk of maternal hypoventilation after the procedure, and lower risk of thromboembolic events in general. Better visualization of the abdominal quadrants in laparoscopy may also reduce the risk of uterine irritability due to a lower need for manipulation of this organ (PEARL et al., 2017).

Some studies indicate that laparoscopic appendectomy is associated with a higher incidence of fetal losses and preterm birth when compared to the open approach. These complications are thought to occur primarily due to the effects of the exposure method (pneumoperitoneum) (ROTTENSTREICH et al., 2022).



Pneumoperitoneum relies on CO<sub>2</sub> insufflation to provide a good view of the abdominal cavity. This increase in intra-abdominal pressure can decrease venous return and cardiac output, events that can compromise placental and fetal blood flow. The American Society of Gastrointestinal and Endoscopist Surgeons (SAGES) recommends in its protocols that the maximum pressure to be achieved while performing pneumoperitoneum should be 10-15 mmHg in pregnant women (YOO et al., 2016).

Another recommendation recommended by SAGES is that patients in the second and third trimesters of pregnancy should be positioned in the left lateral decubitus position on the operating table to avoid compression of the inferior vena cava by the dilated uterus. (GUŇKOVÁ et al, 2024).

There is also a potential risk of manipulation or even uterine perforation during the passage of the trochanters and consequently possible miscarriage. Increased abdominal pressure due to Trendelenburg position has also demonstrated risks to fetal vitality, due to maternal hypercapnia and hypoxemia (ZHANG et al., 2021).

At the same time, the incidence of acute false abdomen in pregnant women is higher than in the population of non-pregnant women in general, mainly due to the difficulties in diagnosis, which have already been mentioned. This circumstance causes a considerable variation in the incidence of this disease, from 5% to 50% (ZINGONE et al., 2015)(SEOK, et al, 2021).

A retrospective study conducted at the University Hospital of Ostrava evaluated pre- and postoperative outcomes among pregnant women who obtained a diagnosis of acute appendicitis during pregnancy. A total of 25 women were found in the period from January 2012 to December 2021, where 12 of them were under 23 weeks gestational age. Among these patients, 20 underwent laparoscopic appendectomy and the rest underwent open appendectomy, with the fetal mortality rate of the group equal to zero, concluding that there is no reason for the delay in surgical treatment, precisely to prevent possible complications that may lead to an increase in the length of hospital stay. to higher risks of thrombotics and a higher rate of fetal mortality. (GUŇKOVÁ et al, 2024).

## **5 FINAL CONSIDERATIONS**

Acute appendicitis in pregnancy can trigger several complications, both maternal and fetal. Early diagnosis and treatment are the key to a better prognosis. Among the studies analyzed, ultrasonography proved to be the most effective imaging method due to its cost-benefit ratio in this group of patients. As for treatment, laparoscopic appendectomy is the first option for most cases, even though it is related to some complications, which, as discussed in this study, may not



have a direct link with the procedure itself, but rather with other factors that may influence the time of surgery. The biggest difficulty for the procedure is to have a team trained to perform it, which limits the therapeutic possibilities on some occasions.



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