

TREATMENT OF ACUTE APPENDICITIS IN PEDIATRIC PATIENTS IN TIMES OF COVID-19

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Abstract: Introduction: The COVID-19 pandemic was declared by the World Health Organization on March 11, 2020, generating true chaos in the global health system which, to date, continues to receive new cases from new variants of the virus. However, conditions such as Acute Appendicitis (AA) have been neglected due to people's fear of exposing themselves to contamination, making it more serious and difficult to treat. **Objective:** To present the treatment for AA in pediatric patients. **Methods:** The study is a review of existing literature by publications indexed in electronic databases: SciELO, Lilacs, Pubmed and Google Scholar, in the period between 2020 and 2021, in Portuguese, English and Spanish, available in full text and online. **Results:** The treatment considered the gold standard for AA is appendectomy (open or laparoscopic) associated with antibiotic therapy after appendix resection, however, the choice of surgical method must consider both the patient's characteristics and the surgeon's experience. evaluating intraoperative aspects and postoperative complications. **Conclusion:** The early diagnosis of AA in pediatric patients is essential for its correct management and to reduce its morbidity and mortality, and it is crucial that the search for health services is immediate, in order to obtain a good prognosis and promote a better quality of life for the child.

Keywords: Acute appendicitis; COVID-19; Pediatrics; Diagnosis; Treatment.

INTRODUCTION

As a result of the COVID-19 pandemic, there was an increase in the number of complicated cases of AA, whose early diagnosis is capable of reducing the child's stay in hospital, in addition to minimizing the harmful impacts of peritonitis resulting from perforated appendicitis, having as a direct consequence, the reduction of its morbidity

and mortality ¹.

To deal with the state of health calamity generated by the disease pandemic declared by the World Health Organization (WHO) in March 2020, global health centers had to restructure their units, increasing the number of specialized beds, isolating wards and using machinery specific in order to accommodate the extensive number of infected patients ^{2,3}.

This growing number of patients requiring hospital care with severe acute respiratory syndrome, many of them requiring intensive care, has overloaded hospital units and health professionals, putting the safe management of patients seeking services with other conditions under threat. ¹.

Due to the fear of being exposed to the virus and knowing the high demand in care units, many guardians take time to seek health services and this means that children arrive at the units in more advanced situations, making their treatment difficult. ^{4,5,2}.

Among these pathologies is AA, considered the most common cause of acute abdomen and whose treatment consists of surgical management with appendectomy. ¹.

Pediatric patients have particularities when compared to adults, such as greater difficulty in being able to inform professionals in a clear and objective way what they feel, thus making it difficult to prepare an accurate diagnosis. Therefore, professionals who work in emergencies must be able to identify, diagnose and treat the most diverse emergency conditions quickly and efficiently. The clinical picture of AA is mainly characterized by severe abdominal pain that appears suddenly, which may or may not be associated with other symptoms and which in most cases requires surgical intervention. ⁶. Complications such as perforated appendix, generalized peritonitis and abscess formation can occur when this is not detected early. ⁷.

Although the impacts of the COVID-19

pandemic cannot be estimated, as it is still spreading with new strains and variants of the virus; It is possible to observe a great need to understand its management during this pandemic period, in order to obtain relevant data that allows professionals to develop sanitary measures and care flows for other urgent pathologies.

Within this context, the present work aims to demonstrate the influence of early diagnosis in the treatment of AA, seeking to contribute to the elucidation of its management in the hospital context in times of pandemic and provide relevant support for a good prognosis.

GOALS

PRIMARY OBJECTIVE

To present the treatment of AA in pediatric patients whose delay in seeking health services leads to its worsening.

SECONDARY OBJECTIVES

- Present the signs and symptoms of AA in pediatric patients;
- Determine AA diagnostic methods;
- Present the treatment of AA.

METHODS

This article is a literature review, carried out by searching for publications indexed in the electronic databases: SciELO, Lilacs, Pubmed and Google Scholar, during the period from July to October 2021 and using the descriptors: "Appendicitis" and "Pediatrics" in accordance with the Health Sciences Descriptors (DeCs). To prepare this work, publications that addressed AA were selected, studying the entire process from diagnosis to treatment.

The established inclusion criteria were: publications indexed in the aforementioned databases in the period between 2020 and 2021, available in full text and online, in

Portuguese, English and Spanish; and that were related to the topic in question.

Publications that were unavailable in full text and online, in languages other than those mentioned above, outside the range previously set out and that were not related to the topic in question were excluded from the search.

The selection occurred first by reading the titles and abstracts in order to check whether the publications actually met the proposed study objectives and after applying the eligibility criteria, they were read in full for analysis, data extraction and writing of the results.

RESULTS

ACUTE APPENDICITIS (AA)

The appendix is a true diverticulum located in the cecum and is subject to acute or chronic infections.⁸ AA is an inflammatory pathology, representing the most common cause of acute abdomen in school-age children.⁹

Its etiopathogenesis is multifactorial and may be influenced by the population's dietary pattern, as well as the association between environmental pollution and its severity.¹

Although it is a condition that can affect all ages, it is more common in people aged 10 to 30 and has a slight predominance in the male population.⁴

The high prevalence of AA in pediatric patients is due to the fact that in childhood the appendix wall is thinner, they have lower immunity and the absence of the omentum to contain local inflammatory processes.⁸

According to De Moraes Alexandrino⁶, AA occurs due to an obstruction of the lumen of the appendix, leading to inflammation, secondary infection and necrosis that can progress to perforation of the organ.

As the secretion's accommodation capacity is limited due to obstruction, venous congestion develops and consequently edema,

which will cause ischemic changes in the intestinal tissue and ulcerated lesions in the mucosa, enabling bacterial invasion.

For this reason, the natural course of AA is for it to progress to perforation of the wall of the cecal appendix⁸.

The healthcare team must be aware of the high probability of this pathology in children in order to check any possible signs. This is a difficult disease to establish a diagnosis, as it presents non-specific symptoms and different clinical presentations.⁹

MAIN SIGNS AND SYMPTOMS

Children with AA present with periumbilical pain with colic in the right iliac fossa exacerbated by movement, with anorexia, nausea, low fever and vomiting being very common symptoms. The duration of this classic clinical history can be variable, ranging between 24 and 48 hours. However, the longer it takes to seek health care, the greater your progression will be.¹⁰

The so-called classic clinical picture of AA consists of: fever, malaise and anorexia that can progress to abdominal pain, vomiting and gastrointestinal changes (diarrhea). Initially, the pain appears non-specific in the epigastric or mesogastric region of a moderate nature, and may progress to the region of the right iliac fossa as the infection progresses.^{5,11}

The AA can present itself in different ways, such as: Uncomplicated appendicitis or Complicated appendicitis, when it involves peritonitis, mass or appendicular abscess¹². The issue of difficulty in diagnosis is due to the fact that it presents clinically in a non-specific way with overlapping symptoms of other diseases that are also common in childhood.¹³

DIAGNOSIS

Early diagnosis and surgical approach are important, as they minimize the harmful

impacts of peritonitis resulting from perforated appendicitis, reducing morbidity and mortality and hospital stay¹. However, this pathology is often difficult to diagnose, as less than 50% of affected patients present classic symptoms, making it difficult to differentiate it from other diseases.⁵

Its diagnosis is generally based on a complete and careful anamnesis, modified Alvarado Scale, physical examination (using signs such as Blumberg) and complementary imaging tests, such as: ultrasound (USG) and abdominal computed tomography (CT).^{4,5}

For Schroeder *et al.*,¹³ laboratory tests have long been used in the diagnosis of AA, including absolute neutrophil and leukocyte counts; however, although leukocytosis is frequently found in AA, it does not represent a specific and sensitive laboratory parameter.

During the anamnesis, the child's general appearance, as well as their activity level and diet, must be assessed. Additionally, ask whether there have been previous episodes of pain, as well as their duration and intensity. The physical examination must be carried out with caution, mainly due to the child's suffering; Distraction strategies such as personal questions and likes can help during the maneuver⁶.

The classic form of AA can be promptly diagnosed and treated, however, in children it is common for the symptomatic picture to not be well defined, making additional tests such as ultrasound (USG) and abdominal computed tomography (CT) necessary. and important for making the correct diagnosis⁵.

Radiation exposure is a factor to consider when dealing with pediatric patients, as it is known that a CT scan of the abdomen and pelvis is approximately equivalent to an exposure of more than 100 chest x-rays, therefore, USG is the option for imaging exam of first choice in cases of acute undifferentiated abdominal pain in children, with 94% specificity and 88%

sensitivity, which in addition to not exposing the patient to radiation, is a low-cost exam ⁶.

The use of the Alvarado score for the diagnosis of acute appendicitis in children is a useful and effective alternative, as it avoids performing imaging tests on patients who have a score above 7 on this scale. This consists of observing the most frequent signs and symptoms using scores greater than or equal to six as a cutoff point, which were associated with a greater probability of diagnostic confirmation on histopathological examination. ⁹

The initial laboratory tests to diagnose AA are: complete blood count, C-reactive protein and urinalysis. In addition to these, fecal studies (evaluating the species of *Campylobacter*, *Cryptosporidium*, *Escherichia coli*, *Salmonella e Shigella*), in addition to the presence of occult blood; liver function test; amylase and lipase ⁶.

TREATMENT

The treatment of AA in pediatric patients requires greater speed, especially in cases where the child is weak, thus requiring greater attention regarding hydration and pain control; In cases of severe pain, the administration of opioids is recommended, as they do not interfere with the diagnosis ⁶.

AA in children is a pathology that generates debate, for example, regarding the choice of surgical and conservative treatment, open and laparoscopic surgery, choice and duration of use of perioperative antibiotics and acceptable rate of negative appendectomies. ¹⁰

AA treatment is surgical and can be performed in two ways: Open appendectomy or laparoscopic appendectomy. Open appendectomy has proven efficacy and safety, however, there is a greater chance of post-operative complications, such as: infections, intra-abdominal adhesions, abscesses, intense pain, in addition to aesthetic discomfort, as

the surgical scar becomes more apparent. Laparoscopic Appendectomy, on the other hand, presents a lower incidence of postoperative complications, less pain after surgery, better healing and faster recovery ⁷.

The choice of surgical method must take into consideration, both the patient's characteristics and the surgeon's experience. Intraoperative aspects and postoperative complications must be evaluated, including: clinical response, cost of the procedure, preference for the minimally invasive technique, length of stay, among others. ¹³.

Regarding the treatment of AA, the gold standard is considered to be appendectomy associated with antibiotic therapy after resection of the appendix. ^{1,4,6}.

DISCUSSION

The COVID-19 pandemic has been causing changes that cannot even be measured in healthcare systems around the world. The demand for medical care from patients with other conditions reduced significantly during this period, causing them to seek health services with more severe conditions, late diagnosis and, consequently, a greater risk of complications. ¹.

AA is the most common cause of acute abdomen in school-aged children ⁹, mainly from 10 to 30 years old ⁴. This inflammatory pathology has a multifactorial etiopathogenesis and may be influenced by the dietary pattern of the population, as well as an association between environmental pollution and its severity. ¹.

Its high prevalence in pediatric patients is due to some issues, including: the fact that in childhood the wall of the appendix is thinner, they have lower immunity and the absence of the omentum to contain local inflammatory processes. As the capacity to accommodate the secretion is limited due to obstruction, venous congestion and consequently edema develop,

causing ischemic changes in the intestinal tissue and ulcerated lesions in the mucosa that allow bacterial invasion⁸. Obstruction of the lumen leads to inflammation, secondary infection and necrosis, which can progress to perforation.⁶

Pediatric patients have greater difficulty communicating clearly and objectively what they feel, making it difficult to make an accurate diagnosis.⁶, furthermore, AA is a difficult disease to establish a diagnosis as it presents non-specific symptoms and has different clinical presentations.⁹

Regarding the signs and symptoms of AA in pediatric patients, De Oliveira, Haldorf and Rodrigues¹⁰ cite periumbilical pain with colic in the right iliac fossa exacerbated by movement, anorexia, nausea, low-grade fever and vomiting. But Alsuwalem *et al.*,⁵ and Teixeira *et al.*,¹¹ define the classic clinical picture of AA as: fever, malaise and anorexia that can progress to abdominal pain, vomiting and gastrointestinal changes (diarrhea). The difficulty in diagnosing is due to AA presenting clinically in a non-specific way, with overlapping symptoms of other diseases also common in childhood.¹³. This can present itself in two ways: Uncomplicated appendicitis or Complicated appendicitis, when it involves peritonitis, mass or appendicular abscess¹².

Early diagnosis and surgical approach are important to minimize the harmful impacts of peritonitis resulting from perforated appendicitis, reducing morbidity and mortality and the child's stay in the hospital environment.¹. This is basically based on taking anamnesis, modified Alvarado Scale, physical examination (using signs such as Blumberg) and complementary imaging tests, such as: ultrasound (USG) and computed tomography (CT) of the abdomen and laboratory tests, such as the absolute count of neutrophils and leukocytes^{4,5,13}, complete blood count, C-reactive protein, urinalysis and,

when necessary, stool study (evaluating the species of *Campylobacter*, *Cryptosporidium*, *Escherichia coli*, *Salmonella* and *Shigella*), in addition to the presence of occult blood; liver function test; amylase and lipase⁶. If imaging exams are necessary, abdominal USG is the first-choice alternative, since abdominal CT, despite its precision, exposes the child to high levels of radiation^{1,6,14}

Regarding the treatment of AA, the gold standard is considered to be appendectomy associated with antibiotic therapy after resection of the appendix.^{1,4,6}. This surgery can be performed through open appendectomy or laparoscopic appendectomy.⁷

Laparoscopic appendectomy, presents a lower incidence of postoperative complications, less pain after surgery, better healing and faster recovery^{7,13}. While open appendectomy, despite proven efficacy and safety, has a greater chance of post-operative complications, such as: infections, intra-abdominal adhesions, abscesses, intense pain, in addition to aesthetic discomfort, as the surgery scar becomes more apparent⁷.

The choice of surgical method must consider both the patient's characteristics and the surgeon's experience evaluating intraoperative aspects and postoperative complications¹³.

According to the literature, laparoscopy has been the most prevalent way to perform appendectomy¹³. However, conventional appendectomy is more recommended during the pandemic period, as laparoscopy may present a risk of aerosolization of the virus present in the peritoneal fluid, if the patient is infected, predisposing professionals to contamination¹.

CONCLUSIONS

The AA is a surgical emergency, whose early diagnosis and approach reduces the patient's stay in hospital and the risk of complications due to its worsening.

As a result of the COVID-19 pandemic, there has been an increase in the number of serious cases requiring immediate surgical intervention. The early diagnosis of AA in pediatric patients is essential for its correct management and to reduce its morbidity and

mortality, and it is crucial that the search for health services is immediate in order to obtain a good prognosis and promote a better quality of life for the child.

More studies are needed to demonstrate the effects of COVID-19 on the propaedeutics and therapy of AA in pediatric patients in the hospital setting, so that professionals can diagnose and treat this condition safely, avoiding exposing themselves to potential risks of contamination.

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