



Antibiotics-First Strategy versus Appendectomy in the Management of Acute Appendicitis

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Abstract

Acute appendicitis is the most common cause of acute abdominal disorders requiring surgery. The mainstay of treatment is an appendectomy for more than 100 years. However, symptoms of acute appendicitis confuse many other conditions making diagnosis a challenge. In addition, as with all operations, postoperative complications exist, including wound infections, intra-abdominal abscesses, ileus and adhesions. For some specific patients (the first trimester of pregnancy or who have contraindications), surgery is not the best choice. So it is important to confirm if antibiotics-first approach is effective and may be used as an alternative treatment for appendectomy.

Subject Areas

Emergency & Critical Care

Keywords

Acute Appendicitis, Appendectomy, Antibiotics

1. Introduction

Acute appendicitis is one of the most common acute abdominal conditions that need urgent surgical treatment, and meantime acute appendicitis remains the most common cause of the acute abdomen in young adults. Traditionally the mainstay of treatment is an appendectomy. However, appendicitis can be notoriously difficult to diagnose, and there exists a negative appendectomy rate of 10% - 20% despite the use of preoperative computed tomography (CT) with high sensitivities and specificities. Our article talks about that if Antibiotics-First approach can cure acute appendicitis and avoid appendectomy, it doesn't increase complications.

2. Pathophysiology

As well known, the appendix is an independent organ and has abundant lymphoid tissue. It participates in the body's immune function, cellular and humoral immunity and secretes several digestive enzymes. Its function reaches its peak at the age of 20 to 30 and after falling down rapidly and completely disappears after 60 years old. Some people therefore think that the adults were removed appendix with no effect on body's immune function. There is argument of whether the appendix has an active physiological function or is simply a vestigial organ for a long time. The observation that the appendix appears to have evolved independently of the cecum across many species supports a possible functional role [1] Bacteria sequestered in the appendix may act as a "safe house", repopulating the gut with healthy bacteria after massive diarrheal disease. For example, recurrence of *Clostridium difficile* infection (although not primary infection) is significantly more common among patients with a history of appendectomy than among those with an intact appendix [2] [3]. Recently, Wei PL and colleagues concluded that an increased risk of new-onset type II diabetes within 3 years after appendectomy was found in patients aged less than 65 years. The risk was highest in men and in those with complicated appendicitis [4].

Acute appendicitis is one of the most common acute abdominal conditions that need urgent surgical treatment, and meantime acute appendicitis remains the most common cause of the acute abdomen in young adults [5]. According to epidemiological survey data that approximately 300,000 people undergo appendectomy each year in the United States, with an estimated lifetime incidence of appendicitis that ranges from 7% to 14% [6] [7]. However, some appendicitis can be notoriously difficult to diagnose, and there exists a negative appendectomy rate of 10% - 20% despite the use of preoperative computed tomography (CT) with high sensitivities and specificities [8] [9] [10] [11] [12]. In addition, as with all operations, postoperative complications exist, including wound infections, intra-abdominal abscesses, ileus and, in the longer term, adhesions. It is worth considering that the mainstay of treatment for other intra-abdominal inflammatory processes, such as diverticulitis, consists initially of conservative management with antibiotics [13]. We presume that antibiotic-first strategy maybe is one of the alternative treatment of appendectomy.

Appendicitis has historically been thought to result from luminal obstruction with a fecalith, distention, bacterial overgrowth, increased intraluminal pressure, and progressive tissue compromise with gangrene and perforation [14]. However, a more recent study measuring the luminal pressure in patients with appendicitis has shown increased pressure in only a quarter of the patients [15]. Similarly, in one study, fecaliths were identified in only 18% of the patients with appendicitis [16]. Growing evidence also suggests that perforation is not necessarily the inevitable result of appendiceal obstruction. Perforated appendicitis and nonperforated appendicitis appear to be different entities [17].

3. Discussion

Urgent appendectomy has been the mainstay of treatment for appendicitis since

the late 1800s [18] [19], with a major advance made in the 1990s, when the use of the laparoscopic approach was suggested instead of the more conventional approach with special minimally invasive effect. In the United States, appendectomy is performed laparoscopically in 60% to 80% of cases, with hospitalization lasting an average of 1 to 2 days and a rate of complications of 1% to 3% [20] [21]. Sometimes appendicitis are difficult to be diagnosed, even with high-quality ultrasonography and computed tomographic (CT) scan, and there exists misdiagnosed appendicitis rate of 10% - 20%. In addition, as with all operations, postoperative complications exist in the shorter and longer term.

With the use of broad-spectrum and sensitive antibiotics, whether antibiotics-first approach could be used as an alternative treatment for some special patients, for example, during the first trimester of pregnancy or who have contraindications to surgery, it is worthy of deeply clinical research.

The treatment of appendicitis with an antibiotics-first strategy [18] (1 g of cefuroxime twice daily and 500 mg of metronidazole 3 times daily) was reserved for patients who were many days into an inflammatory process, with phlegmon and perhaps an abscess. Currently, a course of intravenous antibiotics is administered in these patients, and drainage of the abscess is performed in an attempt to avoid a more extensive operation, and operation will be potentially involving an ileocecectomy or ileostomy because of injury of ileum and cecum [22]. There are many pediatric centres which practise this approach in patients with advanced appendicitis. The authors reported that some cases were successful with conservative management, and some complicated cases were undertaken appendectomy [23] [24] [25]. Mason and colleagues [13] performed what he described as a systematic review of the published literature to assess whether it was necessary to perform surgery for appendicitis. Despite without detailed search methods or the databases used, he concluded that appendectomy may not be necessary for up to 70% of patients who could be appropriately treated with antibiotics. Mason's study does serve to question the traditional approach to as one alternative management of acute appendicitis.

Hansson and colleagues [26] performed an RCT to assess the use of antibiotic therapy versus appendectomy as the primary treatment of acute appendicitis. The antibiotic group is intravenous antibiotics (cefuroxime and metronidazole), the controlled group undertook operation (either open or laparoscopic), and the primary outcomes were to be investigated. 91 of 161 patients in the antibiotic group were successful, other 70 cases receiving surgery. This compared with 13 of 167 patients in the surgical group who received antibiotic treatment and 154 cases received surgery. This was highlighted by the fact that patients who underwent surgery had a higher white cell count, pyrexia and peritonism compared with patients who were treated with antibiotics. Hansson and other authors in this article determined a treatment efficacy of 90.8% for antibiotic therapy and 89.2% for surgical treatment. The authors also demonstrated that the overall incidence of major complications was 3 times higher in patients who underwent surgery compared with those treated with antibiotics. However, once the diag-

nosis of appendicitis becomes clear, then the patient should undergo an appendectomy. There was a study conducted an RCT to assess the role of antibiotics as the sole treatment for appendicitis. They reported an overall complication rate of 8.6% for surgical patients and 10% for patients treated with antibiotics; however, all complications in the antibiotic group developed after a subsequent appendectomy. Abes and colleagues [27] performed a retrospective analysis of patient records to assess the impact of non-operative treatment of acute appendicitis in children and concluded that antibiotics have a role in the management of localized abdominal tenderness. The authors found a statistically significant decrease in appendix size (radiologic imaging) in the antibiotic treatment group. They found that 93.7% (15 of the 16 patients) who received antibiotic treatment were managed successfully, with the only complication being recurrence in 2 patients who subsequently underwent appendectomies. Success with an antibiotics-alone approach in special patients (e.g., Navy personnel or seaman) in whom appendicitis developed while they were at sea (and did not have access to an operating room) supports this strategy in patients with uncomplicated appendicitis as well [28].

Common Features of Randomized Clinical Trials of “Antibiotics First” Regimens [18].

- 1) Eligible patients are consenting adults who are not pregnant, do not have compromised immune function, and do not have certain implantable devices.
- 2) Patients have no evidence of abscess or perforation on imaging.
- 3) Patients have no evidence of sepsis or disseminated peritonitis on clinical examination.
- 4) Patients are admitted to a hospital, and intravenous antibiotics are administered for 48 hours.
- 5) Patients are assessed at intervals of 6 - 12 hours for progression of symptoms or development of sepsis.
- 6) Patients begin oral intake of food; when pain is well controlled, patients are discharged home with 7 days of oral antibiotics.
- 7) A patient proceeds to surgery if sepsis or shock, worsening fever, or disseminated peritonitis develops or if by 48 hours the patient’s pain or elevated white-cell count is not reduced or the patient is unable to eat.

4. Conclusions

The documents listed above recommend trying an antibiotics-first approach treatment for acute appendicitis, but for the complications of cases with surgical intervention in time. Whether high risk of complications related to antibiotics-first approach compared with delayed surgery, and whether conservative management may have a role as a bridge to surgery. Stahlfeld and colleagues [29] performed a retrospective analysis of patients who had undergone appendectomy to determine there was no statistically significant difference between patients who underwent appendectomy within 10 hours of diagnosis and those who underwent appendectomy more than 10 hours after diagnosis. Another study [30], all of the participants being children, concluded that delaying surgery for up to 24 hours did not significantly affect complication rates. There was another observational study [31] similarly showed that a longer wait time to surgery was not associated with a higher risk of perforation but was associated with a higher risk of surgical site infection. Eventual appendectomy after initial, successful

treatment with antibiotics occurred in 10% to 37% of the patients randomly assigned to the antibiotics-first strategy (mean time to appendectomy, 4.2 to 7 months in the three studies in which this outcome was reported [32] [33] [34]). Data from longer follow-up periods were unavailable, and therefore it is unclear whether the likelihood of appendectomy continued to increase or stabilize over time.

Although there appeared to be a growing trend toward the sole use of antibiotics and avoidance of surgery [35], several guidelines [36] [37] [38] recommend that “antibiotics-first strategy may be effective, but there is a higher chance of reoccurrence, not a widely accepted treatment, and may be used as an alternative treatment for specific patients for whom surgery is contraindicated”.

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