

Antibiotic Management for Acute Appendicitis in Children: Is it Worth it?

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ABSTRACT

Introduction: Surgical management of appendicitis in children can reduce its mortality rate, but the risk of complications is comparable. The most common risks in post-operative appendectomy are surgical wound infections, intra-abdominal abscess, and prolonged ileus. The inflammation of the appendix will not always end in perforation because it may resolve spontaneously. This is the result of using antibiotics to reduce the inflammation. The discovery accounts for the decreased appendectomy surgeries. These are the basis for us to conduct research on the use of antibiotics rather than surgery, in appendicitis.

Objective: To determine the effect of antibiotic treatments in pediatric appendicitis to prevent surgery.

Methods: A prospective cohort method was used with a non-random consecutive sampling of 54 children from January 2015 to January 2016. The diagnosis of appendicitis is made based on clinical symptoms and laboratory results with abdominal tenderness, fever, nausea, vomiting, increased leukocyte and neutrophil count, and an abdominal ultrasound. We obtained 40 children (74.1%) diagnosed with non-complicated appendicitis and treated with two classes of antibiotics and one analgesic. 14 children (25.9%) had complicated appendicitis and received three classes of antibiotics with one analgesic. Each group was observed for 3-5 days of treatment.

Results: The group of children with non-complicated appendicitis who resolved only with conservative treatment was 29 children (72.5%) with p value < 0.001 . The group of children with complicated appendicitis who resolved with conservative treatment was only 1 child (7.1%) with p value < 0.001 . There was a significant reduction in pain for both groups (p value < 0.001).

Conclusion: The use of antibiotics as a type of treatment for non-complicated appendicitis has significant effect to reduce surgery. Its administration also significantly decreased pain in both complicated and non-complicated appendicitis. Further studies with larger sample size are needed to investigate the relationship between antibiotic treatments in pediatric appendicitis to prevent invasive interventions.

Keywords

Antibiotic, Analgetics, Appendicitis, Nonoperative management, Surgical vs nonsurgical, Prospective study.

Introduction

Acute appendicitis is a surgical emergency most frequently occurring in children, with the prevalence of 7%-8% and appendectomy procedure is the management of choice for more than one century [1-3].

Ethiologically, appendicitis is caused by an obstruction in the appendix lumen, either caused by the inflammation of the appendix wall or obstruction caused by fecalith matter. The symptoms arising from that condition varies greatly depending on the child, starting from nausea, vomiting, fever to severe abdominal pain, and even peritonitis [4,5].

Diagnostic investigation is greatly needed from history taking, physical examination and supporting examination such as

abdominal ultrasound and even abdominal CT scan. All the examinations are needed to decide whether or not a surgical procedure is needed because around 15% to 30% of appendectomies, there were no signs of appendicitis in the pathological examination [4,5].

Besides all mentioned above, there are short term and long term complications post appendectomy, such as surgical site infection, hematoma, bleeding, fistulas, intraabdominal absces, pneumonia, possibility of adhesion causing intestinal obstruction, requiring re-surgery, and tubal infertility in girls. The use of antibiotics as treatment for acute appendicitis, even for suspected perforated appendicitis, have been proven to be effective in different institutions in the developed countries [2,3,5,6].

We conduct this study to evaluate the efficacy of antibiotic use in children with acute appendicitis and appendicitis with complications in a developing country such as our institution in Indonesia.

Methods

A prospective cohort method was used with a non-random consecutive sampling of 54 children age 1 year old to 18 years old, from January 2015 to January 2016, who were admitted in Tarakan District Hospital, Jakarta. The diagnosis of appendicitis is made based on clinical symptoms and laboratory results with abdominal tenderness, fever, nausea, vomiting, increased leukocyte and neutrophil count, and an abdominal ultrasound. Non complicated acute appendicitis is defined as if in the examination abdominal tenderness is found only on the Mc. Burney region; and for complicated appendicitis is defined as if in the examination the abdominal tenderness is found through out the abdomen. We used an ultrasound examination standard, where we defined positive for appendicitis if the diameter of the appendix is more than 6 mm, and the length of the appendix in more than 6 cm [7].

We obtained 40 children (74.1%) diagnosed with non-complicated appendicitis and treated with two classes of antibiotics, cefotaxim (50 mg/kg every 8 hours) and metronidazole (10 mg/kg every 8 hours) and one intravenous analgesic (ketorolac 0,5 mg/kg every 8 hours). Fourteen children (25.9%) had complicated appendicitis and received three classes of antibiotics, cefotaxim (50 mg/kg every 8 hours), metronidazole (10 mg/kg every 8 hours) and amikasin (7,5 mg/kg every 12 hours) and one intravenous analgesic (ketorolac 0,5 mg/kg every 8 hours) (Figure 1).

Each group was observed for 3-5 days of treatment. If during the observation period of 3 to 5 days, the pain stayed or increased, we would conduct an appendectomy both by open surgery or laporoscopic surgery. If during the first 3 days of observation the pain decreased, we continue the treatment until day 5, and the patient is then discharged or to conduct an interval appendectomy several months later.

This study has received an approval from the ethics committee of Tarakan District Hospital, Jakarta.

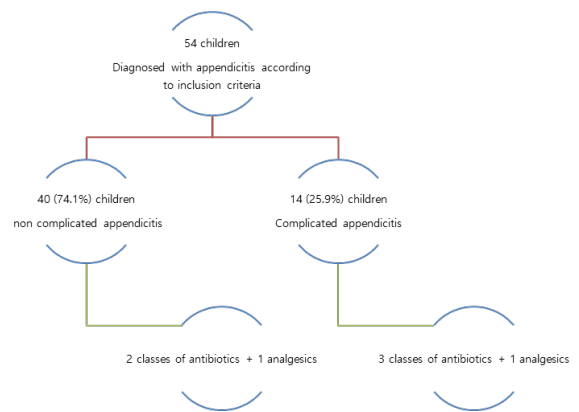


Figure 1: Flow of study.

Results

From the 54 patients that were studied, there were 22 (40.7%) boys, and 32 (59.3%) girls. Overall patients came in with a main complaint of abdominal pain and vomiting (each were 100%), and only 8 patients were presenting fever (14.8%). The abdominal ultrasound results of all patients showed a positive sign of appendicitis according to the initial criterias. Based on the clinical signs and supporting examinations there were 14 patients (25.9%) with complicated appendicitis, and 40 patients (74.1%) with non complicated appendicitis. Baseline characteristics are showed on Table 1, and laboratoy values are showed on Table 2 where all subjects showed an elevated white cell count (leukocvtosis).

	N (%)
Sex	
Male	22 (40.7%)
Female	32 (59.3%)
Clinical signs and symptoms	
Abdominal pain	54 (100%)
Nausea/vomiting	54 (100%)
Fever	8 (14.8%)
Type of appendicitis	
Complicated	14 (25.9%)
Non complicated	40 (74.1%)

Table 1: Baseline Characteristic.

	Median
Hemoglobin level	11.719 ± 0.906
Leukocyte count	13,323.52 ± 2,630.75
Neutrophil count	78.11 + 6.246
Platelet count	306,344.44 ± 59,353.812

Table 2: Laboratory findings.

In the subjects with non complicated appendicitis, there were 29 (72.5%) that showed improvement and was discharged only with antibiotics (conservative treatment), 9 (22.5%) subjects had interval appendectomy several months post discharge, and 2 (5%) subjects had an appendectomy during the initial care. This was compared with the subjects with complicated appendicitis, where only 1 (7.1%) subject showed improvement and was discharged only with antibiotics (conservative treatment) and 13 (92.9%) subjects had an appendectomy procedure (p value <0.001) (Table 3).

	Conservative treatment N (%)	Interval appendectomy N (%)	Surgery N (%)	P value
Non complicated appendicitis	29 (72.5)	9 (22.5)	2 (5)	<0.001
Complicated appendicitis	1 (7.1)	0 (0)	13 (92.9)	

Table 3: Outcome based on severity of appendicitis.

While the comparison of the use of antibiotics on the pain in this study were classified into two groups. The first group, the subjects that showed persistent pain or increased pain during the 3 day period of observation, 2 (15.4%) subjects were given the conservative treatment, 1 (7.7%) subject had an interval appendectomy, and 10 (76.9%) subjects had an appendectomy in the initial care. Compared to the second group where the subjects had a decrease until diminish in pain, 28 (68.3%) subjects were given conservative treatment until day 5, 8 (19.5%) subjects had an interval appendectomy several months later, and 5 (12.2%) subjects had an appendectomy due to the request of the family even when the patient felt no pain during the observation period. The comparison of the groups had a value of p<0.001 (Table 4).

	Conservative treatment	Interval appendectomy	Surgery	P value
Persistent or increased pain in 3 day observation period	2 (15.4)	1 (7.7)	10 (76.9)	<0.001
Decreased or resolved pain	28 (68.3)	8 (19.5)	5 (12.2)	

Table 4: Outcome based on pain progression.

Discussion

Many studies on the non surgical management of appendicitis have been done in developed countries, where in the last years they showed promising results. The non surgical management for cases suspected of appendicitis has the implication of safety, even when there was a delay in conducting surgical procedures, there are still risk of the appendicitis becoming perforated thus implicating sepsis and even death. This should be followed by a standardized management, starting from history taking, physical examination and supporting examinations [5].

For Indonesia, as a developing country, this is the first prospective study conducted in children with appendicitis. We collected

all cases of children with abdominal pain coming from the emergency department or from consults made by pediatricians, through a non random consecutive sampling, after a thorough clinical and radiology examination we classify the children with suspected appendicitis, and also considering the families' choices in conducting the non surgical management or straight to appendectomy. There are several parents that are worried due the initial presentation of their children, they would request surgery from the start; and these cases were not included in the study.

Even when appendectomy as a curative definitive treatment, the perioperative complications can vary from 8.7% to 11.8% patients, causing patients to lose time at school, and also causing the parents to lose working hours [8].

This study's result we found that conservative treatment (use of antibiotics) is effective in 72.5% non complicated appendicitis cases vs. 7.1% complicated appendicitis cases (p<0.001). The standardization of antibiotics with specific use for non complicated or complicated acute appendicitis are yet formulated, thus differ from studies in each hospitals. The use of Cefotaxime and Metronidazole for non complicated appendicitis showed decrease in symptoms, while adding one type of antibiotics (Amikacin) for complicated appendicitis did not show a significant value in this study. The pain evaluation in children with non complicated and complicated acute appendicitis showed variation, depending on the children, thus we added one analgetics, ketorolac (0.5 mg/kg per 8 hours), as a standardized analgetics. The addition of analgetics showed significant effect, between the decrease in pain during the 3 day observation versus the increase or persistence in pain during the 3 day observation (68.3% vs 15.4%, p<0.001). There were 5 (12.2%) children who showed no pain but still had an appendectomy due to the parents' wishes that were worried the pain will re-occur.

Indonesia at this time has a Universal Coverage for health paid by the Government, thus the non surgical management for appendicitis at this time will decrease the cost the Government has to pay for appendicitis cases in children. We still did not find any recurrence in this study after 3 months post discharge.

In the future this study still needs a larger sample size and accounts for other external factors, thus will answer any shortcomings encountered.

References

1. Leung AK, Sigalet DL. Acute abdominal pain in children. *Am Fam Physician*. 2003; 67: 2321-2327.
2. Armstrong J, Merritt N, Jones S, et al. Non-operative management of early, acute appendicitis in children: is it safe and effective? *J Pediatr Surg*. 2014; 49: 782-785.
3. Steiner Z, Buklan G, Gutermacher M, et al. A role for conservative antibiotic treatment in early appendicitis in children. *J Pediatr Surg*. 2015; 50: 1556-1568.
4. Hansen LW, Dolgin SE. Trends in the diagnosis and management of pediatric appendicitis. *Pediatrics in Review*.

-
- 2016; 37: 52-58.
5. Di Saverio S, Sibilio A, Giorgini E, et al. The NOTA Study (Non Operative Treatment for Acute Appendicitis). *Ann Surg.* 2014; 260: 109-117.
 6. Nazarey PP, Stylianos S, Velis E, et al. Treatment of suspected acute perforated appendicitis with antibiotics and interval appendectomy. *J Pediatr Surg.* 2014; 49: 447-450.
 7. Searle AR, Ismail KA, MacGregor D. Changes in the length and diameter of the normal appendix throughout childhood. *J Pediatr Surg.* 2013; 48: 1535-1539.
 8. Minneci PC, Sulkowski JP, Nacion KM, et al. Feasibility of nonoperative management strategy for uncomplicated acute appendicitis in children. *J Am Coll Surg.* 2014; 219: 272-279.