

Microbiological Profile of Acute Appendicitis in Pediatric Population Admitted in Yenepoya Medical College

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Abstract

Aim: To study the most common bacterial microorganism aerobic or anaerobic involved in appendicitis post appendectomy in Paediatric population admitted in Yenepoya Medical College. **Method:** Total of 60 patients admitted with admitted in the department of Paediatric Surgery clinically diagnosed as Appendicitis with age less than 14 years of age and post Appendectomy at Yenepoya Medical College during the October 2017 to March 2019 were considered for the study. **Results:** The most common drug which the isolated organism was sensitive to was Ciprofloxacin, with the exclusion of Multidrug resistant organism. The second most common drug which was sensitive for the isolated organism was Amikacin. **Conclusion:** There was a positive association between diarrhoea and the severity of acute appendicitis. The most common isolated organism was E-coli.

Keywords: Microbiology, Profile, Paediatric, Acute, Appendicitis.

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Introduction

Acute abdomen is the most widespread surgical complaint that is seen across all ages that present to the emergency room[1]. When children come to the emergency room for a surgical consult it is many a times difficult to elicit a proper history, as the result of the agonising pain makes it difficult[2]. Both Streptococcus milleri and Bacteroides fragilis, have been implicated in the pathogenesis of appendicitis by increased isolation rates in times of acute inflammation[3]. In adults anaerobic bacteria are more commonly found than aerobic bacteria in acute inflammation, and anaerobic bacteria, in particular bacteroides species, are isolated in acutely inflamed and normal appendices[4,5]. In terms of epidemiology; the cases of appendicitis constitute a third of all the cases who get hospitalized with the acute surgical abdomen in children.^{6,7} The estimated incidence of appendicitis in children is found to be around 8.67 per cent for the male child and 6.7 % for per cent for the female child[6].

The disease tends to occur in a higher rate in the older children and the adolescent age group with just over a third of all cases diagnosed with appendicitis being less than 18 years of age with the peak being around 11 to 12 years of age[7-11].

Appendicitis is caused by a blockage of hollow part of the appendix. This is most commonly due to impacted fecal matter which is referred to as fecolith[12-14]. The inflamed lymphoid tissues from a viral infection, parasites, gallstones or tumors may also cause blockage[12-14].

Obstruction leading to bacterial overgrowth which often leads to an increase in the intra luminal pressure which obstructs the blood flow and leads to congestion and ischemia of the appendix allowing the bacterial translocation and infection resulting in the inflammation of the appendix[12-14]. The standard treatment for acute appendicitis is surgical removal of the appendix[15]. Antibiotics can be equally effective in cases of non-ruptured appendicitis[16,17].

Most often the diagnosis is a delayed presentation either because of the parents ignoring it to be a result of intestinal or worm colic and trying home remedies, or the treating paediatrician misdiagnosing it to be due to some other cause as often rebound tenderness may be difficult to be elicited. In children still the use of routine ultrasound for abdominal pain is not done and it also contributes to the delay in diagnosing children affected with appendicitis as a cause of abdominal pain[18-20].

During infancy the disease is rare and but most often has a higher incidence of complications as a result of delay in diagnosis[21,22]. The establishment of a diagnosis of acute appendicitis is more difficult in young children than in the adult as a result of the combination of factors explained above yet in case of children findings of maximum tenderness in the right lower quadrant with a walking difficulty or a limp in combination with percussion or cough tenderness have a higher sensitivity for appendicitis[23]. With the rise of the antibiotic era the management of acute appendicitis has improved with a better outcome following surgery. There is enough that acute appendicitis can be treated by non-surgical means by medical therapy alone evidence[24-26] and some authors recommend that appendectomy should be restricted in children as they are more prone for higher rate postoperative complications like persisting pain of unknown aetiology, ileal adhesions, incisional hernia at the surgical scar site and faecal fistula formation[27-30].

Although the diagnosis and management of appendicular pathology has improved drastically, still appendicitis remains a very important

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reason that contributes to significant morbidity during the childhood period. Over the last decade non-operative treatment with antibiotics has been proposed as an alternative to surgery. Since antibiotics are so effective in treatment of acute appendicitis; the role of bacteria in causing appendicitis should be studied in more detail. Detailed role of microbial flora in causation and progression of the disease is not well understood. This study was done with the idea to recognize the common bacterial micro-organism associated with acute appendicitis[24-26]. In view of the above said we conducted a study at the medical college tertiary care hospital in which we evaluated the microbial profile of cases with acute appendicitis with the purpose that this antibiogram data will guide further medical therapy in patients with appendicular pathology especially acute appendicitis.

Aims and objectives

The aim of the present study was as follows:

To study the most common bacterial microorganism aerobic or anaerobic involved in appendicitis post appendectomy in Paediatric population less than 14 years of age admitted in Yenepoya Medical College.

Materials and methods

This study was a cross sectional study that was done on 60 children who were admitted with appendicitis over the period of October 2017 to June 2019 and were admitted in the Department of Paediatric Surgery and operated.

The study subjects were chosen based on a pre-defined criterion. The criteria were as follows:

Inclusion Criteria

- All patients less than 14 years of age diagnosed with Acute Appendicitis undergoing appendectomy in Yenepoya Medical College Hospital, Mangalore.

Exclusion Criteria

- Appendicular Mass.
- Greater than 14 years of age.

Sample Size

Involving 60 patients over the period of October 2017 to June 2019 (Time Bound Study) Sample size is calculated from MRD record by calculating the number of patient undergoing Appendicectomies in a month times the number of months used for the Study.

Methods

After ethical committee approval and informed consent, patients less than 14 years of age diagnosed of Acute Appendicitis admitted in Yenepoya Medical College will be selected for study using the Performa attached. Data collection was done followed by data analysis using appropriate statistical methods.

- A predesigned Performa drafted for the study was used.
- Post Appendicectomy the specimen in sterile container were send to Microbiology dept. for Aerobic and Anaerobic Culture.

For Aerobic

The Specimen is sent in a sterile culture bottle in Normal Saline, Grams staining will be done and inoculated on Blood Agar and Mc Conkeys Agar to Identify the aerobic organism.

For Anaerobic

The specimen is sent in a sterile culture bottle in Normal Saline and inoculated onto Robertson's cooked meat medium or after inoculating in Agar was inoculated on to Glass Jar.

One part of the specimen was sent for Histopathological Examination for conformation.

Data Analysis and Statistical Methods

Data WAS entered into SPSS Software version 23 and qualitative data was expressed in number and percentages for categorical variables (age groups, gender etc.). Quantitative data will be expressed in mean \pm standard deviation. Paired t –test was used to analyze the test of significance.

Results

In the present study, on evaluation of the gender distribution in the study we had 34 male cases (56.67%) and 26 female cases (43.33%) of both sexes.

Table 1: Culture report

culture	Frequency	Per cent
E. coli	39	65.00%
Enterococcus faecalis	11	18.33%
Klebsiella oxytoca	7	11.66%
NO GROWTH	3	5.00%
Total	60	100.00%

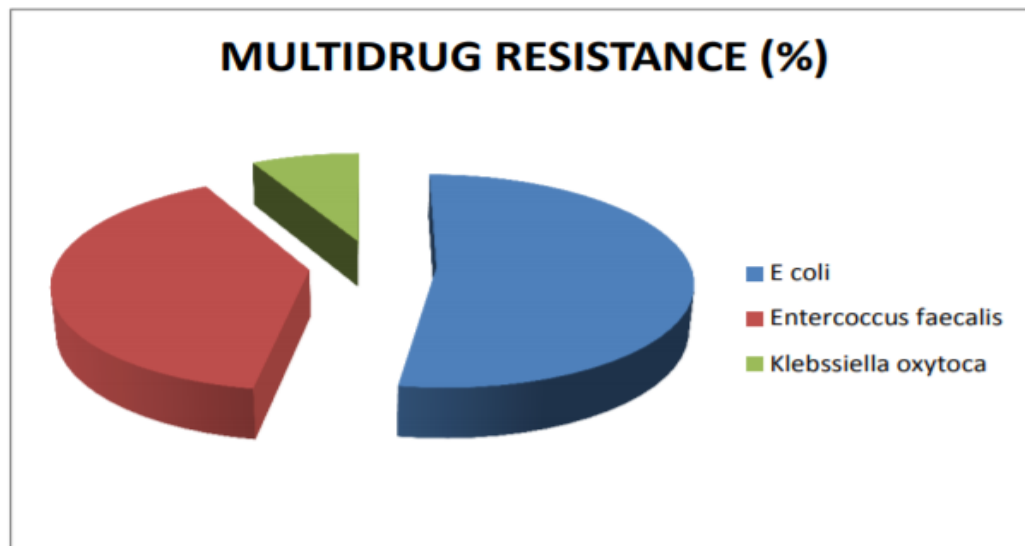


Fig 1: Multidrug Resistance

Table 2: Antibiotic sensitivity pattern.

ISOLATED ORGANISM	ANTIBIOTIC SENSITIVITY (CIPROFLOXACIN)	ANTIBIOTIC SENSITIVITY (AMIKACIN)
E. coli	35	35
Enterococcus faecalis	4	4
Klebsiella oxytoca	6	6
Total	52	52

Discussion

In the present study, on evaluation of the culture distribution in the study we found that the 33(55%) cases had *E. coli* as a mono-microbial organism in the culture. *Enterococcus faecalis* as the isolate was seen in 11 cases, *Klebsiella oxytoca* was seen in 7 cases and 3 cases had no growth. 3 cases of Appendicitis post appendicectomy were found to have a perforated appendix on Histopathological examination. On evaluation, the culture of all 3 perforated appendixes was showing an isolate of *Enterococcus faecalis*.

In the total 60 Cultures 8 cultures were found to be Multi drug resistant which was reported as Multi Drug Resistant (ESBL and Potential Carbapenemase Producer) which also included the 3 cases of perforated appendix on Histopathological examination. The most common drug which the isolated organism was sensitive to was Ciprofloxacin, with the exclusion of Multidrug resistant organism. The second most common drug which was sensitive for the isolated organism was Amikacin. In our study, out of the Multi drug resistant organisms, the most common antibiotic sensitivity was seen among the antibiotic Ciprofloxacin and Amikacin.

Table 3: Comparison with other study.

ORGANISM	OUR STUDY	Chen CY et al	Naher HS and Ktab Fk
Bacteroides spp.	-	-	18.9
E. coli	65%	85%	32.4%
Klebsiella spp.	11%	26%	16.2%
Pseudomonas	-	15%	9.9%
Enterococcus faecalis	7%	-	-

Chen CY, Chen YC, Pu HN, Tsai CH, Chen WT, Lin CH reported in their study that the most commonly identified aerobic bacteria associated with acute appendicitis were *E. coli*, followed by *K. pneumoniae*, *Streptococcus*, *Enterococcus* and *Pseudomonas aeruginosa*. *P. aeruginosa* frequently was not covered by prophylactic antibiotics chosen and might be associated with Surgical Site Infection. J P Roberts reported in his study that acute appendicitis is the commonest surgical emergency in childhood. Both *Streptococcus* and *Bacteroides* however have been implicated as causative organism in the pathogenesis of appendicitis by increasing isolation rates in acute inflammation. In adults, anaerobic bacteria are more commonly found in counts above 10^6 colony forming units/ml than aerobic bacteria in acute inflammation and anaerobic bacteria, more

commonly the *Bacteroides* species, have been identified in acute inflamed and normal appendices. In my study, none of the anaerobic culture were positive after 48 hours of incubation in Robertson's cooked Meat Medium. All the 60 patients were positive for only aerobic cultures.

Conclusion

8 cultures were found to be Multi drug resistant which was reported as Multi Drug Resistant (ESBL and Potential Carbapenemase Producer) which also included the 3 cases of perforated appendix on Histopathological examination. The most common drug which the isolated organism was sensitive to was Ciprofloxacin, with the exclusion of Multidrug resistant organisms, the second most common

drug which was sensitive for the isolated organisms was Amikacin. In my study all the 60 patients were positive for only aerobic cultures only. None of the anaerobic culture were positive after 48 hours of incubation in Robertsons cooked meat medium.

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