

THE ROLE OF PREOPERATIVE SINGLE DOSE ANTIBIOTIC THERAPY IN CASES OF NON-PERFORATED APPENDICITIS

Shekappa C. Malagimani¹, Mohammed Minhajuddin Harsoori²

¹Associate Professor, Department of General Surgery, VIMS, Bellary.

²Postgraduate Student, Department of General Surgery, VIMS, Bellary.

ABSTRACT

BACKGROUND

Objectives- Acute appendicitis is the most common cause of acute abdominal pain requiring surgical intervention and it is the most frequently performed emergency operation.^[1] The efficacy of antibiotic prophylaxis in patients undergoing appendectomy has been examined in several studies.^[2] Without any pre- or peri-operative antibiotic prophylaxis, wound infection rates in patients undergoing appendectomy are 10% or more when the appendix is normal, increasing to 30% when the appendix is phlegmonous or gangrenous.^[3] In patients with perforated appendicitis, preoperative administration of antibiotics has proven to be effective in reducing wound complications that result from the heavy intraperitoneal and wound microbial contamination associated with this condition.^[4] However, the role of such prophylactic therapy in nonperforated appendicitis is still controversial.^[5]

As the role of oral antibiotics in the treatment of acute appendicitis following appendectomy has not been adequately addressed in the literature, the objective of the present study is to study the infective complication rate after open appendectomy for non-perforated appendicitis receiving single dose antibiotic therapy as prophylaxis.

MATERIALS AND METHODS

The Patient attending the department of surgery and also patients referred from other departments of combined hospitals of MCH VIMS, Bellary form the subjects for our study. This study is conducted on patients with the use of single dose preoperative antibiotic therapy in cases of non-perforated appendicitis getting admitted to VIMS, Bellary for treatment during the period of November 2014 to June 2016. Patient of acute appendicitis were subjected to routine blood investigations like CBC, RBS, RFT, serum electrolytes, HIV, HBSAG and radiological investigations like USG abdomen, erect x-ray abdomen and chest x-ray. Single dose of preoperative antibiotic therapy was given for uncomplicated appendicitis. Intraoperative appendix was found to be thickened and inflamed. All uncomplicated appendicitis specimen were subjected to histopathological examination. Postoperative wound infection was noted.

RESULTS

Among total study subjects, fever was associated with 20% of total study subjects. The incidence of post-operative fever was present in 20% of study subjects. The post-operative wound infection was found in 5% of total study subjects. Hence, incidence of post-operative wound infection was 5%. In this study, 80% of study subjects stayed in hospital for less than 3 days, 20% of them stayed in hospital for more than 3 days. Totally, 5% of study subjects stayed in hospital for more than 5 days. On ultrasonography, 85% of patients had thickened and dilated appendix. Among thickened and dilated appendix, the incidence of post-operative infection was 3.5%, whereas among non-thickened and dilated appendix it was 13.3%; this relation between thickened and dilated appendix and chance of post-operative infection was not found to be statistically significant. Investigation of total WBC count revealed that 56% of study subjects had TWBC count more than 10,000. Investigation of DLC N% revealed that 52% of study subjects had DLC N% more than 80%. In this study, post-operative wound infection was less compared to other studies. This study found that in patients undergoing appendectomy for non-perforated appendicitis, single dose preoperative antibiotics were efficacious in preventing post-operative wound infection.

CONCLUSION

1. This study concludes that post-operative wound infection was less compared to other studies; 2. Our study found that in patients undergoing operation for non-perforated appendicitis, single dose preoperative antibiotics were efficacious in preventing post-operative wound infection; 3. Continuing antibiotic prophylaxis in the post-operative period was not necessary; 4) A strategy of single dose preoperative antibiotic use should be followed in all cases of non-perforated appendicitis.

KEYWORDS

Acute Appendicitis, Antibiotic, Postoperative Wound Infection, Fever, USG.

HOW TO CITE THIS ARTICLE: Malagimani SC, Harsoori MM. The role of preoperative single dose antibiotic therapy in cases of non-perforated appendicitis. J. Evolution Med. Dent. Sci. 2017;6(26):2154-2158, DOI: 10.14260/Jemds/2017/467

Financial or Other, Competing Interest: None.

Submission 21-02-2017, Peer Review 17-03-2017,

Acceptance 23-03-2017, Published 30-03-2017.

Corresponding Author:

Dr. Shekappa C. Malagimani,

#B/24, Staff Quarters,

VIMS (OPD), Cantonment, Bellary.

E-mail: doc_shekar@yahoo.com

DOI: 10.14260/Jemds/2017/467



BACKGROUND

Appendectomy has been the mainstay for the treatment for acute appendicitis, since it was first reported by McBurney in 1889^[6] and the general assumption since the 19th century has been that in the absence of surgical intervention the disease often progresses from uncomplicated to perforated appendicitis.^[6] The advent of laparoscopic surgery and the low threshold for operative intervention have led to a risk of high negative appendectomy rates with unnecessary

surgery related morbidity.^[7] Only 20% of patients present with complicated appendicitis and non-operative management with antibiotics and supportive treatment has been explored as a therapeutic option for patients with early uncomplicated appendicitis with resolution in most of them.^[8] Antibiotic treatment was often considered as a bridge to surgery in patients with suspected appendicitis, but no clear indications for appendectomy such as signs of perforation or peritonitis. However, the routine use of antibiotics in patients with uncomplicated acute appendicitis was not well supported, owing to inherent pitfalls in the quality and design of individual studies. The role of antibiotic treatment in acute uncomplicated appendicitis may have been overlooked mainly on the basis of tradition rather than evidence considering that other intra-abdominal inflammatory processes such as colonic diverticulitis are primarily managed non-operatively. This time honoured practice has been challenged recently with reports of less morbidity associated with antibiotic treatment than surgery in uncomplicated acute appendicitis.^[9] With the availability of diagnostic modalities such as computed tomography and ultrasonography, the small group of patients presenting with complicated appendicitis can be identified. Furthermore, epidemiological studies suggest that despite the increasing trend for surgical exploration for suspected appendicitis over the years, the incidence of perforated appendicitis has been similar across all age groups.^[10] However, the management of the large majority with uncomplicated appendicitis warrants further evaluation.

Systematic reviews and meta-analyses of the trials^[10] including a Cochrane review comparing antibiotic treatment and appendectomy,^[11] published in recent years summarised the evidence as either in favour of antibiotic treatment or inconclusive. This could possibly result from inclusion of trials with poor methods or retracted since publication^[12] or from simplifying the evidence as a summary of both randomised and non-randomised studies. The meta-analysis presented here provides a valid and up-to-date summary of the relevant literature including a recently published randomised controlled trial of 339 patients with a confirmed diagnosis of uncomplicated appendicitis. It excludes the study that has been retracted subsequent to publication as well as another, for which it was not clear if patients were randomised. The aim of this meta-analysis of randomised controlled trials was to compare antibiotic treatment with appendectomy for the treatment of uncomplicated acute appendicitis.

Objectives

To study the role of preoperative single dose antibiotic therapy in cases of non-perforated appendicitis in terms of post-operative wound infection, efficacious in preventing post-operative wound infection and should it be followed in all cases of non-perforated appendicitis?

MATERIALS AND METHODS

Source of Data

Study Design- Prospective study.

Study Duration- November 2014 to June 2016.

Sample Size- The sample size of 100 patients.

Sampling Technique

Non-probability purposive sampling Technique. The patient attending the Department of Surgery and also patients referred from other departments of combined hospitals of MCH, VIMS, Bellary form the subjects for our study.

This study is conducted on patients with the use of single dose preoperative antibiotic therapy in cases of non-perforated appendicitis getting admitted to VIMS, Bellary for treatment during the period of November 2014 to June 2016. Patient of acute appendicitis were subjected to routine blood investigations like CBC, RBS, RFT, serum electrolytes, HIV, HBSAG and radiological investigations like USG abdomen, erect x-ray abdomen, chest x-ray. Single dose of preoperative antibiotic therapy was given for uncomplicated appendicitis.

Intraoperative appendix found to be thickened and inflamed. All uncomplicated appendicitis specimen were subjected to histopathological examination. Postoperative wound infection was noted.

Inclusion Criteria

All patients with age group more than 12 years with non-perforated appendicitis.

Exclusion Criteria

1. Patients with perforated appendicitis.
2. Patients with gangrenous appendicitis.
3. Patients with appendicular abscess.
4. Patients with appendicular mass.
5. Patients unfit for surgery.
6. Patients with age group less than 12 years.

Method of Collection of Data

- A written informed consent will be taken from all patients included in the study.
- A detailed history taking.
- Thorough clinical examination.
- Routine blood investigations.
- Radiological investigations like USG abdomen and pelvis.
- CXR- PA view, erect x-ray abdomen.
- The data collected was entered into a specially designed case record form, which is subjected to statistical analysis.

Duration of Study

The study was conducted from November 2014 to June 2016.

RESULTS

Among total study subjects, fever was associated with 20% of total study subjects. The incidence of post-operative fever was present in 20% of study subjects. The post-operative wound infection was found in 5% of total study subjects. Hence, incidence of post-operative wound infection was 5%. In this study 80% of study subjects stayed in hospital for less than 3 days, 20% of them stayed in hospital for more than 3 days. Totally, 5% of study subjects stayed in hospital for more than 5 days. On Ultrasonography, 85% of patients had thickened and dilated appendix. Among thickened and dilated appendix, the incidence of post-operative infection was 3.5%, whereas among non-thickened and dilated appendix it was 13.3%. This relation between thickened and dilated appendix and chance of post-operative infection was not found to be statistically significant. Investigation of total WBC count

revealed that 56% of study subjects had TWBC count more than 10,000. Investigation of DLC N% revealed that 52% of study subjects had DLC N% more than 80%. In this study, post-operative wound infection was less compared to other studies. This study found that in patients undergoing appendicectomy for non-perforated appendicitis, single dose preoperative antibiotics were efficacious in preventing post-operative wound infection. The following tables show the various observation, results and their importance required for the study.

Post-Operative Fever	Frequency	Percentage
Present	20	20.0
Absent	80	80.0
Total	100	100

Table 1. Distribution based on Post-Operative Fever

The incidence of post-operative fever was present in 20% of study subjects.

Post-Operative Wound Infection	Frequency	Percentage
Present	05	05
Absent	95	95
Total	100	100

Table 2. Distribution based on Wound Infection

The post-operative wound infection was found in 5% of total study subjects. Hence, incidence of post-operative wound infection was 5%.

Hospital Stay (Days)	Frequency	Percentage
< 3 Days	80	80
3 - 5 Days	05	05
> 5 Days	05	05
Total	100	100

Table 3. Distribution based on Hospital Stay

In this study, 80% of study subjects stayed in hospital for less than 3 days, 20% of them stayed in hospital for more than 3 days. Totally, 5% of study subjects stayed in hospital for more than 5 days.

USG			Post-Op Infection		Total
			No	Yes	
Thickened and Dilated Appendix	Yes	count	82	03	85
		%	96.5%	3.5%	100%
	No	count	13	02	15
		%	86.7%	13.3%	100.0%
Total	Count	95	05	100	100
	%	95.0%	5.0%	100.0%	100.0%

Table 4. Relation between USG Finding and Infection

Chi square value- 2.58, df- 1, p value- 0.10

Among thickened and dilated appendix, the incidence of post-operative infection was 3.5%, whereas among non-thickened and dilated appendix it was 13.3%. This relation between thickened and dilated appendix and chance of post-

operative infection was not found to be statistically significant. The presence of high post-operative infection among non-thickened appendix may be due to small sample size.

USG			Post-Op Fever		Total
			No	Yes	
Thickened and Dilated Appendix	Yes	Count	68	17	85
		%	80%	20%	100%
	No	Count	12	03	15
		%	80%	20%	100%
Total	Count	80	20	100	100
	%	80%	20%	100%	100%

Table 5. Relation between USG Finding and Fever

Chi square value- 0.00, df- 1, p value- 1.00

Among thickened and dilated appendix, the incidence of post-operative fever was 20%, whereas among non-thickened and dilated appendix also it was 20%. This relation between thickened and dilated appendix and chance of post-operative fever was not found to be statistically significant.

			Post-Op Infection		Total
			No	Yes	
TC	> 10000	Count	52	04	56
		%	54.7%	75%	56%
	< 10000	Count	43	01	44
		%	55.3%	25%	44%
Total	Count	95	05	100	
	%	100%	100%	100%	

Table 6. Relation between TC and Infection

Chi square value- 1.23, df- 1, p value- 0.26

Among patients who had post-operative infection, 75% of them had TWBC more than 10,000 cells. Among patients who did not have post-operative infection, 54.7% of them had TWBC more than 10,000 cells. This relation was not found to be statistically significant.

			Post-Op Fever		Total
			No	Yes	
TC	> 10000	Count	42	14	56
		%	52.5%	70%	56%
	< 10000	Count	38	06	44
		%	47.5%	30%	44%
Total	Count	80	20	100	
	%	100%	100%	100%	

Table 7. Relation between TC and Fever

Chi square value- 1.98, df- 1, p value- 0.15

Among patients who had post-operative fever, 70% of them had TWBC more than 10,000 cells among patients who did not have post-operative fever, 52.5% of them had TWBC more than 10,000 cells. This relation was not found to be statistically significant.

DISCUSSION

Appendicectomy for non-perforated appendicitis is a clean contaminated surgery. Several authors have proved the efficacy of pre-operative antibiotics in preventing postoperative infective complications.^[13] Therefore, as a

standard protocol, all the patients undergoing appendicectomy are given prophylactic antibiotics half to one hour before surgery. If properly used, antibiotics can reduce the rate of infection by 50%.^[14] Patients with perforated appendicitis are universally given postoperative antibiotics. This is necessary to reduce the complications of wound infection and pelvic abscess, which may arise as a result of contamination of the wound and the peritoneal cavity.^[13] On the other hand, however, the use of postoperative antibiotics for preventing infective complications in non-perforated cases is still controversial.^[15] The practice of giving postoperative antibiotics in non-perforated uncomplicated cases of appendicitis varies around the world and no consensus exist on its use.^[13]

When post-operative antibiotics are not used in non-perforated cases some authors have shown high rates of wound infection (11%),^[14] while others showed no significant infection rate (4.6%).^[13] Some adverse events are also associated with postoperative antibiotic use like prolonged hospital stay, increase in financial burden, clostridium difficile infection and postoperative diarrhoea.^[16] Recent research data supports the use of single dose preoperative antibiotics in non-perforated appendicitis.^[15]

Wound infection after any surgery is a dreadful complication, which is never wanted by the patient as well as the surgeon. It is always a depressing situation for the patient when he comes to know that his/her postoperative hospital stay and recovery has been prolonged because of wound infection. There is also a great financial impact of wound infection. Wound infections if not controlled can lead to major complications like burst abdomen, incisional hernia, necrotising fasciitis and septicaemia. Bucknall et al^[17] found that wound infection was a major contributing factor in burst abdomen and incisional hernia in his series.

Keeping in view the increased incidence of such complications associated with wound infection, it is always desirable to avoid wound infection whenever possible.^[18] Frequency of infective complications including wound infection in patients undergoing appendicectomy for uncomplicated appendicitis is generally very low.^[19] However, it has been observed in daily practice that these patients usually receive costly parenteral postoperative antibiotics for prolonged period. The logic of this practice is the fear of the dreadful complications, which we discussed in the above paragraph. This prolonged administration of antibiotics on one hand is unnecessary, can increase antibiotic resistance, can have the antibiotics related side effects and on the other hand significantly increases the financial burden on the patient.^[20]

It has now been proved by research that preoperative prophylactic antibiotics are more crucial in preventing post-operative wound infection in elective cases and in clean contaminated cases like acutely inflamed non-perforated appendicitis.^[21] The extension of administration of antibiotics to the post-operative period is usually not necessary in such cases. Many studies have shown that single preoperative dose of antibiotic is as effective as multiple postoperative doses in preventing wound complications following appendicectomy.^[22] A randomised control study by Mui et al have shown that single dose of preoperative antibiotic is adequate for prevention of infective complications of the wound in patients undergoing surgery for uncomplicated

appendicitis. Their conclusion was that the prolonged antibiotic administration was cost-ineffective and led to unnecessary complications. In study of Rajan and Sheikh, they used a more objective method to assess the progress of the surgical wounds by correlating with the Southampton scoring system. There was no significant difference between wound infection rates of the single dose group (11%) and the three dose group (9%). These findings are in full agreement to the similar studies in the literature.^[23]

However, in cases of unwanted contamination and perforated appendicitis, post-operative administration of antibiotics is justified.^[23] We performed this study to see whether the above observation holds true in our setup as well or not. Our study included 100 patients, all with acutely inflamed non-perforated appendicitis. We used only single dose preoperative antibiotics against aerobic and anaerobic organisms in our patients and observed them for wound infection. We encountered only 5 patients with wound infection and that too were minor with wound redness with erythema according to Southampton scoring system, which settled with conservative management with antipyretics and anti-inflammatory drugs. Our infection rate was 5%. The incidence of post-operative fever was present in 20% of study subjects. This 20% of fever was not only due to wound infection. We observed less financial burden on our patients in term of purchasing antibiotics and less antibiotic associated side effects like post-operative nausea, vomiting and diarrhoea. We also hope that this act would have helped towards decrease in antibiotic resistance. Our study showed that age and gender has no significant association with wound infection in appendicitis. The result of our study is comparable with other studies conducted nationally by Saad et al^[15] as well as internationally by Busutil et al^[21] and Winslow et al. They all concluded with the observation that adding post-operative broad spectrum antibiotics only added financial burden and side effects and had no effect towards preventing wound infection.

Coakley et al, in a recent study, have consistently proven that postoperative antibiotic treatment for nonperforated appendicitis did not reduce infectious complications. In fact, their study showed significantly increased rate of adverse effects like Clostridium difficile infection, diarrhoea, longer length of hospital stay and higher treatment cost. Patients receiving postoperative antibiotics were also more frequently readmitted and reoperated 112. One thing which need special emphasis is that theatre etiquettes and sterilisation techniques should be given due importance as any infection introduced due to breach of sterility can be falsely attributed to the non-use of post-operative antibiotics. In our series, we took special care to avoid any breach of sterility in theatre. We found minimal wound infection in non-perforated appendicitis with single dose prophylactic antibiotics and concludes that this practice should be followed. This practice can be extended to other clean and clean contaminated surgeries as well.

CONCLUSION

1. This study concludes that post-operative wound infection was less compared to other studies.
2. Our study found that in patients undergoing operation for non-perforated appendicitis, single dose preoperative antibiotics were efficacious in preventing post-operative wound infection.

3. Continuing antibiotic prophylaxis in the post-operative period was not necessary.
4. A strategy of single dose preoperative antibiotic use should be followed in all cases of non-perforated appendicitis.

REFERENCES

- [1] Andersen BR, Kallehave FL, Andersen HK. Antibiotics versus placebo for prevention of post-operative infection after appendectomy. *Cochrane Database Syst Rev* 2005;3:CD001439.
- [2] Fraser JD, Aguayo P, Leys CM, et al. A complete course of intravenous antibiotics vs. a combination of intravenous and oral antibiotics for perforated appendicitis in children: a prospective, randomized trial. *J Pediatr Surg* 2010;45(6):1198-202.
- [3] Bauer T, Vennits B, Holm B, et al. Antibiotic prophylaxis in acute nonperforated appendicitis. The Danish Multicenter Study Group III. *Ann Surg* 1989;209(3):307-11.
- [4] Hale DA, Molloy M, Pearl RH, et al. Appendectomy: a contemporary appraisal. *Ann Surg* 1997;225(3):252-61.
- [5] Campbell WB. Prophylaxis of infection after appendectomy: a survey of current surgical practice. *Br Med J* 1980;281(6255):1597-600.
- [6] McBurney C. Experiences with early operative interference in cases of disease of the vermiform appendix. *NY Med J* 1889;50:676-84.
- [7] Coursey CA, Nelson RC, Patel MB. Do more preoperative CT scans mean fewer negative appendectomies? A 10-year study. *Radiology* 2010;254(2):460-8.
- [8] Coldrey E. Five years of conservative treatment of acute appendicitis. *J Int Coll Surg* 1959;32:255-61.
- [9] Blomqvist PG, Andersson RE, Granath F, et al. Mortality after appendectomy in Sweden, 1987-1996. *Ann Surg* 2001;233(4):455-60.
- [10] Livingston EH, Woodward WA, Sarosi GA, et al. Disconnect between incidence of nonperforated and perforated appendicitis: implications for pathophysiology and management. *Ann Surg* 2007;245(6):886-92.
- [11] Wilms IM, de Hoog DE, de Visser DC, et al. Appendectomy versus antibiotic treatment for acute appendicitis. *Cochrane Database Syst Rev* 2011;11:CD008359.
- [12] Hansson J, Korner U, Khorram-Manesh A, et al. Randomized clinical trial of antibiotic therapy versus appendectomy as primary treatment of acute appendicitis in unselected patients. *Br J Surg* 2009;96(5):473-81.
- [13] Hussain MI, Alam MK, Al-Qahatani HH, et al. Role of postoperative antibiotics after appendectomy in non-perforated appendicitis. *J Coll Physicians Surg Pak* 2012;22(12):756-9.
- [14] Abdullah S, Vaithianathan R, Rajendiran K, et al. Randomized clinical trial of single versus three doses of cefazolin as prophylaxis for nonperforated acute appendicitis. *IJCRR* 2012;4(23):124-30.
- [15] Coakley BA, Sussman ES, Wolfson TS, et al. Postoperative antibiotics correlate with worse outcomes after appendectomy for nonperforated appendicitis. *J Am Coll Surg* 2011;213(6):778-83.
- [16] Malik SA, Rasheed M, Abbasi AS, et al. Role of signal dose preoperative antibiotic in acute nonperforated appendicitis. *Pak Armed Forces Med J* 2013;63(1):114-7.
- [17] Bucknall TE, Cox PJ, Ellis H. Burst abdomen and incisional hernia: a prospective study of 1129 major laparotomies. *Br Med J (Clin Res Ed)* 1982;284(6320):931-3.
- [18] Cohn SM, Giannotti G, Ong AW, et al. Prospective randomized trial of two wound management strategies for dirty abdominal wounds. *Ann Surg* 2001;233(3):409-13.
- [19] Gupta R, Sample C, Bamehriz F, et al. Infectious complications following laparoscopic appendectomy. *Can J Surg* 2006;49(6):397-400.
- [20] Meeks DW, Kao LS. Controversies in appendicitis. *Surgical Infections (Larchmt)* 2008;9(6):553-8.
- [21] Busuttill RW, Davidson RK, Fine M, et al. Effect of prophylactic antibiotics in acute nonperforated appendicitis. *Ann Surg* 1981;194(4):502-9.
- [22] Le D, Rusin W, Hill B, et al. Postoperative antibiotic use in non-perforated appendicitis. *Am J Surg* 2009;198(6):748-52.
- [23] Jensen NG. A Danish multicenter study: cefoxitin versus ampicillin + metronidazole in perforated appendicitis. *Br J Surg* 1984;71(2):144-6.