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ANTIMICROBIAL THERAPY IN PREVENTING WOUND INFECTION FOLLOWING APPENDECTOMY FOR UNCOMPLICATED APPENDICITIS IN CHILDREN: COMPARISON BETWEEN SINGLE DOSE AND MULTIPLE DOSES

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Summary

The role of antibiotics in acute appendicitis is well established. If there is no intra-peritoneal contamination the antibiotic administration should be prophylactic. The current trend is to continue post operative antibiotics for fixed periods ranging from 5 to 7 days in most of the hospitals in our country. Our aim was to assess the safety in relation to wound infection after appendectomy for uncomplicated appendicitis in children with single dose combined antimicrobial therapy and multiple doses. For this purpose a prospective comparative study was done in department of surgery , Dhaka shishu hospital from January, 2004 to December, 2004. Children upto 12 yrs of age with diagnosis of uncomplicated appendicitis were included in this study and peroperative findings of perforated, gangrenous appendix, histopathological report of normal appendix were excluded. Patients received antibiotics prior to hospital admission and acute appendicitis with other systemic diseases were also excluded. Total 60 patients were selected randomly in control (30 patients) and study (30 patients) group. All patients received per operative triple antibiotic therapy(Amoxycillin, Metronidazole and Gentamicin). No further antibiotics were given in study group, post operative antibiotics were continued for 7 days in control group. Wound infection was noted in 1 patient(3.33%) of each group and cost of antibiotics was significantly higher in control group(P value > 0.05).It has proved that uncomplicated appendicitis in children can be treated safely with single dose triple antibiotic therapy and use of extended period of post operative antibiotics gives no added benefit.

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Key words

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Introduction

Acute appendicitis is the commonest global abdominal surgical emergency. It is one of the frequent causes of emergency abdominal surgery in children but there continues to be significant variation in practice of treatment and outcome[1-3]. Many terms have been used to describe varying stages of appendicitis, including acute suppurative appendicitis, gangrenous appendicitis, perforated appendicitis, acute focal appendicitis. These distinctions are vague and only the clinically relevant distinction of complicated appendicitis (i.e with perforation or gangrene) versus uncomplicated (i.e without perforation and gangrene) should be made[1]. Because gangrenous appendix represents dead intestine that functionally acts as perforation[4].The most generally accepted treatment of appendicitis is prompt surgery[4]. Wound infection is the commonest source of post operative morbidity due to contamination of abdominal wound by pathogens derived from normal appendicular flora[5]. The frequency of wound infection depends on the degree of operative contamination and various maneuvers are used either to minimize contamination or, to mitigate its consequences[5]. Although the importance of antibiotics is not disputed, controversies still remain regarding which one should be used and for how long. Preoperative antibiotics are clearly beneficial[1,3].Combination of Ampicillin, Gentamicin and Clindamycin is the gold standard for both prophylaxis and treatment[4]. Metronidazole is often substituted for clindamycin[4]. This combination is selected because of the frequency of bacterial involvement, which predominantly include E.coli,Enterococcus, Pseudomonas, Klebsiella,Bacteroides[1]. Only peri-operative antibiotics are required for uncomplicated appendicitis i.e. inflamed appendix without perforation, gangrene or suppuration. The recommended duration is from a single dose to fourty eight hours[1]. For complicated appendicitis treatment to be continued as long as five days with time added as clinically indicated using- afebrile for

twenty four hours, resolution of ileus and normal count of Leucocytes[4]. Excessive duration of prophylaxis for uncomplicated appendicitis is a common practice in our scenario which is not only unwarranted but may be harmful due to drug interactions, toxic or allergic reactions, release of endotoxins from enteric bacteria, spread of resistant microorganisms in the environment and, not the least, excessive hospital cost[6]. To reveal the efficacy of single dose prophylactic antimicrobial therapy for appendectomy in uncomplicated appendicitis in children we conducted a prospective comparative study. The possible outcome of this study will reduce the use of antibiotics and cost of care.

Materials and methods

It was a prospective comparative study carried out from January 2004 to December 2004 in the Department of Surgery, Dhaka Shishu Hospital. All patients up to 12 years of age with preoperative diagnosis of uncomplicated appendicitis were included in this study. Patients with appendix mass, patients received antibiotics prior to Hospital admission, acute appendicitis with other systemic diseases, per-operative findings of gangrenous or perforated appendix and histopathological report of normal appendix were excluded. Eighty five patients were admitted with provisional diagnosis of uncomplicated appendicitis during this period and according to inclusion and exclusion criteria sixty(60) patients were selected for the study. These patients were selected randomly for control (30 patients) and study (30 patients) group. Appendectomy was performed by open method in all cases (60) following standard surgical techniques. Wound was closed by absorbable suture (polyglycolic acid, i.e. vicryl). Skin closure was done by continuous subcuticular stitches with vicryl. All specimens were sent for histopathological examination. All patients received per-operative triple antibiotics(Inj. Amoxycillin, Gentamicin, Metronidazol) according to body weight. No further post operative antibiotics were given for the study group. In control group postoperative parenteral antibiotics were continued till patients were on oral diet, then switched over to oral amoxicillin and metronidazol upto 7th post operative day as conventional practice in the institute.

All patients were followed up on 5th and 10th postoperative day and check dressing was done to detect any features of wound infection. Undue pain at the site of wound, cellulitis, purulent discharge and wound dehiscence were considered as evidence of wound infection and sample of fluid/discharge/ wound swab was sent for gram stain and culture. Only positive report was finally documented as postoperative wound infection. Patients were discharged after establishing oral feeding with normal body temperature. Data were analyzed and compared by unpaired 't' test where applicable using SPSS 11. Level of significance was expressed as 'P' value and value <0.05 was considered as significant.

Results

The age of the children ranged from 3-12 years. Most of the children were more than 5 years old. Thirty two boys and twenty eight girls were included (Table-I).Thirty eight patients admitted from sub-urban areas and rest of the patient came from urban area.

Half of the patients presented within 24 hours of onset of their symptoms. Minimum duration was 3 hours and maximum 5 days (Table-II). Mean ± SD was 1.5 ± 2.4 days.

Abdominal pain was the commonest presentation. Only 17 patients (28.33%) presented with classical peri-umbilical pain with shifting to right lower quadrant (Table-III). Complain of anorexia/nausea was noted in 58 patients (96%).

Almost all patients except one had tenderness over right lower quadrant (Table-IV).This lone patient had tenderness over right hypochondriac region.

Ninety percent of the patients had total leucocyte count>10,000/ul but Neutrophil count was >70% in only 35 patients (Fig-1, Fig-2).

Average hospital stay for test group was 78 hours and 84 hours for control group. The difference is not statistically significant (Table-V).

Post operative wound infection was noted in single patient in each group and isolated organism was E. coli (Table-VI).

The average cost of antibiotics per patient in study group was Taka 210 and in control group Taka1125 which was significantly high in control group (Table-VII).

Table I : Age and sex distribution of study and control group

		Study group (n=30)	Control group (n=30)	Total (n=60)	Percentage
Age	<5 yrs	08	04	12	20%
	5-12 yrs	22	26	48	80%
Sex	Male	14	18	32	53%
	Female	16	12	28	47%

Table II : Duration of symptoms in study and control group

Symptom duration	Study group	Control group	Total (n =60)	%	Mean ± SD
<24 hrs	14	12	26	43	5.5 ± 2.4 days
>24 hrs	16	18	34	57	

Table III : Presenting symptoms in study and control groups

Symptoms	Study group (n=30)	Control group (n=30)	Total (n =60)	%
Periumbilical Pain with shifting to RLQ*	09	08	17	28.33
Periumbilical Pain without shifting	09	06	15	25
Pain RLQ	12	16	28	46.66
Anorexia/nausea	30	28	58	96
Vomiting	22	24	46	77
Fever	24	21	45	75

*Right Lower Quadrant

Table IV: Signs on presentation in study and control group

Signs	Study group (n=30)	Control group (n=30)	Total (n =60)	%
Tenderness RLQ	30	29	59	98
Muscle guard /rigidity	20	16	36	60
Elevation of temperature	24	22	46	77

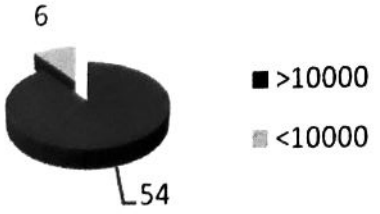

Fig 1 : No of patients with Total count of WBC>10,000 and < 10,000 in sample population (n=60)

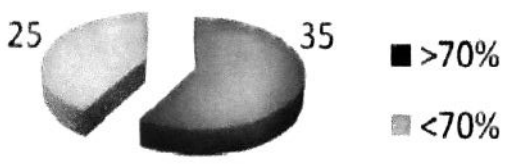

Fig 2 : No. of patients with differential Neutrophil count > 70% and < 70% in sample population (n =60)

Table V: Comparison of length of Hospital stay in study and control group

	48 hrs	72 hrs	96 hrs and more	Average (hrs)	Mean ± SD (in hrs)	Value of t	P value
Study group (n=30)	04	12	14	78	78±23.6	1.026	>0.05
Control group (n=30)	03	09	18	84	85±28.9		

Table VI: Wound infection rate following appendectomy in study and control group

	No. of Pt.	Wound infection	%
Study group	30	01	3.33
Control group	30	01	3.33

Table VII: Cost of antibiotics in study and control group

	Average cost in BDT	Mean ± SD	Value of t	P value
Study group	210	210±41	53.98	<0.05
Control group	1125	1125 ±83		

Discussion

The role of antibiotics in acute appendicitis is well established. If there is no intra-peritoneal contamination, the antibiotic administration should be prophylactic. The current trend is to continue post-operative antibiotics for fixed period ranging from 5-10 days in most of the hospitals in our country. Little attention has been given to correct duration of post operative therapy and most recent studies have examined short (single dose) versus prolonged (24-72 hours) prophylactic use, concluding short course is as good as multiple doses[7]. For this reason in recent years progressive decreases were noted in the mean number of days in antibiotic treatment overtime in children with non perforated appendicitis[8]. Our aim was to assess the safety in relation to wound infection and cost of antibiotics after appendectomy for uncomplicated appendicitis in children with single dose combined antimicrobial therapy and multiple doses. For this purpose a prospective comparative study was done with inclusion of 60 uncomplicated appendicitis patients dividing them into 2 equal groups –study group (30) and control group (30). Single dose per-operative antibiotics were applied in all patients. Post operative antibiotics were continued only in control group.

Out of 60 patients 32 were male 28 were female, 48 patients (80%) were more than 5years of age(Table I).These findings were well consistent with findings of Matin (2001)[9] and Meier et al(2003)[10].We have observed symptoms duration of 1.5day (Table II). Emil et al[4] showed 1.6±1.9 day duration for uncomplicated appendicitis

Though all patients in this series presented with abdominal pain but classical peri-umbilical pain with shifting to right lower quadrant was present only in 17(28.33% - Table III).Twenty eight patients(46.66%) presented with pain at the right lower quadrant (Table III). Pearl et al (1995)[11] observed 97% of their patients with pain at right lower quadrant. Ninety six percent patients in our series experienced anorexia, nausea and these symptoms had high sensitivity (94.28%) in appendicitis patients of pediatric age group[9].Vomiting and low grade fever were present respectively in 77% and 75% of our patients which correlates well with the findings of Meier et al[10].The most reliable sign in diagnosing acute appendicitis is tenderness over right lower abdomen[1] and we found 98% of our study population with this reliable sign(Table IV) which is identical to the finding of Pearl et al[11].

Ninety percent (90%) of our study population had Leucocyte count more than 10,000/ul (Fig:1).Pearl et al[11] and Matin[8] also had similar observations. But Neutrophil count was raised only in 35 patients (Fig:2). In our study length of hospital stay in control group on average 84 hours and in study group 78 hours(Table V) and the difference is not statistically significant

Wound infection was noted in one patient of each group (3.33% -Table VI), the isolated organism was E coli in both the patients. Bacterial contamination is the result of inoculation of organisms into the layers of the wound during operation [5]. Age, obesity, duration of operation and nutritional status are among the factors known to influence infectious complications[12]. In children it is easy to pass through thin abdominal wall with minimal tissue trauma during extracting appendix and minimum fat layer creates small dead space during closure of the wound thus producing lower risk of contamination. The time period required for appendectomy is also shorter in children than in adults. Therefore risk of infectious complications following appendectomy for uncomplicated appendicitis is minimal in children[13]. The possible causes of wound infection in our observation were obesity with thick subcutaneous pad of fat in a patient in study group and hematoma in subcutaneous layer due to improper hemostasis in another patient of control group. Emil et al[4] with an almost similar protocol experienced no wound infection with single dose prophylactic antibiotic in uncomplicated appendicitis patients.

The average cost for antibiotics in study group was Taka 210 and in control group was Taka 1125- which is almost five times higher (Table VII).

Conclusion

Excessive duration of prophylactic antimicrobial therapy which is a common practice is not only unnecessary but may be harmful. Though this study was carried out in a limited number of patients but it was proved that uncomplicated appendicitis could be treated safely with single dose per operative triple antibiotic therapy and use of extended period of post operative antibiotics will increase the cost and side effects without any added benefit.

Disclosure

All the authors declared no competing interestes

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