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Original Article

Effect of post operation antibiotic on infectious complication of suppurative appendicitis

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Abstract. The most common complication of suppurative appendicitis is surgical wound infection and prophylactic antibiotics being used to prevent it. This study evaluates the relationship between postoperative antibiotics and wound infection rate and intra-abdominal infectious complications after suppurative stage appendectomy. This study was a single-blind randomized clinical trial. The population consisted of patients ageing 18-50 years old, admitted to Kashan Shahid Beheshti General Hospital from November 2013, to May, 2016 with the diagnosis of acute suppurative appendicitis. To achieve uniformity in operative procedure, a standard operative protocol was applied. After the operation, patients in group A received 1 gram ceftriaxone every 12 hours plus 500 mg metranidazol intravenously during hospitalization and 3 days after discharge, orally and patients in group B received no antibiotics after operation. Using the SPSS-18 statistical software, the collected data were analyzed. In all statistical tests a $p < 0.05$ was considered statistically significant. Of 140 patients, 90 (64%) were men and 50 (36%) were female and the mean age was the 29.03 ± 10.21 years. The mean operative times was 60 ± 10 min and the mean hospital stay were 48 ± 4 and 48 ± 6 hour in A and B groups respectively. This study showed that the incidence of surgical site infection and intra-abdominal abscess in both group was similar and also the temperature, white blood cell count and polymorphonuclear cells in the two groups were similar. The incidence of infectious complication in patients who had not received postoperative antibiotics was similar to the group that received antibiotics thus indicating no need for any additive postoperative antibiotics.

Keywords: Appendicitis, postoperative antibiotics, suppurative appendicitis

Introduction

The most common cause of acute surgical abdomen is acute appendicitis [1]. Surgical site infection (SSI) is common complication of appendectomy. Without antibiotic prophylaxis, its rates reported 10% in suppurative, up to 30% in perforated or gangrenous appendectomies [2, 3-5]. Prophylactic antibiotics being used to prevent it, however, despite improvement of peri-operative care and effective antibiotics, its frequency still has not been reduced [6] The incidence of postoperative SSIs and infectious intraperitoneal complications has been reported to range from 0% to 11% [7, 8]. Although using prophylactic antibiotics is essential in the treatment of suppurative appendicitis and continues after operation with different courses, but its effectiveness, has not been proved yet, especially in children under 15 years old. [9] however, In surgical practice the supplementary postoperative antibiotics being used increasingly, because surgeons fear from developing postoperative SSIs. In the other hand, postoperative antibiotics increase hospitalization time and treatment cost without any marked clinical benefit [10]. With the widespread use of antibiotics, drug-resistant strains also have been created more difficulties in wound infection management. Therefore, it is very important to determine the necessity of using antibiotics before prescribing them; in addition, the indiscriminate use of antibiotics imposes an enormous cost for the countries all over the world [11]. The present study conducted to examine the necessity of administrating antibiotics after suppurative stage appendectomy.

Materials and Methods

A cross-sectional study in patients under treatment with This study was a single-blind randomized clinical trial. The population consisted of patients' ages 18-50 years old, admitted to Kashan Shahid Beheshti General Hospital from November 2013, to May, 2016 with diagnosis of acute suppurative appendicitis. This study approved by research and ethical committee of Kashan University of Medical Sciences. All of the patients had acute appendicitis diagnosed based on medical history, physical examination and laboratory data. Among 4 clinical stage of appendicitis

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TABLE 1
COMPARATIVE ANALYSIS OF AGE AND GENDER BETWEEN THE TWO EXAMINED GROUPS

Factors		Antibiotic group No. (%)	No antibiotic group No. (%)	P value
Sex	Male	48 (68)	42 (60)	0.41
	Female	22 (32)	28 (40)	
Age		29.22 ± 7.5	28.84 ± 12.3	0.854
Length of stay		48 ± 4	48 ± 6	N.S

TABLE 2
COMPARATIVE ANALYSIS OF BODY TEMPERATURE AND POSTOPERATIVE INFECTION BETWEEN THE TWO EXAMINED GROUPS

Variables	Days	Antibiotic group	No antibiotic group	P value
Body temperature	1	37.21 ± 0.43	36.94 ± 0.47	0.054
	3	36.63 ± 0.55	37.02 ± 0.58	0.061
	7	36.69 ± 0.58	36.76 ± 0.49	0.558
	15	36.60 ± 0.65	36.50 ± 0.54	0.417
	30	36.52 ± 0.54	36.62 ± 0.59	0.403
Erythema and pain	1	0 (0%)	0 (0%)	
	3	3 (4%)	10 (14%)	
	7	0 (0%)	0 (0%)	0.16
	15	0 (0%)	0 (0%)	
	30	0 (0%)	0 (0%)	
WBC postoperation	2	9040	8712	N.S
PMN	2	70.10%	71.40%	NS
WBC postoperation	7	8160	8290	N.S
PMN	7	59%	61%	NS
Incision drainage	All	0	1 seruma	N.S
Incision Infection	All	0	0	-

(catarrhal, suppurative, gangrenous, and perforated), we studied on Suppurative appendicitis. Sex, age, weight, height, clinical diagnosis, operative procedure, duration of procedure, length of hospital stay, readmission, and reoperation were recorded and analyzed. Suppurative appendicitis relatively is in advanced stage, defined as: inflammation of the appendix without gangrene, necrotic tissue or perforation, (clean-contaminated wound). Intra operative findings also are dilatation, inflammation and fibrin around the appendix. Suppurative appendicitis were finally confirmed by pathologist [9]. Outpatient follow-up done to assess development of any postoperative complications specifically incision drainage, infection, superficial erythema, SSIs fever, intra-abdominal pain 30 days after appendectomy.

To achieve uniformity in operative procedure, a standard operative protocol was applied. Open appendectomy performed in all cases, through right lower-quadrant incision by muscle-splitting approach and the appendix removed in the standard fashion. Peritoneum was mopped dry with no peritoneal washing after the appendix removed. The peritoneum, oblique muscles, and the Scarpa fascia closed with 3/0 nylon sutures and the skin closed with interrupted vertical mattress with 3/0 nylon in a standard manner. No local antibiotics used.

In the present study, a single dose of 1 gr ceftriaxone plus 500 mg metranidazol administered as prophylaxis before the incision in all cases. In order to catch informed consent from the patients we explained the complications of related appendectomy include surgical site infection, possible intra-abdominal abscess probably due to avoidance conventional antibiotic administration and also explained benefits of prevention of antibiotic resistance hazard to the patients and their parents. After the operation, patients in group A received 1 gram Ceftriaxone every 12 hours plus 500 mg metranidazol intravenously during hospitalization and 3 days after discharge, orally and patients in group B received no antibiotics after operation. After 30 days, all patients were being examined by one of the surgeons who had no knowledge of using postoperative antibiotics in patients. Wound infection was diagnosed based on the occurrence of pain, erythema and discharge at the site of incision and wound.

Statistical analysis

Using the SPSS-18 statistical software (SPSS Inc., Chicago, IL), the collected data were analyzed. In all statistical tests, $p < 0.05$ was considered statistically significant.

Results

In this study, age range of patients was 18-50 years. The mean age was 29.03 ± 10.21 years. Ninety cases (64%) were male and 50 patients (36%) were female. There was no significant age or gender-based difference between the two groups of patients ($p > 0.05$) (Table 1).

The patient body temperature in various times showed no significant difference in average body temperature between the two groups ($p > 0.05$). The patients wound after appendectomy indicated no pain or erythema around the incision site at the first day after surgery; however, on the third day, 2 patients (%4)in the group receiving antibiotics and 7 patients (%14) in the group not receiving antibiotics had pain and erythema at the incision site which healed over time. The overall results showed no significant difference between two groups ($p<0.05$). Furthermore, infected drainage from the incision or infection was not observed in the two examined groups during the 30-day of follow-up (table 2). Mean hospital stay were 48±6 hours for both groups. Also close observation from onset of abdominal pain to operation (duration of symptoms) was 12±8 hours. Mean operative duration was 60min±10 minutes. During the study period the type of appendicitis included gangrenenated (17%), suppurative (57%), catarrhal (18%), perforated (8%) and peritonitis (0%).

Discussion

Appendectomy is a routine surgical emergency procedure with approximately 800-1000-done annually in this city, with population of 400000. 7% of the population has life-time risk of developing acute appendicitis [12]. The incidence of postoperative SSIs and infectious intraperitoneal complication has been reported to range from 0% to11% [7, 8], without any prophylaxis, it increase to 20%.of Appendectomies [13, 14] The efficacy

of pre-operative antibiotics in reducing the risk of SSI following supperative Appendectomy has been well established in the literature [8, 9]. However, the role of postoperative antibiotics in these patients has not been clearly defined [15].

In the surgical practice, the supplementary post-operative antibiotics have been used increasingly because of the fear of developing postoperative SSIs, So in addition administration of prophylactic antibiotics, various intra-operative antibiotic, and antibiotic powder [16, 15]. Topical antibiotics to wash the wound site before suturing have been used to prevent postoperative infections [17, 18]. There is no single evidence-based antibiotic treatment strategy post operatively for suppurative appendicitis, particularly in children [19]. Type of chosen antibiotic also is more important than continuing postoperatively. In a study, Rafiq et al. used a single pre-operation dose of cefuroxime sodium and metronidazole (group A, but in Group B this was continued as an additional single dose of cefuroxime sodium and metronidazole 8 hours post-operation, results of SSI did not show any difference between the groups: 15(7.8%) in Group A and 18(9.1%) in Group B [20]. In another study, Liberman [21] showed SSI (11.1%) in patients who had received only pre-operative cefoxitin compared to the patients who were given both pre- and postoperative cefoxitin (1.9%). However, they found no infective complication in their third group of patients, who had received a single dose of pre-operative cefotetan [22]. Therefore, the choice of pre-operative antibiotic is an important issue, rather than addition of postoperative antibiotics.

In our study the Mean hospital stay was the same for Group A and B also Close observation from onset of abdominal pain to operation was: 48 ± 4 and 48 ± 6 hour in A and B groups respectively which were same; both groups were comparable in demographics and hospital stay. There was no antibiotic related complication in both groups, and the results of examining incision sites showed no infection or discharge in either group. Pain and erythema were observed in some patients on the third day after the surgery which were healed over time. The average body temperatures in various times were not significantly different between the two groups.

It must be noted that, postoperative fever can occur due to many causes, such as lung infection, injection site infection and factors related to the type of surgery [21-23]. Many of which are not associated with using antibiotics after the surgical treatment. Thus, postoperative fever alone cannot be considered as a reason to continue antibiotics after the surgery [20, 23]. We had no any incision drainage, incision Infection or infectious complication. Erythema and pain were 4% in group A and 14% in group B which disappeared gradually without any antibiotic administration. The second and seventh day post-operative leukocyte count in both group was similar. Thus, the overall results showed no difference between the two examined groups, therefore, the addition of postoperative antibiotics not required. Favorable result of this study may be due to either strictly case selection, rigid eligibility criteria, excluding high risk patients and choice of best prophylactic antiobiotic (1 gr ceftriaxone + 500 mg metranidazol) for a broader coverage, because in our patients was more effective. However, critics may be to suggest the age to exceed more than 50 years old or cases not to be such strictly selected. Other factors involved in good results may include close observation from onset of abdominal pain to operation which was not prolonged: 12 ± 8 hour, and relatively good management practices. Although good chosen preoperative administration of antibiotics as in other studies has proven to be effective in reducing wound infection and intraperitoneal complications [6, 12, 24], however it cannot be the substitute of good surgical and aseptic techniques. Also improvement of diagnostic methods, perioperative care and early surgical interventions are important. Meanwhile the overuse of antibiotics also is associated with the increase risk of antibiotic related complications, bacterial antibiotic resistance and cost of care [5, 6, 8].

Recently, Coakley et al, compared the outcomes patients treated with antibiotics before and after appendectomy with those, who received only pre-operative antibiotics. They concluded that the addition of postoperative antibiotics did not reduce the infectious complications, rather significantly increased the morbidity in the terms of higher rates of antibiotic-associated diarrhea and Clostridium difficile infection [10]. In addition, postoperative antibiotics had significantly prolonged the hospital stay and increased the treatment cost without affording any appreciable clinical benefit [10]. For these reasons, the benefits and side effects of antibiotics therapy must to be evaluated carefully. Even in patients with complicated appendicitis does not reduce the postoperative infectious complications [1, 15]. It seems that choice of 1 gr ceftriaxone + 500 mg metranidazol in our patients has good response.

In the present study, the infection rate after the use of antibiotic prophylaxis was 0% which is more favorable than other studies which were near (5%) [7, 10, 12, 25, 26]. This study showed that well-chosen pre-operative antibiotics as prophylaxis, early operation and standard perioperative care are adequate in preventing SSIs and infectious complications in suppurative appendectomy and also saved the cost of healthcare in 57% of our patients which were supperative appendicitis.

Conclusion

A single pre-operative dose of 1 gr ceftriaxone + 500 milligram metronidazole have the best efficacy in preventing SSIs and infectious complications in supperative appendicitis, and there is no need to repeat the same regimen post-operatively.

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Conflict of Interest

The authors declare no conflicts of interest.

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