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BEST METHOD TO MINIMIZE POST APPENDECTOMY WOUND INFECTION

Nezar A Al-Mahfooz*, Issam Merdan@ & The late Haider T Al-Ba'aj#
*MD, CABS, FICS, FMAS, Consultant Surgeon, Alsader Teaching Hospital. @ FICMS, CABS, Assist. Prof., Dept. of Surgery, College of Medicine, University of Basrah. #MBChB, FICMS, Formerly Specialist General Surgeon, Alsader Teaching Hospital.

Abstract
Despite numerous methods of wound care post appendectomy, no definite technique documented to be the best. Wound irrigation under pressure with syringe is regarded recently as an acceptable physical and biological way to prevent post appendectomy wound infection. This study compares the best of several method of wound infection prevention on 418 patients subjected to appendectomy and divided in different groups, including the use of systemic antibiotic, local antibiotic, povidone iodine, and saline pressure irrigation. We concluded that: syringe pressure irrigation to the wound significantly decrease post operative infection, and is best in
comparison to other methods.

Introduction
Acute appendicitis is the most common cause of surgical acute abdomen in all ages and sexes[1]. The frequency of wound infection is the function of the degree of operative contamination and various maneuvers are used either to minimize contamination or to mitigate its consequences[2]. The goal of cleansing is to decrease the bacterial inoculums in the wound to levels that can be managed by host defense. This cleansing process should not be tissue toxic or increase wound inflammation as this result in a lessened ability to deal with the bacterial load and increase the risk of infection[3]. Although paraenteral antibiotics used prophylactically to reduce wound infection, they do not eliminate it completely[4].So many surgeons advise the use of local antibotics and antiseptics in cases where the appendix found to be severely inflamed or complicated during operation and there are various reports available provide convincing evidence for the value of local antibiotics and antiseptics in reducing the incidence of wound infection[5]. In the present study we designed a comparative clinical trial to analyze the efficacy of different methods to decrease wound infection in patients with acute appendicitis.

Patients and Methods
A prospective randomized clinical study was conducted in Teaching Hospital, Basrah-Iraq, from January 1998 to November 2000. It includes patients of both sexes who were admitted with a clinical diagnosis of acute abdomen suggestive of acute appendicitis with the aid of clinical, laboratory and radio-

logical investigations and confirmed during operation later by histo-pathological studies of the removed appendices. We exclude patients who were sensitive to prophylactic antibiotic used in the study (third generation cephalosporin), patients who received antibiotics therapy within 72 hrs preceding operation, those with other intraperitoneal infection not originating from the appendix and those with any immune deficiency (diabetic mellitus, chronic renal failure, chemotherapy, radiotherapy, or on corticosteroid therapy). All patients included in the study were randomly distributed into five groups with random number per each group (group 1 was control and the others were experimental) and these groups are:

Group 1: Patients treated by prophylactic antibiotic and surgery (control group).

Group 2: Patients treated by prophylactic antibiotic, surgery with the wound soaked with povidin iodine.

Group 3: Patients treated by prophylactic antibiotic, surgery with the wound soaked with normal saline.

Group 4: Patients treated by prophylactic antibiotic, surgery with the wound soaked with rifadin solution.

Group 5: Patients treated by prophylactic antibiotic, surgery with the wound irrigated with normal saline.

To all patients in each group a third generation cephalosporin was administered in a dose of 1G given once daily IV. 30 min. before skin incision was made in those patients who had uncomplicated appendicitis whereas it continues for a minimum 7 days in two doses per day for those with complicated appendicitis.

To maintain uniformity in the surgical procedures, a standard protocol was followed which include: a 5 minutes scrub with povidone-iodine solution, standard grid iron or lanz incision (which may be modified to other incision if needed), minimal handling of the appendix and appendiceal stump managed with precaution. The gloves were changed after fascial closure and the wound either soaked with povidone iodine, normal saline or rifadin solution which was prepared from dissolving of 4 capsules of rifampicin (a total 1200 gm.) in one liter of normal saline or irrigated with 300 ml normal saline delivered with a 50 ml syringe (19-gauge) by the force of one hand at a distance of 2 cm from wound tissues and primary skin closure with synthetic non absorbable suture. All the appendices removed were subjected to histopathological examination to identify the degree of inflammation and the presence of complications.

Uncomplicated cases are those appendices with inflammation, suppuration but not with gangrene or perforation which is considered complicated.

The wound was examined daily till time of discharge from the hospital and then re-evaluated as outpatient visit for 2–4 weeks. The wound was considered to be infected when there were erythema and indurations of the wound, pus collected between fascial planes or positive bactriologic culture from a wound discharge.

Results

This study included a total number of 418 patients with different ages presenting with signs and symptoms of acute appendicitis. According to the clinical and operative findings, there were 131 patients have complicated appendicitis while 287 patients had uncomplicated appendicitis. All these patients were subdivided randomly into the different groups regarding the method used in treating the wound before closure as shown in Table I. The highest incidence of postoperative wound infection was in the group 1 (control group) which is 37.5% and 25.4% in both complicated and uncomplicated cases respectively (Table II and Table III) and the overall incidence of infection in this group was

29% comparing to 16% in the experimental groups, Table IV.

In addition, we found that the incidence of postoperative wound infection is lowest after irrigating the wound with normal saline before closure (group 5) and this incidence was 13.9% and 11.11% in complicated and uncomplicated case respectively and the second lowest group was group 4 (in which the wound was soaked with rifadin solution) where the incidence was 16.6% and 11.6% in complicated and uncomplicated case respectively, as shown in Tables II. and III.

Discussion

In the present study, the rate of wound infection was significantly reduced after appendicectomy when using high pressure syringe irrigation with saline solution or when soaking the wound with saline, rifadine or povidon iodine solution, plus antibiotics prophylaxis compared with a control group using antibiotics prophylaxis only.

The frequency of wound infection is a function of the degree of operative contamination and many strategies are used to decrease such contamination[6]. The risk of postoperative infection depends on several factors, including a patient's perioperative care and intraoperative management. All these factors must be consider and controlled for the evaluation of any procedure intended to decrease the infection rate[4].

Irrigation and debridement are the essentials of wound management as demonstrated by several experimental trauma models[7]. Several investigators have studied the efficacy of different solutions and different methods[8-10] concluding that the best solution for irrigation is with a syringe of 20–60 ml attached to a 19-gauge catheter. On the other hand, the addition of antiseptics to the irrigating solutions is not useful and increase the risk for infection because of the promotion of tissue necrosis at efficacious antiseptic concentration, and if diluted they lose their antiseptic ability[11].

Comparing the side effect of scrubbing and irrigating for wound cleansing, Rode heaver et al[8] found pulsating water jets not only more effective but far less irritating, producing less edema than scrubbing with a sponge. Mechanical scrubbing of the wound should be avoided because it has been shown to increase wound inflammation and no data exist that clearly demonstrate the effect on wound outcome when scrubbing is performed[3].

In the present study, we have clearly demonstrate that syringe pressure irrigation to the wound significantly decrease post operative infection to less than 13.9% in complicated cases and 11.1% in uncomplicated cases respectively which is similar to the incidence found in other study[12], compared with the group using only prophylactic antibiotics in which the incidence found was higher than 37% and 25% in complicated cases respectively.

Conclusion

Based on these results, we recommend the use of syringe pressure irrigation in case of complicated appendicitis, with 300 ml of normal saline solution delivered to the wound with a 20 ml syringe attached to a 19-gauge IV catheter, after facial closure and before skin is closed.

Wound syringe irrigation is a safe, cheep and readily available procedure in any operating room which does not impair the healing process, permits a better cosmetic result, and decreases the hospital stay and expenses.

Table I. Distribution of patients from group 1 to 5.

Groups	Complicated	Uncomplicated	Total
	No.	No.	No.
Group 1	24	59	83
Group 2	26	53	79
Group 3	20	61	81
Group 4	18	42	60
Group 5	43	72	115
Total	131	287	418

Table II. Wound infection-complicated cases.

Groups	No. of cases	No. of infection	%
Group 1	24	9	37.5
Group2	26	6	23
Group 3	20	5	25
Group 4	18	3	16.6
Group5	43	6	13.9

Table III. Wound infection-uncomplicated cases.

Groups	No. of cases	No. of infection	%
Group 1	59	15	25.4
Group2	53	11	20.7
Group 3	61	10	16.3
Group 4	42	5	11.6
Group5	72	8	11.11

Table IV: Incidence of infection in control and experimental groups.

Groups	No. of patients	No. of infection	%
Control group	82	24	29
Experimental group	335	54	16

References

1. Pieper R Kagar. The incidence of acute appendicitis: an epidemio-logical study of 971 cases. Acta Chir. Scand. 1982; 148:45.
2. Krukowski Z H, Irwin S T, Denholm S. Preventing wound infection after appendicectomy; a review. Br. J. Surg. 1988;75:1032.
3. Chisholm C D. Wound evaluation and cleansing. Emerg Med Clin North Am 1992; 10:665.
4. Page C.P., Bohnen J.M.A., Fletcher M. Antimicrobial prophylaxis for surgical wou-nds: Guidelines for Clinical Care. Arch. Surg. 1993; 128 :79.
5. Peter A N Htton, orthopaedic surgery in Aids to post graduate surgery by Roger M Watkins, J Merion Thomas:, Churchill Livingstone, London, 3rd ed, 1989; page 201.
6. Krukowski Z H, Irwin S T, Denholm S: Preventing wound infection after appendicectomy. Br. J. Surg. 1988; 75:1023.
7. Brown L L, Shelton H T, Burnside G H. Evaluation of wound irrigation by pulsitile jet and conventional meth-ods. Ann. Syrg.1978; 187; 170.
8. Rodeheaver G T, Pettry D, Thaker J G. Wound cleans-ing by high pressure irrigation. Surg. Gynecol. Obstet. 1975; 141:357.
9. Dire D J, Welsh A P. A comparison of wound irrigation solutions used in the emergency department. Ann Energ. Med.1990;18:704.
10. Hamer M L, Robson M C, Krisek T J. Quantitative bacterial analysis of comp-arative wound irrigation. Ann. Surg. 1975; 181: 819.
11. Branemark P I, Ekholm R. Tissue injury caused by wound disinfectants. J. Bone Joint Surg. 1967; 49:48.

Carlos R, Jorge A, Patricia Clark. Syringe pressure irrigation of subdermic tissue after appendicectomy to decrease the incidence of post-operative wound infection, Word Jor. of Surg.2000; 24: 38-42.