

Antibiotics Role in Prevention of Post-Appendicotomy Wound Infection

Dr. Khalid Salih Khoudhair¹, Dr. Mustafa Hameed Nasir Al-Rikabi² and Dr. Humam Abdulsalam Naji Alsabbagh³

¹M.B.Ch.B., D.G.S. \ (General surgery), Iraqi Ministry of Health, Al-Karkh Health Directorate, Department of General Surgery, Al-Tarmia General Teaching Hospital, Baghdad, Iraq.

²M.B.Ch.B., D.G.S. \ (General surgery), Iraqi Ministry of Health, Thi Qar Health Directorate, Qalaat-Sikar General Hospital, Thi Qar, Iraq.

³M.B.Ch.B., C.A.B.S. \ (General surgery), Iraqi Ministry of Health, Thi Qar Health Directorate, Qalaat-Sikar General Hospital, Thi Qar, Iraq.

Abstract: Background: Appendicitis is the most prevalent reason for acute abdominal discomfort needing surgical intervention. It's unclear causing appendicitis. The pathogenic mechanism is still under debate. Even with improvements in asepsis and surgical methods, postoperative complications such as wound infection as well as intra-abdominal abscess continue to be an important factor of morbidity. Multiple studies indicate that following surgery. Antimicrobial regimens are used to minimize infections. **Aim of study:** This review investigated the use in preoperative antibiotics relative to no antibiotics for patients undergoing appendectomy in acute appendicitis. **Methods:** This is retrospective cohort study which was carried out on (100) patients in al Yarmouk teaching hospital where the patients divided into groups for each group (50) patients, both group where compared on antibiotic administration pre-operative and relation of wound infection post – operative where appendix that present at time of operation as (normal, actually inflamed or complicated as perforated or gangrenous) where test group received antibiotic. **Result:** The study group was composed of (54 % female) & (46 % male), among the control gr. (n = 50) pt. There were 14 (28 %) pt. had wound infection & test gr. (n = 50) pt. has 6 (12 %) had wound infection. There is a statically significant association of actually inflamed appendicitis between the control & test gr. (p = 0.023) whereas there is no significant association between normal & complicated appendix on both control & test gr. (p = 0.33, p = 0.75) respectively. There is a risk of developing wound infection among the control gr. Who had an inflamed appendix are 5.73, where the number of cases is 100. **Conclusion:** 1. Prophylactic I.V. Metronidazole can decrease wound infection significantly among patients underwent appendectomy, especially in cases with an actually inflamed appendix. 2. Wound infection in patients who underwent appendectomy with a normal appendix, as well as complicated (perforated or gangrenous), and take i. v Metronidazole shows no significant difference from those who did not take it.

Keywords: Antibiotics, Post-Appendicotomy, Wound Infection, Appendicitis.

INTRODUCTION

Inflammation of the appendix is referred to as appendicitis. Appendicitis is believed to start when a blockage occurs in the entrance of the appendix to the cecum. Stool entering the appendix due to the cecum or an accumulation of thick mucus inside the appendix might be the cause of the obstruction. The mucus or feces solidifies as well as becomes rock-like, and clogs the hole (Levy, M. M. 2001; Robson, M. C. 1997). This rock is termed a fecolith in earlier periods. The appendix's lymphatic tissue may enlarge and obstruct the aperture. After the obstruction, bacteria that are typically located inside the appendix start to infiltrate the appendix wall. (McGreevy, J. M. *et al.*, 2002; Skarzynska, J, Ciecialska, A. 2022)

In Treatment can entail merely antibiotics & a liquid diet; for rare circumstances, appendicitis may heal well without surgery. Infection at the surgical incision site is the most frequent consequence of appendectomy. Sometimes, appendicitis causes such severe inflammation and infection that the surgeon fails to stitch up the incision at the conclusion of the surgery out of fear that the opening is already infected. In order to

reduce the risk of infection within the incision and enable the infection to go away with antibiotic medication, the surgical closure is instead delayed for a few days. (Chiang, R. A. *et al.*, 2006)

Another complication of appendectomy is an abscess, a collection of pus in the area of the appendix. The most frequent cause of morbidity following an appendectomy is infection of the surgical incision, even with the regular administration of preventative medicines that target both anaerobic and aerobic organisms. Therefore, it might result in greater discomfort and a prolonged hospital stay. The intact epithelium keeps bacterial pollutants that are often found on skin from penetrating deep tissues. Surgery fractures that have intact epithelium, enabling bacteria to get into these tissues. The bloodstream Ensuring appropriate preoperative antibiotic dose and timing has become a crucial hospital performance metric. Antibiotic prophylaxis works best when sufficient concentrations of antibiotics are available in the tissues around the time of incision. Antibiotics are obviously useless for avoiding postoperative wound infection once

operational contamination has taken place. (Alsaeed, O. M. et al., 2022; Nandi, P. L. et al., 1999)

In this study, Prophylactic single-dose preoperative intravenous injection of 500 mg of metronidazole is effective in decreasing the post-appendectomy rate of wound infection.

Metronidazole decreases post-operative wound infection from 11.1 % to 0 % in a normal appendix, while in an actually inflamed appendix, Metronidazole decreases from 29 % to 6 7 % and in complicated cases, it is still high at 33.3 % while in the normal appendix in this study, there is no field for their value because it is present 11.1 % in all 17 cases in this study. (Nandi, P. L. et al., 199)

Parenteral prophylactic antibiotic can be administered as a single I V dosage beginning 60 minutes as well as less before the procedure. For protracted operation > 4 hrs and those with considerable blood loss, extra intraoperative doses should be administered at intervals 1 – 2 times the half-life of the medication throughout the length of the procedure for a patient having normal renal function. The patient, the tissues surrounding the wound, and the wound itself should all be evaluated for symptoms and indications of wound infection as well as for variables that might raise the likelihood and extent of infection. (Bahar, M. M. et al., 2010)

PATIENT AND METHODS

Study population:

In all patients with a clinical diagnosis of appendicitis who were operated on in the general surgery department in Al Yarmouk teaching hospital, from the first of March 2022 to the end of November 2022.

The following data were collected: gender, and pathological findings, intraoperatively inflamed, complicated (perforated or gangrenous), and clinical features of Patients were evaluated for any signs and symptoms of wound infection.

(erythema, induration, pain, and pus at the incision site) for less than three weeks following surgery by the surgeon.

At the end, data were collected for (100) patients, with (54) female and (46) male patients. Patients were divided into two groups of control and test based on received antibiotics pre-operative on test group (50 patients) and control group (50 patients) who not received antibiotics pre – operative.

Collection of patients aged 18 years old and not exceeding 45 years old.

Test group who received antibiotic (metronidazole 500 mg IV) – 50 patients showed (6) patients (12 %) wound infection postoperatively in cases of acute appendicitis where intraoperative inflamed, complicated (perforated or gangrenous).

Control group who did not receive antibiotic (metronidazole 500 mg IV) – 50 patients showed (14) patients (28 %) wound infection postoperatively in cases of acute appendicitis where intraoperative inflamed, complicated (perforated or gangrenous).

Prophylactic IV Metronidazole 500 mg three times daily can decrease wound infection significantly among patients underwent appendectomy, especially acute appendicitis, where intraoperative inflammation is complicated (perforated or gangrenous). (McGreevy, J. M. et al., 2002; Bahar, M. M. et al., 2010)

Wound infection in patients who underwent appendectomy with a normal appendix, as well as complicated (perforated or gangrenous), and those who take

I.v. Metronidazole 500 mg three times daily shows no significant difference from those who did not take it (Alsaeed, O. M. et al., 2022; Medical News Today, 2023)

Exclusion criteria:

Exclusion criteria included patients with diagnosed medical illnesses, like D, immunocompromised patients, pregnant females, who interfere with the wound healing process, and patients with appendicitis removed by laparoscopic surgery.

Statistical Analysis :

Each patient was assigned a serial identification number. The data were reviewed, with double-check entry into the computer using Statistical Package for Social Sciences (SPSS) version 20 for Windows 2013

The categorical data are presented as frequency and percentage tables as well as bar, pie, and stacked bar charts. Pearson's chi-square and Fisher's exact tests were used to assess the association between the categorical data. The level of significance in this study was of $p < 0.05$, and the confidence interval 95 %

Ethical Consideration:

Research approval was obtained from the health authority in Al Yarmouk Teaching Hospital.

RESULTS

The male-to-female ratio in the control group was 24:26, and the ratio of the test group was 22:28

Overall percentage of the pathological state of the appendix were (17 %) normal, (61 %) inflamed and (22 %) complicated.

Table 1: Distribution of the participants in the study groups according to their gender, n=100

Gender	Control group No. (%)	Test group No. (%)	Total No. (%)
Male	24 (48)	22 (44)	46 (46)
Female	26 (52)	28 (56)	54 (54)
Total	50 (100)	50 (100)	100 (100)
Pearson's chi-square, p-value 0.688 (not significant at alpha <0.05)			

Table 1 shows no statistical relationship between study group and gender, as $p = 0.688$

Table 2: Intraoperative and wound infection among included controls who underwent appendectomy without intravenous Metronidazole, n=50.

Pathological state of the appendix	Number of cases	Number of wound infections	%
Normal	9	1	11.1%
inflamed	31	9	29.0%
Gangrenous or perforated	10	4	40.0%
Total number	50	14	28.0%

Table 2: Shows that actually inflamed appendix found to be the with the highest number (31) cases, followed by complicated appendix with (10) cases, were (9) cases in actually inflamed

appendix (29 %), and complicated appendix cases were (4) cases with (40 %) present with wound infection among the control group

Table 3: Pathology and wound infection among the included test group underwent appendectomy with intravenous Metronidazole, n=50.

Intraoperative state of the appendix	Number of cases	Number of wound infections	%
Normal	8	0	0.0%
inflamed	30	2	6.7%
Gangrenous or perforated	12	4	33.3%
Total number	50	6	12.0%

Table – 3 Show that actually inflamed appendix found to be the with the highest number (30) cases, followed by complicated appendix with (12) cases, were (2) cases in actually inflamed

appendix (6.7 %), and complicated appendix cases were (4) cases with (33.3 %) present with wound infection among the test group

Table 4: Comparison of the number of wound infections between the test and control group, n=100.

Intraoperative state of the appendix	Control group No. (%)	Test group No. (%)	p-value
Normal	1 (11.1)	0 (0.0)	0.33 (NS) ^F
inflamed	9 (29.0)	2 (6.7)	0.023* ^P
Gangrenous or perforated	4 (40.0)	4 (33.3)	0.75 (NS) ^F
Total	14 (28.0)	6 (12.0)	0.046* ^P
Fisher's exact test, ^P Pearson's chi-square test, NS not significant, * significant at alpha <0.05			

Table 4 Shows there is a statistical difference in cases of actually inflamed appendix between test & control groups, with p-value < 0.023. Also, show there is no statistical difference in cases of

complicated appendix and normal cases of appendix between test & control groups, and there is a statistical difference in total cases between test & control groups with p-value = 0.046

Table 5: Risk of getting wound infection after Appendectomy in patients without prophylactic antibiotics compared to those given IV Metronidazole, n=100.

Intraoperative state of the appendix	Risk	95% confidence interval
inflamed	5.73*	(1.121 – 29.25)
Total	2.85 (NS)	(0.995 – 8.137)
NS= not significant, * significant at alpha <0.05		

The above table means that patients with an actually inflamed appendix and who had no prophylactic antibiotics have a significant risk of wound infection (5.73 times compared to those who have taken IV metronidazole, while the total risk was not significant because the confidence interval crossed.

DISCUSSION

In this study prophylactic preoperative metronidazole injection (500 mg) was able to reduce the rate of wound infection in the normal appendix to (zero), inflamed from 29 0 % in control group to 6 7 % in test group while in complicated appendix who received the metronidazole still have a high wound infection from 40.0 % in control group to 33 3 % in test group.

On the contrary, Chiang *et al* have observed that the existence of appendiceal perforation was the most important factor related with the occurrence the postoperative wound infection. They have decided that in the case of perforation, the wound may be left open to prevent an increased probability of wound infection and extended hospital stay. (Bahar, M. M. *et al.*, 2010; Skarzynska, J, Cieciana, A. 2022)

It appears plausible to infer that antimicrobial prophylaxis is helpful in the prevention in postoperative issues for the appendectomied individuals, whether the administration was preoperatively, or should be considered for regular usage in emergency appendectomy. (Andersen, B. R. *et al.*, 1996; Robson, M. C. 1997)

The male-to-female ratio in the control group was 24, 26, and the ratio of the test group was 22 : 28 (Skarzynska, J, Cieciana, A. 2022; Alsaed, O. M. *et al.*, 2022)

Overall percentage of the pathological state of the appendix were (17 %) normal. (61 %) inflamed and (22 %) complicated

Percentage of total wound infection among included controls who underwent appendectomy without intravenous Metronidazole, n=50.

Illustrated that wound infections were 14 cases (28 %) and 36 cases (72 %), respectively, and did not show wound infection among the control group.

Percentage of total wound infection among included test subjects who underwent appendectomy with intravenous Metronidazole, n=50.

Illustrated that wound infections were 6 cases (12 %), and 44 cases (88 %) did not show wound infection among the test group.

Percentage of wound infection according to the pathological state of the appendix among study groups. Showed there is a statistical difference in cases of actually inflamed appendix between test & control groups, with p value < 0.05. In contrast, there is no statistical difference in cases of complicated appendicitis between the test & control groups.

LIMITATION

The follow-up was for less than three months only, and many of them were lost during the period of follow-up due to loss of more information or loss of contact with patients.

CONCLUSION

Prophylactic single-dose preoperative intravenous injection of (500 mg) Metronidazole is effective in decreasing the post-appendectomy rate of wound infection.

Metronidazole decreases post-operative wound infection from 11.1 % to 0 % in normal appendix, while in the inflamed appendix, Metronidazole decreases from 29 % to 6 7 % and in complicated cases, it is still high at 33.3 % (Robson, M. C. 1997; Skarzynska, J, Cieciana, A. 2022)

While in the normal appendix, in this study, there is no field for their value because it is present in 11—1% of all 17 cases in this study. Early diagnosis and early operation (appendectomy) on the acute appendicitis reduces the incidence of perforation, which is a complication (Chiang, R. A. *et al.*, 2006; Nandi, P. L. *et al.*, 1999)

(include wound infection) and increase the effectiveness of pre-operative Metronidazole injection (Bahar, M. M. et al., 2010; Nandi, P. L. et al., 1999; Nandi, P. L. et al., 1999)

1. Prophylactic I.V. Metronidazole can decrease wound infection significantly among patients underwent appendectomy, especially cases with an actually inflamed appendix (Alsaed, O. M. et al., 2022; Medical News Today, 2023)

2. Wound infection in patients who underwent appendectomy with a normal appendix, as well as complicated (perforated or gangrenous), and take

i.v. Metronidazole shows no significant difference from those who did not take it. (Medical News Today, 2023; Nandi, P. L. et al., 1999)

The male-to-female ratio in the control group was 24:26, and the ratio of the test group was 22: 28. Overall, the percentage of the intraoperative state of the appendix were (17 %) normal, (61 %) inflamed, and (22 %) complicated (Surgical Site,)

Percentage of total wound infection among included controls who underwent appendectomy without intravenous Metronidazole, n=50. Wound infections were 14 cases (28 %), and 36 cases (72 %) did not show wound infection among the control group (Bahar, M. M. et al., 2010; Skarzynska, J, Cieciana, A. 2022)

Percentage of total wound infection among included test subjects who underwent appendectomy with intravenous Metronidazole, n=50. Wound infections were 6 cases (12 %), and 44 cases (88 %) did not show wound infection among the test group.

Percentage of wound infection according to the intraoperative state of the appendix among study groups. (Nandi, P. L. et al., 1999; Surgical Site,)

There is a statistical difference in cases of actually inflamed appendix between test & control groups, with p value < 0.05, whereas there is no statistical difference in cases of complicated appendix between test & control groups (Bahar, M. M. et al., 2010; Skarzynska, J, Cieciana, A. 2022)

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| 14. A surgical site infection can develop anytime from 2 to 3 days after the operation, up to when the wound has healed (2023). | 15. Infection following a procedure at another surgical site. The 2024 is the American ICD-international versions 2023 illoit park Search in Surgical Wound Infection. |
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