

THE EFFECT OF WASH THE WOUND WITH NORMAL SALINE ON DECREASE THE SURGICAL SITE INFECTIONS POST-APPENDECTOMY (COMPARATIVE STUDY).

Dr. Zaid Ali Majeed¹, Dr. Ali Fthala Atya² and Dr. Haider Yihya Naeif³

Al Muthanna University, College of Medicine, Department of Surgery, A.B.H.S.G, MBChB¹

²Al-Hussein Teaching Hospital, Samawah, Al-Muthanna, Iraq M.B.Ch.B
,F.I.C.M.S(surgery)²,F.I.C.M.S, A.B.H.S.G.³

Corresponding author: Zaid_a28@my.edudr.zaid.ali.36@gmail.com

ABSTRACT

In this study we take (200) case of acute appendicitis who presented to the emergency department of AL- HUSSAIN TEACHING HOSPITAL in period between January 2020 till July 2021 all of them diagnosed as acute appendicitis by clinical ALVARADO score, laboratory tests, ultrasound and C.T. scan.

the age of patients in average between 15 to 50 years old, (140) was male and (60) were female.

surgery done for all of them, perforated appendix found in (30) patients while (170) patients was not perforated acute appendicitis. (table 2)

the follow up of the wound continue for 1 month postoperatively depending on clinical observations for wound and vital signs.

Key words: Wound, APPENDECTOMY, Normal.

INTRODUCTION

Appendicitis is inflammation of the vermiform appendix. This is a hollow organ located at the tip of the cecum, usually in the right lower quadrant of the abdomen. However, it can be located in almost any area of the abdomen, depending on if there were any abnormal developmental issues or if there are any other concomitant conditions such as pregnancy or prior surgeries. The appendix develops embryonically in the fifth week. During this time, there is a movement of the midgut to the external umbilical cord with the eventual return to the abdomen and rotation of the cecum. This results in the usual retrocecal location of the appendix. It is most often a disease of acute presentation, usually within 24 hours, but it can also present as a more chronic condition. If there has been a perforation with a contained abscess, then the presenting symptoms can be more indolent. The exact function of the appendix has been a debated topic. Today it is accepted that this organ may have an immunoprotective function and acts as a lymphoid organ, especially in the younger person. Other theories contend that the appendix acts as a storage vessel for "good" colonic bacteria. Still, others argue that it is a mere developmental remnant and has no real function, appendicitis considered the most common surgical emergencies in the world. [\[1\]\[2\]\[3\]](#)

ETIOLOGY

The cause of appendicitis is usually from an obstruction of the appendiceal lumen. This can be from an appendicolith (stone of the appendix), or some other mechanical etiologies. Appendiceal tumors such as carcinoid tumors, intestinal parasites, and hypertrophied lymphatic tissue are all known causes of appendiceal obstruction and appendicitis. Often, the exact etiology of acute appendicitis is unknown. When the appendiceal lumen gets obstructed, bacteria will build up in the appendix and cause acute inflammation with perforation and abscess formation. One of the most popular misconceptions is the story of the death of Harry Houdini. After being unexpectedly punched in the abdomen, the rumor goes, his appendix ruptures, causing immediate sepsis and death. The facts are that Houdini did die from sepsis and peritonitis from a ruptured appendix, but it had no connection to him being struck in

the abdomen. It was more related to widespread peritonitis and the limited availability of effective antibiotics at the time.[\[4\]\[5\]](#).

EPIDEMIOLOGY

Appendicitis occurs most often between the ages of 5 and 45 with a mean age of 28. The incidence is approximately 233/100,000 people. Males have a slightly higher predisposition of developing acute appendicitis compared to females, with a lifetime incidence of 8.6% for men and 6.7 % for women. There are approximately 300,000 hospital visits yearly in the United States for appendicitis-related issues.

PATHOPHYSIOLOGY:

The pathophysiology of appendicitis likely stems from obstruction of the appendiceal orifice. This results in inflammation, localized ischemia, perforation, and the development of a contained abscess or frank perforation with resultant peritonitis. This obstruction may be caused by lymphoid hyperplasia, infections (parasitic), fecaliths, or benign or malignant tumors. When an obstruction is the cause of appendicitis, it leads to an increase in intraluminal and intramural pressure, resulting in small vessel occlusion and lymphatic stasis. Once obstructed, the appendix fills with mucus and becomes distended, and as lymphatic and vascular compromise advances, the wall of the appendix becomes ischemic and necrotic. Bacterial overgrowth then occurs in the obstructed appendix, with aerobic organisms predominating in early appendicitis and mixed aerobes and anaerobes later in the course. Common organisms include *Escherichia coli*, *Peptostreptococcus*, *Bacteroides*, and *Pseudomonas*. Once significant inflammation and necrosis occur, the appendix is at risk of perforation, leading to a localized abscess and sometimes frank peritonitis.[\[6\]](#)

The most common position of the appendix is retrocecal. While the anatomical position of the root of the appendix is mostly constant, tail positions can vary. Possible positions include retrocecal, subcecal, pre- and post-ileal, and pelvic.

SURGICAL WOUND INFECTION POST APPENDECTOMY

Postoperative wound infection is a common healthcare problem especially after appendectomy . The process of wound infection is complex and involves an interplay between several biological pathways at the molecular levels. Wound infections account for high morbidity and mortality. Current data indicates that surgical site wound infections account for over two million nosocomial infections in patients who have been hospitalized in the United States.[\[7\]](#)

Surgical wound infections are classified as follows by the Centers for Disease Control and Prevention (CDC):

- 1 - Superficial incisional infection that only involves the skin and subcutaneous tissues. One of the following criteria has to be met: purulent discharge from the wound, isolated organism, at least one symptom of infection, and diagnosis by the surgeon. These infections account for more than 50% of all surgical infections.
- 2 - Deep incisional infections involve deeper tissues, including muscles and fascial planes. One of the following criteria has to be met: purulent discharge from the wound, dehiscence, or deliberate re-opening of deep incision by the surgeon after suspecting an infection, evidence of abscess formation, or other deep infection diagnoses by the surgeon.
- 3 - Organ/space infection may involve any organ apart from the incision site but must be related to the surgical procedure. One of the following criteria has to be met: purulent discharge from the drain placed in the organ, isolated organism from the organ, abscess, or other infection involving the organ.

To be classified as a surgical site infection, the wound must:

1 - occur within 30 days after the surgery (in the case of organ/space infections with an implant in situ this is one year)

2 - only include the skin, subcutaneous tissues, deep layers or distant organs, and

3 - have either purulent drainage or organisms isolated from the wound site.

If the surgeon opens the wound for cleaning, it is considered a surgical wound infection. A wound is not considered to be infected if there is only a stitch abscess. The majority of surgical site wound infections are due to endogenous flora that is usually present on the mucous membranes, skin, or hollow viscera. In general, when the microbiological flora concentration is higher than 10,000 microorganisms per gram of tissue, there is a high risk for an infected wound.[\[8\]](#)

The etiology of postoperative wound infection is complicated by the heterogeneous nature of these infections. They vary by geographical region, surgical subspecialty, and the wide array of procedures performed.

Risk factors can be divided up into patient factors and procedural factors.

Patient risk factors for wound infection include advanced age, malnutrition, hypovolemia, obesity, steroid use, diabetes, use of immunosuppressive agents, smoking, and coexistent infection at a remote site.

Procedure-related risk factors include the formation of a hematoma, the use of foreign material such as drains, leaving dead space, prior infection, duration of surgical scrub, preoperative shaving, poor skin preparation, long surgery, poor surgical technique, hypothermia, contamination from the operating room, and prolonged perioperative stay in hospital.[\[9\]](#)

When looking at the theatre environment, appropriate planning, maintenance, and training are essential to minimize the rates of SSI. An appropriate theatre block should allow optimal patient flow and the separation of clean and contaminated areas. Furthermore, the operating room layout and item materials should be arranged in a way to maintain a clean and sterile environment. When considering ventilation, positive pressurization, filtering, laminar airflow systems, and the number of air exchanges are important factors.[\[10\]](#) Appropriate reduction of patient flora in the form of chlorhexidine shower is widely used in some specialties the day before surgery. Hair removal should only be done when necessary, and with clippers just before surgery. Using iodine or chlorhexidine based agents for preparation of surgical area is a controversial topic, and certain subspecialties have their protocols. For the surgeon, appropriate scrubbing technique and double gloving have been shown to reduce rates of infection.[\[10\]](#) The WHO surgical checklist has been designed to improve communication, prevent complications, and to improve safety overall, which includes surgical site infections as well.

The type of surgical procedure is also a significant risk factor. Surgical procedures and, therefore, wounds are further classified as clean, clean-contaminated, contaminated, and dirty-infected with very different rates of postoperative wound infection rates. Classification is defined as follows from the CADTH report 2011:

- Clean — a procedure in which no inflammation is encountered during incision, approach, or main part of the operation, and sterility is maintained. The gastrointestinal, urogenital, and pulmonary tracts are not entered.
- Clean-contaminated — a procedure where the gastrointestinal, urogenital, and pulmonary tracts are entered in a contained manner, but there is no contamination.
- Contaminated — a procedure during which asepsis is not followed or an incision through acutely inflamed tissue (non-purulent). Also, traumatic wounds (older than 24 hours), or if there is a significant release from the gastrointestinal, urogenital, or pulmonary tracts.
- Dirty/infected — a procedure on perforated hollow viscera, or an incision through acutely inflamed tissue (purulent). Also, traumatic wounds (older than 24 hours) with necrotic tissue present or sustained through a dirty mechanism (contact with fecal material).[\[11\]](#)

The concept of asepsis or antisepsis was established in the 19th century by Semmelweis, who used carbolic acid as an antiseptic and showed that hand washing before a delivery reduced puerperal fever and surgical infection rates. He has seen a decrease in mortality due to puerperal sepsis from 12% to 2%. Before this concept was established, the risk of surgical infection was significantly higher. Acknowledgment of the aseptic approach made a significant impact on outcomes. In current times it is challenging to provide accurate data for postoperative wound infections as the term covers a wide variety of specialties, operations, patients, and geographies.

Also, identifying wound infections is more challenging due to increased prevalence of day case surgery, and shortened hospital stays. CDC data from 2018 is to be read with the above precautions. The morbidity for 2018 in the US was 157,500 for surgical site infections (SSI), with an estimated mortality of 8,205. 11% of all deaths in intensive care units were associated with SSI. It is a burden for the patient with an additional 11 days of hospitalization for each SSI and a burden to the system with an overall cost of \$3.2 billion per year. SSI rates also depend on what type of surgery is performed, appendectomy wound considered clean contaminated if the appendix not ruptured while if it was ruptured appendix it considered dirty wound . [\[12\]\[13\]](#)

METHOD

In this study we divided the patients into 2 groups equally as :The first group we wash the wound after closure of first layer (peritoneum) by use of normal saline after that we close the other layers till the skin .

The second group we didn't wash the wound with normal saline and closure the layers of wound till the skin as usual.

Both groups had the same treatment postoperative which include :

Broad spectrum antibiotics , I.V. fluids and analgesia .

RESULTS:

FIRST GROUP A (WASH WITH NORMAL SALINE) :

The number was (100) patients , (85) patients with non perforated acute appendicitis only (15) had surgical site infection (SSI) postoperative

(15) patients were with perforated acute appendicitis , only (5) had surgical site infection .(table 2)

SECOND GROUPB (WITHOUT WASH WITH NORMAL SALINE):

The number was (100) patients .(85) patients with non perforated acute appendicitis , the SSI happened in (35) patients postoperative .

While (15) patients were presented with perorated acute appendicitis , (7) of them had SSI postoperative .(table 2)

the mean age was (28.3 years old) and the standard deviation (8.79) as shown below in table (1)

| | | |
|---------------------------|--|------------------------|
| Mean | | 28.375 year |
| Std. Deviation | | ± 8.79 |

Table (2) Clinico- epidemiological characteristics of patients

| | | Frequency | Percent |
|-------------------------|---------------------|-----------|---------|
| Age | < 20 | 47 | 23.5 |
| | 21-30 | 81 | 40.5 |
| | 31-40 | 51 | 25.5 |
| | 41-50 | 21 | 10.5 |
| Gender | F | 60 | 30 |
| | M | 140 | 70 |
| Type of Appendicitis | Acute Appendicitis | 170 | 85 |
| | Perforated appendix | 30 | 15 |
| Surgical Site Infection | positive | 57 | 28.5 |
| | negative | 143 | 71.5 |
| Wash with normal saline | positive | 100 | 50 |
| | negative | 100 | 50 |
| Total | | 200 | 100 |

In table 3 we notice that the relation between age groups and SSI was significant

Table (3) relation between patients age groups and SSI

| SSI | | Age | | | | Total |
|-----------|----------|-----|-------|-------|-------|-------|
| | | <20 | 21-30 | 31-40 | 41-50 | |
| SSI | positive | 9 | 18 | 18 | 12 | 57 |
| | negative | 38 | 63 | 33 | 9 | 143 |
| Total | | 47 | 81 | 51 | 21 | 200 |
| P < 0.004 | | | | | | |

In table 4 show the relation between the gender of patients and SSI was significant

Table (4) relation between patients gender and SSI

| SSI | | Gender | | Total |
|----------|----------|--------|-----|-------|
| | | F | M | |
| SSI | positive | 23 | 34 | 57 |
| | negative | 37 | 106 | 143 |
| Total | | 60 | 140 | 200 |
| P < 0.04 | | | | |

In the table 5 show the relation between type appendicitis and SSI was not very significant.

Table (5) relation between patients with type of appendicitis and SSI

| | | type of appendicitis | | Total |
|-------|----------|----------------------|---------------------|-------|
| | | Acute Appendicitis | Perforated appendix | |
| SSI | positive | 46 | 11 | 57 |
| | negative | 124 | 19 | 143 |
| Total | | 170 | 30 | 200 |
| | | P < 0.28 | | |

In table 6 show the relation between wash with normal saline and SSI , we found that wash with normal saline was very significant in decrease SSI postoperative .

Table (6) relation between patients with wash with normal saline and SSI

| | | Wash with normal saline | | Total |
|-------|----------|-------------------------|-----|-------|
| | | + | - | |
| SSI | positive | 15 | 42 | 57 |
| | negative | 85 | 58 | 143 |
| Total | | 100 | 100 | 200 |
| | | P < 0.0001 | | |

Discussion:

Although the capacity of the skin to heal itself is large, restrictions on this ability include dryness of the wound surface and infections. After the review of the results in this study we found that the wash of wound with normal saline prior to closure the wound in case of acute appendicitis had a significant effect in decreasing the rate of SSI postoperative, while in another published study under title of (The role of saline irrigation prior to wound closure in the reduction of surgical site infection: a systematic review and meta-analysis) this similar with (14).

found that This systematic review could not identify an advantage for routine irrigation of abdominal wounds with normal saline over no irrigation prior to wound closure in preventing or reducing the rate of SSI.

in another study under title (Intra-operative wound irrigation to reduce surgical site infections after abdominal surgery: was agree (15).

suggest that IOWI(intera-operative wound irrigation) before skin closure represents a pragmatic and economical approach to reduce postoperative SSI after abdominal surgery and that antibiotic solutions seem to be more effective than PVP-I solutions or simple saline, and it might be worth to re-evaluate their use for specific indications. Like with (16,17).

The recommendation

After this study we recommended to take larger number of patients to improve the result of this study and published as a preventive method to decrease the SSI postoperative.

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