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COLLEGE OF MEDICINE**



**Comparison between early appendicectomy and  
delayed appendicectomy in treating acute  
appendicitis**

**A Thesis Submitted to the College of Medicine  
And Committee of Graduate Studies of University of Diyala  
As Partial Fulfillment of the Requirements  
For The Degree of Master in General Surgery**

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بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

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صِدْقَ اللَّهِ الْعَظِيمِ

سورة فاطر

الاية 28

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## **Dedication**

I would like to dedicate my thesis to my Family, my supervisor Assistant professor Dr.Muqdad Fuad Abdulkareem and all the seniors in Baquba Teaching Hospital; and to the College of Medicine/University of Diyala; to everyone helped me in accomplishing this thesis.

Special dedicate to Professor Ismail Ibrahim Latif for his support to all of us as students over these two years. He was our big brother in addition to be an excellent teacher.

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## **Summery**

### **Background:**

Acute appendicitis is the most common emergency condition that faces the surgeon worldwide. The overall lifetime risk of having acute appendicitis is estimated to be 6–7 %. This means that about 7% of the population will develop acute appendicitis in their lifetime, with the peak incidence occurring between the ages of 10 to 30 years

Early and sometimes immediate appendicectomy is standard in treating a case of acute appendicitis putting in mind the risk of pathological progression into perforation, gangrenous appendicitis and abscess formation.

However, recently, this practice has been challenged by authors giving a suggestion that appendicectomies can be delayed in some cases and still devoid of adverse postoperative outcomes.

**Patients and method:** This is a prospective randomized study of 341 patients (189 males and 152 females) underwent appendicectomy over a period of eleven months (May 2019-March 2020) in Baquba Teaching hospital in Diyala governorate. The total number of patients entered the study was 377 patients, all with features of acute appendicitis. 36 patients out of the 377 patients were excluded from the study because they were operated on intentionally in the first eight hours of diagnosis for certain reasons. The patients who were excluded from the study include patients under 12 years (poor localization of infection and peritonitis) or older than 65 years (high risk of perforation rate), toxic patients and patients with advanced abdominal and vital signs of appendicitis (features of peritonitis), patients diagnosed as having appendicular mass or abscess intraoperatively, pregnant

females (high maternal and fetal mortality related to the possible perforation of delay) and those underwent negative appendectomies (found to have gynecological problems as ovarian problems, those who found obvious mesenteric lymphadenitis, those who have grossly normal appendix, and those who found to have Meckel's diverticulitis).The rest of patients involved in the study were 341 patients.

The patients categorized into two groups for making the comparison (all underwent appendectomy): **Group A:** 181 patients (male 108, female 73) include those who are operated on within 8 hours of arrival to the hospital and **Group B:** 160 patients(male 81, female 79) include those who are operated on after 8 hours of arrival to the hospital (many of patients in this subgroup admitted at day time and operated on at the night and others presented near the midnight to be operated on the next morning).

The study form includes the name, age, sex, interval from onset of symptoms to visit the hospital, time from receiving the patient to diagnosis of acute appendicitis, time interval from the diagnosis to operation, vital signs at presentation, laboratory findings at presentation particularly complete blood count, whether intraperitoneal drain placed or not, postoperative complete blood count, time to start oral intake, complications postoperatively, length of hospital stay, and the need for readmission within 30 days of surgery.

The patients in the two groups were compared regarding the following postoperative outcome measures:

1. White blood cell (WBC) count on postoperative day one.



2. Time to liquid diet.
3. Rate of complication.
4. Length of hospital stay.
5. The need for readmission within 30 days of doing the surgery.

## **Results**

Regarding the mean white blood cell count on the first postoperative day, it was lower for group B. than that for group A ( $p$  value 0.0018); this may be explained by being the patients received at least two doses of antibiotics which are usually a combination of two antibiotics (mostly one drug of the cephalosporin group plus metronidazole) before doing the surgery. With regard to timing of starting having liquid diet, there was no significant difference, and the patients in the two groups started oral within the first 24 hours ( $p$  value 0.0715). The immediate and early postoperative complication rate in group A was 0.02% and 0.37% for group B With a ( $p$  value 0.4022), which make it non-significant. The length of postoperative hospital stay in group A range between 2 days and less than one day; for group B, it also range between 2 days and less than one day ( $p$  value 0.0826), which make it also non-significant. With regard to the need for readmission within 30 days, 0.016% of the patients in group A and 0.025% of those in group B ( $p$  value 0.9984) were readmitted for having severe surgical site infection (severe cellulitis or wound abscess) or developing features of adhesional intestinal obstruction. Considering the  $P$  value more than 0.05 make it non-significant.

## **Conclusions**

- Acute appendicitis still considered urgent surgical disease but uncomplicated cases are not necessarily regarded as an emergency disease that mandate operation at the time of admission or within hours (early appendicectomy) fearing of complications.
- This study concluded that delayed appendicectomy was safe and feasible for patients with uncomplicated appendicitis.
- Delayed appendicectomy can improve the quality of care provided from both the residents and surgeons enhance patient's quality of care, and it allow an increase efficient utilization of medical resources and theaters for other life-threatening emergency cases.

## **Recommendations**

We suggest that surgeons can decide the suitable timing of appendicectomy considering other situations in the hospital and the operating room mainly the available hospital resources.

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# Chapter One

## Introduction

## **Introduction:**

Acute appendicitis is the most common emergency condition that faces the surgeon worldwide. The overall lifetime risk of having acute appendicitis is estimated to be 6–7 %. This means that about 7% of the population will develop acute appendicitis in their lifetime, with the peak incidence occurring between the ages of 10 and 30 years **[Stewart B, et al 2014]**. It is used to perform appendectomy at the time the diagnosis of acute appendicitis is done; within hours because delay means more progression of the inflammation **[ Pittman-Waller VA, et al 2000, Lee HJ, et al 2011]**. Thus, the procedure appendectomy is one of the most frequently achieved surgical operation worldwide and it forms a significant burden on nowadays health providers. In spite of being very common, the causes of acute appendicitis are still poorly understood. Insufficient number of clinical researches yielded an uncertainty regarding the best practice, which ultimately affects the outcome **[Addiss DG, et al 1990, Schwartz SI. 1994]**.

Physicians with different specialties including pediatricians and internal medicine in addition to the surgeons, encounter patients with acute appendicitis in daily practice. When the disease presents itself with typical symptoms, it is somewhat easy to diagnose it and finally treat it. In elderly patients and children, and patients presenting with symptoms that are atypical, however, delayed diagnosis is possible and the difficult treatment may result **[Lee JH, et al 2010]**. Despite the advances in technology, the diagnosis of acute appendicitis still primarily depends on the patient's history and the clinical examination. Prompt diagnosis and surgical management decrease the risk of occurrence of



complications as perforation and gangrenous appendicitis. The mortality rate in uncomplicated appendicitis is <1 percent, but increase up to 5 percent or even more in young children and old aged patients, in whom the diagnosis may frequently be delayed and thus perforation more likely to occur [**Liu CD, et al 1997, Wilcox RT, et al 1997**]. It is well established that soon the diagnosed of acute appendicitis is made; the treatment is emergency appendectomy at the time of diagnosis. This is considered standard of care for treatment of appendicitis during last century. Any delay in surgery is believed to increase the postoperative morbidity due to progression into complicated appendicitis as perforated appendicitis or appendicular abscess [**Temple CL, et al 1995, Eldar S, et al 1997**]. However, in the last few decades, a revolution occurred in improving the quality of antibiotics and many studies revealed that interval appendectomy for radiologically small appendicitis related abscess was having better outcome than early surgery and even some recent studies suggested that such abscesses in selected patients can be dealt without interval appendectomy [**Andersson RE, et al 2007, Lugo JZ, et al 2010**]. In addition, successful satisfied outcomes of treating some selected uncomplicated cases with antibiotics cancelling the surgery were documented in update literature [**Vons C, et al 2011, Sakorafas GH, et al 2011**]. However, still many authors refuse considering acute appendicitis as a medical disease. The timing of appendectomy is a subject of controversy till now and still exists. Many studies achieved regarding this subject. Some of these studies still supported immediate or early appendectomy saying that it is associated with better outcomes than those in delayed appendectomy group [

**Udgeri N, et al 2011, Earley AS, et al 2006]** . Those, the later authors advocated that delayed appendectomy result in more postoperative complications, most prominently surgical site infection. On the contrast, other studies revealed no significant difference in the outcomes between early and delayed appendectomy [ **Yardeni D, et al 2004, Stahlfeld K, et al 2007**]. Also, many studies revealed negative impact of continuous prolonged working hours for the house hold resident doctors or sleep deprivation on cognitive abilities and clinical performance [ **Eastridge BJ, et al 2003, Kahol K, et al 2008** ] . In addition, the timing of operation, particularly after midnight in reality influenced by another factors as limited anesthesia related availability, limited theater availability, equipment availability, and the surgeon decision results in pediatric age group [ **Dunlop JC, et al 2012**]. In addition, the number of surgical resident doctors was reduced and the surgical conditions needing operation were increased in the last decade. Therefore post ponding appendectomy for hours became frequently seen despite early appendectomy was planned. Recently, however, the concept of immediate appendectomy have been challenged by many studies that suggest that an acute appendicitis can be treated non operatively, or delaying the surgery did not reveal any increase in the morbidity [**Hansson J, et al 2009, Varadhan KK, et al 2010**]. On the other hand, there are other studies that support emergency appendectomy as delay in the surgery will increase the complication rate and overall length of hospital stay [**Varadhan KK, et al 2010, Nagpal K, et al 2012**]. Recent studies suggested that antibiotics therapy can be initiated and appendectomy can be performed as a semi-elective strategy. It is clear that appendectomy in the daytime reduces the use of

nursing, anesthesia, and surgical staff through the night hours and it may even prevent medical mistakes resulting from surgical overloading. A brief period of in-hospital observation of less than 6 hours in suspected cases does not increase the perforation rate and may improve diagnostic accuracy [ **Ditillo MF, et al 2006, Earley AS, et al 2006, Yardeni D, et al 2004 and Stahlfeld K, et al 2007**]. For that, controversy still present about the timing of operation for acute appendicitis and whether cancelling midnight appendectomy is safe or not. This study aims to make a comparison regarding the outcomes between early (emergency) appendectomy and delayed appendectomy and also to assess the feasibility of delayed appendectomy.