

## Evaluation of Period from Onset till Operation in Acute Appendicitis

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### Abstract

**Background:** The vermiform appendix, is a small blind tubular structure, and in no way a vestigial organ but a specialized structure without any definitely known function, probably concerned with the establishment and maintenance of the body defense, immunity of the body and other benefits in the surgery. Its importance in surgery results from propensity for inflammation, which results in the clinical syndrome called acute appendicitis which is the most common cause of acute abdomen in surgery, and results in the most frequently performed abdominal operations.

**Objectives:** Even the most experienced physicians and surgeons are not able to diagnose appendicitis 100% of the times, thus many patients wait a period of time ranging from one to several hours until they receive a treatment, so we evaluate the period of time from onset of symptoms till the definitive treatment in acute appendicitis.

**Methodology:** An observational cross sectional study based on a standardized preformed questionnaire contains 20 questions answered directly by the patient who underwent a surgical removal of the appendix in the surgical department of Al -Hussain medical city for the period 10\10 -10\12\2012, and Fisher Exact test used for data analysis

**Results:** A total 100 cases were interviewed, 42% of cases their waiting time more than 24 hours before receiving the definitive treatment and perforation occurred in 6% of cases, and perforation rate was higher among patients who wait more than 24 hrs before operation, but with no statistical significance.

**Conclusion:** The overall period from onset of symptom till operation in acute appendicitis was acceptable as compared to many scientific and clinical based studies and didn't seem to be associated with significant incidence of complication.

### المخلص

الزائدة الدودية عبارة عن تركيب إنبوبي ذو نهاية مسدودة، وله وظائف مناعية بالإضافة لبعض الاستخدامات الجراحية. أهمية الزائدة تأتي من احتمالية إصابتها بالتهاب حاد ينتج عنه أعراض تحتاج إلى تدخل جراحي في غالبية الأوقات، حيث إنها السبب الأساسي لأكثر الحالات الجراحية الطارئة.

حتى أمهر الأطباء والجراحين غير قادرين على إعطاء تشخيص نهائي 100% في كل الحالات وإن غالبية المرضى يقضون فترة تتراوح بين ساعة وساعات حتى حصولهم على العلاج النهائي.

هذا البحث أنجز في ردهات الجراحة في مدينة الحسين (ع) الطبية باستخدام مجموعة أسئلة تجاب من قبل المريض لتقييم الفترة بين ظهور أول عرض إلى حين إجراء العملية الجراحية، ولقد كانت النتيجة أن هناك 42% من المرضى يقضون فترة تزيد عن 24 ساعة بين حصولهم على العلاج النهائي وهذه فترة مقبولة مقارنة بالعديد من المصادر العلمية والعملية،

### Introduction

Vermiform Appendix

The vermiform appendix is a narrow blind tube organ appendage rising from the wall

of caecum. The word vermiform derived from the Latin word "Vermiforma" means worm shaped or resemble worm. the position of the appendix is retrocaecal in 74% of the cases and 21% pelvic 2% paracaecal 1.5 % subcaecal 1% preial

0.5% postilial, the position of the base of the appendix is constant being found at the confluence of the three taeniae coli of the caecum .the mesentery of appendix arise s from the lower surface of the mesentery of the terminal ilium .the appendicular artery is a branch of the lower division of the ileocaecal artery passes behind the ilium to enter the mesoappendix. the appendix varies considerably in length and circumference and the average is between 7.5and 10 cm with few millimeters in diameter. <sup>(3), (10).</sup>

Microscopically, it consists of mucous, submucous, muscular and serous coats from inside out, with its surface epithelium consisting of simple columnar, Goblet, Paneth and Argentaffine cells. Due to the presence of extensive lymphoid tissues in the mucosa and submucous coats forming almost lymphoid follicles, it has been called 'Tonsil of the abdomen'. <sup>(2).</sup>

The appendix has a function in fetuses and adults <sup>(5)</sup>, Endocrine cells have been found in the appendix of 11-week-old fetuses that contribute to "biological control (homeostatic) mechanisms." In adults, the appendix acts as a lymphatic organ. The appendix is experimentally verified as being rich in infection-fighting lymphoid cells, suggesting that it might play a role in the immune system. It plays a role in both manufacturing hormones in fetal development as well as functioning to "train" the immune system, exposing the body to antigens so that it can produce antibodies. <sup>(15)</sup> Many authors proposed that the appendix serves as a haven for useful bacteria when illness flushes those bacteria from the rest of the intestines<sup>(10)</sup>, This proposal is based on a new understanding of how the immune system supports the growth of beneficial intestinal bacteria in combination with many well-known features of the appendix, including its architecture, its location just below the normal one-way flow of food and germs in the large intestine, and its association with copious amounts of immune tissue. Research performed at a western hospital showed that individuals without an appendix were four times more likely to have a recurrence of *Clostridium difficile*. <sup>(16)</sup> .it can

be successfully transplanted into the urinary tract to rebuild a sphincter muscle and reconstruct a functional bladder. The appendix is used for the construction of an efferent urinary conduit, in an operation known as the Mitrofanoff procedure, in people with a neurogenic bladder <sup>(6)</sup>.The appendix is also used as a means to access the colon in children with paralysed bowels or major rectal sphincter problems <sup>(7)</sup>.The appendix is brought out to the skin surface and the child/parent can then attach a catheter and easily wash out the colon (via normal defecation) using an appropriate solution <sup>(7)</sup>.

Acute inflammatory process involving the appendix and it's of two types:

#### 1. Non-obstructive acute appendicitis:

The inflammation commences either in mucous membrane or in lymph follicles and terminates either as resolution, ulceration, suppuration, fibrosis or gangrene. Infection progresses rapidly once it reaches sub mucous tissue. The organ becomes turgid, dusky red and hemorrhage occurs into the mucous membrane. The vascularity of the distal part of appendix is often in jeopardy as the artery is intramural and liable to occlusion by inflammation/ thrombosis thereby, leading to gangrene of the tip. The non-obstructive appendicitis progress slowly allowing protective barrier to develop and at times inflammation do not progress beyond the mucosal lining (Catarrhal appendicitis) and attack go off without sequel <sup>(1)</sup>.

#### 2. Obstructive acute appendicitis:

2/3rd cases belong to this group. The obstruction is either in the lumen (Faecolith, foreign body, Parasite) or in the wall (invariably Inflammatory but may be direct occlusion by carcinoma of caecum) or outside the wall (adhesions/kinking). Products of inflammation proceed more rapidly and more certainly to gangrene/perforation. Within 12-18 hrs appendix distal to the obstruction becomes gangrenous. Perforation occurs most commonly at the site of impacted faecolith before protective adhesions have had time to form. The escaping purulent and

gaseous contents are under high pressure and early widespread peritonitis is liable to ensue.

Factors increases risk of appendicitis:

1. Decreased dietary fibers
2. Increased consumption of refined carbohydrates
3. Worm infestation
4. Malignancy

The clinical features are more pronounced and progressive in obstructive than non-obstructive type of acute appendicitis. Pain that starts from paraumbilical area/epigastrium shifts to right iliac fossa and may associated with nausea, vomiting

Symptoms and signs of acute appendicitis:

No.	symptom	sign	Special sign
1	pain	Increased body temperature	Rovsing's sign
2	anorexia	RIF tenderness	Pointing sign
3	nausea	RIF guarding	Rebound tenderness
4	fever	Tachycardia	Psoas sign
5	constipation	Brown-furred tongue	Obturator sign
6	Diarrhea	Hyperesthesia(Sherren's triangle)	Cough sign

Note:

- \* Pelvic position produces no somatic pain but suprapubic discomfort and tenesmus.
- \* Constipation is invariably present but in pelvic type diarrhea may predominate.

Factors encouraging Progression of Inflammation:

1. Very young \old patient.
2. Immunosuppressive agents.
3. Free lying appendix
4. Presence of faecolith.
5. Purgatives/enema
6. Impaired blood supply

Although the diagnosis of acute appendicitis invariably is clinical yet it may be supported by exclusion after doing some investigations. No test yet devised that is 100% diagnostic. The only diagnostic procedure is open exploration and diagnostic laparoscopy. Routine investigations include:WBC count : Normal WBC count about 4000 – 11000 cell/ml, so any elevation may raise the suspicion of an inflammatory process in the body.so WBC count is an important step in the diagnosis of acute appendicitis especially if it elevated to 15000-18000 cell/ml and associated with a left shift and

and loss of appetite ,Once parietal peritoneum is involved it produces more intense, constant and localized somatic pain that shifts and has changed its character.

Early signs and symptoms depend upon the location of the tip of the appendix that is highly variable, in early appendicitis; the patient is initially afebrile or has a low-grade fever. Appendicitis in age extremities is a difficult problem as they show atypical picture of acute appendicitis resulting in incorrect diagnosis, delay in management as well as high rate of complications.

differentiate it from other pathology that may gave a similar picture.<sup>(10)</sup>

2. Urine examination:

It regarded as one of the doors of the body and can give important results and of a value of patient condition, it may be showing pyuria/microscopic hematuria. If the surgeon is satisfied that appendicitis cannot be ruled out, operation under such circumstances is entirely justified; that may show inflamed appendix adherent to right ureter/bladder<sup>(1)</sup>.

Selective investigations:

1. Radiology:

A) Ultrasonography of abdomen:

More useful for the differential diagnosis as It's an operator dependent With experience one may find acutely inflamed appendix as non-compressible, aperistaltic, tubular structure with a central dilated lumen surrounded by an inner echogenic mucosal layer and outer edematous wall that shows few echoes also free fluid in the peritonail cavity can be seen.

**B) Plain X-ray Findings**

1. Fluid levels localized to caecum/terminal Ileum
2. Localized ileus with gas in caecum/ascending colon
3. Increased soft tissue density in right lower quadrant
4. Blurring of right flank stripe
5. Faecolith in right iliac fossa
6. Blurring of Rt. Psoas shadow
7. Free intraperitoneal gas
8. Deformity of the caecal gas shadow

**2. Other investigations include:** pregnancy test contrast enhanced CT scan.urea and serum electrolytes

The treatment of acute appendicitis is appendectomy. There's a perception that urgent operation is essential to prevent the increased morbidity and mortality of peritonitis, period of short intensive preparation (IV.fluid, analgesia, antipyretic and antibiotics) should be given before operation to normalize patient condition as possible.

**A) Open Appendectomy**

Conventional-appendectomy: under general anesthesia Done by standard methods with the help of either of the available incisions (Grid Iron, Rutherford-Morrison's, Rockey Davis, Lanz, Paramedian, Midline)

**B) Laparoscopic-Appendectomy:**

Though done by many at many centers yet to find large scale favor from surgical fraternity as procedure of choice for appendicitis

**Post-operative complications:**

1. Wound infection.
2. Intra-abdominal abscess.
3. Ileus.
4. Venous thrombosis.
5. Faecal fistula.
6. Respiratory complications.
7. Adhesive intestinal obstruction.
8. Portal pyaemia.

**The aim of the study** was to evaluate the period from onset till operation in acute appendicitis.

**Research Methodology**

The design of the study was an observational cross sectional study in which we used standardized preformed questionnaire contains 20 questions answered directly by the patient who underwent a surgical removal of the appendix in the surgical department of Al - Hussain medical city. the period of study from 10\10 -10\12\2012, oral consent taken directly from the patient during the post-operative period, and the interview occurred in the rooms of the hospital, during day or at night and each interview last for about 15 minutes in the presence of a relative for the patient, and we collect the data from that questionnaires, examination and results of investigations that done for the patient to be study in the our research. And positive results of an investigation refer to the result that aid in the diagnosis of acute appendicitis.

Our sample for the study was 100 patients, from any age any sex, in any day post operation who diagnosed and treated in the hospital, with help from the medical stuff in the hospital. And Fisher Exact test used for data analysis and statistical study.

**Results**

Our study based on 100 case of acute appendicitis and we found that females more subjected to acute appendicitis as they form 56% of cases while males formed 44% of the cases, as shown in table (1),

Table 1. Gender distribution in acute appendicitis:

Gender	No. of cases	%
Male	44	44%
Female	56	56%

The median age of acute appendicitis was 25 years ranging from 1year to above 60 years; the most affected age group was (10-19 years) which formed 40% of cases followed by the age group (20-29 years)

which formed 34% of cases as shown in table (2)

Table 2. Age distribution in acute appendicitis:

Age\years	No. of cases	%
1-9	6	6%
10-19	40	40%
20-29	34	34%
30-39	13	13%
40-49	3	3%
50-59	4	4%
Above 60	0	0%

The most common presenting symptom was abdominal pain which formed 92% of cases mainly in the form of paraumbilical pain 43% and right iliac fossa pain 40% As shown in table (3):

Table 3. Mode of presentation of A.A\*:

Presenting symptom	No.	%
Abdominal pain :		
RIF pain*	40	40%
Paraumbilical pain	43	43%
Epigastric pain	9	9%
Vomiting	1	1%
Nausea	0	0%
Anorexia	0	0%
Fever	1	1%
Vague	6	6%

Note:

\*A.A refers to acute appendicitis.

\*RIF refers to right iliac fossa

There were many investigation types in our hospital but the most performed type was general urine exam (G.U.E) as it done for 93% of cases despite that only 40.8% was positive while white blood cells count done for 87% of cases and was positive in 64% of cases, and abdominal ultrasound done for 70% of cases and was positive in

55.7% of cases, other types of investigations were less informative as shown in table (4)

Table 4. Investigations in acute appendicitis:

	Investigation	No.	Positive	Negative
1	G.U.E*	93	38	55
2	W.B.C * count	87	56	31
3	Abdominal US*.	70	39	31
4	C.T* scan of abdomen	2	1	1
5	Pregnancy test	5	2	3
6	Abdominal X-ray	7	3	4
7	ECG*	5	0	5

Note:

1. G.U.E refers to general urine exam.
2. WBC refers to white blood cells.
3. US refer to ultrasonography.
4. CT refers to computerized tomography
5. ECG refers to electrocardiography.

In our study we found that duration from onset of symptoms till operation was more than 24 hours in 42% of cases as shown in table (5)

Table 5. Duration in hours from onset of symptoms till operation.

Duration\hours	No.	Percentage
1-12	23	23%
13-24	35	35%
Above 24	42	42%

Perforated appendix found in 6 patients which formed 6% of the cases studied in our research. The percentage of perforation was higher after 24 hours form onset of symptom as it formed 66.7% of cases that subjected to perforation as shown in table (6):

Table 6. pre-operative duration and percentage of complication:

Parameter	Before 24 hours	After 24 hours	Total
Perforation: positive	2	4	6
Negative	56	38	94
Total	58	42	100

P value > 0.05 (non significant)

Fisher Exact test used for data analysis

Usually there is no need for post-operative drain tube in appendectomy operation but there were 19 cases in which a tube drain was inserted which equal to 19% of cases studied in the research.

## Discussion

The most affected gender in our study were females as they formed 56% of the cases while males formed 44% of the cases as females form more percent in our country and the result of the present study is different from other studies which showed female predominance <sup>(12)</sup>.

There was a wide distribution across the range of age but the age group (10-19) years was the most subjected to acute appendicitis as they formed 40% of cases followed by the age group (20-29) which formed 34% of cases, so about 74% of cases occurred during the 2nd, 3rd decades of life which is the usual period for acute appendicitis <sup>(10)</sup>.

The presentation of acute appendicitis differ form patient to patient but abdominal pain was the most common which formed 92% of the presenting symptoms which is the usual and typical picture of acute inflammatory process within the abdominal cavity, paraumbalical pain found to be slightly more common than right iliac fossa pain (43% and 40% respectively) and that related to the time elicited from the first sensation till reaching the hospital as the inflammation of parietal peritonium result in shifting of pain from initial site to right iliac fossa so more early presentation to hospital more chance to find the pain in the paraumbalical area. <sup>(1)</sup>

Despite that routine investigation done for all most all patients but the yield of it was different ,the most commonly used investigation was G.U.E but it was negative in 59% of cases as its result depends on operator, used kits, medical condition of patient,

So by G.U.E only we can't make a perfect diagnosis but it's a good chance find UTI and treat it to decrease the risk of post-operative complication.

WBC count found to be more useful in the diagnosis as it was elevated in almost all patients and elevated significantly in about 64% of cases result in earlier management for the patient.

The most common selective investigation used was the US but as it's dependent on the operator and the machine so it was helpful in the differential diagnosis as well as diagnosis of acute appendicitis complications pre operatively (perforation, mass formation and free peritoneal fluids) more than in diagnosis of acute inflammation of appendix as it was positive only in about 55% of cases compared to 46% of cases in which US led to change therapeutic measure for the patients <sup>(13)</sup>.

Regarding the duration from onset of first symptom till the definitive management received by patients the duration was more than 24 hours In about 42% of cases and that result from the delay of presentation to the hospital as many patients neglect the first symptom till his\her condition become severe enough to bring the patient hospital, the atypical presentation in some patients that make them went to pediatric , gynecological hospital or private clinic before referring the patient to Al Hussain medical city , lack of specific diagnostic method as we depend on clinical finding in many occasions to cope with Alvarado score , and late presentation to hospital at night with comorbidity of some patient make the overall preparation delayed for a while to improve the overall condition before operation and to prevent complications and improve the outcomes, and that period seem to be not prolonged as the complications found only in 6% of cases which is below the expected percentage, compared to more than 7% complications in patient waited for more than 24 hours in western hospitals <sup>(9),(10),(12),(14)</sup>. Despite that 66.7% of

perforation occurred in patients who wait more than 24 hours before operation but without statistical significant.

In conclusion the overall period from onset till operation was similar to many surgical department worldwide and such period did not yield in significant increase in the risk of complication and we recommend the following:

1. Community education about risk of delay and benefits of early presentation to hospitals in acute appendicitis
2. We need to Increase the accuracy of investigations and the yield of US devices.
3. We need to Increase number of US devices and persons operated on during 24 hours.
4. Usage of multidisplinary team to manage comorbid patients.
5. Increase number of theaters in our hospital which is the only hospital in the city.

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