

Original Research Article

TO INVESTIGATE THE RELATIONSHIP BETWEEN CLINICAL, SONOLOGICAL, AND HISTOLOGICAL FACTORS IN PATIENTS WITH RIGHT ILIAC FOSSA PAIN WHO UNDERWENT APPENDECTOMY

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ABSTRACT

Background: Appendicitis is a frequent source of discomfort in the right iliac fossa, sometimes requiring emergency abdominal surgery. Despite clinical, intraoperative, radiographic, and histo-pathological observations, the presence of non-perforating or non-acute types of appendicitis is still questioned. Although appendectomy is considered curative, the scheduling of the procedure remains debatable, particularly in cases of non-acute appendicitis. **Aim:** To investigate the relationship between clinical, sonological, and histological factors in patients with right iliac fossa pain who underwent appendectomy.

Material and Methods: This study was conducted on 30 cases with probable appendicitis who had appendectomy in the department of general surgery. The research included all patients who presented with right iliac fossa discomfort and underwent appendectomy.

Results: The mean age was 26.46 with a standard deviation of 3.37. Within the research group, 24 patients had symptoms that indicated they had previously experienced acute appendicitis, whereas 6 patients did not have any indication of such a history. Ultrasonographic probe tenderness was seen in 22 instances, whereas it was not observed in 8 cases. The histopathology report indicated acute illness in 10 instances, accounting for 33.33% of the total, whereas chronic disease was seen in 20 cases, accounting for 66.67%. The research revealed that the ultrasonographic results had a sensitivity of 100% and a specificity of 45.50% when compared to the clinical diagnosis of appendicitis. Among the total of 15 chronic cases, 50% showed no probe discomfort, indicating a poor level of specificity. Out of the 16 patients who had moderate rebound discomfort in the right iliac fossa, indicated by a positive sign, none of them had acute inflammation of the appendix, but all 16 patients had chronic inflammation of the appendix. The investigation revealed that the surgeon's observations exhibited a sensitivity of 100% and a specificity of 90%. The X2 test yielded a P value that was determined to be very significant.

Conclusion: Our research supports the suggestion made by others that there are distinct forms of appendicitis - perforating and non-perforating. Furthermore, we found that resolving episodes are indicative of non-perforating appendicitis attacks. It is crucial to identify non-acute/non-perforating variations because if surgical intervention is not performed, it may lead to prolonged symptoms, perforation, and wasteful procedures for other diagnoses.

Keywords: Appendicitis, discomfort, right iliac fossa, histo-pathological.

INTRODUCTION

Appendicitis is the medical term used to describe the inflammation of the vermiform appendix. The most frequent reason is the blockage of the passageway owing to an increase in the size of the lymphoid follicles in younger individuals or by the blockage of the passageway by hardened feces in elderly patients.^[1] Acute appendicitis (AA) is the primary reason for acute surgical emergencies in the general population, and its occurrence is on the rise in Asian countries.^[2] While the diagnosis is often uncomplicated in the majority of instances, it is mostly determined by clinical examination, and the preferred treatment is appendectomy. Delay in diagnosis may lead to higher rates of illness and death, as well as the development of complications such as perforation, peritonitis, or sepsis.^[3,4] Although AA is widespread, there have been several endeavors to enhance the precision of diagnosis and the overall prognosis for patients. Diagnosing appendicitis continues to be difficult. Several diagnostic scoring methods have been proposed to enhance the accuracy and reduce the percentage of unnecessary appendectomies, which currently stands at 25-30%.^[5]

Ultrasound is a commonly used method for diagnosing acute appendicitis based on certain sonographic criteria. In our country, it is customary to submit all appendix specimens for histopathological tests. The purpose of this research is to establish a correlation between the histopathological results and the clinical and sonological diagnoses. This research aimed to assess the effectiveness of the Alvarado scoring system in diagnosing acute appendicitis by comparing it with sonographic and histological findings.^[6]

Postoperative histopathology, performed on samples obtained following surgery, is crucial for the definitive diagnosis. It aids in verifying the accuracy of the clinical diagnosis, which is determined based on observable indications and symptoms, and determining whether the suspected abnormality has been effectively removed.^[7,8] This assists the doctor in determining the necessary course of action for the patient's subsequent treatment. It is essential in surgical practice to consistently submit the material for histology, unless there are specific clinical indications suggesting otherwise, and not just depend on clinical evaluation.^[8]

The histopathological results have a direct impact on the patient's postoperative care and indicate if further therapy is necessary. Various histopathological findings may include acute gangrenous appendicitis, neoplasia, diverticulitis, parasites, endometriosis, and several granulomatous disorders.^[8] The potential consequences of failing to identify these illnesses might be seen as having a malevolent effect on the patient's life. Alternatively, histology may indicate a healthy appendix vermiformis, prompting the need for further examinations to identify any other

underlying conditions. The varied results highlight the significance of histology in evaluating appendectomy specimens.^[9]

Studies have classified appendicitis as either acute or non-acute based on clinical and histological characteristics.^[10,11] While many people deny the existence of chronic and recurring appendicitis, it is really a rather prevalent ailment. The presence of chronic and recurring pain in the right iliac fossa is a complex issue that poses a challenge globally. Despite extensive clinical evaluation and many diagnostic tests and treatments, the underlying cause of the pain remains unidentified.^[12] The diagnosis of acute appendicitis mostly relies on clinical evaluation. However, relying only on clinical suspicion to decide on surgery might result in the unnecessary removal of a healthy appendix in 15-30% of cases. There is a suggestion that there are several types of appendicitis, namely perforating and non-perforating appendicitis. It is believed that resolving episodes are really instances of non-perforating appendicitis. A recent research on the treatment of appendicitis with antibiotics alone discovered that 95% of cases were successfully treated. However, during a span of 17 months, 35% of those cases had a recurrence of appendicitis. The objective of our present investigation was to establish a correlation between clinical observations, ultrasonographic results, and histological findings in various cases of acute and non-acute (chronic) appendicitis.^[13]

MATERIAL AND METHODS

Retrospective observational research was undertaken on a sequential series of 30 cases with probable appendicitis who had appendectomy in the department of general surgery. The research included all patients who presented with right iliac fossa discomfort and underwent appendectomy. Pregnant women and those aged 60 and above were not included.

Methodology

Surgical intervention was performed on all patients experiencing discomfort in the right iliac fossa and probable appendicitis, using either spinal or general anesthesia as considered necessary. The procedures were conducted by a skilled surgeon who had post-operative antibiotic protection. The data was collected retrospectively from a patient database and recorded in Microsoft Excel version 16 (for Windows).

Statistical Analysis

The data was gathered and organized using Microsoft Excel 2016. The mean and standard deviation (SD) were used to analyze continuous data, while frequency and percentages were computed for categorical data. The chi-square test was used to determine the statistical significance of categorical data. A p-value is deemed statistically significant if it is less than or equal to 0.05. The

logistic regression analysis was further conducted utilizing the odds ratio (OR) along with a 95% confidence interval (CI). Analyzed data was processed using SPSS version 21, a statistical software specifically designed for social sciences.

RESULTS

Within the study group, the number of female patients exceeded that of male patients. The 20-30 years age group had the highest number of cases (40%), followed by the below 20 years age group (26.67%) and the 30-40 years age group (16.67%). The mean age was 26.46 with a standard deviation of 3.37. The provided information corresponds to Table 1. Within the research group, 24 patients had symptoms that indicated they had previously experienced acute appendicitis, whereas 6 patients did not have any indication of such a history. Ultrasonographic probe tenderness was seen in 22 instances, whereas it was not observed in 8 cases. (Table 2) The histopathology report indicated acute illness in 10 instances, accounting for 33.33% of the total, whereas chronic disease was seen in 20 cases, accounting for 66.67%. Table 3 The research revealed that the ultrasonographic results had a sensitivity of 100% and a specificity of 45.50% when compared to the clinical diagnosis of appendicitis.

Among the total of 15 chronic cases, 50% showed no probe discomfort, indicating a poor level of specificity. The poor specificity seen may be attributed to the large proportion of non-acute cases, in which ultrasonography is mostly used to rule out disease in other pelvic organs rather than specifically indicating appendicitis as seen in acute

cases. By using the X2 test, it was determined that the P value is very significant. (Table 4) Patients having a previous medical history indicative of appendicitis were compared to the histopathological results, which were deemed the definitive criterion for the final diagnosis.

Out of the 6 patients who had no prior indications of appendicitis, 4 patients had acute inflammation of the appendix, whereas 2 individuals displayed chronic inflammation.

Out of the 24 patients who had a prior history indicating appendicitis, 6 individuals had acute inflammation of the appendix, whereas 18 patients showed chronic inflammation. By using the X2 test, it was determined that the P value is very significant. The information may be found in Table 5. A comparison was made between the patients exhibiting rebound discomfort and the histopathological results, which were regarded as the most reliable method for determining the ultimate diagnosis.

Among the 14 patients with moderate rebound tenderness denoted by “++” or severe tenderness in the right iliac fossa, denoted by “+++”, 10 patients showed associated acute inflammation of the appendix while 4 patients showed inflammation of the appendix.

Out of the 16 patients who had moderate rebound discomfort in the right iliac fossa, indicated by a positive sign, none of them had acute inflammation of the appendix, but all 16 patients had chronic inflammation of the appendix. The investigation revealed that the surgeon's observations exhibited a sensitivity of 100% and a specificity of 90%. The X2 test yielded a P value that was determined to be very significant, as seen in Table 6.

Table 1: Gender and age of the participants

	No of cases	Percentage	P value
Gender			0.14
Male	13	43.33	
Female	17	56.67	
Age (years)			0.17
Below 20	8	26.67	
20-30	12	40	
30-40	5	16.67	
40-50	4	13.33	
Above 50	1	3.33	
Mean Age	26.46±3.37		

Table 2: ultrasound probe tenderness in right iliac fossa

Ultrasonographic probe tenderness	No of cases	Percentage
Absent (-)	8	26.67
Present (+)	22	73.33

Table 3: Histopathology Report

Histopathology Report	No of Cases	Percentage
Acute	10	33.33
Chronic	20	66.67

Table 4: Relation between tenderness and ultrasound probe tenderness

Tenderness	Ultrasound probe tenderness present	Ultrasound Equivocal (probe tenderness absent)	Total	Percentage	P value

Mild (+)	8	7	15	50	0.001
Moderate(++)	11	1	12	40	
Severe(+++)	3	0	3	10	
Total	22	8	30	100	

$X^2=26.07$; $p<0.001$, Sensitivity - 100%; Specificity – 45.50%

Table 5: Association of past history suggestive of AA with HPR findings

Past history suggestive of AA	Histo-pathology Report		Total	Percentage	P value
	Acute	Chronic			
Absent	4	2	6	20	
Present	6	18	24	80	0.001
Total	10	20	30	100	

$X^2=31.36$, $p<0.001$

Table 6: Association between tenderness and histopathological findings among the study group

Tenderness	Histo-pathology Report		Total	Percentage	P value
	Acute	Chronic			
Positive	10	4	14		0.001
Negative	0	16	16		
Total	10	20	30		

$X^2=73.48$; $P<0.001$, Sensitivity=100; Specificity=90

DISCUSSION

Acute appendicitis is a frequently occurring surgical emergency that requires immediate diagnosis and treatment. While clinical presentation and imaging are important in evaluating the condition, histology is essential for establishing the diagnosis and directing proper therapy. This talk will explore the importance of histological assessment of appendectomy material and its influence on patient management. The diagnosis of acute appendicitis mostly relies on clinical signs, with the clinical diagnostic accuracy ranging from 76% to 92%. However, histopathology is considered the gold standard for diagnosis, emphasizing its relevance. Histopathological analysis may reveal other diseases that may not be apparent during the surgery.^[14] In this research, a limited number of 4 individuals had intermittent episodes of discomfort in the lower right abdomen without any sudden onset of fever. During the intervals between attacks, these individuals had no symptoms and their physical evaluation yielded normal results. Upon pathological investigation, it was discovered that they had appendicoliths or signs of an increased appendiceal diameter. The majority of these cases had both surgical and pathological indications of chronic inflammation of the appendix, with subsequent alleviation of symptoms after an appendectomy. The data provide evidence that appendicitis involves a range of inflammatory alterations that may sometimes fluctuate in severity. Acute appendicitis refers to a condition where the appendix is severely congested and swollen, with the presence of pus or a hard mass of feces in its lumen. The appendix's inner lining shows increased redness, ulceration, and infiltration by different types of white blood cells such as polymorphonuclear cells, eosinophils, or histiocytes. Additionally, there is a fibrinopurulent exudate on the outer surface of the appendix, and the appendix

may also show partial tissue death or infarction. Several writers have suggested a set of criteria for diagnosing chronic appendicitis, which include the following: symptoms persisting for more than two weeks, absence of any other possible diagnosis, confirmation of chronic inflammation in the appendix by pathological examination, and remission of symptoms after undergoing an appendectomy.^[17] The signs and symptoms of chronic appendicitis are identical to those of acute appendicitis, but with a longer duration and decreased intensity.^[17] The histological findings indicating chronic inflammation include the presence of immunological competent T lymphocytes, scarring or fibrosis that is activated, degranulating eosinophils, a rise in neural cells, and an increase in the size of follicles.^[17-21] Upon careful examination, the notion that it is more advantageous to promptly remove a healthy appendix rather than postpone diagnosis does not hold true, especially in older individuals.^[13] The diagnostic accuracy of ultrasonogram may be significantly improved by applying the graded compression approach developed by Puylaert.^[22] Prospective investigations have shown that ultrasonogram has a high level of accuracy in diagnosing appendicitis, with a mean sensitivity of 86% and a median specificity of 96%.^[23] A meta-analysis of 14 prospective studies shown that ultrasonography had a sensitivity of 0.86 and a specificity of 0.81. In contrast, our retrospective investigation found that ultrasonographic results had a sensitivity of 100% and a specificity of 44.44% when compared to the clinical diagnosis of appendicitis. Out of the entire 15 instances, 50% of the chronic patients who showed no probe tenderness had poor specificity. Nevertheless, ultrasonogram is limited by its varied dependability and the well-known dependence on the operator. Ultrasonogram is particularly effective in ruling out probable pelvic abnormalities in instances when the diagnosis is uncertain.^[25]

The ultrasonographic findings include an appendiceal width more than 6mm, a non-compressible appendix, the presence of fat infiltration or fluid around the appendix, the existence of more than 3 nodes measuring more than 5mm on their shortest axis in the right lower quadrant, and the presence of an abscess. In order to confirm a diagnosis of chronic appendicitis, the surgically removed appendix must exhibit certain characteristics, including fibrosis in the wall of the appendix, partial to total blockage of the inner passage, signs of previous ulceration and scarring in the inner lining, and the presence of chronic inflammatory cells infiltrating the appendix wall.^[24] Among the 14 patients with moderate to severe rebound discomfort in the right iliac fossa, there was a correlation between the ultrasound results and the histological findings. Specifically, 10 individuals exhibited acute inflammation of the appendix, whereas 4 patients showed inflammation of the appendix. All 15 patients who had minor rebound discomfort in the right iliac fossa also exhibited chronic inflammation of the appendix. Research done by Prabhu et al found that out of 173 patients with an Alvarado score more than 7, 69 individuals had probing discomfort and 25 patients did not. These findings were correlated with positive histological results, indicating acute appendicitis. Out of the 64 patients with an Alvarado score of less than 7, 32 individuals exhibited tenderness when examined with a USG probe, whereas 9 patients did not display any tenderness. Among these patients, 25 had positive histological results. Elective appendectomy is recommended for individuals who exhibit the presence of fecolith on an abdominal radiograph. It is also advocated if the appendix does not fill completely on a Barium enema or if there is partial filling with an indentation of the caecal apex. These findings have been seen in cases with acute, chronic, and recurring appendicitis. According to a research, the most important criterion for ruling out appendicitis during a barium enema is the filling of the lumen. Performing many inspections during an incident offers proof of recurrent appendicitis.^[1]

CONCLUSION

Our research supports the suggestion made by others that there are distinct forms of appendicitis - perforating and non-perforating. Furthermore, we found that resolving episodes are indicative of non-perforating appendicitis attacks. It is crucial to identify non-acute/non-perforating variations because if surgical intervention is not performed, it may lead to prolonged symptoms, perforation, and wasteful procedures for other diagnoses. Diagnosing non-acute variations might be challenging if the practitioner is not familiar with this condition. Sonography, despite being reliant on the skills of the user, is the most widely accessible and available radiological investigation for examining the

abdominal and pelvic cavity to eliminate alternative diagnoses. It has proven to be a significant diagnostic tool and can also predict the outcome of a condition.

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