

# Incidence of Acute Appendicitis on Histopathology

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## ABSTRACT

**Objectives:** To evaluate the incidence of appendectomy due to acute appendicitis and its conformation by histopathology so that the true positive and false positive procedures can be estimated.

**Study Design:** Cross sectional study.

**Place and Duration of Study:** This study was conducted at the Department of General Surgery, Nishtar Hospital Multan from February 2016 to January 2017.

**Materials and Methods:** A total two hundred and forty five (245) patients with clinical diagnosis of acute appendicitis were included in the study. Data was analyzed on computer software SPSS version 23. Mean and standard deviation were calculated for numerical variables, frequency and percentages were calculated for categorical variables. P value  $\leq 0.05$  was considered as significant.

**Results:** The main outcome variable of our study was Positive Appendectomy in all the patients of appendectomy due acute appendicitis. It was seen that out of 245 (100%) subjects, 75.1% (n=184) were found true positive appendectomy and 24.9% (n=61) were found false positive appendectomy. Alternatively, it was also observed that out of 245 (100%) patients, 24.9% (n=61) were negative appendectomy and 75.1% (n=184) were positive appendectomy. When patients were grouped in different age categories it was seen that majority of the patients 77.1% (n=189) were of age 20 to 40 years. And only 22.9% (n=56) were of 41 to 60 years of age.

**Conclusion:** Surgeons should keep in mind the all possibilities of parasitic infestations mimicking acute appendicitis and confirmation of all clinical diagnosis with histological findings in our setting justifies routine histopathological examination of appendices.

**Key Words:** Acute Appendicitis, Histopathology

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## INTRODUCTION

Inflammation of Appendix is called acute Appendicitis. Surgical appendectomy is the gold standard treatment of this acute emergency<sup>1, 2</sup>, in spite of advanced modalities nowadays<sup>3, 4</sup>. Acute appendicitis has 7% of lifetime risk, 6.7% and 8.6% in females and males respectively<sup>5</sup>. Appendectomy decreases the risk of life-threatening complications and allows for the histopathology examination which is the gold standard for confirmation the diagnosis of acute appendicitis, irrespective of the intraoperative findings<sup>6</sup>. Pathologically acute appendicitis is characterized by transmural inflammation of the appendix, granulocytes in the mucosa and infiltrated into the epithelium<sup>7</sup>.

However, appendectomy has a high rate of negative appendectomy, which is referred to an appendectomy based on the clinical diagnosis of acute appendicitis but

in which the histopathologically examination of the appendix is normal. In spite of advanced radiological investigation such as ultrasonography and CT scan (computed- tomography) in the diagnosis of acute appendicitis, the rate of misdiagnosed cases of appendicitis remains the same during these years (15.3%), same as the rate of perforated appendix.

The histopathologically examination of the appendectomy specimen is highly recommended because of interobserver variations among distinguished surgeons<sup>8</sup>. The primary goal of this study was to find out the accuracy of the criteria used by surgeons based on their observations in the operation room (OR) in comparison with the histopathologically examination for acute appendicitis. It has an additional benefit of determining the rate of negative appendectomy in our center<sup>9</sup>.

Sudha et al.<sup>10</sup> conducted a study on incidence of acute appendicitis confirmed by histopathologically diagnosis. In his study a total of five hundred and ninety three (593) patients of appendectomy were enrolled. Out of these total (100 %) patients 80.1 % were confirmed positive on histopathology 3.4% were having chronic appendicitis and remaining 14.1% diagnosed negative on histopathology.

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## MATERIALS AND METHODS

This cross sectional study was started after approval from the ethical review committee of Nishtar hospital Multan. A total of 245 patients with clinical diagnosis of appendicitis were admitted for appendectomy during the period of February 2016 to January 2017. After taking informed consent various parameters were recorded by taking history and examination. All patients were operated by qualified surgeon with at least 5 years clinical experience after post graduation, standard protocol of general anaesthesia was observed and qualified anesthetist with 5 years clinical experience monitored the patients. Patient's demographic data i.e age, gender and histopathologic data i.e appendectomy surgery date and microscopic features of appendix were noted in preformed Performa. Patients who underwent appendectomy during other surgical procedures such as trauma surgery, colorectal cancer surgery or having malignant disease were excluded from study. Appendectomy performed on the basis of clinical diagnosis of appendicitis but on histopathology examination it was found to be normal was labeled as negative appendectomy. Specimen found to be inflamed on histopathology were labeled as positive.

The data was analyzed by computer software SPSS version 23. Mean and standard deviation for age was calculated. The qualitative variables like gender, Positive appendectomy and negative appendectomy were calculated as frequency and percentage. Chi square test was applied to analyze the data. Effect modifiers like age and gender were controlled through stratification and post-stratification chi square test was applied. P-value  $\leq 0.05$  was taken as significant.

## RESULTS

To evaluate the incidence of appendectomy due to acute appendicitis and its conformation by histopathology so that the true positive and false positive procedures can be estimated, the current study was conducted in Department of General Surgery, Nishtar Hospital Multan, taking a sample of 245 (100%) subjects (both genders).

The mean age of the patients was 33.59 and SD 8.95. Minimum age was 20 years and maximum age was 60 years. Gender distribution of the patient showed that there were more males i.e. 57.6% (n=141) while the females were 42.4% (n=104) (Table-1).

The main outcome variable of this study was Positive Appendectomy in all the patients of appendectomy due acute appendicitis. It was seen that out of 245 (100%) patients, 75.1% (n=184) were found positive appendectomy and 24.9% (n=61) were found positive appendectomy (Table-1). Alternatively, it was also observed that out of 245 (100%) subjects, 24.9% (n=61) were negative appendectomy and 75.1%

(n=184) were positive appendectomy. When patients were grouped in different age categories it was seen that majority of the patients 77.1% (n=189) were of age 20 to 40 years. And only 22.9% (n=56) were of 41 to 60 years of age (Table-2).

When chi-square was applied to see the effect modification it was observed that stratified age was associated with positive appendectomy and in our study, it was very interesting to note that gender was not associated with positive appendectomy as shown in table-3.

**Table No.1: Demographics**

Gender		
Characteristics	Frequency	Percentage (%)
Female	104	42.4 %
Male	141	57.6 %
Positive Appendectomy		
No	61	24.9 %
Yes	184	75.1 %
Negative Appendectomy		
No	184	75.1 %
Yes	61	24.9 %
Age	33.59	8.95 %

**Table No.2: Inferential Results**

Age Groups	Positive Appendectomy		P Value
	No	Yes	
20-40 Years	53	136	0.037
41-60 years	8	48	
Total	61	184	

**Table No.3: Inferential Results**

Gender	Positive Appendectomy		P Value
	No	Yes	
Female	26	78	0.975
Male	35	106	
Total	61	184	

## DISCUSSION

Acute appendicitis is one of the most commonly encountered causes of acute abdomen, and appendectomy is commonly performed surgical procedure worldwide. The incidence of appendicitis varies from country to country based on various factors such as sex, age, race, region, dietary habits, hygiene, socioeconomic status and season.<sup>11</sup> Current data shows that it is more common in Europe and USA in comparison to African and Asian countries.<sup>12</sup> High protein and low fiber diet is associated with increased risk of appendicitis.<sup>13</sup> The incidence of acute appendicitis and lymphoid development go hand in hand, with peak incidence between the ages of 10 and 30 years.

Although sex equity is seen in cases of acute appendicitis before the age of puberty and in old age patients but the frequency in adults shifts gradually in favour of males reaching ultimately to a ratio of 2:1. The overall lifetime risk of acute appendicitis is 7%, with 8.6% for men and 6.7% for women; however, the incidence of appendectomy is lower for males than for females (12% versus 23%, respectively). In our study highest number of appendectomy cases were seen between 20- 40 years of age group. This is similar to finding of study done at Zulfikar et al<sup>14</sup> and Makaju in nepal.<sup>15</sup> In the present study males were more commonly affected than females. The results are almost similar to a study done by Makaju et al, 60.42% of their cases were males and 39.58% cases were females.<sup>15</sup> but this is in contrast to the finding of a study done by Shrestha et al as 52.6% of their patients were females.<sup>16</sup> The diagnosis of acute appendicitis made on the basis of the patient's history, laboratory investigations and radiologic findings, as well as on the surgeon's subjective judgment based on experience. Histopathological examination is used not only for confirmation of the diagnosis of acute appendicitis but also to disclose many additional pathological lesions that can change the management plan for patient. A similar study was conducted by Mahesh Set al.<sup>17</sup> in which inflamed appendix was found in 86% cases out of which 14% cases were having negative appendectomy. Therefore accurate diagnosis of appendicular inflammation emphasis more on histopathology than on macroscopic evaluation.<sup>18</sup> However, in the light of authenticated studies such as study conducted by Kim-Choy Ng et al.<sup>19</sup> the rate of histology-proven negative cases following appendectomy ranges between 9.2% and 35.0%. Fascinatingly, the rates of negative cases are exceptionally high for women during child-bearing years. The current study shows the rate of negative appendectomy (24.9%) is compare able to with collective literature. However, if surgery is denied to patients requiring it, theoretically there will be an increase risk of undesirable complications. Differential diagnosis can be aided in most patients with abdominal ultra sonography (US), computed tomography (CT), or diagnostic laparoscopy. US is cost effective and proven valuable in the diagnosis of doubtful cases of appendicitis. CT is more accurate, operator independent, less commonly performed due to its cost. It has emerged as the leading modality for adults whose diagnosis is uncertain from history, physical examination and other radiological modalities. Regardless of the etiology, development of luminal obstruction is regarded as the most significant factor in the etiopathogenesis of acute appendicitis. In the first two decade of life lymphoid hyperplasia is most commonly encountered condition underling the pathogenesis of acute appendicitis while in elderly

patients it is fecal obstruction. Several other less common conditions may also contribute in the pathogenesis of acute appendicitis. In another study conducted by Nadir M et al.<sup>20</sup> a total of 219 cases of appendectomy were included. In his study negative appendectomy was found in 6.8% of cases.

Fibrous obliteration is reported in 30% of resected specimen. Despite its explicit name, this occlusive process is predominantly comprised by neurogenic proliferation. Neurogenic appendicopathy and appendicular neuroma have recently been proposed as alternative diagnostic terminology. The underlying molecular pathogenesis mechanism is still unknown. Patient's clinical history, symptoms, and laboratory and physical examination findings help in the differential diagnosis between appendicular neuroma and acute appendicitis. It is a difficult differential diagnosis. Most of the cases of appendicular neuroma are found incidentally on pathological examination of appendix revealing fibrous obliteration in asymptomatic patients. Sudha et al.<sup>10</sup> conducted a study on incidence of acute appendicitis confirmed by histopathologically diagnosis. In his study a total of five hundred and ninety three (593) patients of appendectomy were enrolled. Out of these total (100 %) patients 80.1 % were confirmed positive on histopathology 3.4% were having chronic appendicitis and remaining 14.1% diagnosed negative on histopathology.

## CONCLUSION

Acute appendicitis is mostly diagnosis clinically on the basis of clinical findings and physical examination by the surgeons. But a definitive diagnosis is made by histopathological investigation and many The causes of a disease are simultaneously highlighted. Negative appendectomies provide a lead to surgeons' clinical judgment. It is essential to submit all specimens of appendectomy for histopathological evaluation.

**Conflict of Interest:** The study has no conflict of interest to declare by any author.

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