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Dr. Kesha Rachani
3rd Year Resident, Department, Pathology Department B.J. Medical College Ahmedabad, Gujarat, India

Dr. Ami Manan Shah
Assistant Professor, Pathology Department B.J. Medical College Ahmedabad, Gujarat, India

Dr. Hansa Goswami
Professor and Head of Pathology Department B.J. Medical College Ahmedabad, Gujarat, India

Corresponding Author:
Dr. Ami Manan Shah
Assistant Professor, Pathology Department B.J. Medical College Ahmedabad, Gujarat, India

Clinicopathological correlation of emergency appendicectomies in a tertiary care centre-an institutional experience

Dr. Kesha Rachani, Dr. Ami Manan Shah and Dr. Hansa Goswami

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Abstract
Introduction: Acute appendicitis is the most common abdominal emergency and has remained an on going diagnostic challenge. Histopathologic studies are the gold standard for final diagnosis.
Aims and Objectives: To detect the diagnostic accuracy of appendicitis by clinical, radiological and histopathological findings
Materials and Methods: A one-year retrospective study from 1ST July 2019 to 30th June 2020 of 204 appendicectomy cases. Demography, clinical findings, radiologic and laboratory studies, histopathology findings were analysed.
Results: Among the 204 appendicectomy cases 132 (64.7%) were males and 72 (35.29%) were female patients. Most of the patients presented in the 2nd decade. Most common histopathological finding was Acute Appendicitis comprising of 126 cases followed by chronic appendicitis comprising of 50 cases. Acute appendicitis was associated with leucocytosis and neutrophilia. Rare incidental finding of neoplasm was one case of Low Grade Mucinous Neoplasm (LAMN). USG and histopathological correlation was significant only when USG was combined with clinical and laboratory findings.
Conclusion: Histopathological examination of appendix is necessary for confirmation of type of inflammation. In addition scrutinized grossing should be done to detect any parasitic infestations, appendicolith, tubercular appendicitis and neoplasms of appendix. USG should be correlated with clinical and laboratory findings to diagnose appendicitis.

Keywords: Appendix, histological, appendicectomy, emergency

Introduction
The appendix, a vestigial organ in humans, is attached to caecum. Appendicitis is one of the common causes of acute abdomen and emergency surgery resulting in significant morbidity and mortality [5]. Acute appendicitis presents with pain in the right iliac fossa, fever, vomiting, tenderness, guarding and rigidity with rebound tenderness. These patients commonly have leucocytosis and absolute neutrophilia. Early appendicectomy relieves all symptoms. Misdiagnosis often leads to removal of un-inflamed appendix. The thought that prevailed in 20th century was that the immediate complication i.e., perforation of appendix is avoided by early surgical removal resulting in rise of negative appendix rates to more than 20% [6]. Ultrasound (US) and CT scan have been widely used as an adjunct to the clinical examination in atypical and complicated cases, especially in females. There is rise in use of Ultrasonography (USG), Computed Tomography (CT), and Magnetic Resonance Imaging (MRI) to reduce negative appendicectomy rates [7]. All appendices removed not always have inflammatory changes alone. Some may harbor neoplasms with grave prognosis such as adenocarcinoma [8], Low Grade Mucinous Neoplasm (LAMN) [9], neuroendocrine tumours [10], non-Hodgkin lymphoma [11] or may be the site of metastasis [12, 13]. There are very few studies in India highlighting the importance of proper grossing methods in diagnosis of appendix specimens and the importance of combining the clinical findings, laboratory parameters with USG instead of considering USG features alone in diagnosis of appendicitis. Proper histopathological evaluation is most important in appendix disease management. Hence, a retrospective study was attempted to find the sensitivity and specificity of USG in identifying diseased appendix, to study the histopathological features of lesions of appendix in patients presenting with clinical features indicative of appendicitis. The study also discusses about rare appendicular lesions encountered.

Material & Method

The present study was a retrospective study of one year duration from July 2019 to June 2020 conducted at Civil Hospital, Ahmedabad. The study included the patients who underwent appendicectomy for having clinical features of appendicitis. Appendectomies done additionally along with another abdominal surgery without presenting with clinical features of appendicitis were excluded from the study. The slides and blocks were retrieved from histopathology based on pathology registry and section were re-examined. The patient's clinical history, laboratory parameters, radiologic reports, operative notes, follow-up were recorded.

Results

In our study, a total 204 cases of emergency appendicectomies were studied, were most common in the age group between 21-30 years closely followed by 11-20 years of age.

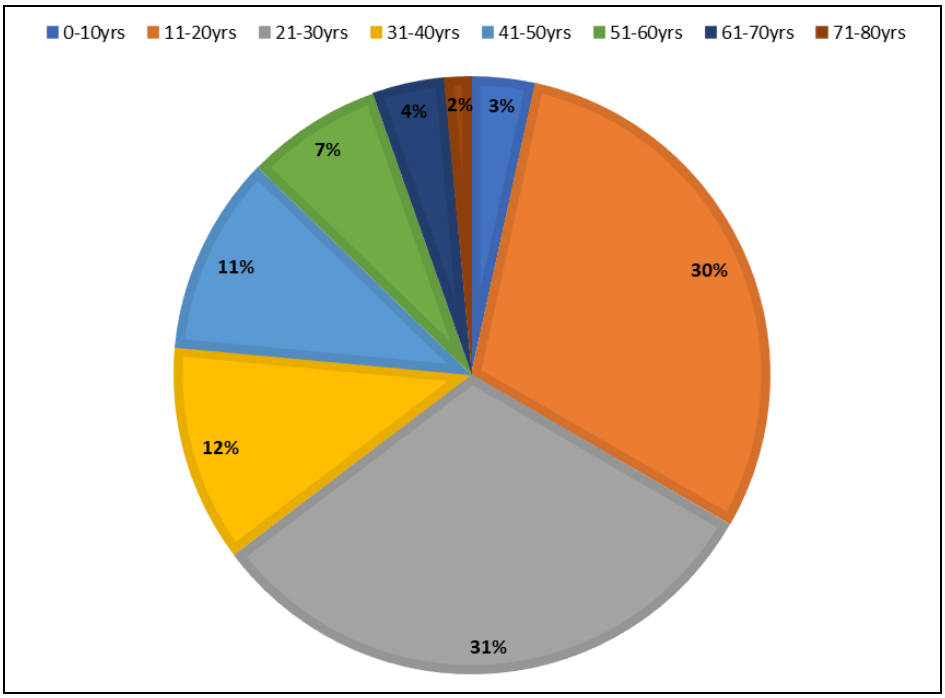

Fig 1: Age group wise distribution of the cases in the study

In the study of 204 cases, male and female ratio were 1.83:1. So, the incidence of emergency appendectomies were slightly more common in male patients.

Table 1: Gender wise distribution of the cases in the study

Gender	Cases	Percentage
Male	132 Cases	64.7%
Female	72 Cases	35.3%

In the study of 204 cases, association of appendicular lesions with leucocytosis with neutrophilia is around 40% while 60% account for normal WBC count. Association of leucocytosis with neutrophilia is seen in acute appendicitis only.

Table 2: WBC count wise distribution of the cases in the study

	Cases	Percentage
Appenidicular lesions with leucocytosis and neutrophilia	82 Cases	40%
Appendicular lesions with normal WBC count	122 Cases	60%

Most common complain that the patient presented with was abdominal pain which was followed by nausea and vomiting.

Table 3: Presenting complains seen in patients undergoing emergency appendicectomies

Presenting complains	No. of cases
Abdominal Pain	200
Nausea & Vomiting	58
Fever	45
Abdominal Distension	4
Anorexia	4
Diarrhoea	5

The Fisher's-exact test showed a p-value of 0.01 (i.e., <0.05) hence highly significant as shown in Table 4.

Table 4: Association of Clinical symptoms and Radiological findings with confirmatory histological findings.

	Histopathology positive for similar appendicular lesions	Histopathology negative for similar appendicular lesions	Total	P-Value
Clinical & Laboratory findings of appendicitis+ USG Positive for appendicular lesions	165 cases	19 cases	184 cases	0.01(ie <0.05)
Clinical & Laboratory findings of appendicitis+ USG Negative for appendicular lesions	14 cases	6 cases	20 cases	
Total	179 cases	25 cases	204 cases	

Most common histological finding was found to be of acute appendicitis which consist of 126 cases. We have included the acute on chronic appendicitis cases under the acute appendicitis to maintain the uniformity.

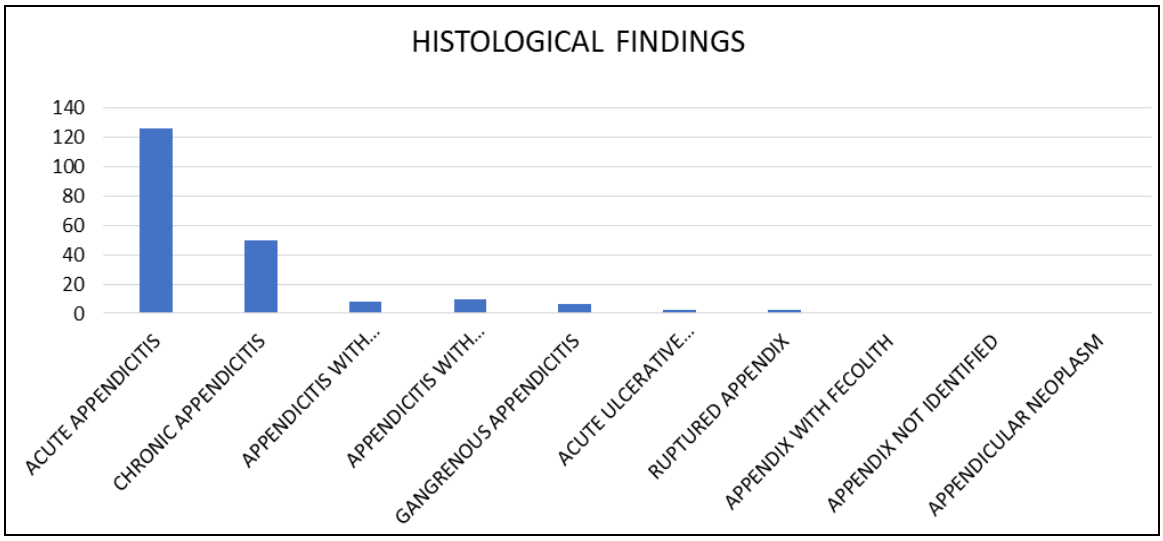

Chart 2: Histological findings seen in the received specimen of appendicectomy

Discussion

Acute appendicitis is one of the most common condition which needs emergency operative solution. It presents with sudden and severe onset of symptoms of pain in lower abdomen later localizing to Mc Burney's point, nausea, vomiting and fever. Acute symptoms if tolerated may further lead to formation of appendicular mass, a protective phenomenon by viscera and omentum to localize the peritonitis.

If left untreated, it may lead to perforation of appendix, pus collection in peritoneal cavity, generalized peritonitis and septicaemia. Appendicectomy specimens must be grossed thoroughly, documenting every abnormality present externally and on cut surface. The lesions can be very tiny and sometimes even less than a microscopic field. It is better if bisected tip of the appendix is entirely submitted for processing. The base of the appendix should be inked for recognition. Cross sectional bits should be submitted from every centimetre including the perforation sites and nodules. The luminal material should not be emptied while submitting. Shorter appendix must be submitted entirely for processing.

This pattern of age distribution is usually seen in second decade which is in concordance with Myageri *et al* [1] and Rahman MZ *et al* [3] study. But some studies showed peak age falling in second decade followed by third decade.

Table 5: Age wise comparison with different studies

Age wise	Aneel Myageri *et al* [1]	Rahman MZ *et al* [3]	Present study
0-10 yrs	30(6.3%)	5(5%)	7(3%)
11-20 yrs	110(23.3%)	44(44%)	61 (31%)
21-30 yrs	160(33.8%)	32(32%)	64(30%)
31-40 yrs	70(14.8%)	9(9%)	24(12%)
41-50 yrs	50(8.4%)	7(7%)	22(11%)
51-60yrs	24(5%)	3(3%)	15(7%)
61-70 yrs	19(4%)	0	8(4%)
71-80 yrs	3(0.63%)	0	3(2%)

The following table shows the gender wise comparison where the present study is in concordance with various other studies as mentioned below.

Table 6: Gender wise comparison with different studies

Gender	Aneel Myageri *et al* [1]	Mohammad Zourab *et al* [2]	Chudasama *et al* [4]	Rahman MZ *et al* [3]	Present Study
Male	59.95%	65.4%	63%	56%	64.7%
Female	40.05%	34.6%	37%	44%	35.3%

In our study, the most common symptom is abdominal pain followed by nausea and vomiting. This is in concordance with Chudasama *et al* [4] and study and Rahman MZ *et al.* study [3].

The one diagnosed as acute appendicitis showed leucocytosis (>10,000/cumm) with absolute neutrophilia (>7000/cumm) which was in concordance with Rahman MZ *et al* [3], Mohammad Zourab *et al* [2] and Aneel Myageri *et al.* [1].

USG findings were available in 204 cases. When USG suggested appendicular pathology (inflammation, mucocele and neoplasm), combined with clinical findings, it correlated with histopathological findings in 159 cases. This was in concordance with the Aneel Myageri *et al* [1] study where out of 367 cases that underwent USG, 307 gave out similar appendicular pathology as seen in USG. The p-value in both the studies showed clinical, radiological and histopathological correlation.

Further correlating the histological findings with other studies, comparable results were obtained, acute appendicitis being the most common histological finding.

Table 7: Further correlating the histological findings with other studies

Histological findings	Shahanuma Shaik *et al* [14]	Mohammad Zourab *et al* [2]	Present Study
Acute appendicitis	71	228	126
Chronic appendicitis	-	-	49
Appendicitis with perforation	14	28	8
Appendicitis with abscess formation	5	4	10
Gangrenous appendicitis	5	-	6
Acute ulcerative appendicitis	-	-	2
Ruptured appendix	-	-	2
Appendix with fecolith	-	-	1
Necrosed and autolysed	-	-	1
Appendix not identified	-	-	1
Appendicular neoplasm	1	1	1
Other	6	29	1

Conclusion

Histopathological examination of every appendix is essential for the confirmation of type of appendicitis. In addition, extensive grossing should be done to diagnose parasitic infestations, unusual conditions like tuberculous appendicitis and neoplasms of appendix like carcinoid or LAMN which are usually incidentally detected. A combination of the clinical features (laboratory parameters (leukocytosis and neutrophilia) should be combined with ultrasonography to diagnose appendicitis and reduce the rate of negative appendicectomy. An earlier surgical intervention prevents complications like perforation.

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Conflict of Interest: None

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