ORGINAL ARTICLE

NORTH BENGAL MEDICAL COLLEGE JOURNAL [2021], VOL., 7, No. 1 : 22-28

Clinically Diagnosed Acute Appendicitis and its Correlation with their Histopathological Findings

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ARTICLE INFO

Article history:
Received: 12 September 2020
Accepted: 23 December 2020

Online:
www.nbmc.ac.bd

Keywords:
Acute appendicitis, Histopathological examination, Negative appendicectomy

ABSTRACT

Introduction: *Acute appendicitis may present with various pathological entities that claim specific approach for diagnosis andtreatment. The aim of this study is to ascertain the correlation of clinically diagnosed acute appendicitis with their histopathological findings.* ***Methods:*** *This prospective study included a consecutive total of 100 cases (Male: 48, female: 52, age range: 4.5 years to 45 years) were presented with acute appendicitis undergoing operative treatment in the department of Surgery at Medical College for Women and Hospital, Uttara, Dhaka from December, 2008 to December, 2009. Preoperative diagnosis was made from history, physical examination and relevant investigations. All the specimens of resected vermiform appendix were sent for histopathological examination to a single laboratory.* ***Results:*** *Out of 100 cases, histopathological analysis revealed acute appendicitis in 27 (27%) cases, acute suppurative appendicitis in 36 (36%) cases, acute resolving appendicitis in 31 (31%) cases, acute gangrenous appendicitis in 03 (3%) cases, appendix abscess in 02 (2%) cases and lymphoid hyperplasia in a single (1%) case. Overall diagnostic error or negative appendicectomy (i.e. normal appendix at histopathology) was zero.* ***Conclusion:*** *Diagnosis of acute appendicitis is based mostly on clinical ground. Subsequent prognosis, evaluation and management of these patients were significantly altered by the histopathological findings. This study suggests that routine histopathological analysis of resected appendix may be an obligatory step for overall management of these patients.*

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INTRODUCTION

In human being the appendix or vermiform appendix is a worm like structure of caecal wall (large intestine). It is an elongated muscular tube resembling a worm so, its nomenclature based on the Latin word 'vermiform' which means 'worm shaped'. Its function in the human body is not fully established yet. Scientists believe it is a vestigial remnant. Some claimed that the appendix is rich in lymphoid tissues (abdominal tonsil), which help the body to fight against infections; hence it could have a role in the body's immune function.[1] Acute appendicitis is the most common cause of an acute abdomen and appen-

dicectomy is the most frequently performed urgent abdominal operation.[2] Modern radiographic imaging has improved diagnostic accuracy but the diagnosis of acute appendicitis remains essentially clinical.[3]

The diagnosis of acute appendicitis can create a challenge to the most experienced clinicians even with structured scoring i.e., the Alvarado score and computer-aided systems i.e., Computed Tomography (CT)scan[4] and negative appendicectomy rates may found up to 20%[5] in some centres. Ultrasonographically diagnosis of acute appendicitis by the experienced hands can be accurate but false negative diagnosis can occur.[6] Moreover, it helps to exclude gynaecological pathology.[7,8] Computed Tomography is the investigation of choice for the diagnosis of acute appendicitis, with reports of up to 100% accuracy and negative appendicectomy rates of 7%.[9]

The most useful diagnostic procedure is laparoscopy for the exclusion of gynaecological pathology in case of a young female. Laparoscopic appendicectomy has shown to reduce negative appendicectomy rates as well as post-operative morbidity compared to open procedures.[10] Some clinicians advocate delaying surgery to improve diagnostic accuracy in selected doubtful cases; however, there have previously been reports that may lead to increased perforation rates[11] and significant mortality.[12-14]

Occasionally, the appendix is the site of tumours such as carcinoid or adenocarcinoma and may become involved in inflammatory diseases of caecum and ileum such as tuberculosis, typhoid and Crohn's disease.[15] It is also reported that appendix is the common site for melanosis at autopsy[16] and most common site for gastrointestinal carcinoid tumour.[17] There is an association between mucosal hyperplasia of appendix and adenocarcinoma of colon.[18] Lymphoid hyperplasia itself predispose to acute appendicitis by obstructing the appendiceal lumen.[19] Other than acute appendicitis, appendix may present with various pathological conditions that needs specific approach for diagnosis and different modalities of treatment. Evaluation, management and prognosis of these patients were significantly altered by the histopathological findings. So, the aim of this study was to ascertain the correlation of clinically diagnosed acute appendicitis with their histopathological findings.

METHODS

This prospective study included a consecutive total number of 100 cases (Male: 48, female: 52, age range: 4.5 years to 45 years) were presented with acute appendicitis undergoing operative treatment in the department of surgery at Medical College for Women and Hospital, Uttara, Dhaka from December, 2008 to December, 2009. Preoperative diagnosis was made from history, physical examination and relevant investigations that included complete blood count, urine for routine and microscopic examinations, X-ray KUB and ultrasonography. After diagnosis appendicectomy was done for every cases. All the specimens of resected vermiform appendix were sent for histopathological examination to a single laboratory. Data for this study, were collected in a preformed data collection sheet about the post-operative recovery, histopathological diagnosis, subsequent management and outcome of treatment of acute appendicitis. Utmost importance was emphasized on histopathological diagnosis for further management. Statistical analysis of data was done by using computer based program Statistical Package for Social Science (SPSS), version 20.

RESULTS

Age ranged from 4.5 years to 45 years with maximum incidence in 2nd and 3rddecade of life.Out of 100 cases, 48 (48%) patients were male (M) and 52 (52%) patients were female (F) with M: F ratio of 1:1.08 (Table I).

Table I: Age and Sex distribution of patients (n-100)

Age range (Years)	Sex		Number of patients	Percentage (%)
	Male	Female		
0-10	01	00	01	01
11-20	12	17	29	29
21-30	24	29	53	53
31-40	07	05	12	12
41-50	04	01	05	05
Total	**48**	**52**	**100**	**100**

Majority of patients complained of onset of pain around umbilicus (86, 86%) and anorexia (82, 82%). The next predominant symptoms were pain migrated to right iliac fossa (76, 76%) and nausea (78, 78%) (Table II).

Table II: Distribution of patients by clinical symptoms (n-100*)

Clinical symptoms	Number of patients	Percentage (%)
H/O onset of pain around umbilicus	86	86
Pain migrated to right iliac fossa	78	78
Anorexia	82	82
Nausea	76	76
Vomiting	68	68

*Multiple responses

Assessment of clinical signs shows that majority of the patients exhibited tenderness in right lower abdomen (93, 93%), pointing sign (86, 86%), rebound tenderness (79, 79%), Rovsing's sign (78, 78%) and elevated temperature (78, 78%). Other less common signs were muscle guard/rigidity (45, 45%) and tenderness on digital rectal examination (15, 15%)(Table III).

Table III: Distribution of patients by clinical signs (n-100*)

Clinical signs	Number of patients	Percentage (%)
Tenderness in right lower abdomen	93	93
Pointing sign	86	86
Rebound tenderness	79	79
Rovsing's sign	78	78
Muscle guard/rigidity	45	45
Elevated temperature (>99.14^{0}F)	78	78
Psoas sign	12	12
Dysuria	07	07
Diarrhea	04	04
Vaginal discharge	05	05
Digital rectal examination-Tender	15	15

*Multiple responses

Macroscopically per-operative findings of resected appendix out of 100 cases, 75 (75%) patients found to have inflamed appendix, 4 (4%) patients had gangrenous appendix, 2 (2%) patients had perforated appendix and 19 (19%) patients hadnormal looking appendix. Histopathological analysis revealed majority (36, 36%) of the cases were acute suppurative appendicitis, 31 (31%) cases were acute resolving appendicitis and 27 (27%) cases were acute appendicitis (Table IV).

Table IV: Per-operative and histopathological findings of appendix

Peroperative findings	Percentage (%)	Histopathological findings	Percentage (%)
Inflamed Appendix (n-75)	75	Acute suppurative appendicitis	35 (46.7%)
		Acute resolving appendicitis	27 (36%)
		Acute appendicitis	13 (17.3%)
Gangrenous Appendix (n-04)	04	Acute gangrenous appendicitis	03 (75%)
		Acute suppurative appendicitis	01 (25%)
Perforated Appendix (n-02)	02	Appendix abscess	02 (100%)
Normal looking Appendix (n-19)	19	Acute appendicitis	14 (73.6%)
		Acute resolving appendicitis	04 (21%)
		Lymphoid hyperplasia	01 (5.3%)

During operation after splitting open the lumen of the resected appendix also showed fecolith in 35 (35%) cases.

Over all among 100 cases, histopathological analysis revealed acute appendicitis in 27 (27%) cases, acute suppurative appendicitis in 36 (36%) cases, acute resolving appendicitis in 31 (31%) cases, acute gangrenous appendicitis in 03 (3%) cases, appendix abscess in 02 (2%) cases and lymphoid hyperplasia in a single (1%) case (Table V).

Table V: Histopathological findings of resected appendix (n-100)

Diagnosis based on histopathology	Number of patients	Percentage (%)
Acute appendicitis	27	27
Acute suppurative appendicitis	36	36
Acute resolving appendicitis	31	31
Acute gangrenous appendicitis	03	03
Appendix abscess	02	02
Lymphoid hyperplasia	01	01
Total	**100**	**100**

After histopathological analysis, out of 100 cases, over all correct diagnosis (appendicitis) was made in 100 cases (100%). There was no negative appendicectomy.

Post-operative recovery was good and there was no mortality, and morbidity was also negligible. Only seven (7%) patients had superficial wound infections, which were treated appropriately. All patients were healthy on subsequent follow up.

DISCUSSION

The diagnosis of acute appendicitis remains mostly on the basis of clinical manifestation. However delay in diagnosis leads to increased rates of morbidity and mortality. It is a clinical entity with an ongoing diagnostic challenge. Histopathological examinations are the gold standard for the final diagnosis, which has revealed much unusual, unexpected serious underlying pathology.

Acute appendicitis is the most frequent cause of persisting progressive abdominal pain in teenagers and appendicectomy represent about 1% of all surgical operations now.[15] It is a disease of the young[20-23] and this statement is reinforced by the current study in which 53% cases occurred in 3rd decade and 29% cases occurred in 2nd decade of life. The peak incidence of acute appendicitis is in the second decade of life.[24] However, no age is immune and the age range in this study was 4.5 years to 45 years. In all age groups, there was a well established bias towards male patients and young male patients constituted the majority of the cases. The observations are similar to those of observed in other studies.[20,21,25,26]

A female predominance was observed here with male female ratio of 1:1.08. The incidence of appendicitis is equal among males and females before puberty. In teenagers and young adults, the male female ratio increases to 3:2 at age 25; thereafter, the greater incidence in male declines.[3] The highest female incidence is in the 15 to 19 years of old age group.[27]

In this study, clinical findings revealed migratory pain 78%, anorexia 82%, nausea/vomiting 76%, elevated temperature 78%, localized tenderness in right iliac fossa 93%, rebound tenderness 79%, rovsing's sign 78%, psoas sign 12% cases. But in a retrospective review of the 211 consecutive suspected appendicitis cases, there, migratory pain was in 79.0%, anorexia 91.9% and nausea/vomiting in 74.7% cases.[10] These findings are very much consistent with our findings.

Obstruction of appendiceal lumen by fecolith or lymphoid hyperplasia is said to be of importance in the pathogenesis of acute appendicitis.[28-31] In this study, during operation after splitting open the lumen of the resected appendix also showed fecolith in 35% cases. This is consistent with the report of Burkitt[32] who found fecolith in 40% cases. Evidence of perforation observed in 02% cases as compared to other studies which have reported a perforation rate 3.6% to 26%.[21,29] It has reported that elderly patients with appendicitis seek medical attention later than the young.[33] This significant delay before surgery resulted in high rate of complicated appendicitis in older age group because early loss of appendiceal blood supply.

During operation, 81 patients found to have macroscopically pathological appendix, 19 patients had normal looking appendix and histopathological analysis found as various types of acute inflammation of appendix in all cases. Apparently normal looking appendix may show different degrees of inflammation on histopathological examination.

Negative appendicectomy may be found in any study but this study shows no negative appendicectomy. This finding is compared with other studies which have reported a negative appendicectomy rate of 07% to 12%.[34-39] There is an agreement that even highly competent surgeons may do false positive diagnosis of acute appendicitis and remove normal appendices up to 20% cases.[40]

As the appendix may present with various pathological conditions such as carcinoid or adenocarcinoma and may become involved in inflammatory diseases of caecum and ileum such as tuberculosis, typhoid and Crohn's disease, apart from acute appendicitis, but the present study show no such diseases of appendix rather than appendicitis. Here found varieties of acute inflammatory diseases of appendix such as acute appendicitis, acute suppurative appendicitis, acute resolving appendicitis, acute gangrenous appendicitis, appendix abscess and lymphoid hyperplasia.

CONCLUSION

Correlation of histopathological findings with the clinically diagnosed acute appendicitisis necessary because, it may be associated with various pathological conditions like carcinoid tumor, tuberculosis, adenocarcinoma etc.

***Acknowledgements*:** We would like to thank the department of pathology, Medical College for Women and Hospital, Uttara, Dhaka, for their laboratory support.

Conflict of interest: There is no conflict of interest.

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