Original Article

HISTOLOGICAL SPECTRUM OF APPENDICULAR LESIONS: TEN YEARS EXPERIENCE AT A TERTIARY CARE HOSPITAL

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ABSTRACT

Objective: To determine the frequency of histopathological entities in appendectomy specimens.

Material and Methods: This descriptive retrospective study was done for ten years from January 2011 to December 2020 at the Department of Pathology, Combined Military Hospital, Kharian. All surgically removed appendectomy specimens received for histopathology were included in the study. The appendix, resected along with other organs like with uterus or intestine, was excluded from the study. The clinical and demographic details of the patient were retrieved from request forms. All cases were reviewed. Only those cases were excluded from the study for which blocks were not available (taken for review). Descriptive statistics were calculated.

Results: A total of 883 specimens, which were fulfilling inclusion and exclusion criteria were analyzed. Out of these, 597(67.6%) were males and 286(32.4%) were females. Among non-neoplastic entities (99.44%) acute suppurative appendicitis with periappendicitis (31.9%), appendix showing reactive lymphoid hyperplasia (26.2%) were the common diagnosis, while parasitic infestation of Entrobious Vermicularis (4.8%), chronic appendicitis with fibrosis (3.2%), appendix showing congestion and fecolith (2.0%) and granulomatous appendicitis 2 (0.2%) were seen less frequently. Only five were neoplastic, including mucinous cystadenoma (0.3%), carcinoid tumor (0.1%), and mucinous adenocarcinoma (0.1%).

Conclusion: The routine histopathology examination of all appendectomy specimens should be considered mandatory as it not only confirms the clinical diagnosis of acute appendicitis but also explores the incidental unusual pathologies, which are to be missed on gross examination, including parasitic infestation, granulomatous appendicitis and mucinous neoplasms.

Key Words: Appendix, Appendicitis, Parasite, Mucinous, Periappendicitis.

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INTRODUCTION

Acute appendicitis is a common surgical cause of acute abdomen and appendectomy is one of the most common operations carried out, as an emergency procedure all over the world. There is around 7% lifetime risk of appendectomy and this probability is approximately 1.4 times greater in men than in women [1]. Misdiagnosis and delay in surgery can lead to complications like appendicular mass, perforation and peritonitis. The incidence of acute appendicitis varies among different countries and is mostly seen in young adults and children; however, no age is immune to appendectomy. The incidence is increasing in most urban centers, probably due to adoption of western diet in developing countries [2]. Despite advanced diagnostic modalities, there is a dilemma in the clinical diagnosis of acute appendicitis and the histopathological examination is considered as the gold standard [3].

Appendicitis is caused by a wide spectrum of causes ranging from non-neoplastic to neoplastic lesions that may or may not obstruct the lumen. Obstructive lesions can be simple fecalith, lymphoid hyperplasia or worm infestation [4]. The unusual lesions include neoplastic lesions of the appendix showing diverse morphological variations, from those that resemble adenoma to those that mimic colorectal carcinoma [5]. Such different findings warrant different kinds of management strategies, varying from simple follow-up to aggressive chemotherapy.

In actual clinical practice, it is quite variable among different centers that the appendix will be sent for histopathology or not. Some centers send all appendectomy specimens for histopathology while others only send those specimens having any unusual abnormality on gross examination [6]. Along with acute appendicitis, sinister unusual findings are seen like different tumours, tuberculosis etc. These could be missed if specimen is not subjected to histopathology, therefore altering the management [7]. This study was performed to explore the frequency of clinical diagnosis of appendicitis and different entities over ten years to highlight the importance of histopathological analysis of every single resected appendix.

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MATERIAL AND METHODS

This retrospective study was done over a period of ten years from Jan 2011 to Dec 2020 at department of pathology Combined Military Hospital Kharian and permission from hospital ethical review committee was taken. The study included surgically removed specimens received for histopathology (including both open and laparoscopic appendectomy specimens) for evaluation of pathological lesions of the appendix over a period of ten year from Jan 2011 to Dec 2020. The appendix resected along with other organs like with uterus or intestine were excluded from the study. Moreover, those cases were also excluded from the study for which blocks were not available (taken for review). The clinical details of the patient were retrieved from histopathology request forms like age, gender, diagnosis etc. All haematoxylin and eosin stained slides were reviewed according to the mentioned diagnostic criteria [8]. Descriptive statistics were calculated by using SPSS version 21.

RESULTS

A total of 883 specimens, which were fulfilling inclusion and exclusion criteria were analyzed. Out of these, 597 (67.6%) were males and 286 (32.4%) were females, making a male to female ratio of 2:1. In the present study peak incidence was found in the third, second and fourth decades, both in males and females. Males predominated females in every decade of life. The peak incidence is seen in the third decade in males and the second decade in females. (as shown in Table-I)

Out of 883 cases, only five (0.56%) were neoplastic, while the rest of the cases 878 (99.44%) were non-neoplastic. The histopathological examination showed acute suppurative appendicitis with periappendicitis (31.9%) was the commonest diagnosis while carcinoid tumour (0.1%) and mucinous adenocarcinoma (0.1%) were least frequent ones.

Table-I: Showing frequency of males and females in different age groups.

Age group	Gender		
	Total	Male	Female
1-10 yrs	68	37	31
11-20 yrs	223	122	101
21-30 yrs	354	270	84
31-40 yrs	135	99	36
41-50 yrs	49	30	19
51-60 yrs	28	18	10
61-70 yrs	20	15	5
71-80 yrs	4	4	0
80-90 yrs	2	2	0
Total	**883**	**597**	**286**

Table-II: Showing frequencies and percentages of histopathological diagnoses.

Histopathological Entity	Frequency	Percentage (%)
Acute appendicitis with periapendicitis	282	31.9
Appendix showing reactive lymphoid hyperplasia	231	26.2
Acute appendicitis	109	12.3
Appendix showing congestion	100	11.3
Gangrenous appendix	66	7.5
Appendix showing Entrobius vermicularis	42	4.8
Appendix showing fibrosis	28	3.2
Appendix showing congestion and fecalith	18	2.0
Appendix with mucocele	3	0.3
Granulomatous appendicitis	2	0.2
Mucinous denocarcinoma	1	0.1
Carcinoid Tumour	1	0.1
Total	**883**	**100.0**

DISCUSSION

Acute appendicitis is one of the most common conditions requiring emergency surgical intervention. The current study is a retrospective study from the data available over ten years from 2011 to 2020 comprising 883 appendectomy specimens received for histopathological analysis. The histopathological examination of the appendix serves two purposes, first, it allows the diagnosis of acute appendicitis to be confirmed; second, it reveals additional pathological findings that may not be evident clinically and intraoperatively which may have a profound impact on patient management.

In the present study, the ratio of male to female is 2:1 which is similar to the proportion found by Kokila K *et al* [9]. In both studies, males predominated females, but to a lesser extent than the present study. A similar proportion was seen in the study by Jat MA *et al* [10] where the male to female ratio was 1.4:1. Kokila K *et al* [9] also found a similar proportion, where the male to female ratio was 1.3:1. However, in the study by Chandarakar RK *et al* [11] the ratio is reversed showing that females predominated males, but in the adolescent age, males are predominant which is in agreement with other studies. This reversal of gender predominance might be due to differences in the population or differences in the selection criteria for appendectomy. Similarly, in another study by Salahuddin O *et al* [12] in the elderly males predominated females, as was found in the present study.

In the present study, the peak incidence of appendectomy was found in the third decade followed by the second and fourth decades, both in males and females. Males predominated females in every decade of life. The peak incidence is seen in

the second decade in females (n=101) and the third decade in males (n=270). In a study by Jat MA *et al* [10] males also predominated females in every decade of life as was found in the present study but the second decade was the commonest decade for the appendectomy rather than third decade as found in the present study. This disparity is probably due to differences in ethnic origin of subject population.

In the current study, acute appendicitis with periappendicitis was the commonest histopathological diagnosis (n=282) followed by appendix showing reactive hyperplasia (n=231), appendix showing congestion (n=100). In females, no case of mucocele and chronic granulomatous inflammation was seen, while one case of adenocarcinoma was seen in the seventh decade and a case of carcinoid was seen in the second decade females, but no case was seen in males.

In the present study among elderly (6^{th}, 7^{th} and 8^{th} decades), the commonest diagnosis was acute appendicitis with periappendicitis followed by acute appendicitis, and no case of gangrenous appendix was found in this group. In another study by Salahuddin O *et al* [12] the commonest was acute appendicitis with periappendicitis associated with perforations, followed by gangrenous appendicitis. Perhaps this difference of gangrenous appendicitis is on account of selection criteria by the authors as the study only includes the elderly rather than all groups and also includes clinical criteria which were not included in the present study.

Parasitic infestation is considered to be one of the causes of obstruction of the appendicular lumen which in turn leads to appendicitis. Numerous studies have found the parasite in the appendicular lumen to be associated with or without appendicitis in the range of 0.3 to 3.5% Chandrakar RK *et al* [11]. The most common parasites associated includes Enterobius Vermicularis, Taenia Sp, Schistosoma Sp and Ascaris Lumbricoides. However, in the present study only Entrobius Vermicularis was seen in 4.8% of cases, irrespective of gender, which is slightly higher and may be due to differences in social setting. Most cases were seen in the second and third decades of life in either of the sexes. However, females were affected more (64%) than males (36%). Second decade was the commonest age group in females followed by third decade for infestation of Entrobious Vermicularis. However, in males second and third decades were equally involved and to a lesser extent than females. Few cases having the infestation of Entrobius were also seen in the first decade as well as in the later ages of life, signifying that no age is immune to parasitic infestation probably on account of feco-oral contamination.

In daily practice, both neoplastic and non-neoplastic lesions of the appendix present with abdominal pain. Non-neoplastic lesions of the appendix outnumber the neoplastic counterparts and appendicitis is the most frequently encountered lesion in daily clinical practice. Imaging studies like ultrasound are commonly used to identify the neoplastic nature of the lesion. Histopathology of the specimen is considered gold standard for confirmation of diagnosis [13].

In a study conducted by Kokila, K *et al* [9], out of 1100 appendectomy specimens 0.6% of cases (7 cases) were neoplastic lesions. Sujatha R *et al* [14] also found (0.6%) neoplastic cases of mucinous cystadenoma among 230 cases. Similarly, Hassan A *et al* [15] found that out of 766 appendectomy specimens 4 (0.52%) cases were neoplastic lesions. The results of these three studies are quite similar to the present study. In another study by Acharya A *et al* [1] found that 7 (0.8%) cases were malignant and 848 (99.2%) were non-malignant on histopathology and all of these malignant cases were considered suspicious for malignancy preoperatively by the surgeon and the authors had recommended that the histopathology should be done only for the appendix which is looking suspicious for malignancy. However, in a larger study, Bastiaenen VP *et al* [16] compared 25 studies and concluded that there is a huge variation in suspecting malignancy preoperatively during surgeries among different studies. Therefore, all appendectomy specimens should be submitted for histopathology until reliable data on safety and potential cost savings of selective cases for histopathology become available.

Among neoplastic lesions, the primary appendiceal epithelial tumors can be of four groups: mucinous, non-mucinous, neuroendocrine, and mixed glandular-endocrine (composite) tumors. The WHO 2019 classification of tumors of the digestive system is an important step in simplifying the classification of non-neuroendocrine tumors of the appendix. The term "appendiceal mucinous lesions", which was recently introduced into the medical literature, is to distinguish between lesions with and without malignancy potential.

Memon I *et al* [17] found that carcinoid tumours is 0.6% of all appendectomies, which is quite a higher percentage compared to the present study where the percentage is only 0.1%. This might be due to the larger sample size and different geographic distribution of population. They also concluded that these usually present at an early

stage and 90% of cases show excellent prognosis with appendectomy while 10% of cases might need further evaluation and treatment [15].

CONCLUSION

It is evident that finding an unusual pathology in clinically suspected acute appendicitis is still not uncommon. Such unusual entities like granulomatous inflammation, appendicular tumours warrant further investigations and treatment. The second and third decades of life are common decades for appendectomies, however, no age is immune to appendectomy. Males are more prone as compared to females of all ages for appendectomy. Histopathology should be considered as the gold standard until any better modality is available for confirmation of diagnosis.

AUTHOR CONTRIBUTIONS

Abdul Qadir: Designed the study, collection of data and review of cases.

Adeel Arif: Literature review, data analysis, drafting of article.

Najmusaqib Khan Niazi: Proof reading and critical review.

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