Original Article

Unusual Incidental Histopathological Findings of Appendectomy Specimens

Inayatullah Memon and Attiya Memon

ABSTRACT

Objective: To determine the unexpected incidental histopathological findings ofsurgically removed appendectomy specimens.

Study Design: Observational study

Place and Duration of Study: This study was conducted at the Department of Pathology, Indus Medical College Tando Muhammad Khan from February 2017 to January 2018.

Materials and Methods: A sample of 200 appendectomy specimens was collected according to inclusion and exclusion criteria. Gross examination of specimens was noted. 5 µ tissue sections were stained with Hematoxylin and Eosin and examined under microscope. A structured proforma was designed for the collection of data. Data variables were typed on the Microsoft excel sheet in Windows 7.0 software. Data was analyzed onStatistix 8.1(USA) at 95% confidence interval ($P \leq 0.05$).

Results: Mean Age was noted as 27±10.56 years. Male to female ratio was 5.6:1 (P=0.0001). Acute appendicitis was noted in 30.5%, suppurative appendicitis in 8%, gangrenous appendicitis in 5%, perforation in 9.5%, tuberculosis in 8.5%, lymphoid hyperplasia in 5.5% and fecolith in 7.5% of cases. Unusual histopathological findings noted were Crohn`s disease (1.5%), benign tumors (6%), carcinoid (1%), Adenocarcinoma (7%), endometriosis (3.5%) and Enterobiusvermicularis (6.5%).

Conclusion: Incidence of unexpected histopathological findings was high in appendectomy specimens.The present study emphasizes the importance of histopathological examination of every single resected appendectomy specimen to avoid missing any clinically important and treatable disease.

Key Words: Appendectomy,Tuberculosis, Enterobius, Histopathology

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INTRODUCTION

Acute appendicitis is commonly encountered surgical problem in emergency,[1] while the appendectomy is widely performed surgical procedure. Negative histopathological examination is reported in 20% of patients who underwentappendectomy.[2] Negative histopathological examination of appendectomy specimens is common in female compared to male. Making diagnosis of acute appendicitis is a surgical dilemma, especially in females because of internal genitalia. Misdiagnosis of acute appendicitis is very common in female who are non-pregnant of child bearing age.[3]Peak age incidence of acute appendicitis is in teenage and early 20s. Incidence of acute appendicitis is similar among male and female before puberty. In adult age, the incidence in male is more frequent with male to female ratio of 3:2, this decreases with advancing age. Obstruction of appendix lumen is dominant factor in the pathology of acute appendicitis. Obstruction may occur due to worm, fecolith, fibrosis and or lymphoid hyperplasia in youngsters. Unusual causes had also been reported.[3,4]Practice of histopathological examination of surgically removed appendectomy specimens varies. Some authors[5]are of opinion that it is not necessary to perform routine histopathological examination of appendectomy specimens until or unless gross abnormality is not observed in the appendix.[5]While others[6,7] suggest performing routine histopathological examination of appendectomy specimensis mandatory. Histopathological examination remains the gold standard procedure for confirmation of appendicitis. It is necessary to be performed for each appendectomy specimen because occasionally sinister findings such as worms, tumors, tuberculosis and rare causes are encountered, which are confirmed by histopathological examination only. Such findings necessitate the pathological examination of each and every resected appendectomy specimen.[8]

Department of Pathology, Indus Medical Colleges, T.M. Khan, Sindh.

Correspondence: Dr. Inayatullah Memon, Associate Professor of Pathology, Indus Medical Colleges, T. M. Khan, Sindh.
Contact No: 0300-9371766
Email: memon.inayat@gmail.com

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MATERIALS AND METHODS

The present case control study was conducted at the Department of Pathology, Indus Medical College Tando Muhammad Khan. The study covered duration of one year i.e. from Feb. 2017 to Jan. 2018.

Appendectomy specimens of acute appendicitis surgically removed either by open or laparoscopic surgery was included in the study protocol. Chronic/recurrent appendicitis, or appendix removed during some other surgical procedure was exclusion criteria. Incompletely filled patient proforma, not labelled properly and delayed specimens were also excluded. Surgeons were approached and communicated about the purpose so that they could provide completely filled proforma of the patient's histopathological examination. A sample of 200 appendectomy specimens were collected and studied. Appendectomy specimens were collected with proper protocol.5µ tissue sections were prepared, stained with Hematoxylin and Eosin (H & E) and examined under microscope.Consent form was signed from only selected cases where it was considered essential. Volunteers were informed about the purpose of study.Ethical permission was taken from institute before commencing the study. A structured proforma was designed for the collection of data in a systemic way to avoid any deficiency in collection of research variables. This proforma was also approved by the panel of ethical review committee for its completeness in comparison to the objectives of the study and possible findings. Confidentiality of patient data was secured by keeping the record locked and only authorized researcher were allowed to access the results and biodata of patients. Data variables were typed on the Microsoft excel sheet in Windows 7.0 software. Once the data was complete, it was checked carefully by all the authors. Then it was copied to the Statistix 8.1(USA) sheet. Proper statistical tests were discussed by authors and were used to analyze data properly. Continuous variables (e.g. age) and categorical variables (e.g. gender) were analyzed by the Student`s t-test and the Fischer`s exact test respectively. 95% confidence interval was considered statistically significant($P \leq 0.05$).

RESULTS

Age (mean±SD) of total 200 subjects was noted as 27±10.56 years. 45% of subjects belonged to the second decade, followed by 17.5% in third decade and 12.5% in fifth decade (table 1) (P=0.0001).

Table No.1: Age distribution of study subjects (n=200)

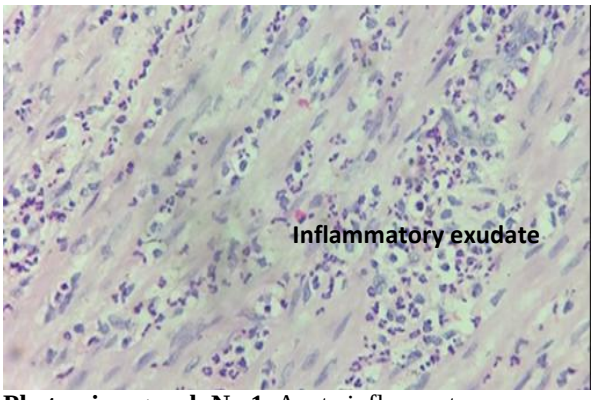
Age (years)	No.	%	P-value
10 - 19.9	90	45.0	0.0001
20 - 29.9	35	17.5	
30 - 39.9	19	9.5	
40- 49.9	25	12.5	
50 -59.9	19	9.5	
≥60	12	6.0	
Total	200	100.0	

Table No.2: Histopathological findings(n=149)

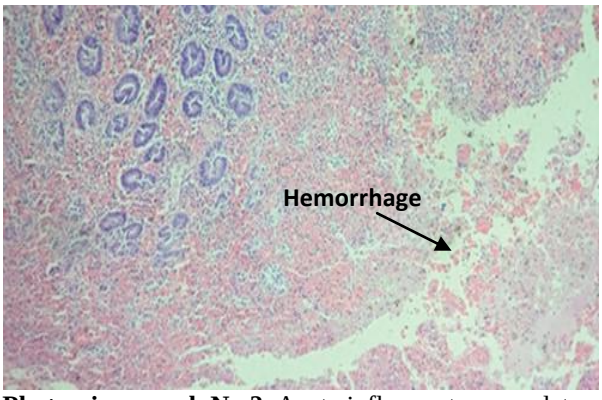
	No.	%	P-value
Suppurative appendicitis	16	8.0	0.0001
Gangrenous appendicitis	10	5.0	
Perforation	19	9.5	
Tuberculosis	17	8.5	
Lymphoid hyperplasia	11	5.5	
Fecolith	15	7.5	
Acute inflammation	61	30.5	
Total	149	74.5	

Table No.3: Unexpected incidental histopathological findings (n=51)

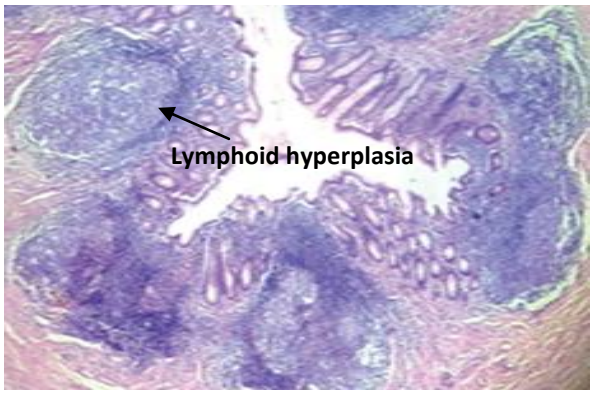
	No.	%	P-value
Crohn`s disease	3	1.5	0.0001
Benign tumors	12	6.0	
Carcinoid	2	1.0	
Adenocarcinoma	14	7.0	
Endometriosis	7	3.5	
Enterobius	13	6.5	
Total	51	25.5	



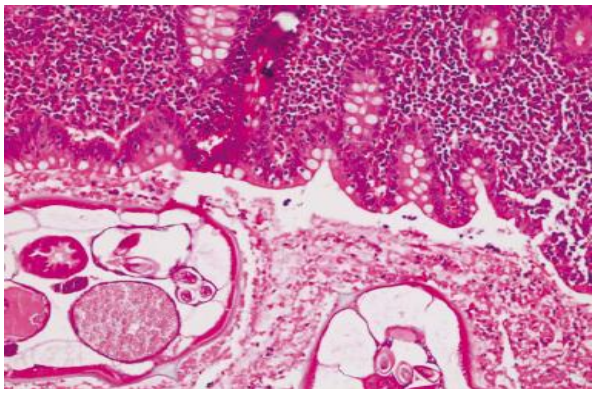
Photomicrograph No.1. Acute inflammatory exudates showing neutrophil infiltration (H& E x100)



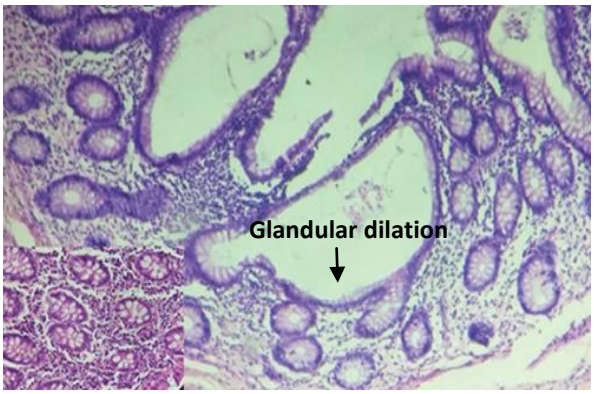
Photomicrograph No.2. Acute inflammatory exudates showing hemorrhage & necrosis (H& E x100)



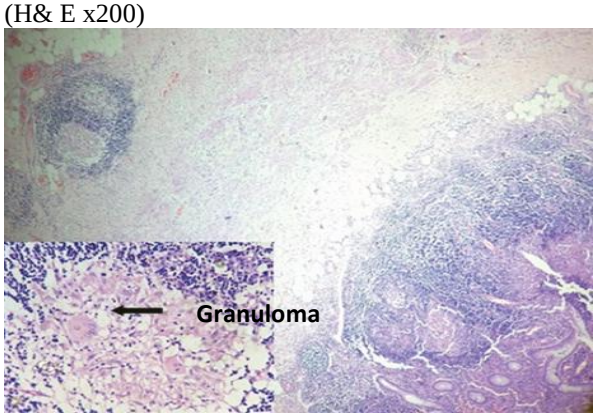
Photomicrograph No.3. Lymphoid hyperplasia seen in the acute appendicitis (H& E x100)



Photomicrograph No.4. Enterobiusvermicularis is seen in the Appendicular lumen & wall (H& E x200)



Photomicrograph No.5: Mucin secreting glandular dilatation showing goblet cell metaplasia (H& E x100)



Photomicrograph No. 6: Chronic granulomatous inflammation showing caseous necrosis (H& E x400)

Of total 200, 170 (85%) were male and 30 (15%) were female. Male to female ratio was 5.6:1 (P=0.0001). Histopathological findings are shown in table 2 and 3. Acute appendicitis (acute inflammatory exudate) was noted in 30.5% of cases. Remaining specimens revealed suppurative appendicitis in 8%, gangrenous appendicitis in 5%,, perforation in 9.5%, tuberculosis in 8.5%, lymphoid hyperplasia in 5.5% and fecolith in 7.5% of cases (table 2) (P=0.0001). Otherunexpected incidental histopathological findings noted were Crohn`s disease (1.5%), benign tumors (6%), carcinoid (1%), Adenocarcinoma (7%), endometriosis (3.5%) and Enterobiusvermicularis (6.5%). Histopathological examination is shown in Photomicrograph 1-5.Acute inflammatory exudates showing neutrophil infiltration, acute inflammatory exudates showing hemorrhage & necrosis, lymphoid hyperplasia,Enterobiusvermicularis, glandular dilatation with goblet cell metaplasia and Chronic granulomatous inflammation with caseous necrosis were observed in the histopathological examination.

DISCUSSION

The present observational study reports on the unexpected incidental histopathological findings of acute appendectomy specimens. The histopathological examination is essential because appendix may have different disease for which the management differs. For example the management of tuberculous appendicitis and parasitic appendicitis will be different and a misdiagnosis may lead to failure of symptoms or a flare up of original disease such as the tuberculosis, Crohn`s disease, carcinoid tumors, etc. Acute appendicitis is a surgical emergency and appendectomy is its mainstay of treatment. In Western countries, appendectomy accounts for 40% of all surgical procedures. Incidence of appendicitis is increasing in urban areas of developing countries due to adoption of western diets. Incidence of appendicitis varies according to age, sex, hygiene, race, geographical areas and socioeconomic status.[9]In most cases of appendicitis, obstruction of appendix lumen caused by fecolith or worm results in acute inflammation and symptoms of appendicitis. Appendix lumen obstruction facilitates the bacterial proliferation of various Enterococci species. Lymphoid hyperplasia may also occlude the appendix lumen as in young leading to appendicitis. Lumen obstruction builds the pressure on the wall of appendix resulting in ischemia and obstruction of lymphatic flow.[9] Histopathological examination of appendectomy

specimens serves 2 purposes; first- it allows proper diagnosis, second- it may reveal incidental findings which affect the subsequent clinical therapy.[10] Appendicitis affects 7% of general population in their life with peak incidence noted during first three decades of life.[9]The present observational study reports different unexpected incidental histopathological findings of appendectomy specimens such as the Crohn`s disease, carcinoid, adenocarcinoma, endometriosis and Enterobiusvermicularis (6.5%). Age (mean ± SD) of study subjects was noted as 27±10.56 years. 45% of subjects belonged to the second decade, followed by 17.5% in third decade and 12.5% in fifth decade (P=0.0001). This finding is consistent with Sinha et al[11]which had reported peak incidence of acute appendicitis of 2nd decade in male and 4th decade in female. Other previous studies[12-14]reported 80% of cases belonged to <40 years of age. In present study, of total 200, 170 (85%) were male and 30 (15%) were female. Male to female ratio was 5.6:1 (P=0.0001).Male dominancy is in agreement with previous studies.[11,12]Acute appendicitis (acute inflammatory exudate) was noted in 30.5% of cases (Photomicrograph 1,2). Remaining specimens revealed suppurative appendicitis in 8%, gangrenous appendicitis in 5%,, perforation in 9.5%, tuberculosis in 8.5%, lymphoid hyperplasia in 5.5% and fecolith in 7.5% of cases (P=0.0001). Our findings are consistent to previous studies.[15-17] Suppurative and gangrenous appendicitis is due to delay health seeking behavior of public. Incidence of perforation was 9.5% which is higher than previous studies.[11,12] Reason could be differences of health provision facilities and socio economic status which results in delayed clinical presentation. Sinha et al[11] reported 40% incidence of fecolith in their study which is higher than that of 7.5% noted in present study. However, the suppurative and gangrenous appendectomy specimens are consistent to reported studies.[15-17] Granulomatous inflammation suggestive of tuberculosis was noted in 8.5%of cases which is higher than reported incidence of 0.1-0.6%.[18] Granuloma, caseation necrosis and Langhan`s cells as shown in Photomicrograph 6 are suggestive of primary tuberculous infection of appendix. Eosinophilic inflammation by Enterobiusvermicularis was noted in 6.5% cases. Presence of Enterobiusvermicularis within appendix lumen mimics the symptoms suggestive of acute appendicitis. The finding is in keeping with World incidence of 0.2 – 41.8% of Enterobius infestation in acute appendicitis.[19] Goblet cell metaplasia (Photomicrograph 5) is in agreement with previous study.[11,20,21]Sinha et al[11] reported Crohn`s disease in 7.14% cases which is very high compared to 1.5% noted in the present study.A few of limitations of present research are a small sample size and particular ethnicity; hence findings cannot be generalized. However, findings highlight the importance of histopathological examination of appendectomy specimen, to reach at a proper diagnosis as the clinical management of tuberculosis, Enterobius infestation, Crohn`s disease, etc are different.

CONCLUSION

Incidence of unexpected histopathological findings was high in appendectomy specimens. Incidental findings included the tuberculosis, Crohn`s disease, carcinoid tumors, adenocarcinoma, endometriosis and Enterobiusvermicularis. The present study emphasizes the importance of histopathological examination of every single resected appendectomy specimen to avoid missing any clinically important and treatable disease.

Author's Contribution:

Concept & Design of Study:	Inayatullah Memon
Drafting:	Attiya Memon
Data Analysis:	Inayatullah Memon, Attiya Memon
Revisiting Critically:	Inayatullah Memon, Attiya Memon
Final Approval of version:	Inayatullah Memon

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

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