Original Article

Histopathological findings of appendicectomy specimens at a tertiary care hospital in Peshawar; A two-year retrospective study

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Objective: To determine the histopathological findings of appendectomy specimens and rate of negative appendectomies with the advent of newer diagnostic modalities.

Methodology: This descriptive cross-sectional study was carried out at the general surgery and histopathology units of Rehman Medical Institute (RMI) from October to December 2019 using universal sampling technique. Data from June 2017 to June 2019 was extracted from RMI archives. All the patients admitted for appendectomies were included in the study regardless of their age, gender or ethnicity. Patients excluded from the study were those with the need of a concurrent surgical intervention. Data were copied into Microsoft Excel and analyzed using pivot tables.

Results: A total of 271 appendectomies were carried out during study period. Out of the 271 appendectomies, 173 (63.8%) were males while 98 (36.1%) females. Mean age for both males and females was 28.59 ± 15.26 years. Acute appendicitis was the most common diagnosis (51.66%), Follicular Lymphoid Hyperplasia (18.45%) followed acute appendicitis showing the same male dominance (30) against females (20). Normal appendix or negative appendectomies were seen to be only 1.11%. Parasitic appendix (0.74%) and Xanthogranulomatus appendicitis (0.37%) were two of the rare findings.

Conclusion: The most common histopathological finding in appendectomy specimens is that of acute appendicitis. Normal appendix specimen were low.

Keywords: Abdominal pain, appendectomy, appendix.

INTRODUCTION

The most frequently performed emergency abdominal surgery is that of acute appendicitis worldwide and it's the most common cause of acute abdominal pain.[1] Appendectomy not only cures the disease but also helps reduce life threatening complication of appendix rupture, sepsis or plastron.[2] The lifetime incidence of acute appendicitis for both gender is 8.6%.[3,4] The recurring cause of acute appendicitis is the obstruction of lumen which either happens due to the hyperplasia of lymphoid tissue or fecolith in adults.[2] Complications include ruptures of the appendage itself and then causing peritonitis which leads to sepsis then eventually morbidity and mortality.

Histopathological examination of specimens is an important as guides treatment plan and options. Specimens with malignancies require proper histopathological reports to manage the case effectively post operatively.[5] Guidelines from American and British boards of pathology discourage histopathological examination of every sample of appendix and gall bladder specimens and recommend this practice be done only selectively to decrease burden on hospitals and prevent depletion of resources. However, in our hospital, routine pathological examination of appendix specimen is performed; hence it was imperative to correlate the histopathological elements with the clinical diagnosis. This study was carried out to determine histopathological findings of appendectomy specimens and rate of negative appendectomies.

METHODOLOGY

This is a descriptive cross-sectional study carried out at the general surgery and histopathology units of RMI from October to December 2019 using universal sampling technique. All emergency appendectomies and interval appendectomies were included in the study regardless of their age, gender or ethnicity. A CT scan was performed for most patients undergoing appendectomies. The appendectomies performed were using both the open and laparoscopic techniques. Patients excluded from the study were those who underwent a concurrent surgical intervention such as a right hemicolectomy.

Data from June 2017 to June 2019 was extracted from the histopathology archives. These were then cross

checked with the entry on the hospital software and evaluated in the histopathology unit using gross and microscopic examination for reaching a final diagnosis. The final report was then entered in the hospital software.

Normal appendix on histological examination was defined as a negative appendectomy. Acute appendicitis was defined as the presence of neutrophils in the mucosa, wall of appendix and congested blood vessels with fibrinous exudates in the serosa. Suppurative appendicitis was associated with foci of suppurative necrosis and abscess formation.

Statistical Analysis: Data were copied into Microsoft Excel and analyzed using pivot tables. Mean and standard deviation was also calculated using Microsoft Excel. $p < 0.05$ was considered significant.

RESULTS

Out of 271 appendectomies carried out during study period, 173 (63.84%) were males while 98 (36.16%) females. The male to female ratio being 1.77:1. Mean age for appendectomies in males and females was 28.59 ± 15.26 years. For males, the mean age was 27.7 ± 14.8 years and average age for females was 30.2 ± 15.9 years (Table 1).

Table 2 shows the gender wise distribution of the histopathological findings. Acute appendicitis was the most common diagnosis (51.66%) of all the appendix resected. Males (31.73%) accounted for the highest proportion of the acute appendicitis diagnosis with females (19.93%). Follicular Lymphoid Hyperplasia (16.61%) followed acute appendicitis showing the same male dominance (11.07%). Normal appendix or negative appendectomies were only 1.11%. Parasitic appendix (0.74%) and Xanthogranulomatus Appendicitis (0.37%) were two of the rare findings.

Table 1: Characteristics of study population.

Characteristic		Number (%)
Age, mean [range] (years)		28.59 [6-84]
Adults >18 years		185 (68.27%)
Gender	Females	98 (36.16%)
	Males	173 (63.84%)
Patients undergone CT scans		179 (66.05%)
Negative Appendectomy Rate		3 (1.11%)

Table 3 demonstrates distribution of histopathological findings among different age groups. In the group below 18 years old, the most common finding was of acute appendicitis (30.71%) followed by follicular lymphoid hyperplasia (32.00%). In the age group 18 and above, similar findings were observed, acute appendicitis (69.29%). Acute Appendicitis with periappendicitis was higher compared to the age group below 18 years ($p = 0.053$). The rate of fibrosis was also higher in adults whereas none of these findings was observed in below 18 group ($p = 0.046$).

Table 2: Gender wise distribution of histopathological findings.

Finding	Males n (%)	Females n (%)	Total n (%)
Acute Appendicitis	86 (31.73)	54 (19.93)	140 (51.66)
Acute Appendicitis with periappendicitis	32 (11.81)	13 (4.80)	45 (16.61)
Acute Suppurative Appendicitis	10 (3.69)	2 (0.74)	12 (4.43)
Fibrosis	3 (1.11)	7 (2.58)	10 (3.69)
Follicular Lymphoid Hyperplasia	30 (11.07)	20 (7.38)	50 (18.45)
Normal Appendix	2 (0.74)	1 (0.37)	3 (1.11)
Parasitic (Entrobeus Vermicularis)	1 (0.37)	1 (0.37)	2 (0.74)
Perforated appendix	8 (2.95)	-	8 (2.95)
Xanthogranulomatus Appendicitis	1 (0.37)	-	1 (0.37)

Table 3: Histopathological findings of appendix in different age groups.

Finding	< 18 years n (%)	≥ 18 years n (%)	p value
Acute Appendicitis	43 (30.71)	97 (69.29)	0.248
Acute Appendicitis with Periappendicitis	8 (17.78)	37 (82.22)	0.104
Acute Suppurative Appendicitis	5 (41.67)	7 (58.33)	0.268
Fibrosis	.	10 (100)	0.046
Follicular Lymphoid Hyperplasia	16 (32.00)	34 (68.00)	0.449
Normal Appendix	2 (66.67)	1 (33.33)	0.129
Parasitic (Entrobeus Vermicularis)	1 (50.00)	1 (50.00)	0.479
Perforated appendix	.	8 (100)	0.076
Xanthogranulomatus Appendicitis	.	1 (100)	0.535

DISCUSSION

Some authors have suggested that appendicitis has higher occurrence in males compared to females. Studies have shown a ratio ranging from 1.1 to 2.9:1, male to female, respectively. A study by Saleh Al–Mulhim showed males (61.2%) and females (38.3%), corresponding to the ratio, 1.6:1.[6] Shrestha et al stated that the females to male ratio was 1.1:1, opposite to the norm.[7] In our study, the male to female ratio is 1.77:1, in line with most of the studies suggesting a male dominance.

Shrestha et al[7] and Zulfikar et al[8] reported acute appendicitis in 52.0% and 86.3%, respectively. Acute suppurative appendicitis was seen in 23.2% by Shrestha et al and Lymphoid hyperplasia in 57.8% by Zulfikar et al.[8] Negative appendectomy was reported as 10.8% by both authors.[7,8] The findings vary slightly in comparison to our study but generally follow the same trend with acute appendicitis diagnosis being the most common diagnosis. Our histopathological findings were acute appendicitis (51.66%) followed by follicular lymphoid hyperplasia (18.45%), acute appendicitis with peri-appendicitis (16.61%) and acute suppurative appendicitis (4.43%), fibrosis (3.69%).

Improved Alvarado (MANTRELS) score is commonly used for diagnosing appendicitis in emergency rooms. Although it is an effective tool, it has a tendency to overpredict the probability of appendicitis in females and is inconsistent in children.[9] This could lead to negative appendectomies which is defined as the removal of a gross and histologically normal appendix. Negative appendectomy rate (1.11%) was lower in our center compared to other centers (15% and 1.7%).[10,11] In order to keep the negative appendectomy rate low and avoid misdiagnosis, radiological interventions can be useful along with the clinical acumen of the doctor. At our center, a CT abdomen scan is almost always done before the appendectomy to reduce the rate of negative appendectomy, and to exclude any pathology that might be missed on clinical examination which is subjective to individual's perception.

The rate of appendix perforation in a case of appendicitis is usually low. This could be due to the patients presenting with classical symptoms, the high index of suspicion of doctors for the disease, and prompt surgical intervention. The rate of perforation at our center was 2.95%, which is comparable or lower to other centers (3% and 16%).[12,13] Enterobius vermicularis, pinworm infection and appendicitis association are a known fact. While the reported incidence of pinworm infections in appendectomy specimens from patients with presumed appendicitis has ranged from 0.2% to 41.8%.[14-16] In our results, the incidence of pinworms in the appendix appendage specimen was 0.74% (1 case), which is within the spectrum of the suggested literature.

Granulomatous appendicitis is another rare finding that can be incidentally discovered in a patient with acute appendicitis. In the West, the incidence reported ranged from 0.14% to 0.30% but in underdeveloped countries the incidence is higher ranging from 1.3% to 2.3%.[17,18] Several infectious agents such *Mycobacterium*, *Schistosoma* and *Yersinia* species along with non-infectious factors such as Crohn's disease and sarcoidosis have been reported as causative factors of this disease.[15,19,20] The criteria for diagnosis of these conditions include granulomatous inflammation, fissuring type ulcers and transmural aggregates.

CONCLUSION

The most common histopathological finding in appendectomy specimens was that of acute appendicitis. Normal appendix specimens were low. Rare finding of Xanthgranulomatous appendicitis was also found.

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