

Original Article

Appendicitis- Histology Specific Incidence Trends In A Semi Urban Population In New Delhi: A Study Of 262 Cases.

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Abstract:

Objectives: Acute appendicitis is a condition characterized by inflammation of the appendix for which timely surgery is mandatory to prevent morbidity and mortality. The aim of this study was to assess the differences in incidences, age, sex and seasonal variations and to review the histological diagnoses of all the appendicectomy samples. **Methods:** A retrospective analysis of patients who underwent appendicectomy at the Hakeem Abdul Hameed Centenary Hospital, New Delhi during the period Jan 2007 to Oct 2010. All the relevant data were retrieved from the accompanying laboratory request forms or patients files records where available. All histology slides were also retrieved and reviewed. To overcome the lack of standardization which is inherent in a retrospective analyses of this type, on review, all the cases were grouped into histopathologic categories **Results:** Of the 262 cases reviewed, acute suppurative appendicitis accounted for the maximum cases (80,30.53%) and a negative appendicectomy rate of 7% was observed. Male predominance was seen with a M:F ratio of 1.4:1. A peak incidence of 35.1% was observed in the 21-30 years age group. A seasonal trend of majority cases being confined to the months of June -August coinciding with the rainy season was noted. **Conclusion:** The vermiform appendix is a vestigial organ with no specific function. It comes into the limelight when a diagnosis of acute appendicitis is made by the surgeon based upon clinical features and physical examination. Histological examination of the appendix is therefore necessary to assess the surgeon's rate of negative appendicectomy as well as avoid missing a rare diagnosis or a malignancy.

Key Words: Appendicitis, seasonal trends, histology.

Introduction:

Acute appendicitis is a condition characterized by inflammation of the appendix for which timely surgery is mandatory to prevent morbidity and mortality. It occurs in any age group, from children to the elderly, but is most prevalent in adolescents and young adults. Untreated, mortality is high, mainly because of the risk of rupture leading to peritonitis and shock.

First described by Reginald Fitz in 1886, acute and chronic appendicitis are today recognized as the most common reason for an abdominal operation to be performed in the acute setting.¹ The clinical diagnosis usually rests on the history with classical physical examination, corroborated by laboratory and radiological findings.² In many cases the findings are not typical and in such situations a policy of early intervention to avoid perforation may lead to high negative appendicectomy rates.

The aim of this study was to assess the differences in incidences, age, sex and seasonal variations and to review the histological diagnoses of all the appendicectomy samples received at our Hospital Laboratory.

Subjects and Methods

This was a retrospective analysis of 262 patients who underwent appendicectomy during the period Jan 2007 to Oct 2010 at the Hakeem Abdul Hameed Centenary Hospital, New Delhi. This hospital caters to the populace who live in the slums located around this hospital in New Delhi. Data on the age, sex, month of admission, presenting clinical features and the gross examination findings of all cases were retrieved from the accompanying laboratory request forms, or patients files records where available. All histology reports and slides were also retrieved and reviewed. To overcome the lack of standardization which is inherent in a retrospective analyses of this

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type, on review, all the cases were grouped into the following histopathologic categories based on the **severity of the disease as follows**

- (a) Appendix showing a normal histological picture.
- (b) Early acute appendicitis: Gross examination showing a dull serosal surface & microscopic examination showing a mild to moderate transmural neutrophilic infiltrate.
- (c) Acute suppurative appendicitis: Gross examination showing fibrinopurulent exudates on the serosal surface & microscopic examination showing dense transmural neutrophilic infiltrates with areas of mucosal ulceration & abscess formation.
- (d) Acute gangrenous appendicitis: Gross examination showing a greenish black necrotic appendix with microscopic examination showing large areas of mucosal ulceration, extensive hemorrhage and necrosis involving all the layers and extending upto the serosa.
- (e) Recurrent appendicitis: A clinical history of

recurrent right iliac fossa pain with a grossly unremarkable/fibrosed appendix and microscopic examination showing submucosal fibrosis, prominent nerve fibres and moderate mononuclear cell infiltrates.

Other additional specific histologic features like lymphoid hyperplasia, faecoliths, granuloma, Enterobius vermicularis, tumor and perforation were also recorded.

Results

262 patients underwent appendicectomy at the Hakeem Abdul Hameed Centenary Hospital, New Delhi over a 45 months period. There were 156 (59.5%) males and 106(40.4%) were females (M:F ratio of 1.4:1) The age and sex distribution of these patients is shown in Table 1. The age range was between 6 years to 82 years. Only 4.5%, i.e.12 cases were recorded in the first decade of life and a peak incidence of 35.1% or 92 cases was observed in the 21-30 years age group. The most common presenting clinical symptoms were right sided abdominal pain with nausea and vomiting.

Table I: Age & Sex Distribution of Appendicectomy patients

AGE (years)	MALES	FEMALES	SUBTOTAL	%
	No of cases			
0-10	9	3	12	04.58
11-20	40	19	59	22.51
21-30	58	34	92	35.11
31-40	30	21	51	19.46
41-50	8	18	26	09.92
51-60	7	09	16	06.10
61-70	2	1	3	01.14
71-80	1	0	1	00.38
81-90	1	1	2	00.76

The largest histologic subgroups were early acute and acute suppurative appendicitis together accounting for 136 (51.9%) cases, indicating that timely surgery had taken place. Gangrenous changes were seen in 41(15.6%)cases, out of which 15 cases had appendiceal perforation. Recurrent appendicitis was reported in 62 (23.6%) cases whereas histologically normal appendix was seen in 23 (8.7%) cases.

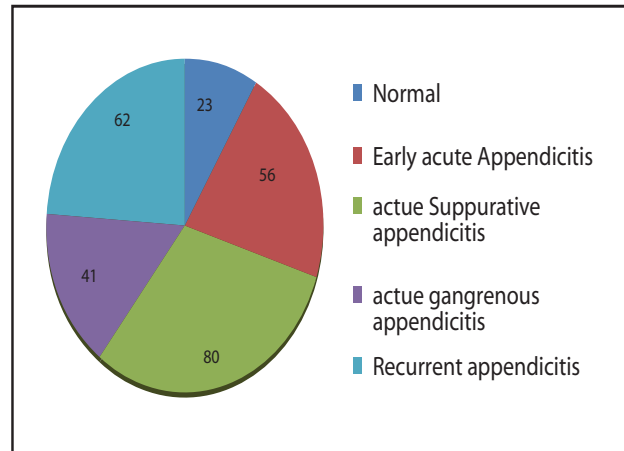


Figure I: Pie chart representing distribution of histopathological features

The distribution of the major histologic findings and certain specific features which were observed in some of these cases, both in males and females respectively are shown in Tables II and III

Table II Distribution of the major histological features by sex

S.No	Pathology	Male	Female	Total
1.	Normal	5	18	23
2.	Early acute appendicitis	34	22	56
3.	Acute suppurative appendicitis	42	38	80
4.	Acute gangrenous appendicitis	28	13	41
5.	Recurrent appendicitis	47	15	62

Table III Distribution of other specific histological features by sex

S.No	Other specific pathology	Male	Female	Total
1.	Fecolith	13	9	22
2.	Oxyuriasis	2	0	2
3.	Tubercular granuloma	1	1	2
4.	Carcinoid	1	0	1
5.	Lymphoid hyperplasia	8	3	11
6	Perforation	6	9	15

The seasonal variations of the major histologic types of appendicitis was also analyzed and the findings are presented (Figure II, Table IV). The months of June to August, which coincide with the rainy season showed the maximum incidence of appendicitis cases.

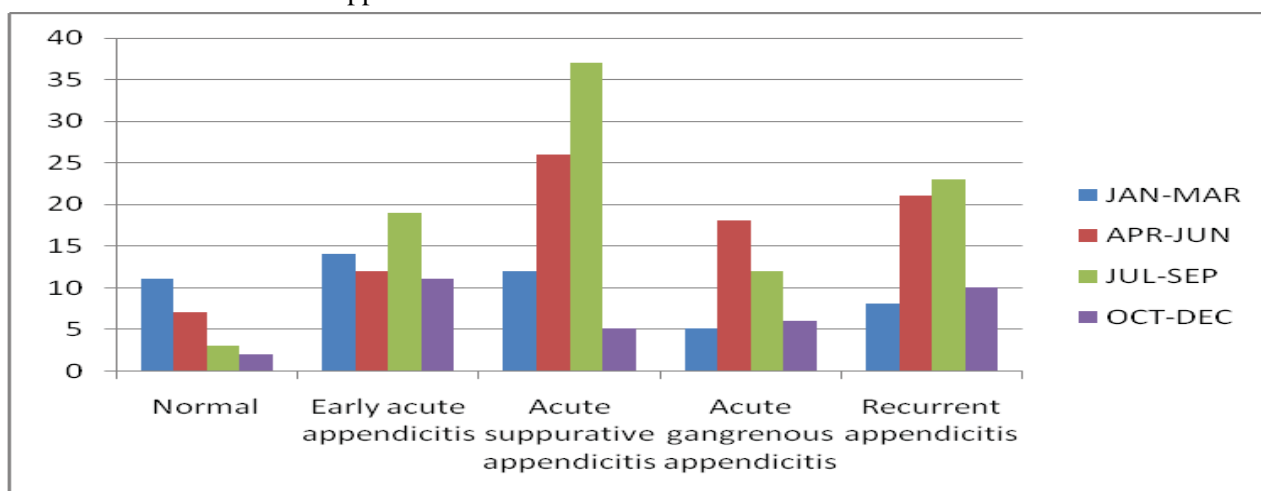


Figure II: Distribution of major histological feature by season

Table IV Distribution of the major histological features by season

S.No	Pathology	Jan-Mar	Apr-June	July-Sep	Oct-Dec	Total
1.	Normal	11	07	03	02	23
2.	Early acute appendicitis	14	12	19	11	56
3	Acute suppurative appendicitis	12	26	37	5	80
4	Acute gangrenous appendicitis	5	18	12	6	41
5	Recurrent appendicitis	8	21	23	10	62

Discussion

This study constituted of 262 consecutive resected appendices over a 45 month period. Patient demographics, clinical signs and symptoms and histological findings and the incidence of other pathologies encountered were tabulated and analyzed.

Histologically normal appendices were reported in 23 cases, of which 5 were incidental appendectomies in young females undergoing laprotomy for ovarian cysts and 18 cases were negative appendectomies, i.e surgery performed based upon a clinical diagnosis of acute appendicitis and the appendix subsequently found to be histologically normal. The negative appendectomy rate (NAR) in this study

was 7.0% which compares favorably with other studies which showed NAR ranging from 14.4% to 18.4%.³⁻⁵ These three studies were all retrospective analyses of cases of acute appendicitis, whereas our study also included appendices removed for recurrent right sided pelvic pain which may account for our comparatively low negative appendectomy rate. However, Marudanayagam et al analyzed 2660 appendectomies performed over a 7 year period and also found a high NAR of 28.2% and was significantly higher in females.⁶

The NAR was higher in females in the reproductive age group i.e 13 out of 18 cases, where clinical conditions like ovarian and tubal pathologies mimic fea-

tures of acute appendicitis, findings corroborated by all previous workers.³⁻⁶

The clinical presentation and the demographic characteristics of acute appendicitis were similar to other reported series.³⁻⁶ Acute appendicitis is generally considered to be the end result of a primary obstruction of the appendicular lumen which leads to overgrowth of the bacteria. The causes of obstruction include intestinal worms, lymphadenitis and most commonly calcified fecal deposits known as faecoliths which are formed by inspissation of faecal matter around vegetable fibres. Once this obstruction occurs the appendix subsequently becomes filled with mucus and swells, increasing pressures within the lumen of the appendix, resulting in thrombosis of the small vessels, ischaemia and perforation. The end result of this cascade is appendiceal rupture causing peritonitis with septicemia and shock.⁷ The most obvious common cause of obstruction in our series was fecolith followed by mucosal lymphoid hyperplasia. Fecoliths were seen in 22 i.e. 8.3% cases in this study, comparable with the 6.3% reported by Babekir et al⁸ while the Durban study reported an incidence of only 1.5%³

Normal appendix is rich in lymphoid tissue. We noted mucosal lymphoid hyperplasia in 11(4.1%) cases of appendicitis. In contrast Babekir et al⁸ reported lymphoid hyperplasia in 25% cases. They proposed that obstruction by lymphoid hyperplasia plays an important role in the pathogenesis of acute appendicitis.

Other specific pathologies recorded in our series were 2 cases of *Enterobius vermicularis*, 2 cases of granulomatous inflammation and 1 case of carcinoid tumor. Both cases of *Enterobius vermicularis* were incidental findings in appendices removed for recurrent right sided abdominal pain. Studies of appendectomies from the African continent have reported in addition to *Enterobius*, parasites like *Schistosomia*, *Trichuris trichura*, *Entamoeba histolytica* and *Ascaris*.^{3,5} In 2 of our cases, a diagnosis of tubercular granulomatous inflammation was made as coalescing caseating granulomas were seen microscopically and other granulomatous disorders, such as Crohn's disease were excluded on detailed evaluation and follow-up. We also had 1 case of an appendiceal carcinoid diagnosed by histological examination and presenting clinically as acute appendicitis. Pathologies like adenocarcinoma,

mucinous cystadenoma, endometriosis of the appendix found in other studies were not present in our series.

Perforated appendix was seen in 15 (5.7%) cases, all of which showed extensive hemorrhage and necrosis microscopically and grossly appeared gangrenous. As we have seen, the largest histologic subgroups in our series were early acute and acute suppurative appendicitis, 136 (51.9%) cases, indicating that timely surgery had taken place. Thus this low perforation rate compares favorably with rates of 5-26% quoted in literature by Colson et al.⁹ A retrospective study in Kerman-Iran over a 5 year period had a perforation rate of 0.8%,¹⁰ while relatively higher perforation rates ranging from 23.2 to 34.0% were reported in series from Africa i.e. Nigeria and South Africa.^{3,5} Marudanayagam et al reported a significantly higher perforation rate in patients above the age of 70 years, where the clinical diagnosis is often difficult. Of our patients with histological evidence of perforation,⁹ i.e. 60% were females in the 11-20 age group, similar to the findings of the study by I Chamisa.³

Recurrent appendicitis was seen in a fairly large number of patients in our study, i.e. 62 cases, (23.5%). Extensive fibrosis with obliteration of the appendiceal lumen was seen in 8 of these cases. Other retrospective studies have observed a far lower incidence of recurrent appendicitis. Chang et al¹¹ reported an incidence of 11% in a two year study, whereas Lee et al¹² reported an incidence of only 0.6% over a 21 year period.

A well defined seasonal variation was observed in our study. An increased incidence was noted in the rainy season, i.e. the months of July, August & September. Similar findings were noted in two studies from Nigeria and the Middle East respectively where multiple factors like humidity, allergens, increased incidence of bacterial & viral infections (causing lymphoid hyperplasia leading to appendiceal luminal obstruction) have been implicated.^{13,14} In contrast, an higher incidence of appendicitis in the summer months & lower incidence in the winter months has been reported in a study from Ontario, Canada.¹⁵

Conclusion:

The vermiform appendix is a vestigial organ with no specific function. It comes into the limelight when a

diagnosis of acute appendicitis is made by the surgeon based upon clinical features and physical examination. Histological examination of the appendix is therefore necessary to assess the surgeon's rate

of negative appendectomy. Histopathological assessment of every removed appendix is also essential to avoid missing a rare diagnosis or a malignancy.

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