Appendectomy: A Contemporary Appraisal

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A study of 1014 patients who underwent appendicectomy from January 1997 to December 1998 was carried out. The diagnosis was mainly based on clinical findings. The disease had definite seasonal variation. Incidence was higher in March to October. Majority (65%) of the patients belong to younger age groups (15-30 years). Histopathological diagnosis of normal appendix was made in 6.9%. The commonest complication (3.5%) was wound infection. There was no death in the series. The mean hospital stay was 4.3 days.

Key words: Acute appendicitis, Seasonal variation, Appendicectomy

In 1711, Lorenzo Heister, a professor of surgery at Helmstedt, was the first to suggest the appendix as the likely site of primary inflammation and abscess formation in acute typhlitis. [1] It was not until 1886, however, when Reginald Fitz, a professor of pathology, published a landmark manuscript describing the appendix as the source of inflammation in acute typhlitis[2] It is Fitz who recognized as coining the term *appendicitis*. In his classic publication, he described the signs and symptoms of acute and perforated appendicitis and was among the first to recommend early diagnosis and operative intervention.

There are case reports of successful appendectomies dating back as early as 1735, it was not until Fitz's presentation of his manuscript at the Association of American Physicians in 1886 that pioneering American surgeons began to intervene early in acute appendicitis. [3] [4]

In a presentation to the New York Surgical Society in 1889, Charles McBurney described his experience with many successful operations for early removal of the appendix. [5] [6]

Although considered one of the most elemental of general surgical disease process, its presentation regularly confounds the diagnostic acumen of even the most experienced of surgeon. The emergency department evaluation of suspected appendicitis requires the clinician to integrate and interpret clinical and laboratory data. Patient with abdominal pain represent between 5% to 10% of all emergency department visits. Of these patients only 4.3% will be diagnosed as having acute appendicitis [7]. Despite this small figure, appendicitis still remains the most common cause of acute abdominal pain requiring surgical intervention.

Patients and Methods:

This study was conducted in North Surgical Ward, Mayo Hospital, Lahore. The medical records of all patients who underwent nonincidental Appendicectomy over a two-year period (from January 1997 to December 1998) were collected for analysis. There operations were performed in Accident and Emergency department Mayo Hospital, Lahore. The level of experience of the surgeons performing the cases spans the entire spectrum from residents to surgeon with more than 20-year experience. All the patients who had appendicectomy were operated on clinical diagnosis based on detail history and physical examination. Necessary preoperative laboratory studies, as directed by the patient's age, medical history, hospital requirements and which were available, such as blood for haemoglobin, White Cell Count, urea, electrolytes were done. No specific emphasis was laid on radiological investigations. All the patients were subjected to the standard appendicectomy procedure under General Anaesthesia.

Results:

A total of 1014 non-incidental Appendicectomy were performed over this period. Appendicectomy were performed on 550 males and 464 females. (Figure I). Age ranged from 13 years to 65 years. (Figure II). For purpose of analysis, the patients were divided into four diagnostic groups: 1) Normal appendix, 2) Acute suppurative appendicitis, 3) Gangrenous appendicitis and 4) Perforated appendicitis.

Figure 1: Male: Female

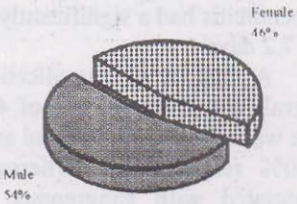
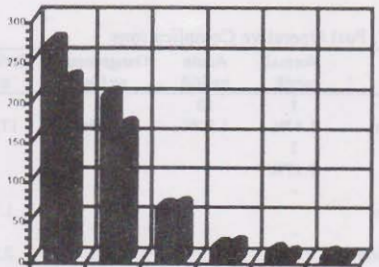


Figure II: Age distribution



	10-20yr	21-30yr	31-40yr	41-50yr	51-60yr	61-70yr
Males	268	202	60	12	6	2
Females	222	164	62	14	2	0

A histo-pathological diagnosis of normal appendix was returned in 68 cases (6.90%). In 50 of these cases the clinically based postoperative diagnosis taken from the operative report also indicated a normal appendix.

An operative diagnosis of acute appendicitis was confirmed pathologically in 664 cases (65.48%). The presence of and obstructing appendicolithiasis was documented in the operative report or pathology report of 66 cases (9.93%).

An operative diagnosis of gangrenous appendicitis was confirmed pathologically in 194 cases (19.3%) and the diagnosis of perforated appendicitis was confirmed in 88 cases (8.67%).

Table I illustrates the distribution of diagnosis (normal, acute, gangrenous, perforated) by gender. Table II shows the various positions of appendix.

Table I: Pathological types.

	MALE	FEMALE	n=	%age
Normal	30	38	68	6.90
Acute	356	308	664	65.48
Gangrenous	106	88	194	19.13
Perforated	58	30	88	8.67
Total	550	464	1014	

Table II: Positions of appendix

Position	n =	%age
Retrocaecal	708	69.82
Subcaecal	20	1.72
Preileal	12	1.18
Postileal	34	3.35
Paracaecal	88	8.67
Pelvic	152	14.99

The mean length of hospitalisation for all patients was 4.3 days. The mean length of stay for patients with normal appendices and acute appendicitis was 3.8 and 3.4 days, respectively. Patients with perforated appendicitis had a significantly longer hospital mean stay of 7.2 days

A total of 42 complications were recorded for an overall complication rate of 4.14%. The complications rate was minimum in normal and acute group. (2.94% vs. 1.50% respectively), Whereas the complication rate associated with gangrenous, especially in perforated group was 21.5%. The distribution of these complications by diagnosis is listed in Table III.

Table III: Post Operative Complications

	Normal n=68	Acute n=664	Gangrenous n=194	Perforated n=88	Total n=1014
Wound infection	1 1.47%	10 1.50%	10 5.15%	15 17.04%	36 3.55%
UTI	1 1.47%	-	-	-	1 0.09%
Chest infection	-	-	-	1 1.13%	1 0.09%
Bowel obstruction	-	-	-	2 2.27%	2 0.19%
Pelvic collection	-	-	1 0.51%	1 1.13%	2 0.19%
n=	2 2.94%	10 1.50%	11 5.67%	19 21.5%	42 4.14%

The most common complication was wound infection (n = 36, 3.55%). The distribution of wound infections was not significantly affected by gender or age. The risk of a wound infection increased markedly with perforated 17.04% compared to the rate associated with normal appendices (1.47%) and acute appendicitis (1.50%).

Urinary tract infection was seen in only one patient who had a normal appendix. One patient developed chest infection in a case of perforated appendix. Gender had no influence on the rate of this complication. Two cases of small bowel obstruction were diagnosed within 25 days of appendectomy. Age and gender did not significantly influence the occurrence of this complication. Both of the cases of obstruction resolved with conservative measures alone.

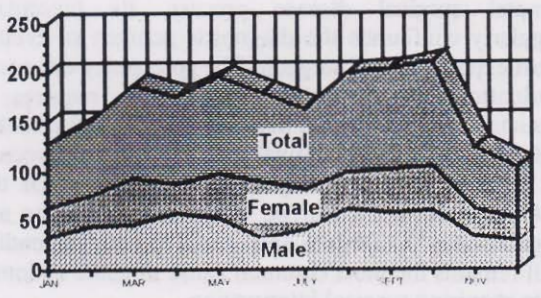
Intraperitoneal abscesses (pelvic) were diagnosed in two cases. Patients who had perforated or gangrenous appendicitis experienced this complication. In both instances, the abscesses were managed successfully with antibiotics alone.

Table IV gives an overall idea about the distribution of total number of cases admitted in North Surgical Ward and patients who had Appendicectomy, on monthly basis during the study duration. Figure III shows an interesting monthly (seasonal) variation of presentation of patients with acute appendicitis.

Table IV: Overall monthly indcidence

	Male	Female	n=	%age Male	%age Female
JAN	34	30	64	53.12	46.87
FEB	44	32	76	57.89	42.10
MAR	46	48	94	48.93	51.06
APR	58	30	88	65.90	34.09
MAY	52	46	98	35.55	46.93
JUN	32	58	90	35.55	64.44
JUL	40	42	82	48.78	51.21
AUG	62	38	100	62.00	38.00
SEP	58	44	102	56.86	41.50
OCT	60	46	106	56.60	43.39
NOV	34	28	62	54.83	45.16
DEC	30	22	52	57.69	42.30
n=	550	464	1014	54.24	45.75

Figure III: Seasonal Variation



Discussion

The early clinical diagnosis and operative intervention recommended by McBurney over a century ago remains the standard of care for the practicing emergency physician today [5].

For patients with typical signs and symptoms of appendicitis, only a minimum of diagnostic studies are required, a complete blood count with differential, a urinalysis, and possibly electrolytes with blood urea nitrogen and creatinine. Any further studies only increase the expense, prolong the delay to definitive surgical therapy, and increase the risk of complications.

For those patients whose presentation is suggestive but not diagnostic of appendicitis, many

studies are available to assist the clinician.

Patients with appendicitis tend to have an increase in WBC count on second measurement (4-8 hours after admission), except in the case of perforation, where the WBC has been observed to fall. [8]. Thus, although an elevated WBC count appears to be fairly sensitive, the fact that it can be normal in acute appendicitis, combined with its low specificity, should cause the clinician not to place too much emphasis on its value.

Plain abdominal radiographs are abnormal in 24% to 95% of patients with appendicitis. [9]. But the radiographic signs are not diagnostic or specific for appendicitis.

The sensitivity and specificity of barium enema in the diagnosis of appendicitis has been reported to be high (i.e. 90% to 100%). [10,11]. But there is high incidence of technical failure resulting in a nondiagnostic study, risk of contrast extravasations in the presence of perforation, and inability to provide information about disease outside of the colon. [12,9] For this reasons, barium enema is used infrequently in the evaluation of appendicitis.

Ultrasonography (US) has recently become a popular and effective tool in the evaluation of appendicitis. Graded compression US has a reported sensitivity of 76% to 96%, specificity of 84% to 94%, and an overall accuracy of 83% to 95%. [13,14,15,16].

Computed tomography (CT) has proved useful in the evaluation of appendicitis. CT has 87% to 98% sensitivity, 83% to 97% specificity, and 93% to 94% accuracy. [13,17,18].

Several practical scoring systems have been developed in the past several years to assist the clinician in the diagnosis of acute appendicitis. One of them is Alvarado [19] scoring system. In a prospective evaluation of the use of this scoring system, Bond and co-workers[20] found it was reliable in 16 to 17 years old patients but not in younger patients. Prospective evaluation of scoring system, revealed a sensitivity ranging from 80% to 90% and specificity 81% to 90% for the diagnosis of acute appendicitis. [14] [28]

Acute appendicitis affects all age groups. The overall incidence is approximately 11 cases per 10,000 population per year overall. There is, however, an increased incidence in patients between the ages of 10 and 20 years during which time the incidence increases to 23 per 10,000 populations per year. [23] Although there was no significant overall difference in the age distribution of males and females in this study, there was a slight increase in the proportion of men in the 15 – 30 years range. This most likely reflects the influence of the active-duty population.

There also exists a male: female incidence ratio of approximately 1.5:1.0. [13,24]. In our study, of the patients undergoing Appendicectomy 54.24% were males and 45.75% were females. Males were somewhat more prone to perforation than females, 65.90% (n=58) versus 34.00% (n=30). Conversely, the rate of normal appendices being found at the time of surgery was elevated significantly in females, 55.88% (n=38) versus 44.11% (n=30). Only 6.90% normal appendix were found in our study, which is low as compared to international study rates. This is due to the fact that most of patients are treated by General practitioners, which due to lack of proper clinical skills recognize the symptoms late and even if they do appreciated them try to treat on conservative basis. The increase incidence of normal appendices found in females is due to confusion with other gynaecological emergencies (salpangitis, ovarian cyst).

It was also observed that retrocaecal position of appendix is the commonest place (69.82%). This is similar to as reported by Gladstone and Wakeley [25].

Geographic and seasonal differences have also been noted, although they are inconsistent. [26,27,28]. Brumer in his study pointed out the seasonal variation. 70% of appendicitis occurring between March to September and related this occurrence to low humidity [27]. We also observed a rise in incidence between March to October, especially from August to October. A family history of appendicitis has been shown to increase one's likelihood of acute appendicitis. [29]. Socio-economic factors have also been noted, with higher rates of perforation found among the indigent and uninsured patients. [30,31]. In our study rate of perforation was increased among poor socio-economic class, possibly due to late presentation because of lack of availability of adequate medical facilities and self-treatment.

With the advocacy of early surgical intervention, the mortality rate of acute appendicitis over the 15 years succeeding Fitz's manuscript dropped from 50% to 15%. [32]. Over the past 100 years, advances in surgical techniques, anaesthesia, and antibiotic therapy have reduced the morbidity and mortality of laparotomy or laparoscopic surgery far below the morbidity associated with delayed diagnosis of perforation. In our two years study there were no mortality at all. The more things change, the more they stay the same. This apt phrase pertains to the diagnosis and treatment of appendicitis as much as to any other phenomena. We can take some solace, however, from the observation that modern surgical therapy has been responsible for reducing the mortality of appendicitis.

It seems clear that the presence of a competent health care team and access to care is more important than any available advanced technology in obtaining satisfactory results.

Conclusion

Appendicitis commonly involved young age group with a seasonal variation. Diagnosis still based upon clinical findings. Operative intervention remains the standard of care. In questionable cases of pain in right iliac fossa, especially in females pre operative diagnostic laparascopy is recommended

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