Original Article

CLINICAL, HISTOLOGICAL AND BACTERIOLOGICAL EVALUATION OF ACUTE APPENDESITIS

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Objective: To ascertain the diagnostic accuracy of clinical findings only, clinical findings supplemented with limited investigations (CBC & urine C/E), clinical findings routine investigations and detailed investigations in acute appendesitis. To study the histopathology and bacteriology of acute appendesitis.

Material and Methods: A Study was carried in department of surgery Services Hospital, Lahore. 150 patients who were operated for appendisectomy with suspicion of AA were included. Patients were randomly allocated 3 groups. Group A clinical findings only, Group B Clinical findings supplemented with limited investigations(CBC and Urine C/E), Goup C clinical findings & detailed investigations (investigations done in addition to GR. B.). Before operation patients signs and symptoms were recorded on specialized Performa on which relevant lab investigation, operative findings, post op sequeal, result of histological examinations, appendix culture reports and follow up visits were also recorded. Analysis was done to determine the diagnostic accuracy of three groups using computer based Epi-info-G-chi square test was used to check the significance of difference between three groups. .

Results: 150 patients divided in 3 groups were operated for appendisectomy. 50 patients (group-A) on the basis of clinical suspicion, 50 patients (group-B) on clinical suspicion and routine investigations (CBC and Urine C/E), 50 patients (group-C) with clinical suspicion, routine investigations and special investigations (X-ray erect posture and abdominal U/S). Out of 150 patients 111 had acute appendisitis (74%). Diagnostic accuracy was not significantly different between group A & B, but it was significantly higher in group-C than group-A.

Most prevalent organism found was Klebsiella followed by E.coli. Sensitivity was high in group-A (94.2%) but only insignificantly high in group-B (95.7%) and group-C (99.6%) specificity was low in group-A (22.6%) better in group-B (49.4%) and higher in group-C (76.9%).

Conclusion: Appendicitis still remains primarily a clinical diagnosis. With highest rate of diagnostic accuracy there is highest rate of perforations and via versa. So it can be stated that although negative findings on laparotomy in suspected acute appendicitis is not without risks, the hazards of perforated appendix are much more serious. .

Key words: IAppendicitis, Perforation, Diagnostic Accuracy.

Introduction

Acute appendicitis is the commonest diagnosis made in the acute abdomen in many countries including Pakistan. Appendicitis itself is responsible for about 1% of all emergency surgery (Kumar et al 1992). According to an estimate 5% of the population suffer from acute appendicitis during their lifetime and there is no way to prevent an attack of appendicitis. Appendicitis is a disease of all ages and both sexes but commonly found among the young and the middle aged with male dominance (Amir and Shami 1992). The diagnosis of acute appendicitis is mostly clinical with typical features of periumbilical pain shifting to right iliac fossa along with anorexia, nausea, vomiting localized tenderness and rebound tenderness in right iliac fossa (Lee and Teoh 1990). All these features are accentuated in the complicated (gangrenous and perforated) appendicitis. But similar features may be encountered in the variety of conditions all dubbed as acute abdomen.

Migration of the pain to the right iliac fossa and /or guarding/rigidity support diagnosis of acute appendicitis. The diagnosis of acute appendicitis should be doubted when anorexia, nausea and vomiting are absent, when symptoms have persisted for more than 72 hours without apparent perforation and when the tenderness is the right iliac is absent (Rasmussen, and Hoffman 1991). Especially vulnerable are patients in extremes of age where the diagnosis is often difficult and delayed. This leads to the greater frequency of complicated cases, which

and Thompson 1987).

In woman of childbearing age and those pregnant the dilemma is even greater which is reflected in 45% to 59% negative exploration on one hand and 33.2% incidence of complicated cases on the other hand (Khan et al 1990). Role of investigation in diagnosis of acute appendicitis is equally important to clinical diagnosis. Routine WBC count is a simple and non time consuming investigation. It remains the best laboratory method for diagnosing uncomplicated acute appendicitis. C-reactive protein and phospholipase A2 are better indicators of perforation and formation of appendiceal abscess than WBC count. As regards radiological investigation, a confident diagnosis cannot be made on plain x-ray abdomen in many patients. In high-resolution ultrasonography (USG) with graded compression to shift the bowel gases and soft tissue, the appendix is visible in 70% of the children with appendicitis. The best colour Doppler sonographic predictors of appediceal perforation are periappendiceal or pelvic fluid collection and periappendiceal soft tissue hyperemia. Sonographic criteria for diagnosing acute appendicitis are

a) Non compressible and aperistaltic blind end tubular structure.
b) Target like appearance in the transverse view with maximum dilatation of 7mm or more
c) Hypoechoic wall thickness >2.5mm
d) Peri-appendiceal fluid collection.

The alternate diagnosis is negative appendicectomy are mesenteric adenitis, acute terminal ileitis, right acute salpingitis, ruptured ovarian follicles, torsion of ovarian cyst in females; acute gastroenteritis, trichuriasis, acute pancreatitis, perforation of transverse colon due to non specific inflammation, appediceal carcinoid (Jess et al 1981), intussusception, pyelonephritis etc (Amir and Shami 1992). The number and severity of complications were significantly higher in the perforated appendix as opposed to the simple acute appendicitis. Other complications like septicemia, intra abdominal abscesses, wound dehiscence, and incisional hernia were seen only in perforated cases (Amir and shami 1992). Postoperative wound infection can be prevented by single pre or postoperative use of broad-spectrum antibiotic effective against both aerobic and anaerobic organism. Non-closure of the wound is considered to be an unnecessary measure in perforated and gangrenous acute appendicitis (Krukowski et al 1988). Primary closure is superior to delayed closure in terms of a lower wound infection rate. A histological criterion for acute appendicitis is a polymorphonuclear leucocyte infiltration of the mascularis of the appendix (Ojo et al 1991). Bacteriological study of appendix tissue showed that Klebsiella was the commonest organism isolated followed by E. coli on appedicular culture (Rasool et al 1992). Bacteriologic examination of both the appendix and pus from the subsequent wound infection if it occurs after appndicectomy often show a mixture of both anaerobic and aerobic organism (i.e Bacteroides fragiliss and E. Coli) Bauer et al 1989).

As appendicitis is a polymicrobial infection comprising of gram positive and gram-negative aerobes and anaerobes, a logical selection of antimicrobial therapy should cover all the possible pathogens. The review of published data from various countries shows that among all appendicectommies, 5.6% to 33% appendicies were normal. The rate of misdiagnosis is fairly high even in centres with most advanced technologies. The negative appendicectomy rates are 19.6% for Tanzania (Mbenbati et al1996). 21.7% for South Africa (Levy et al 1997). 16.7 for turkey (Gurleyik et al 1995) & 12.8% to 33% in USA (Hale et al 1997), All these facts leads someone to speculate, if high tech investigations are really necessary and cost effective. Appendicitis remains diagnosis based primarily on history and physical examination. This study is therefore, thought to be worthwhile to ascertain the value of different modalities in the diagnosis of acute appendicitis.

Material and Methods

The study was carried out in the Department of Surgery, Services Hospital, Lahore. One hundred & fifty patients, who were operated for appendicectomy because of suspicion of acute appendicitis were included in this study. The patients were randomly allocated to one of the three groups: Group A consisted of 50 patients, Group B, 50 patients and Group C, 50 patients.

Group A: Clinical findings only,

Group B: Clinical findings supplemented with limited investigations (CBC and Urine C/E)

Group C: Clinical findings and detailed investigations (investigations done in addition to those mentioned in B).

Methodology:

Before operation, the symptoms and signs of patients were recorded on a special Performa on which relevant laboratory investigations, the operative

findings, postoperative sequel, the results of histological examination, appendix culture reports and the follow up visits were also to be recorded post operatively.

Patients who had interval appendicectomies and that incidental to other operations such as cholecystectomies were excluded from the study.

In case of perforated appendix, the abdominal cavity was washed with 0.9% saline solution and mopped well. All patients received preoperative antibiotics. Ampicillin was used in simple cases and ampicillin along with metronidazole and an aminoglycoside (gentamycin) were used for complicated cases. These drugs were used for 2-3 days in simple cases and 5-7 days in complicated cases. A swab from the outer surface of the appendix was taken and put in Amies transport medium. A tangential piece of suspected area of inflammation excluding the lumen of appendix was taken and put in amies transport medium. Both were sent for aerobic and anaerobic culture, remaining portion of the appendix was sent for histopathology. At the time of discharge all patients were clearly explained about the follow up, which lasted for 6 weeks (1week, 2 week, 4week and 6 week). It started 1 week after the patient was discharged from the hospital. They were instructed to consult as soon as they note any complication like wound pain with fever, wound swelling, discharge etc. In all cases, the stitches were removed in between 7-10 days. Every time when the patient comes for follow up, they were asked about any compliant and start of routine work. The condition of wound and scar was noted and examination of abdomen was done.

Analysis was done to determine diagnostic accuracy of 3 group's analysis was computer based using EIP-Info-6.

Results

There were one hundred & fifty patients of appendicectomies. Male to female ratio was 1.7:1. The age distribution showed **(Table -1).**

Histopathological and microbiological study showed that of 150 cases of pain right iliac fossa, 111 patients had acute appendicitis.**(Table-2).**

91 (60.6%) patients presented with simple acute appendicitis; 20 (13.3%) patients had complicated appendicitis i.e. gangrenous appendix 11 (7.3%) and per forated appendix 9 (6%). 39 (26%) patients were found to have normal appendix.

The distribution of the symptoms showed in **(Table-3).** The distribution of signs in 111 patients showed that tenderness at McBurney's point was present in 111 (100%) patients. Cough sign was present in 95 (85.5%) and absent in 16 (14.4). Pain at percussion in right iliac fosa was present in 92 (82.8%) patients and absent in 19 (17.1%). Rebound tenderness was present in 88 (79.2%) patients and absent in 23 (20.7%) patients. Cope's psoas test was positive in 62 (55.8%) and negative in 49 (44.1%) patients. Involuntary guarding in right iliac fossa was present in 59 (53.1%) and absent in 52 (46.8%) patients. Rovsing sign was present in 59 (53.1%) and absent in 52 (46.8%) patients. Cope's obturator test was positive in 51 (45.9%) and negative in 60 (54.05%).

The investigations done to help diagnosis were; total leucocyte count and complete urine examination in 100 patients out of 150 patients with pain right iliac fossa, 50 patients were subjected to only clinical examination. Plain x-ray abdomen & ultrasonography of abdomen wad done in 50 patients out of 150 pts. Regarding routine investigations total leucocyte count ranged from 5600/cumm to 20,800/cumm (mean-9604/Cumm) in 64 (64%) patients with acute appendicitis and 36 (36%) patients without acute appendicitis. In male patients total leucocyte count ranged from 6,800-20,800/cumm (mean 9636/cumm) in 42 (42%) patients with acute appendicitis and in 20 (20%) without acute appendicitis. In female patients total leucocyte count ranged from 5600-14500/cumm (mean 9572/cumm) in 22 (22%) patients with acute appendicitis and in 16 (16%) patients without appendicitis.

The results of urine examination showed that pus cells in the range of (4-30) were present in 16 (16%) patients with acute appendicitis and 55 (55%) patients without appendicitis. Red blood cells in the range of (1-20) were found in 5 (5%) patients with appendicitis and 2 (2%) patients without appendicitis. Urine was normal (with pus cells 0-3) in 55 (55%) patients with appendicitis and 17 (17%) patients without appendicitis. Regarding radiology the results of plain x-ray abdomen showed that calcified faecolith were visualized in 4 (8%) patients with acute appendicitis and 1 (2%) patient with normal appendix, isolated dilated loops of small intestine in right lower quadrant were observed in 20 (40%) patients with acute appendicitis and 2 (4%) patients with normal appendix. The result of ultrasonography of right lower quadrant of abdomen showed that enlarged thick walled appendix was seen in 35 (70%) patients with acute appendicitis. Appendicolith was detected in 4 (8%) patients with acute appendicitis & 1 (2%) patients with normal appendix. Diagnosis was

uncertain in 5 (10%) patients with acute appendicitis & 6 (12%) patients with normal appendix. The different positions of the appendices were also studied. In 114 (76%) patients it was retrocaeal. In 22 (14.6%) patients it was pelvic, 4 (2.6%) patients had paracaecal appendicis. Post-ileal appendices were found in 5 (3.3%) patients. 3 (2%) of the patients had pre-ileal appendices and only 2 (1.3%) had subcaecal appendix.

Based on histological examination of the removed appendices, 111 out of 150 patients had acute appendicitis showing a diagnostic accuracy of 74%. 91 Pt. (60.6%) had simple acute appendicitis, 11 pts (7.3%) had gangreuous appendix and 9 pts (6%) had perforated appendix. Organisms isolated by culture and sensitivity are shown in **(Table 4).**

Clinical findings were correlated with histological outcome and termed as true and false positives and negatives in 150 patients. Likewise elevated white blood cell (>11,000 cells/cumm), urine examination showing pus cells 3 or less than 3 and absence of red blood cell was considered having appendicitis and compared with histological finding in 100 patients. The findings of plain x-ray abdomen and ultrasonology of abdomen was correlated with operative and histological finding in 50 patients. These results were expressed in terms of sensitivity, specificity, positive predictive value, negative predictive value and accuracy. The diagnostic accuracies were not significantly different between group-A and group-B and so were between group B and C, but the diagnostic accuracy was significantly higher in-group C than in-group A. Ten (6.6%) patients developed wound infection during first week postoperatively. The type of wound infection was superficial which settled in 7-10 days time by antiseptic dressings. Twelve (8%) patients had

Table-1:SAge distribution of male an female patients with pain right iliac fossa.

Age/Years	Male		Female			
	No	%	No	%	No	Total
11-20 Years	34	23	28	18.7	62	41.7
21-30 Years	35	23.7	25	16	16	40
31-40 Years	13	09	05	03	18	12
41-50 Years	03	1.6	04	2.7	2.7	4.6
50 above	03	02	0	0	0	02
Total	89	59.0	61	40.7	150	100

Table-2: Age distribution among males and females with acute appendicitis (n=111).

Age/Years	Male		Female			
	No	%	No	%	No	Total
11-20 Years	25	22.6	17	15.8	42	37.8
21-30 Years	29	26.2	17	14.9	46	41.4
31-40 Years	12	10.8	04	3.6	16	14.4
41-50 Years	02	1.8	03	2.5	05	4.5
50 above	02	1.8	0	-	02	1.8
Total	70	63.06	41	36.9	111	100

Table-3: Distribution of patients according to symptoms (n=111).

Symptoms	No	%	Symptoms	No	%
Pain in right iliacfossa	111	100	Vomitting	69	62.1
Anorexia	100	90.5	Shifting of pain	64	57.6
Nausea	91	81.9	Diarrhoea	08	7.2
Fever	84	75.6	Constipatin	07	6.3

paralytic ileus, which recovered itself after 72 hours of operation. Five (3.3%0 patients developed haemotama, which were evacuated, and primary suture applied. Five (3.3%) patients suffered chest infection; they were treated by changing appropriate antibiotics, tincture benzoin inhalation and chest physiotherapy.

Table-4: Bacteriology of acute appendicitis (n=111).

Organisms Isolated	No of case	%Age
Pain in right iliacfossa	111	53.3
Anorexia	100	29.3
Nausea	91	19.3
Fever	84	75.6
Vomitting	69	4.6
Shifting of pain	64	2.6
Diarrhoea	08	3.3
Constipatin	07	0.3
Constipatin	07	0.6
Organisms isolated	No of case	0.6
Anaerobes		
Bacteriodes fragilis	68	45.3
Clostridium species	54	36
Peptostre ptococcus species	28	
Fusobacterium species	42	26
Actinomyces species	24	16
No growth	39	26

Discussion

Acute appendicitis is one of the most common surgical emergencies in Pakistan (Rathore, 1995) although the exact prevalence is not available (Mufti et al, 1996). The second most common cause of admission is appendicitis (14.9%) with 25% of these appendicectomies proving to have a hitologically normal appendix. (The first being non-specific abdominal pain) (Hawthorn, 1991). Unnecessary appendicectomies waste resources and are a source of morbidity (Hawthorn, 1991). Perforation, causing either localized or generalized peritonitis, is a serious complication of appendicitis and occurs due to delay in the diagnosis or surgical treatment. It leads to postoperative complications like wound sepsis, septicemia and intra-abdominal abscesses with prolonged recovery period (Ghumro et al, 1996)

The evaluation and treatment of acute appendicitis remain essentially unchanged for the majority of individuals who present with this disease. Although laboratory analysis as well as imaging via ultrasonography and CT may help but nothing can replace careful evaluation by an experienced surgeon. Appendicitis remains a diagnosis based primarily on history and physical examination with further studies being useful adjuvents in atypical cases.

In this study, reliability of the clinical feature (including history and physical examination) of acute appendicitis was assessed. The final diagnosis of the acute appendicitis was made on the basis of histopathological findings. One of the histological criteria for diagnosis of acute appendicitis is polymorphonuclear leucocyte infiltration of the muscularis of the appendix. Up to 30% of appendices removed after a clinical diagnosis of acute appendicitis may be normal on pathological examination. On the other hand, such rare diseases as primary appendiceal adenoca- rcinoma have been diagnosed on such specimens (Ojo et al, 1991).

The data from this study will serve as a guide to the usual bacteriology of acute appendicitis. It is generally accepted that antimicrobial coverage should be directed only towards the most prevalent aerobes and/or anaerobes.

The Therapeutic failures despite what is believed to be adequate antibiotic coverage may be explained by less frequently encountered organisms that are very resistant (e.g. biolophilia). However, the initial antimicrobial therapy must be empiric (Bennion, 1990).

Overall diagnostic accuracy of appendicectomy due to suspected appendicitis in this study was 74%. This figure was within the wide range for diagnostic accuracies cited by other authors, 70.3% by Jess et al 1981, 81% by Lee & Teoh 1990, 92.8% by Amir & Shami 1992, 91.5% by Ghumro et al 1996.

A diagnostic accuracy of 50 to 80 percent would probably be desirable if one weight the risks of negative appendicectomy against the hazards of a perforated appendix (Jess et al, 1981). The proportion of normal (26%) simple inflamed (60.6%) and complicated, (perforated & gangerous) appendices (13.3%) encountered in this study was similar to that reported by some other authors 29.7%, 58.5% & 11.4% in (Jess et al, 1981) and 19%, 63.4% & 18% (Lee and Teoh, 1990), but different than the local series 7.21% & 79.5% in Amir and Shami 1992, 8.5%, 47.3% & 44.2% in Ghumro et al 1996. This difference was probably due not only to various attitudes toward the proper time of surgical intervention but also to variation in the organization and function of medical service in various centers.

Our findings confirm the difficulties involved in

making the correct diagnosis in females, who had diagnostic accuracy of 66.4% while males had 78.7%. This data was comparable with data from other series. The diagnostic accuracies for males was 75% and for females was 65% in (Jess et al 1981) study, 86.1% and 72.4% respectively in Lee and Teoh 1990 study, 92.8% and 82.9% respectively in Ghumro et al 1996 study.

In our study anorexia was a common symptom in 90% patients of appendicitis. This symptom was present among 80% cases of Nauta and Maagnant (1986) and 78% of Rasmussen and Hoffman (1991). Vomiting was present in 62.4% of our cases, 53% in Nauta and Magnant 1986, 69% in Rasmussen and Hoffman 1991. Fever was present in 76% of our cases, 81% in Lee & Teoh 1990. The measurement of body temperature is of very little value. Diarrhoea was found in 6.8% of our cases, (11% in Rasmussen and Hoffman 1991). Constipation was found in 6.3% of our cases of appendicitis (4-18%) in Rasamussan and Hoffman 1991). Shifting of pain from central abdomen was present in 57.3% of our cases, Initial central abdominal pain is found in 63% cases of appendicitis (Nauta and Magnant 1986) to 74% cases (Rasamussan and Hoffman 1991). Tenderness in the right iliac fossa or together with tenderness in other parts of abdomen is the most sensitive sign in appendicitis. It is found in 96-100% cases of the appendicitis (Rasamussan and Hoffman 1991). In our study it was present in 100% cases. Guarding or involuntary rigidity is one of the more valuable signs and is present in 80% cases of appendicitis (Lee an Teoh 1990). In our study it was found in only 53.1% of cases of acute appendicitis. Rebound tenderness is of questionable value in acute appendicitis. It is found in 70% cases of acute appendicitis of Rasamussan and Hoffman 1991. Nauta and Magnant 1986 found this sign in 86% cases. But in our study, it was seen among 79.2% cases of acute appendicitis. Rovsing sign is found in 25% of es of appendicitis (Rasamussan and Hoffman 1991). In this study we could elicit this sign in 53.1% of the cases of acute appendicitis. The Psoas sign is positive in 35% of cases of appendicitis (Rasamussan and Hoffman 1991). In our study, it was present in 55.8% of the cases of appendicitis. Percussion tenderness was less sensitive (Sensitivity 0.57) but more specific (specificity 0.86). In this study purcusion tenderness was in present 82.8% of cases of Acute Appendicitis. Group-A patients (50) were operated upon with the suspicion of acute appendicitis on the basis of clinical evaluation. The overall sensitivity, specificity and accuracy of the clinical diagnosis of appendicitis were 94.2%, 22.6% and 72% respectively. Positive predictive value (PPV) 73; Negative predictive value (NPV) 63.6%. Those in mufti et al 1996 study were 84.3%. 23.7% and 54% (PPV 59%, NPV 31%). The white blood count is highly sensitive test for acute appendicitis. In our study, the results of white blood count gave a sensitivity of 90.4% and a specificity of 53.8% for acute appendicitis. The predictive value for appendicitis was 80.3% for a positive result and 72.9% for a negative result and accuracy was 78.5%. The sensitivity, specificity and accuracy were 92%, 70% and 77% respectively in Harland 1991 study, (PPV 91%, NPV 73%); 71%, 59% and 65% respectively in Davis et al 1991 study with (PPV, 65%, NPV, 65%).

In this study, pus cells (range4-30) were present in 16% of the patients with appendicitis and 5.5% of the patients without appendicitis. Pus cells (range 0-3) were present in 5% of the patients with appendicitis and 17.5% of patients without appendicitis. Red blood cells (range 1-20) were seen in 5% of the patients with appendicitis and 2% without appendicitis. These results of urinalysis gave a sensitivity of 76.5% and specificity of 27.5% for acute appendicitis. The positive predictive value was 75.5%, negative predictive value was 28.6% and accuracy 64%. The Group-B included 50 patients. Who were operated on the suspicion of acute appendicitis based on clinical examination and limited laboratory investigations? The combined approach of clinical evaluation and routine laboratory investigations of total leucocyte count and urinalysis showed. Sensitivity, 95.7%; specificity, 48.4% positive predictive value 80.5% negative predictive value, 83.3% and accuracy 81%. The sensitivity, specificity and accuracy were 80%, 81% and 80.7% respectively in Ramirez and Deus 1994 study. In our study, plain x-ray abdomen was done in 50 cases of group C patients. Isolated dilated loops in right lower quadrant were seen in 20 (40%) patients with acute appendicitis and 2 (4%) patients with normal appendix. Calcified faecolith was seen in 4 (8%) patients with appendicitis and 1 (2%) patient with normal appendix. Sensitivity and specificity of plan x-ray abdomen for acute appendicitis were 61.3% and 80% respectively. Positive predictive value was 92.5% negative predictive value 34% and accuracy 65%. The last 50 cases (Group-C) of suspected appendicitis were also subjected to ultrasound of abdomen. Clinical and ultasonographic findings were correlated with

pathological outcome. Enlarged thick walled appendix was found 35 (70%) patients with appendicitis; appendicolith was noted in 4 (8%) patients with appendicitis and 1 (2%) patient with normal appendix. The sensitivity, specificity and accuracy of ultrasonology for appendicitis were 89.8%, 91.5% and 90% respectively (positive predictive value 98.7% negative predictive value 55%). The sensitivity, specificity and accuracy were 81.8%, 88.2% and 60% in Mufti et al 1996 study.

The comparison between three groups of patients (Group-A, Group-B and Group-C) was done in terms of sensitivity, specificity, accuracy, positive predictive value and negative predictive value. Sensitivity was high (94.2%) in group A, but only insignificantly higher in group B (95.7%) and group C (99.6%). Specificity was very low in group A (22.6%), better in group B (49.4%) and higher in group C (76.9%). But still the low specificity in all three groups suggested that those investigations of total leucocyte count, urine examination, plain x-ray and ultrasonography of abdomen did not contribute in the management of patients with equivocal clinical findings. Positive predictive value for group A patients was 73%. There was an improvement of 7.5% on positive predictive value (80.5%) in group B and 23.5% on positive predictive value (96.51%) in group C. Negative predictive value for group A was 63.61% which is low and fairly high in group B (83.3%) and group C (76.9%). The accuracy was 72% for group A and higher in group B (81%) and group C (94%). Overall accuracy of diagnosis in group C in comparison with group patients with normal appendices 39 (26%) grew bacteria. Our finding of E coli (53.3%) as the most frequently encountered aerobic organism agreed with previous reports in patients with appendicitis (61.5% in Bennion et al 1990, 76% in Pearl et al 1995; 57.1% in Berne et al 1987), but Rasool et al 1992 study differed as far as aerobic bacteriological profile was concerned; Klebsiella (25%) was commonest organism followed by E Coli (18.2%).

Bacteroides fragile was the most common anaerobic organism (45.6%) in our study. It was also the most common organism in Berne et al 1987 study (39.3%), higher in Bennion et al 1990 study (73.3%) and lower in Bennion and Thompson 1987 study (32.3%) and Pearl et al 1995 study (24%).

In this prospective study of 150 patients, we had a diagnostic accuracy of 74% and perforation rate of 6%, which was only comparable with Malik et al 1993 study (4.3% perforation rate and diagnostic accuracy of 87%). With the highest incidency of diagnostic accuracy 91.7% (Bennion and Thompson 1987), there was highest rate of perforation (39%) also. With low diagnostic accuracy 70% (Jess et al 1981), there was low perforation rate 16%. It means improving diagnostic accuracy led to an increase in the perforation rate (Lee and Teoh 1990).

Conclusion

There have been revolutionary improvements in the diagnostic modalities to investigate cases of acute abdomen besides the traditional tools of total leucocyte count, urine analysis and abdominal radiographs. Investigations such as ultrasonology, barium contrast studies, laparoscopy, CT scan, diagnostic peritoneal lavage, C-reactive protein, radio-isotope imaging and thermography have all been mentioned with favourable results. But none had shown 100% sensitivity or specificity. All these are costly investigations and usually not readily available in most of our institutions. The clinical diagnosis of acute appendicitis was supported by laboratory tests of total leucocyte count and urinalysis but the tests were less specific. The plain abdominal x-ray was less helpful because of low sensitivity and accuracy. The ultrasonographic evaluation of patients with suspected acute appendicitis was highly reliable and was considered to be of great assistance in surgical practice. Therefore, till the easy availability of ultrasonographic examination, in the Emergency Department appendicitis above all remains a clinical diagnosis. From our results, we suggest that if the surgeon is clinically certain of the diagnosis in a male then he is justified in performing an appendicectomy. In a female he or she is advised to re-examine the evidence. In conclusion, it can be stated that although negative finding on laparotomy in patients with suspected acute appendicitis is not without risks, the hazards of a perforated appendix are much more serious. Therefore, one should not hesitate to operate, especially in elderly patients who have a very high

frequency of perforated appendicitis, if a detailed history of a patient as well as careful examination and observation indicate acute appendicitis.

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