

ORIGINAL

Acute Appendicitis

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ABSTRACT

IN a prospective study of 132 patients with operative and histological proof of acute appendicitis, details of clinical features, and many laboratory and radiological investigations were made. The disease was found to be predominant among males in their twenties, who usually presented with central abdominal pain which then referred to the right iliac fossa. Only half of the patients had fever and tachycardia and the minority were constipated, while the abdominal findings were remarkable. Rectal examination was informative in more than half of the cases, and leucocytosis was present in 72.7% of the patients. Positive radiological findings directly related to acute appendicitis were detected in 55% of the cases. Drainage of the operative field even in gross soiling was not necessary, and antibiotics were only used in 36% of the patients. There was no mortality, but postoperative complications occurred in 22 patients (16.6%). Wound sepsis, which occurred in 20 cases (15%), had a significant relationship to the pathological status of the appendix. Those who had gangrenous-perforated appendix had about a 7 times greater chance of developing wound infection than others.

Acute appendicitis is a common disease (Ross, et. al., 1962). It is still a condition which may prove fatal in spite of modern aids to diagnosis and the use of

antibiotics, (Howie, 1966). Clinical experience and acumen are of real value to any surgeon, and although we learn from the experience of others we also learn from our own clinical material. In common with their medical and surgical colleagues, the authors have, on occasion, failed to make an early diagnosis in obscure cases of appendicitis in which there have been puzzling symptoms and few or anomalous signs. The objectives of this study are :—

to obtain general information about the disease and its' incidence in Kuwait

to identify the role of radiology in diagnosis

to establish the indications and uses of antibiotics

to attempt to develop a universal plan for the surgical unit in treating the condition.

METHOD

From September 1981 and over one year, 132 patients with operative and histological confirmation of acute appendicitis were treated in one surgical unit — at Al Sabah Hospital, and were studied. They constituted 100 males (75.8%) and 32 females (24.2%), making a male: female ratio of 3 : 1. Their age ranged from 13 - 75 years, with a mean age of 21 years. Some other patients in whom wrong diagnosis of acute appendicitis was made and who were operated upon, were excluded from the study.

General information regarding age, sex and nationality of each patient was noted. The presenting clinical features and physical examination findings were recorded. All cases had their blood and serum tested for haemoglobin level, leucocytes count and differential, serum electrolytes, urea and sugar. Routine urine examination and chest X-ray were also performed. All patients had a plain abdominal film in the erect and supine positions and the following findings were especially looked for :—

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1. Presence of sentinel loop
2. Appendicular calculus
3. Soft tissue mass in the right iliac fossa
4. Obliteration of the right sacroiliac joint
5. Obliteration of the right psoas major muscle
6. Lumbar scoliosis as a result of irritation to the psoas major muscle
7. Elevated right hemidiaphragm, in subphrenic abscess
8. Gas under right hemidiaphragm
9. Distended small bowel loops in partial obstruction.

Notes about the types of the surgical wound, operative findings, procedure undertaken, type of fluid present, results of its' culture, the duration of patient stay in the hospital, the histology result of the removed specimens and the status of the surgeon were all recorded.

Antibiotics were used preoperatively, peroperative, or postoperatively according to the following system : —

1. Preoperative antibiotics were given when the patient —
 - a. Looked toxic
 - b. Had features of perforation, i.e. local or generalised peritonitis
 - c. Was known to be diabetic
 - d. Had diseases or conditions lowering his resistance.
2. During the operation cleaning the operative field with saline swabs or irrigation with normal saline was a routine measure. However, this was followed by saline-antibiotic irrigation (Gentamycin or Tetracycline) whenever gross soiling or frank pus and necrotic debris were present. In this situation if antibiotics were not already being given preoperatively they would usually be started at this time. Drainage of the operative field was only used in 4 cases.
3. Postoperative antibiotics were used —
 - a. As a continuation to preoperative or peroperative application.
 - b. In severe wound infection with cellulitis and constitutional symptoms not responding to thorough wound drainage and cleaning.
 - c. In postoperative intraperitoneal abscesses or collection, possibly as a preliminary measure to open drainage.
 - d. To combat other complications and cover associated conditions, for example, in severe chest infection.

The antibiotics preferred were Metronidazole (Flagyl) and Gentamycin. However in some of the

cases, Keflin or Sisomycin were used instead of Gentamycin when the latter was not available. Depending on the general condition of the patient and his recovery, these antibiotics were used as briefly as possible, as a maximum for up to 5 days in some of the cases.

RESULT

Males were 3 times more affected by the disease than females. The incidence of the disease was highest (37.1%) among those patients with an age range from 20 — 30 years, and the least incidence was among those between 50 — 60 years and over 60 years (1.5% and 0.8% respectively). Egyptians, Jordanian-Palestinians and Kuwaitis were the most common nationalities affected (23.5%, 19.7% and 18.2% respectively). Iranians, Syrians, Pakistanis, Iraqis and Indians came next in order. Many other nationalities constituted the remaining patients.

During this year of study, an average 2 — 3 patients were admitted in each emergency day. Acute appendicitis cases constituted 70% of total emergency operations (excluding abscesses), and 26% of total admissions to the surgical unit in that year.

The classical central abdominal pain referring to the right iliac fossa was present in 75% of the patients, while in the other 25% of cases it was at the right iliac fossa from the beginning. Nausea with or without vomiting was present in 78% and absent in the other 22% of patients. The pain preceded the nausea and vomiting in 73.5% of patients. Regarding the bowel habits, 71.2% of cases had normal movement, 25.8% were constipated, and in 3% diarrhoea was present.

Table 1 shows the incidence of the different signs detected. Leucocytosis was present in 72.7% of the cases, and abnormal findings in the routine urine examination were found in 56.4% of the patients.

TABLE 1
Different Physical Signs

Fever	47%
Tachycardia	50%
Tenderness at R.I.F.	99%
Rebound tenderness	88%
Muscle rigidity	95%
Rovsing's sign (+)	65%
Rectal examination (+)	56%

Table 2 shows the various findings of the plain abdominal films, in which positive signs were detected in 55% of the cases. Table 3 shows the types of operative incisions chosen, and in Table 4 the site of the appendix as found at operation is verified. Free peritoneal fluid whether clear, turbid or purulent was encountered in 61% of the cases, and in only 19% of them the culture was positive. *E. coli*, *Klebsiella*, Non haemolytic streptococcus, *Proteus*, and *Bacteroides* were the organisms isolated.

In 64% of the patients the criteria for the use of antibiotics mentioned before were not fulfilled and therefore no antibiotics were given. However, as stated previously antibiotics might be continued postoperatively from a pre or peroperative start and therefore an overlap might occur. Preoperatively these were given to 23% of the cases, used in 17% postoperatively, and in 33% postoperatively.

There was no mortality; however postoperative complications did occur in 22 patients (16.6%). Twenty cases (15%) had wound infection, one developed local intraperitoneal abscess at the operative field, and in another one pelvic peritonitis developed. The organisms subsequently isolated were *E. coli*, *Klebsiella*, *Streptococcus faecalis*, *Staph. Aureus*, *Pseudomonas*, *Proteus*, *Acinobactor*, α Haemolytic *Streptococcus*, β -Haemolytic *Streptococcus*, and *Bacteroides*, in that order. Those who developed wound infection all had adequate wound drainage and frequent dressings. Recovery was excellent after 4 - 9 days at which time secondary suture was accomplished. Antibiotics were necessary in only 3 patients of this group. The other 2 cases with intraperitoneal abscess and pelvic peritonitis, were both treated aggressively with antibiotics. In both instances the condition settled after 4 and 6 days respectively, and therefore no open drainage was necessary.

Average stay of patients in the hospital was from 3 to 25 days, a mean of 5 days in uncomplicated cases, and 14 days in patients who developed complications.

The operation was performed by Registrars in 48% of the cases, Assistant Registrars in 36%, trainee doctors in 12% and in another 4% of patients the procedure was done by Senior Registrars.

On histological examination all specimens were reported to have some degree and form of acute inflammation. However for special interest, acute bilharzial appendicitis was seen in 10 cases (7.6%), one also had *Entrobilus Vermicularis* worms, and in another one (0.8%) carcinoid tumour was detected.

DISCUSSION

Our findings about the prevalence of the disease among males and patients in their twenties, is in accordance with the nature of the disease (Barnes et al., 1962, Lichtner et al., 1971). Although we found Egyptians, Jordanian-Palestinians and Kuwaitis were the most commonly affected, the difference in the incidence was not significant from other nationalities when the total hospital admissions and total number of inhabitants of the different nationalities living in Kuwait were taken into consideration. We studied the monthly patients admissions during the year of study; however, no significant difference in the incidence of the disease during certain months was noted. This could be true, or the results might be different if a longer time of study, or all patients admitted to all surgical units were included.

The variations in clinical presentation from the classical features of acute appendicitis were clearly noticed in this study. This is certainly dependent on both the pathology of the attack and the anatomical position of the organ (Gillespie et al., 1977). Contrary to the general belief that constipation usually accompanies an attack of acute appendicitis and is associated with a frustrating downward urge to defecate (Shackelford et al., 1982), only 25.8% of our patients were constipated. Fever (over 37.5°C) was recorded in less than half of our cases (47%), while the local abdominal findings were remarkable (Table I).

Laboratory investigations seem to be universally done to all patients everywhere. Apart from their value in assessing the general condition of the patient, their interpretation as an aid to diagnosis should be carefully correlated with the clinical findings. Although it was reported (Sasso et al., 1979), that leucocytosis (over 10,000) might present in 90% of the patients, a considerable overlap is possible, and therefore the presence of leucocytosis in 72.7%, and neutrophilia in 70% of our patients can be regarded as acceptable. The presence of significant abnormalities (RBCs, WBCs, Crystals, and deposits) in routine urine examination of 56.4% of our cases is remarkable. The possible explanation is the high incidence of urological problems in this community, and may not be directly related to the appendicitis itself. The performing of routine plain abdominal films (erect and supine) is usually to exclude other abdominal conditions from which appendicitis must be differentiated. However as mentioned before, we paid more attention to the possible radiological changes directly related to the disease, and their usefulness in the diagnosis. And although we detected

positive signs in 55% of our patients (Table 2), in the majority of them, the clinical diagnosis was already convincing enough to warrant emergency surgical intervention.

TABLE 2
Positive Radiological Findings
(Overlap in some of the patients was present)

Sentinel loop	64 (48%)
Scoliosis	14 (11%)
Distended S. bowel loops	12 (9%)
Oblit. of Rt. psoas muscle	9 (7%)
Gas under the diaphragm	1 (0.8%)
Appendicular calculus	1 (0.8%)
Total	101 (76.6%)

Generally positive findings detected in 55% of patients

Accidental Findings

Bilh. bladder calcification	3 (2.3%)
Lower end ureteric stone	1 (0.8%)
Asymptomatic congenital diaph. hernia	1 (0.8%)

As noted earlier, the grid iron incision is the one most preferred (88%) in this series. However the approach is left to the surgeon's preference and we have nothing against other exposures, but we believe as others (Stewart, 1980), that in a situation like peritonitis whether localized or generalised, or whenever there is doubt in diagnosis, a more generous exposure is mandatory.

TABLE 3
Operative Incisions

Grid iron (7 needed muscle cutting)	116 (88%)
Lower midline	8 (6%)
Lanz	6 (4.5%)
Rt. lower paramedian	1 (0.8%)
Low crease	1 (0.8%)

Perhaps a difficult and more important task in this study, was the examination of the use of antibiotics and their implication, since we were aware of many randomised and double blind studies (Forgan, 1975,

TABLE 4
Sites of Appendix

Retrocaecal	69 (52%)
Postileal	31 (24%)
Pelvic	12 (9%)
Preileal	12 (9%)
Subcaecal	8 (6%)

Everson et al., 1977, Griffiths et al., 1976, Richards et al., 1981) devoted to such emergency abdominal operations, and since we were dealing with inflamed organs of differing pathological varieties in which antibiotic cover in many patients could be mandatory. Because also, one of our aims from this study was to try to establish a universal unit approach to this condition, we therefore preferred to classify our patients according to their risk of developing postoperative infection, and so arranged the plans mentioned before. The extensive survey of Cruse and Foord (1973) has demonstrated that a major cause of wound sepsis in abdominal surgery is bacteriological contamination of the wound at the time of operation. Taking these points into consideration, and due to the fact that the usual causative organisms are the gram negatives and anaerobes, we therefore selected the combination of Metronidazole (Flagyl) and Gentamycin. By so doing we succeeded in using antibiotics for only 36% of our patients, while in the other 64% of cases these agents were not necessary — an approach which we believe is remarkable. A wound infection rate of 15% is regarded as acceptable (Richards et al., 1981); however, we were also interested in identifying the possible factors which help in developing this wound sepsis, and therefore we studied these cases in detail. No significant factor regarding antibiotic usage, procedure adopted, the dealing with the appendix stump, non drainage of the operative field, the status of the surgeon or others were noted. What was significant was the pathological status of the appendix. Of the total 132 patients studied, 108 of them had appendices not perforated, and 8 of these developed wound infection. In the other 24 cases the appendices were gangrenous and perforated, and 12 of them developed wound infection despite good cleaning measures and intensive use of antibiotics — a finding which was in agreement with others (Richards et al., 1981, Gilmore et al., 1974). The presence of bilharzial appendicitis in 10 (7.6%) of our patients is not uncommon, particularly as the disease is a common one in many nationalities living in this country.

CONCLUSION

We therefore conclude that the disease is common in Kuwait, affecting males mainly in their twenties. No significant difference in the incidence of the disease between the different nationalities was noted. Although plain abdominal films were positive in 55% of the patients, they actually did not change the clinical impression about the diagnosis; however they remain both interesting and beneficial. While routine culture of any free fluid present in the peritoneal cavity is essential, drainage of the operative field is not necessary and should not be adopted routinely. Many patients can easily be saved from the use of antibiotics, since the pathological state of the appendix and the degree of peritoneal soiling are the important factors in the development of wound sepsis. We believe that planned management applied by the unit team to these patients is mandatory.

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