

Acute Appendicitis: Clinico Pathology and Management

Arunkumar*, Mohd. Zaheeruddin Ather*

*Assistant Professor, Department of Surgery, ESIC Medical College, Gulbarga, Karnataka.

Abstract

Introduction: Accuracy rates in diagnosis of appendicitis are variable; the role of blood tests, radiological investigations, laparoscopy and computer analysis has been studied. Even with all investigations, the negative appendectomy rate is 15-30%. **Methodology:** The source of data for this study was patients admitted to various surgical units in Department of Surgery, K.R. Hospital, which is attached to Mysore Medical College and Research institute. A period of four months has been given for follow up period to study the outcome of Surgery. These patients were diagnosed to have acute appendicitis and were operated on the same day. During the study period, 100 cases with provisional diagnosis of acute appendicitis which were posted for surgery were selected using randomization. **Results:** In this study, all 100 patients underwent emergency open appendectomy. **Conclusion:** Negative appendectomy rate can be decreased if appendectomy is avoided in patients where WBC count, neutrophil count and abdominal graded compression USG is normal.

Keywords: Appendicitis; Appendicectomy; Pathology.

Introduction

Acute appendicitis is the most common general surgical emergency and early surgical intervention improves outcomes [1].

Perhaps the most common surgically correctable cause of abdominal pain, the diagnosis of acute

appendicitis remains difficult in many instances. Some of the signs and symptoms can be subtle to both clinician and the patient and may not be present in all instances. Arriving at the correct diagnosis is essential, however, as a delay in diagnosis may allow progression to perforation and significantly increased morbidity and mortality. Incorrectly diagnosing a patient with appendicitis, although not catastrophic, often subjects the patient to an unnecessary operation [2].

Nevertheless, unnecessary appendicectomy is not altogether without problems. There will be a small incidence of wound sepsis and subsequent adhesive intestinal obstruction and incisional hernia. More important is the situation where the operation fails to relieve the patient's symptoms and so has wasted everyone's time and, in addition caused him (or more her) inconvenience and suffering without therapeutic gain [3].

In a lifetime, 8.6% of male and 6.7% of females can be expected to develop acute appendicitis. Young age is a risk factor, as nearly as 70% of patients with acute appendicitis are less than 30 years of age. Acute appendicitis in the elderly progress to perforation more them 50% of the time [4].

It used to be taught that the unnecessary appendicectomy rate should be around 20% in order to reduce the chance of missing a possible inflamed appendix. Since the mid 1980s this has no longer held true and with the incorporation of adjuvant techniques to improve diagnosis and decision making, the error rate has been significantly reduced [5].

The total leukocyte count (WBC) is widely used for the diagnosis of acute appendicitis, although this is controversial. Of patients with acute appendicitis 79.90% have raised WBC count ($>10,000/\text{mm}^3$), Neutrophils of $>75\%$ is observed in 78% of patients. Total white cell count found to be higher among patients with complicated appendicitis than those with simple appendicitis [6].

Corresponding Author: Dr. Arunkumar, Assistant Professor, Department of Surgery, ESIC Medical College, Gulbarga- 585105, Karnataka.
E-mail: drarunuttam@yahoo.com

Accuracy rates in diagnosis of appendicitis are variable; the role of blood tests, radiological investigations, laparoscopy and computer analysis has been studied. Even with all investigations, the negative appendectomy rate is 15-30% (more in females and in extremes of age) [7].

Appendectomy is the most frequently performed surgical procedure, thus correct diagnosis is critical to reduce negative appendectomies, operative complications and to reduce morbidity and mortality due to undiagnosed appendicitis. Death is uncommon after appendectomy for non-perforated appendicitis, but the mortality rate is about 8% after perforation, emphasizing the importance of making early diagnosis [8].

In three studies involving 862 patients, ultrasound was accurate in diagnosing acute appendicitis in 94% to 96% of patients. The classic bull's eye or target appearance of appendix on ultrasound has a diagnostic accuracy rate of 95% which represents a significant improvement over the 75% accuracy rate achieved with symptoms, physical examination and laboratory testing alone [9].

Appendectomy is the most frequently performed surgical procedure, thus correct diagnosis are critical to reduce negative appendectomies, operative complications and to reduce morbidity and mortality due to undiagnosed acute appendicitis. It is with this idea that we have planned a prospective study "clinico-pathological study of acute appendicitis and its management.

Methodology

The source of data for this study was patients admitted to various surgical units in Department of Surgery, K.R. Hospital, which is attached to Mysore Medical College and Research institute. A period of four months has been given for follow up period to study the outcome of Surgery. These patients were diagnosed to have acute appendicitis and were operated on the same day.

During the study period, 100 cases with provisional diagnosis of acute appendicitis which were posted for surgery were selected using randomization. Patients were methodically enquired according to the proforma approved by the guide. A detailed history as to the method of presentation, thorough clinical examination and all patients were investigation with routine blood tests, WBC count, DC, USG abdomen and Pelvis, X-ray, blood grouping and Rh typing, and histopathological study of the

appendix were performed and reported by senior pathologist of the department.

Inclusion Criteria

All the patients who were admitted to the K.R. Hospital during the study period with the diagnosis of acute appendicitis and posted for surgery were included in the study.

Diagnosis of acute appendicitis was made on the, history of right lower quadrant pain or periumbilical pain migrating to right lower quadrant, nausea, anorexia and/or vomiting, fever more than 38°C and or leukocytosis above 10,000 cells / cumm, right lower quadrant guarding and tenderness on physical examination.

Exclusion Criteria

1. Patients were excluded if the diagnosis of acute appendicitis was not clinically established.
2. Patient had history of symptoms more than 5 days.
3. Palpable mass in the right lower quadrant, suggesting an appendicitis abscess / mass.
4. Patients with generalized peritonitis due to appendicular perforation.
5. Acute appendicitis in pregnancy.
6. Acute appendicitis in less than 12 year old patients.
7. Inability to give informed consent due to mental disability.

Preoperative investigations were done which include WBC count and USG abdomen and pelvis. WBC count of more than 10,000 cells/mm³ was considered positive and neutrophil cont of more than 75% was considered positive.

USG features of acute appendicitis are blind-ending tubular structure at the point of tenderness, non-compressible, diameter 7 mm or greater, no peristalsis, appendicoliths, high echogenicity non-compressible surrounding fat and edema of caecal pole considered positive.

Surgery

All operations were done by open method (open appendectomy) under general/spinal/epidural anaesthesia by a consultant senior specialist surgeon. Informed consent was taken in all patients. All surgeries performed in the study were assessed meticulously.

All patients started on one of the antibiotic regimen from the time of diagnosis.

1. Ciprofloxacin 200 mg IV 12th hourly + metromidazole 500 mg IV 8th hourly
2. Cefotaxim 1 gm IV 12th hourly + Metronidazole 500 mg IV 8th hourly

All patients were resuscitated before shifting to operation theatre.

- No urinary catheters were used.
- Nasogastric tube was inserted in patients suspected to have a significant postoperative ileus.

All patients were operated by open appendectomy. A suitable skin incision was made depending on the case and surgeon's choice, most commonly a McBurney muscle-splitting incision about 1.5 inches in the right lower quadrant. The incision is carried down to subcutaneous tissue, exposing the aponeurosis of the external oblique which is divided. Internal oblique and transverse abdominis muscles are separated along the orientation of their muscle fibres. Peritoneum is exposed, grasped with the forceps and opened sharply along the orientation of the incision. The incision is explored with finger in an attempt to locate the appendix. Adhesions divided using blunt dissection under direct vision. If necessary, to improve exposure, the incision extended medially by partially dividing the rectus muscle, or laterally by further dividing the oblique and transverse abdominis muscles. Once the appendix is located, delivered through the incision. Care taken to avoid perforation of the appendix, with spillage of pus or enteric contents into the abdomen. Meso appendix divided between the clamps and tied with 2-0 vicryl or non-absorbable tip to the base. Appendix ligated and divided at base, and its stump inverted with purse-string suture or with Z-suturing with absorbable suture material (2-0 vicryl or 2-0 chromic catgut). Base ligated with non-absorbable suture materials. Distal ileum visualized to detect possible Meckel's diverticulitis. Abdomen closed in layers with absorbable suture (2-0 vicryl or chromic catgut) and skin closed with a subcuticular absorbable suture or with interrupted sutures with non-absorbable suture or with stapler. At the end of the procedures, wound dressing done.

Postoperative Care

Antibiotic regimen continued for 48 hours, strict criteria were followed for the reintroduction of nutrition. Bowel sounds were checked every 12 hours. Once present, the patients were started on a clear

liquids, liquid diet and advanced to regular diet and oral analgesics when the liquid diet was tolerated and flatus passed. Patients were discharged when they tolerated a regular diet and were afebrile for 24 hours, most of the patients were discharged on 3rd or 4th postoperative day.

The management of every patient was individualised, every patient was carefully followed. After stitches or staples removal, patients were followed-up every monthly for four months to see late wound complications like sinus, neuralgia, hernia, etc.

All appendix specimen were sent for histopathological examination. The details of all cases are summarised in a master chart and the result of the study has been analysed.

Results

In this study, 100 patients with a provisional diagnosis of acute appendicitis who underwent emergency appendectomy at K.R. Hospital, which is attached to Mysore Medical College and Research Institute and a period of 4 months has been given for follow-up. In this study, all 100 patients underwent emergency open appendectomy. 94 patients (94%) underwent emergency appendectomy under spinal anaesthesia. 93 patients (93%) underwent emergency appendectomy with right McBurney's grid iron incision.

Various positions were seen after opening the peritoneal cavity of 100 patients. The most common position was retrocaecal position, which was present

Table 1: Anesthesia

Anesthesia	Number of cases	Percentage
Spinal anesthesia (SA)	94	94
General anesthesia (GA)	05	05
Epidural anesthesia (EA)	01	01

Table 2: Incision

Incision Type	Number of cases	Percentage
Mc Burney's grid iron	93	93
Lanz	04	04
Mc Burney's converted to Rutherford Morrison	03	03

Table 3: Position of the appendix

Position	Number of cases	Percentage
Retrocaecal	69	69
Pelvic	23	23
Para Caecal	04	04
Sub caecal	02	02
Pre ileal	01	01
Sub hepatic	01	01
Total	100	100

Table 4: Peroperative finding of appendix

Findings	Number of cases	Percentage
Inflamed	75	75
Perforated	09	09
Gangrenous	03	03
Normal	13	13

Table 5: Postoperative complications

Complications	Number of cases	Percentage
Wound infection	06	06
Stitch abscess	04	04
Paralytic ileus	01	01

in 69 patients (69%) and second common position was pelvic (23%). On peroperative examination, 13 patients had normal appendix (13%). Most common postoperative complication was wound infection, which was present in 6 patients (6%).

Duration of Stay in Hospital

Out of 100 cases, minimum duration of stay was 3 days and maximum duration of stay was 13 days and average mean duration was 3.5 days.

Table 6: Distribution of histopathologically positive and negative cases

	Number of cases	Percentage
HPE positive	84	84
HPE negative	16	16
Total	100	100

Follow up

All patients were followed up for four months from the date of discharge. Out of 100 cases studied, 84% of the cases were histopathologically positive and 16% of cases were histopathologically negative, so the negative appendectomy rate in our study is 16%.

Discussion

Out of 100 patients, 93 patients (93%) underwent appendectomy with McBurney's grid iron incision, McBurney's grid iron muscle splitting incision is well suited for open appendectomy, originally described by Charles McBurney in 1894 [8], still the standard incision for open appendectomy [10].

Position of the Appendix

Wakeley in 1933 studied 10,000 patients for their position of the appendix. A comparison of the various positions of the appendix of the study shown below.

The most common position in this study was retrocaecal, which was present in 69 patients (69%) and second most common position is pelvic which was present in 23%. This is comparable to study done by Wakeley [2,11,12].

Table 7: Position of the Appendix

Position of the appendix	Wakeley series ^{2,11,12}	Presentstudy
Retrocaecal	74%	69%
Pelvic	21%	23%
Paracaecal	2%	4%
Subcaecal	1.5%	2%
Pre ileal	1%	1%
Post ileal	0.5%	-
Subhepatic	-	1%
Splenic	-	-
Total		100%

Peroperative Finding

Perforated appendix was present in 9 patients (9%), compared to 19.2% of Addiss et al [4]. The reason is less number of extreme aged patients, because it is common in extreme ages < 5 years and > 65 years [4].

Histopathologically Positive and Negative Cases

Clinical diagnosis was found to be correct in 84 cases (84%) and negative appendectomy rate was 16% in this study. this is comparable with the study done by Erikson (14%) [10] and Gurleyik (16%)[11,13].

Out of 16 patients who were HPE negative, 10 patients (62.5%) were females and 6 patients (37.5%) were males. It is comparable to study done by Goroos 62% female and 38% male patients had negative appendectomy [14].

Conclusion

Most common postoperative complication was wound infection, followed by stitch abscess and paralytic ileus

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