IOSR Journal of Dental and Medical Sciences (IOSR-JDMS)
e-ISSN: 2279-0853, p-ISSN: 2279-0861.Volume 15, Issue 7 Ver. I (July 2016), PP 36-42
www.iosrjournals.org

Acute Appendicitis: A Comparative Study of Clinical, Radiological And Operative Findings

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Dr. Sudershan Kapoor[1], Dr. Punit Kumar[2] Dr. Ashish Kumar Sharma [3]
Professor,Resident, ,Resident Department Of Surgery Govt. Medical College, Amritsar (Punjab).

Abstract: *Vermiform appendix, a narrow worm shaped tube, which springs from the posteromedial wall of caecum, although being vestigial, is a favourite site of various disease processes. . Acute appendicitis is the most common cause of an ''acute abdomen ''in young adults and thus appendicectomy is the most frequently performed urgent abdominal operation.[1] Various diagnostic modalities are used to diagnose it accurately. The present study is attempted to evaluate the efficiency of clinical examination, radiological investigations, intraoperative and histopathological examination in diagnosis of acute appendicitis.*
Methods: *Fifty consecutive patients suspected of acute appendicitis were admitted, clinically examined, investigatedradiologically, operated and excised samples were examined histopathologically.*
Results: *The results of the study showed that in almost all cases (98%) diagnosis is accurately made only on the basis of clinical examination, while in a significant number of cases (18%), radiological investigations, used for diagnosis, failed to diagnose the positive cases.*
Conclusion*: Acute appendicitis is more a clinical diagnosis rather than radiological and it is better to use radiological investigations only to confirm the diagnosis of acute appendicitis rather to diagnose it primarily because it is clear from the present study that a significant number of positive cases had been missed radiologically.*
Keywords: *Appendix.Ultrasound.Appendicitis,Alvarado,Histopathology*

I Introduction

Acute appendicitis is the most common surgically correctable cause of abdominal pain, the diagnosis of which remains difficult in many instances. Some of the signs and symptoms can be subtle to both the clinician and the patient and may not be present in all instances. Arriving at the correct diagnosis is essential; however, a delay 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. The diagnosis of acute appendicitis is essentially clinical; however a decision to operate based on clinical suspicion alone can lead to removal of a normal appendix in 15–30 % cases. A number of clinical and laboratory based scoring system have been devised to assist diagnosis. The most commonly used is the Alvarado score and equally its modification,ultrasound abdomen, intraoperative and histopathological confirmation. Modified Alvarado score: This consist of three symptoms, three signs and two laboratory findings as described by Alvarado et al, later modified by Kalan et al.

Score:

1 – 4 Appendicitis unlikely
5 – 6 Appendicitis possible
7 – 9 Appendicitis probable
9 – Appendicitis definitive.

All patients (100%) ,which were positive for acute appendicitis intra-operatively and histopathologically were also positive for the same by clinical examination,while 18% of cases were negative for the same by radiological investigations (ultrasonography).

II Review Of Literature

Historical background: Claudius Amyand (1660–1740) a French surgeon working at St. George's and Westminster hospitals in London, performed the first successful appendectomy in an 11-year-old boy presented with an inflamed, perforated appendix in an inguinal hernia sac in 1735.Within the hernia sac, Amyand found the appendix. He successfully removed the appendix and repaired the hernia.[2] In 1824, Louyer- Villermay presented a paper before the Royal Academy of Medicine in Paris. He reported on two autopsy cases of appendicitis and emphasized the importance of the condition. In 1827, Francois Melier, a French physician, expounded on Louyer- Villermay's work. He reported six autopsy cases and was the first to suggest the antemortem recognition of appendicitis.[3] Reginald Fitz, a professor of pathologic anatomy at Harvard, is credited for coining the term "Appendicitis". His landmark paper definitively identified the appendix as the

primary cause of right lower quadrant inflammation [7]. Fergus, in Canada performed the first elective appendicectomy in 1883.[4] The greatest contributor to the advancement in the treatment of acute appendicitis is Charles Mc Burney. In 1889, he published his landmark paper in New York Medical Journal describing the indications for early laparotomy for the treatment of appendicitis. It is in this paper that he described McBurney's point as the point of maximum tenderness, when one examines with the fingertips is, in adults, one half to two inches inside the right anterior spinous process of the Ilium on a line draw to the umbilicus.McBurneys subsequently published a paper describing the incision that bears his name in 1894.[5] However, McBurney later credited McArthut with first describing this incision . Semm is widely credited with performing the first successful laparoscopic appendisectomy in 1982.[6] Bhattacharjeeet al in their study on 110 patients of acute appendicitis observed that high score (>5) was found to be a dependable aid both in the preoperative diagnosis of acute appendicitis and in the reduction of negative appendicectomy in men and children and the same was not true for women who had a high false positive rate for acute appendicitis.[7] Malik et al in their study on 106 patients concluded that the high score in men and children were found to be an easy and satisfactory aid in the early diagnosis of acute appendicitis, but a high false positive rate for acute appendicitis was found in women.[8] Patel et al (2010) studied 100 cases of right iliac fossa pain and five modalities that were used for the diagnosis of position of appendix & appendicitis, i.e. clinical features, lab Ix, ultrasound, intraoperative findings & histopathology, only 47% of cases all the modalities were positive. So the diagnosis of position of appendix & appendicitis is a combination of all the modalities and not just dependent on one basis.

Momin et al (2015)presenteda article showing In proven acute appendicitis, both WBC count & serum CRP levels were raised. WBC count showed 80% sensitivity & 67% specificity in diagnosis. Alvorado score proved helpful to diagnose complicated appendicitis with significant high scores. Ultrasonography of Abdomen had accuracy of only 58.2% in diagnosis.[9]

III Objectives

1.To assess the association between clinical, radiological, operative and histopathological finding and thus evaluate clinical diagnostic accuracy and radiological diagnostic accuracy.
2.To assess the effectiveness of radiological investigation in diagnosing acute appendicitis.
3.To assess the importance and accuracy of clinical examination in acute appendicitis.

IV Materials And Methods

The study was conducted after approval from institutional thesis and ethical committee and informed consent of the patient was taken.
Sources of data:
All (50)patients admitted to the surgery wards at Guru Nanak Dev Hospital/Govt. Medical College, Amritsar, with signs and symptoms of appendicitis.
This is a time bound prospective study in which patients presenting with clinical suspicion of Acute appendicitis in Guru Nanak Dev Hospital/Govt. Medical College, Amritsar, were taken into study.

- The period of study was from October 2013 to September 2015
- 50 cases were taken up for study.

Inclusion criteria:

- Only patients undergoing surgery were included
- All age groups and of both sex

Exclusion criteria:

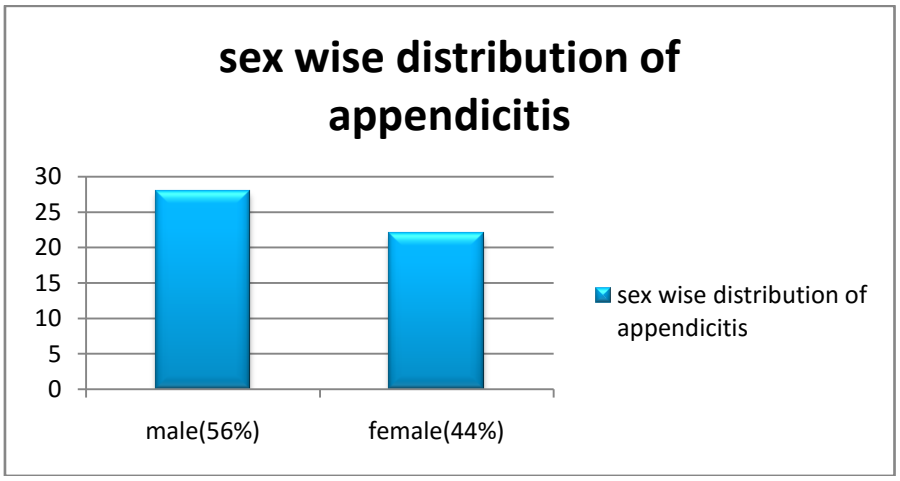
Patients admitted for interval appendicectomy following recurrent appendicitis, appendicular abscess, appendicular mass previously treated conservatively.
Patients were subjected to detailed history and thorough physical Examination

- Alvarado's scoring
- Patients underwent necessary investigations.
- Blood counts, biochemical analysis and urine analysis, USG abdomen/ pelvis, CT-Abdomen (As and when required), all diagnosed patients will be subjected to surgery.
- In all cases, operative findings and post-operative diagnosis by histopathological examination were recorded.
- Final outcome was evaluated on the basis of clinical, operative radiological and histopathological findings.

Observations:
Sex distribution;

Out of total patients, majority of the patients (54%) are male while, 44% patients are female.

Sex	**No. of cases**	**Percentage**
Male	28	56.00
Female	22	44.00
Total	**50**	**100.00**



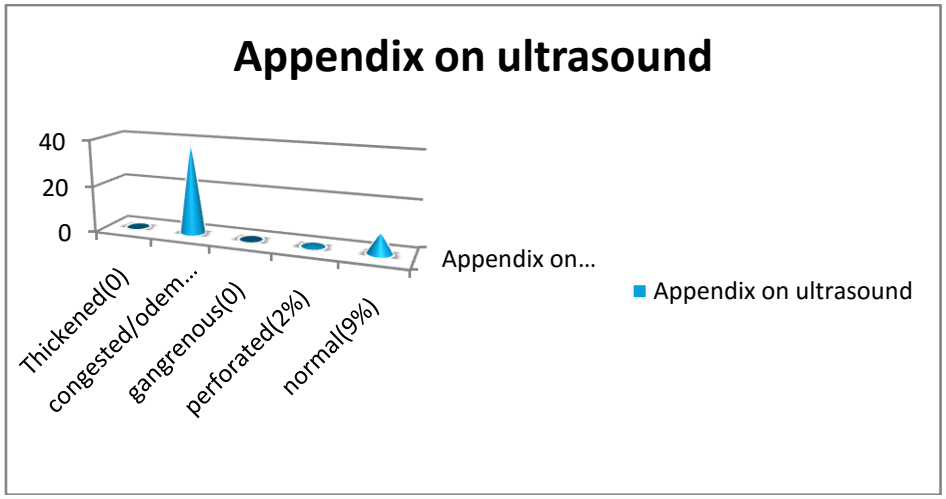
.Among 50 patients, 84% cases have Alvorado score of more than 8/10,while 14% of patients have alvorado score between 7 and 8. Only 2% of patients have alvorado score between 5and 6 as shown in

Alvorado Score	**No. of cases**	**Percentage**
<5	-	-
5-6	1	2.00
7-8	7	14.00
>8	42	84.00
Total	**50**	**100.00**

On ultrasonography abdomen, in majority of cases (80%), appendix was found to be congested and edematous, while in 2% of cases, appendix was found to be perforated. In 18% of cases no abnormality was detected in appendix, as shown in table.

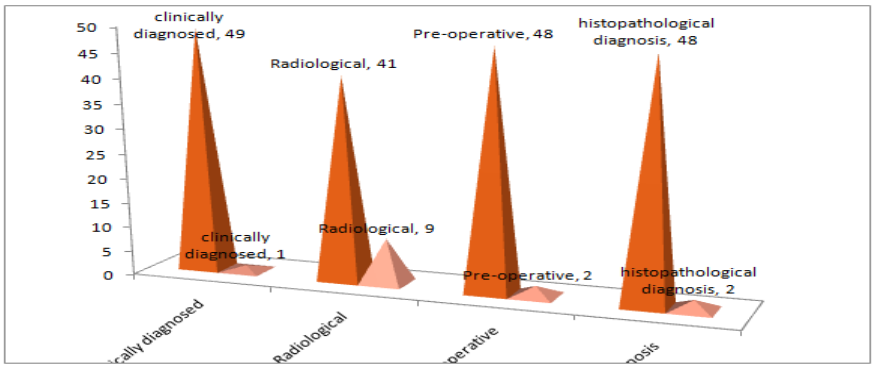
ULTRASONOGRAPHIC FEATURES OFAPPENDIX	**NUMBER OF CASES**
Thickened, fibrotic	-
Congested, edematous	40 (80%)
Gangrenous	-
Perforated	1 (2%)
Normal appendix	9 (18%)

Total	50 (100%)



In 98% cases of acute appendicitis, we are able to diagnose it clinically, while considering the radiological diagnosis, a significant number of cases (18%) were missed by radiological investigations. During operation and histopathological examination, 96% cases were diagnosed having disease and 4% cases were normal, as shown in table.

Clinically diagnosed		**Radiological**		**Per-operative**		**Histopathological diagnosis**	
Positive	Negative	Positive	Negative	Positive	Negative	Positive	Negative
49 (98%)	1 (2%)	41 (82%)	9 (18%)	48 (96%)	2 (4%)	48 (96%)	2 (4%)



Discussion

Acute appendicitis is the most common cause of an 'acute abdomen' in young adults and thus appendicectomy is the most frequently performed urgent abdominal operation.

Comparison of male: female ratio in different studies;

In the present study the number of male patients is more than female patients.

Fiske (1964) reported the incidence of acute appendicitis more in male than females. Shephard (1960) and Dhawan (1962) observed that the incidence of acute appendicitis in male was slightly more than in females.[10]

Pieper et al (1982) reported incidence of acute appendicitis more in females (51.2%) as compared to males (48.8%).[11]

In the present study, number of male patients were more (56%) as compared to female patients (44%).

Various diagnostic modalities (clinical, radiological, operative, histopathology) are used for the diagnosis of acute appendicitis. Initially the diagnosis of acute appendicitis was solely based on clinical and operative features but after the advent of radiological investigations in acute appendicitis, the preoperative diagnosis of acute appendicitis has been improved but overall clinical diagnosis of acute appendicitis is always appreciated.

Clinical examination;

In present study**,** Pain was the most predominant (90%) symptom presented by all cases of acute appendicitis. Vomiting was present in 82% of total cases in the present study. 46 cases (92%) out of 50 cases in the present study had fever at the time of admission. hyperaesthesia and tenderness in right iliac fossa in 98% of all cases was reported and rebound tenderness was observed in 41 out of 50 cases (82%).. There was leucocytosis in 41 (82%) cases along with increase in neutrophil polymorphs in 44 (88%) cases in present study.

Radiological Examination

Plain X-ray of abdomen is not helpful in the diagnosis of acute appendicitis, but by this investigation we can rule out the possibility of ureteric stones on the right side.

In present study ultrasonography of abdomen showed positive results in 41cases (82%) out of 50 cases. In majority of cases (80%), appendix was found to be congested and edematous, while in 2% of cases, appendix was found to be perforated. In 18% of cases no abnormality was detected in appendix,

Operative Findings

On operation by muscle splitting, transverse skin incision, the appendix was seen in different positions. In present series most of appendix (62%), were retrocaecal in position and In 14% of cases it was pelvic in position

On gross examination of the appendix it was congested and edematous in 92% of cases. In 4% cases it was perforated and in 2 cases (4%) appendix was normal. No case of gangrene was reported in the present study.

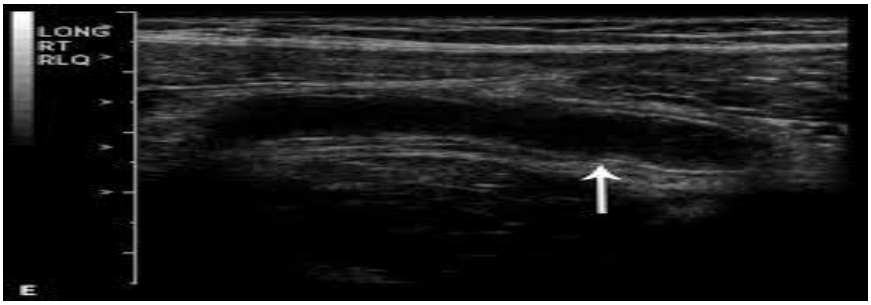
Histopathological Findings

On removing the appendix it was inflamed in 86% of cases on histopathological examination. In 4% of cases it was normal.

Summary and conclusion: In the present study,majority of cases were in the age group of 20-40 years. The ratio of male to female was 28:22. Abdominal pain was present in 90% of cases. Fever was present in 92% of cases while nausea and vomiting were present in 82% of cases. Tenderness in right iliac fossa was present in 98% of cases. 98% of patients showed alvorado score of >7 (s/o clinically positive). In majority of cases position of appendix was retrocaecal (62%), while pelvic position was present in 14% of cases, and preileal in 10% of cases. Ultrasound abdomen diagnosed 82% cases of acute appendicitis and it showed negative results in 18% of cases which were clinically positive. Per operatively, in 96% of cases appendix was diseased (either inflamed or perforated), while only in 4% of cases it was normal(non diseased). Histopathological examination revealed that in 96% of cases, appendix was diseased, while in 4% of cases it was completely normal. 96% of cases were discharged from the hospital uneventfully. In almost all cases (98%) diagnosis is accurately made only on the basis of clinical examination, while in a significant number of cases (18%), radiological investigations, used for diagnosis, failed to diagnose the positive cases.

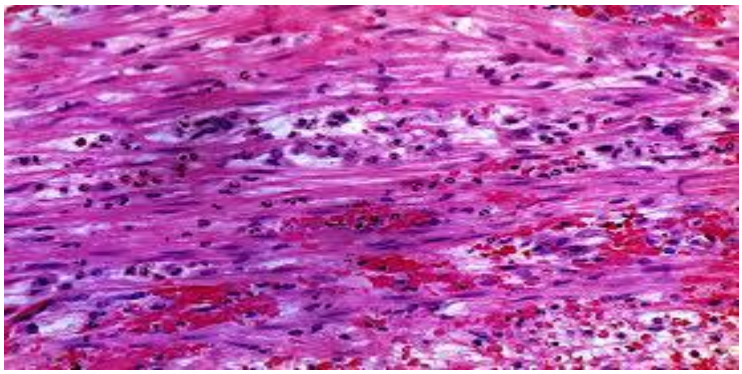
Acute appendicitis is a clinical diagnosis, although the radiological, biochemical and pathological evaluation in acute appendicitis is important. The history and clinical examination and alvorado score is more significant to treat and manage the cases of acute appendicitis which has been proved from our study and the literature.The diagnostic accuracy of clinical features is far more better than radiological investigations in the diagnosis of acute appendicitis.

Therefore it is concluded that acute appendicitis is more a clinical diagnosis rather than radiological and it is better to use radiological investigations only to confirm the diagnosis of acute appendicitis rather to diagnose it..

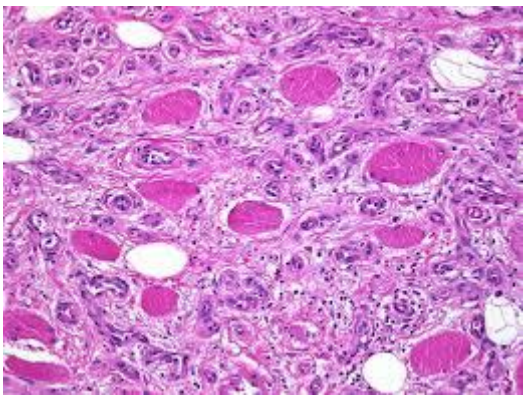


1.Ultrasound of appendix

2.Gross appearance of appendix



3.Histopathology of appendix



4.Histopathology of appendix

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