

CLINICAL RADIOLOGICAL PATHOLOGICAL CORRELATION IN ACUTE APPENDICITIS- A CASE SERIES

General Surgery

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ABSTRACT

In cases of Acute appendicitis the diagnosis is primarily clinical suspicion supported with radiological collaboration. With times the emphasis to rely on ultrasonographic findings have grown, followed by computed tomography (CT), in areas of dilemma and non visualization of appendix due to bowel shadows. The diagnosis of acute appendicitis has traditionally been made by clinical examination and lab investigations. However, use of ultrasonography and CT combined with clinical findings and lab investigations makes more precise diagnosis possible. These Imaging modalities are useful for determining whether surgery is necessary or the patient be managed by ochsner-sherren regimen. Ultrasonography is easy to perform and minimally invasive, and is the most commonly performed imaging test. It can visualize hypertrophy, disruption of the appendiceal wall, intraluminal obstruction, accumulation of purulent fluid periappendiceally and in pelvis. CT is superior to ultrasonography in objectivity and is useful for demonstrating periappendiceal fat stranding, ascites, and abscess formation. Laparoscopic appendectomy is the procedure of choice for obese & young patients. In cases of suspicion of perforation, phlegmon or local signs of peritonism we opted for open procedure with or without intra abdominal drain placement which was found to have good outcome in decreasing both morbidity and planning for interval appendectomy at specialised higher center. In our study of 82 cases 61 individuals were less than 40 years, and 21 individuals were more than 40 years of which predominant symptom was periumbilical pain and right iliac fossa pain constituting 100% of patients. The typical tenderness in MC Burneys point and rebound tenderness in right iliac fossa were present in 97-100%, with fever being present in 14.63% of patients. 75 % of patients had a total leucocytic count of more than 10,000 cells/cu.mm. The common per operative finding was inflamed appendix constituting 82.92% and perforation in 0.08 % of cases. Radiologically 67% had fecolith as obstructing agent and luminal diameter 5-8 mm in 66 cases and 8-10 mm in 16 cases. Histopathologically acute mucosal and submucosal inflammation and lymphoid hyperplasia was seen in 92.68% and 32.83% respectively. Out of 82 cases with 5-8 mm luminal diameter, 85 % underwent surgery and 14.63% were managed conservatively. 15.85% of 82 cases having luminal diameter 8-10 mm underwent surgery & 0.03% were managed conservatively. The presence of mucosal and submucosal inflammation represent pathological changes of primary acute appendicitis of probable clinical significance. Other causes of abdominal pain should be sought in patients especially in females of child bearing age. Presence of migratory abdominal pain, vomiting following right iliac fossa pain and tenderness on deep palpation clinches the diagnosis of Acute appendicitis substantiated by Ultrasonographic evidence of luminal diameter and luminal obstruction to increase the accuracy of diagnosis. In addition, the patients with acute appendicitis with luminal obstruction and increased diameter (8-10mm), (5-8mm), with periappendiceal fat stranding are unlikely to resolve with conservative approach, clinical deterioration and unresolving symptoms warrants surgery in such cases.

KEYWORDS

Acute appendicitis; Imaging diagnosis; luminal diameter; luminal obstruction; treatment; histopathology;

INTRODUCTION:

Acute appendicitis is the most common cause of abdominal pain which requires surgery. Literature indicates that appendicitis affects between 7-12% of the general population throughout their lifetime. The global risk of suffering from appendicitis is 8.6% for men and 6.7% for women in all age groups.

This pathology occurs more frequently during the second and third decade of life, with a peak at the age of 22 years. 250,000-280,000 new cases in a year are documented in the United States, with a mortality of 0.0002%. Appendicular perforation is one of the final stages of inflammatory process. The purpose of surgical intervention in patients with acute appendicitis is to avoid it.

Once perforation occurs, mortality increases to 3% and morbidity becomes as high as 47%. Even if diagnosed early, up to 26% of appendicitis cases have been found to have perforation at the time of diagnosis.

The diagnosis and treatment of acute appendicitis, particularly the diagnostic role of imaging modalities such as ultrasonography and computed tomography (CT), and the therapeutic role of laparoscopic and open appendectomy were summarized over 82 cases treated in a peripheral hospital of armed forces over period of 2 years.

MATERIALS AND METHODS:

For treatment of acute appendicitis either surgery or conservative ochsner sherren regimen was followed.

This is a retrospective observational study conducted in a peripheral hospital of Armed forces in Ahmednagar, Maharashtra, during the period July 2021 - July 2023.

The inclusion criteria were

- All patients diagnosed as acute appendicitis clinically and radiologically
- All hemodynamically stable patients without signs of sepsis either biochemically or systemically.

The exclusion criteria included

- Paediatric age group (age < 12 years)
- Pregnant women.
- Haemodynamically unstable patients.

The null hypothesis was that there is no significant difference between outcome of patients and luminal diameter in resolution of symptoms and signs of appendicitis.

All patients admitted were subjected to clinical, biochemical, radiological evaluation primarily by ultrasonography, and few were subjected to NCCT Abdomen. The data is entered and analysed using IBM SPSS version 24 and results tabulated. Two by two table was used to assess the significance at 'p' value of 0.05.

RESULTS:

Distribution Of Patients According To Age

Age	No. of gentleman patients	No. of lady patients	Total
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>12yrs < 40 yrs	23	38	61
>40 yrs <80 yrs	15	06	21

Distribution Of Patients According To Symptoms

Symptoms	No. of patients	%
Pain	82	100
Nausea	71	86.58
Vomiting	69	84.14
Anorexia	56	68.29
Constipation	24	29.26
Dysuria	15	18.29

Distribution Of Patients According To Signs

Signs	No. of patients	%
Tenderness in R.I.F	82	100
Rebound Tenderness	80	97.56
Rovsing's	64	78.04
Guarding	19	23.17
Fever	12	14.63

WBC Count Findings In Patients Included In The Study

	No. of patient	%
More than 10000 /cu.mm	62	75.60
Less than 10000 /cu.mm	20	24.39

Appendicular And Other Operative Findings

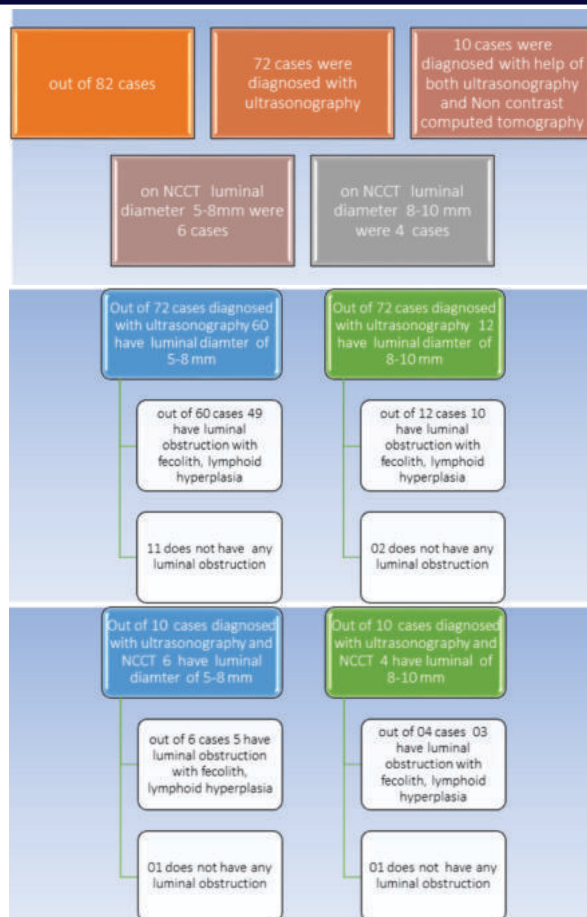
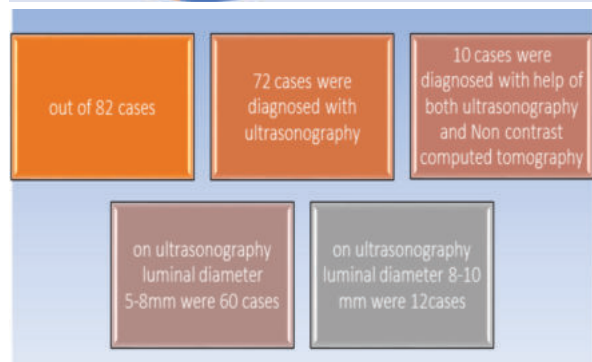
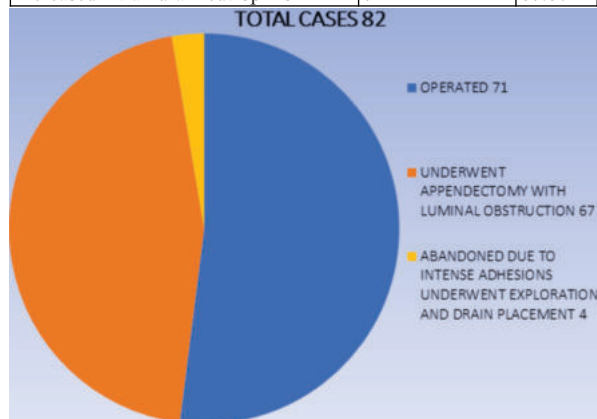
Condition of the Appendix	No. of patient	%
Inflamed	68	82.92
Gangrenous tip	3	0.03
Perforated	7	0.08
Mass	4	0.04
Total	82	100

Causes Of Obstruction Found In 67 Out Of 82

Obstructing agent	Male	Female	Total	%
Faecoliths	27	18	45	67.16
Lymphoid hyperplasia	15	07	22	32.83
Total	42	25	67	99.99

Results Of Histopathological Study Of Appendicular Specimens

Histopathological diagnosis	No. of specimens	%
Acute mucosal and submucosal inflammation	76	92.68
Gangrenous acute appendicitis	03	0.03
Periappendicitis	81	98.78
Increased intramural neutrophils	72	87.80



Luminal diameter	Underwent surgery	Managed conservatively	Total
5-8mm diagnosed by ultrasonography	49	11	60
8-10 mm diagnosed by ultrasonography	10	02	12
% out of 82 cases	71.95	15.85	

Luminal diameter	Underwent surgery	Managed conservatively	Total
5-8mm diagnosed by ultrasonography and NCCT	05	01	06
8-10 mm diagnosed by ultrasonography and NCCT	03	01	04
% out of 82 cases	0.09	0.02	

Luminal diameter	Underwent surgery	% out of 82 cases	Managed conservatively	% out of 82 cases
5-8mm	54	65.85	12	14.63
8-10 mm	13	15.85	03	0.03
Total	67	81.70	15	18.29

DISCUSSION:

In the 82 cases included in the study there is no significant sex difference, while the commonest age groups are 12-40 years and the disease is not rare at 70 years also, the eldest patient was about 75 yr old female. Regarding the signs presence of tenderness and rebound tenderness were present in 100% and 97% of cases respectively and are highly suggestive of appendicitis. (1,2,3). However, there is variation in intensity of tenderness elicited associated with the position of appendix especially if the appendix is retrocecal. (4,5)

Patients with right iliac fossa pain with anorexia, nausea, vomiting, fever, constipation, dysuria varying from approximately 100%, 86%, 84%, 68%, 29%, 18% respectively, if vomiting precedes the onset of pain, or in the absence of anorexia, nausea and vomiting, the diagnosis should be questioned. So, at least one of these three symptoms will be present in more than 90% of patients at the time when visceral pain is present. (6,7,8)

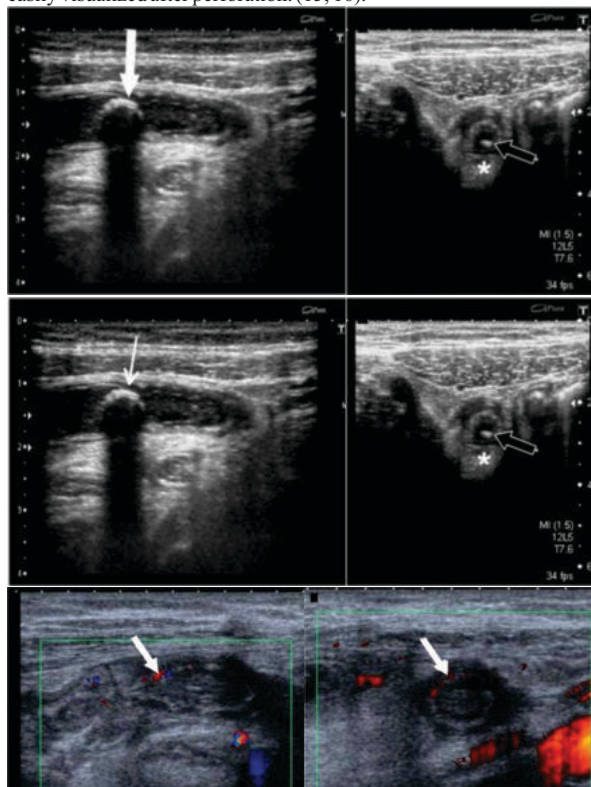
Although WBC count more than 10,000 cells/cu.mm has been

demonstrated with relatively low sensitivity and specificity, it is only used as a screening test, but not for the diagnosis. Count less than 10,000 cells/cu.mm doesn't exclude appendicitis. (9,10).

The most practical and valuable diagnostic aid is Ultrasound of abdomen. It is a good or better than other methods as it avoids radiation. Plain Non contrast CT Scan is found to be an accurate effective technique for diagnosis of appendicitis in cases in which appendix is not visualised on Ultrasonography due to bowel gas shadows. The primary criteria is of identification of appendix with a transverse diameter more than 6mm with periappendiceal changes. (11, 12).

The normal caecal appendix is seen as a tubular, elongated, and caecum structure with a lamellate appearance due to its histological layers. It usually has a diameter of less than 6 mm in its transverse diameter. It is important to note that the normal appendix is compressible, mobile, and it does not present an alteration in echogenicity of surrounding fat. (13, 14).

The normal appendix must be mobile and compressible. The loss in compressibility or that the appendix adopts a circular shape in axial images with plain compression is a criterion in order to consider the diagnosis of acute appendicitis on ultrasonography, along with inflammatory changes in the surrounding fat. Appendicoliths are recognizable in only 30% of appendicitis cases. However, their finding increases the risk of perforation. It is common that the appendix is not easily visualized after perforation. (15, 16).



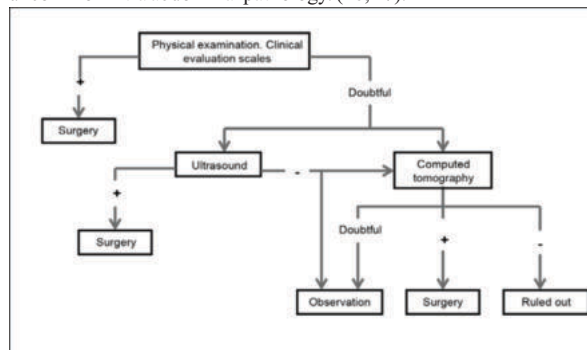
On ultrasonography visualisation of appendicoliths, increased vascularity inflamed appendix.

Non contrast CT, along with U.S., are the two most commonly used diagnostic modalities for the diagnosis of acute appendicitis in non visualization of appendix on Ultrasonography, the advantages of this protocol is that it is cheaper and does not require the patient to be prepared and it is quicker. (17, 18, 19, 20). One of its disadvantages include 7.3% rate of false negatives. (21, 22).

The sensitivity ranges between 85 – 96%. Specificity ranges between 93 – 99%, and precision is closer to 97%. When the test is negative for appendicitis, it offers differential diagnosis in only 35% of cases. (23, 24, 25).

Addition of the intravenous (IV) contrast CT scan increases the sensitivity of 96%, a specificity of 89%, and a precision of 94% and

also provides differential diagnosis in 56 % of cases of patients with uncommon intra abdominal pathology. (26, 27).



Algorithm for management of acute appendicitis diagnosed by ultrasonography and Non contrast CT Scan

Brown, et. al states that up to 42% of healthy adults have an appendix with a diameter between 6-10mm is called "appendix with an undetermined diameter", and other imaging signs must be sought in order to support the diagnosis of appendicitis, like thickening of the wall of the appendix greater than 1mm with a sensitivity of 66% and specificity of 96% for diagnosing acute appendicitis. (28, 29, 30).

Appendicoliths are present in 20-40% of cases. However, they increase the risk of perforation when present. The alteration in the density of peri appendicular fat reports a sensitivity between 87-100% and a specificity between 74-80% for acutely inflamed appendix. If there is perforation, the presence of extra luminal gas, the visualization of an abscess, phlegmon, the presence of an extra-luminal appendicolith or a focal defect in the enhancement of the wall clinches the diagnosis of perforation. (31, 32)

There are several differential diagnosis of acute appendicitis, depending on age and sex. In women of fertile age, gynecological and obstetric causes of abdominal pain are the main differential diagnoses. Other causes of abdominal pain in the right iliac fossa are mesenteric adenitis, Crohn's disease, diverticulitis, colonic cancer, acute gastroenteritis, inflammatory pelvic disease, infection of the urinary tracts, urolithiasis, epiploic appendagitis, ovarian torsion, ectopic pregnancy, and stump appendicitis, if previously operated. (33, 34, 35).

CONCLUSION:

The presence of mucosal and submucosal inflammation represents pathological changes of primary acute appendicitis of probable clinical significance. Other causes of abdominal pain should be sought in patients especially in females of child bearing age. Presence of migratory abdominal pain, vomiting following right iliac fossa pain and tenderness on deep palpation clinches the diagnosis of Acute appendicitis substantiated by Ultrasonographic evidence of luminal diameter and luminal obstruction to increase the accuracy rate of diagnosis. In addition, the patients with acute appendicitis with luminal obstruction and increased diameter (8-10mm), (5-8mm), with periappendiceal fat stranding are unlikely to resolve with conservative approach and clinical deterioration and unresolving of symptoms warrants surgery in such cases.

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