

Role of Ultrasound in the Diagnosis of Acute Appendicitis and its Correlation with Neutrophil Count

Role of
Ultrasound in
Acute
Appendicitis

Muhammad Ashraf Kasi

ABSTRACT

Objective: The objective of this study was to assess the role of ultrasound in the diagnosis of acute appendicitis and its correlation with neutrophil count.

Study Design: Descriptive study.

Place and Duration of study: This study was conducted at the Department of Radiology, Bolan Medical Complex Hospital, Quetta from September 2016 to June 2017.

Materials and Methods: A total 70 patients were selected from emergency and outdoor departments of Bolan Medical complex Hospital Quetta. The patients were presented with pain and tenderness in right lower quadrant. Ultrasound findings were correlated with neutrophil count.

Results: Total of 70 patients in which 35 (50%) were males and 33 (47%) were females. 56(80%) patients presented with acute appendicitis, 4(6%) with appendicular abscess, 7(10%) with appendicular lump and 3(4%) patients with appendicular rupture. The most common age presentation was 11-20 years 31 (44%), the least common age presentation was 41 years and above 2 (3%), 21-30 year range was 18(26%), 0-10 years range was 16 (23%) and from 31-40 years was 3 (4%). Patients with increased neutrophil (Neutrophilia) count were seen in 63 (90%) and with normal neutrophil count were 7 (10%).

Conclusion: Ultrasound is safe, easily available and effective tool in the diagnosis of acute appendicitis.

Key Words: pain, tenderness, right iliac fossa, Doppler ultrasonography, acute appendicitis, Neutrophil count.

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INTRODUCTION

The appendix is a blind ended tubular structure connected to the cecum approximately 2cm below the ileocecal junction in right iliac fossa.¹

The length of appendix is variable and usually on average 9cm long and width between 7 and 9mm. The blood supply arises from appendicular artery a branch of ileocolic artery and venous drainage from appendicular vein. Lymphatic drainage of appendix drains into the upper and lower ileocolic lymph nodes, which surrounds the ileocolic artery. The presence of lymphoid tissue suggests that the appendix may role in the immune system in addition to the digestive system. It is worm like structure attached to the base of first part of large intestine in the right iliac fossa. The appendix is suspended by a small triangular fold of peritoneum, called the mesoappendix. It has no known function thought to be vestigial remnant. The appendix is not vital organ and medical researchers still debate its function in human body.

The blockage leads to increased pressures in the appendix, decreased blood flow to the tissues of the appendix, and bacterial growth inside the appendix causing inflammation.² If the blockage is not treated, the appendix may rupture and the infection may leads to peritonitis. It is possible the pain could localize to the left lower quadrant in people with situs inversus totalis.

The positions of the appendix is variable but the most common positions are retrocecal and subcecal. McBurney's point is the name given to the point over the right side of the abdomen that is one third of the distance from the anterior superior iliac spine to the umbilicus. The point roughly corresponds to the most common location of the base of the appendix where it is attached to the cecum. Congenital anomalies of vermiform appendix are rare but occasionally seen as duplication, triplication or agenesis.

The acute appendix is assessed by doppler ultrasonography machine using convex and high resolution linear probes. These findings were correlated with neutrophil count. The classic presentation was abdominal pain. The pain was periumbilical initially and then migrates to the right lower quadrant.³ In Asian and African counties the incidence of acute appendicitis is lower because of dietary habits. They take high fiber diet and less carbohydrate. With the right diagnostic tests and antibiotics, most cases are identified and treated without complications.

Department of of Radiology, Bolan Medical Complex Hospital, Quetta.

Correspondence: Muhammad Ashraf Kasi, Professor of Radiology, Bolan Medical Complex Hospital, Quetta.

Contact No: 0333-5198623

Email: ashrafkassi@yahoo.com

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MATERIALS AND METHODS

Total of 70 patients were included in the study irrespective of age group and gender. The study was conducted in the department of radiology Bolan medical complex hospital Quetta. The referral of the patients was from the Emergency department and outpatient departments of the hospital. The patients mostly presented with abdominal pain and tenderness, followed by nausea and or vomiting and fever. The other pathologies were excluded from the study.

The diagnosis of acute appendicitis is difficult to diagnose on the basis clinical examination alone. This should be supplemented by radiologist operated doppler ultrasonography and laboratory investigations. The study was conducted using convex and linear probes and correlated with neutrophil count. Doppler ultrasonography is non-invasive, easily available and cost effective tool. Ultrasonography is operator dependent and needs expertise in the proper diagnosis. Visualization of blind ended non compressible blind ended appendix measures greater than 6 mm diameter with or without other findings like appendicoliths, echogenic periappendicular fat, and abscess and pericecal fluid collection was the diagnostic of appendicitis.

There is mild male predominance. The incidence of appendicitis gradually rises from birth, peak in late teen age and gradually declines in old age. Appendicitis is rare in infants. Young patients have incidence of perforations. The clinicians must maintain a high suspicion in all age groups. The other conditions should be kept in differential diagnosis may include stump appendicitis, epiploic appendagitis, right psoas abscess, inflammatory bowel disease, Meckel’s diverticulitis and typhlitis.

RESULTS

Total of 70 patients in which 35 (50%) were males and 33 (47%) were females (Table 1). 56(80%) patients presented with acute appendicitis, 4(6%) with appendicular abscess, 7(10%) with appendicular lump and 3(4%) patients with appendicular rupture. The most common age presentation was 11-20 years 31 (44%), the least common age presentation was 41 years and above 2 (3%), 21-30 year range was 18(26%), 0-10 years range was 16 (23%) and from 31-40 years was 3 (4%). Patients with increased neutrophil (Neutophilia) count were seen in 63 (90%) and with normal neutrophil count were 7 (10%). (Table 2)

Table No. I: Gender distribution

Male	Female
35 (50%)	33(47%)

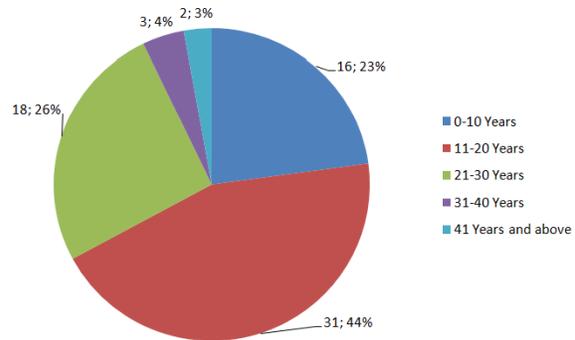


Figure No.1: Age Distribution.

Table No. 2: Leukocyte count in Appendicitis

Leukocyte count	Appendicitis
Increased	63 (90%)
Normal	7 (10%)
Total	70

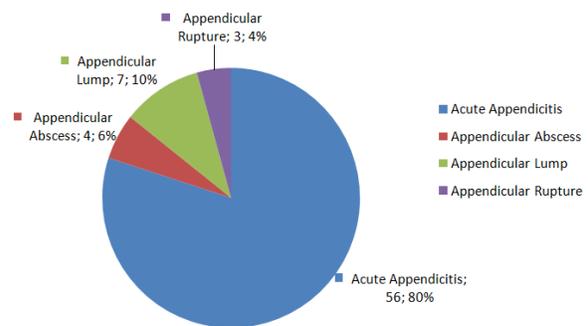


Figure No. 2: Ultrasound Findings

DISCUSSION

It is important to know that the position of appendix is variable.

Appendicitis can happen at any time, but it occurs most often between the ten and twenty years. It is more common in males than in females. Dull Pain usually started from periumbilical region shifting to the right lower quadrant at McBurney’s point. Followed by nausea and or vomiting, rebound tenderness and low grade fever. The location of the base of the appendix is much variable, especially as the length of the appendix has an extensive range 2-20cm⁴. Appendicitis is more common in developed nations. The reason for this discrepancy is unknown; causes may include family history, low fiber diet, infection and high sugar level. Acute appendicitis is an acute surgical emergency needs urgent attention to perform appendectomy. Acute appendicitis can presents in typical or atypical manner. Timely diagnosis of atypical appendicitis remains clinically challenging and is one of the missed problems in the emergency department. Furthermore the consequence of missing appendicitis, leading to

perforation significantly increases the morbidity and prolongs hospitalization.⁵ Appendicitis is caused by direct luminal obstruction usually secondary to fecoliths, lymphoid hyperplasia, impacted stool or rarely appendiceal/ cecal tumors. The neutrophil count is increased in ninety percent patients while in ten percent of patients it was normal or decreased. The diagnosis of appendicitis is delayed in elderly patients. Even with inflamed appendix there is no pain or fever. Research focusing on various aspects of ultrasound imaging in the diagnosis of acute appendicitis has gained major importance over recent years as radiation protection, broad availability and cost-effectiveness became increasingly important aspects of modern imaging techniques in the diagnosis of acute appendicitis.⁶ CT is not easily available and is not cost-effective. Additionally CT has radiation effects on the human body. Computerized tomography (CT) can only be done for inconclusive studies to avoid complications like appendicular perforation. Appendicular lumps are treated conservatively followed by surgery. Appendicular rupture was managed by emergency laparotomy. Appendicitis is one of the main reasons for abdominal surgeries in young patients. A recently described dynamic ultrasound technique using a sequential 3 step patient positioning protocol has been shown to increase the visualization rate of the appendix.⁷In the study patients were initially examined in conventional supine position followed by left posterior oblique and again supine position. Urine analysis may be sometime useful in the diagnosis of acute appendicitis. Ultrasonography also excludes other pathologies like ureteric calculi and ovarian torsion/hemorrhagic cysts. In women with reproductive age ectopic pregnancy should also be excluded. Usually normal appendix is not visualized on ultrasonography. When becomes inflamed the diameter of appendix will be increased and non-compressible. Neutrophilia is usually seen in patients with acute appendicitis. In infant and elderly patients WBC count is unpredictable because these patients may not normal response to infection. Appendicitis is considered a preventable disease due to the effect such as diet on its development.⁸ Epidemiologic and demographic studies report the appendicitis to vary according to age, gender, race, socioeconomic status, food culture and seasonal changes⁹. In the first year of life, the appendix is funnel shape, perhaps making it less likely to become obstructed. Lymphoid follicles are interspersed in the colonic epithelium that lines the appendix and may obstruct it. These follicles reach their maximum size during the adolescence.¹⁰ The most common non obstetric emergency needing surgery in pregnancy is appendicitis.¹¹Pregnant women are less likely to have a classic presentation of appendicitis than non pregnant women, especially in late pregnancy.¹² A recent large scale case control study has suggested a reduction in the

incidence of appendicitis during the pregnancy; particularly during the third trimester.¹³ Pregnant women are less likely to have classic presentation of appendicitis than non pregnant women, especially in late pregnancy. The most common symptom of appendicitis, ie, right lower quadrant pain, occurs close to McBurney's point in the majority of pregnant women, regardless of the stage of pregnancy,¹⁴ however, the location of appendix migrates a few centimeters cephalad with the enlarging uterus, so in the third trimester, pain may localize to the mid or even the upper right side of the abdomen.¹⁵ The presence of pus cells in the urine does not exclude the acute appendicitis. Irritation of ureter by inflamed appendix can cause pyuria and hematuria. Despite large number of tests available, the diagnosis of appendicitis is challenging.

CONCLUSION

Doppler ultrasonography is non invasive, easily available and cost effective imaging tool, used in the diagnosis of acute appendicitis. And it also helps to exclude the other pathologies. Increased neutrophil count further strengthening the diagnosis of acute appendicitis.

Author's Contribution:

Concept & Design of Study:	Muhammad Ashraf Kasi
Drafting:	Muhammad Ashraf Kasi
Data Analysis:	Muhammad Ashraf Kasi
Revisiting Critically:	Muhammad Ashraf Kasi
Final Approval of version:	Muhammad Ashraf Kasi

Conflict of Interest: The study has no conflict of interest to declare by any author.

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