

Original Article

Ultrasound in the diagnosis of appendicitis: a plea for caution

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Abstract

Background/Objectives: Acute appendicitis is one of the most frequent causes of acute abdomen. The clinical diagnosis is based on the case history and the physical examination. However, in some cases the typical clinical symptoms are equivocal or misleading at which time, making the diagnosis of appendicitis may be considerably difficult. Ultrasound may play a role in this class of patients. This article assesses the accuracy of this adjunctive test at our centre

Methods: This is a six-year retrospective study from July 2000 to July 2005 looking at patients that had appendectomy done at Ahmadu Bello University Teaching Hospital Kaduna Nigeria. We analyzed postoperatively those with histological diagnosis of appendicitis who at the same time had preoperative ultrasound assessment for the main purpose of establishing appendicitis. The final histopathological evaluation was used as the standard to rate the efficacy of ultrasonographic diagnosis of appendicitis.

Results: One hundred and forty nine patients 149 were documented. 128 had adequate data for further analysis and only 78 patients (60%) had ultrasound before surgery. The actual diagnostic accuracy of ultrasound in our environment is 24.4%.

Conclusions: Ultrasonography routine use in all our patients suspected of having classical appendicitis cannot be advocated at present.

Key words: Ultrasound, Appendicitis, Accuracy, Caution.

Introduction

Appendicitis remains the commonest cause of lower abdominal pain. It retains a common presentation at all ages. The incidence of appendectomy is high worldwide and it variously stands at about 15-30% generally^{1,2}. This operation is by and large performed in 15 to 45 % of the cases for histologically normal appendices^{1,2}. Ultrasound is one of the imaging systems that can visualize the inflamed appendix with a good sensitivity. Since 1986, 13 studies involving more than 5000 patients have been published showing a sensitivity of 85% and a specificity of 96% if an experienced examiner performed the sonographic examination³⁻⁵. This imaging technique has now assumed significant roles in the treatment of patients suspected to have appendicitis. This communication summarizes the diagnostic performance of ultrasound and its clinical impact in our environment and is contrasted with what is obtained elsewhere in the world. Even though supplementary and diagnostic investigation may be beneficial in patients with acute appendicitis, ultrasonography *routine* use in all our patients suspected of having *classical appendicitis* cannot be suggested at present.

Materials And Methods

This study covered six years from July 2000 to July 2005 looking at all patients that had appendectomy done at Ahmadu Bello University Teaching Hospital Kaduna, Nigeria. Diagnosis of appendicitis at our hospital is usually clinical. Some of the patients had ultrasound done before surgery. Recommendation of preoperative ultrasound was a prerogative of the attending surgeon. Some had it to rule out other clinical conditions that may mimic appendicitis and some actually presented from onset to the hospital with ultrasound report from referral hospitals. One hundred and forty nine patients 149 were clinically diagnosed to have appendicitis and 128 had sufficient data for further analysis. Out of these 128 patients, 78 patients had ultrasound before surgery. It is this category of 78 patients that had preoperative ultrasound assessment that our attention is being focused. The rate of ultrasound scanning before surgery was reviewed and compared to the findings of histological reports postoperatively. Patients diagnosed to have appendicitis by ultrasound all had positive histological features of appendicitis. The final

pathological examination was used as the standard to rate the efficacy of ultrasonographic diagnosis of appendicitis. Presence of acute inflammatory cells in the muscularis mucosa was the hallmark of histological diagnosis.

Results

One hundred and twenty eight (128) patients had adequate data for analysis out of which 78 had preoperative ultrasound scanning. This gives us a rate of 60% of our patients having preoperative ultrasonography for patients with clinical diagnosis of appendicitis. However only 19 (24.4%) of these patients with preoperative ultrasound had comments on the nature of appendicitis even when requests were made for such. All the 78 patients with preoperative ultrasound scan had histological confirmation of appendicitis. This gives false 100% accuracy of level of ultrasonic diagnosis of appendicitis in our patients. However a dismal rate of 24.4% is revealed as actual diagnostic accuracy as only 19 out of 78 had diagnosis of appendicitis made preoperatively.

Discussion

Appendicitis remains the commonest cause of undiagnosed lower abdominal pain, and retains a common presentation at all ages. In clinical practice history and examination play major roles in clinical diagnosis of appendicitis^{4,7}. However, in some cases the typical clinical symptoms are equivocal or misleading at which time, making the diagnosis of acute appendicitis may pose a considerable problem 5-8. Prompt and accurate diagnosis is essential to obtain minimal morbidity as diagnostic mistakes result either in delayed minimal morbidity as diagnostic mistakes result either in delayed initiation of adequate therapy and / or unnecessary operations. Diagnosing his condition may elude the most experienced clinician as it mimics many problems hence the need for aided diagnosis^{1,3,6,9-12}.

Many diagnostic imaging have assisted in the diagnosis of appendicitis even though no single imaging technique is 100% diagnostic. Ultrasound is one of the imaging techniques that have improved the diagnosis of appendicitis. Ultrasound has been reported to have sensitivity of 89-99% specificity of 89-98% positive and negative predictive value of 86-98% and 96% respectively and accuracy of 94-96%. However many, other results do not support this accuracy^{3,6,11,13-18}. What is the typical feature of appendicitis found in ultrasonography? In early study

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of the ultrasonographic diagnosis of appendicitis, the only criterion for acute appendicitis was inability to

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directly visualize normal appendix^{4,8,16-18}. However, recent advances with sophisticated ultrasonography equipment have enable clinicians to visualize a normal appendix. Consequently, criteria for the ultrasonographic diagnosis of this condition have been established. This include enlarged appendiceal diameter greater than 6mm, appendiceal wall thickening greater than 3mm detection of gas in the appendix, presence of a complex mass suggestive of periappendiceal inflammation and hyperemia in the wall of the appendix in color Doppler US^{3,4,11,15,17,18}. The typical appearance of ultrasonographic features of acute appendicitis are as shown in (fig 1) below

This study looked into the ultrasound request rate but the actual level may not reflect the true state, as our record keeping is poor. Some of the reasons for the LOW level of accuracy in diagnosis include the use of substandard ultrasound machine with inappropriate probes of suitable frequencies (5-7.MHZ) for the purpose of this diagnosis. Poorly trained operator of the ultrasound machine with lack of knowledge of the proper techniques and criteria for analysis on the diagnosis' and very poor clinical history to guide the operator particularly in cases of self-referral by patients

Acute appendicitis requires accurate and prompt diagnosis, which is essential to minimize morbidity. Ultrasound has the advantages of being rapid, non-invasive, and capable of being done at the bedside. Its disadvantages are its dependence on the technique of the operator and the current inexperience of most emergency physicians with the modality. Accuracy of this test varies, depending in part on the patient population studied, the diameter of the appendix considered to indicate abnormality, and the ultrasonic equipment used. With the newer addition of colour, the best results have been obtained with high frequency (5 to 7.5mHZ) probes.

Hospital database showed that the mean cost of appendectomy and 2 nights of admission in our hospital is averagely \$10 for uncomplicated appendicitis. Appendectomy is one of the commonest surgical procedures being carried out world wide hence one must seriously consider the cost of unnecessary appendectomy. Ultrasonography performed in patients with suspected acute appendicitis improves patients' care by averting delay before surgical treatment, which consequently reduces hospital and patient overheads.

In conclusion, although adjunctive testing may be beneficial in patients with acute appendicitis, ultrasonography routine use in all our patients suspected of having classical appendicitis cannot be advocated at present.

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