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Original Research Paper

Radiodiagnosis

CLINICAL-RADIOLOGICAL CORRELATION IN ENHANCED DIAGNOSIS OF ACUTE APPENDICITIS WITH HISTOPATHOLOGICAL CORRELATION

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ABSTRACT

Background: In 1986 Alvarado described a scoring system, the ALVARADO or MANTRELS SCORE, to help diagnosis of acute appendicitis John Murphy described the triad of pain abdomen, vomiting and fever for diagnosis.

Aims: The purpose of the study is to evaluate the effectiveness of Ultrasonography and Modified Alvarado Scoring System individually and both in combination for diagnosing acute appendicitis by correlating with histopathology reports.

Materials and Methods: Modified Alvarado Score, sonographic examination was done and histopathology report was analyzed.

Results: In our study, combination of ultrasonography and MASS was found to have highest sensitivity(93%) and diagnostic accuracy(80%) in the diagnosis of acute appendicitis, when compared to ultrasound and MASS individually.

Conclusion: The combination of Modified Alvarado Scoring System and Ultrasonography increased diagnostic accuracy & sensitivity in diagnosis of acute appendicitis, when compared individually and thus helps in reducing unnecessary diagnostic tests and surgical interventions

KEYWORDS : Acute appendicitis , clinico-radiological, enhanced diagnosis of appendicitis, alvarado scoring

INTRODUCTION:

Acute appendicitis is common cause of surgical acute abdomen with 7% of lifetime prevalence (1). The clinical presentation is atypical, as symptoms overlap with other conditions. The main aim is appropriate treatment of all cases without unnecessary surgical interventions and diagnostic tests.

Diagnosis on the basis of only patients signs and symptoms result in high negative appendicectomy rates of about 15%-30%(62-64).

Modified Alvarado Scoring System is the most commonly used clinical scoring system for diagnosis of acute appendicitis and helps the surgeon to decide the further management. It includes clinical signs, symptoms and blood investigation (differential leukocyte count) (Table 1) more specific than being sensitive with high positive predictive value (PPV). (2, 3)

Graded compression ultrasonography is less time consuming, non-expensive and non invasive method with diagnostic accuracy rate of 71%–90 %.(12-14).It has similar specificity as CT and lacks ionizing radiation(64-65).First line ultrasound would reduce radiation exposure by 56% and cost of imaging by 45% as compared to the CT modality.

But lack of ultrasound findings in a patient with a high possibility of acute appendicitis, doesn't rule out the condition. However it's an operator dependent modality.

Objectives of the study:

In the current study, our objective is to evaluate the efficacy of Modified Alvarado Scoring System & Ultrasonography individually and in combination for diagnosis in patient with suspected acute appendicitis.

MATERIALS AND METHODS:

Data of 153 patients, who visited OPD/emergency of Meenakshi Medical College Hospital and Research Institute with suspected acute appendicitis and underwent appendectomy, was collected. Modified Alvarado Score, sonographic examination was done and histopathology report was analyzed. The patients were divided into four groups according to Modified Alvarado Score and ultrasound findings respectively. The results of ultrasound and Alvarado Scoring System individually and in combination were compared by correlating with the histopathological reports.

Machine Used: Volvuson S6 Pro Ultrasound Machine

STATISTICAL METHODS

Cross-sectional study

Two by two tables was used to calculate sensitivity, specificity, positive predictive value and negative predictive values.

Statistical software: The Statistical software SPSS 21.0, was used for the analysis of the data and Microsoft Word and Excel have been used to generate graphs, tables etc.

RESULTS:

Table.1 Groups Based On Ultrasound Findings

US-1	Normal appendix (diameter < 6 mm) visualised
US-2	Appendix not visualised and no secondary signs of appendicitis

US-3	Complicated Appendicitis (perforated appendix, early mass formation). Appendix visualised/ not visualised separately.
US-4	Acute appendicitis

Table.2 Age Distribution Of Patients Presenting With Acute Appendicitis

Age group(yrs)	N=153	PERCENTAGE
0-16 yrs	21	14%
17-25 yrs	39	25%
26-35 yrs	44	29%
36-50 yrs	26	17%
>50 yrs	23	15%

TABLE.2 Out of total of 153 patients, the age at presentation ranged from 8-76 years. Majority of patients belonged to the 26-35 yrs and 17-25 yrs with 44 and 39 patients respectively.

Table.3 Representation Of Relative Percentage Of Males And Females In Study Group

MALES	FEMALES
89 (58%)	64(42%)

TABLE.3 There were 89 (58%) males and 64 (42%) females patients included in the study group

Table.4 Percentage Of Distribution Of Patients Into Mass Groups

Mass groups	Percentage (n=153)
Group1	19(12%)
Group2	48(31%)
Group 3	70(46%)
Group 4	16(10%)

TABLE.4 the majority of patients belonged to group 3 (46%) and had the highest positive histopathological results (56%). Thus group 3 of MASS was found to have the highest accuracy for clinical diagnosis of appendicitis.

Table.5 Representation Of Percentage Of Distribution Of HPE Positive And Negative Patients Into Mass Groups

Mass groups	HPE positive (n=108)	HPE negative (n=45)
Group 1(<4)	5(4%)	14(31%)
Group 2 (5,6)	30(26%)	18(40%)
Group 3(7,8)	58(56%)	12(27%)
Group 4(9)	15(14%)	1(2%)

TABLE.5 Majority of the patients belonged to US group 4(55%) and had highest positive histopathologicalresults (74%). Patients belonging to US group 1 had the highest histopathological negative results (62%)

Table.6 Percentage Of Distribution Of Patients Into USG Groups

USG GROUPS	Percentage (n=153)
US GROUP 1	41(27%)
US GROUP 2	13(8%)
US GROUP 3	15(10%)
US GROUP 4	84(55%)

TABLE.6 108/153(71%) had histopathologically positive results for acute appendicitis, 6 patient were found to have a normal appendix, 22 patients had lymphoid hyperplasia, 6 patients had ileocecal TB, 2 patients in each were histopathologically diagnosed for Crohn's disease and parasitic infections. 1 patient in each was diagnosed with Meckel's diverticulum, appendicular endometriosis and carcinoid tumor.

Table.7 Representation Of Sensitivity, Specificity, Ppv, Npv And Diagnostic Accuracy Of Usg, Mass And Their Combination

Groups	Sensitivity %	Specificity %	PPV %	NPV %	Diagnostic Accuracy %
US Group	80%	71%	87%	60%	77%
MASS Group	68%	71%	85%	48%	69%
Combination	93%	50%	82%	73%	80%

TABLE .7 Combination showed a sensitivity of 93% and diagnostic accuracy of 80%. However specificity was less with 50%

DISCUSSION

There are various imaging techniques for the evaluation of patients with suspected acute appendicitis, such as plain radiographs, barium enema, ultrasound, CT and MRI.

Ultrasonography is less time consuming, a non-expensive and non invasive method with a diagnostic accuracy rate of 71%–90% [12-14].

Ultrasound was more sensitive with high predictive value & diagnostic accuracy, when compared to MASS but it had some limitations such as the abnormal appearance of the appendix due to lymphoid hyperplasia. 5 patients in US group 3 and 1 patient in US group 4 had ileocecal TB, 1 patient in us group 3 had Crohns disease which mimicked acute appendicitis by producing secondary signs sonographically.

The specificity of USG and MASS was similar (71%). Though modified Alvarado scoring system helped in early diagnosis of acute appendicitis its insignificant diagnostic tool on its own.

In cases where ultrasound findings are normal and MASS is significant, we can have negative HPE report which may be due to the PID & salpingitis in females, infectious colitis, Meckel's diverticulum When USG and MASS were combined there was an increase in sensitivity (93%) and diagnostic accuracy (80%).

LIMITATION

Ultrasound examination can be affected by poor acoustic window due to bowel gas shadows.

SUMMARY

Use of modified Alvarado scoring system and ultrasound in combined will help in the diagnosis of acute appendicitis with high accuracy and thus prevent unnecessary diagnostic tests &appendectomies and helps in preventing late complications of appendicitis by early detection.

CONCLUSION

The combination of Modified Alvarado Scoring System and Ultrasonography increased diagnostic accuracy & sensitivity in diagnosis of acute appendicitis, when compared individually and thus helps in reducing unnecessary diagnostic tests and surgical interventions. Also helps in preventing complications of acute appendicitis by early diagnosis.

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Conflicts of interest: Nil

Image 1 Ultrasound Image Of Normal Appendix. (us Group 1)

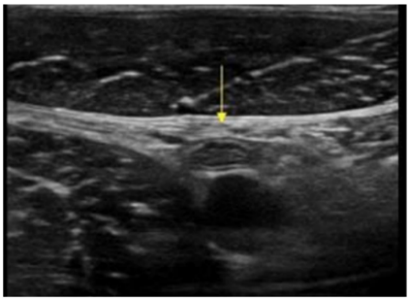


Image 2. Ultrasound Image Of Early Mass Formation. (us Group 3)

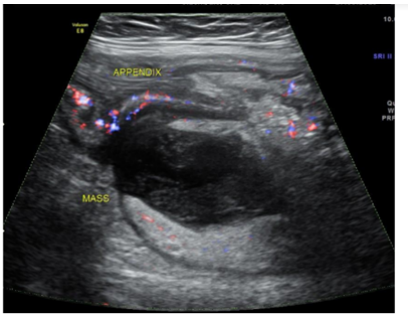


Image 3. Ultrasound Image Of Rif Mass With Abscess Formation. (us Group 3)

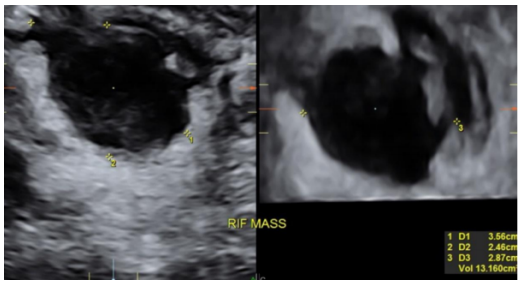
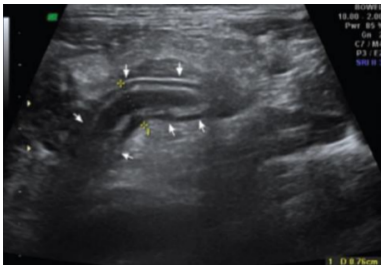


Image 4. Ultrasound Image Of Appendicular Perforation. (us Group 3)

Image 5. Ultrasound image of acute appendicitis. (US group 4)



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