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REVEALING ACUTE APPENDICITIS DIAGNOSIS, THE COMPARISON BETWEEN RADIOLOGICAL, CLINICAL AND LABORATORY DIAGNOSIS

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Abstract:
Objective: *We conducted this study to find out the diagnostic results of acute appendicitis via radiological, clinical and laboratory outcomes.*
Study design: *Prospective analytical study.*
Time and Duration: *This study was carried out from November, 2017 to October, 2018 at surgical department of Mayo Hospital, Lahore.*
Methodology: *We included a total number of 150 cases of pain abdomen admitted in the general surgery department with in one to two days. Statistics like preoperative investigations, physical findings and clinical history was investigated from all selected patients and also recorded on a proforma. Carried out systemic, general physical and few specific examinations for acute appendicitis. Also carried out ultrasonography and preliminary hematological diagnosis of pelvis and abdomen. Modified Alvarado scoring system was used to analyze all patients. SPSS V.20 was used for analysis of data.*
Results: *Out of all selected patients (150) we found most cases among the age of 20 years to 30 years which presented a percentage of 34.0% followed by the age group starting form 31 years upto 40 years with a percentage of 26.0%. Found gender of all selected patients as 87 (58.0%) males and 63 (42.0%) females. Tenderness in right iliac fossa and pain in abdomen was observed in all selected patients (100%) and the second most complain observed was the vomiting in 123 (82.0%) patients.*
Conclusions: *According to the findings of our study we concluded that radiological diagnosis is less good than clinical diagnosis. Therefore, it is suggested to use clinical diagnosis for the finding of acute appendicitis than other diagnosis processes as it was observed that positive cases were missed in these processes in a significant number.*
Keywords: *Clinical diagnosis, radiological diagnosis, Acute abdomen, Acute appendicitis, Appendix.*

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INTRODUCTION:

The appendix when inflamed appears as appendicitis. This disease mostly occurs between the age of 10 years to 30 years so as we can say that it is a disease of young age. In a study carried out by Fitz et al in 1886, without surgical therapy, ratio of death due to appendicitis was approximately 67%[1]. Surgeon is called for emergency treatment in the case of acute appendicitis as said by Sir HeneageOgilive [2]. Besides better clinical diagnosis, for the treatment of this disease a more skilled surgeon is required to handle it carefully. Very common surgical reason of acute abdomen is acute appendicitis. It is very clear that initial diagnosis is very necessary to have speedy surgical procedure. Appendectomy is very common operation of abdominal in most general hospitals. Emergency abdominal surgeries, in most hospitals comprises about 25.0% cases of surgery. In every year approximately 10 out of 1000 get appendicitis, which is estimated by Meloney and his team [3]. A good known acute appendicitis prevention method has not been found yet.

Through the examination results and typical history study of the patients it is very common in practice to diagnose acute appendicitis via clinical method. The reason of acute appendicitis is unidentified but suggested ways of identifying are familial factors, multifactorial luminal obstruction and dietary [4]. The most common choice for treatment is appendectomy [4,5]. Finding out of appendicitis is still dependent on physical examination and medical history of the patients although, medical science is advanced a lot. Risk of perforation mighty be reduced and complications might be prevented via timely diagnosis and surgical referral. In non-perforated appendicitis, ratio of death is less than one percent but may increase upto five percent in elderly and young patients. The aim of out study is to compare the outcomes of radiological, clinical and laboratory during acute appendicitis.

METHODOLOGY:

We conducted this prospective analytical research study from November, 2017 to October, 2018 for the duration of one year, at surgical department of Mayo Hospital, Lahore to examine diagnostic accurateness and value of radiological,clinical and laboratory results in acute appendicitis. We included in our study a total number of 150 cases of pain abdomen admitted in the general surgery department with in one to two days. All those patients who were having history of pain abdomen for more than two days with clinical signs and symptoms indicative of appendicular abscess or appendicular mass or might be diagnosed of having other pathological conditions like Mackle's diverticulum, obstructed carcinoma of the caecum, regional ileitis, nonspecific mesenteric lymphadenitis, enterocolitis, torsion of omentum, acute cholecystitis, perforated duodenal ulcer, right ureteric calculus, ruptured ectopic and PID were excluded from the study.

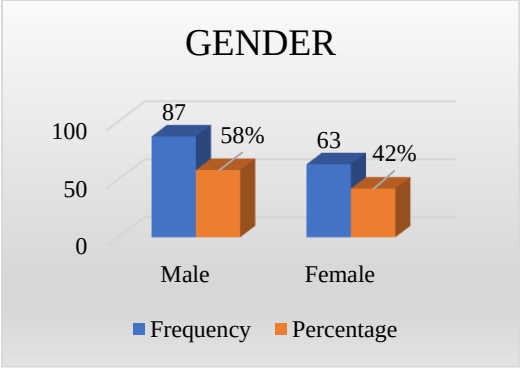
Statistics like preoperative investigations, physical findings and clinical history was investigated from all selected patients and also recorded on a proforma. Carried out systemic, general physical and few specific examinations for acute appendicitis. Also carried out ultrasonography and preliminary hematological diagnosis of pelvis and abdomen. Modified Alvarado scoring system was used to analyze all patients. SPSS V.20 was used for analysis of data. With the P value(< 0.05) considered significant statistically,categorical variables were calculated in frequency and its proportions whereas, continuous variables were shown with ±SD in average values.

RESULTS:

Selected 150 cases who were suffering from the pain in right iliac fossa diagnosed as acute appendicitis within one to two days and ere admitted in the surgical department of hospital. Demographical variables were calculated via recording and analyzation of all selected patients. We found most cases among the age of 20 years to 30 years which presented a percentage of 34.0% followed by the age group starting form 31 years upto 40 years with a percentage of 26.0%. Found gender of all selected patients as 87 (58.0%) males and 63 (42.0%) females as shown below in table no 01.

Table no 01: Gender Distribution of Patients

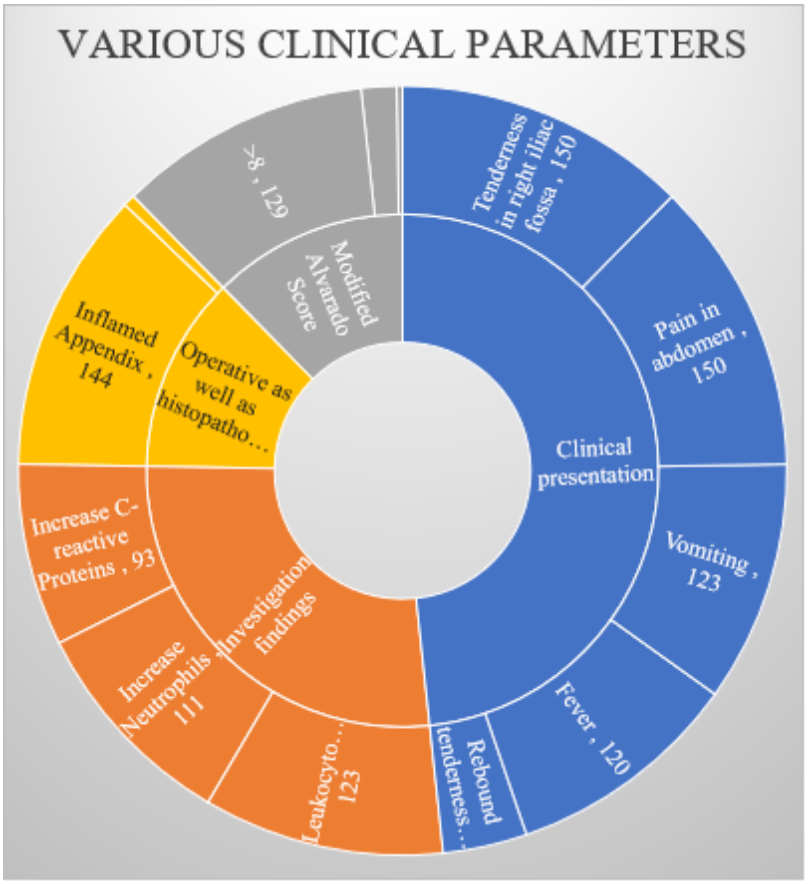
Gender	Frequency	Percentage
Male	87	58%
Female	63	42%



With the rate of 82.0 percent vomiting found pain in abdomen and inflammation in right iliac fossa in all selected patients of our study. Several hematological diagnoses were conducted among the patients of acute abdomen. According to the findings of our study most of the cases were having leukocytosis, increased neutrophil count and increased C-reactive proteins as 82.0%, 74.0% and 62.0% respectively as shown below in table 02.

Table No 02: Distribution of cases according to their various clinical parameters

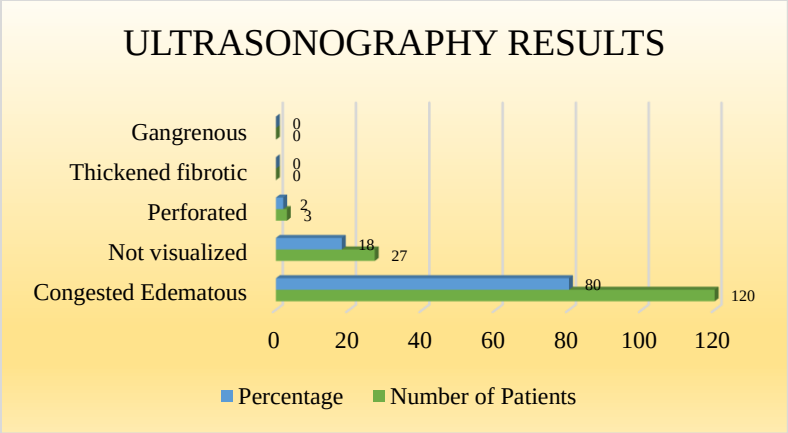
Clinical parameters		Number of patients	Percentage
Clinical presentation	Pain in abdomen	150	100
	Vomiting	123	82
	Fever	120	80
	Tenderness in right iliac fossa	150	100
	Rebound tenderness	43	28.67
Investigation findings	Leukocytosis	123	82
	Increase Neutrophils	111	74
	Increase C-reactive Proteins	93	62
Modified Alvarado Score	<4	00	00
	5-6	03	02
	7-8	18	12
	>8	129	86
Operative as well as histopathological findings	Inflamed Appendix	144	96
	Appendicular perforation	06	04



Furthermore, all patients were referred to ultrasonographical analysis.Most of the cases were suffering from congested edematous appendix with the percentage of 80.0% followed by perforated appendix in 03 patients as observed through USG features. For reconfirmation of the studied cases histological diagnoses was conducted and result was found that 92.0 % of cases were suffering inflamed appendix and 4.0% were having appendicular perforation as shown below in table no 03.

Table No 03: Results of Ultrasonography

USG Features	Number of Patients	Percentage
Congested Edematous	120	80
Not visualized	27	18
Perforated	03	02
Thickened fibrotic	00	00
Gangrenous	00	00
Total	150	100



144 patients were undergoing appendicitis as compared with just clinical and radiological analysis which were 92.0% and 82.0% respectively, as a whole study of histological, clinical and radiological outcomes and concluded that clinical accuracy was above with the sensitivity of 92.0% than that of radiological accuracy with the sensitivity of 82.0% as shown below in table no 04 and 05.

Table No 04: Comparison of Clinical, Radiological and Histological Findings

Diagnosis	Positive	Percentage	Negative	Percentage
Clinical	138	92	12	08
Radiological	123	82	27	18
Histological	144	96	06	04

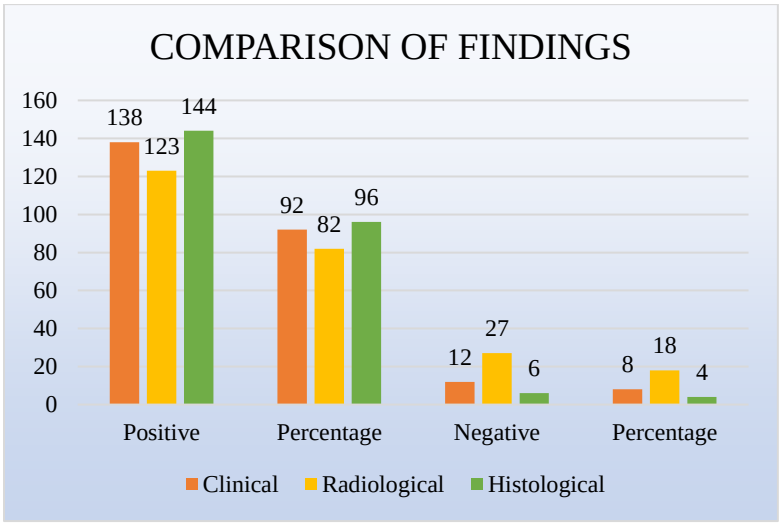
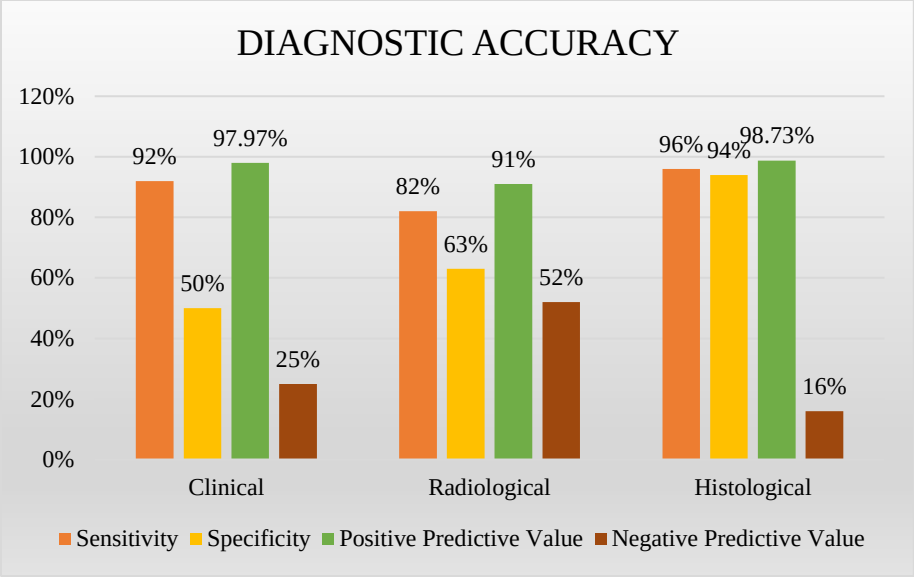


Table No 05: Diagnostic accuracy of Clinical, Radiological and Histological Findings.

Diagnosis	Sensitivity	Specificity	Positive Predictive Value	Negative Predictive Value
Clinical	92%	50%	97.97%	25%
Radiological	82%	63%	91%	52%
Histological	96%	94%	98.73%	16%



DISCUSSION:

A firm diagnosis of appendicitis can only be obtained at surgery and after pathological inspection of surgical specimen [04,05]. Laboratory test results, previous history and clinical investigations are the basic methods of diagnosing appendicitis. Recently in a few years, many new techniques have been invented for diagnosis such as graded compression ultra-sonography, computed tomography, scoring and computer analysis, non-contrast helical computed tomography, laparoscopy, peritoneal aspiration cytology and estimation of C-reactive protein [6]. The disadvantage with these methods is immersion of extracharges and deficiency of free availability. Because of these issues these modalities have not gained large acceptance as general diagnostic procedures of acute appendicitis. Imaging techniques have showed to add very less.

In current study, we give emphasis on the significance of clinical examination and application of modified Alvarado score in makingassured diagnosis of acute appendicitis and by this means reducing the rate of appendectomy negativity.The current study has revealed that Modified Alvarado Scoring System (MASS) provides top level of accuracy, sensitivity, specificity and PPV in the diagnosis of acute appendicitis by showing high positive predictive value and lower negative appendectomy rate. That is the reason we recommend that modified Alvarado score might be used to enhance the diagnostic correctness of acute appendicitis and successively decrease negative appendectomy and complication rates. Animproved Alvarado score above 07 willshow appendectomy without the need for further imaging studies. This study verifies that modified Alvarado scoring system is very useful scoring system for diagnosis of acute appendicitis. It may help making early diagnosis and prevent further complications, reduce numbers of negative appendectomies.It is better than other scoring systems because it includes wide spectrum of symptoms and signs and laboratory investigations and finally it helps in reducing necessity of ultrasonography and CT scan which has become now-a-days gold standard for diagnosis of acute appendicitis. When clinical indications of any patient are high enough than taking ultrasound is just unnecessary. Anyhow, in the situation of negative clinical results, accuracy of diagnostic is improved due to additional statisticstaken from ultrasound. Rather to use ultrasound as primary diagnostics method foracute appendicitis, it is better to utilize it as only to confirm the resultant data of other methods as it is very clear observation of our study that many cases missed out via using radiological method.

Nshuti R[7] in their study found pain as a major symptom among 90% whereas Kapoor S et al[8] (2016) observed pain as a most common symptom among 92%. Kapoor S et al[8] (2016) evaluated the efficiency of clinical examination, radiological investigations, intraoperative and histopathological examination in diagnosis of acute appendicitis among fifty consecutive patients suspected of acute appendicitis observed mean age of 28 ±11 years. In a study in 2010, Gligorievski et al verified the value of the ultrasound (US) as superb diagnostic modality in assessment of the appendix in 124 cases with history and physical examination of acute appendicitis observed with aged 15-57, with peak incidence in second decade of life with mean age of 31 ±10 years

[9]. In this study it was observed that tenderness in right iliac fossa and abdomen pain were there in 100 percent selected strength of patients with 82 percent of them were also having vomiting. Most of patients showed with leukocytosis (82%) with increased neutrophil count 74%. The modified Alvarado Score showed that majority of patients were having score more than 08 (86%). In this study it was observed that many patients were having congested edematous appendix (80%). It was observed that most of patients were having congested finding (96%), followed by perforated appendix (04%). The majority of patients were having inflamed appendix finding (92%), followed by appendicular perforation (04%). The histological findings showed 144 (96%) patients positive finding related to appendicitis as compared to radiological (82%).

In our study, clinical accuracy was observed to be more as (sensitivity=92%) compared to radiological accuracy (sensitivity=82%). In this study it was observed that positive predictive value is 97.97% and negative predictive value is 25%. The findings related to clinical presentation were compared with studies done by Richard Nshuti, they found sensitivity of clinical findings as 93%, Specificity (86%), PPV (93.3%) and NPV (66.7%).

CONCLUSIONS:

We concluded in our study that Modified Alvarado Scoring System (MASS) is very useful scoring system for diagnosis of acute appendicitis. Rather to use ultrasound as primary diagnostics method for acute appendicitis, it is better to utilize it as only to confirm the resultant data of other methods as it is very clear observation of our study that many cases missed out via using radiological method.

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