IOSR Journal of Dental and Medical Sciences (IOSR-JDMS)
e-ISSN: 2279-0853, p-ISSN: 2279-0861.Volume 22, Issue 3 Ser.14 (March. 2023), PP 54-57
www.iosrjournals.org

A Series of Non-Traumatic Acute Abdomen Cases Comparing Pre-Operative and Post-operative Diagnosis

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Date of Submission: 10-03-2023 Date of Acceptance: 22-03-2023

I. Introduction:

Acute Abdomen is loosely defined as a clinical course of abdominal symptoms that can range from minutes to hours to weeks, and is often used synonymously for a condition that requires immediate operative intervention. Surgical acute abdomen is one of the commonest cases seen at surgical emergency as sudden onset of abdominal diseases condition which requires immediate surgical evaluation and probable intervention.[1] Acute abdominal pain can be caused by a variety of diseases ranging from mild and self-limiting to life-threatening diseases.[2] An early and accurate diagnosis results in more accurate management, that leads to better outcomes. Urgent causes for acute abdominal pain require immediate treatment (within 24 hrs) to prevent complications; whereas for non-urgent causes, no immediate treatment is required.[2]Although most abdominal pain is benign, as many as 10 percent of patients in the emergency department setting and a fewer percentage in the outpatient setting have a severe to life-threatening cause requiring surgery.[3] Surgical emergencies represent more than 50% of surgical admissions and constitute a major part of the surgeon's workload in most parts of the world.[4] Proportion of non-trauma surgical emergencies is reported to be between 30% and 57% with more than half requiring surgical intervention.[4] The combination of improved diagnostic tools, safe anaesthesia, better preoperative assessment with thorough knowledge of clinical and laboratory findings and operative management has decrease the morbidity and mortality of patients of acute abdomen.[10] Previous studies have demonstrated that management errors can be significantly reduced by accurate preoperative diagnosis in acute abdomen.[10] Correct pre-operative diagnosis of acute abdomen remains challenging despite good history taking and clinical examination, and improvement in new techniques requiring sophisticated equipment and specialist expertise all the time, making it a difficult job most of the times.

Objectives:

- To assess the validity of pre-operative diagnosis in relation to operative diagnosis at emergency laparotomy among non-traumatic acute abdomen.

II. Methodology:

This is a hospital-based case series involving patients undergoing emergency laparotomies for non-traumatic acute abdomen under the Department of General Surgery, Gauhati Medical College and Hospital for the period of 1st June 2020 to 31st May 2021.Patinets who underwent emergency laparotomy for non-traumatic acute abdomen were included in the study to compare the pre-operative diagnosis based on clinical examination, laboratory and radiological findings with operative diagnosis. On the other hand, patients aged less than 12 years, traumatic acute abdominal cases like blunt and penetrating injuries, acute abdomen in pregnancy and cases that can be managed conservatively were excluded from the study. Among the study population, patients admitted with acute pain abdomen, which were of non-traumatic origin and underwent emergency laparotomy were considered as cases. Patients those were selected as cases were queried about detailed history and thorough physical examination were performed. After necessary and relevant investigations, few minor procedures like needle aspiration in the four quadrants were performed in some of the cases as required.

Data were collected using pretested and predesigned clinical history sheet and compiled in Microsoft Excel sheets. Statistical analysis was carried out using Instat Graph Pad software. Permission from the instructional ethics committee was obtained as per institutional norms.

Diagrams and Tables:

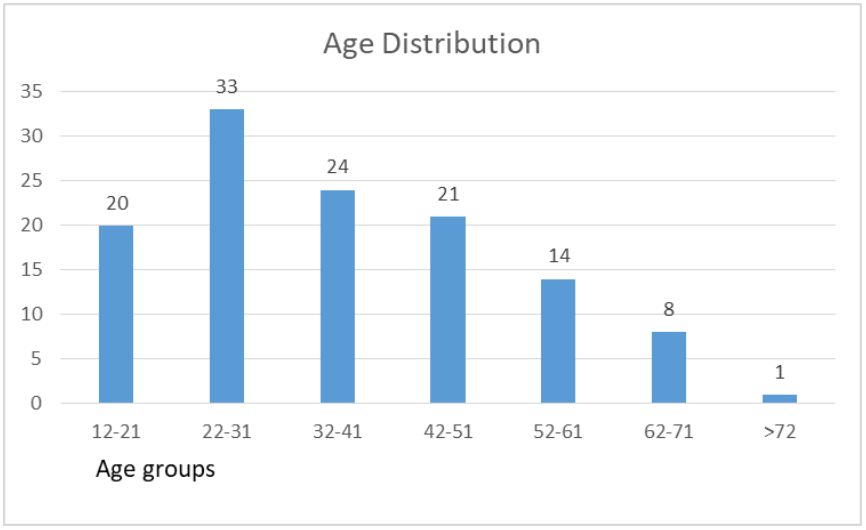

Fig1: Bar diagram showing distribution of the patients according to their age group

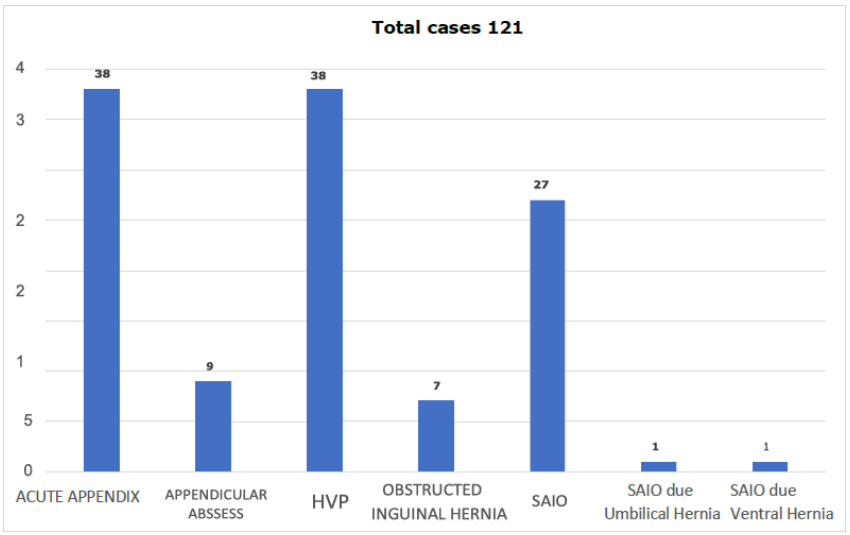

Fig 2: Bar diagram showing distribution of pre-operative diagnosis

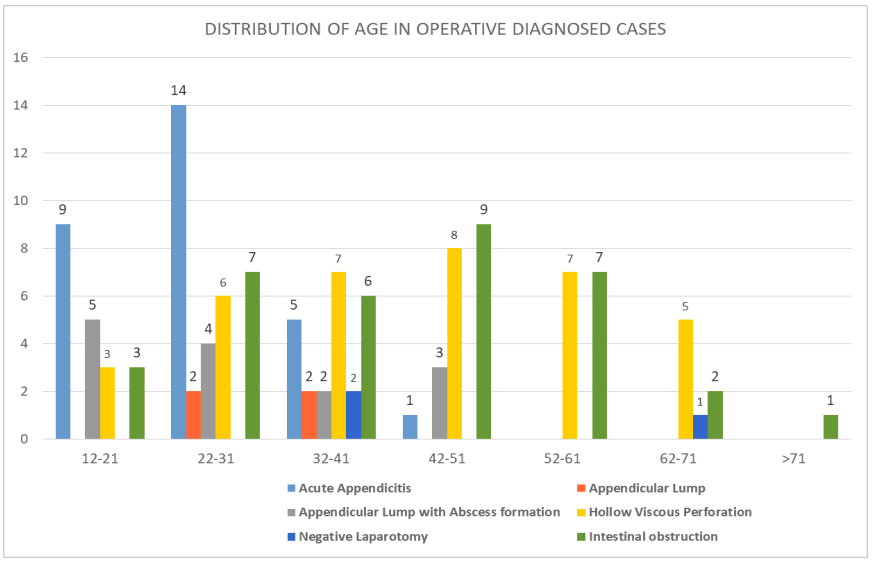

Fig 3: Bar diagram showing age distribution with Operative diagnosis

Table 1: Corelation of Pre operative and Operative diagnosis

Preoperative Diagnosis	No of cases	Correct Diagnosis	% of correct Diagnosis
Acute Appendicitis	38	29	76.31%
Bowel Perforation	38	36	94.73%
Intestinal Obstruction	29	28	96.55%
Obstructed inguinal hernia	7	7	100%
Appendicular abscess	9	5	55.55%

Table 2: Diagnostic value for various preoperative diagnosis

Diagnosis	Operative diagnosis	Other Operative diagnosis	Total N=121	p value	Sensitivity	Specificity	PPV	NPV
Acute Appendicitis								
Preop diagnosis	29	09	38	<0.001	100%	90.2%	76.3%	100%
Other Pre-op diagnosis	00	83	83					
Bowel perforation								
Preop diagnosis	36	02	38	<0.001	100%	97%	94.7%	100%
Other Pre-op diagnosis	0	83	83					
Obstructed Inguinal Hernia								
Preop diagnosis	07	0	07	<0.001	100%	100%	100%	100%
Other Pre-op diagnosis	0	114	114					
Appendicular Abscess								
Preop diagnosis	05	04	09	<0.001	71.4%	96.4%	55.5%	98.1%
Other Pre-op diagnosis	02	110	112					
Intestinal obstruction								
Preop diagnosis	28	01	29	<0.001	100%	98.9%	96.5%	100%
Other Pre-op diagnosis	0	92	92					

III. Results:

This study conducted among 121 patients, where 20 cases belonged to age group 12-21, 33 cases to 22-31 category, 24 cases to 32-41, 21 cases to 42-51, 14 cases to 52-61, 8 cases to 62-71 and only 1 case to >72 years age group in **Figure 1**. In the present study, it was found that 70% (85 cases) of the participants were male and 30% (36 cases) were female. Majority (70%) of the participants belonged to Hinduism and 30% followed Islam. In **Figure 2**, Out of 121 patients, 38 patients were diagnosed as Acute appendicitis preoperatively, and bowel perforation in 38 patients. Intestinal Obstruction found to be in 27 patients, 9 cases were diagnosed as appendicular abscess preoperatively. 9 cases were diagnosed as sub-acute intestinal obstruction due to obstructed inguinal hernia (7 cases) and 1 cases each due to obstructed ventral and umbilical hernia. The Operative Diagnosis with Acute Appendicitis was highest in 22- 31years of age group, whereas bowel perforation and intestinal obstruction were highest in the age group of 42- 51 years in **Figure 3**.

In **Table 1**, Highest correct diagnosis of 100% was seen in obstructed inguinal hernia cases and lowest 76.31% seen in Acute Appendicitis cases. Diagnostic accuracy of bowel perforation and intestinal obstruction were 94.73% and 96.55% respectively. For appendicular abscess cases percentage of correct diagnosis was 55.55%.

In **Table 2**, diagnostic value for various diseases had been shown, for all p value is < 0.000, while for acute appendicitis Sensitivity 100%, Specificity 90.2%, Positive predictive value 76.32% Negative predictive value 100% Diagnostic accuracy 92.56%. For Bowel perforation Sensitivity 100%, Specificity 97%, Positive predictive value 94.74% Negative predictive value 100% Diagnostic accuracy 98.35%, For intestinal obstruction Sensitivity 100%, Specificity 98.92%, Positive predictive value 96.55% Negative predictive value 100% Diagnostic accuracy 99.17%. Obstructed inguinal hernia, Sensitivity 100%, Specificity 100%, Positive predictive value 100%. Negative predictive value 100%, Diagnostic accuracy 100% and Appendicular abscess Sensitivity 71.43%, Specificity 96.49%, Positive predictive value 55.56% Negative predictive value 98.21% Diagnostic accuracy 95.04%.

IV. Discussion:

In the present study, in **Figure 1** age distribution of acute abdomen that underwent Emergency Laparotomy, among the 121 patients, 33 (27.3%) are between the age group of 22-31 years, while only 1 patient was above 72 years. Study by Chhetri R K et al in 2005 and Ganesh L K et al in 2017 finds similar results as the present study except a study by Harsha N S et al in 2013, where common age group was found to be 31-40. The reason for the deviation in that study might be due to difference in sample size, along with short study period. In **Figure 2**, in present study distribution of pre-operative diagnosis Acute Appendicitis and Bowel Perforation is of 31.4% with 29.75% Intestinal Obstruction. While a study by Malviya A et al in 2017, stated pre operative diagnosis of Acute abdomen for Acute Appendicitis was 61.71%, for Bowel perforation and Intestinal Obstruction was 8.57%.

In **Figure 3**, My study was comparable with Chhetri R K et al 2005 in the aspect of Acute Appendicitis, who also found it more common in the age group of 20- 29 years [9]. However, Chhetri R K et al 2005 found that Intestinal Obstruction is common in 50-59 years of age. This deviation from my study might have occurred due to a small sample size taken by Chhetri R K et al 2005. Another difference between my study and the study done by Chhetri R K et al 2005 showed that Bowel Perforation was more common in 10-19 years of age group. This may be due to Chhetri R K et al 2005 included patients of the age group 10-12 years in their study which was not included in present study because patients in this particular age group were attended to the Department of Pediatric Surgery, in our Institute.

While comparing correlation of pre operative and operative diagnosis findings in **Table 1**, present study showed percentage of correct diagnosis for Acute Appendicitis was 76.31%, for Bowel Perforation 94.73% and for Intestinal Obstruction 96.55%. These study findings were supported by studies by Al- Aquli et al in 2016 and Anil KJ et al in 2016 with similar findings.

On the other hand, while comparing diagnostic value for various pre operative diagnosis in **Table 2**, for Acute Appendicitis present study had comparable diagnostic accuracies with study done by Anil KJ et al in 2016, whereas, other studies conducted by Venkateswarlu MC et al in 2015, Al- Aqquli et al in 2016 and Chetri R.K et al 2005 had similar, but lower diagnostic accuracies for Acute Appendicitis. On comparing for Bowel perforation, present study showed 100% sensitivity and 97% specificity with 94.74% PPV, 100% NPV and 98.35% diagnostic accuracy which had similar findings with study done by Al-aquli et al in 2016, whereas varied from the studies done by Anil KJ et al in 2016, Venkateswalu MC et al in 2015 and Chhetri RK et al in 2005. Study done by Anil KJ et al in 2016 stated that Intestinal Obstruction had a sensitivity of 100% and specificity 96.4% with PPV 60%, NPV 100% and diagnostic accuracy of 93% which supports the diagnostic accuracy of the present study.

V. Conclusion:

Acute abdomen constitutes a major part of surgical patients of emergency department, often requiring surgical intervention. Various diagnostic modalities such as Laboratory, radiology and clinical judgment play a vital role in decision making and planning further management. Present study showed that Acute appendicitis and Bowel perforation were the leading cause of acute abdomen requiring laparotomy followed by and intestinal obstruction.

Acute abdomen is a surgical emergency and a challenge to any surgeon. A valid and accurate diagnostic procedure is a vital tool for the surgeon to plan the appropriate management. As had been said by Bailey “A correct diagnosis is the hand maiden of successful operation”. An accurate pre-operative diagnosis prevents Negative laparotomies.

Dr. Ponadhar Deori, et. al. “A Series of Non-Traumatic Acute Abdomen Cases Comparing Pre-Operative and Post-operative Diagnosis.” *IOSR Journal of Dental and Medical Sciences (IOSR-JDMS),* 22(3), 2023, pp. 54-57.

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