Original Article

Plain E-Ray to diagnose Acute Abdomen

Diagnostic Accuracy of Plain Abdominal Radiographs Compared with Per-Operative Findings in Patients Presenting with Acute Abdomen

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ABSTRACT

Objective: To evaluate the efficacy of plain x ray abdomen to diagnose acute pain in abdomen.
Study Design: Retrospective study.
Place and Duration of Study: This study was conducted at the Surgical Department, PMC Hospital Nawabshah from July 2017 to June 2018.
Materials and Methods: This is study of total 69 patients included both gender, 40 (57.9%) were female and 29(42.02%) male suffering from intestinal obstruction, gastrointestinal perforation, renal stones, foreign bodies, and acute appendicitis.
Results: Findings found on plain X ray abdomen were compared with per operative findings. 92% to 98% X ray findings matched with operative findings. It detected the site of abnormality and also the organ involved.
Conclusion: It has helped a lot to detect the site, level, cause and also remedy of acute abdominal pain. The per-operative findings confirmed that majority of our decisions were accurate.
Key Words: X Ray Abdomen, gastrointestinal perforations, Acute Abdomen, Renal Stone.

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INTRODUCTION

Acute abdomen has remained a dilemma for surgeons to resolve for last many centuries. To sort out the exact underlying cause of acute pain in abdomen is still challenging despite the advanced radiological investigations. The high cost of Computed Tomography (CT scan) and Magnetic Resonance Imaging (MRI) make them unavailable in every setup. Therefore it is obligatory to investigate acute abdomen by the ideal, cheap, and easily accessible imaging tool having diagnostic accuracy for the proper management of the patients.[1] In this regard, plain abdominal radiograph ensures balance between diagnostic accuracy and management plans. It has also the lower radiation exposure as well as cost.[2]

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Traditionally, imaging investigations to diagnose acute abdomen commence with plain radiographs of abdomen and pelvis taken in different views. These are deemed to be the initial and the best investigation in all setups from primary to tertiary ones[3, 4.]

In 1895, X-Ray was first discovered and it was Wilhelm Rontgen who unveiled the use of X-Rays for the medical purpose.[5]

It is observed that the most common complain of surgical patients registered in emergency department is abdominal pain and accounts for 4-10% of total emergency department visits. So it is mandatory to make accurate decision to make early surgical interventions if required.[6]

The conventional radiography is the preliminary investigation in diagnosis of gastrointestinal perforations because I ml of free gas on upright or left lateral decubitus abdominal plain films can also be detected. The increase in frequency of missed cases is solely due to in expertise technique[7, 8]. The intestinal obstruction accounts for 7% of all acute abdominal conditions. Imaging in intestinal obstruction tells the location, level of obstruction and also cause of obstruction. Plain X Ray Abdomen (Erect/Supine) is the standard tool to diagnose the disease. Of all, 50%-60% findings are diagnostic, indifferent in 20% to 30% and misleading in 10-20% of patients.

Plain abdominal as well as chest radiographs are sensitive in only 50% to 70% of cases despite the fact

that it is deemed to the first line of investigation in conditions of gastric, small bowel and large bowel perforations. Different radiological findings are used to denote distribution of free intra peritoneal gas like Rigler sign, football sign and triangle sign.[9]

A plain X Ray KUB (Kidney Ureter and Bladder) detects urinary tract stones size, site, type, shape of stones in renal system. It has sensitivity from 44% to 77% and specificity of detecting stones from 80% to 87%[10]. The standard investigation to localize ingested foreign bodies is the plain X-Ray if patient is symptomatic because most of them pass from gastrointestinal tract easily without damaging structures. In these cases, the sensitivity, specificity and accuracy of plain X Rays is 90%, 100% and 100% respectively. Acute appendicitis is rarely seen on the plain abdominal radiographs. Right Iliac Fossa calcifications can represent appendicoliths.[11]

The rationale of our study is to find out the accuracy of plain X Ray abdomen in the diagnosis of acute abdominal conditions in surgical practice so that patients may get benefit from this cheap imaging modality.

MATERIALS AND METHODS

A retrospective study of 69 patients was conducted at Surgical Department of Peoples Medical College Hospital from July 2017 to June 2018. All patients were admitted through Surgical Outpatient Department (OPD) and emergency Department. The patients suffering from acute abdomen were received; descriptive history and thorough abdominal, pelvic, inguinoscrotal and back examination in addition to digital rectal examination (DRE) were done. The provisional diagnosis was made and patient was advised to get plain X-Ray abdomen (Erect/Supine) to reach the diagnosis. After the plain abdominal radiograph, diagnosis was made and managed accordingly. Patients of intestinal obstruction, gastrointestinal perforations, acute appendicitis, renal stones and foreign body were prepared for the required surgical procedures according to the diagnosis. Apart from the routine biochemical investigations including viral markers, cardiac and anesthesia fitness was obtained. Patients along with attendants were counseled regarding the procedures, per-operative and postoperative complications. After taking consent from the patient and their relatives, patients were shifted in Operation Theater and the procedures were performed accordingly. Patients with diagnosis of ruptured ovarian cyst or uterine perforations were excluded and referred to Gynecology/obstetrics ward. Patients of aged 10 years o less than 10 were also excluded.

RESULTS

This is a retrospective study of one year from July 2017 to June 2018. Total 69 patients were admitted and study was conducted at Surgical Department of Peoples Medical College Hospital. This study included only limited conditions of acute abdomen. 33 (47.8%) presented with intestinal obstruction, 25 (36.2%) came with diagnosis of gastrointestinal perforation, 7 (10.1%) were diagnosed as renal colic, 3 (4.3%) were of acute appendicitis and 1 (1.4%) was suffering from foreign body as is shown in table No.1 below;

In 33 cases of intestinal obstruction, x ray abdomen (Erect supine) showed multiple air fluid levels at the center as well as periphery of X-Ray according to the cause. Per operatively, the findings of x ray abdomen Plain matched and showed the accuracy of diagnosis of this investigation. Of 33, 20 patients were found to be suffering from small and large bowel obstruction, 5 with tuberculosis stricture, 3 with Sigmoid Volvulus, 3 with omental bands and 2 having left sided colonic masses. The diagnostic accuracy of Plain abdominal radiograph in intestinal obstruction was 97%.

In 25 patients of gastrointestinal perforations, 18 were of illeal typhoid perforations, 3 duodenal, 1 gastric, 1 jejunal perforation and only 2 patient's X Ray Plain showed no any perforation but per operatively these were found to be suffering from tiny sealed off illeal perforations. The diagnostic accuracy of the abdominal X-rays was 92% (Chart No.1).

Table No.1: Diagnosis on basis of plain X Ray Abdomen

S. No.	Diagnosis	No of Cases	Percentage
1	Intestinal obstruction	33	47.8%
2	Gut perforation	25	36.2%
3.	Renal calculi	7	10.3%
4.	Foreign body	1	1.4%
5.	Acute Appendicitis	3	4.3%
Total		**69**	**100%**

X-ray No.1: Plain Abdominal X-ray

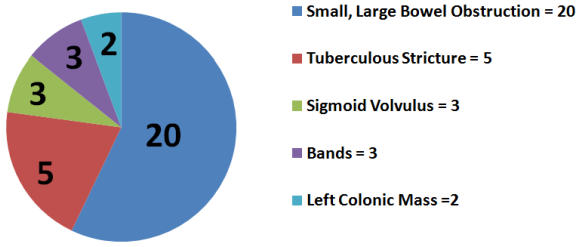
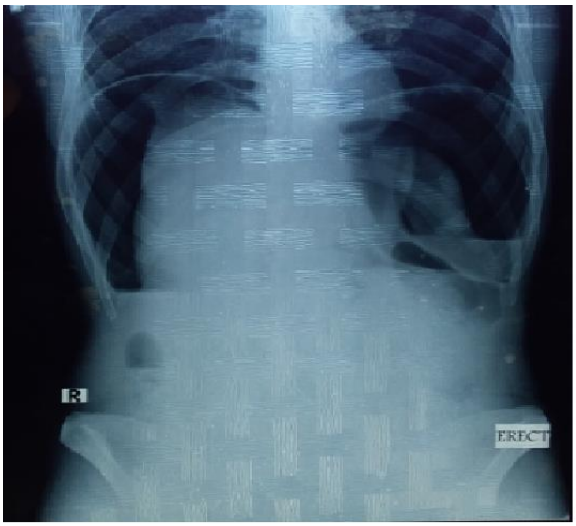


Chart No.1: Peroperative findings of patients of bowel obstruction

In cases of renal calculi, and foreign body, the accuracy of plain X-Ray was found to be 100%. But in case of acute appendicitis, the accuracy was very limited (Chart 2.)



Xray No.2:

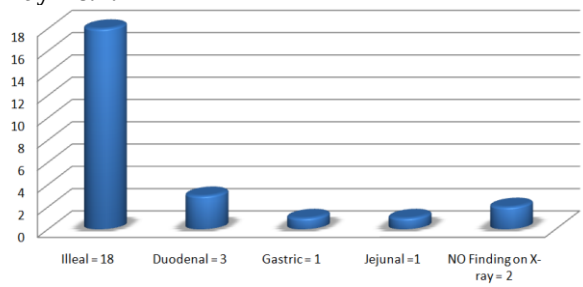


Chart No.2: Peroperative Findings Of Pneumo-peritonium

DISCUSSION

Plain X Ray Abdomen occupies an important place in surgical practice in the diagnosis of abdominal conditions. Seldom is the Surgeon found in the world who hasshun the utilization of this imaging investigation for the purpose of diagnosis of surgical abdomen. A study of 35 years from 1972 to 2007 in various stages conducted in renowned American university showed the decreasing use of Plain x-Ray due to the excessive use of Ultrasound and CT Scan but it proved that still Plain abdominal radiograph was used as primary investigation of choice in 21% of patients. In developing countries Like Pakistan where not all people has easy access to CT scan, abdominal radiograph is still considered to be and used as initial and cheap modality of choice in most of acute abdominal conditions. Time spent for X ray abdomen is less as compared to CT scan. The patient wasted 6.64 hours for latter investigation.[12]

Another study conducted on the diagnostic accuracy of plain abdominal radiography showed that in 502 (50%) patients out of 1021, the diagnosis was accurate according to abdominal radiograph. But in our study the ratio is too high ranging from 92% to 97% .[13]

Several other studies have detected the 77% of all advised plain abdominal radiographs appeared to be normal. This is not so in our study because in all cases of intestinal obstruction, renal stones, postoperative adhesions and foreign body, diagnostic accuracy was 97%. But in cases of gut perforation, it was 92%.[14]

In one study, the sensitivity of the plain radiograph in abdominal conditions was 74% and changes in decision after other investigations were done only in 16 patients out of 72. This study showed higher similarity between clinical evaluations and plain radiograph of abdomen.[15]

In a study, left lateral decubitus showed pneumoperitonium in 96% patients, chest radiographs in 85% and supine and upright abdominal radiographs in 56% and 60% respectively. Another study detected pneumoperitonium in 83% of all patients with documented visceral perforation.[16] In our study, the ratio of accuracy in these cases was 92%.Comparative study conducted to detect pneumoperitonium by chest, abdominal and ultrasound showed that 120 patients out of 126 confirmed the findings of plain abdominal radiography intra operatively. In Urological study, the plain radiography showed sensitivity of 45% and specificity of 77% for the detection of Ureteric and kidney stones.[17]

In our study, the accuracy plain radiographs in the diagnosis of acute abdominal pain conditions are quite high and satisfactory. Though it was somewhat misleading, most of the diagnosis matched with per operative findings. In cases of acute appendicitis, fecolith was shown on X-Ray abdomen.

CONCLUSION

The role of plain x ray abdomen in acute abdomen is satisfactory in our study. Despite unavailability of CT scan in emergency, preoperative findings detected matched with findings of Plain X Ray abdomen. Our study showed the higher accuracy of plain abdominal X-Ray in the diagnosis of gastrointestinal and urological conditions in our setup.

Author's Contribution:

Concept & Design of Study:	Mashooq Ali Khowaja
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Final Approval of version:	Mashooq Ali Khowaja

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

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