

## ROLE OF WATER SOLUBLE CONTRAST RADIOLOGY IN SMALL INTESTINAL OBSTRUCTION

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Received: 30/01/2014

Revised: 16/04/2014

Accepted: 22/04/2014

### ABSTRACT:

**Objectives:** To evaluate the water soluble contrast radiography as diagnostic modality in small intestinal obstruction, where plain X-ray abdomen is inconclusive. **Material and method:** Study was conducted upon 20 patients admitted in the surgical department of Geetanjali Medical college and Hospital, with features of intestinal obstruction but no concrete evidence of the same and hence underwent contrast study with water soluble contrast agent. After admission a brief history, clinical assessment and plain abdominal radiograph were taken in the standing and supine position and in case of suspicion, there the water soluble contrast study was carried out. **Results:** Total 20 patients were taken for contrast study on the basis of X-ray findings. Out of these, 6 patients showed clear cut off in the contrast level in the small intestine and were taken for surgery. Two patients in which findings were equivocal were also subjected to surgery and were found to have the intestinal obstruction. In 12 patients, dye passed freely into large bowel, so these patients were managed conservatively. Out of these, 3 Patients didn't respond to conservative management and were subjected to surgery. Thus in 17 patients' correct diagnosis could be made with the help of contrast studies. **Conclusion:** To Conclude water soluble contrast study is safe and easy to perform, and gives useful information regarding presence or absence of complete obstruction and aids in the decision making regarding the mode of management.

**Keywords:** water soluble contrast radiography, intestinal obstruction, plain X-ray abdomen

### INTRODUCTION

Intestinal obstruction is a condition which is seen commonly in surgical practice and is responsible for 20% admission in surgical emergency. (1) (2)

Mortality rates for intestinal obstruction are declining, but still remain as high as 5-11 % (3) (4). Despite of advancements made in the

management, there is no unanimity among surgeons regarding the indication for operative treatment and the role of conservative management.

Diagnosis of intestinal obstruction is considered when X-ray Abdomen in both erect and supine position shows gas and fluid levels or ladder pattern of distension in the small intestine. However similar X-ray findings are present in case of adynamic ileus and it may be difficult to distinguish between two conditions on the basis of plain X-ray alone, the diagnostic accuracy being 60 % (5)

The use of contrast media confirms the diagnosis in mechanical obstruction and prevents surgery in pseudo obstruction. The value of contrast study in small bowel obstruction is varied from useful to contraindicated. (6)

Barium sulphate has been used in the past in the diagnosis of small intestinal obstruction. It is not water soluble, particles remain discrete and tend to precipitate, after water has been absorbed, thereby converting partial obstruction to complete one. (7)

Thus the need for an improved contrast medium for the gastro-intestinal tract is quite obvious. Water soluble contrast has been considered superior to Barium sulphate because the transit time is shorter, the solution is easier to handle, nontoxic even if accidentally introduced into abdominal cavity and more important this solution does not flocculate and does not cause obstruction.

The transit time of water soluble contrast medium through gastro-intestinal tract has been found to be 30-90 minutes, and if the contrast

media stay in one area of small intestine for period of 3-4 hrs. The diagnosis of intestinal obstruction is made. (8)

Considering the above facts, this study was designed to assess the value of water soluble contrast radiography as a diagnostic tool and its ability to aid surgical decision in patients with small bowel obstruction.

## MATERIAL AND METHOD

Twenty patients who were admitted in the surgical department of Geetanjali Medical College and Hospital, Udaipur between Nov 2011- march 2013 were included in the study.

After admission history taking and a clinical assessment of the patients were done to rule out any evidence of an obvious cause of intestinal obstruction, like obstructed external hernia or any obvious evidence of strangulation obstruction.

Plain abdominal radiograph were taken in the standing and supine position, to see any evidence of intestinal obstruction.

Those patients, in whom plain X-ray abdomen could not confirm or refute the diagnosis of intestinal obstruction, were taken up for study. The patients were evaluated to bring their physiology as normal as possible.

An IV line was started, the urine output was recorded and a Ryle's was passed. Thereafter the water soluble contrast study was carried out in these patients after ensuring that they are well hydrated.

Water soluble contrast Conray 280 (Megulamine lothalmate) was used - 80 ml in adults and

around 40 ml in children. The dye was introduced through the Ryle's tube and the tube occluded. For the next four hours aspiration was not done.

Supine abdominal radiograph in the AP position were taken at 30 minutes and again at four hours after administration of dye.

The cases with a clear cut off in the contrast level in the small bowel, or if the contrast failed to reach large bowel by 4 hrs, were taken up for surgery. Cases in which second film showed persistently dilated gut loop around a fixed part or were not conclusive were taken for surgery.

The other cases in which the contrast passed off into the colon by end of 4 hour were managed conservatively.

#### **Exclusion Criteria**

1. Patients with clinically obvious intestinal obstruction such as obstructed inguinal hernia.
2. Patients suspected to have intestinal strangulation.
3. Patients who underwent barium contrast-study in immediate past.

#### **RESULTS:**

Study was conducted upon 20 patients with features of intestinal obstruction but no concrete evidence of the same and hence underwent contrast study with water soluble contrast agent.

Patients with obvious cause of intestinal obstruction or in whom there was the strong doubt of strangulation, were excluded from study.

When X-ray showed contrast in large bowel in 4 hours, these patients were considered to have no obstruction and were managed conservatively. Patients in which the contrast failed to reach large bowel in 4 hrs, were operated.

There were 11 males and 9 females in the study. Maximum incidence of intestinal obstruction was in the age group 20- 29 years and 40-49 years.

Pain was the commonest symptom and distension of abdomen was the commonest sign. Dilated gut loops were the commonest findings in supine X-ray abdomen.

In 6 patients dye showed clear cut off and on surgery all had the cause of intestinal obstruction. 2 patients in which the findings were equivocal were operated.

In 12 patients dye passed freely into colon. Out of 12 patients, 9 patients recovered on conservative management and 3 patients required surgery.

The commonest cause of intestinal obstruction was adhesive obstruction and intestinal tuberculosis. Water soluble contrast study was helpful in 85 % of the patients with intestinal obstruction and the outcome could be correctly predicted.

There was no side-effect noticed due to contrast agent. Mortality rate, observed in the study was 10 %.

**Table 1. Results of contrast media in diagnosis of intestinal obstruction**

Intestinal obstruction					
Contrast media Test	Present	n	Absent	n	Total
Positive	True Positive	a=8	False Positive	b=0	a + b = 8
Negative	False Negative	c=3	True Negative	d=9	c + d = 12
Total		a + c = 11		b + d = 9	

**Table 2 Stastical analysis of test using Contrast media**

Sensitivity	$\frac{a}{a + c}$	= 72.73 %	95% CI: 39.08 % to 93.65 %
Specificity	$\frac{d}{b + d}$	= 100.00 %	95% CI: 66.21 % to 100.00 %
Positive Likelihood Ratio	$\frac{\text{Sensitivity}}{100 - \text{Specificity}}$	= 72.73 %	95% CI: 67.559 to 100
Negative Likelihood Ratio	$\frac{100 - \text{Sensitivity}}{\text{Specificity}}$	= 0.27	95% CI: 0.10 to 0.72
Disease prevalence	$\frac{a + c}{a + b + c + d}$	= 55.00 % (*)	95% CI: 31.55 % to 76.90 %
Positive Predictive Value	$\frac{a}{a + b}$	= 100.00 % (*)	95% CI: 62.91 % to 100.00 %
Negative Predictive Value	$\frac{d}{c + d}$	= 75.00 % (*)	95% CI: 42.84 % to 94.22 %

## DISCUSSION

Small bowel obstruction is an important cause of admissions in surgery departments of hospitals

with adhesions being the leading cause. A patient with small bowel obstruction is necessitating a

correct and timely diagnosis for proper management to save his life.

In the present study, 50 % of the patients were seen in the less than 40 years of age group. Jean-Jacques Duron J.J. et al found that age of less than 40 years was a risk factor for the small intestine obstruction. The reason that less patient was seen in the age group of < 40 yrs may be due to the presence of Kalawati Saran children hospital in near vicinity. **(8)**

Sarr et al (1983) found a male: female ratio of 1.14: 1. **(9)** In the present study male: female ratio 1.2: 1. The degree of male predominance in our study is consistent with the previous studies.

Out of the cardinal features of intestinal obstruction i.e. pain, vomiting, distension and obstipation, all four were not present in all patients of intestinal obstruction, but were present in the varying combination each patient.

La Pass et al too found that patients commonest complaint were either crampy abdominal pain or vomiting and abdominal distension along with high pitched bowel sound were commonest physical findings. **(10)** Similar conclusion was derived in our study. The high incidence of abdominal pain could be due to the fact that it is the pain that makes the patients aware of their problem and brings them to the hospital.

Plain X-ray was done in the patients suspected of obstruction. Maglente DD reported in their series that plain X-ray abdomen was diagnostic in 60% of cases. **(11)** Our present study diagnostic accuracy of plain X-ray abdomen was 60 %, which is same with literature.

In the present study, dye passed freely into colon in 12 patients. Out of these 12, 3 patients required surgery as their obstruction didn't relieved on conservative management. One of these patients refused surgery, one patient had the band as the cause of obstruction, one patient had appendicular perforation with flimsy adhesion. So the surgery could be avoided in 45% of the patients. Hok-Kwok Choi (2002) performed contrast study in nineteen patients. The use of Gastrografin significantly reduced the need for surgery by 74%. **(12)** Joyce et al managed 112 patients out of 127 patients without surgery on the basis of the water soluble contrast study. **(13)**

In the contrast study, when there was clear cut off, patients were considered to have complete obstruction, therefore subjected to surgery. Joyce et al operated on 15 patients out of 127 patients based on water soluble contrast radiography, as study showed clear cut off of the contrast level. **(13)** Dunn et al in their study of 327 patients, performed surgery in 42 patients, based on contrast study. **(14)**

They found causes as multiple adhesion, single obstructing band, intussusceptions, etc. In the present study 6 cases showed clear cut off in the contrast level and underwent surgery. All of them had intestinal obstruction proved on laparotomy.

When the contrast radiology does not fulfil the criteria of either obstruction or free passage, the surgeon is obliged to perform an operative procedure in order to make a diagnosis.

In the present study two patients, who had equivocal finding, were operated. One of them had pyloric stenosis with Para duodenal

herniation and other patient had carcinoma hepatic flexure.

In the present study ten patients were operated. The commonest cause of intestinal obstruction was adhesive obstruction accounting for 30 % of all cases of obstruction who underwent surgery, Ileo-caecal tuberculosis accounted another 30%, Malignancy 10%, Pyloric stenosis 10%, Congenital band logo, appendicular perforation with adhesions 10%.

Post operative adhesion has been regarded as an important cause of small intestinal obstruction. Reports from the western world shows very high incidence of adhesive obstruction where as the reports from lesser developed regions are constituted by hernia, intussusception and volvulus. Joyce et al found post operative adhesion as cause of small intestinal obstruction about 30% of patients in a study of 127 patients. (13)

Present study notices the higher incidence of abdominal tuberculosis causing obstruction. Tuberculosis is a disease seen very commonly in clinical practice in India and the same is reflected in our results.

There was no significant procedure related adverse effect seen during study. Contrast agent didn't induce significant dehydration due to their osmotic effect. Contrast density was observed to be good up to jejunum and proximal ileum.

But in the terminal ileum, there was definite loss of the contrast density due to dilution of contrast. The other disadvantage of the contrast study was that it tells only about the presence or absence of obstruction and does not tells about cause of obstruction.

There was no procedure related mortality in the study. In the present study 2 patients expired of which one was having carcinoma hepatic flexure, and the other was a case of adhesive obstruction with gangrenous patches in ileum, who died of septicaemia.

Use of contrast study in the diagnosis and management of small intestinal obstruction has been studied by various workers. Dunn et al found that contrast radiography is helpful in 50-80 % of cases of intestinal obstruction. (14)

Chung CC derived useful information from 89 % of contrast studies performed in the setting of intestinal obstruction.(15) Riveron et al found that contrast studies helpful in 86 % of patient with intestinal obstruction.(16)

In present series contrast study was helpful in 85% of the patients, which is comparable with literature.

## CONCLUSION

To conclude, water soluble contrast study is easy to perform, safe and gives useful information regarding presence or absence of complete obstruction and aids in the decision making regarding the mode management.

**Funding:** No funding sources

**Conflict of interest:** None declared

**Ethical approval:** The study was approved by the institutional ethics committee

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