

Research Article

Oral contrast radiography evaluation in adhesive intestinal obstruction

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ABSTRACT

Background: Adhesive small bowel obstruction (ASBO) is a common cause for admission in the surgery casualty. Non-operative management is initially recommended unless there is suspicion of complication, but its optimal duration is controversial. The aims of this study were to evaluate the usefulness of radiographic small bowel examination with contrast medium to predict the need for surgery in ASBO and to decrease late-surgery morbidity.

Methods: This prospective observational study was carried out in a tertiary apex institute in Kerala, India enrolling 50 patients with clinical and radiological features of adhesive SBO. The past surgical history, as well as clinical picture, blood tests and radiological findings in these patients were studied. Fifty millilitres of 5% barium suspension were given via naso-gastric tube, and plain abdominal radiographs were taken at 6 and 24 hours afterwards. The primary variable assessed was the presence/absence of contrast in right colon. Surgical intervention was decided upon, based on the treating surgeon's discretion.

Results: In 36 patients, barium contrast appeared in the right colon. In the remaining 14 patients, no evidence of barium contrast in the right colon was seen, and 8 of them underwent surgery, while the other 6 were treated conservatively. There was a statistically significant relationship ($p < 0.01$) between the presence of contrast medium in the right colon and being treated conservatively. There was also a statistically significant ($p < 0.05$) relationship between index case being one for malignancy and undergoing laparotomy for ASBO in the study.

Conclusions: Early oral administration of a radiological contrast medium in patients with adhesive small bowel obstruction can effectively predict the need for a surgical procedure. It can shorten not only hospital stay, but also the potential morbidity of late surgery, secondary to a prolonged and unsuccessful non-operative treatment.

Keywords: Adhesion, Small bowel obstruction, ASBO, Barium, Radiography, Oral contrast

INTRODUCTION

Intestinal obstruction is a common cause of admission in the surgical ward and casualty. In the wide spectrum that is intestinal obstruction, there are various subtypes, of which adhesive small bowel obstruction (ASBO) is an enigma still elusive of clear therapeutic ideas. The dilemma of whether to operate or to continue non-operative treatment and if so, for how long, is the question being asked; around a quarter of adhesive intestinal cases are being operated and that too with mixed results.¹ Even if the patient is placed on a non-

operative regime, the duration of the 'waiting' period and when to intervene surgically is also important, in preventing undue morbidity to the patient.²

The role of oral contrast radiography in being able to predict the need for surgery in this dilemma has been studied in this study so as to develop a tool for better categorisation and management of patients with this disorder. Aim of the study was to study the usefulness of radiographic intestinal examination with contrast medium to predict the need for surgery in adhesive intestinal obstruction.

METHODS

The study conducted was a prospective observational study done at Government Medical College, Calicut, Kerala, India over the period from 1st March 2013 to 1st November 2014. Patients who sufficiently fulfilled the inclusion criteria were inducted into the study after attaining their written informed consent for the same. Age group included was >18 years.

Inclusion criteria

- Patients presenting to the casualty with features suggestive of subacute small bowel obstruction, defined as patients who are admitted to the hospital with constipation, abdominal distension, vomiting, ±abdominal pain and with dilated small bowel loops ±air fluid levels on abdominal radiograph (X-Ray) with previous history of abdominal surgery.

Exclusion criteria

- Patients who previously had total or subtotal colectomy.
- Patients who appeared to have early postoperative obstruction (within 4 weeks) and ileus.

Study method

Patients who satisfied the criteria for selection were individually inducted into the study group after obtaining their detailed informed consent.

A thorough physical and radiographic examination was conducted. Routine blood tests were sent for. Special emphasis was placed on history of previous abdominal surgeries, drug intake (narcotics, sedatives, psychiatric medications).

Past history of surgeries, identification of the index surgery (if >1 previous surgeries were present), time since last surgery, previous admissions for small bowel obstruction (SBO) and also whether the index surgery was for malignancy were noted. Whether chemoradiation was done in malignant cases was also noted.

Presence of any intra-operative complications due to the administration of barium was also noted. After obtaining a routine abdominal erect and supine x-ray on presentation, patient was placed on nil per oral (NPO), intravenous (I.V.) fluids, a naso-gastric tube inserted and gastric aspiration done. After 2 hours, 50 ml of 5% barium suspension was given through the naso-gastric tube and tube clamped for 60 min. A repeat abdominal x-ray was taken 6 hours after instilling contrast and findings noted. Another abdominal x-ray was taken 24 hrs after contrast administration and findings noted. Primary outcome watched for was presence/absence of contrast in right colon. Treatment was determined by the attending surgeon on the basis of clinical and laboratory

findings, as well as plain x-ray findings. The surgeon was not given the results of this study to avoid bias.

Final diagnosis was established at laparotomy, in patients who were treated operatively and by clinical judgment (based on the overall clinical findings) in patients who were relieved of their symptoms and signs with non-operative treatment. Barium concentration and volume was so fixed, that it did not adversely affect the prognosis, if the patient had to be subjected to a laparotomy or otherwise, based on literature as well. Any patient developing acute pain or deteriorating clinically were excluded from the trial.

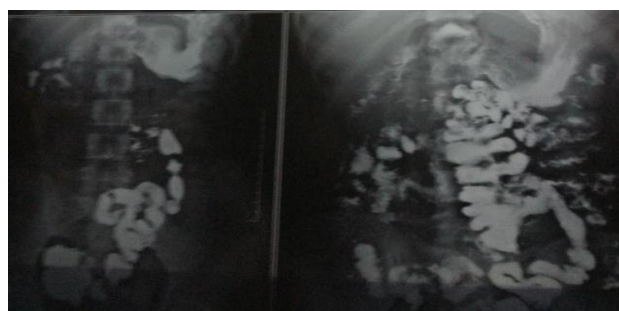


Figure 1: Serial X-rays showing contrast in small bowel that later reaches colon.



Figure 2: Presence of contrast in small bowel but not in colon.



Figure 3: Erect X-ray after contrast administration showing air fluid levels but no contrast even in small bowel.

Statistical analysis

Data were included in a data base and analyzed with the statistical software program SPSS (v 18.0.0 for Windows).

Looking for a variable having association or not, Student's 't' test was used for quantitative variables, and a Chi-square test in case of dichotomic variables. A $p < 0.05$ was considered significant.

RESULTS

The sample size of the study was 50 patients that were included in the study period. Of these, 36 (72%) were male while females constituted the remaining 28% (14). The mean time between present admission and previous abdominal surgery was 4.24 years (SD 6.52).

One patient who was initially included in the study had developed acute pain and was operated before completing the study and was therefore excluded from the trial. She had a small bowel volvulus with band.

Of the 50 study patients, 36 (72%) had radiographic evidence of barium contrast in the right colon which was considered to be the primary variable in this study. 14 (28%) patients didn't have evidence of barium in the right colon even though there was evidence of contrast in the small bowel of 11 patients.

3 patients had total absence of contrast- in their small and large bowel; all of whom ended up being operated. Of all the types of previous abdominal surgeries, open appendectomy was the single most common surgery, present in 12 patients.

Surgery for malignancy was the index case for 15 patients, out of which 8 were operated during the study. Intra-op findings in these cases were mostly adhesions. Any recurrences were excluded from the study. Out of the 35 patients who were operated initially for benign conditions, only 4 were operated in the study, such that, there exists a statistically significant association between the index case being one for malignancy and being operated in the present admission ($p < 0.05$).

Table 1: Operated or not versus malignancy as index case.

		Malignancy as index case		Total
		No	Yes	
Operated or not	No	30	8	38
	Yes	5	7	12
Total		35	15	50

Table 2: Operated or not versus X-ray findings.

		Contrast in colon		Total
		No	Yes	
Operated or not	No	6	32	38
	Yes	8	4	12
Total		14	36	50

There lies a statistically significant relationship between presence of contrast in colon and not undergoing laparotomy, such that the presence of contrast in colon is a predictor for patient successfully completing conservative management ($p < 0.01$).

Of the 12 patients who underwent laparotomy, none of them experienced complications related to contrast medium administration. No cases of perforation with barium spillage in the peritoneal cavity were found, and the presence of barium did not increase the difficulty of small bowel resection. 12 patients had undergone laparotomy, which were further divided into those having isolated adhesiolysis and those requiring bowel transection, mainly resection and anastomosis. 7 of the 12 patients had undergone resection and anastomosis ± adhesiolysis. Of these patients, no patients had any evidence of contrast in colon even after 24 hours.

5 patients had undergone isolated adhesiolysis. Of these patients, 4 patients had radiographic evidence of contrast in right colon during the study. All 3 of the patients who didn't show contrast in small or large bowel even after 24 hours had undergone laparotomy. Of the 12 people who underwent laparotomy, 2 patients had undergone previous laparotomy for adhesive obstruction, both of whom had index case for peritonitis. One patient died during his admission, who had undergone laparotomy and had post-operative respiratory and cardiovascular complications.

DISCUSSION

The most frequent cause of acute small bowel obstruction is postoperative adhesion. In the absence of strangulation, initial trial of conservative treatment is given to most patients. Non-operative conservative management is indicated in the case of partial obstruction. The reported operative rate for adhesive small bowel obstruction ranges from 27% to 42%, and was found to be 24% in the present study.^{1,2} Seror et al reported that nonoperative management of up to 5 days duration can be used safely for the majority of patients with postoperative bowel obstruction.

Hostetter suggested that small bowel obstruction should be treated surgically if obstruction is not resolved within 12 hours of conservative treatment.³ Cox et al reported that of patients who were cured by conservative treatment, 88% had obstruction resolved within 48 hours.⁴

While Brolin and colleagues found that failure of conservative treatment requires prompt laparotomy usually within 24 hours.⁵ Sosa and Gardner found that patients with adhesive small bowel obstruction may be treated non-operatively for 24-48 hours, if no signs of strangulation are noted.⁶ However, Bizer et al. suggested that 48-72 hours is a sufficient period for non-operative management.⁷ Some authors have also showed that

absence of gas in the large bowel, electrolyte disorders, and inframesocolic location of previous surgery; all had an independent predictive value for surgical intervention.

No single diagnostic tool is good enough to be followed in all cases. Also, the possibility of resolution of adhesive small bowel obstruction must be weighed against the need to decrease the complication of delayed surgery.⁸ Thereby, the question of whom to operate and when to operate is one to ponder upon. Fifty patients were selected for the study and included into it after careful clinical examination, radiographic and biochemical evaluation, and proper history. Special emphasis was given on the detailed history of previous admissions, previous surgeries and type of previous surgeries.

The age ranged from 18 to 75 years. The younger patients included those having history of surgeries for congenital defects as well for emergency surgeries, among which appendectomy was the most frequent surgery. Almost all of these surgeries were open surgeries, highlighting the effect of peritoneal manipulation on post-op adhesion formation. Studies have reported that appendectomy and colorectal surgery are the procedures that most commonly caused adhesive obstruction.^{2,4,9,10} In a similar study by García JP et al, which studied the role of barium contrast in predicting need for surgery in adhesive intestinal obstruction, appendectomy was found to be chief culprit, forming the bulk of the past history of the patients included in the trial.⁹

Reasons for the association with prior appendectomy may include the high incidence of the procedure among emergency procedures in our institution, the high probability of abscess, mass and rupture complicating the case. The high incidence of peritonitis causing future adhesions is well documented.¹¹ Among other surgeries commonly encountered in the past history, colorectal surgeries also had an important presence being present in the history of 10 of the 50 cases studied (20%).

Other abdominal surgeries forming a significant proportion included gynaecological and upper G.I. surgeries, mainly duodenal ulcer perforations. All patients in the study had a history of at least one previous abdominal surgery, the mean being 1.52 surgeries (SD 0.909). This again concords with previous reported studies. In studies conducted by Wadani HA et al and Garcia JP et al also, almost 60-70% of patients had a history of only one previous surgery.^{4,9} This again signifies that even a single peritoneal entry can lead to the formation of adhesions and later adhesive small bowel obstruction.

Most patients who were included in the study had presented with complaints of progressing constipation and abdominal distension; vomiting was present in a few patients. Severe abdominal pain was almost always subjected to aggressive management, leading to a laparotomy.

Rates of operation in ASBO varies between 27-42% in various studies, and in the present study was found to be 12 out of 50 (24%).¹ The fact that previous abdominal surgery of the in inframesocolic compartment increases this rate is well known.^{1,2}

The mean period of time between the abdominal surgery and present admission was found to be 4.24 yrs (SD 6.52). In the study done by Garcia JP et al, the mean duration was found to be 5.5 years. In our study, it was also found to include subjects presenting as many as 40 years after the initial surgery. The fact that the index surgery was done that long back, may not be protective against developing fresh attacks of adhesive obstruction.

The presence/absence of contrast in colon was our primary variable and the factor studied in this study. Serial x-rays were taken first at presentation, then 6hrs and 24hrs after contrast administration. 72% of subjects had contrast in colon while only 14 (28%) didn't have any contrast in colon even after 24 hours. Of the 36 individuals showing contrast in colon, 4 got operated. All these 4 patients were found to have adhesions intra-op. No major bowel resection was needed in these 4 patients. This study while trying to find those cases that need to be operated, also may be helpful in avoiding laparotomies confined to isolated adhesiolysis. The fact that none of these 4 patients needed a major procedure like bowel resection and anastomosis is a finding that helps our cause.

14 patients showed no contrast in colon after 24 hrs. Of these 8 patients underwent laparotomy. 7 patients needed a resection and anastomosis±adhesiolysis. 7 of the 8 patients who were operated, who didn't have contrast in colon, needed a major procedure. That brings out the true essence of conducting this study; in predicting those that need surgery.

Therefore, there lies a statistically significant relationship between the absence of contrast in colon and the probability of undergoing laparotomy in this study (p value <0.01), thereby fulfilling our primary aim in being able to predict the need for surgery in ASBO. Another important aspect in the results was the total absence of contrast –in either the small or large bowel– in the plain abdominal radiographs of 3 patients. All of them underwent surgery because of lack of clinical improvement.

A most probable explanation is that the absence of contrast was due to severe loop distension, with subsequent fluid and air accumulation and contrast dilution. It is reasonable to conclude that clinical improvement after nonoperative treatment is unlikely with such an extensive obstruction. Other authors have shown that the amount of nasogastric tube drainage, as well as the grade of dilatation of the small bowel loops, is predictive of surgical management.¹²

Another avenue that was explored during this study was to find if any association existed between the index case (first abdominal surgery) being one done for malignancy and the probability of undergoing laparotomy during this admission. During history evaluation, this was also noted.

There were 15 patients for whom the index case was for malignancy, of which 8 underwent laparotomy in this study. Of the 35 patients for whom the index case was for a benign cause, only 4 underwent laparotomy. This association was statistically significant (p value 0.014). This shows that, there exists a significant association between the index case and the present end-point. If the index case was for malignancy, the chance for patient needing laparotomy for adhesive intestinal obstruction is significant. This is in concordance with results obtained in a study by Saleh M Abbas.¹²

A barium contrast concentration of 5%, as determined after discussion with the Radiology Department, theoretically prevented the risk of complications. This was calculated as the minimum concentration needed to allow a proper view of contrast in the bowel lumen. No patient experienced complications related to contrast medium administration. No cases of perforation with barium spillage in the peritoneal cavity were found, and the presence of barium did not increase the difficulty of small bowel resection.

The use of a water-soluble contrast medium, Gastrografintm has also been evaluated in other studies with the aim of predicting the need for surgical intervention in SBO. It is also said to have a possible therapeutic role due to its osmotic properties, but more studies are warranted regarding this. In a randomized study, Assalia et al. suggested that GastrografinTM administration shortened hospital stay and the need for surgery by 10%.¹³ On the other hand, Feigin et al and Fevang et al. found no such advantages.^{2,14}

Chen et al studied the predictive value of this type of water-soluble contrast in the management of adhesive SBO.⁸ They showed that patients with contrast in the right colon within 24 hours were all successfully managed with nonoperative treatment. Laparotomy was necessary in 96% of patients who had no contrast in the right colon within 24 hours.

This study confirms the results obtained by Chen et al., but using a diluted barium suspension.⁸ Barium was preferred in our study of adhesive small bowel obstruction as it was not as easily diluted by enteric fluid as Gastrografintm and provides a better mucosal image on radiography. The possible complications for barium are inspissation causing complete obstruction and spillage into the peritoneal cavity in case of a perforation. Both these complications were taken care of in our study by using a dilute solution so as to ensure safety without compromising on radiographic utility. Also, Gastrografintm was known to be rarely associated with

complications like anaphylactoid reactions and lethal aspiration.

CONCLUSION

On successful completion of the study and careful analysis of the data compiled and evaluation of parallel studies, we have come up with the following key points regarding this work-

- Oral contrast radiography holds an important role in management of adhesive small bowel obstruction as a key predictor of need for surgery in such patients.
- This tool might also help to decrease hospital stay and potential late-surgery morbidity, as well as avoiding unnecessary laparotomies.

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Ethical approval: The study was approved by the Institutional Ethics Committee

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