

# Role of Water Soluble Contrast Agents in Assigning Patients to a Non-Operative Course in Adhesive Small Bowel Obstruction

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## Abstract

**Objectives:** Adhesive small bowel obstruction (SBO) is a common surgical emergency. It is estimated that at least 60% of SBO are due to post-operative adhesions. Water soluble contrast agents (gastrografin) have been used to identify patients who might be treated non-operatively. This study aims to determine the role of gastrografin in adhesive intestinal obstruction patients.

**Methods:** In this prospective study, 27 patients admitted between 1<sup>st</sup> August 2004 and 1<sup>st</sup> July 2006 with clinical signs suggestive of postoperative adhesive SBO met the inclusion criteria. After intravenous hydration, nasogastric tube insertion and complete suctioning of the gastric fluid, 100 ml of gastrografin was given and plain abdominal radiography was taken 6 hours and 24 hours if the contrast is not seen in the colon. Those in whom the contrast reached the colon in 24 hours were considered to have partial SBO and started oral intake. If gastrografin failed to reach the colon in 24 hours and the patient did not improve in the following 24 hours, laparotomy was performed.

**Results:** Conservative treatment was successful in 31 cases (91%) and 3 (9%) required operation. Patients treated conservatively had short hospital stay (mean=4 days) and tolerated oral feeding with no morbidity or mortality.

**Conclusion:** Oral gastrografin helps in the management of patients with postoperative adhesive SBO.

**Keywords:** Water soluble contrast agents; Adhesive small bowel obstruction; Conservative management of adhesive small bowel obstruction.

## Introduction

Small bowel obstruction (SBO) is a common cause of emergency surgical admissions.<sup>1,2</sup> It is estimated that 60% of small bowel obstruction is due to postoperative adhesions.<sup>3</sup> Traditionally, most of the patients with Adhesive (SBO) respond to conservative

management. However, surgical intervention may be required in 20-30% of patients who develop serious complications such as strangulation, which can develop when surgery is delayed for more than 48 hours or do not respond to conservative treatment.<sup>4</sup> Gastrografin (sodium diatrizoate, meglumine diatrizoate, schering, New Zealand) have been found to be helpful for predicting the outcome of obstruction.<sup>5</sup> The aim of this study is to determine the role of gastrografin in predicting patients with adhesive small bowel obstruction who will respond to conservative treatment.

## Methods

This prospective study was conducted between 1<sup>st</sup> August 2004 and 1<sup>st</sup> July 2006 at King Fahd University Hospital, Al Khobar, K.S.A. The study included 27 patients with 34 adhesive small bowel obstruction episodes who were admitted consecutively. The inclusion criteria were as follows: (a) clinical symptoms and signs compatible with small bowel obstruction including abdominal pain, distention, nausea, vomiting, abnormal bowel sounds and constipation and, (b) a plain abdominal radiograph showing dilated small bowel loops and air fluids levels. Patients were excluded if: (a) they had signs suggestive of intestinal strangulation present at admission including fever, intractable pain, leukocytosis or signs of peritonitis, (b) if the cause was something other than adhesions e.g. inflammatory bowel disease, external hernia, malignant disease or prior abdominal irradiation, (c) the obstruction developed within the first 4 weeks after abdominal surgery, (d) previously had total or subtotal colectomy, (e) allergy to iodine, and (f) pregnancy.

All patients had a thorough history and physical examination and were managed by intravenous hydration with Ringer's lactate solution to correct dehydration and electrolyte imbalance. Nasogastric tube was inserted and after complete suction of gastric fluid, 100 ml of undiluted gastrografin was administered through the nasogastric tube after written informed consent was obtained, then the tube was clamped for 3 hours and the patient was kept in semi-sitting position. Planned abdominal radiography was taken at 6 hrs and 24 hrs. Patients with contrast reached colon were considered to have partial small bowel obstruction, thus the nasogastric tube was removed and the patients were given liquid diet followed by soft diet. Patients in whom gastrografin failed to

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reach the colon after 24 hours were considered to have complete small bowel obstruction and underwent laparotomy if there was no clinical or radiological improvement in the following 24 hours. The attending surgeon regularly assessed the patients' condition during the hospital stay for any signs that would suggest the need for surgery. The patients were discharged when symptoms had resolved and they were able to tolerate regular diet.

The data collected for each patient included: age, sex, type and time of previous operation, previous attack of intestinal obstruction, other medical illness outcome, hospital stay and surgical intervention.

## Results

From August 2004 to July 2006, 27 patients with 34 episodes of adhesive small bowel obstruction were included in the study. Another three patients were excluded (mesenteric ischemia in 2 patients and one with colonic carcinoma presented with small bowel obstruction and had previous splenectomy). The mean age was 38.2 years (range: 19-69). Twenty-two patients were males and 12 females; and nine patients (26.5%) had associated medical illness. There were 44 previous operations, 28 patients had undergone a single previous abdominal operation. The most common operations were: Cholecystectomy and appendectomy (Table 1). Twenty-five patients were treated conservatively in 31 cases (91%). (Table 2)

**Table 1:** Demographic data of 27 patients adhesive small bowel obstruction.

| Data   | No.      |
|--|----------|
| Number of patients with SBO                                    | 30       |
| Patient included   | 27       |
| Patient excluded   | 3        |
| Episodes of adhesive small bowel obstruction patients included | 34       |
| Age (year)   | 19-69    |
| Sex (M:F) per episodes   | 22:12    |
| Co-morbidities   | 9(26.5%) |
| Previous surgeries   | (1-3)    |
| Cholecystectomy  | 10       |
| Appendectomy   | 8        |
| Hepatic surgery  | 5        |
| Gastroduodenal surgery   | 5        |
| Small bowel excision   | 5        |
| Splenectomy  | 4        |
| Gynaecological surgery   | 4        |
| Colonic surgery  | 2        |
| Abdominal vascular surgery                                     | 1        |

Four of them re-admitted twice and one was re-admitted three times. Repeated abdominal radiography showed gastrografin in

the colon after 6 hours in 28 episodes (91.3%) and after 24 hours in (9.7%) while the mean hospital stay was 4 days (2-8). The only patient who stayed 8 days was diabetic and had hypertensive coronary artery disease and previous abdominal vascular occlusion operation. Three patients (9%) underwent laparotomy after gastrografin failed to reach the colon in the first 24 hours and no clinical improvement was observed in the next 24 hours (Table 2). Adhesiolysis was performed in two patients and small bowel resection in one patient. One patient was re-admitted with symptoms of small bowel obstruction and was managed conservatively. The time between admission and operation was planned in the protocol of the study after 48 hours, but one patient was delayed by one more day to control his blood sugar. The mean hospital stay was 8.3 days (7-10). All patients were discharged after resolution of their symptoms and once they tolerated oral feeding. No intra or postoperative complication and no mortality were reported. All the data analysis was done for the SBO cases.

**Table 2:** Outcome after administration of oral gastrografin.

| Total                    | 34 episodes |   |
|--------------------------|-------------|---|
| Conservative             | 31(91%)     | Surgical 3 (9%)   |
|                          |             | Adhesiolysis 2  |
|                          |             | Bowel resection 1                                       |
|                          |             | Interval between admission and operation 2.3 days (2-3) |
| Readmission              | 6           | 1   |
| Hospital stay(days) mean | 4(2-8)      | 8.3(7-10)   |
| Abdominal radiography    |             |   |
| After 6 hours            | 2.8(90.3%)  |   |
| After 24 hours           | 3(9.7%)     |   |

## Discussion

Adhesive small bowel obstruction is a common surgical problem but the optimal period of conservative treatment is of controversial issue before surgical intervention. Seror et al.<sup>6</sup> reported that non-operative 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.<sup>7</sup> While Brodin and colleagues found that failure of conservative treatment requires prompt laparotomy usually within 24 hours.<sup>8</sup>

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.<sup>9</sup>

However, Bizer et al. suggested that 48-72 hours is a sufficient period for non-operative management.<sup>10</sup> The possibility of resolution of adhesive small bowel obstruction must be weighed against the need to decrease the complication of delayed surgery.<sup>11</sup> The present study suggests that operation should be performed in patients in whom Gastrografin fails to reach the colon within 24 hours.

Different methods have been used to predict which patient will best benefit from non-operative treatment. Recent reports have indicated that abdominal computed tomography and ultrasonography may improve the diagnostic accuracy of bowel strangulation increasing the safety of conservative treatment. The use of gastrografin in the management of adhesive bowel obstruction has been evaluated in recent years.<sup>12</sup>

Gastrografin is a water-soluble contrast medium of high osmolarity composed of sodium diatrizoate, Meglumine amidotrizoate and wetting agent (polysorbate 80). The real value of gastrografin in this study was early detection of patients who could be confidently managed non-operatively. This study identified 91% of the patients who were treated conservatively.

Gastrografin may also have therapeutic effects in adhesive bowel obstruction because of its hyperosmolarity. Gastrografin also promotes shifting of fluid into the bowel lumen and increases the pressure gradient across the obstructing site.<sup>13</sup> The bowel contents are diluted and in the presence of wetting agent, easier passage of the bowel content through narrowed lumen is allowed; thus gastrografin also decreases bowel wall edema, and enhances bowel motility.<sup>13-15</sup>

Furthermore, gastrografin is water soluble and relatively safe even if the obstruction is complicated by perforation. Complications from the use of gastrografin in small bowel obstruction are rare, although anaphylactoid reaction and lethal aspiration have been described.<sup>16,17</sup> Gastrografin may also shorten postoperative ileus and relieve intestinal obstruction caused by impacted ascaris lumbricoides and bezoar.<sup>16-18</sup> In this study, all patients with the contrast observed in the colon within 24 hrs were treated conservatively. On the other hand, surgery was performed in all the patients in whom the contrast failed to reach the colon within 24 hrs. There was no complication that could be attributed to the use of gastrografin in this study.

## Conclusion

All patients with adhesive small bowel obstruction in whom the contrast reaches the colon in 6 hrs may be successfully treated conservatively as Gastrografin may have a therapeutic effect in addition to its diagnostic effect and permits early oral intake and discharge from hospital.

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