

Therapeutic Role of Gastrografin in the Management of Adhesive Small Bowel Obstruction

Original
Article

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ABSTRACT

Background: Adhesive small bowel obstruction (ASBO) is often managed conservatively, but laparotomy may be the final step. Numerous researchers have examined the benefits of oral gastrografin for both assessment and treatment of ASBO, but no clear consensus has been reached.

Aim: To assess gastrografin's role in the conservative management of ASBO.

Methods: This research comprised 70 participants with an ASBO diagnosis. Patients were assigned to the gastrografin and control groups. After receiving 100 milliliters of oral gastrografin, abdominal radiographs were taken repeatedly. Laparotomy was performed on patients whose large bowels did not get the contrast within one day since they were considered to have total blockage. Conservative therapy was continued for patients whose large bowel received the contrast within 24 hours. The resolution of the adhesive attack was assessed clinically and radiologically, and the duration of hospitalization was estimated.

Results: The gastrografin group saw a 17% surgery rate, compared to 37% in the control group. In individuals whose colon was not reached by contrast within a day, surgery was required in 100% of cases, and in 3.3% of cases, it did. Patients' obstructive symptoms resolved sooner in those who got gastrografin. Compared to the control group (5.8d), the gastrografin group's hospital stay was shorter (3.8d).

Conclusions: Gastrografin aids with early resolution, shortens hospital stays, and lowers the surgery rate, making it a useful management tool for ASBO.

Key Words: Adhesive small bowel obstruction (ASBO), gastrografin, non-operative management.

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INTRODUCTION

A common side effect after abdominal surgery is adhesive small intestine obstruction, which accounts for 60% to 70% of small intestine obstructions^[1,2].

Conservative treatment is the recommended method in selected individuals presented by ASBO, which is effective in 74% of cases, but with a high rate of recurrence. 70.5 to 84% of these individuals will eventually need surgery, according to some studies' findings^[3]. On the other hand, recurrent surgery for adhesiolysis may exacerbate the intensity and progress of adhesion^[4,5].

Numerous researchers have examined the advantages of using water-soluble contrast medium (WSCM) in ASBO, indicating that the agent's hyperosmolarity promotes therapeutic benefits by promoting water movement into the small bowel lumen, reducing small bowel wall edema, and improving smooth muscle contractility^[6-10]. These results are still debatable, though, since multiple researchers rejected any therapeutic benefits^[11-13].

In order to ascertain the therapeutic impact of oral gastrografin in the therapy of ASBO, this research was designed.

PATIENTS AND METHODS

Seventy ASBO patients were involved in this prospective, randomized research. They were admitted between January 2020 and January 2025 at the Department of General Surgery, Aswan University Hospital, Egypt.

Inclusion criteria:

Individuals without symptoms of strangulation or peritonitis who have adhesive small bowel obstruction (ASBO) as demonstrated by clinical and radiological findings at least one month following their most recent abdominal surgery.

Exclusion criteria:

Patients with inflammatory bowel disease, individuals

who have previously received abdominal radiation therapy, individuals who have intra-abdominal malignancy, individuals exhibiting symptoms that might indicate peritonitis or strangulation, and individuals having a documented history of iodinated contrast agent sensitivities.

Study design: patients were subdivided into:

Group I: (Control group): 35 individuals were treated in this group.

Group II: (Gastrografin group) 35 individuals were treated in this group.

Initial workup for all patients:

Medical history, thorough physical examination, and preliminary investigations (including radiological procedures like plain abdominal radiographs, abdominal ultrasonography, and abdominal CT scan in certain patients to exclude other bowel blockage causes and laboratory procedures like complete blood count, serum sodium, potassium, and creatinine).

First care for all patients: Intravenous fluids, nasogastric suction, and any necessary electrolyte or acid-base imbalance correction.

Control group: 35 patients in this group were treated conservatively for 48 hours, including intravenous (IV) fluids, correction of any electrolyte or acid-base disorder, and nasogastric suction.

Patients who exhibited indications of intestinal strangulation or peritonitis at any time during the conservative phase were referred to surgery. Patients who completed the conservative therapy phase but did not exhibit appreciable improvement on radiological or clinical grounds were subjected to a laparotomy as a result of the conservative management's failure.

During the conservative phase, those who demonstrated clinical and radiological resolution of intestinal blockage received food and, when they tolerated oral feeding, were discharged.

Gastrografin group: 35 individuals were treated in this group. 100mL of gastrografin, a combination of sodium amidotrizoate and meglumine amidotrizoate, were given via a nasogastric tube, the stomach content suctioned, and the patient was hydrated. The tube was then clamped for two hours. After contrast is administered, patients were subjected to sequential plain abdomen radiographs at 3, 6, 12, and 24 hours. As long as there was clinical improvement and the dye reached the cecum, the therapy was deemed successful.

Patients who had abdominal radiography with contrast failed to reach the colon after 48 hours were classified as having complete ASBO and were referred to laparotomy. The remaining patients who had a clinical improvement within 48 hours were given food and allowed to go home.

Research outcome measures:

We evaluated the patients based on the proportion of cases resolved post-therapy, the period of time the dye takes to reach the colon, and the length of hospital stay in hours following treatment.

RESULTS

This research involved 70 patients between January 2020 and January 2025 hospitalized at the Department of General Surgery at Aswani University Hospital and identified as having adhesive small intestinal obstruction upon arrival, with no symptoms of peritonitis or strangulation. The involved patients were randomly divided into two categories:

Control group: 35 patients were included, with a mean age of 44.5 ± 16 years, 20 (57.1%) men and 15 (42.8%) females.

Gastrografin group: consisted of 35 patients, with a mean age of 47 ± 17 years, 22 (62.8%) men and 13 (37.1%) females.

In terms of age, gender, number of prior operations, and length of symptoms prior to admissions, both groups were matched, as shown in Table (1).

Number of previous operations:

While 51 out of 70 patients (72.8%) of this study had a history of only one surgical procedure, 19 patients out of 70 patients (27.1%) had history of multiple abdominal procedures before as shown in Table (1) and Figure (1).

Table 1: Demographic data:

	Control group "n= 35"	Gastrografin group "n= 35"
Male	20(57.1 %)	22(62.8 %)
Female	15(42.8 %)	13(37.1 %)
Age	16-79	19-80
Age mean	44.5±16ys	47±17ys
Period of symptoms prior to hospitalization(h)	33.6±13.1	36.3±11.4
Number of prior operations:		
• One	26(74.3 %)	25(71.4 %)
• Two	6(17.1 %)	9(25.7 %)
• Three	3(8.57 %)	1(2.85 %)
• Multiple previous surgery	9(25.7 %)	10(28.57 %)

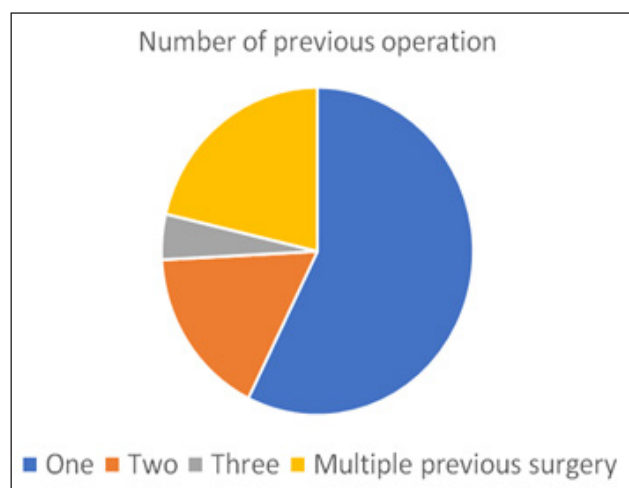


Fig. 1: Number of the previous operation.

Types of previous abdominal surgery:

Fourteen patients (20%) had trauma exploration and eighteen patients (25.7%) had appendectomy as their prior procedure as shown in Table(2) and Figure (2).

Table 2: Kind of primary surgery and quantity of cases:

Type of primary surgery	No. of cases
Appendectomy	18(25.7%)
Trauma exploration	14(20 %)
Cesarean section	7(10%)
Hernia repair surgery	6(8.57 %)
Gynecological operations	5(7.1 %)
Peptic ulcer surgery	4(5.7 %)
Colorectal surgery	4(5.7%)
Splenectomy	4(5.7%)
Cholecystectomy	3(4.3%)
Other	5(7.1 %)

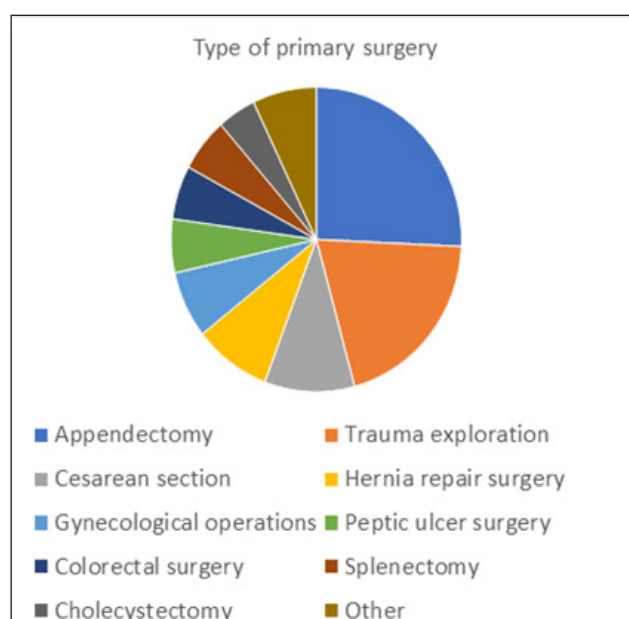


Fig. 2: Kind of primary surgery and quantity of cases.

Time of resolution and hospital length of stay:

The time period of the obstruction and hospital length of stay were reduced with gastrografin. In the gastrografin group, the duration from hospital admission due to obstruction to symptom relief was considerably shorter (19.8 versus 40.6h). The duration of hospitalization demonstrated a significant decrease in the gastrografin group (4.2 versus 7.1d) as shown in Table(3).

Table 3: Resolution time and length of hospital stay:

	Gastrografin group "n= 35"	Control group "n= 35"	p-value
Time of resolution in(h)	19.8±20.5	40.6±14.8	0.001
Mean duration of hospital stay (days)	4.2	7.1	0.002
The duration of non-operative patients' hospital stay (days)	3.8±1.6	5.8±4.1	0.04

Outcome:

After a mean of 19.8 hours, 30(85.7%) patients in the gastrografin group had their obstruction eliminated. After 24 hours from delivery of gastrografin, complete obstruction was found in 5(14.3%) patients for whom a laparotomy was performed (Two of the patients needed intestinal resections due to strangulation.) and 30(85.7%) patients revealed partial obstruction(the contrast was observed in the large bowel) (Figures 3,4). Out of 30 patients, only 1(3.33%) had ongoing clinical and radiologic blockage after 48 hours and was explored (Table 4).



Fig. 3: Post contrast 12 hours-contrast seen in the large bowel.

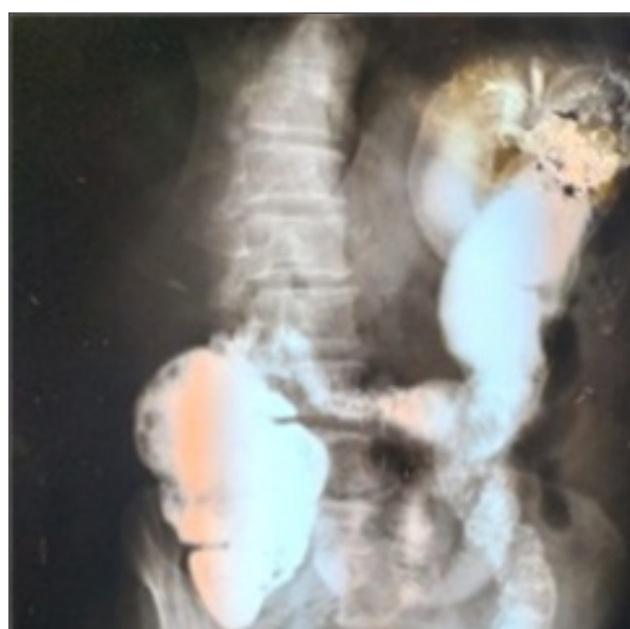


Fig. 4: Post contrast 24 hours-contrast seen in the large bowel.



Fig. 5: Plain abdominal radiograph taken at 24 hours post admission - persistent radiologic obstruction (multiple air-fluid levels with gas distension).

Table 4: Outcome and operative rate:

	Gastrografin group		Control group		p- value
	Gastrografin reach colon within 24h.	Gastrografin did not reach colon within 24h.	Complete mechanical obstruction	Partial mechanical obstruction	
Type of obstruction	30(85.7%)	5(14.3%)	7(20%)	28(80%)	
Non-operative management	29(96.7%)	0(0%)	0(0%)	22(78.6%)	
Operative management	1(3.33%)	5(100%)	7(100%)	6(21.4%)	
Total operative rate in each group		6(17.1%)		13(37.1%)	0.001
Type of surgery					
• Adhesiolysis		4		10	
• Strangulation and resection		2		3	

After receiving conservative care for 24 hours, 7 out of 35 patients (20%) in the control group had complete mechanical blockage, both clinically and radiologically (i.e., no gases in the colon), and these patients underwent laparotomy. On the other hand, 28 patients (80%) were treated with conservative therapy, and 6(21.4%) of them needed a laparotomy after 48 hours of follow-up due to ongoing clinical and radiologic blockage (Figure 5). There was a statistically significant difference in the total operation rate between the two groups (17% in the gastrografin group and 37% in the control group) (Table 4).

DISCUSSION

Gastrografin (GGF) is a radiopaque contrast agent used for the radiographic evaluation of the gut segments. It is a hypertonic solution that draws fluid into the lumen and promotes peristalsis, which helps to lessen oedema in the intestinal wall. It is being used more and more in the conservative treatment of ASBO^[6-10].

Taking into account the study's primary outcomes, the surgery rate was decreased by the usage of gastrografin from 37% in the control group to 17% in the gastrografin group. 3.3% of patients whose colon was reached by contrast in less than a day and 100% of patients whose large bowel did not get the contrast within that time required surgery. Patients receiving gastrografin experienced an earlier resolution of obstructive symptoms. The gastrografin group had a shorter hospital stay (3.8 days) compared to the control group (5.8 days). This is most likely due to the fact that patients may begin feeding earlier than those in the control group and that ASBO resolution with gastrografin occurs more quickly based on the progressive restoration of bowel function that is often used in standard conservative care of ASBO, the gastrografin group's mean time to resolution was 19.8 ± 20.5 hours, whereas the control group's was 40.6 ± 14.8 hours.

The results of our study, which revealed that gastrografin therapy considerably shortened hospital stays,

are consistent with earlier studies in terms of the mean duration of hospital stays (4.2 vs. 7.1 days)^[6]. However, one research found no benefit with regard to the duration of hospital stay^[12]. As long as caution is exercised when administering it, gastrografin is safe to use as there were no negative effects seen during the trial.

In terms of the operating rate, some earlier studies has found no benefit of using gastrografin to lessen the requirement for surgery^[10,13]. Nonetheless, two meta-analyses found that administering WSCM decreased the number of surgeries required for ASBO patients^[14,15]. The benefits of gastrografin in minimizing surgical requirements were well demonstrated by our current findings. The gastrografin group had fewer surgical procedures (17% vs. 37%) in our research.

In individuals with ASBO, the incidence of bowel strangulation varied from 6% to 11%^[16]. This study found that 7% of subjects were strangled. While three patients (8.5%) in the control group suffered from strangulation, just two (5.7%) in the gastrografin group did.

The Bologna guidelines also recommend the early use of gastrografin. These steps are in addition to maintaining nil per os, administering intravenous fluids, and decompressing the nasogastric tube. Signs of intestinal strangulation, bowel ischemia, and peritonitis were among the conditions for which they recommended urgent surgery. Evidence from the Bologna guidelines indicates that if the blockage persists after more than 72 hours of non-operative treatment, surgery should be taken into consideration^[16].

For individuals with ASBO who don't need urgent surgery, the UK's national audit on small bowel obstruction suggests starting gastrografin treatment as soon as possible. If conservative measures prove ineffective, surgery is advised within 72 hours^[17].

Our research showed that the conservative management of ASBO significantly benefits from the use of gastrografin, as over 96% of instances of ASBO resolved with its administration (compared to 78% in the control group). Randomized controlled studies have provided evidence to support this advantage, including faster blockage clearing, quicker patient discharge, and a decreased need for surgery in certain patients^[8,9]. In our investigation, the mean duration for obstruction alleviation in the gastrografin group was 19.8 hours, and 29 patients (96.66%) experienced relief of blockage following the administration of the contrast material. As opposed to this, the control group's resolution took 40.6 hours ($P<0.001$) and involved 22 patients (78.6%) who had relief from obstruction. This aligns with the results of earlier research^[18,19], which showed that administering an oral water-soluble contrast agent to ASBO patients shortened hospital stays and assisted in the early clearance of blockage.

The gastrografin therapy regimen has the potential to save a significant amount of money, based on a difference of two days of hospitalization, no operating room expenses, and, presumably, less time off work. Although this was not shown in this study, it's possible that the non-operative group will face fewer recurrences over time.

Despite the small sample size of this study, the findings imply that gastrografin may be helpful when treating ASBO patients conservatively. Furthermore, if gastrografin is administered from the beginning, it may have predictive value as it aids in the early detection of instances with total blockage. Long-term follow-up investigations are also advised in order to ascertain the frequency of recurring adhesive episodes following the administration of gastrografin.

CONCLUSION

Gastrografin reduces hospital stays and aids in early resolution, making it a useful management tool for ASBO. Additionally, it significantly reduces the need for surgery in individuals with partial ASBO and aids in the early detection of those who need surgery.

ABBREVIATIONS

ASBO: Adhesive small bowel obstruction, **WSCM:** Water-soluble contrast medium, **CT:** Computerized tomography, **IV:** Intravenous.

ETHICS APPROVAL AND CONSENT TO PARTICIPATE AND CONSENT TO PARTICIPATE

This research was performed at the Department of General Surgery, Aswan University. Ethical Committee approval and written, informed consent were obtained from all patients.

AVAILABILITY OF DATA AND MATERIAL

The datasets used and/or analyzed during the current study are available from the corresponding author upon reasonable request.

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AUTHORS' CONTRIBUTIONS

All authors contributed to the study's conception and design. Material preparation, data collection, and analysis were performed by Hassan A. Abdallah. The first draft of the manuscript was written by Hassan A. Abdallah and all authors commented on previous versions of the manuscript. All authors read and approved the final manuscript.

CONFLICT OF INTERESTS

There are no conflicts of interest.

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