



Gastrografin as a Diagnostic and Therapeutic Tool In Small Bowel Obstruction: Our Experience

KEYWORDS

Gastrografin, Obstruction, Adhesion, laparotomy

Dr Ajaz A Malik

Dr Shams ul Bari

Professor Department, of surgery Skims Srinagar, India

Assistant Professor, Department of Surgery Skims Medical College Srinagar, India

Dr Khalid Bashir

Registrar Department, of surgery Skims Srinagar, India

ABSTRACT **Background:** Adhesions are the leading cause of small bowel obstruction. Identification of patients who require surgery can be difficult. Gastrografin, a hyperosmolar water soluble contrast agent, has been shown to have both diagnostic as well as therapeutic benefit in such a situation. This study analyzes the role of gastrografin in the management of adhesive small bowel obstruction. **Material & Methods:** The study is a hospital based case control study conducted on 69 patients who were randomized into 37 cases and 32 controls. All cases underwent contrast study and were followed for 24 hours with serial abdominal radiographs. If contrast reached colon, patients were considered to have partial small bowel obstruction and were managed conservatively. If contrast failed to reach the colon and/or there was clinical deterioration, patients underwent laparotomy. **Results:** Patients in the contrast group passed their first stool after a mean of 6.1 hours while those in control group passed their first stool after a mean of 23.2 hours. This was statistically significant ($p < 0.05$). The mean hospital stay was 2.4 days in contrast group and 4.8 days in control group which was also statistically significant. Only 10.9% of patients in contrast group needed surgery in comparison to 21.9% in the control group. **Conclusion:** The use of gastrografin in adhesive small bowel obstruction is safe and has both diagnostic as well as therapeutic benefits in the management of such patients.

INTRODUCTION:

Small bowel obstruction is defined as a partial or complete interference with the passage of stool distally in the small intestine^[1]. Mechanical small-bowel obstruction is the most frequently encountered surgical disorder of the small intestine. Although a wide range of etiologies for this condition exist, intra-abdominal adhesions related to prior abdominal surgery is the etiologic factor in up to 75% of cases of small-bowel obstruction. It has been estimated that more than 90% of patients who undergo abdominal operations will develop postoperative adhesions^[2]. More than 300,000 patients are estimated to undergo surgery to treat adhesion-induced small-bowel obstruction in the United States annually^[3]. Less-prevalent etiologies for small-bowel obstruction include hernias and Crohn's disease. In contrast to colonic obstruction, small-bowel obstruction is uncommonly caused by neoplasms. Fewer than 3% of cases are caused by primary small-intestinal neoplasms.^[4] Of the common causes of small bowel obstruction in the developed world are abdominal tuberculosis^[5] and worm obstruction.^[6]

Neither complete nor incomplete acute intestinal obstruction can be reliably identified clinically or with plain radiological studies.^[7] Gastrografin, an oral water-soluble contrast agent, has been used in the non-operative management of adult patients with adhesive small bowel obstruction^[8], and many prospective studies were carried out to evaluate its diagnostic and therapeutic values in the conservative management of adhesive small bowel obstruction in adults.^[9] In addition, Gastrografin reduces the operative rate and length of hospital stay. However, findings are still conflicting, as some authors did not find a therapeutic advantage.^[10]

The current case control study has been done to evaluate the possible role of Gastrografin in the management of patients with intestinal obstruction.

MATERIAL & METHODS:

The present study is a hospital based case-control study conducted in the department of General Surgery at Sher-i-Kashmir Institute of Medical Sciences, Srinagar from 2008 to 2010. The study was approved by the Institutional review committee. Patients who had complete bowel obstruction and were less than 18 years of age were excluded from the study. A total of 69 patients of partial small bowel obstruction were included in the study. Informed consent was taken

from each patient before giving gastrografin. Patients were randomized into 37 cases and 32 controls. All were properly age/sex matched.

A detailed history was taken from every patient laying emphasis on presenting complaints, duration of illness mode of onset and progression and history of previous surgery. All patients underwent a thorough general physical and systemic examination including digital rectal exam. Abdominal girth was measured in every case at regular intervals. A careful examination was made in every case for any sign of strangulation. X-ray abdomen both standing and supine was performed in all patients. All patients initially received a conservative trial and all cases underwent contrast study using water-soluble contrast dye gastrografin and were followed for 24 hours using serial abdominal radiographs at 3, 8, 16 and 24 hours after giving contrast. Patients were considered to have successful conservative management if contrast reached colon along with clinical improvement. When contrast failed to reach the colon (cecum) and there was clinical deterioration, patients were considered to have failed conservative trial and underwent laparotomy. Finally the entire data was analyzed statistically using SPSS 11.5 software.

RESULTS:

This study was a hospital based case-control study with 69 patients of partial adhesive small bowel obstruction. The patients were randomized into two groups with age/sex matched 37 patients in the oral contrast group and 32 patients in controls (Table1). There were 20 males and 17 females with mean age of 52.7 in the oral contrast group. There were 19 males and 13 females with a mean age of 51.3 years in the control group. The various surgical procedure which the patients had undergone is depicted in table 2.

Table 1: Patient characteristics

Characteristic	Oral contrast	Control
No. of patients	37	32
Age (years)	52.7 + 12	51.3 + 11
Weight (kg)	69.2 + 8.3	72.2 + 8.1
Gender (M/F)	20/17	19/13
Symptoms duration (days)	1.38 + 0.97	1.23 + 0.96

Table 2; surgical background of the patients

Previous surgery	Oral contrast (37)	Control(32)
Gynecologic	11	9
Appendectomy	9	8
Colon surgery	5	5
Cholecystectomy	4	3
Hernia surgery	3	4
Others	5	3

The presence of oral contrast in the colon within 24 hours of ingestion as an indicator of non-operative management. Patients in the control group passed their first stool after a mean period of 23.2 hours whereas patients receiving contrast passed stool after a mean of 6.1 hours which was statistically significant (p<0.05) as shown in table 3. These patients were successfully managed conservatively. The mean hospital stay in patients who responded to conservative treatment was 4.8 days in the control group and 2.4 days in the contrast group (Table 3).

Table 3: Timing of first stool and hospital stay (n= 69)

Group	N	Hours	Range	p value	Hospital stay(days)	Range	p value
Oral contrast	37	6.1 + 4.2	2 to 19	0.003	2.4+ 1.1	0.7 to 7	0.04
Control	32	23.2 + 12.7	6 to 71		4.8+ 1.3	3 to 8	

Overall 84% of patients in the study resolved conservatively. Four patients (10.9%) in the contrast group and 7 (21.9%) patients from control group required surgery (figure 1).

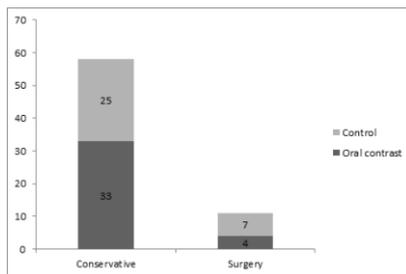


Figure 1: Bar diagram depicting rates of operation in two groups

DISCUSSION:

Small bowel obstruction due to postoperative adhesions is a common problem in general surgical practice. Any laparotomy initiates the lifelong risk of this complication. Adhesions form after any operative peritoneal injury or damage caused by peritoneal contamination and infection. Most of these patients are managed conservatively unless there are clear signs of bowel ischemia. A delay in surgical treatment may lead to an increased mortality rate, from 3–5 % when the obstruction is simple and to about 30 % when it is strangulated or when the bowel becomes necrotic or perforated.^[11]

Oral Gastrografin, a water soluble contrast medium (containing iodine) with high osmolarity, has been used to differentiate partial from complete intestinal obstruction. It has also been shown to have a therapeutic effect and to predict the need for early surgery in intestinal obstruction.^[12] Gastrografin is a mixture of diatrizoate meglumine and diatrizoate sodium. It may exhibit a therapeutic effect in small bowel obstruction by reducing the bowel wall edema and increasing the intraluminal tension, it may also enhance smooth muscle contractile activity that can generate effective peristalsis and overcome the obstruction.^[13] Additionally, gastrografin follow-through can reliably give a diagnosis of complete or incomplete small bowel obstruction depending on the appearance of contrast in the colon.^[14]

In a prospective study by Vakil^[15] et al, 32 patients with adhesive small bowel obstruction were randomized into control group and gastrografin group. Patients in control group were treated conservatively in the absence of symptoms of strangulation patients.

For patients in gastrografin group, patients were considered to have partial obstruction if contrast reached colon within 22 hours. In another prospective study by Choi^[16] et al, 44 episodes of obstruction showed no improvement within 48 h and gastrografin was administered. Seven patients underwent complete obstruction surgery. Partial obstruction was demonstrated in 37 other cases, obstruction resolved subsequently in all of them except one patient who required laparotomy because of persistent obstruction. In a similar study by Abdelkader^[17] et al, 33 patients with adhesive bowel obstruction were included and were given a conservative trial for 48 hours in the absence of signs of strangulation. Patients who failed conservative trial were given gastrografin. An oral administration of gastrografin successfully completed the conservative management in eight of 12 patients (66.6%), thus avoiding surgery and subsequently reducing hospital stay.

Ahmad Assalia^[18] et al reported the timing of first stool in the control group as 23.4 hours(range 6-72) and in the gastrografin group 6.2 hours (range 2-20). Hospital stay in the control group was 4.4 days (range 2-7) and 2.2 days (range 0.5- 7) in the gastrografin group. In their study the overall success of conservative treatment was 85%; and 21% cases in the control group had to be operated and 10 % cases in the gastrografin group. These findings are also in agreement with our study.

Conclusion:We conclude that adhesive bowel obstruction can be managed conservatively if there are no signs of strangulation either clinically or radiologically. We recommend the use of oral gastrografin on admission as it as both diagnostic as well as therapeutic role in adhesive small bowel obstruction. It significantly decreases the hospital stay as well as the need for operative intervention.

REFERENCES:

- Houghton SG, De L Medina AR and Sarr MG. Bowel obstruction. In Maingot's Abdominal Operations. Michael J Zinner, Stanley W Ashley. 11th ed. McGraw-Hill; 2007, p479.
- Ray NF, Denton WG, Thamer M, Henderson SC, Perry S: Abdominal adhesiolysis: inpatient care and expenditures in the United States in 1994. J Am Coll Surg 1998; 186(1):1-9.
- Ray NF, Denton WG, Thamer M: Abdominal adhesiolysis: Inpatient care and expenditures in the United States in 1994. J Am Coll Surg 186: 1, 1998. [PMID: 9449594]
- Mucha P Jr.: Small-intestinal obstruction. Surg Clin North Am 67: 597, 1987. [PMID: 3296252]
- Khanzada TW, Samad A, Champa S. Aetiologic spectrum of dynamic intestinal obstruction. Gomal Journal of Medical Sciences, July-Dec. 2007; 5(2).
- P.P.Wasadikar, A.B. Kulkarni. ; Intestinal obstruction due to ascariasis. British Journal of Surgery. 1997; 84(3):410-412.
- Ha HK, Kim JS, Lee MS, Lee HJ, Jeong YK, Kim PN. Differentiation of simple and strangulated small-bowel obstructions: usefulness of known CT criteria. Radiology. 1997; 204:507-12.
- Kumar P, Kaman L, Singh G, Singh R. Therapeutic role of oral water soluble iodinated contrast agent in postoperative small bowel obstruction. Singapore Med J 2009; 50:360-364.
- Abbas SM, Bissett IP, Parry BR. Meta-analysis of oral water-soluble contrast agent in the management of adhesive small bowel obstruction. Br J Surg 2007; 94:404-411.
- Farid M, Fikry A, El Nakeeb A, Fouda E, Elmetwally T, Yousef M. Clinical Impacts of Oral Gastrografin Follow-Through in Adhesive Small Bowel Obstruction (SBO). J Surg Res. 2010; 162:170-6.
- Ellis H. The clinical significance of adhesions: focus on intestinal obstruction. Eur J Surg Suppl. 1997; 577:5-9.
- Chen SC, Lin FY, Lee PH, Yu SC, Wang SM, Chang KJ. Water-soluble contrast study predicts the need for early surgery in adhesive small bowel obstruction. Br J Surg 1998; 85:1692-4.
- Choi HK, Chu KW, Law WL. Therapeutic value of Gastrografin in adhesive small bowel obstruction after unsuccessful conservative treatment: a prospective randomized trial. Ann surg 2002; 236:1-6.
- Al Salamah SM, Fahim F, Mirza SM. Value of water soluble contrast (meglumineamidotrizoate) in the diagnosis and management of small bowel obstruction. World J Surg. 2006; 30:1290-4.
- Vakil Rakesh, Kalra Sanjay, Raul Subrat, Paljor Yoel & Joseph Sudhir. Role of water-soluble contrast study in adhesive small bowel obstruction: A randomized controlled study. Indian J of Surg., Vol. 69, No. 2, 2007: 47-51.
- Choi HK, Law WL, Ho JWC, Chu KW. Value of gastrografin in adhesive small bowel obstruction after unsuccessful conservative treatment: A prospective evaluation. World J Gastroenterol 2005; 11(24): 3742-3745.
- H Abdelkader, M Abdel-Latif, K El-Asmar, I Al-Shafii, A Abdel-Hamid, M ElDebeiky et al. Gastrografin in the management of adhesive small bowel obstruction in children: a pilot study. Annals of Pediatric Surgery 2011, 7:3-6.
- Assalia. A., Schein, M., Kopelman. D., Hirschberg. A. Therapeutic effect of oral Gastrografin in adhesive, partial small bowel obstruction: a prospective randomized trial. Surgery 1994; 115:433.