

ORIGINAL RESEARCH**EFFECT OF HYPEROSMOLAR WATER-SOLUBLE CONTRAST FOR MANAGEMENT OF ADHESIVE SMALL BOWEL OBSTRUCTION****Dr. Mohit Sharma¹, Dr. Varsha Choudhary², Dr. Uzma Padwal³, Dr. Shyam Kumar Gupta⁴,
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Abstract**Objective:** This prospective study looked into the usefulness of the hyperosmolar water-soluble contrast agent Urografin® in determining which patients should receive conservative treatment for small-intestinal obstruction brought on by post-operative adhesions.**Methods:** The nasogastric tube was used to administer Urografin® to 37 individuals who had adherent intestinal blockage. After 2, 4 and 8 hours, direct abdominal radiographs were taken.**Results:** 24 individuals (64.9%) were deemed to have partial obstruction because Urografin® was found in the right colon within 8 hours in those patients. These patients started eating by mouth even though abdomen radiographs showed levels of gas and fluid.**Conclusion:** Regardless of the lack of blockage symptoms, conservative treatment might be advised for patients in whom contrast medium is found in the right colon within 8 hours of delivery. However, the absence of contrast material in the right colon within 8 hours cannot be regarded as a surgical indication.**Keywords:** Water-soluble contrast medium; Small intestine; Adhesion; Obstruction**Received: 12-10-2022****Accepted: 14-11-2022****Introduction**

An important reason for urgent abdominal surgery is intestinal obstruction, which is a partial or whole blockage of the flow of intestinal contents through the gastrointestinal tract. If left untreated, intestinal obstruction is linked to high rates of morbidity and mortality. [1–3] Following neoplasms and hernias as the primary aetiological factors for intestinal obstruction, the rates of reported cases have remained consistent throughout investigations undertaken over the past 25 years. [4–6] Although the mortality rate from intestinal blockage has been estimated to be between 30 and 50 percent, improved diagnostic and therapeutic approaches may be able to lower this to between 5 and 10%. [7]

Following major abdominal surgery, > 90% of patients develop adhesions [8], and 4–15% of patients experience small-intestine blockages brought on by postoperative adhesions. [9] Adhesions can also lead to infertility, persistent pelvic or abdominal pain, and challenges with re-operation. [10]

When surgery is put off for an adhesive obstruction that needs to be removed surgically, there may be major side effects. [10] When the small intestine is strangled, the death rate, which is only around 5% in uncomplicated obstruction, jumps to 30%. In addition, necrosis or perforation are linked to postponing surgical treatment. [11] Therefore, early diagnosis and adequate treatment are key to reducing the morbidity and mortality brought on by post-operative adhesions.

The goal of the current prospective study was to examine the value of the hyperosmolar water-soluble contrast medium in determining when conservative treatment for patients with small-intestinal obstruction brought on by post-operative adhesions could be suitable.

Materials and methods

Patients who had been diagnosed with intestinal obstruction and were referred from the emergency room to the surgery department between January 2021 and December 2022 were evaluated to see if they should be included in the trial. All patients got thorough physical examinations, full blood cell counts, upright abdominal radiographies, and biochemical tests. Using the criteria outlined by Brolin, a diagnosis of small intestinal blockage was determined based on the patient's symptoms and physical characteristics. [12] Patients were deemed to have intestinal blockage if they had abdominal discomfort, distension, aberrant intestinal sounds, and vomiting in addition to dilated small intestine loops and gas-fluid levels on direct abdominal radiography. Patients who had previously undergone abdominal surgery were selected for the trial because they were thought to have intestinal obstruction brought on by post-operative adhesions. Peritonitis carcinomatosa, peritonitis symptoms, age 15 years, and abdominal surgery within 30 days of admission were all exclusion factors. All study participants provided written informed permission, and the study methodology was approved by the hospital's ethics committee.

After it was determined that post-operative adhesions were the cause of the small-intestine obstruction, a urinary catheter was placed, and 0.9% sodium chloride intravenous fluid replacement was started and titrated based on the hourly urine output. A nasogastric tube was used to perform gastric decompression. A nasogastric tube was used to give 40 ml of Urografin® (Schering AG, Berlin, Germany), along with 40 ml of distilled water. The tube was unclamped after one hour. After 2, 4 and 8 hours, direct abdominal radiographs were taken. Patients were deemed to have partial obstruction if contrast medium was seen in the right colon within 8 hours of receiving Urografin®. Even though belly radiographs showed that these individuals had high levels of gas-fluid, oral feeding was started for them. Patients who did not have contrast medium in the right colon within 8 hours were still being watched, and those who had no toxic symptoms after 24 hours began receiving clear liquid diets orally. Patients were sent for surgical care if they developed a fever, ongoing stomach pain, or symptoms of peritonitis.

Calculations were made to determine the presence of Urografin® in the right colon 8 hours after administration as a sign of conservative treatment for small-intestine obstruction brought on by post-operative adhesions.

Results

The study covered 37 patients in total. Table 1 lists the patient's features and current symptoms. On auscultation, all patients showed abdominal distension and hyperactive peristalsis; on erect direct abdominal radiographs, gas-fluid levels and dilated small intestine loops were seen.

23 patients (62.2%) had undergone appendectomy, cholecystectomy, or subtotal gastrectomy along with bilateral truncal vagotomy in the past. Table 2 contains details on previous surgical treatments that were gleaned from patient medical histories.

The development of toxic signs led to the referral of 10 of the 13 patients (76.9%) for surgical treatment, including peritoneal irritation in seven patients, persistent abdominal pain in nine patients, leucocytosis in six patients, and fever in all ten patients. Of the 13 patients (35.1%) in whom contrast medium did not reach the right colon within 8 h after Urografin® administration, These patients underwent surgery 6 to 12 hours after the 8-hour radiograph. Operation revealed obstruction caused by adhesion bands with proximal dilatation. In seven cases, adhesiolysis relieved the obstruction; in three patients with regions of necrosis, partial small intestinal resection and end-to-end anastomosis were carried out. In two patients who received partial resection, an infection developed at the intervention site. No additional morbidity or mortality, such as aspiration pneumonia or allergy to the contrast media, was noted.

TABLE 1: Demographic characteristics and presenting symptoms of the patients with small intestine obstruction due to post-operative adhesions who were enrolled into the present study

Variables	
Age, years, mean (range)	56 (21 - 83)
Gender (n)	
Male	23
Female	14

Presenting symptoms (%)	
Abdominal pain	32 (86.5)
Constipation	28 (75.7)
Vomiting	22 (59.5)
Time since surgery, mean (range)	9 years 8 months (2 months - 25 years)

TABLE 2: Previous surgery undergone by patients who had small-intestine obstruction due to postoperative adhesions

Type of Surgery	n (%)
Appendectomy	8 (21.6)
Cholecystectomy	8 (21.6)
Subtotal gastrectomy plus bilateral truncal vagotomy	7 (18.9)
Drainage of hydatid cyst of the liver	4 (10.8)
Total abdominal hysterectomy plus bilateral salpingo-oophorectomy	3 (8.1)
Splenectomy	2 (5.4)
Haemostasis due to ovarian cyst rupture	1 (2.7)
Aorto-bifemoral bypass	1 (2.7)
Primary suture repair of injured small intestine due to penetrating trauma	1 (2.7)
Caesarean section	1 (2.7)
Right hemicolectomy ileotransversotomy due to firearm-related injuries	1 (2.7)

Discussion

The most common reason for acute small-intestine obstruction in adults is post-operative adhesions. [4,7,13,14] Such adhesions have been prevented through numerous attempts, but no successful strategy has yet to be identified. [15,16] The multifactorial aetiology of adhesion formation is yet unclear. [9,15,17] Any sort of abdominal surgery can result in adhesive small-intestine blockage. According to earlier research, colorectal surgery and appendectomy were the two most often occurring causes of adhesion intestinal blockage. [11,18-21] In the current investigation, 23 patients, or 62.2% of the entire population, had undergone appendectomy, cholecystectomy, or subtotal gastrectomy along with bilateral truncal vagotomy in the past. Between 73% and 90% of patients who get conservative care for ileus brought on by post-operative adhesions report success. [12,18,22] The rate was found to be 72.9% in the current study, which is consistent with other research. It is still debatable how long patients with small-intestinal blockage should receive conservative care. In patients with intestinal obstruction brought on by post-operative adhesions, according to Seror et al. [18], this time frame could be extended up to 5 days, whereas Sosa and Gardner [10] believed that conservative treatment could only be used for 24–48 hours unless there were signs of strangulation. 48 hours, 24 hours, and 48-72 hours were advised by Assalia et al. [22], Bizer et al. [23], and Brodin et al. [24]. Hofstetter [25] recommended surgical intervention if blockage relief did not occur within 24 hours, and according to other sources, conservative treatment should be limited to 12, 24, 48, or 72 hours. [7,13,26] So, finding the ideal time for conservative treatment requires a quick and accurate procedure.

To plan the management of intestinal obstruction, serial abdominal radiographs with barium or water-soluble contrast media are frequently employed. [12,25-27] Both small intestine blockage and the upper gastrointestinal system have been evaluated using barium. Given that it can display the mucosal pattern, is less diluted, and does not have peristaltic effects, it might be preferred to water-soluble contrast media. [12,28] However, barium can be dangerous for individuals with practically total obstruction because it can harden the area around the obstruction or, in cases where there is a rupture, can enter the abdominal cavity and lead to peritonitis. [29] Gastrografin® (Schering) and Urografin® are the most often utilised hyperosmolar water-soluble contrast media for the assessment of adhesion intestinal obstruction. These have been utilised in both prospective and retrospective trials to distinguish between partial and complete adhesion-related blockage as well as the requirement for surgical intervention. [22,29-33]

Conclusion

Complete obstruction of the small intestine should generally be treated surgically due to the risk of strangling, whereas partial obstruction should primarily be treated conservatively. Methods that distinguish between partial and total occlusion are thus required. The results of the current study shown that Urografin® administration could distinguish between partial and total obstruction in patients with post-operative adhesive small-intestine obstruction. These findings suggest that, regardless of the lack of obstruction signals, conservative therapy and oral feeding may be advised for individuals in whom contrast medium is found in the right colon within 8 hours of Urografin® administration. However, the absence of contrast medium in the colon within 8 hours cannot be a sign that surgery is necessary. Additional trials involving more participants and longer follow-up times are necessary to evaluate the benefit of Urografin® treatment in patients who will have surgery.

References

1. Sarraf-Yazdi S, Shapiro ML: Small bowel obstruction: the eternal dilemma of when to intervene. *Scand J Surg* 2010; 99: 78 - 80.
2. Duron JJ, du Montcel ST, Berger A, et al: Prevalence and risk factors of mortality and morbidity after operation for adhesive postoperative small bowel obstruction. *Am J Surg* 2008; 195: 726 - 734.
3. Foster NM, McGory ML, Zingmond DS, et al Small bowel obstruction: a population-based appraisal. *J Am Coll Surg* 2006; 203: 170 - 176.
4. Mucha P Jr: Small intestinal obstruction. *Surg Clin North Am* 1987; 67: 597 - 620.
5. Landercasper J, Cogbill TH, Merry WH, et al: Long-term outcome after hospitalization for small-bowel obstruction. *Arch Surg* 1993; 128: 765 - 770.
6. Fevang BT, Fevang J, Stangeland L, et al: Complications and death after surgical treatment of small bowel obstruction: a 35-year institutional experience. *Ann Surg* 2000; 231: 529 - 537.
7. McEntee G, Pender D, Mulvin D, et al: Current spectrum of intestinal obstruction. *Br J Surg* 1987; 74: 976 - 980.
8. Kisli E, Söylemez O, Baser M, et al: Adhesiv Ince Barsak Obstrüksiyonlarının Görülme Sikligi. *Van Tip Dergisi* 2004; 11: 13 -16.
9. Jones PF, Munro A: Recurrent adhesive small bowel obstruction. *World J Surg* 1985; 9: 868 - 875.
10. Sosa J, Gardner B: Management of patients diagnosed as acute intestinal obstruction secondary to adhesions. *Am Surg* 1993; 59: 125 - 128.
11. Ellis H: The clinical significance of adhesions: focus on intestinal obstruction. *Eur J Surg Suppl* 1997; 577: 5 - 9.
12. Brolin RE: Partial small bowel obstruction. *Surgery* 1984; 95: 145 - 149.
13. Tanphiphat C, Chittmitrapap S, Prasopsunti K: Adhesive small bowel obstruction. A review of 321 cases in a Thai hospital. *Am J Surg* 1987; 154: 283 - 287.
14. Richards WO, Williams LF Jr: Obstruction of the large and small intestine. *Surg Clin North Am* 1988; 68: 355 - 376.
15. Ellis H: Adhesions: an introduction. In: *Adhesions: the Problems* (Ellis H, Lennox M, eds). London: Westminster Hospital Medical School, 1983; pp 1 - 5.
16. Goldberg EP, Sheets JW, Habal MB: Peritoneal adhesions: prevention with the use of hydrophilic polymer coatings. *Arch Surg* 1980; 115: 776- 780.
17. Holmdahl L, Risberg B: Adhesions: prevention and complications in general surgery. *Eur J Surg* 1997; 163: 169 - 174.
18. Seror D, Feigin E, Szold A, et al: How conservatively can postoperative small bowel obstruction be treated? *Am J Surg* 1993; 165: 121-126.
19. Cox MR, Gunn IF, Eastman MC, et al: The operative aetiology and types of adhesions causing small bowel obstruction. *Aust N Z J Surg* 1993; 63: 848- 852.
20. Matter I, Khalemsky L, Abrahamson J, et al: Does the index operation influence the course and outcome of adhesive intestinal obstruction? *Eur J Surg* 1997; 163: 767- 772.
21. Füzün M, Kaymak E, Harmancıoğlu O, et al: Principal causes of mechanical bowel obstruction in surgically treated adults in western Turkey. *Br J Surg* 1991; 78: 202 – 203.

22. Assalia A, Schein M, Kopelman D, et al: Therapeutic effect of oral Gastrografin in adhesive, partial small-bowel obstruction: a prospective randomized trial. *Surgery* 1994; 115: 433 - 437.
23. Bizer LS, Liebling RW, Delany HM, et al: Small bowel obstruction: the role of nonoperative treatment in simple intestinal obstruction and predictive criteria for strangulation obstruction. *Surgery* 1981; 89: 407- 413.
24. Brolin RE, Krasna MJ, Mast BA: Use of tubes and radiographs in the management of small bowel obstruction. *Ann Surg* 1987; 206: 126 - 133.
25. Hofstetter SR: Acute adhesive obstruction of the small intestine. *Surg Gynecol Obstet* 1981; 152: 141 - 144.
26. Erickson AS, Krasna MJ, Mast BA, et al: Use of gastrointestinal contrast studies in obstruction of the small and large bowel. *Dis Colon Rectum* 1990; 33: 56 - 64.
27. Feigin E, Seror D, Szold A, et al: Water-soluble contrast material has no therapeutic effect on postoperative small-bowel obstruction: results of a prospective, randomized clinical trial. *Am J Surg* 1996; 171: 227 - 229.
28. Foley MJ, Ghahremani GG, Rogers LF: Reappraisal of contrast media used to detect upper gastrointestinal perforations: comparison of ionic water-soluble media with barium sulfate. *Radiology* 1982; 144: 231 - 237.
29. Watkins DT, Robertson CL: Water-soluble radiocontrast material in the treatment of postoperative ileus. *Am J Obstet Gynecol* 1985; 152: 450- 455.
30. Biondo S, Parés D, Mora L, et al: Randomized clinical study of Gastrografin® administration in patients with adhesive small bowel obstruction. *Br J Surg* 2003; 90: 542 -546.
31. Chen SC, Lin FY, Lee PH, et al: Water-soluble contrast study predicts the need for early surgery in adhesive small bowel obstruction. *Br J Surg* 1998; 85: 1692 - 1694.
32. 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.
33. Blackmon S, Lucius C, Wilson JP, et al: The use of water-soluble contrast in evaluating clinically equivocal small bowel obstruction. *Am Surg* 2000; 66: 238 - 242.