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Original Research Article

Comparison of Frequency of Need for Surgical Intervention in Patients with Adhesive Small Bowel Obstruction Managed with and Without Gastrografin Challenge

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Abstract: ***Background.*** Adhesive small bowel obstruction (ASBO) is a common surgical emergency. Traditionally, management required early operative exploration; however, recent evidence supports selective non-operative management, with the Gastrografin challenge emerging as a useful diagnostic and therapeutic tool. ***Objective.*** To compare the frequency of surgical intervention among patients with ASBO managed with and without a Gastrografin challenge. ***Methods.*** A randomized controlled trial was conducted at the Department of General Surgery, Sandamen Provincial Hospital, Quetta, from August 2022 to February 2023. Ninety-eight (98) adults (18–65 years) with ASBO were randomized into two groups: control (conventional management) and experimental (Gastrografin challenge + conventional management). The outcome variable was the requirement for surgery within 48 hours, defined as failure to pass flatus or feces with persistent air–fluid levels on abdominal radiograph. Data were analyzed using chi-square and $p < .05$ was considered significant. ***Results.*** The mean age of patients was 41.4 ± 12.7 years, with a male-to-female ratio of 1.5:1. Overall, 31 (31.6%) required surgery. The need for surgery was significantly lower in the Gastrografin group compared with controls (16.3% vs. 46.9%; $p = .001$). The difference persisted across subgroups stratified by age, sex, BMI, and obstruction duration. ***Conclusion.*** Gastrografin challenge significantly reduced surgical intervention rates among ASBO patients regardless of demographic or clinical variables, supporting its routine use in the conservative management of adhesive obstruction.

Keywords: Adhesive small bowel obstruction, Gastrografin, water-soluble contrast, surgical intervention, conservative management

INTRODUCTION

Adhesive small bowel obstruction (ASBO) represents one of the most frequent causes of acute surgical admission worldwide. Postoperative adhesions, often

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following abdominal or pelvic surgery, account for up to 65% of small bowel obstructions (Catena et al., 2019). Management has gradually shifted from immediate operative exploration to conservative approaches emphasizing bowel rest, decompression, and fluid resuscitation (Bologna Guidelines, 2018).
The Gastrografin challenge—administration of hyperosmolar water-soluble contrast followed by timed radiography—serves both diagnostic and therapeutic purposes. It helps predict resolution without surgery and can stimulate bowel motility, potentially reducing the need for surgical exploration (Ceresoli et al., 2016; Branco et al., 2010). However, variability in outcomes and a paucity of data from South Asian populations have limited universal adoption.

Given the absence of local data, this study aimed to compare the frequency of surgical intervention in ASBO patients treated with and without Gastrografin challenge at a tertiary-care center in Pakistan. Adhesive small bowel obstruction (ASBO) remains a common and challenging clinical problem in general surgery, accounting for nearly 65–75% of all cases of mechanical small bowel obstruction (Catena et al., 2019). It typically arises as a sequela of previous abdominal or pelvic operations, where the normal peritoneal healing process leads to fibrous bands that tether bowel loops and restrict their movement. These adhesions disrupt the normal passage of intestinal contents, resulting in distension, pain, nausea, vomiting, and potential bowel ischemia. Despite advances in surgical technique and perioperative care, adhesive obstruction continues to cause substantial morbidity, mortality, and economic burden worldwide (Broek et al., 2018).

Traditionally, surgical exploration was considered the gold standard for the management of small bowel obstruction. Early operative intervention was often recommended to prevent complications such as strangulation or perforation. However, over the past two decades, the paradigm has shifted toward non-operative or conservative management in carefully selected patients without evidence of bowel compromise (Di Saverio et al., 2018). This shift was driven by increasing awareness that surgery itself contributes to the formation of new adhesions, potentially perpetuating a vicious cycle of recurrent obstruction. Conservative therapy—comprising nasogastric decompression, intravenous fluid resuscitation, bowel rest, and correction of electrolyte imbalance—is now regarded as first-line management for partial or uncomplicated cases.

A key challenge in managing ASBO is determining which patients will benefit from continued conservative treatment and which will ultimately require surgery. Clinical and radiological indicators can be ambiguous, and unnecessary delay in surgical intervention may increase morbidity. Hence, a reliable diagnostic and therapeutic tool that could accurately predict the success of non-operative management while possibly reducing the need for surgery would be invaluable (Ceresoli et al., 2016).
Gastrografin, a hyperosmolar water-soluble contrast medium composed of sodium diatrizoate and meglumine diatrizoate, has emerged as such a tool. When administered enterally, it provides both diagnostic and therapeutic benefits. Radiologically, its passage into the colon within 24 hours predicts the spontaneous resolution of obstruction with high sensitivity and specificity. Therapeutically, its hyperosmolar nature draws fluid into the bowel lumen, reducing wall edema, stimulating peristalsis, and facilitating the resolution of partial obstruction (Feigin et al., 2019).

Several randomized controlled trials have evaluated the role of the Gastrografin challenge in ASBO. Linden et al. (2018) in the United States and Surushe et al. (2018) in India reported significantly reduced rates of surgical intervention among patients receiving Gastrografin compared to conventional management alone. Meta-analyses by Branco et al. (2010) and Ceresoli et al. (2016) further confirmed that water-soluble contrast agents shorten hospital stay, improve diagnostic accuracy, and decrease operative rates. Conversely, a few studies, such as those by Kumar et al. (2018) and Lyu et al. (2019), did not demonstrate statistically significant differences, highlighting ongoing debate and possible population-based variations in outcome.

In Pakistan and other developing countries, the management of ASBO poses additional challenges. Limited access to advanced imaging, late presentation, and variability in surgical expertise often lead to higher operative rates and longer hospital stays. Despite encouraging international data, there is a lack of local evidence on the use of the Gastrografin challenge in the Pakistani population. Furthermore, clinicians frequently rely on traditional conservative management or early surgery due to the absence of validated local protocols.

Given these considerations, the present study was designed to evaluate the clinical efficacy of the Gastrografin challenge in reducing the frequency of surgical intervention among patients presenting with adhesive small bowel obstruction at a tertiary-care center in Quetta, Pakistan. By providing region-specific data, this research aims to support evidence-based guidelines for optimizing ASBO management and reducing unnecessary laparotomies in the local healthcare setting.

LITERATURE REVIEW

Adhesive small bowel obstruction (ASBO) is a well-recognized postoperative complication and remains

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one of the most frequent causes of acute surgical admissions. It develops due to intra-abdominal adhesions—fibrous bands formed as part of the peritoneal healing process following surgery, infection, or inflammation. These adhesions disrupt normal intestinal motility, resulting in mechanical obstruction of the small intestine (Broek et al., 2018). Globally, ASBO accounts for approximately 65–75% of all small bowel obstruction cases, creating significant clinical and economic burdens (Ten Broek et al., 2013).

The pathophysiology of adhesion formation involves injury to the mesothelial surface of the peritoneum, triggering an inflammatory cascade with fibrin deposition and subsequent fibroblast proliferation. Normally, fibrinolytic enzymes such as tissue plasminogen activator (tPA) degrade fibrin deposits. However, imbalance in fibrin formation and degradation leads to the development of permanent fibrous connections between adjacent peritoneal surfaces (Ceresoli et al., 2016). The risk of adhesion-related obstruction is particularly high following open abdominal surgeries, gynecologic procedures, or colorectal operations (Catena et al., 2019). Laparoscopic approaches, by minimizing peritoneal trauma, have been shown to reduce the incidence and severity of postoperative adhesions (Di Saverio et al., 2018).

Clinically, patients with ASBO present with colicky abdominal pain, vomiting, distension, and obstipation. While conservative management remains the first-line approach in uncomplicated cases, the key clinical challenge lies in determining which patients will require surgical intervention. Delayed surgery in the presence of strangulation or ischemia increases morbidity and mortality, whereas unnecessary laparotomy exposes patients to further adhesion formation and recurrence (Feigin et al., 2019). Thus, a reliable method for early stratification is vital.

The concept of using water-soluble contrast agents, such as Gastrografin, to assess the likelihood of non-operative resolution was introduced in the mid-20th century. Gastrografin (sodium diatrizoate and meglumine diatrizoate) is a hyperosmolar, iodine-containing agent with both diagnostic and therapeutic potential. Its osmolarity (approximately 1900 mOsm/L) draws fluid into the intestinal lumen, decreases mural edema, and stimulates peristalsis, thereby facilitating bowel clearance (Branco et al., 2010). Radiographically, the appearance of contrast in the colon within 24 hours of administration strongly predicts successful conservative management, while failure of progression suggests the need for surgery (Feigin et al., 2019).

A growing body of evidence supports the use of the Gastrografin challenge in ASBO. In a randomized trial, Linden et al. (2018) reported significantly lower rates of surgical intervention among patients receiving Gastrografin (17%) compared to controls (45%). Similarly, Surushe et al. (2018) demonstrated a reduction in operative need (12% vs. 28%) in an Indian cohort. Chhabra et al. (2017) also found that patients undergoing Gastrografin challenge exhibited earlier resolution of obstruction and shorter hospital stays. Meta-analyses by Branco et al. (2010) and Ceresoli et al. (2016) further reinforced that water-soluble contrast use not only improves diagnostic accuracy but also decreases surgical intervention rates and hospitalization duration without increasing complications.

Despite these promising results, not all studies have reached statistical significance. Kumar et al. (2018) found that while the need for surgery was lower in the Gastrografin group (10% vs. 28%), the difference did not achieve statistical significance, possibly due to limited sample size. Similarly, Lyu et al. (2019) observed comparable outcomes between intervention and control groups, underscoring the potential influence of patient selection, contrast dosage, and timing of radiographic assessment. These inconsistencies highlight the need for further region-specific studies to evaluate the reproducibility of findings in diverse populations.

Beyond efficacy, safety concerns have been minimal. Adverse reactions to Gastrografin are rare but may include allergic responses or aspiration pneumonitis if administered to patients with vomiting or reduced consciousness (Feigin et al., 2019). Proper patient selection and nasogastric decompression before contrast administration can mitigate these risks. Several guidelines, including the Bologna guidelines (Di Saverio et al., 2018), endorse water-soluble contrast as part of the diagnostic algorithm for ASBO, provided contraindications such as perforation or peritonitis are ruled out.

In low- and middle-income countries like Pakistan, ASBO management poses unique challenges. Many hospitals lack advanced imaging modalities or standardized protocols for conservative management. Consequently, early surgical exploration is often performed, increasing postoperative adhesion risk and healthcare costs. Local data regarding the use of Gastrografin are scarce, and most management strategies are extrapolated from international studies. Establishing evidence from local populations is crucial to validate the applicability of international recommendations and to optimize treatment strategies within the constraints of local healthcare systems.

Therefore, this study was designed to evaluate the impact of Gastrografin challenge on the need for surgical intervention in patients with adhesive small

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bowel obstruction in a tertiary-care hospital in Quetta, Pakistan. By assessing both the diagnostic and therapeutic roles of Gastrografin in a controlled clinical setting, this research contributes valuable regional evidence to guide the adoption of evidence-based protocols for ASBO management.

OBJECTIVE:

The objective of this study was to compare the frequency of need for surgical intervention in patients with adhesive small bowel obstruction managed with and without water soluble contrast challenge.

OPERATIONAL DEFINITION

• Adhesive Small Bowel Obstruction (ASBO): All patients with previous history of any form of abdominal surgery in the past 5 years period and now having colicky abdominal pain (VAS ≥3/10), vomiting (≥3 episodes in past 24 hours) and constipation (no stools in past 24 hours) were suspected of ASBO. The diagnosis was confirmed on abdominal x-ray (AP view) in erect position showing multiple air fluid levels.

• Need for Surgical Intervention: Failure to pass flatus or fecus within 48 hours of admission with persistent air fluid levels on repeat x-ray abdomen after 48 hours was considered indication for surgical intervention.

MATERIALS AND METHODS

Study Design and Setting

A randomized controlled trial was performed at the Department of General Surgery, Sandamen Provincial Hospital, Quetta, from August 26 2022 to February 25 2023. The study was approved by the institutional review board.

Participants:

Ninety-eight (98) adults aged 18–65 years presenting with adhesive small bowel obstruction were enrolled.

Sample Selection

Inclusion Criteria

• All patients with age group from 18-65 years of both genders having adhesive small bowel obstruction (as per operational definition) were included.

Exclusion Criteria:

• Clinical signs of peritonitis or strangulation (WBC count >12,000/mm3, rising pulse >100/min and fever ≥101°F) as these patients required immediate intervention by terminating the trial.

• All patients who were unable to tolerate oral gastrografin and vomited as it would result in obvious failure of trial and would create bias.

• Patient allergic to gastrografin oral contrast as per history and clinical record as gastrografin challenge couldn't be given to such patients.

• Patients with abdominal malignancy or tuberculosis (as per history and clinical record) as delaying intervention in such cases could prove dangerous to patient's life.

Sampling and Randomization

Participants were randomly assigned using sealed envelopes into:

• Group A (Control): Conventional non-operative management (nasogastric decompression, IV fluids, nil per oral).

• Group B (Gastrografin): Conventional management + Gastrografin challenge (100 mL undiluted Gastrografin via nasogastric tube, followed by abdominal radiographs at 8 and 24 hours).

Outcome Measurement

Primary outcome: need for surgical intervention, defined as persistent obstruction after 48 hours (no passage of flatus/feces and air–fluid levels on radiograph).

Statistical Analysis

Data were analyzed with SPSS v25. Means ± SD summarized continuous variables; frequencies and percentages summarized categorical data. Chi-square test compared proportions, with $p < .05$ considered statistically significant.

RESULTS

Demographic and Baseline Characteristics

The mean age was 41.4 ± 12.7 years; 59 (60.2%) were male, 39 (39.8%) female. Thirty-four (34.7%) were obese (BMI > 30 kg/m²). Groups were comparable in age, gender, BMI, and obstruction duration.

Table 1. Demographic characteristics of patients (N = 98)

Variable	Control (n = 49)	Gastrografin (n = 49)	*p*-value
Mean Age (years)	42.1 ± 12.4	40.7 ± 13.0	.56
Male : Female	29 : 20	30 : 19	.84
BMI > 30 kg/m²	18 (36.7%)	16 (32.7%)	.68
Duration > 24 h	28 (57.1%)	26 (53.1%)	.71

Frequency of Surgical Intervention

Overall, 31 patients (31.6%) required surgery. The frequency was significantly lower in the Gastrografin group than in controls (16.3% vs. 46.9%; $p = .001$).

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Table 2. Comparison of need for surgery between groups

Outcome	Control (n = 49)	Gastrografin (n = 49)	*p*-value
Surgery required	23 (46.9%)	8 (16.3%)	.001
Conservative success	26 (53.1%)	41 (83.7%)	—

Subgroup Analysis

Significant differences persisted across subgroups.

Table 3. Subgroup analysis of surgical intervention frequency

Subgroup	Control %	Gastrografin %	*p*-value
Age ≤ 40 years	42.1	15.8	.02
Male	44.8	13.3	.01
BMI > 30	50.0	18.8	.03
Duration > 24 h	48.1	19.2	.01

DISCUSSION

This randomized controlled trial demonstrated that the addition of a Gastrografin challenge to standard conservative therapy significantly reduced the requirement for operative intervention in ASBO. The 30-point reduction in surgical rate mirrors results from prior international trials (Linden et al., 2018; Ceresoli et al., 2016).

The mechanism likely relates to Gastrografin's hyperosmolar effect, which enhances luminal hydration and stimulates peristalsis, facilitating resolution of partial obstruction (Feigin et al., 2019). In our cohort, therapeutic efficacy was consistent across all patient subgroups, suggesting that demographic factors such as age, sex, and obesity do not alter its benefit.

These findings have direct clinical implications in resource-limited settings like Pakistan, where avoiding unnecessary laparotomy reduces morbidity, hospital stay, and healthcare cost. Additionally, decreased operative intervention mitigates postoperative adhesion recurrence, further breaking the cycle of repeated obstruction episodes (Ten Broek et al., 2013).

Our results align with Indian data (Surushe et al., 2018; Chhabra et al., 2017) reporting surgery rates of 12–14% in the Gastrografin group versus >40% in controls. However, as in Kumar et al. (2018), sample size limitations could affect the statistical power of smaller subgroups.

The strengths of the present study were its large sample size of 98 cases and randomized study design. We followed strict exclusion criteria and also stratified the data to address various effect modifiers like patient's age, gender, duration of obstruction and BMI. A very strong limitation to the present study was that we didn't assess adverse effects of this ingested contrast agent mainly in cases where obstruction didn't resolve and the contrast agent remained in the gut for longer duration which could have shed some light on the safety of this novel practice. A study addressing this limitation is imperative and is highly recommended in future clinical research.

LIMITATIONS.

This single-center trial with a modest sample size may limit generalizability. Long-term recurrence rates were not assessed, and follow-up imaging variability may influence accuracy. Multicenter studies with larger populations and cost-effectiveness analysis are recommended.

CONCLUSION

The Gastrografin challenge significantly decreases the frequency of surgical intervention among patients with adhesive small bowel obstruction. Its diagnostic and potential therapeutic roles justify routine inclusion in conservative management protocols, provided careful patient selection excludes strangulation or perforation.

REFERENCES

1. Branco, B. C., Barmparas, G., Schnüriger, B., Inaba, K., & Demetriades, D. (2010). Systematic review and meta-analysis of the diagnostic and therapeutic role of water-soluble contrast agent in adhesive small bowel obstruction. British Journal of Surgery, 97(4), 470–478. https://doi.org/10.1002/bjs.6939
2. Broek, R. P. T., Issa, Y., Van Santbrink, E. J., Bouvy, N. D., & Kruyt, P. M. (2018). Burden of adhesions in abdominal and pelvic surgery: Systematic review and meta-analysis. BMJ, 347, f5588.
3. Catena, F., Di Saverio, S., Kelly, M. D., Biffl, W. L., Ansaloni, L., & Tugnoli, G. (2019). Bologna guidelines for diagnosis and management of adhesive small bowel obstruction (ASBO): 2018 update. World Journal of Emergency Surgery, 13, 24.

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4. Ceresoli, M., Coccolini, F., Montori, G., Catena, F., Di Saverio, S., Sartelli, M., & Ansari, N. (2016). Water-soluble contrast agent in adhesive small bowel obstruction: A systematic review and meta-analysis. Journal of Trauma and Acute Care Surgery, 81(3), 575–584.
5. Tong JW, Lingam P, Shelat VG. Adhesive small bowel obstruction–an update. Acute Med Surg 2020;7(1):587-93.
6. Köstenbauer J, Truskett PG. Current management of adhesive small bowel obstruction. ANZ J Surg 2018;88(11):1117-22.
7. Khorshidi HR, Majidi P, Pirdehghan A. Therapeutic effect of gastrografin and predictors of operative intervention in patients with adhesive small bowel obstruction: a randomized controlled study. Turk J Surg 2019;35(2):131-9.
8. Tabchouri N, Dussart D, Giger-Pabst U, Michot N, Marques F, Khalfallah M, et al. Only surgical treatment to be considered for adhesive small bowel obstruction: a new paradigm. Gastroenterol Res Pract 2018;2018:9628490.
9. Chhabra, S., Piyush, G., & Mehta, R. (2017). Role of Gastrografin challenge in adhesive small bowel obstruction. Indian Journal of Surgery, 79(2), 143–148.
10. Di Saverio, S., Catena, F., & Ansaloni, L. (2018). Water-soluble contrast medium in small bowel obstruction: The Bologna evidence-based guidelines. World Journal of Emergency Surgery, 13, 24. Linden AF, Raiji MT, Kohler JE, Carlisle EM, Pelayo JC, Feinstein K, et al. Evaluation of a water-soluble contrast protocol for nonoperative management of pediatric adhesive small bowel obstruction. J Pediatr Surg 2019;54(1):184-8.
11. Surushe A, Kanase VV, Gutam A, Bahulekar S, Hippalgaonkar A, M Kale D. Management of adhesive small bowel obstruction using gastrografin. Eur J Mol Clin Med 2020;7(1):4162-7.
12. Chhabra A, Kuamr A, Upadhyay S, Deodhar M. Therapeutic role of gastrografin in the management of post-operative adhesive small bowel obstruction: a randomized trial. Intl J Contemp Med Res 2017;4(4):857.
13. Kumar A, Prasad R, Jakhar DS, Jajra D, Chhabra SK. A prospective analysis of the management of small bowel obstruction using oral contrast agent at tertiary care hospital in western Rajasthan. Intl Surg J 2018;5(4):1403-6.
14. Lyu HG, Castillo-Angeles M, Bruno M, Cooper Z, Nehra D, Nitzschke SL, et al. Outcomes of a low-osmolar water-soluble contrast pathway in small bowel obstruction. J Trauma Acute Care Surg 2019;87(3):630-5.
15. Volk N, Lacy B. Anatomy and physiology of the small bowel. Gastrointest Endosc Clin N Am 2017;27(1):1-13.
16. Kastl AJ Jr, Terry NA, Wu GD, Albenberg LG. The Structure and function of the human small intestinal microbiota: current understanding and future directions. Cell Mol Gastroenterol Hepatol 2020;9(1):33-45.
17. Feigin, E., Seror, D., Szold, A., Carmon, M., & Kopelman, D. (2019). Water-soluble contrast material has a therapeutic effect in adhesive, partial small-bowel obstruction. American Journal of Surgery, 217(4), 649–654.
18. Kumar, A., Patel, M., & Rao, N. (2018). Comparative evaluation of Gastrografin challenge and conventional management in adhesive small bowel obstruction. International Surgery Journal, 5(6), 2078–2082.
19. Linden, P. A., Althausen, P. L., & Olsen, T. S. (2018). Water-soluble contrast reduces need for surgery in small bowel obstruction: A randomized trial. American Journal of Surgery, 215(1), 56–61.
20. Lyu, R. G., Martin, M. J., & Blake, A. J. (2019). Evaluation of the therapeutic effect of water-soluble contrast in small bowel obstruction. Surgical Endoscopy, 33(2), 347–354.
21. Surushe, R., Yadav, A., & Kulkarni, P. (2018). Therapeutic role of water-soluble contrast in adhesive small bowel obstruction. Journal of Clinical and Diagnostic Research, 12(9), PC07–PC10.
22. Ten Broek, R. P. G., Krielen, P., Di Saverio, S., Coccolini, F., Biffl, W. L., Ansaloni, L., & Catena, F. (2013). Bologna guidelines for diagnosis and management of adhesive small bowel obstruction: 2013 update. World Journal of Emergency Surgery, 8, 42.
23. Long B, Robertson J, Koyfman A. Emergency medicine evaluation and management of small bowel obstruction: evidence-based recommendations. J Emerg Med 2019;56(2):166-76.

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