

Assessing the Therapeutic Role of Oral Gastrografin in Subacute Intestinal Obstruction

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ABSTRACT

Objective: To assess the therapeutic role of gastrografin in patients with subacute intestinal obstruction.

Study Design: Quasi-experimental study.

Place and Duration of Study: Surgical Department, Combined Military Hospital, Rawalpindi, Pakistan from Jul to Dec 2019.

Methodology: A total of 112 patients who presented to Combined Military Hospital, Rawalpindi with subacute intestinal obstruction were included. Fifty-six patients were each allotted into group-A and group-B. Group-A were controls and received conventional treatment, whereas group-B, which was the study group received addition of 100 ml gastrografin meal. Patients were followed up with variables like operative rates, hospital stay during the admission and further readmissions with similar complaints were also assessed in next 3months time.

Results: Surgical operation was performed in 14(25%) of the non-gastrografin group (group-A), for whom conservative treatment failed. In contrast, surgery was required in 5(8.9%) patients from the gastrografin group (group-B). The length of hospital stay showed a significant reduction from 5.02±1.61 days to 3.2±0.72 days for groups A and B, respectively. Readmission rate between groups was not statistically significant ($p=0.151$).

Conclusion: We concluded that the gastrografin administration in subacute intestinal obstruction has a definite advantage in terms of lower surgery rate and reduced hospital stay.

Keywords: Conservative Treatment, Gastrografin, Intestinal obstruction, Length Of Stay, Patient Readmission.

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INTRODUCTION

Intestinal obstruction is one of the most common surgical emergencies, representing about 25% of cases of acute abdomen.¹ Small bowel obstruction (SBO) is a major cause of morbidity and mortality in patients presenting with intestinal obstruction especially in elderly.¹ SBO may arise as a result of adhesions after operation, intussusceptions especially in children and volvulus especially in older population. Post-surgical adhesions accounts for about 75% cases of the obstruction.^{2,3} Some studies put the rate of post-surgery adhesions at 94%–95%. This rate of adhesion is lower in laparoscopic procedures due to minimal access and minimal manipulation.³

Initial conservative management includes nil per oral (NPO) and intravenous fluid resuscitation along with intestinal decompression by nasogastric tube and Foley's catheterization to gauge hydration status. Majority of the symptoms are resolved by this conservative treatment. Operative management is indicated if there is suspicion of ischemia or intestinal

suffering. Surgical options are explored immediately when there are any findings that suggest strangulation. It is required in about 20% to 30% of cases.⁴

The administration of Oral Water Soluble Contrast Agent (WSCA) like gastrografin has been shown to reduce surgical intervention, duration of hospital stay and time to resolution of intestinal obstruction.⁵ Gastrografin is used for long as a diagnostic modality in SBO, which involves capturing serial abdominal radiographs.⁶⁻⁸ But if the signs and symptoms of intestinal obstruction are still present after 24 to 48 hours, or if there is suspicion of intestinal strangulation, surgery will be required.^{8,9} A lot of research has shown the diagnostic benefit of gastrografin but the therapeutic advantage has not been established by majority of authors.^{3,10} The present prospective study was undertaken to evaluate therapeutic role of gastrografin follow-through in subacute intestinal obstruction.

METHODOLOGY

This Quasi-experimental study was conducted in the Surgical Department of Combined Military Hospital (CMH) Rawalpindi, Pakistan from July to

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December 2019. Approval was obtained from hospital Ethical Review Committee (vide ERC Certificate no A/28/EC/113/19).

Inclusion Criteria: Patients of either gender, from 15 to 65 years of age who were admitted with signs and symptoms of subacute intestinal obstruction (abdominal distension, pain abdomen, constipation, absent or hyper intestinal sounds) were included.

Exclusion Criteria: Patients with gastrografin contrast allergy, previous radiotherapy, cardiovascular disease, obstruction in early post-op period, incarceration in ventral hernia, inflammatory bowel disease or patients who presented with dangerous signs and needed immediate surgical intervention were excluded.

Sample size was calculated using World Health Organization (WHO) sample size calculator with anticipated population proportion of 28%¹ and anticipated population proportion-2 of 10% for both groups.¹ Minimum sample size came out to be 56 in each group and 112 in total. Non-probability consecutive sampling was employed for data collection. Informed, written consent was taken from every patient that was included in the study.

Patients were divided into 2 groups, group-A and group-B (Figure).

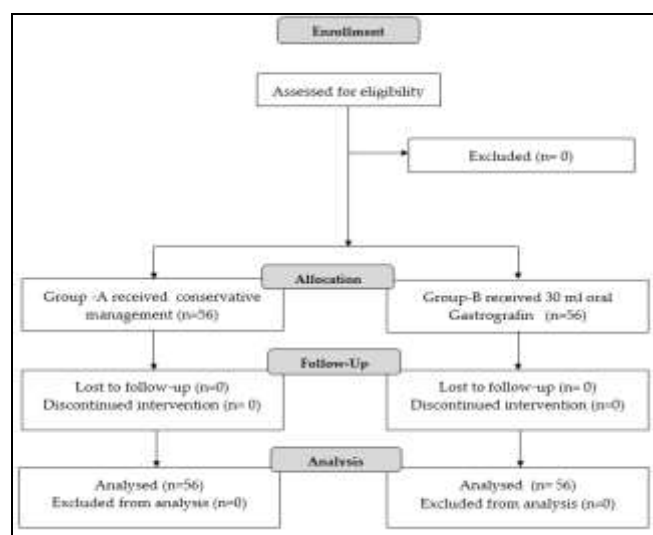


Figure: Patient Flow Diagram (n= 112)

Group-A patients were observed for resolution of subacute intestinal obstruction with conservative management i.e. with nil per oral, nasogastric tube decompression and intravenous fluid resuscitation only, while patients in group-B received 30ml of oral

contrast gastrografin along with standard conservative management within 4 days after admission.

Patients were observed for either resolution of their symptoms or aggravation of their condition leading to surgical intervention. Resolution was clinical improvement (decreased pain, decreased distension, passage of flatus or stool, normal intestinal sounds, and decreased amount of Ryle tube output) and radiological improvement. The patients who showed no progressive clinical and radiological improvement after 4 days, in either group, underwent surgery.

Others variables included duration of hospitalization and rate of readmission with signs and symptoms of intestinal obstruction with 3 months of initial admission. Details of the patient and above-mentioned data were recorded on a structured proforma.

Data was entered and analyzed using Statistical Package for the Social Sciences (SPSS) version 23.00. Quantitative variables like age, duration of hospitalization were measured as mean and standard deviation. Qualitative variables like gender, operations and readmission were measured in terms of frequencies and percentages. Post stratification t-test was performed. A p -value \leq 0.05 was considered significant.

RESULTS

Out of 112 patients included in final analysis, 56 were in group-A and 56 were in group-B. Mean age of all patients was 50.07 ± 14.36 years, while in group-A it was 52.98 ± 11 years, and that of group-B was 47.16 ± 16.12 years (Table-I). When therapeutic role of oral gastrografin contrast in subacute intestinal obstruction was compared between two groups based on age of the patients, the p -value came out to be 0.452. In gender distribution, group-A comprised of 42 Females (75%) and 14 Males (25%). Group-B comprised of 38 Female (67.86%) and 18 Males (32.14%).

Table-I: Age and Gender Distribution of patients across Groups (n=112)

Parameters	Group-A (n=56)	Group-B (n=56)	p -value
Mean Age	52.98 \pm 11.79yrs	47.16 \pm 16.12yrs	0.452
Gender	Female= 42(75%) Male= 14(25%)	Female= 38(67.86%) Male= 18(32.14%)	0.274

Therapeutic role of gastrografin in subacute intestinal obstruction was analyzed on basis of gender of the patients in both groups. Female patients operated for intestinal obstruction in group-A were 10(23%) and 4(10.5%) in group-B, while male patients in group-A were 4(28%) and 1(5%) in group-B as shown in Table-II. *p*-value was 0.142.

Table-II: Therapeutic role of Gastrografin in Subacute Intestinal Obstruction (n=112)

Variable	Group-A (n=56)	Group-B (n=56)	<i>p</i> -value
Patient Operated	14(25%)	5(9%)	0.042
Patient Not Operated	42(75%)	51(91%)	

Therapeutic role of gastrografin was assessed mainly on the operation rate in subacute intestinal obstruction patients. In group-A, 14(25%) patients were operated upon, while in group-B, 5(9%) were operated upon, with a statistically significant *p*-value (0.017).

Hospitalization duration was also compared between the two groups (Table-III). In group-A, the hospitalization duration was 5.02±1.61 days, while in group-B, the hospitalization duration was 3.2±0.72 days, which was a statistically significant difference (*p*=0.001).

Readmission rates with the same symptoms of intestinal obstruction within 3 months of initial admission were also compared between the two groups. In Group-A, the readmission rate was 4(7.14%), while in group-B, the readmission rate was 10(17.86%) as shown in Table-III. The readmission rate was higher in group-B, but it was not significant (*p*=0.151).

Table-III: Hospitalization Duration and Readmission across groups (=112)

Variables	Group-A (n=56)	Group-B (n=56)	<i>p</i> -value
Hospitalization Duration in days (Mean±SD)	5.02±1.61	3.2±0.72Days	0.001
Readmission Rates n(%)	4(7.14%)	10 (17.86%)	0.151

DISCUSSION

In our study we assessed the therapeutic role of gastrografin in subacute intestinal obstruction while focusing mainly on the operation rate. In gastrografin group (group-B), 5(9%) patients were operated upon while in non-gastrografin group (group-A) 14(25%)

patients were operated upon (*p*=0.017). Across groups, the difference between duration of hospital stay was statistically significant (*p*=0.001), while readmission rate was not (*p*>0.05).

We compared the findings of our study with some of the related studies on the topic. One study reported that surgical operations were done in 10% of the gastrografin group, while in the non-gastrografin group it was 28%.¹¹ The results are in line with our findings. The duration of hospitalization showed a significant decrease from 4.60±1.14 days to 2.64±1.05 days for non-gastrografin and gastrografin groups, respectively. The findings were again in line with our study. Kumar A *et al.*,¹ demonstrated that gastrografin reduced operative surgical management from 90% to 72% in patients with failed conservative treatment.¹ In the absence of signs and symptoms of strangulation, conservative management was given to patients. Twelve patients successfully responded to this conservative management. However, a delay in operative surgical management also led to increased mortality rate, from 3% to 5% when the obstruction was simple, but the mortality increased to about 30% when the obstruction was strangulated.

We also analyzed the results of Safamanesh *et al.*, They studied 46 patients who were referred to their hospital with acute small bowel obstruction (SBO).³ Out of 46, 37 patients (80%) responded to conservative management and did not require surgical procedure while 9(20%) patients failed to respond to conservative treatment, and underwent surgical management i.e. midline exploratory laparotomy. Here in non-gastrografin group, patients stayed in the hospital for 5- 12 days (average: 8 days). This is in accordance with the findings of our study, showing reduced hospitalization duration for gastrografin group. They stated that gastrografin helps in rapid resolution from bowel obstruction and reduces hospitalization duration.

Farid *et al.*, studied 110 patients, divided into gastrografin and non-gastrografin groups, who reported with intestinal obstruction.⁴ In the gastrografin group, obstruction settled in 85.5% patients. Complete obstruction was observed in 14.5% of patients, who did not respond to conservative options and thus underwent laparotomy. While in non-gastrografin group, 34.5% patients had complete mechanical obstruction and underwent laparotomy. These findings of operative rates at 34.5% to 14.5% in non-gastrografin to gastrografin groups respectively

were again similar to our results of 25% operation rates in non-gastrografin to 9% operations in gastrografin. Gastrografin decreases the duration of obstruction and also the duration of hospitalization. The duration from the hospital admission for intestinal obstruction to resolution of the signs and symptoms of intestinal obstruction was significantly decreased in gastrografin group (19.5 versus 42.6 hours). The duration of hospitalization showed a great reduction in gastrografin group (3.8 versus 6.9 days). This decrease was even more profound when compared with the length of hospitalization in non-operative patients (3.1 versus 5.1 days). These findings were similar to our results which showed hospitalization duration in gastrografin at 3.2 ± 0.72 days while in non-gastrografin group, the hospitalization duration was 5.02 ± 1.61 days, showing a mark reduction in gastrografin group.

Lastly, we also analyzed and compared the results of Ceresoli *et al.*, They showed that gastrografin had a sensitivity of 92% and a specificity of 93% in predicting resolution of obstruction.⁵ The administration of an oral Water-Soluble Contrast Agent (WSCA) like gastrografin markedly lowered the need for surgical intervention, hospitalization duration, and time to resolution of obstruction. These findings are again similar to ours results showing that gastrografin reduces the operation rate and hospital stay in intestinal obstruction. Singla *et al.*,¹¹ had 66.7% of cases with history of a surgical intervention. In their findings, adhesions were the most common cause of intestinal obstruction. Abdominal pain was the main symptom, followed by nausea and vomiting (90%), constipation (83.3%), and abdominal distension (60%). All patients were monitored and assessed after Gastrografin administration at 12 hours, 24 hours, and 48 hours. Over 90% patients showed improvement, with the rest requiring surgical intervention.

Bueno-Lledó *et al.*, showed that 198 episodes responded to conservative management with a success rate of 84.2% and 33 patients (15.8%) required surgical operation.¹² Only 3 patients of the gastrografin cohort with contrast in colon, required surgery. Pujahari *et al.*, concluded that predicting conservative or operative management in bowel obstruction is challenging.¹³ Decision on performing surgical intervention and abandonment of conservative treatment should be taken in paediatric patients within 24 hours.

Rajkumar *et al.* studied different factors influencing non-operative outcomes.¹⁴ They found factors that

are significantly associated with surgical intervention were the presence of radiologic air fluid levels and absence of flatulence 24 hours prior to admission, C-reactive protein (CRP) more than 10 mg/L and dehydration at the time admission. Absence of these factors significantly favored the conservative treatment. Isaksson *et al.*, concluded that the presence of two or more early predictive factors as defined above at admission, significantly correlates with a likelihood of complete obstruction and the need for surgical intervention.¹⁵

Koh *et al.*, evaluated the therapeutic value of Water-Soluble Contrast Media (WSCM) and showed that it does not lower the rate of surgical procedure in subacute intestinal obstruction.¹⁶ However, it decreases duration of hospitalization by 0.15 days (3.6 hours). Researchers also addressed the safety profile of gastrografin in Acute Sub-Bowel Obstruction (ASBO).^{17,18} They observed and discussed the possible mechanisms for the causation of haemorrhagic gastritis. Those patients who are at high risk of gastropathy experienced haemorrhagic gastritis. Generally speaking, gastrografin is usually safe and effective in ASBO. However, extra caution may be warranted in patients at high risk of gastropathy.

CONCLUSION

We concluded that the gastrografin administration in subacute intestinal obstruction has a definite advantage in terms of lower surgery rate and reduced hospital stay.

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Authors Contributions:

Following authors have made substantial contributions to the manuscript as under:

MZ & SMN: Conception, study design, drafting the manuscript, approval of the final version to be published.

AND & ASM: Data acquisition, data analysis, data interpretation, critical review, approval of the final version to be published.

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Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

REFERENCES

1. Kumar A, Prasad R, Jakhar DS, Jajra D, Chhabra SK, Rai A, et al. Prospective analysis of the management of small bowel obstruction using oral contrast agent at tertiary care hospital in western Rajasthan. *Int Surg J* 2018; 5(4): 1403-1406. <https://doi.org/10.18203/2349-2902.isj20181119>

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2. AlsMAIL MW, Alnaim AA, Alramadhan FS, Sagga BK, Alnomari LF, Almeashi NA, et al. Role of Gastrografin Challenge in Diagnosis of Small Intestinal Obstruction. *Arch Pharma Pract* 2019; 10(4): 21-24.
3. Safamanesh S, Pazouki A, Tamannaie Z, Mohammadalipour B, Ramezani K, Hajnasrollah E, et al. Evaluation of Gastrografin Therapeutic Role on the Management of Small Bowel Obstruction. *J Minim Invasive Surg Sci* 2012; 1(3): 90-93. <https://doi.org/10.5812/jmiss.6996>
4. Farid M, Fikry A, El Nakeeb A, Fouda E, Elmetwally T, Yousef M, et al. Clinical impacts of oral Gastrografin follow-through in adhesive small bowel obstruction (SBO). *J Surg Res* 2010; 162(2): 170-176. <https://doi.org/10.1016/j.jss.2009.03.092>
5. Ceresoli M, Coccolini F, Catena F, Montori G, Di Saverio S, Sartelli M, et al. Water-soluble contrast agent in adhesive small bowel obstruction: a systematic review and meta-analysis of diagnostic and therapeutic value. *Am J Surg* 2016; 211(6): 1114-1125. <https://doi.org/10.1016/j.amjsurg.2015.06.012>
6. Almafrefji I, Chinaka U, Hussain A, Lynch M, Cottrell R. Role of Gastrografin in Patients with Small Bowel Obstruction. *Cureus* 2020; 12(8): e9695. <https://doi.org/10.7759/cureus.9695>
7. Shahid MA, Bhatta P, Raya A, Rai BK. Therapeutic Role of Gastrografin in Adhesive Small Bowel Obstruction After Unsuccessful Conservative Treatment. *Med Phoenix* 2020; 5(1): 26-31. <https://doi.org/10.3126/medphoenix.v5i1.31395>
8. Nelms DW, Kann BR. Imaging modalities for evaluation of intestinal obstruction. *Clin Colon Rectal Surg* 2021; 34(04): 205-218. <https://doi.org/10.1055/s-0041-1729737>
9. Alnouchoukati O, Ray-Zack M, Godin S, Apodaca T, Zielinski M, Dunn J. Optimal Timing of First Abdominal Radiography after Gastrografin Administration for Small Bowel Obstruction. *J Surg Res* 2020; 256: 193-197. <https://doi.org/10.1016/j.jss.2020.06.053>
10. Mansoori B, Vasan V, Xi Y, Fielding JR. Variations in use of "water soluble contrast challenge" for small bowel obstruction among academic radiologists: results of a national survey. *Abdom Radiol* 2020; 45(2): 1050-1056. <https://doi.org/10.1007/s00261-020-02436-3>
11. Singla RL, Singh B, Kumar A, Kumar P, Khandelwal A. Role of Gastrografin Contrast Study in Intestinal Obstruction. *Int J Anat Radiol Surg* 2017; 6(3): SO01-SO05.
12. Bueno-Lledó J, Barber S, Vaqué J, Frasson M, Garcia-Granero E, Juan-Burgueño M, et al. Adhesive small bowel obstruction: predictive factors of lack of response in conservative management with Gastrografin. *Dig Surg* 2016; 33(1): 26-32. <https://doi.org/10.1159/000441530>
13. Pujahari AK. Decision making in bowel obstruction: a review. *J Clin Diagn Res: JCDR* 2016; 10(11): PE07-PE12. <https://doi.org/10.7860/JCDR/2016/22170.8923>
14. Rajkumar PN, Nagaraj B, Bharathi H, Yogish B. To study the efficacy of Gastrografin in diagnosis of adhesive small bowel obstruction Indian J Public Health Res Dev 2014; 5(1): 158-162. <https://doi.org/10.5958/j.0976-5506.5.1.036>
15. Isaksson K, Weber E, Andersson R, Tingstedt B. Small bowel obstruction: early parameters predicting the need for surgical intervention. *Eur J Trauma Emerg Surg* 2011; 37(2): 155-159. <https://doi.org/10.1007/s00068-010-0033-x>
16. Koh A, Adiamah A, Chowdhury A, Mohiuddin MK, Bharathan B. Therapeutic Role of Water-Soluble Contrast Media in Adhesive Small Bowel Obstruction: a Systematic Review and Meta-Analysis. *J Gastrointest Surg* 2020; 24(2): 473-483. <https://doi.org/10.1007/s11605-019-04341-7>
17. Guy S, Al Askari M. Haemorrhagic gastritis following Gastrografin administration for adhesive small bowel obstruction: a case report of a rare outcome. *Int J Surg Case Rep* 2017; 33(1): 51-54. <https://doi.org/10.1016/j.ijscr.2017.02.030>
18. Heng S, Hardy J, Good P. A retrospective audit on usage of Diatrizoate Meglumine (Gastrografin®) for intestinal obstruction or constipation in patients with advanced neoplasms. *Palliat Med* 2018; 32(1): 294-298. <https://doi.org/10.1177/0269216317726430>