

## Impact of Application of Gastrographin on Management of Small Bowel Obstruction

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### Abstract

**Introduction:** Small bowel obstruction is one of the most common surgical emergencies and the main causes of hospital admissions. Emergency surgical procedure is necessary when strangulation or complete obstruction occurs <sup>(1,2,3,4)</sup>. Gastrografin, is hyperosmolar water-soluble contrast agent, makes the fluid move into the intestinal lumen and increases the pressure gradient across obstructive sites that may result in resolving the obstruction <sup>(5,8)</sup>. If the symptoms are still present after 24 to 48 hours, surgery is indicated<sup>(4)</sup>. While many studies have shown the diagnostic benefit of gastrografin, the therapeutic advantage was not found by other authors <sup>(6)</sup>. **Objective:** The aim of this study was to evaluate the therapeutic role of gastrographin in management and assessing the indication for surgical intervention in patients with small bowel obstruction. **Patients and Methods:** In this prospective study, gastrografin was given to patients diagnosed with small bowel obstruction in clinical and radiological grounds. The contrast passage was assessed by CT or serial X-ray and accordingly, The patients were divided into two groups: group (A), who were improved by gastrografin administration, and group B, who finally required surgery. **Results:** Fifty two patients were included in the study. forty one of them (78.8 %) received a non-operative course in whom the contrast was observed in the large bowel. They had a mean hospital stay of 4 days. eleven patients (21.2 %) required operative intervention. These patients had a mean hospital stay of 8 days. **Conclusion:** This study has demonstrated that gastrografin helps to assess and reduce the indication for surgical interference and hospital stay for cases presented with acute small bowel obstruction

**Keywords:** Diatrizoate; Meglumine; Intestinal Obstruction; Surgery

### INTRODUCTION

Small bowel obstruction is one of the most common surgical emergencies and the main causes of hospital admissions. Emergency surgical procedure is necessary when strangulation or complete obstruction occurs <sup>(1,2,3,4)</sup>. The management of small bowel obstruction is still a clinical challenge <sup>(5)</sup>. Radio-opaque water-soluble contrast agents have been used to identify patients who might be managed non-operatively. The great diagnostic advantage of gastrografin in assessing the indication for surgical intervention in patients with complete obstruction has been established <sup>(6,7)</sup>.

Gastrografin, is hyperosmolar water-soluble contrast agent, makes the fluid move into the intestinal lumen and increases the pressure gradient across obstructive sites that may result in resolving the obstruction <sup>(5,8)</sup>.

If the symptoms are still present after 24 to 48 hours, surgery is indicated <sup>(4)</sup>. While many studies have shown the diagnostic benefit of gastrografin,

the therapeutic advantage was not found by other authors <sup>(6)</sup>.

#### Objective:

The aim of this study was to evaluate the therapeutic role of gastrographin in management and assessing the indication for surgical intervention in patients with small bowel obstruction.

### PATIENTS AND METHODS

This study was carried on fifty two patients over period of two years 2014-2016, in Ain Shams university hospitals and private hospital in Jeddah, KSA. All the patients referred to emergency department with symptoms and signs of acute small intestinal obstruction based on clinical and radiological evidences (such as plain x ray erect with multiple air fluid levels , lack of gas in the colon, and small intestine with diameter more than 3 cm).

Patients with renal failure and who had a contraindication for gastrografin administration

and those with signs of strangulation (such as fever, leukocytosis, and severe abdominal tenderness) and urgent requirement for surgery were excluded from the study. Initially, physical examination was performed, I.V. line was fixed, and fluids were administered. In the absence of strangulation signs, 80 to 100 mL of gastrografin was given orally. Further plain supine abdominal X-rays or CT examination were taken after 4, 8, and 24 hours. Patients did not undergo more radiological investigation if the contrast passed ileo-cecal valve and therefore, non-operative treatment was continued. Patients were observed for 24-36 hours and operative management was considered if strangulation signs were manifested or clinical condition deteriorated. The patients were divided into two groups: those who were managed non-operatively; group(A) and those who underwent surgery; group (B).

## RESULTS

Fifty two patients with mean age 44 years (ranging from 20 to 70 years) and male to female ratio 2 to 1 ,were referred with acute small bowel

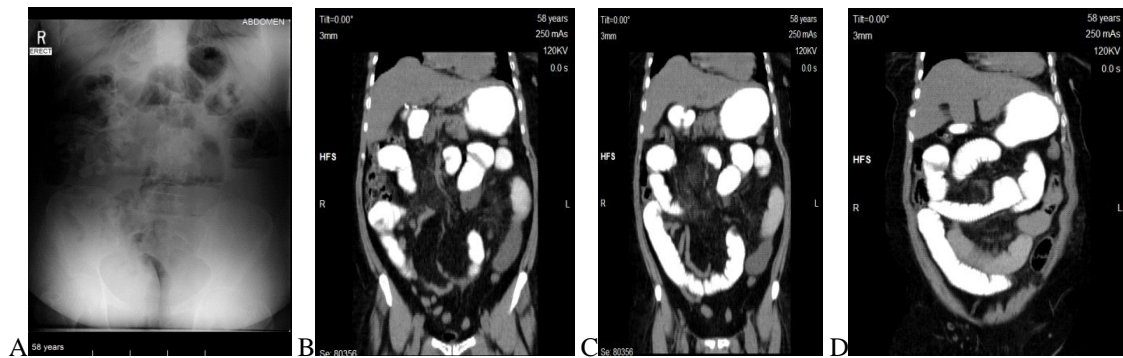
obstruction symptoms and accepted initial criteria, entered into the study. 41 patients of them (78.8%) did not require surgical intervention while 11 (21.2%) patients underwent surgery.

The patients stayed in the hospital for 3 to 6 days (average 4.6 days).

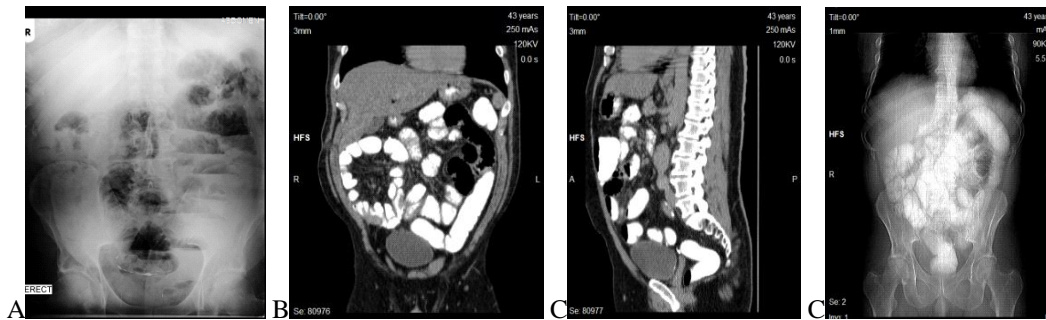
It should be noted that during the study, the patients were observed for signs of peritonitis and deterioration of general condition. Mostly (80%) defecated in the first 24 hours and the others in 48 hours after gastrografin swallow. None of the patients showed further obstructive presentation during hospitalization. Oral nutrition was started within two to three days after admission and they were all discharged in good general conditions.

The 11 patients in group (B) had no bowel movement and seven patients had no gas passing, too. All patients showed persistent radiological signs of small bowel obstruction.

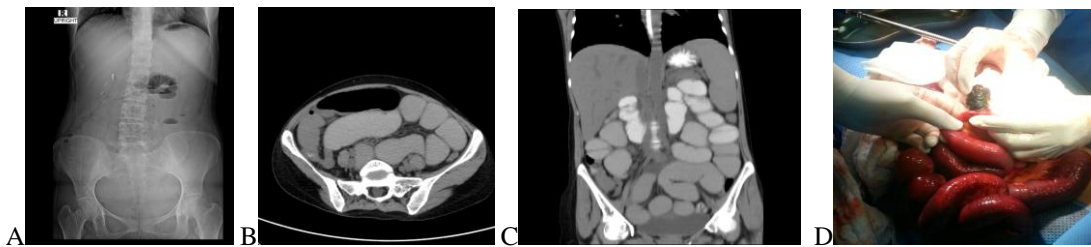
The surgical findings in patients in group B were as follow: fibrotic adhesive bands were found in eight patients (Figure 1, 4),cecal tumor in two and bezoar was detected in one patient (Figure 3).



**Fig. 1:** This patient came to hospital with symptoms of intestinal obstruction, A: is abdominal erect x-ray shows multiple air fluid levels. B, C and D: are serial CT coronal images showing no contrast passage in jejunal loops up to 24 hours and it was found in surgery to be an adhesive band.



**Fig. 2:** This patient presented with acute abdominal pain .A: is plain x-ray abdomen erect view shows multiple air fluid levels. B: is x-ray abdomen after contrast. C and D: are coronal and sagittal CT images showing passage of Gastrographin within 24 hours down to the lower rectum.



**Fig. 3:** This patient presented with acute abdominal pain .A: is plain x-ray abdomen erect view shows multiple air fluid levels. B and C: are axial and coronal CT images showing stop of passage of contrast at ileo-cecal junction up to 36 hours indicating small intestinal obstruction at this level. D: is the operative image of the obstructing bezoar.



**Fig. 4:** This patient came to hospital with acute abdominal pain, plain x ray (A) shows dilated jejunum with multiple air fluid levels seen , (B,C,D ) are axial ,coronal and sagittal CT images with oral and IV contrast shows complete arrest of contrast at jujenoileal junction for up to 36 hours and was proved to be adhesive band in surgery as seen in image E.

## DISCUSSION

Gastrographin is a water-soluble contrast medium has been evaluated recently in an attempt to predict the need for surgery in adhesive small bowel obstruction. some studies have also been performed to evaluate its possible therapeutic effect. Gastrografin is the contrast medium most commonly mentioned. Gastrografin is an ionic, bitter-flavored mixture of sodium diatrizoate,

megluminediatrizoate, and a wetting agent (polysorbate). itsosmolarity is 1900 mOsm/L, approximately six times that of extracellular fluid. It promotes shifting of fluid into the bowel lumen and increases the pressure gradient across the obstructive site. so the bowel content is diluted, and in the presence of the wetting agent, passage of bowel contents through a narrowed lumen is facilitated.it also decreases edema of the bowel wall and enhances bowel motility

(11,12,13). Barium can be used to evaluate adhesive small bowel obstruction; it is not as easily diluted by enteric fluid as Gastrografin and provides a better mucosal image on radiography. However, a barium study can be risky because it may become inspissated and completely obstruct the bowel. Barium may spread into the peritoneal cavity if perforation occurs, a condition that is potentially risky. Gastrografin is water-soluble and relatively safe even if the obstruction is complicated by perforation. Complications from the use of Gastrografin in small bowel obstruction are rare, although anaphylactoid reactions and lethal aspiration have been described. Gastrografin may also shorten postoperative ileus and relieve intestinal obstruction caused by impacted bezoar and *Ascaris lumbricoides* (11,14).

Chen et al (11) studied the predictive role of water-soluble contrast medium in the management of adhesive intestinal obstruction. The results of their study showed that patients with contrast observed in the colon within 24 hours were all managed successfully without surgery. Surgery was required in 96% of patients in whom contrast failed to reach the colon within 24 hours.

In this study, we had investigated the therapeutic effect of Gastrografin in enhancing resolution of acute small bowel obstruction. The study demonstrates the great effect of Gastrografin in resolving obstructions eliminating the need for surgery in 78.8 % of cases. Our results are in agreement with other studies that revealed reduction in surgery requirement in 70 to 80 % of cases (15, 16, 17, and 18).

According to the surgical findings, fibrotic adhesive bands were found in eight patients (Figure 1, 4), cecal tumor in two and bezoar was detected in one patient. (Figure 3)

According to the results of this study, Gastrografin administration under the patient monitoring is not only effective in the reduction of surgery requirement, but also decreases the length of hospital stay, this was in agreement with results of Galardi N. et al and Sina et al (15, 19).

Gastrografin as a contrast medium, is also useful to detect obstruction level. Because of its therapeutic effect, it seems logical to try Gastrografin administration before the decision for surgical intervention which may impose unwanted complications and excessive cost. It is

noticeable that exact selection of patients for gastrografin administration will prevent further obstructive complications such as intestinal strangulation and gangrene.

## CONCLUSION

Gastrografin significantly prompted the relief of obstruction, shortened the hospital stay, and reduced the need for surgery.

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