Original Research Article

ROLE OF GASTROGRAFIN IN ADHESIVE INTESTINAL OBSTRUCTION

ABSTRACT

OBJECTIVE: To determine the role of gastrografin in adhesive intestinal obstruction.

STUDY DESIGN: This is an observational study.

SETTING: Study carried out at General Surgery department, Liaquat University of Medical and Health Sciences Jamshoro and Shaheed Benazir Bhutto Medical College, Lyari Karachi, from January 2020 to July 2021

MATERIAL & METHOD: Patients having clinical and radiological signs evidence of adhesive bowel obstruction over the age of 18 years were selected for the study.One hundred milliliters of gastrografin was given via nasogastric tube and its transit was followed by serial abdominal radiographs and fluoroscopy.

RESULTS: In the time of 1 and half year, we received 53 patients with adhesive intestinal obstruction. It included 54.7% (n= 29) males and 45.2% (n=24) females with a mean age of 61 years. Out of 53 patients, 46 patients had single previous abdominal surgery.After complete examination and investigations emergency laparotomy was performed in 15% (n=8) patients. Hence out of total 53 patients, 27 patients fit into our criteria for gastrografin meal and follow through. Fluoroscopy revealed partial obstruction in 19 patients and complete obstruction in 8 patients. After gastrografin follow through obstruction was relieved in 17 patients within mean time of 63 hours (range 20-78h).

CONCLUSION: In our study gastrografin is found to be of great diagnostic and therapeutic value with fewer adverse effects. It also reduces the need for surgery, hence decreasing the financial burden of operative treatment. In Pakistan its use is still limited due to lack of equipment, expertise and radiological imaging facility.

KEY WORDS: Gastrografin, Intestinal obstruction, Diagnostic and therapeutic.

INTRODUCTION

Small bowel obstruction is a leading cause of surgical emergency and major cause of morbidity and mortality. Worldwide, it has been seen as significant financial burden over the healthcare system. Most common etiology of small bowel obstruction are adhesions due to previous abdominal surgery (1). Recurrence rate of small bowel obstruction due to adhesions is very high and it depends on the type of procedure performed. Major surgical procedures have higher chances of adhesion formation, and they cause obstruction after approximately 10 years of surgery (2). Yearly small bowel obstruction alone results in 30,000 deaths and affects quality of life (3). Recently the algorithm of management of small bowel obstruction has changed due to the advancement in imaging by abdominal computed tomography (CT) scan and laparoscopic surgery (4). Laparoscopic surgery has reduced formation of adhesions by 25% and the adhesion severity score has been lowered downby 1.7 times (5). According to a study in Europe the cost for non-operative treatment is 7 times less than surgical treatment (6).Non-surgical treatment for small bowel obstruction comprises of bowel rest and nasogastric decompression in patients without strangulation. Strangulation can be ruled out by the help of abdominal CT scan, as ischemia only occurs in 20% cases of small bowel obstruction (7). Gastrografin is an ionic bitter flavored contrast containing sodium diatrizoate and meglumine diatrizoate, having osmolarity of 1900 mOsm/L. (8). Water soluble contrast medium gastrografin have been used for small bowel obstruction recently and their therapeutic effect has been evaluated. The efficacy of gastrografin in patients with no response to conservative treatment is being studied in various randomized controlled trials these days. If there is no sign of strangulation on CT scan and no danger signs, then conservative treatment is used for small bowel obstruction. Conservative treatment is usually implied for 48 hours, and patient is evaluated for clinical and radiological improvement (9). The use of gastrografin is implied when there is no improvement after 48 hours to look for degree of intestinal obstruction. Gastrografin is an oral water soluble contrast agent administered via NG tube and its transit time to the large intestine is noted by serial abdominal radiographs. Appearance of contrast in the large intestine suggests partial obstruction and continuation of conservative treatment. Surgery is only required for cases with no clinical and radiological improvement after 48 hours and administration of gastrografin shows complete obstruction (10). The mode of action of gastrografin in intestinal obstruction is not known, the only possible explanation found is due to its high osmolality it allows shifting of fluid into bowel lumen decreasing edema and diluting bowel content for easy passage. As described above it also aids in evaluation of need for surgery in bowel obstruction(11). The aim of our study is to evaluate the diagnostic and therapeutic value of gastrografin in adhesive intestinal obstruction.

MATERIAL & METHOD:

This study carried out at General Surgery department, Liaquat University of Medical and Health Sciences Jamshoro and Shaheed Benazir Bhutto Medical College, Lyari Karachi, from January 2020 to July 2021. In this study we selected patients visiting the emergency department and after being evaluated shifted to the department of general surgery. Patients having clinical and

radiological signs evidence of adhesive bowel obstruction over the age of 18 years were selected for the study. A detailed history especially regarding previous surgeries and physical examination was carried out. Patients having previous abdominal malignancy, history of abdominal radiation, signs of bowel strangulation and early post operative obstruction were excluded from the study. Abdominal radiographs were taken, and nasogastric decompression was performed. Intravenous fluid resuscitation and conservative treatment was started in most patients. Patients having no clinical and radiological improvement with conservative management for 48 hours were given gastrografin via nasogastric tube. One hundred milliliters of gastrografin was given via nasogastric tube and its transit was followed by serial abdominal radiographs and fluoroscopy. Gastrografin presence in the large intestine after 24 hours showed partial obstruction and conservative management was continued. Those patients with no contrast in the large intestine even after 24 hours were treated by laparotomy. Complete resolution of bowel obstruction was established when signs and symptoms of obstruction were alleviated and no bowel dilation on X-ray. In this study we observed the percentage of patients requiring surgery after gastrografin administration, complications, and mortality with adhesive bowel obstruction. Data was collected prospectively and entered SPSS for analysis.

RESULTS:

In the time of 1 and half year, we received 53 patients with adhesive intestinal obstruction. It included 54.7% (n= 29) males and 45.2% (n=24) females with a mean age of 61 years. Out of 53 patients, 46 patients had single previous abdominal surgery. Majority of the patients had cholecystectomy, colorectal and gynecological surgeries done. In our study group, only 7 patients had history of more than one abdominal surgery, while no one had previous history of intestinal obstruction. Patients were first encountered at the emergency department and then shifted to the surgical unit for further management. The mean time duration from entering the emergency to admission at the surgical unit was found to be 35 hours.

After complete examination and investigations emergency laparotomy was performed in 15% (n=8) patients due to risk for strangulation, whereas the remaining 45(84.90%) patients were managed conservatively by nasogastric compression. There was clinical and radiological improvement found in 18(40%) patients within 48 hours of admission, so conservative management was continued in these patients (Table No.1). Hence out of total 53 patients, 27(60%) patients fit into our criteria for gastrografin meal and follow through. Fluoroscopy revealed partial obstruction in 19(70.37%) patients and complete obstruction in 8(29.62%) patients (Chart No.1). After gastrografin follow through obstruction was relieved in 17 patients within mean time of 63 hours (range 20-78h). Laparotomy was performed in patients in 10 patients who showed persistent obstruction after gastrografin meal and follow through.

The difference in patients responding to conservative treatment and operative treatment was found in volume of nasogastric output. Patients with unsuccessful conservative treatment had

comparatively higher nasogastric output than patients with conservative management (p= 0.001). There were no differences due to variables like age, gender and duration of symptoms.

DISCUSSION:

There is no specific standard protocol for adhesive small bowel obstruction management, and it is encountered frequently. The duration of conservative treatment is controversial especially in patients with no signs and symptoms of strangulation. Hence it depends on the case scenario whether to continue the conservative management or not (12). Cox et al. in his study reported that approximately 69% of adhesive obstructions are relieved by conservative management within time interval of 48 hours. Based on such studies it is recommended to at least continue conservative treatment for 48 hours. Recently the use of gastrografin has been considered in the management of adhesive intestinal obstruction for diagnostic and therapeutic purposes. Gastrografin has osmolarity of 1900mOsm/L which is six times the osmolarity of blood allowing shifting of fluid from intracellular compartment to the bowel lumen increasing pressure on the obstructive site (13). It also makes the contents of bowel dilute and decreases bowel wall edema favoring the relief of obstruction and increasing intestinal motility (14). Appearance of contrast medium in the colon within 24 hours of administrations signifies partial obstruction and delay in operative treatment can be done. Various studies have shown that 98% cases of partial obstruction can be relieved by conservative treatment. Failure of gastrografin to reach the colon shows complete obstruction which requires surgery in 80% of the cases. (15). A retrospective study in 2020 also concluded that gastrografin has major therapeutic role in relieving adhesive small intestinal obstruction as well as refractory constipation. In comparison to CT scan, it is more effective and has higher diagnostic value (82.5% vs 92.3%) (16). The UK national audit recommends the use of gastrografin after 48 hours of conservative treatment and operative treatment after 24 hours of gastrografin administration and no improvement (17). In our study 62.96% of partial obstructions were relieved by gastrografin meal and follow through in mean duration of 63 hours. Adverse effects of this contrast medium and mortality is rare when administered correctly. Aspiration pneumonia is a possible complication due to gastrografin administration but it can be eliminated by gastric decompression prior. Dehydration can also occur in individuals due to shifting of fluid into the bowel lumen if intravenous rehydration is not continued simultaneously (18). Some rare complications like gastritis, hemoorhage into the GI

tract, pneumonitis, pulmonary edema have also been reported but their chances are less than 1% (19).

CONCLUSION:

In our study gastrografin is found to be of great diagnostic and therapeutic value with fewer adverse effects. It also reduces the need for surgery, hence decreasing the financial burden of operative treatment. In Pakistan its use is still limited due to lack of equipment, expertise and radiological imaging facility.

REFRENCES:

1. Reddy SR, Cappell MS. A systematic review of the clinical presentation, diagnosis, and treatment of small bowel obstruction. Current gastroenterology reports. 2017 Jun 1;19(6):28-32.
2. Zins M, Millet I, Taourel P. Adhesive small bowel obstruction: predictive radiology to improve patient management. Radiology. 2020 Sep;296(3):480-92.
3. Jeppesen M, Tolstrup M-B, Gögenur I. Chronic pain, quality of life, and functional impairment after surgery due to small bowel obstruction. World J Surg. 2016;40(9):2091–7.
4. Pei KY, Asuzu D, Davis KA. Will laparoscopic lysis of adhesions become the standard of care? Evaluating trends and outcomes in laparoscopic management of small-bowel obstruction using the American College of Surgeons National Surgical Quality Improvement Project Database. Surgical endoscopy. 2017 May;31(5):2180-6.
5. 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. Journal of Gastrointestinal Surgery. 2020 Feb;24(2):473-83.
6. Krielen P, van den Beukel BA, Stommel MWJ, van Goor H, Strik C, ten Broek RPG. In-hospital costs of an admission for adhesive small bowel obstruction. World J Emerg Surg. 2016;11(1):49-51.

7. Millet I, Ruyer A, Alili C, Curros Doyon F, Molinari N, Pages E, et al. Adhesive small-bowel obstruction: value of CT in identifying findings associated with the effectiveness of nonsurgical treatment. Radiology. 2014 Jul 4;273(2):425-32.

8. Atahan K, Aladağli I, Cökmez A, Gür S, Tarcan E. Hyperosmolar water-soluble contrast medium in the management of adhesive small-intestine obstruction. J Int Med Research. 2010 Dec;38(6):2126-34.

9. Alsimail MW, Alnaim AA, Alramadhan FS, Sagga BK, Alnomari LF, Almeashi NA, et al. Role of Gastrografin Challenge in Diagnosis of Small Intestinal Obstruction. Archives of Pharmacy Practice. 2019 Oct 1;10(4):21-5.

10. Paily A, Kotecha J, Sreedharan L, Kumar B. Resolution of adhesive small bowel obstruction with a protocol based on Gastrografin administration. Journal of medicine and life. 2019 Jan;12(1):10-3.

11. Gu L, Zhu F, Xie T, Feng D, Gong J, Li N. Use of the Water-Soluble Contrast Medium Gastrografin in Treatment of Adhesive Small Bowel Obstruction in Patients with and Without Chronic Radiation Enteropathy: A Single-Center Retrospective Study. Medical Science Monitor: Int Med J of Experimental & Clin Resea. 2021;27:e930046-1.

12. Kanase VV, Gutam A, Bahulekar S, Hippalgaonkar A, M Kale D. Management of adhesive small bowel obstruction using gastrografin. Euro J Molecular & Clin Med. 2020 Dec 31;7(1):4162-7.

13. Kumar A, Prasad R, Jakhar DS, Jajra D, Chhabra SK, Rai A. Prospective analysis of the management of small bowel obstruction using oral contrast agent at tertiary care hospital in western Rajasthan. Int Surg J. 2018 Mar 23;5(4):1403-6.

14. D'Agostino R, Ali NS, Leshchinskiy S, Cherukuri AR, Tam JK. Small bowel obstruction and the gastrografin challenge. Abdominal Radiology. 2018 Nov;43(11):2945-54.

15. Katano T, Shimura T, Nishie H, Iwai T, Itoh K, Ebi M, et al. The first management using intubation of a nasogastric tube with Gastrografin enterography or long tube for non-strangulated acute small bowel obstruction: A multicenter, randomized controlled trial. J Gastroenterol.2020 Sep;55(9):858-67.

16. Almafreji I, Chinaka U, Hussain A, Lynch M, Cottrell R. Role of Gastrografin in Patients With Small Bowel Obstruction. Cureus. 2020 Aug;12(8).

17. Report of the National Audit of Small Bowel Obstruction. [Jun;2020];https://www.acpgbi.org.uk//content/uploads/2017/12/NASBO-REPORT-2017.pdf 20191

18. Barone M, Leone B, Cipollone G, Mucilli F. Gastrografin-based conservative approach to small bowel obstructions: too far from a daily use. J Emerg Practice and Trauma. 2020 Jan 1;6(1):1-2.

19. Ceresoli M, Coccolini F, Catena F. Water-soluble contrast agent in adhesive small bowel obstruction: a systematic review and meta-analysis of diagnostic and therapeutic value. Am J Surg 2016;6:1114–1125.

Table No.1

Demographic Variable

N=53

Variable	No. Patients	Percentage
Gender		
• Male	29	54.7%
• Female	24	45.2%
Management		
• Emergency laparotomy	8	22.22%
• Conservatively	45	38.88%
Conservatively Management N=45		
• Improvement found	18	40%
• For gastrografin	27	60%

Chart No.1

GASTROGRAFIN RESULT

N=27