The role of oral gastrografin (Diatrizoic acid) in the management of postoperative adhesive small bowel obstruction

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Abstract

Background:

Small bowel obstruction is one of the most common surgical emergencies and causes of hospital admissions. Diatrizoate Meglumine Gastrografin has been used to triage patients with small bowel obstruction for an operative or a non-operative management.

Patients & Methods:

Sixty eight patients were selected. Patients with clinical & radiological evidences of adhesive small bowel obstruction were grouped into two groups, in which the members of the first group were given Gastrografin orally, while the members of the second group were not. Both groups were observed for 72 hours & managed accordingly.

Results:

Total of 68 patients; 27 responded well to conservative management with gastrografin, 18 responded well to conservative management without gastrografin, while 23 patients required surgery with no postoperative complications or mortality.

Conclusions:

Orally administered Gastrografin is safe and reliable water-soluble contrast agent which can safely be used in patients with small bowel obstruction. Patients who received Gastrografin had a shorter hospital stay than those who did not, with good tolerance to an early oral diet.

Key words: intestinal obstruction, adhesion, gastrografin.

Introduction

Small bowel obstruction is one of the most common surgical emergencies and causes of hospital admissions (1).

The clinical presentation of intestinal obstruction is well known to all surgeons, when the patient presents with a previous history of abdominal surgery, the most likely diagnosis is adhesions (2).

The overall incidence of adhesive intestinal obstruction is 30% (2). Subsequent studies have revealed a steady rise in the incidence of intestinal obstruction to the present day incidence of about 40% (3).

Adhesions have now become the leading cause of intestinal obstruction. The diagnosis though being straight forward, management possesses a lot of problems due to the high incidence of recurrence. The

advent of laparoscopic surgery may alter the incidence of adhesions. Despite the promise of laparoscopic surgery adhesions still continue to be a major source of concern for surgeons not only because of technical difficulties but also because of the volume of work they generate (4).

Diatrizoate Meglumine Gastrografin, a hyperosmolar water-soluble contrast agent, has been used to triage patients with small bowel obstruction for an operative or a non-operative management. It can also have a therapeutic effect by increasing the pressure gradient across obstructive sites that may result in resolving the obstruction (5). Gastrografin is the contrast medium most commonly mentioned as an ionic, bitter-flavored mixture of sodium diatrizoate, meglumine diatrizoate, and a wetting agent (polysorbate 80). The osmolarity 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 an obstructive site. The bowel content is diluted, and in the presence of the wetting agent, passage of bowel contents through a narrowed lumen is facilitated. Gastrografin also decreases edema of the bowel wall and enhances bowel motility (6).

Complications from the use of Gastrografin in small bowel obstruction are rare, although anaphylactic reactions and lethal aspiration have been described.

Gastrografin may also shorten postoperative ileus and relieve intestinal obstruction caused by impacted *Ascaris lumbricoides* and bezoar (7).

Patients & Methods

Patients older than 16 years of age admitted through the emergency room to the Department of Surgery, Tikrit Teaching Hospital, with clinical and radiologic evidence of adhesive small bowel obstruction were included in this study.

Sixty eight patients were selected from 1st October 2013 to 31st May 2014.

A detailed history, including information on previous abdominal surgery and adhesive obstruction, was taken and a complete physical examination was performed for every patient.

A nasogastric tube was inserted for decompression, with strict measurement of output.

Intravenous fluid replacement was given and electrolyte imbalances were corrected as required.

Supine and erect abdominal radiographs were taken and the maximal diameter of the small bowel was measured on admission.

Exclusion Criteria:

- Evidence of peritonitis on admission or within 24 hours of admission.
- Patients with palpable intra-abdominal mass.
- Patients with history of previous surgery for intra-abdominal malignancy.
- Patients who had received previous abdominal radiotherapy.
- Age less than 16 years.

Diagnosis was confirmed by finding of:

- Distended small bowel loops.
- Multiple air fluid levels on plain abdominal X-rays.

After admitting the patients to the surgical department, they were assigned to groups A and B alternatively. For group A, I.V. fluid replacement was initiated and nasogastric aspiration carried out for 24 hours. A radiographic contrast study was then conducted. 60 milliliters of Gastrografin (0.1 gm of sodium diatrazoate and 0.66 gm megulumine diatrazoate per ml ; Schering , Berlin , Germany) mixed

with 40 ml distilled water was administered via a nasogastric tube which was subsequently clamped for 3 hours .

Serial abdominal X-rays were taken at 6, 12, 18 and 24 hours after Gastrografin instillation. In patients in whom the radiographic contrast was seen to have reached the cecum, the nasogastric tube was taken out, oral feed started and patients were discharged from hospital. Any patient who did not tolerate oral feeds was operated on as were all patients in whom the radiographic contrast did not reach the cecum within 24 hours.

In group B, no radiographic contrast study was carried out. All these patients were observed and were operated as and when deemed necessary; on increasing signs of obstruction or no response to conservative treatment.

The collected data were analyzed and calculated using Chi Square test.

Results

The age of patients varied from 16 to 65 years with a fair distribution among all age groups. The mean age was 33 years and, while the median age was 35 years. Thirty six of 68 patients were males (M: F = 1.2:1) (table 1).

In group A, 34 patients were administered 60 ml of gastrografin mixed with 40 ml of distilled water after which a radiographic contrast study was performed .Then they were observed for 72 hours. Out of these 34 patients, 7 patients (20.6%) required surgery at the end of 24 hours after admission, while 27 patients (79.4%) tolerated oral feeds.

After administering radiographic contrast , the radiographic contrast reached the cecum within 24 hours in 29 patients (85.3%) and oral feeds started . 27 out of these 29 patients tolerated the feeds well and were subsequently discharged . The remaining 2 patients who developed recurrence of colicky pain and / or vomiting were operated upon. The 5 patients (14.7 %) in whom the radiographic contrast did not reach the cecum within 24 hours were also operated upon , taking the total number of patients operated in this group to 7 (20.5 %) .

In group B, 34 patients were not administered any radiographic contrast and were observed clinically for 72 hours. Out of these 34 patients 8 patients (23.5%) improved with conservative treatment within 48 hours , 6 patients (17.7%) were operated within 48 hours of admission because of increasing signs of obstruction , 10 patients (29.4%) improved spontaneously after 48 hours conservative treatment , 10 patients (29.4%) required surgery after 48 hours (table 2) .

From the table of X2 , calculated P value is below the tabulated P value (3.84) , rejecting the Null Hypothesis i.e., there is a significant difference between the two groups .

In group A , in 24 (82.8%) out of 29 patients in whom radiographic contrast reached the cecum , it did so within 12 to 18 hours only . Only in 5 (17.2%) patients did the radiographic contrast reach the cecum as late as 24 hours .

Therefore , it can be judged that 18 rather than 24 hours is a sufficient period of study after administering Gastrografin in patients with adhesive small bowel obstruction .

In group B , within 48 hours , 8 patients (23.5%) out of 34 resolved while 6 (17.5%) had to be operated upon . After 48 hours , 10 (29.5 %) more patients resolved spontaneously , while the remaining 10 (29.5 %) patients had to be operated upon . Thus a total of 16 (47%) patients had to be operated upon .

Twenty seven (79.5%) out of 34 patients in group A resolved within 24 hours as compared to only 8 (23.5%) out of 34 patients resolving within 48 hours in group B . Other 10 (29.5 %) patients resolved in this group after 48 hours .

At the end of this study , there was no complication no mortality and all 64 patients were discharged after being successfully treated for adhesive small bowel obstruction .

Discussion

Almost 95% of patients who have undergone laparotomy are shown to have adhesions at subsequent surgery . Postoperative adhesions account for about 30% of cases with intestinal obstruction (8). Considerable controversy exists regarding the ideal therapeutic strategy for adhesive small bowel obstruction . Advocates of non operative treatment insist that nasogastric tube decompression and fluid resuscitation for a reasonable period is justified based on resolution that is observed in up to 75% of partial and 16 – 36% of complete small bowel obstruction (9).

The benefits of decreased hospital stay and negligible morbidity in this subgroup must be weighed against increased risk assumed by delay in surgery in the remainder (8). Such delay may lead to an increased mortality rate from 3-5 % when the obstruction is simple to almost 30% when it is complicated by strangulation , necrosis or perforation of the bowel (10). This is important as it is difficult to find a strong correlation between one or more classical signs of strangulation , i.e., fever , tachycardia , leucocytosis , local tenderness , and presence of irreversible damage to the gut(11).

In our study , it was found that the contrast medium reaching the colon within 24 hours had a sensitivity of 100% , a specificity of 60% , and an accuracy of 82.35% .

The positive and negative values obtained were 85.71 and 100% respectively .

When comparing these results with the control group using Chi Square (X2) test , we find a significant difference .

So , it was concluded that Gastrografin study can better predict the need for early surgery than a combination of clinical criteria and radiography . But as the specificity of the study is only 60% , improved diagnostic tools are required to predict the true negative patients (

those who required surgery in spite of radiographic contrast reaching the colon) with better accuracy .

In patients with a diagnosis of adhesive intestinal obstruction , oral Gastrografin contrast study is safe and can facilitate the prediction of the necessity of early operative intervention compared to a plain radiography (12).

This study confirms the observation made by Assalia et al (9) that mere evacuation of Gastrografin per rectum does not definitely prove that the obstructive episode has resolved as Gastrografin can pass through areas of partial small bowel obstruction .

Therefore , for the absolute diagnosis of successful resolution , the following additional criteria must be met :

- the abdominal pain should disappear ,
- the abdomen should appear flat and soft ,
- the nasogastric aspirate should become scanty ,
- the patient should have at least one spontaneous bowel action (10).

In cases of adhesive intestinal obstruction , oral Gastrografin can differentiate partial from complete intestinal obstruction within 12 to 18 hours of administration and thus it permits a change in the management of adhesive intestinal obstruction(8).Operative intervention is required if Gastrografin fails to reach the cecum within 12 to 18 hours of being administered orally(11).

Regarding the duration of observation , it can be seen that 12-18 hours is an optimal period required for observation after giving the radiographic contrast in patients with adhesive small bowel obstruction . Beyond this period (i.e., if the radiographic contrast does not reach the cecum within this period) , a significant number of patients require surgery (12).

Conclusions

- Orally administered Gastrografin is safe and reliable water-soluble contrast agent which can safely be used in patients with small bowel obstruction . Patients who received Gastrografin had a shorter hospital stay than those who did not , with good tolerance to an early oral diet .
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- Gastrografin did not reduce the number of episodes that required operative management significantly .
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- Adhesive small bowel obstruction mainly happens after appendicectomy and gynecological operations .
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- Adhesive small bowel obstruction shows no significant gender difference .

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Table 1:Age & Sex Distribution in Patients with Post-Operative Adhesive Small Bowel Obstruction

Age Interval (Years)	Male	%	Female	%	Total
16-25	8	11	3	4	11
26-35	9	13	15	22	24
36-46	11	16	8	11	19
46-55	5	7	4	6	9
56-65	3	4	2	3	5
Total	36	53	32	47	68

Table 2: Distribution of Patients According to their Response to Conservative Management with and without Gastrografin

Result	Group A Conservative management with Gastrografin		Group B Conservative management without Gastrografin		Total
	Observed	Expected	Observed	Expected	
Resolution	27	22.5	18	22.5	45
Failure	7	11.5	16	11.5	23
Total	34	34	34	34	68