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Original Research Article

Evaluation of the role of oral gastrografin in management of simple adhesive small bowel obstruction in children

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ABSTRACT

Background: The risk of post-operative adhesive small intestinal obstruction is highest during the first post-operative year. Bowel injury during adhesiolysis increases the post-operative morbidity. Consequently, the conservative management of small bowel obstruction has considerable interest. The aim of this study was to evaluate the therapeutic role of gastrografin in the management of small bowel obstruction.
Methods: All patients with simple adhesive small bowel obstruction will be included and treated conservatively for 48hours unless there was evidence of strangulation. After the first 48 hours all the patients were given oral gastrografin unless improved or signs of strangulation arise. The evaluating parameters are the success rate, time to start full oral feeding and total duration of hospital stay.
Results: Twenty-five cases were included in which two of them developed clinical evidence of strangulation during the first 48hours and were explored. Three cases improved on the conservative treatment. The remaining twenty cases were given oral gastrografin. Fourteen cases out of twenty showed the contrast dye in their large bowel by 24hours. Those 14 cases tolerated full oral feeding earlier and had shorter hospital stay than the remaining 6 cases that declared treatment failure and underwent surgical exploration.
Conclusions: The use of gastrografin as a preliminary step of non-surgical treatment of simple adhesive intestinal obstruction may be helpful. However, further randomized study on a large number of patients was needed.

Keywords: Gastrografin, Simple adhesive intestinal obstruction, Water-soluble contrast study

INTRODUCTION

Adhesive small bowel obstruction (ASBO) is a significant cause of postoperative morbidity in children with an incidence ranged from 1% to 9%. The risk of post-operative ASBO is highest during the first post-operative year.[1,2]

Surgical treatment of ASBO may lead to the additional formation of adhesions. Also characterized by long operative times and the risk of severe complications, such as bowel injury and bleeding. Consequently, the conservative management of small bowel obstruction has considerable interest.[3,4] The utilization of water-soluble contrast agents has revolutionized the non-operative management of ASBO. Many studies have addressed the benefits of using water-soluble contrast in ASBO in adults suggesting that the hyperosmolarity of water-soluble contrast agent confers therapeutic benefits by activating movement of water into the small bowel lumen decreasing edema of the small bowel wall and enhancing smooth muscle contractility.[5-9]

The aim of this study was to evaluate therapeutic role of gastrografin in the management of small bowel obstruction in children.

METHODS

All patients with simple adhesive small bowel obstruction were included and treated conservatively with IV fluids, naso-gastric suction and correction of any electrolyte or acid base balance for 48hours unless there is evidence of strangulation. Also, patients with known history of hypersensitivity to iodinated contrast agents, asthma, and inflammatory bowel disease were excluded from study. Full history and clinical examination for all patients were taken. After the first 48hours, the patients were given oral gastrografin (a mixture of sodium amidotrizoate and meglumine amidotrizoate) unless improved or complications arise. Before starting oral gastrografin intravenous, Ringer's solution should be introduced as a bolus infusion to guard against dehydration that may be caused by the hygroscopic effect of gastrografin. The dose of gastrografin varied according to the age of patient (Table 1).

Table 1: Dosage of gastrografin used according to the age of patients.

Age of the patients	Amount of oral gastrografin
1year to 3 years	30ml
3years to 6 years	40ml
6years to 12 years	50ml
>12 years	100ml

Gastrografin was given in a dilution with equal volume of Ringer's solution then the prepared mixture was given through the nasogastric tube that was kept closed for 3hours. Serial plain abdominal radiographs were taken at 3, 6, 12 and 24hours post gastrografin administration. The evaluating parameters were the success rate (judged by appearance of the dye in the large intestine), time to start full oral feeding and total duration of hospital stay. The patients followed up to detect any evidence of complications or recurrence. Informed consent will be taken from patient's guardians to participate in this study after explaining all the risks and benefits. Approval of Assiut university ethical committee was obtained before conducting this study.

RESULTS

Twenty-five patients (16 males and 9 females) age ranged from 14months to 15years presented with simple adhesive intestinal obstruction during period from December 2012 to June 2017. The number of previous adhesive intestinal obstruction attacks ranged from one to four attacks caused by different surgical procedures as shown in (Table 2). The presenting symptoms were persistent bilious vomiting, abdominal distension and absolute constipation with multiple air fluid levels in the plain X ray film. Two cases had previous surgery for perforated appendix developed tachycardia with signs of peritoneal irritation during the 48hours of conservative treatment and explored, one of them had resection anastomosis of his bowel while the other only needed adhesiolysis. Three cases (1 had abdominal pull-through (PT), 1 resection anastomosis of intussusception and 1 colostomy closure) improved on the conservative treatment, the nasogastric tube was removed, and they were discharged after tolerance of full oral feeding. The remaining twenty cases started gastrografin through the nasogastric tube.

Abdominal plain X-ray erect were taken on 3, 6, 12 and 24hours post contrast. The contrast was seen in the large bowel of 14 cases after a period ranged from 6 to 24hours and they started oral feeding (Figures 1-8).

Table 2: Type of primary surgery and number of cases.

Type of primary surgery	No. of cases
Perforated appendix	8 cases
Resection anastomosis for gangrenous intussusceptions	4 cases
Open reduction for intussusceptions	2 cases
Abdominal PT for HD	2 cases
Colostomy closure	3 cases
Hydrocephalus with ventriculo-peritoneal shunt	1 case
Gastroschisis	2 cases
Congenital diaphragmatic hernia (CDH) repair	1 case
Malrotation of the gut	1 case
MCA with liver trauma	1 case

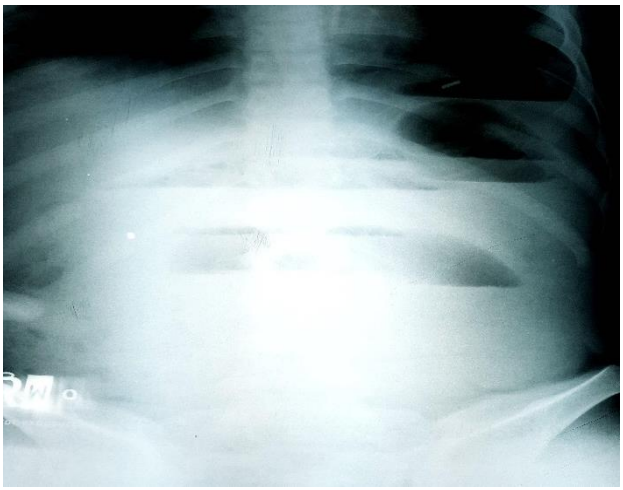

Figure 1: Case one on admission.

These 14 cases tolerated first oral feeding over a mean period of 38.14hours±14.81SD. Their hospital stays had a mean of 4.64days±0.74SD (student t-test). Six cases did not show any progress of the dye after the 24 hours and were explored where one of them needed resection because of doubtful viability of their bowel. Not surprisingly they tolerated first oral feeding later than the fourteen cases with a mean time of 100.0hours±35.32SD.

Their total hospital stay was also longer with a mean of 10.50days±2.25SD (student t-test). There were no remarkable complications of oral gastrografin apart from mild transient diarrhea in 2 cases. During the follow up period five cases out of fourteen developed recurrence and managed conservatively compared to two cases needed adhesiolysis out of six that failed gastrografin management.

Figure 2: Case one post contrast 6hour.

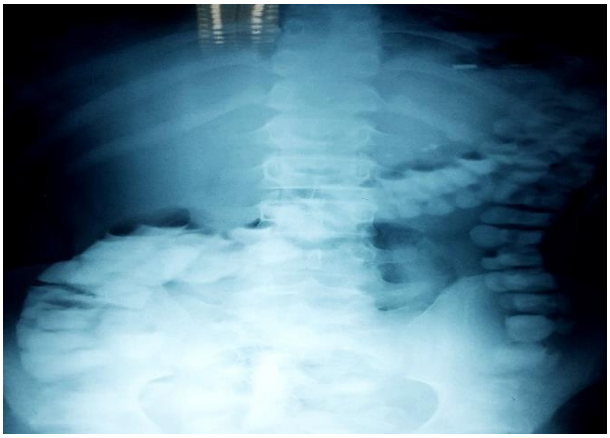

Figure 3: Case one post contrast 12hours.

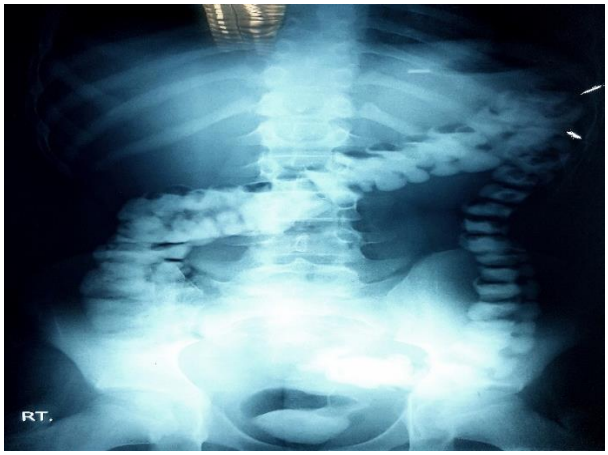

Figure 4: Case one post contrast 24hours.

Figure 5: Case two on admission.

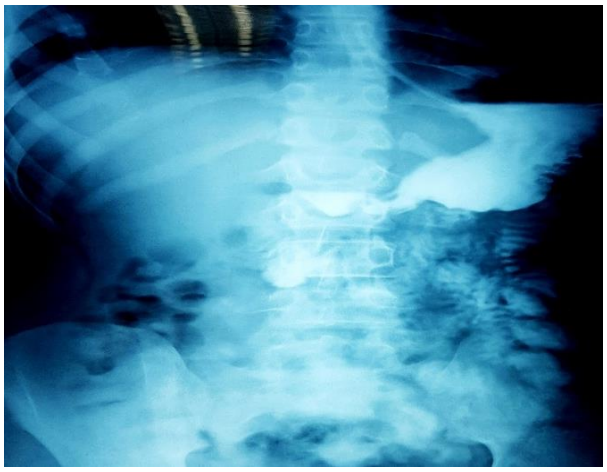

Figure 6: Case two post contrast 3hour.

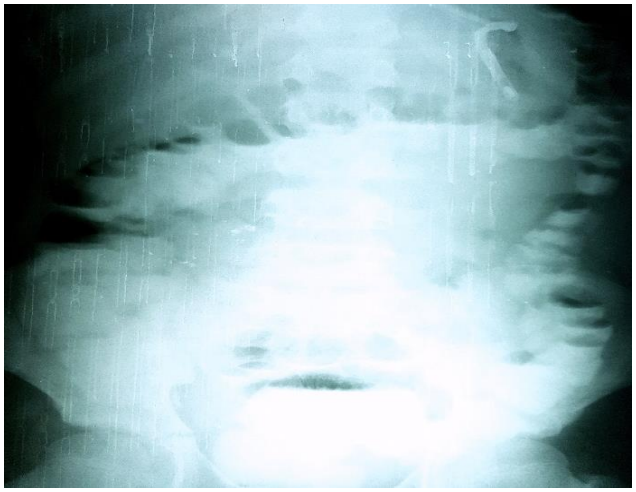

Figure 7: Case two post contrast 12hour.

DISCUSSION

Adhesions are internal, fibrous, band-like scars occurring after injury to the peritoneum resulting from both biochemical and cellular responses attempting to repair the peritoneum. The role of gastrografin in treatment of

adhesive intestinal obstruction was that its osmolarity is six times that of extracellular fluid so it promotes shifting of fluid into the bowel lumen and increase the pressure gradient across an obstructive site.[10]

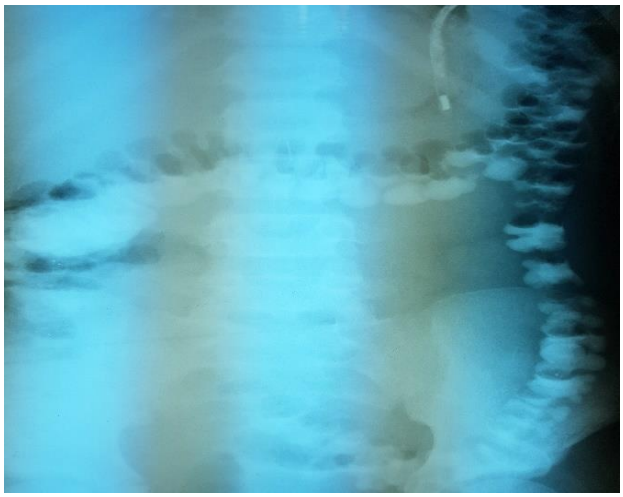

Figure 8: Case two post contrast 24hour.

Although the effectiveness of conservative treatment in children with ASBO ranging from 16 to 60%. Bonnard A et al, found that addition of gastrografin to the conservative treatment regimen increased this rate up to 75%. In this study, authors had 70% success rate. Authors thought that although this study had a relatively high success rate, more importantly it early predicts those who fail conservative treatment and resulted in early surgical intervention with subsequent minimizing morbidity, mortality and shorten the hospital stay with its costs.[3,11]

Treatment success was likely to be affected by the age of the children, in a study done by Vijay K et al, included patients from 0 to 13 years of age. The treatment success increased for children more than 1year of age. Also, Akgur FM et al, included patients from 1month to 16 years of age they reported that the patients from 8 years of age and older had the greatest chance of overcoming obstruction non-operatively in the first 3 months of the postoperative period, compared to patients who underwent their first surgery early in their life.[12,13] Although present study was conducted over a small number of patients; we had a comparable success rate to the above mentioned studies with patient's age ranged from 14 months to 15 years.

In the study, reported by Akgur FM et al, the rate of ASBO recurrence was lower with conservative compared to operative treatment, while in the study reported by Eeson GA et al, no patients who received conservative treatment experienced complications compared to more than 10% of patients who received operative treatment. This was not the same findings found by Lee CY et al, who found that the recurrence rate was higher in the gastrografin group compared to the surgical group (55% vs. 38%), the need for surgery for the recurrent episodes was much lower (17% vs. 33%).[10-13] In this study, five cases out of fourteen (35%) of gastrografin group experienced recurrence, all managed conservatively compared to two cases out of six (33%) treated surgically that needed exploration for their recurrence. The limitation of this study was both small sample size and absence of control group.

CONCLUSION

Gastrografin may be helpful not only in management of ASBO but also in prediction of those who will need early surgical intervention. However, further randomized controlled study on large number of patients with longer follow up period is recommended to prove the therapeutic effect of gastrografin in management of ASBO and in minimizing the need for surgery and recurrence.

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Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee

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