International Journal of Research in Medical Sciences
Das BM et al. Int J Res Med Sci. 2017 Nov;5(11):4797-4802
www.msjonline.org
pISSN 2320-6071 | eISSN 2320-6012
DOI: http://dx.doi.org/10.18203/2320-6012.ijrms20174922

Original Research Article

Role of water soluble contrast in adhesive small bowel obstruction, a prospective randomised control trail

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Received: 07 October 2017
Accepted: 14 October 2017

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ABSTRACT

Background: The aim of this study was to assess the diagnostic and therapeutic role of urografin (water soluble contrast agent) in patients with adhesive small bowel obstruction.
Methods: This was a prospective study conducted in the department of surgery in association with the department of Radiology, in S.C.B.M.H, Cuttack. Odisha India. Total patients with clinical and radiological evidence of adhesive SBO were selected for this study. The primary outcome in the diagnosis role of WSCA was its ability to predict the need for surgery.in the therapeutic role, the following were evaluated, resolution of SBO without surgery, time from admission to resolution, duration of hospital stays, complications and mortality.
Results: 129 prospective patients were included. The appearance of contrast in the colon within 4-24 Hrs, after administration had a sensitivity of 96 percent and specificity of 98 percent in predicting resolution of SBO.
Conclusions: Water soluble contrast agent (urografin) was effective in predicting the need for surgery in patients with adhesive SBO. In addition, it reduced the need for operation and shortened hospital stay.

Keywords: Urografin, SAIO, WSCA

INTRODUCTION

Small bowel obstruction (SBO) is a common problem in emergency surgery, and it is associated with repeated hospitalisation and high morbidity and mortality.[1]

Almost 75% of the obstruction cases are consider to be the consequence of postsurgical adhesion. Adhesions have been well documented as the leading cause of small intestinal obstruction, especially in the old patients with a history of previous abdominal surgery. The treatment of small bowel obstruction is still controversial. Emergency surgery is mandatory when strangulation or complete obstruction occurs. The majority of postoperative SBO can be managed by non-operative conservative management with an excellent outcome and shorter length of hospital stay. Radio-opaque water soluble contrast agents (urograffin, gastrograffin) have been used to identify patients who might be managed non-operatively.

Urograffin is a water soluble contrast medium composed of sodium aqueous solution. It has an osmolarity of 2000 mOsm/L, which is approximately six times that of extra celluar fluid (285-295). So, Urograffin may have a therapeutic effect in adhesive small bowel obstruction. A prospective, randomised controlled trail was performed to define the efficacy of an oral water soluble contrast agent in patients with postoperative SBO.[2-13]

METHODS

This study was a prospective, randomised, controlled trail. After obtaining institutional ethics committee approval and full informed consent 129 consecutive patients with postoperative SBO and who presented to the emergency services of the SCB Medical College and Hospital, Cuttack, Odisha, India. Between January 2015 to December 2016 were included. All postoperative intestinal obstruction cases which presented with clinical and radiological evidence of SBO were included. The diagnosis was based on a history of previous abdominal operation with clinical and radiologic picture of adhesive small bowel obstruction, without signs of strangulation. Supine and erect abdominal radiographs were taken and maximal diameter of the small bowel was measured on admission.

RESULTS

Table 1: Characteristics of patients with successful verses unsuccessful conservative treatment.

	Successful conservative treatment(n=92)	Unsuccessful conservative treatment(n=34)	P value
Male/female	69/23	18/16	0.1
Age	65(17-95)	66(19-85)	0.82
No of previous operation	1.4(1-3)	1.4(1-3)	0.64
No of previous adhesive obstruction	0.49(0-4)	0.8(0-9)	0.34
Duration of symptom before admission	1.9(1-7)	1.6(1-7)	0.13
Maximal diameter of small bowel	43(20-72)	41(20-60)	0.32
Nasogastric tube output	21(0-124)	33(0-96)	0.2

Table 2: Characteristics of patients randomised to urografin study verses surgery.

	Urografin study N=20	Surgery N=14	P value
Male/female	9/11	10\4	0.32
Age	68(19-85)	64(20-83)	0.59
No of previous operation	1.2(1-2)	1.7(1-3)	0.25
No of previous adhesive obstruction	0.58(0-3)	1.1(0-9)	0.93
Duration of symptom before admission	1.47(1-4)	1.69(1-7)	0.87
Maximal diameter of small bowel	40(20-55)	42(20-60)	0.69
Nasogastric tube output	34(6-96)	32(0-86)	0.8

From January 2015 to December 2016, 129 patient's adhesive small bowel obstruction were included. Eighty-seven patients were male and forty-two females. The mean age was 66 years (range 17–95). Ninety patients had undergone a single previous abdominal operation like colorectal surgery, appendicectomy, cholecystectomy, and gastro duodenal surgery were the most common single antecedent operations. Thirty-six patients had more than one previous abdominal operation. Forty-one patients had a history of adhesive obstruction before the study period. Twenty patients developed two episodes of obstruction during the study. The time interval between the two episodes ranged from 2 to 17 months, with a median of 5months. They were all treated conservatively for the first episode without Urografin or surgery. The mean duration of symptoms before admission was 1.89 days (range 1-7).

Table 3: Complication and deaths of patients undergoing urografin study verses surgery.

	Urografin study (n=20)	Surgery (n=14)
Complication	Persistent obstruction (1)	Prolonged ileus (1)
Death	None	Pneumonia (1) Peritonitis (1)

The maximal diameter of the small bowel on admission was a mean of 42 mm (range 20–72). Because the duration of nasogastric tube decompression varied with different patients, the average nasogastric tube output of each patient (total amount of drainage/duration) was used for evaluation. For patients who underwent Urografin study or surgery, only the output before the procedure was considered. The mean output was 24 mL/ (range 0–124). Three patients had emergency surgery performed within 24 hours after admission because of suspected bowel strangulation. Laparotomy confirmed strangulation in two of them, and the diseased bowel segments were resected. Ninty two cases showed improvement or resolution of obstruction during the initial 48 hours, and conservative treatment was continued. Only one of these patients required laparotomy and enterolysis on day 6 after admission, the remaining ninty one cases had bowel obstruction resolved with conservative treatment; the mean time of complete resolution was 60 hours (range 7–

150) after admission. Twenty patients were randomized to have Urografin study and 14 patients for surgery. The groups were well matched in terms of age, sex, duration of symptoms before admission, number of previous abdominal operations and adhesive obstruction, maximal diameter of small bowel, and output of nasogastric tube (Table 2).

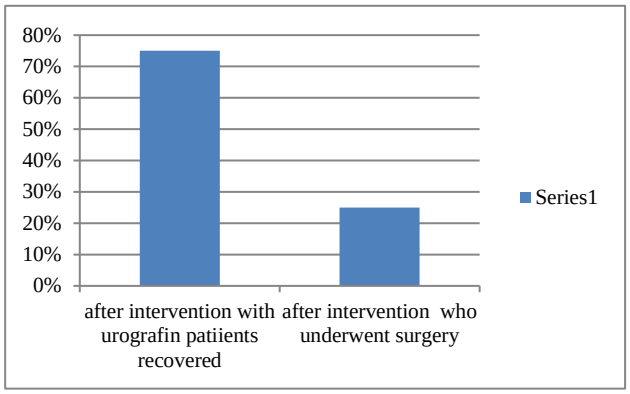

Figure 1: Percentage of patients symptomatically relieved with urograffin.

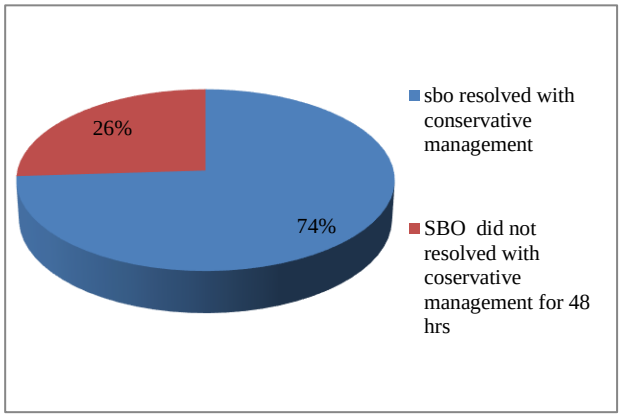

Figure 2: Percentage of SBO relieved with conservative management.

In the Urografin group, the mean time that the study started was 60 hours (range 48–68) after admission. Partial obstruction was demonstrated in 15 patients. Obstruction resolved subsequently in all of them at a mean time of 41 hours (range 6–80) after administration of Urografin. The remaining five patients had complete obstruction shown by the contrast study and underwent laparotomy. Urografin significantly reduced the need for surgery by 74% (14/19, P .001). The administration of Urografin was not associated with any complications. There was one postoperative complication in the Urografin group as a result of unsuccessful enterolysis and two complications in the group randomized to undergo surgery. One patient in the latter group died of peritonitis after enterolysis (Table 3). No bowel strangulation was noted in either group. The median hospital stay of patients who had received Urografin was 10 days (range 5–15); that of the other group was 10 days (range 5–34).

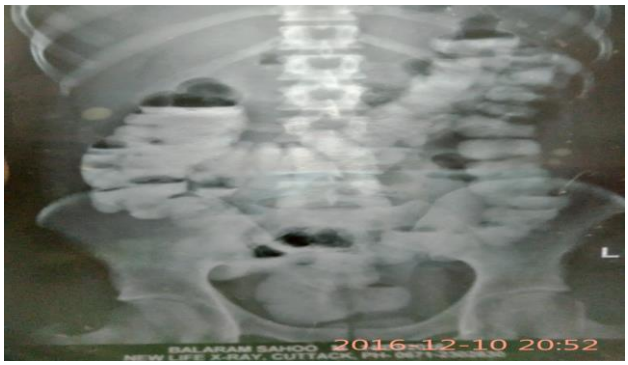

Figure 3: X-ray showing passage of urografin to colon.

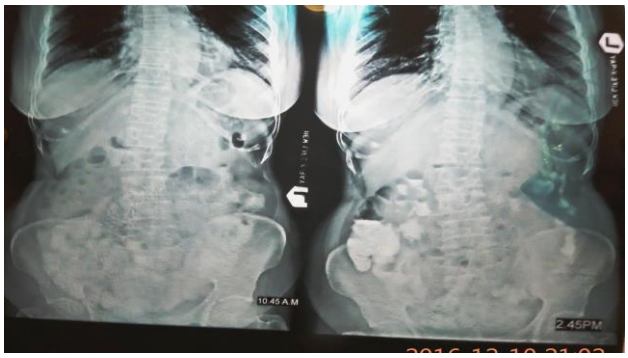

Figure 4: Serial X-ray in a patient of SBO taken after 1hr and 4hrs.second x-ray showing dye crossing the i-c valve.

DISCUSSION

Adhesive small bowel obstruction can be a complication of any abdominal operation. Studies have reported that appendicectomy and colorectal surgery along with gynaecological procedures are the procedures that commonly caused adhesive obstruction.

The most frequent cause of acute small bowel obstruction is postoperative adhesion. Numerous attempts have been made to prevent postoperative adhesion, but till now no method has proven to be completely effective. In the absence of strangulation, initial trial of conservative treatment is given to most patients. Successful response to non-operative treatment is reported to be 73–90 %.[14] Irvin noted that 3.5% of all emergency surgical admissions that resulted in laparotomy, subsequently developed adhesive intestinal obstruction. Assalia et al, in their study on 99 patients (107 episodes of adhesive SBO), showed that there was a shorter time to first bowel movement, hospital stay and the operation rate in patients who were administered an oral water soluble contrast agent.[8] Biondo et al also showed a shorter hospital stay and tolerance of early oral feed in patients administered

an oral contrast agent, but their study did not show a reduction in the operation rate.

Di Saverio et al. noticed that oral gastrografin significantly reduced the operative rate (18.5 % in the gastrografin group vs. 45 % in the control group), reduced hospital stay by 59.8 % (4.67 vs. 7.8 days), and shortened the time of resolution of obstruction (6.9 vs. 43 h). In spite of these studies, in the meta-analysis by Abbas et al., water-soluble contrast agent did not reduce the need for surgical intervention, but reduced the length of hospital stay for patients who did not require surgery compared with placebo. Cox et al reported that of patients who were cured by conservative treatment, 88% had obstruction resolved within 48 hours. Assalia et al recommended that surgery should be considered if the obstruction failed to improve after 48 hours of conservative treatment.[8] Sosa and Gardner found that patients without signs of strangulation could be treated non-operatively for 24 to 48 hours.[15] The reported operative rate for adhesive small bowel obstruction ranged from 27% to 42%.

This study aimed to evaluate the therapeutic value of Urografin for selected patients who had unsuccessful conservative treatment. The ideal design for such a study would require a control arm to continue conservative treatment instead of proceeding to surgery directly. However, to continue conservative treatment for patients who showed no improvement for 48 hours may increase the risk of bowel strangulation. Before we carried out the present study, it was our practice to proceed to surgery if patients showed no clinical and radiologic improvement after receiving conservative treatment for 48 hours. This criterion for proceeding to surgery is generally acceptable according to the literature.

In this study, we randomized these patients to undergo either Urografin study or surgical treatment. There was no bowel strangulation in this group of patients with delayed intervention. The risk factors associated with failure of conservative treatment remain poorly understood. The importance of nasogastric tube output and size of dilated small bowel have seldom been evaluated in the literature.

We found that nasogastric tube output was significantly greater in patients who failed to respond to conservative treatment versus those successfully treated with conservative treatment. This could be explained by the difference in the severity of obstruction.

An alternative explanation is that the nasogastric tube drainage of patients who responded to conservative treatment decreased with time; therefore, the lower average output. The degree of bowel distention was similar between the two groups, although one might think that patients with grossly distended bowel would be more likely to need surgical treatment Seror et al stated that patients with persistent obstruction for more than 5 days always required surgical intervention. Four patients in our series, however, had bowel obstruction ultimately resolved after conservative treatment for more than 5 days. Water-soluble contrast medium has been evaluated recently in an attempt to predict the need for surgery in adhesive small bowel obstruction. Studies have also been performed to evaluate its possible therapeutic effect.

Urografin is the contrast medium most commonly mentioned. It is anionic, bitter-flavored mixture of sodium amidodiatrizoate, meglumine amidodiatrizoate, and a wetting agent (polysorbate 80). The osmolarity is 2000 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. Urografin also decreases edema of the bowel wall and enhances bowel motility. Barium has also been used to evaluate adhesive small bowel obstruction; it is not as easily diluted by enteric fluid as Urografin 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 lethal.[5] Urografin is watersoluble and relatively safe even if the obstruction is complicated by perforation. Complications from the use of Urografin in small bowel obstruction are rare, although anaphylactoid reactions and lethal aspiration have been described. Urografin may also shorten postoperative ileus and relieve intestinal obstruction caused by impacted Ascaris lumbricoides and bezoar.

Studies showed that patients with contrast observed in the colon within 24 hours were all treated successfully without surgery. Surgery was required in 96% of patients in whom contrast failed to reach the colon within 48 hours. The therapeutic effect of water soluble contrast in adhesive obstruction is controversial. In a randomized controlled study performed by Assalia et al, Urografin significantly prompted the resolution of obstruction, shortened the hospital stay, and reduced the need for surgery to 10% in the treatment group.[9]

However, Feigin et al reported no advantage of water-soluble contrast in adhesive small bowel obstruction.[10] The operative rate, time of resolution of obstruction, and hospital stay were similar in the treatment and control groups. Similar results were obtained in Fevang et al's study. The operative rate in the treatment groups was 12% in Feigin et al's study and 35% in Fevang et al's study.[10] There was no complication that could be attributed to the use of the contrast in these studies. Water-soluble contrast medium was given soon after admission in these trials. The method in our study was different: Urografin was administered only to patients who failed to respond to conservative treatment.

To our knowledge, there has been no similar methodology in other studies. Fourteen of the 19 patients who received Urografin had obstruction resolved without surgical intervention. Urografin significantly reduced the need of surgery by 74% (14/19).

If it was assumed that all 34 patients who showed no response to conservative treatment within 48 hours were given Urografin. Ninteen (five in urografin group and fifteen in group B) of them would undergo surgery, and the estimated overall operative rate would be about 17%, 23/129(3+5+15). On the other hand, if Urografin had not been used, all 34 patients would have undergone surgery, and the overall operative rate would be about 24% (37/129). Concerning the five patients with complete obstruction demonstrated by Urografin study, none of these patients had evidence of bowel strangulation at the time of surgery.

It was safe to give Urografin even after the failure of conservative treatment. Complete resolution of bowel obstruction occurred a mean of 41 hours after administration of Urografin. It was usually at least 2 days later that solid food was allowed in our practice. Patients were discharged only when solid food was well tolerated. This could explain why the hospital stay of patients who had received Urografin was similar to that of patients who underwent surgery. We conclude that Urografin is safe and reduces the need for surgery when conservative treatment fails.[16]

CONCLUSION

In conclusion, this study has demonstrated that urografin administration in the presence of acute small bowel obstruction symptoms decreased the need to surgery in 74% of patients who had a history of previous abdominal surgeries and were allowed to receive urografin Because of its therapeutic effect, it seems logical to try urografin administration before the decision for surgical intervention which may impose unwanted complications and excessive cost.

Our study demonstrated that the administration of an oral water-soluble contrast agent in cases of postoperative SBO helps in an earlier resolution of intestinal obstruction and also decreases the total length of hospital stay.

We recommend the administration of oral water-soluble contrast agents in cases of postoperative adhesive SBO after adequate resuscitation and close monitoring of the patient. However, more studies with larger sample sizes are required to determine if the administration of an oral contrast agent decreases the operation rate.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee

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Cite this article as: Das BM, Pattanaik SK, Dash P, Sahoo A, Rajan BNR. Role of water soluble contrast in adhesive small bowel obstruction, a prospective randomised control trail. Int J Res Med Sci 2017;5:4797-4802.