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Diagnostic and Therapeutic Role of Water Soluble Contrast in Adhesive Small Bowel Obstruction

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ABSTRACT

Background: *Adhesive small bowel obstruction is one of the commonly encountered clinical problems associated with repeated hospitalization. Gastrografin is a hyperosmolar water-soluble contrast medium. Besides its predictive value for the need of operative treatment, a potential therapeutic role of this agent in adhesive small bowel obstruction has been suggested. Aim: To evaluate the role of Gastrografin in predicting the need of surgery in post-operative intestinal obstruction and its therapeutic effect in management of adhesive intestinal obstruction.* ***Methods:*** *This prospective nonrandomized controlled trial study was conducted on 72 patients with a diagnosis of adhesive small bowel obstruction. All patients were divided into Groups A and B. In 36patients of Group A, Gastrografin dye was administered and serial abdominal X-rays were taken up to 24 hours. The patients, in whom contrast reached caecum within 24 hours, the result was positive for partial obstruction and they were treated conservatively. False positive included high-grade partial obstructions that ultimately required surgery. If the contrast failed to reach the large bowel within 24 hours, the patient was considered to have complete obstruction and was operated. In 36 patients of Group B, all these patients were treated conservatively and were operated when required. Qualitative data was analysed by Fisher exact test.* ***Results:*** *In our study, in gastrograffin group 83.3% of cases were managed conservatively and 16.6% were operated, whereas in control group 66.6% were managed conservatively and 33.3% were operated (P value=0.02). Further in case of patients who received dye 88.9% patients resolved within 24 to 48 hours were as in case of controls only 33.3 % patients resolved within 24 to 48 hours. Therefore, in our study gastrograffin had 100% sensitivity and 86.6 % specificity, 86.6% positive predictive value and 100% negative predictive value. Overall accuracy was calculated to be 88.88%. The mean hospital stay of group A patients was 4.4 days and in case of group B was 6.3 days (p value 0.009).* ***Conclusions:*** *Gastrografin was effective and safe for prediction of need for surgery in adhesive small bowel obstruction. Furthermore, it speeds the resolution of obstruction and reduces the need for operation.*

Key words: *small bowel obstruction, Caecum, Gastrograffin.*

INTRODUCTION

Mechanical small bowel obstruction is the most frequently encountered surgical disorder of the small intestine. Intra-abdominal adhesions related to prior abdominal surgery account for up to 75% of the cases of small bowel obstruction.[1] The diagnosis of mechanical bowel obstruction is based on a variety of historical, physical and radiological criteria'. Its proper management is still controversial.[2] Emergency surgical procedure is necessary when strangulation or complete obstruction occurs. The management of small bowel obstruction is still a substantial clinical challenge.[3] Often in adhesive intestinal obstruction there is no objective endpoint to decide on surgical intervention. The difficulty lies in deciding who would benefit from conservative treatment and who would not. There is no specific clinical indication except for bowel ischemia to guide one to decide when surgical intervention is needed. A trial of conservative treatment is acceptable if the obstruction is incomplete.[4] However, the optimal duration of this trial of conservative treatment has not been well defined. Hyper osmotic water soluble contrast studies have been found to be helpful diagnostic tool in adhesive bowel obstruction and also have been suggested as an

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objective method to decide on the line of management to be followed in an individual patent. It can also be used to differentiate partial adhesive small obstruction from complete obstruction.[5] Further, being hyperosmolar, it can also help to reduce bowel oedema and may help resolve non-critical obstruction. However, this therapeutic value needs further evaluation. With this background, a prospective randomized study aimed to examine objectively the therapeutic role of Gastrografin in adhesive small bowel obstruction for patients who failed to respond to conservative treatment was undertaken.

METHODS

A randomized controlled prospective study was undertaken in Department General Surgery, HIMSR which included all patients of adhesive small bowel obstruction admitted who met inclusion criteria. This study was carried out over period of 2 years spanning January 2015 until December 2016.All patients above 12 years of age admitted with the diagnosis of adhesive bowel obstruction were included in the study.

Exclusion Criteria:

1. Evidence of peritonitis on admission or within 24 hours of admission.
2. Patients with palpable abdominal mass.
3. Patients with history of previous surgery for intra-abdominal malignancy.
4. Patients who have had received previous abdominal radiotherapy.
5.

The diagnosis was established on clinical history and assessment with radiological confirmation.

On admission patients were evaluated. A detailed history, physical examination and plain radiographs were taken for each patient. On diagnosing intestinal obstructions hydration with IV fluids and gastric decompression with nasogastric tube was initiated. Patients were assigned two broad groups randomly after two hour of NG decompression. In group A (case group) water soluble contrast study was conducted. 60 ml of urograffin (0.1gm of sodium diatrizoate and 0.66 gm megluminediatrizoate/ml) mixed with40 ml distilled water was administered to each patient via naso gastric tube only. The NG tube was then clamped for a period of 3 hours. Serial abdominal radiographs were taken 6 hours; 12 hours; 18 hours and 24 hours after urograffin ingestion. Subsequent radiography was cancelled if a previous radiograph showed the contrast media reaching the caecum. In patients in whom radiography demonstrates contrast media in the caecum within 24 hours after urograffin ingestion, NG tube was removed and feeds initiated. Any patient who did not tolerate feeds was surgically explored for persistent obstruction.

All patients in whom urograffin fails to empty in to caecum within 24 hrs of administration were operated. All patients who developed signs of peritonitis during the urograffin contrast study were taken for exploratory laprotomy and excluded from study. In group B (control group) no dye study was conducted. They were observed clinically and were operated as and when required depending upon increasing signs of obstruction or upon no response to conservative management as judged by clinician. The results of group B were recorded in two categories. In first were those patients whose obstructions was relieved spontaneously within 48 hours of admission. In the second category were those who were not relieved on conservative t/t and required surgery within 48 hrs of admission.

The radiological findings; the clinical outcome and surgical interventional findings of the patients in both groups were analyzed by standard statistical means. Qualitative data was analysed by chi square test; mann whitnay test or anova-F test; while qualitative test was compared using student t test. $P<0.050$ was considered significant.

RESULTS

From January 2015 to December 2016, 72 patients of adhesive small bowel obstruction were included with preset inclusion criterion. Out of 72 cases studied,38 were males and 34 were females. In our study majority of patients were in the age group of 12-30 years, followed by 41 to 50. Mean age in cases was 41.6 years and in controls it was 40.9 years. The difference was statistically insignificant. Fifty-one patients had undergone a single previous abdominal operation. In our study, appendicectomy, cholecystectomy, gynecological procedure were the most common single antecedent operations (Table 1). Twelve patients had more than one previous abdominal operations. Twenty patients had a history of adhesive obstruction before the study period which was managed conservatively. In both cases and controls most common site of previous abdominal incision was lower abdomen. Cases and controls were well matched with respect to previous site of incision. Obstruction due to adhesive intestinal obstruction is more prone to occur in surgeries performed on lower abdomen as depicted in table 2. In both cases and controls most common site of previous abdominal incision was lower abdomen. Cases and controls were well matched with respect to previous site of incision. Obstruction due to adhesive intestinal obstruction is more prone to occur in surgeries performed on lower abdomen as depicted in table 2.

Abdominal X ray findings revealed 3 or more dilated loops were seen in more than 50% of both cases and controls.

Out of 72 patients admitted with a diagnosis of adhesion obstruction, 36 patients were given contrast agent two hours after NG tube decompression. Within 24 hours of giving dye plain radiographs demonstrated dye in 26 patients. In these group of patients NG tube was removed and feeds were initiated, all the 26 patients tolerated feed sand were discharged. In 10 patients, no dye was seen in caecum at 24 hours, out of these 6 were operated and 4 were managed conservatively. In control group, 12 patients were operated and 24 were managed conservatively.

Table 1: Nature of Previous Abdominal Surgery in Studied Groups

Nature of previous surgery	Group A	Group B	Total	%age	P value
Appendicectomy	08	10	18	25	
Cholecystectomy	06	02	08	11.1	
Enterotomy	02	06	08	11.1	
Hysterectomy	04	02	06	8.3	
LSCS	02	04	06	8.3	
Splenectomy	04	02	06	8.3	
Resection anastomosis	04	02	06	8.3	**0.975**
Ileal perforation repair	04	02	06	8.3	
Duodenal perforation repair	03		03	3.2	
Necrosectomy		02	02	2.8	
Cystostomy		02	02	2.8	
Records not available	01		01	1.4	
			72	100%	

Table 2: Site of Previous Abdominal Operation

Surgical site	Group A	Group B
Lower abdomen	61.1	61.1
Midline	22.2	33.3
Upper abdomen	16.7	5.6

Table 3: Gastrograffin Dye Study at 24 hours

Contrast study findings (24hrs)		N (%)
Dye not reaching colon		10 (27.8%)
Dye reaching colon		26 (72.2%)
Time in hrs	**6hrs**	10 (38.5%)
	12 hrs	06 (23.1%)
	18 hrs	02 (7.7%)
	24 hrs	08 (30.8%)

Table 4: Final Management

Management	Group A	Group B	P value
Conservative	30 (83.3%)	24 (66.7%)	
Surgical	06 (16.7%)	12 (33.3%)	0.02

DISCUSSION

Post-operative adhesions are the most frequent causes of acute small-intestine obstruction in adults.[6] Many attempts have been made to prevent such adhesions, but no effective method has been reported to date.[7] The etiology of adhesion development is multifactorial and has not yet been clarified.[8] Adhesive small-intestine obstruction may occur following any type of abdominal surgery. Previous studies have reported that appendectomy and colorectal surgery were the most common causes of adhesive intestinal obstruction.[9] Similar were results in our study, 18 patients (25%) had previously undergone appendectomy, followed by cholecystectomy and gynecological procedures. Most of our patients had been previously operated with lower abdominal incisions present in majority of patients in both groups (61.1%) which is similar to previous studies.[10]

In our study, we found out that Gastrograffin reached colon within 24 hours in more than 72% of patients of group A and all these patients were managed successfully by conservative approach. Among cases in whom dye failed to reached colon in 24 hrs, few were managed conservatively and about 6 patients (16.7%) were operated upon. These results are comparable with the other studies in the literature, which have suggested that presence of contrast agent in the colon indicated that the obstruction would resolve without surgical intervention with a sensitivity ranging from 95-100%.[11]

The success rate of conservative treatment for obstruction caused by post-operative adhesions has been described as between 73% and 90%.[12] The rate was determined to be 75% in the present study, with 83.3% in group A and 66.7% in group B which is in concordance with previous studies.

The mean hospital stay of group A patients was 4.4 days and in case of group B was 6.3 days (p value 0.009). Similarly, previous studies demonstrated the significant reduction from 4.6 days to 2.7 days for control and GF groups, respectively, a significant reduction by 57.6%[13] which comparable to Di Saverio *et al*. (59.8%).[1]

In our study, it was found that contrast medium reaching the colon within 24 hours as an indicator for non-operative treatment has sensitivity -100%,specificity - 86.6%,positive predictive value- 86.6%, negative predictive value - 100%, accuracy was calculated to be 88.88.Farid M[14] reported the sensitivity, specificity, positive predictive value, and negative predictive value for gastrografin follow-through as an indicator for operative treatment of ASBO were 87.5%, 100%, 100%, and 97.9%, respectively.

In our study, out of total 72 patients, 36 patients were administered dye which reached colon within 24 hours in more than 72 % patients. It concludes that optimum period of observation in a patient with adhesive intestinal

obstruction would be about 24 hours after giving water soluble contrast agent. This is in agreement to previous studies.[15]

CONCLUSION

The study though limited in number of patients, demonstrated that administration of oral water soluble agent in cases of adhesion obstruction has a definite therapeutic role in their management. It helps in early resolution of intestinal obstruction and also decreases the total length of hospital stay in patients managed conservatively. We recommend the administration of oral water soluble contrast agents in cases of adhesion obstruction.

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