

## ORIGINAL ARTICLE

# RECURRENT ADHESIVE INTESTINAL OBSTRUCTION: A NEW HOPE FOR ITS PREVENTION

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### Abstract

**Aim:** To evaluate the effectiveness of Postoperative Peritoneal Lavage (PPL) method (new method) in prevention of recurrent Adhesive Small Bowel Obstruction (ASBO).

**Methods:** A total of 40 patients were enrolled in this study. They were victims of ASBO. They were randomized into two groups. Group I (20 patients) were treated with adhesiolysis alone, and Group II (20 patients) were treated with adhesiolysis plus PPL. Patients were followed up for an average period of 25½ months to detect the incidence of recurrent ASBO.

**Results:** There were six recurrences (30%) in Group I while in Group II only one patient (5%) developed a recurrent episode of ASBO, which responded to conservative measures and didn't need surgery. The rate of surgical re-operation in PPL treated patient was zero.

**Conclusion:** PPL is a new hope for prevention of recurrent ASBO that achieved significant reduction in recurrence rate.

**Keywords:** Bowel obstruction, intra-abdominal adhesions, peritoneal lavage.

## INTRODUCTION

Intra-abdominal adhesion is the most common cause of small bowel obstruction in industrialized countries, accounting for approximately 65% to 75% of cases. It is estimated that the risk of adhesive small bowel obstruction (ASBO) is 1% to 10% after appendectomy, 6.4% after cholecystectomy, 10-25% after intestinal surgery and 17-25% after restorative proctocolectomy.<sup>(1-9)</sup>

Postoperative adhesions represent a significant socioeconomic burden on health care resources. For example in 1994, the estimated financial impact for direct patient care owing to adhesions related disorders in the United States Of America was 1.3 billion US\$, while in Sweden, it is estimated that health care burden owing to adhesive disease reaches 13 million US\$

annually.<sup>(10-11)</sup>

Understanding of the patho-physiology of adhesion formation is of utmost importance to discover an effective method to reduce or abolish adhesion formation as well as identification of inflammatory mediators involved. Surgical trauma to the peritoneum can occur by various mechanisms: cutting, abrasion, ischaemia, desiccation and coagulation.<sup>(12-15)</sup> The fluid exudate released from injured peritoneal surfaces is rich in plasma protein especially fibrinogen. Activation of the coagulation cascade results in formation of fibrin. Fibrin is a tacky substance and causes injured serosal surfaces to coalesce.<sup>(16-18)</sup>

Fibrinolysis allows mesothelial cells to proliferate and peritoneal defect to be restored within 4 to 5 days

preventing permanent attachment of adjacent surfaces.<sup>(19-20)</sup> If fibrinolysis does not occur within 5 to 7 days of peritoneal injury, the temporary fibrin matrix persists and gradually becomes more organized as collagen secreting fibroblasts and reparative cells infiltrate the matrix.<sup>(13,16,18,21)</sup>

Over the years, several strategies to prevent postoperative adhesions formation have proposed, based on what has been learned about the underlying patho-physiology.

Unfortunately, although numerous different strategies have been evaluated, few have been successful, and some have been deleterious. To this day, there is no means of completely preventing post-operative adhesions formation.<sup>(1,18)</sup>

Postoperative Peritoneal Lavage (PPL) is a new idea developed by the author to minimize postoperative adhesions based on his observation that patients who developed postoperative ascites rarely complain of adhesions related disorders.

## PATIENTS AND METHODS

This study included 40 patients with postoperative adhesive intestinal obstruction who were admitted to the Emergency Unit of our Department of General Surgery, Zagazig University Hospitals from April 2005 to September 2007.

The protocol of this study was approved by the Department of Surgery, Faculty of Medicine, Zagazig University.

**Inclusion criteria:** Patients admitted to the hospital with provisional diagnosis of first attack of ASBO. ASBO is diagnosed clinically by the tetrad of colicky pain, vomiting, absolute constipation and abdominal distension, and radiologically by multiple fluid levels in plain erect of the abdomen, together with history of previous laparotomy

**Exclusion criteria:** Patients under 18 years and above 60 years:

1. Patients responded to conservative measures and did not need surgical exploration.
2. Patients who have ascites at presentation.
3. Patients who had a previous episode of ASBO.
4. Patients whose explorations revealed gangrenous intestinal loop that necessitated resection anastomosis or septic lesion that needed rubber drains insertion.
5. Patients with cardiac or renal insufficiency for fear of lavage induced hypervolaemia.
6. Patients whose explorations revealed intestinal obstruction due to any cause other than adhesions.
7. A patient who died during the follow up period.

8. Patients who were missed during the follow up period.

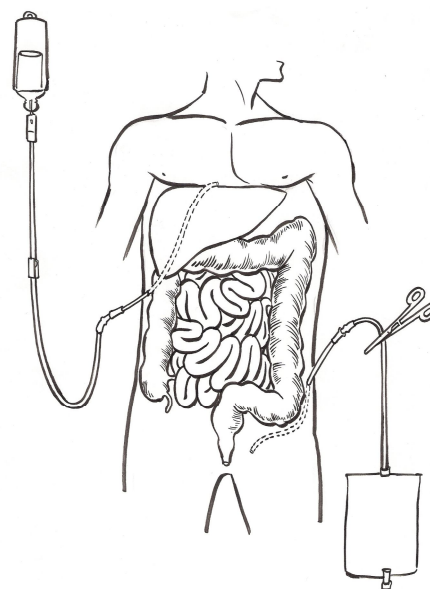
All patients were admitted to the emergency unit and received conservative measures that included nasogastric tube insertion, intravenous fluids therapy, correction of blood electrolytes and repeated enemata.

All patients included in the study failed to respond to conservative measures and were surgically explored for adhesiolysis.

Each patient entered the research when he was admitted in the emergency unit with a provisional diagnosis of ASBO and he was given a serial number in the study, if his number was odd, he would enter Group I and if his number was even, he would enter Group II. So, if one patient entered Group I, the next one would enter Group II and so on.

**Group I** (patients with odd numbers) for whom adhesiolysis was performed alone and the abdomen was closed without drains.

**Group II** (patients with even numbers), they were treated with adhesiolysis plus PPL. After adhesiolysis, two Nelaton catheters were inserted, the first in the right mid-axillary line just below the costal margin and placed above the liver. The second catheter is introduced in the left mid-axillary line above the iliac crest and was passed in the left paracolic gutter to settle in the pelvis. These sites of tube insertion were chosen to be away from small bowel contact for fear of that these tubes being foreign bodies may induce adhesions with small bowel (Fig 1).



**Fig 1. Postoperative Peritoneal Lavage (PPL).**

All patients were explored through midline laparotomy which was closed by mass closure technique.

PPL was started immediately after surgery in the in-patient wards using one liter of warm saline (about 37.5 OC using electric water bath) infused through the upper catheter (the lavage tube) under complete aseptic precautions while the lower catheter (the drainage tube) is clamped and saline is retained in the peritoneal cavity for 8 hours till the next lavage, where the drainage tube is declamped and left open while the patient in the semi-setting position till the intraperitoneal fluid is drained as completely as possible, then the tube is clamped again and the next liter of saline is infused through the lavage tube. Then the process is repeated every 8 hours till return of intestinal motions but not less than three days. Trained surgical residents were responsible for close observation of the patients, clamping and declamping of the tubes at the proper time and for measuring the intra-abdominal pressure (IAP) after each infusion through the lavage tube. It was planned not to allow IAP to reach above 5 cm water. Passage of flatus was taken as a confirmed sign of return of intestinal movement. At the end of the lavage period, abdominal U/S was performed to exclude any residual fluid intra-abdominally before withdrawal of the tubes.

All patients in Group II were given explanation of the new technique and all patients signed a written consent form.

Recurrent intestinal obstruction was diagnosed by the author in the same parameters mentioned before.

All patients were followed up, either through regular visits in the outpatient clinics, or through phone calls at 6 months intervals till the end of the follow up period (September 2008) for a minimum period of 12 months.

The result of this study was statistically analyzed using the Fisher's exact test.

## RESULTS

The study included a total 40 patients who were admitted with a diagnosis of ASBO and all of them underwent surgical exploration and adhesiolysis. They were 23 males (57.5 %) and 17 females (42.5 %), and the age of patients ranged from 19-49 years with average age  $32.25 \pm 10.03$  years, and median age of 31 years.

The primary surgeries before ASBO are illustrated in Table 1.

Two patients had iatrogenic injury of the bowel during adhesiolysis that needed resection anastomosis of the injured loop, and rubber drains were inserted. Also one

patient died in the early postoperative period, another one was missed in the follow up period, and one patient, during exploration, the obstruction was due to recurrent malignancy, all these patients were excluded from the study.

The maximum follow up period in this study was (31/2 years) and the mean follow up period was  $25\frac{1}{2} \pm 12.5$  months.

The draining fluid was serosanguinous which colour was getting lighter with time No leak of the fluids had been detected from the exploration wound in any case. Also, it was noted that the amount of the drainage fluid was usually less than the infused one, mostly due to absorption of saline through the peritoneum.

Six patients (30%) of Group I (3 in the first 6 months) were re-admitted to the hospital due to symptoms of recurrent ASBO. Four of them (20%) were surgically re-explored for adhesioysis again, while two (10%) responded to conservative measures and were discharged home. While in Group II, only one case (5%) was re-admitted to the hospital with picture of recurrent ASBO. He responded to conservative measures and became clinically and radiologically free and was discharged. There was statistically significant reduction ( $P < 0.05$ ) in the recurrence rate and surgical re-exploration in Group II in comparison to Group I Table 2.

Also, two out of the six recurrences in Group I were re-admitted to hospital again during the follow up period with picture of recurrent ASBO. One of them responded to conservative measures within 72 hours, and was discharged while the other was surgically re-explored for adhesiolysis again. He recovered well and discharged for follow up.

Also, it is worth mentioning that one patient (5%) of the Group II developed incisional hernia at his laparotomy scar 6 months postoperatively and was re-admitted to hospital for its repair. Exploration of the peritoneal cavity during hernia repair revealed no intestinal adhesions at all.

### **Complications recorded with the technique:**

1. Leakage of the lavage fluid around the catheter may be due to large stab for insertion of the tube.
2. Some patients experienced some abdominal discomfort at the end of the lavage, may be due to rapid infusion although the IAP did not exceed 5 cm of water. This pain was controlled by traditional analgesic.

It is worth mentioning that no single case of intra-abdominal sepsis or residual collection was detected by abdominal ultrasonography after PPL technique.

**Table 1. The types and incisions of the primary surgery before first attack of ASBO.**

Type of the primary surgery	Type of laparotomy incision	No	%
Appendicectomy for acute appendicitis	Mc Burnney's incision	9	22.5 %
Resection anastomosis of small bowel for different indications	Midline incision	6	15 %
Exploration laparotomy for peritonitis due to perforated appendicitis	- Rt. paramedian incision (4 cases). - Lower midline incision (1 case)	5	12.5 %
Hysterectomy for dysfunctional uterine bleeding	Lower midline incision (4 cases). Pfannsteil's incision (1 case)	5	12.5 %
Exploration laparotomy for peritonitis due to perforated peptic ulcer	Upper midline incision	3	7.5 %
Splenectomy for hypersplenism	- Upper Rt. paramedian incision (2 cases) - Upper midline incision (1 case)	3	7.5 %
Abdominoperineal resection of the rectum for carcinoma	Midline incision	2	5 %
Extended Lt. hemicolectomy for diverticulosis coli	Midline incision	2	5 %
Rt. hemicolectomy for carcinoma	Midline incision	1	2.5 %
Open cholecystectomy	Kocher's subcostal incision	1	2.5 %
Tubo-oophorectomy	Pfannsteil's incision	1	2.5 %
Hernioplasty for para-umbilical hernia	Transverse supra-umbilical incision	1	2.5 %
Radical cystectomy with reconstruction of ileal conduit for bladder cancer	Midline incision	1	2.5 %

**Table 2. The incidence of recurrent ASBO and the rate of surgical re-exploration in both groups.**

Variable	Group I (n = 20)	Group II (n= 20)	P
Recurrent ASBO	6	1	0.03
Surgical redo	4	0	0.03

There is significant reduction in the recurrence rate and surgical re-exploration in Group II in comparison to Group I ( $P < 0.05$ ).

## DISCUSSION

The recurrent nature of ASBO represents a major clinical problem because adhesive obstruction commonly follows previous abdominal surgery.<sup>(22)</sup> The recurrence rate after an ASBO admission given in previous studies varies from 19% to 53%.<sup>(23-24)</sup>

It is well known that adhesions may present as obstruction 30 or more years after abdominal surgery, and it would be impossible to follow up a group of patients for this period of time to find out how many ultimately obstruct from their adhesions. It appears that more than one third of patients with adhesive obstruction present within 1 year of surgery. Since 1990, it has been reported that ASBO occurs in 3% of all laparotomies, 1% during the first postoperative year.<sup>(25)</sup>

The idea of PPL method is that by diluting and washing out of fibrinogen in the peritoneal fluid, we can minimize adhesions among intestinal loops and by creating some sort of artificial ascites, fluid acts as a lubricant over the intestinal wall that facilitates motility and prevents adhesions.

In this study, 30% of Group I cases developed recurrent ASBO within the follow up period, while in Group II only 5% of cases presented with picture of recurrent ASBO. Also, the rate of surgical re-exploration was 20% in Group I and zero in Group II. There was statistically significant reduction in the recurrence rate and surgical re-exploration rate in Group II in comparison to Group I.

The incidence of recurrent ASBO among our Group I was 30%, which falls in the same range recorded by previous studies which was 19 to 53%.<sup>(23-24)</sup> Also 50% of this recurrent ASBO occurred in the first 6 months after surgery, the finding that parallels with data obtained by Fazio VW. et al,<sup>(26)</sup> where they recorded that 50% of first ASBO episodes occurred within 6 months after the initial surgery.

In this study, the rate of recurrent ASBO in PPL treated patients was significantly lower than control group, in comparison to Fazio VW. et al<sup>(26)</sup> who used Seprafilm® as a barrier to intestinal adhesions, and who recorded no significant difference between treatment and control group in overall rate of ASBO, but the incidence of ASBO requiring re-operation was significantly lower for Seprafilm® patients compared with no-treatment patients.

In conclusion, Postoperative Peritoneal Lavage (PPL) is a new hope for prevention of recurrent ASBO that achieved significant reduction in recurrence rate, and hopefully will abolish the need for surgical re-exploration in victims of ASBO.

It is hoped, that this method will be studied on a larger scale of patients and centers over a longer period of follow up for re-assessment and possible modifications.

Further studies are also needed to evaluate and properly decide the optimum composition and amount of the fluid used, and the optimum duration of the lavage needed to ensure best results. Also, the drainage fluid should be biochemically and cytologically analyzed, hoping to determine hidden facts about the aetiology of ASBO.

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