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# Re-infusion of High Output Effluent from a Loop Jejunostomy into Its Distal Limb through a Subcutaneously Implanted Catheter: A Case Report

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**Abstract** Diverting jejunostomy is almost always a last ditch effort in a situation of abdominal catastrophe. Although it is life-saving, it may adversely affect the patient's metabolic status and renal function. Consequentially an emergency jejunostomy should be a temporary measure and should be closed as early as possible. We present a unique case where the creation of a temporary loop jejunostomy was indicated. To prevent acute renal failure, we re-infused the stoma effluent into its distal limb through a Foley catheter. The latter was implanted subcutaneously which allowed us to re-feed the stoma without disturbing the appliance seal. The patient recovered on oral intake without the use of total parenteral nutrition.

***Keywords:*** *jejunostomy, diverting, high output, re-infusion, implanted, catheter*

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## 1. Introduction

There are rare situations when the use of defunctioning jejunostomy is justified as a life-saving procedure. These scenarios include: multiple intestinal suture lines and anastomosis in septic abdomen [1], anastomotic leakage and/or fistula after primary jejunal anastomosis [2], enteral nutrition access [3], severe small bowel inflammation (Crohn's disease or radiation injury) [4]. Creation of a double barrel jejunostomy is reported in cases with extensive bowel resection in a severely contaminated abdomen and/or haemodynamic instability [5] and exteriorization of anastomotic leak [6]. An end jejunostomy was used in the setting of distal small bowel leaks [7]. Our case represents a unique inducation for creation of a loop jejunostomy, namely co-existing severe diffuse peritonitis and complete adhesive small bowel obstruction.

Surgeons are reluctant in doing a diverting jejunostomy because its high output induces short bowel syndrome (SBS). The latter presents a challenge in maintaining the patient's metabolic balance. The acute phase of this syndrome could be dramatic with stoma output of 6-8 liters per 24 hours [8]. Patients in this phase will need fluid and nutritional support, most often in the form of total parenteral nutrition (TPN).

Publications on re-infusion of the stoma effluent are scarce. Only four studies examine this method [9]. The infrequent use of this technique is governed by low aesthetic tolerance, difficulties with appliance management, and recurrent tube dislodgement. In addition, an unfounded fear of putting excretion back into the body. The output of a high jejunostomy is not a waste, conversely it is a rich mixture of digestive enzymes, nutrients, and electrolytes. Apart from maintaining the patient's nutritional balance during the acute phase, re-feeding the stoma prevents injury to the kidneys and liver as well as intestinal failure of the distal bowel segment. This method is a viable alternative to TPN in patients with an adequate length of distal small bowel and present ileocecal valve [10].

## 2. Case Report

A 57-year old male was admitted 45 days after previous emergency surgery for acute colonic obstruction due to a recurrent rectal cancer. This resulted in right transverse colostomy being created. His presenting signs and symptoms were suggestive of concomitant diffuse peritonitis and complete small bowel obstruction. The abdomen was hugely distended and tender with muscle guarding and rebound tenderness throughout. Per rectum examination detected a mass at 6 cm from the anal verge. Plain erect abdominal x-Ray showed massively distended small bowel loops with wall and mucosal thickening (valvulae conniventes), with air-fluid levels and a transition zone (Figure 1).

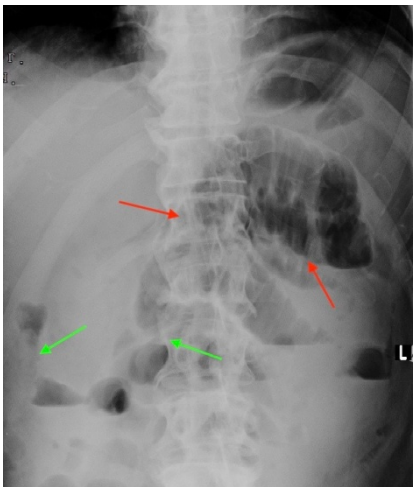

**Figure 1.** Erect plain abdominal x-Ray on admission confirming acute small bowel obstruction. (-Dilated small bowel loops with wall and mucosal thickening (valvulae conniventes), and air-fluid levels (red arrows). -Transition zone with paucity of gas distally (green arrows))

The patient was hemodynamically unstable with blood pressure measuring 70/40 mmHg, heart rate 120 beats/minute, respiratory rate 36/minute and low urine output. Notably, he was afebrile and with normal white blood count. After short intravenous fluid resuscitation, the patient was operated on revealing a 'hostile abdomen'. Small bowel loops were tightly fused to the scar of the previous laparotomy as well as to each other in the form of bowel agglutinate positioned at the right. The latter served as a transition zone below which the cecum was empty, whereas the small intestine proximally was very enlarged with fresh fibrin deposits throughout. One liter of thick pus with rotten eggs odor was aspirated, the sample of which grew E. coli and Candida albicans; no obligate anaerobes were cultured. Meticulous exploration revealed a spot of serosal necrosis at the site of the rectal cancer which had invaded the pelvic peritoneum and the bladder; there was no transmural perforation. No other source of infection was detected. No attempt for adhesiolysis was made because of the risk of bowel perforation. The small intestine was decompressed through a tube inserted via jejunotomy just above its tight adhesion to the residual sigmoid colon; this site was 200 cm below the Treitz ligament. The jejunotomy was exteriorized and transformed into a 'spout' loop jejunostomy at the left lower quadrant. The patient had a complicated post-operative period with wound infection and full thickness dehiscence; the latter happened although internal retention sutures were used during fascial closure. On the tenth postoperative day an intra-abdominal abscess located below the right transverse colostomy was detected on an abdominal and low chest computed tomography (CT) image (Figure 2), as well as free fluid below the left diaphragmatic dome and small reactive pleural effusions bilaterally.

The abscess was drained through a direct open access and the sample of it cultured E. coli and Streptococcus agalactiae. The subphrenic fluid was left undisturbed because the patient did not show any symptoms and signs suggestive of suppuration. The same approach was applied to the pleural effusions, which reabsorbed spontaneously. The patient resumed oral feeding. The effluent from the jejunostomy gradually increased and measured between 4 and 6 liters per 24 hours while the urine output dropped below 500 ml/24. A sample from the effluent was sent for microbiology testing for pathogen bacteria and Clostridium difficile toxins and returned negative. This was an unacceptably high stoma output from non-infectious origin, threatening the development of acute renal failure. Consequentially we decided to proceed to early stoma reversal on the fifteenth postoperative day. Prior to this we examined the patency of the distal bowel segment with soluble contrast, which we infused through a Foley catheter into the distal stoma limb. The exam showed incomplete bowel obstruction at the site of the bowel agglutination (Figure 3).

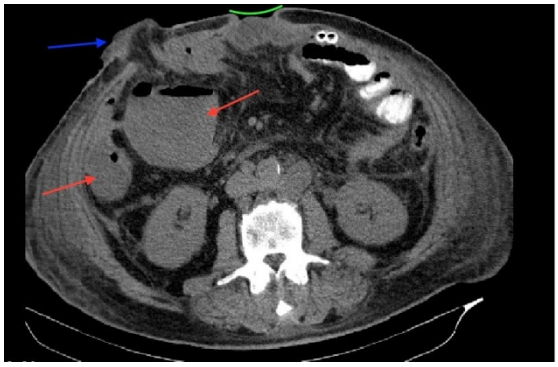

**Figure 2.** Abdominal CT (axial slice) (-Bi-lobulated intra-abdominal abscess with air bubbles (red arrows) positioned below the level and adjacent to the right transverse colostomy (blue arrow).-Full thickness wound dehiscence bridged by a small bowel segment (green arc))

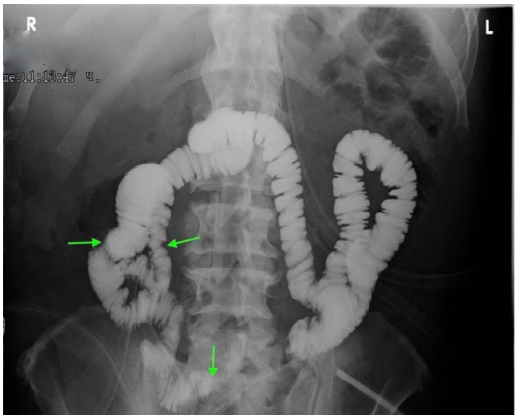


**Figure 3.** A follow-through image taken 1 hour after infusion of water soluble contrast into the distal jejunostomy limb (-A marked transition zone of narrowed ileum and slowed contrast transit (sub occlusion) at the site of the small bowel agglutination (green arrows))

The contrast slowly passed into the cecum and reached the transverse colostomy on the 6$^{th}$ hour. We agreed that restoration of the bowel continuity under these circumstances in a still septic patient would place him at risk of anastomotic leak. As a consequence of this we decided to re-infuse the stoma effluent into the distal limb. For this purpose, two stab incisions were made - the first one at 0.5 cm from the muco-dermal junction of the distal limb and the second one outside the circumference where the bag flange sealed. We tunneled the subcutaneous tissue between the two incisions with a long hemostat. The tip of a large bore Foley catheter was pulled through the tunnel, inserted deep into the distal stoma limb securing it to the skin incisions. It should be noted that in order to prevent the catheter from kinking, the distal limb of the stoma must be created at the level of the skin (Figure 4).

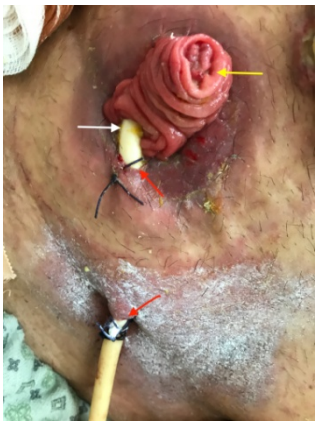

**Figure 4**. The subcutaneously implanted Foley catheter *(picture taken from the patient's left side) (*-The two stab incision to which the catheter is secured (red arrows). -The catheter has been pulled through the subcutaneous tunnel between the incisions and inserted deep into the distal stoma limb (white arrow), the latter being at the level of the skin. -The 'spout' of the proximal stoma limb (yellow arrow))

This achieved a permanent access to the distal limb for alternated re-infusion of the stoma effluent and enteral feeding with commercial liquid food without disturbing the bag seal (Figure 5).

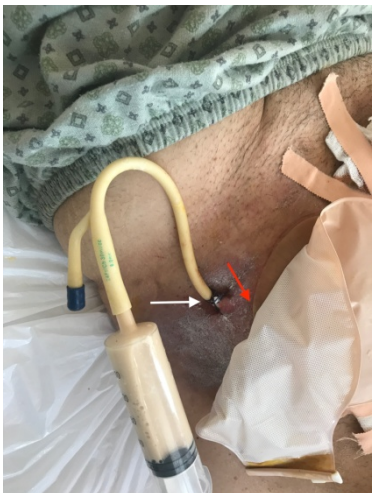

**Figure 5.** Re-feeding the stoma and enteral feeding with commercial liquid food without disturbing the appliance seal *(picture taken from the patient's left side) (*-Catheter entry point (white arrow) which is outside the circumference of the stoma bag flange (red arrow))

No TPN was started. The patient's wife was trained to perform this simple procedure at home.

The patient was discharged on the 34$^{th}$ postoperative day. He was hemodynamically stable, with urine output of >1000 ml/24. Liver function tests, non-protein nitrogen (urea and creatinine), and electrolytes were within reference range. A follow up on the first and second month found that the patient had regained two kilograms of body weight. The distal transverse colostomy excreted normally the re-infused effluent without signs and symptoms of obstruction. The jejunostomy output gradually dropped below 1200 ml/24 - bowel adaptation had occurred in the second phase of SBS [8].

## 3. Discussion

The patient presented with marked local signs of inflammation but with almost no systemic ones; he had normal body temperature and white blood count which was due to immune paralysis secondary to malignancy and recent major surgery.

We were forced to perform a re-laparotomy 45 days after a previous operation. This was the most vulnerable post-operative period where adhesion maturation and wound healing processes had not been completed [11]. Hence, a hostile abdomen was encountered and wound dehiscence occurred although internal retention sutures were applied.

We did a comprehensive English literature search, mainly PubMed, and did not find a case similar to ours where diffuse purulent peritonitis and acute adhesive small bowel obstruction coexisted. Given the intraoperative findings of no detection of an obvious source of infection, we concluded that bacterial translocation from the peritumoral inflammation of the invading rectal cancer was responsible for the development of the severe peritonitis. In turn, the subsequent bowel edema caused acute complete obstruction at the site of a previously patent small bowel adhesions. In our opinion, the best option to temporary deal with such a high bowel blockage is the Bishop-Koop jejunostomy or its mirror variant-the Santuli jejunostomy. Although these stomas were originally designed for neonates in cases of intestinal anomalies such as atresia, volvulus and apple-peel syndrome, they can be used in adults as well [12]. In this case creation a termino-lateral anastomosis (these stomas are by the nature of their design) in the haemodynamically unstable patient with severely contaminated peritoneal cavity was contraindicated. This situation dictated that we had no choice other than creating a life-saving defunctioning loop jejunostomy. Data from publications claim that a diverting stoma located at 200 cm distally from the Trietz ligament would not cause short bowel syndrome [8]. In our case the cited length of jejunum turned out to be insufficient in preventing this syndrome.

Ideally, a temporary defunctioning jejunostomy should be reversed before life-threatening physiologic disturbances had occurred. As stated above, this tactic would be hazardous in our patient because of the high risk of anastomotic leakage. Instead, we proceeded to re-feeding the jejunostomy. The method described by Kittscha J. [9] of insertion of the catheter through a cut of the stoma bag carries the drawbacks of leakage from it and catheter displacement. Our technique of subcutaneous implantation of a Foley tube outside the appliance seal makes its change and reinfusion independent of one another and prevents leakage from the bag. The two points of attachment of the catheter to the skin makes its dislodgement impossible. Further, the deep insertion of the catheter tip into the distal limb does not allow a back flow even in bolus infusion and without balloon insufflation; the latter eliminates the risk of pressure necrosis of the bowel. In addition, this method avoided the use of TPN. No complications related to the implanted catheter were noted. Our method was accompanied by general measures for managing a high output stoma in accordance with the guidelines for management of patients with a short bowel of the British Society of Gastroenterology [13]. A PubMed, Google Scholar and Wiley Online Library data base revealed only one article

where a similar access for re-feeding of jejunostomy was used [3].

We did not make any attempt to evacuate the liquid collection under the left diaphragmatic dome because the patient did not exhibit any symptoms and signs of subphrenic abscess throughout the hospital stay. Consequently, we concluded that it was a sterile residual lavage fluid [14] and accepted the same tactic as for sterile peripancreatic collections in acute pancreatitis, that is 'wait and observe' which time proved right.

## 4. Conclusion

The creation of diverting high jejunostomy should be considered as a last resort in patients with severe abdominal sepsis. It should be temporary and reversed as soon as indicated. If early closure is not possible, re-infusion of high output stoma effluent into the distal limb should be initiated once the amount exceeded 1500ml/24. This can be safely accomplished through our technique of subcutaneous implantation of a Foley catheter. Re-feeding of jejunostomy will prevent acute renal injury and intestinal failure, and minimize the use or completely avoid TPN. We believe that this case study will add the limited literature on the problem discussed.

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## Statement of Competing Interests

The author declares that he has no competing interests.

## List of Abbreviations

**SBS:** short bowel syndrome;
**TPN:** total parenteral nutrition;
**CT:** computed tomography

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