

# The Easier Construction Method of Terminal Stoma by Extraperitoneal Route Using Nelaton's Catheter

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**Introduction:** Abdominoperineal resection is performed using laparoscopic techniques at many institutions. Few institutions construct the terminal stoma using the extraperitoneal route, mainly because of the difficulty of this approach. However, the extraperitoneal route for terminal stoma might be associated with a lower rate of complications when compared with the transperitoneal route. We construct the terminal stoma via the extraperitoneal route using Nelaton's catheter. **Materials and Surgical Technique:** We call this technique the "Nelaton's Catheter Hauling Technique", which involves: 1) dissection of the extraperitoneal space using an intestinal spatula, 2) insertion of Nelaton's catheter into the abdominal space via the extraperitoneal route, 3) capture of the tip of Nelaton's catheter and pull it to the outside, 4) tying of the threads of the stump of the colon and the tip of Nelaton's catheter, and 5) pulling up on Nelaton's catheter to move the stump of the colon outside via the extraperitoneal route. **Discussion:** We believe that the use of this technique will contribute to the reduction of stoma-related complications.

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**Key words:** extraperitoneal route, laparoscopic stoma construction, Nelaton's catheter

## Introduction

During laparoscopic surgery, some of the standard operative procedures performed in the context of open surgery are often omitted due to technical difficulty, and omission of these practices can lead to worse outcomes or complications. These problems include internal herniation and ileus caused by persistence of the mesenteric gap which is otherwise usually closed during open surgery<sup>1,2)</sup>. The terminal stoma is usually constructed through the extraperitoneal route at open surgery<sup>3)</sup>. However, during laparoscopic surgery, almost all of the stoma constructions are performed via the transperitoneal route because of the technical difficulty associated with

using the extraperitoneal route. We speculate that this difficulty is due to the lack of a standard laparoscopic construction procedure of extraperitoneal stoma.

The incidence of parastomal hernia is higher with single-barreled colostoma (4.0-48.1%), which is frequently used as a terminal stoma, when compared with double-barreled (0-6.2%) or single-barreled ileostomy (1.8-28.3%)<sup>4)</sup>.

We have constructed the stoma via the extraperitoneal route using an intestinal spatula and Nelaton's catheter during laparoscopic surgery. This procedure is easy and may reduce the risk of stoma-related complications.

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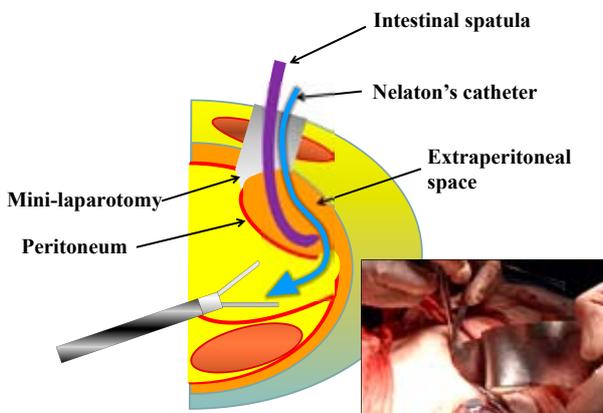
## Materials and Surgical Technique

### *Indications for this technique*

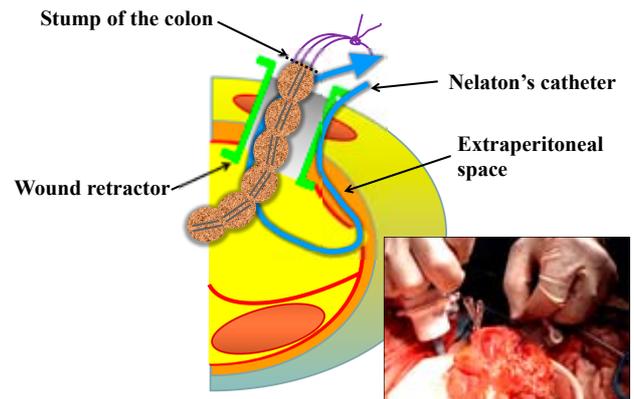
Because the extraperitoneal route requires sufficient length to approximate the colon to the skin level, cases in which a sufficient length of colon could not be secured were excluded.

### *Construction of the terminal stoma via the extraperitoneal route using Nelaton's catheter*

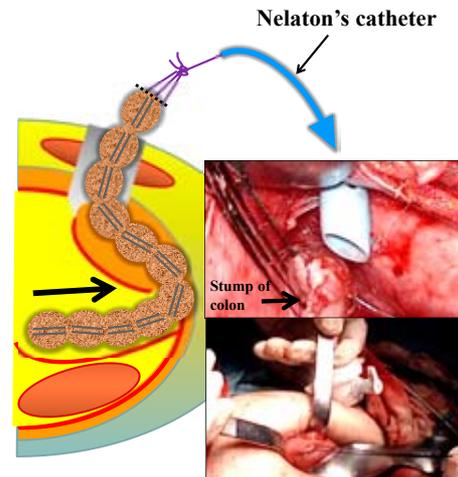
After mini laparotomy of the stoma site, wound retract device [wound retractor<sup>®</sup>] was attached, the tumor was resected to allow enough length to create the stoma via the extraperitoneal route. Four support sutures were placed at the stump of the colon, and the threads were tied into one knot. The stump of the colon and threads were then returned to the intraabdominal space. After detaching the wound retractor, blunt dissection of extraperitoneal space was performed using Kelly forceps. Next the intestinal spatula was inserted into the extraperitoneal space, and gently rotated to secure enough space to ligate the stump of the colon. Then, the Nelaton's catheter was inserted into the dissected space as deep as possible, and the wound retractor was attached again. The tip of Nelaton's catheter was grasped and pulled up to the outside and clamped (Fig.1). The stump of the colon was pulled up to the outside, and the tip of Nelaton's catheter and threads (already mentioned) were connected and returned to the abdominal cavity (Fig.2). The wound retractor was detached, and Nelaton's catheter was hauled up gently with the stump of the colon above the skin level (Fig.3). The stoma via the extraperitoneal route was constructed by laparoscopic procedure (Fig.4).



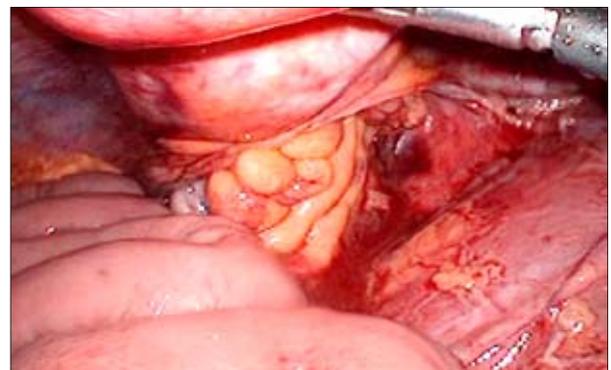
**Figure 1:** Tumor is already resected. First, the extraperitoneal space is dissected using an intestinal spatula. Second, the Nelaton's catheter is inserted into the abdominal space via the extraperitoneal route.



**Figure 2:** The tip of the Nelaton's catheter is grasped intracorporeally under pneumoperitoneum conditions and then pulled to the outside through the wound retractor. The threads of the stump of the colon and the tip of Nelaton's catheter are tied.



**Figure 3:** By pulling up the Nelaton's catheter, the stump of the colon is pulled outside the abdomen via the extraperitoneal route.



**Figure 4:** The stoma via the extraperitoneal route was constructed by laparoscopic procedure.

**Table 1:** Six cases of extraperitoneal stoma constructed using the “*Nelaton’s Catheter Hauling Technique*”

Case	Age/Sex	Disease/Location	Operation Procedure	Type of Stoma	Stoma Construction Time (min)	Complication
1	87/F	Rectal Cancer/PRb	Lap-APR	Colostomy	28	no
2	54/M	Rectal Cancer/RbP	Lap-APR	Colostomy	29	no
3	80/M	Ulcerative Colitis	Lap-IPACA	Ileostomy	26	no
4	83/M	Rectal Cancer/Rb	Lap-APR	Colostomy	36	Congestion & Partial Necrosis of Stoma
5	81/F	Rectal Cancer/P	Lap-APR	Colostomy	24	no
6	32/M	Rectal cancer/Rb	Lap-APR	Colostomy	28	no
Average	77				28.5	

Lap-APR: laparoscopic abdominoperineal resection

Lap-IPACA: laparoscopic ileal pouch anal canal anastomosis

We do not believe it is necessary to close the peritoneal defect, as the small laparotomy is supported behind by the serosa of ligated colon. If the surgeon desires to close this defect, it can be sutured before pulling up the Nelaton’s catheter.

We have performed six surgeries using this technique, and the average time needed to create the stoma was approximately 30 minutes (Table 1).

## Discussion

The increasing use of laparoscopic surgery has led to the omission of some vital procedures that are classically performed during open surgery. Closure of the mesenteric gap tends not to occur in the setting of laparoscopic surgery, as a large gap is associated with a low risk of internal hernia. However, similar to Petersen’s hernia (i.e., internal hernia occurring after laparoscopic total gastrectomy), recently cases of internal hernia have been described after colorectal laparoscopic surgery. This has prompted surgeons to attempt to close the mesenteric gap<sup>12)</sup>. Although not randomized controlled trials, some reports have suggested that the extraperitoneal route is associated with a reduced risk of stoma-related complications when compared with the transperitoneal route<sup>5-7)</sup>. According to a retrospective study of 203 cases of construction of endcolostomy, the incidence of parastomal hernia was 3.5% when using the extraperitoneal route and was 35.0% when using the transperitoneal route. The incidence of ileus was 3.5% and 5.9%, respectively<sup>8)</sup>. Hama-

da et al. reported that the incidence of parastomal hernia was lower with the extraperitoneal route when compared with the transperitoneal route under laparoscopic surgery<sup>9)</sup>.

Tsukuda et al. described difficult construction of terminal colostoma through the extraperitoneal route during laparoscopic abdominoperineal resection<sup>10)</sup>.

Laparoscopic construction of the terminal stoma through the extraperitoneal route can be technically difficult, and special instrumentation is required to promote success. With respect to the laparoscopic colostoma construction through the extraperitoneal route, Hamada et al. described a construction method using Kelly forceps<sup>11)</sup>, and Leroy et al. described the use of a special instrument to dissect the extraperitoneal space<sup>12)</sup>. We believe that our method is not inferior as compared with these methods and could create laparoscopic extraperitoneal stoma easily, simply and reasonably.

Because the length of the extraperitoneal route is longer than that of transperitoneal route, important attention is needed in regards to resection of the oral side colon. Only one case required re-operation due to partial necrosis of the stoma caused by intraoperative severe congestion (Table 1). We believe that this necrosis was due to the narrow dissection of extraperitoneal space rather than due to the operative procedure itself.

In conclusion, this “*Nelaton’s Catheter Hauling Technique*” enables construction of laparoscopic extraperitoneal stoma simply and easily without requiring special instruments. Therefore, we believe that this technique will contribute to reducing the risk of stoma-related complications.

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