Journal of Coloproctology

www.jcol.org.br

Original Article

A novelty in laparoscopic total colectomy with natural orifice specimen extraction using a plastic cover

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ARTICLE INFO

Article history:
Received 13 March 2020
Accepted 2 May 2020
Available online 24 June 2020

Keywords:
Total colectomy
Minimally invasive methods
Laparoscopy
NOSE

ABSTRACT

Introduction: Minimally invasive colectomy has been performed for some years for many patients worldwide without much complications compared to the open approach. In this study we explained our experience regarding a modification in laparoscopic total colectomy and removing the specimen with Natural Orifice Specimen Extraction (NOSE) through rectum using a plastic cover for the first time.

Methods and material: This was an experimental study on a new technique of total colectomy with a small modification. Total colectomy was performed based on 7 port laparoscopic approach. Rectum was sparred. Colon was then taken out through the anal canal using a plastic cover.

Results: Thirteen patients underwent laparoscopic total colectomy by removal of the specimen through rectum. Mean age of patients was 42.23 ± 8.15 years. Mean duration of operation was 130 ± 32.4 min. All patients had an uneventful postoperative hospitalization.

Discussion: Laparoscopic total colectomy has been proven to have superior benefits than the open approach. In NOSE technique, colon is removed from the anal canal without any complication or consuming much time. This technique might have less pain and removes the complications associated with an incision on the skin to remove the specimen. Also, due to low price of a usual plastic cover, it can be used instead of other techniques to remove the specimen through the rectum.

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https://doi.org/10.1016/j.jcol.2020.05.001

Uma novidade na colectomia total laparoscópica com extração de espécime em orifício natural usando uma cobertura plastic

Palavras-chave:
Colectomia total Métodos minimamente invasivos
Laparoscopia
NOSE

RESUMO

Introdução: A colectomia minimamente invasiva vem sendo realizada há alguns anos em muitos pacientes no mundo inteiro, apresentando menos intercorrências do que a abordagem aberta. Neste estudo, os autores relatam sua experiência com uma modificação da colectomia total laparoscópica e extração de espécime em orifício natural (NOSE) pelo reto, usando uma cobertura plástica pela primeira vez.

Métodos e materiais: Este foi um estudo experimental sobre uma nova técnica de colectomia total com uma pequena modificação. A colectomia total foi realizada com base na abordagem laparoscópica de sete portas. O reto foi poupado. O cólon foi então retirado pelo canal anal usando uma cobertura plástica.

Resultados: Treze pacientes foram submetidos a colectomia total laparoscópica por remoção do espécime pelo reto. A idade média dos pacientes foi de 42,23 ± 8,15 anos. A duração média da operação foi de 130 ± 32,4 minutos. Para todos os pacientes, a internação pós-operatória transcorreu sem intercorrências.

Discussão: Foi comprovado que a colectomia total laparoscópica apresenta benefícios superiores à abordagem aberta. Na técnica NOSE, o cólon é removido mais rapidamente do canal anal, sem nenhuma intercorrência. Essa técnica pode causar menos dor e remove as complicações associadas a uma incisão na pele para remover o espécime. Além disso, devido ao baixo preço de uma cobertura plástica comum, ela pode ser usada no lugar de outras técnicas para remover o espécime pelo reto.

Introduction

Minimally invasive surgery is generally associated with shorter hospitalization, fewer postoperative complications and pain and more patients' satisfaction. Many researchers have shown the superiority of minimally invasive resection in benign and malignant colorectal diseases compared to open approaches.[1,2]

Compared to open approach, laparoscopic resection results in less blood loss and postoperative pain, smaller incision site for cosmetics and also oral intake could be faster initiated.[3] Despite the fact, there is few data regarding laparoscopic approach for total colectomy using NOSE in the literature.

Total colectomy either laparoscopic or open is performed in many conditions such as Inflammatory Bowel Disease (IBD), Familial Adenomatous Polyposis (FAP), Hereditary Nonpolyposis Colorectal Cancer (HNPCC), slow transit constipation or concurrent malignant neoplasms in different parts of the colon.[4] Also in special circumstances in obstructive masses in which the endoscope is not able to pass through the lesion to assess other parts of colon, total colectomy could be performed according to the surgeon judgment.

Laparoscopic total colectomy is performed for many years in aforementioned conditions. However, a skin incision is usually needed to extract the specimen and resection and anastomosis is performed after the incision.[5] The incision could be small lower midline laparotomy or the Pfannenstiel incision etc.[5] Morbidity of such an incision could be partly the same as open colectomy and only some centimeters of difference regarding the incision size. The incision size in Laparoscopically Assisted Colectomy (LAC) is 6–8 cm.[6–8] It has been shown that this minilaparotomy did not reduce the incidence of incisional hernias compared to the conventional open surgery (3 vs. 10, $p = 0.52$) in some investigations.[9]

Also wound site infection could be occurred in laparoscopically assisted colectomy such as open colectomy.[10,11] Such morbidities associated in laparoscopically assisted colectomy are due to the incision made to extract the specimen.[12–14]

Natural Orifice Specimen Extraction (NOSE) has been introduced for a few years and has been popular among surgeons.[15,16] Transanal specimen extraction via laparoscopic sigmoid resection has been introduced in few investigations.[13,14] However, very few studies have been published in the literature regarding total colectomy using NOSE approach.

Objective

The aim of this study was to explain our experience regarding the new technique for laparoscopic total colectomy and extraction of total colon specimen through rectum.

Methods and materials

This was an experimental investigation performed in 2018 in a general university hospital in Tehran, Iran. Thirteen patients candidate for total colectomy due to inflammatory bowel disease, familial adenomatous polyposis or cancer entered the

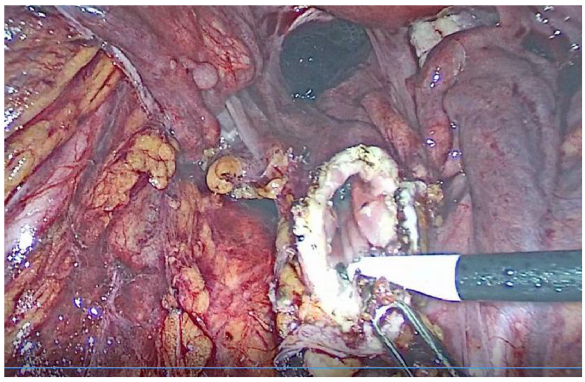

Fig. 1 – Cutting the rectum stump with cautery.

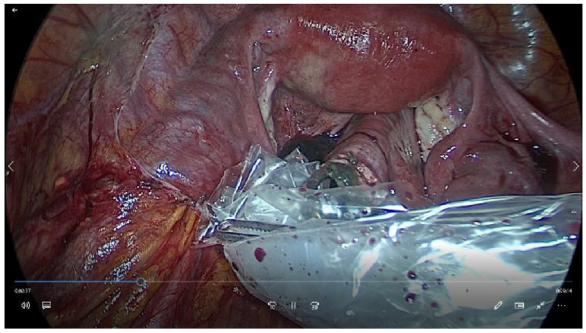

Fig. 2 – Passing plastic cover from the port through the rectum.

study. Inclusion criteria were all patients who needed total colectomy due to inflammatory bowel disease, familial adenomatous polyposis or cancer. Exclusion criteria were previous abdominal surgeries, any rectal diseases like rectal cancer, rectal prolapse, rectal polyp, anal canal stenosis due to any reason, previous coloanal surgeries or coloanal anastomosis etc. An informed written consent was obtained from patients. Patients were informed about the procedure and all were free to leave the study at any point they wanted without affecting their standard medical care. Possible complications and probable need for loop ileostomy explained to all patients. Patients' diet was liquids three days before the operation.

The operation technique

At first, patients underwent general anesthesia and prep and drape was performed in a semi-lithotomy position. An umbilical 10 mm trocar was placed with the open technique. Abdomen was insufflated to 14 mmHg. Two 12 mm trocars were placed in lower right and left sides of abdomen 10–15 cm lateral to the umbilicus. Three 5 mm trocars were placed in hypogastric, right side and left lower areas of abdomen. First, the gastrocolic ligament and hepatic flexure were dissected using LigaSure 10 mm (Medtronic, US). By mediolateral approach, below the ileocolic artery, the mesocolon was detached to the hepatic flexure on the Toldt's fascia. Ileocolic artery was ligated with Hemolac. Also the midcolic artery was ligated. Splenic flexure was dissected. The inferior mesenteric vein was then ligated near the Treitz ligament. Then the inferior mesenteric artery was ligated. Mesocolon was completely dissected. After completion of procedure, mesorectum was cut at the level of sacral promontory. Then rectosigmoid junction and terminal ileum were cut by two endo-staplers (Yellow and blue cartridges, Ethicon, Johnson & Johnson, The USA). At this time, the recto-sigmoid stump was opened with scissors and a nylon sterile cover passed through the rectum for spillage protection and easy removal (Fig. 1). A 70 cm cut of nylon cover was made and entered the abdominal cavity through the right lower port incision. Distal portion of cover was taken out of the rectum using a ring forceps (Fig. 2). Rectal enema with 500cc NS serum was performed before a cut was made on the rectum. Total colon was then taken out of the anus using a ring forceps (Fig. 3). We did not use rectoscope, because the specimen removed easily facilitated by the plastic cover. Finally, the rectal stump was closed with endostaplers (Fig. 4). Actually it is a laparoscopic nylon to cover unsterile devices during laparoscopic operations. The circular staple anvil entered the abdomen through 12 mm port and inserted into ileum. Distal ileum and upper rectum were closed by two endo-staplers. Distal stamp of ileum and upper rectum cut by endostaplers, and removed through 12 mm port using Endobag if available or without it. Finally, ileorectal anastomosis was performed using circular stapler and leak test was performed (size 33.5) (Fig. 5). Port sites in one of our patients are presented in Fig. 6. Patients transferred to ICU after the operation. Nutrition started 2–3 days after the operation. No post-op complication occurred during hospitalization and they were discharged 4–5 days after the operation.

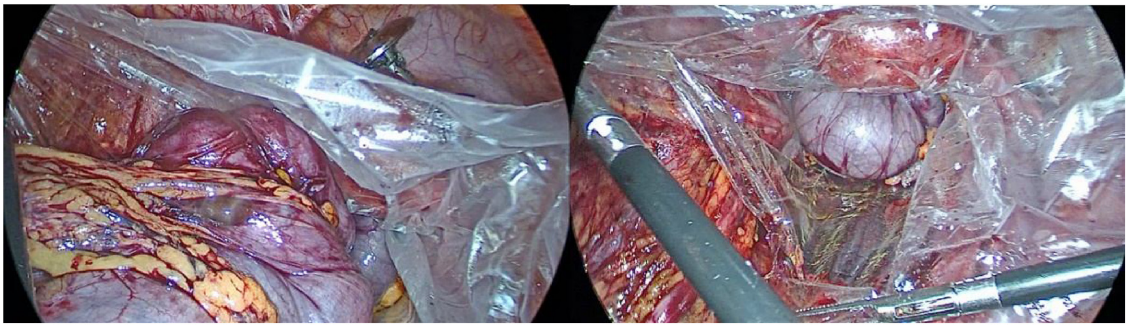

Fig. 3 – Taking out the colon through the cover from rectum.

Table 1 – Demographic characteristics of patients.

Patient number	Age (year)	Gender	Body mass index	Operation time (min)	ICU stay (day)	Hospitalization (day)	Indication of operation
1	25	Female	27	130	3	6	HNPCC
2	50	Male	21	150	3	6	Polyposis + Lt colon Ca
3	47	Female	22	130	2	6	Colon inertia
4	36	Female	33	140	2	6	Colon inertia
5	40	Male	31	190	3	5	aFAP
6	30	Male	23	140	2	5	Large cecal mass + left colon polyposis
7	60	Female	32	150	3	7	Colon inertia
8	51	Male	27	150	2	6	HNPCC
9	32	Male	29.5	120	2	6	Ulcerative colitis
10	40	Female	24	130	2	5	Colon inertia
11	58	Male	25	160	3	6	Large sigmoid cancer + polyposis
12	37	Male	23	150	3	5	Colon inertia
13	43	Female	26.5	140	2	6	aFAP

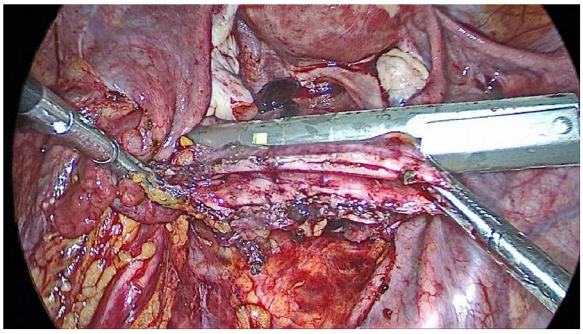

Fig. 4 – Closing the rectal stamp with endostapler.

Results

Thirteen patients underwent the operation. Indications for total colectomy were polyposis in 2, colon inertia in 5, aFAP in 2, ulcerative colitis in 1 and colon cancer in 3 patients. The mean age of patients was 42.23 ± 8.15 years (Median = 40, range 25–60 year). Mean of Body Mass Index was 26.07 (Median = 26.5; range: 21–33). Seven patients were male and 6 female. The mean duration of operation was 130 ± 32.4 minutes (range: 130–190 min). No major blood loss during the operation occurred. Estimate blood loss was almost null. No patient received packed cell during their hospitalization. There was no need for additional port placement or extension of the trocar site intraoperatively. The mean duration of hospitalization post-operation was 6 days (range: 5–7). All patients admitted to ICU after the operation. The mean duration of ICU stay was 2.5 days (range: 2–3). In our center, patients who undergo major operations are usually admitted in intensive care unit to receive higher care. Also because NOSE technique was done for the first time in our hospital, we preferred ICU postoperatively. Passage of flatus and defecation occurred on the third or fourth day of operation. Surgical diet was started for all patients after 2 days. No major complication occurred during the operation or in post-op hospitalization. All patients received deep vein thrombosis prophylaxis with subcutaneous heparin 5000 IU two times a day during their hospital stay. Only one patient with aFAP had colic abdominal pain after 3 days of the operation. Electrolytes and abdominal US revealed no abnormal findings. His pain relieved after 2 days. Patients transferred to surgical ward and discharged with loperamide, acetaminophen codeine, ondansetron and in case of colon cancer, enoxaparin for 30 days was prescribed. Patients' demographic characteristics are demonstrated in Table 1.

Conclusion

Colorectal surgery has been improved dramatically after the introduction of laparoscopic surgery in this field.[17] Partial or total colectomy has been performed by laparoscopic technique for many years, however, a skin incision is usually

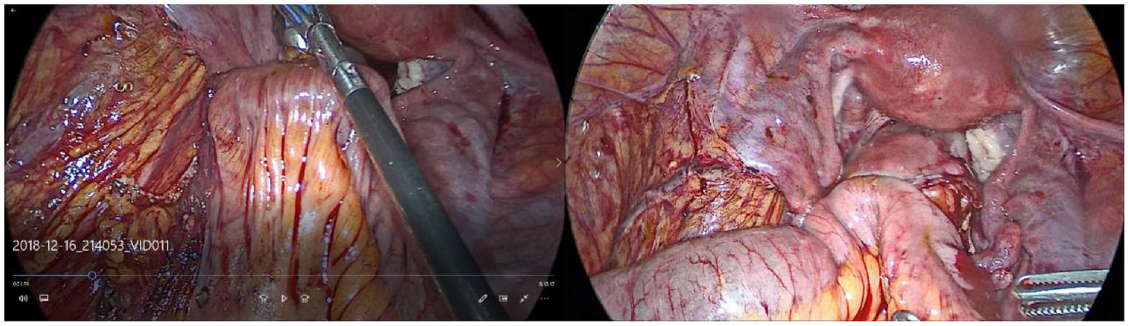

Fig. 5 – Ileorectal anastomosis with endostapler.

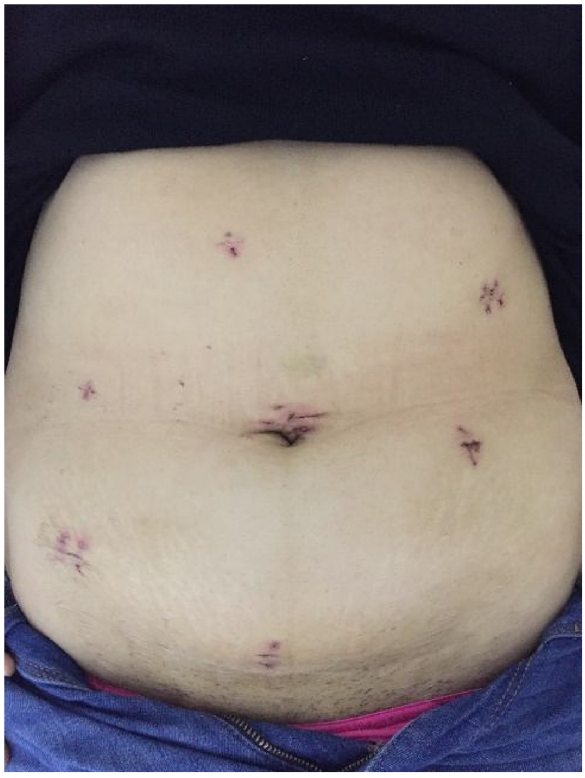

Fig. 6 – Port site after two weeks of the operation.

needed to take out the specimen and resection and anastomosis is performed after the incision. The incision could be small lower midline laparotomy or the Pfannenstiel incision etc.[5] Morbidity of such an incision could be partly the same as open colectomy and only some centimeters of difference regarding the incision size. The incision size in Laparoscopically Assisted Colectomy (LAC) is 6–8 cm.[6–8]

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Also wound site infection could occur in laparoscopically assisted colectomy such as open colectomy.[10,11] Such morbidities associated in laparoscopically assisted colectomy are due to the incision made to extract the specimen.

Natural orifice specimen extraction has been introduced for a few years and became popular for many surgeons.[15,16] Transanal specimen extraction via laparoscopic sigmoid resection has been reported in a few investigations.[18] However, very few studies have been published in the literature.[19] A meta-analysis performed on all studies reporting NOSE of total colectomy revealed that such approach can meaningfully decrease hospitalization and improve post-op recovery with better cosmetic consequences. Also, postoperative pain and fewer complications were reported.[20–22]

In these studies, rectoscope has been used for the removal of total colon from the rectum. Novelty of our study was using a tubular plastic cover through the rectum to take out the specimen. This has not been used in previous studies, and we did not have any problem to remove the specimen. Actually, it is a laparoscopic nylon cover and is very cheap and has no financial burden for patient and health care system. Also it avoids spillage of fecal in the abdomen. Only in one case cecum was not easily transferred due to its size. Therefore, we entered the suction in the cecum via a small colotomy out of the body and suctioned the luminal content. Another issue is the expertise of surgeon to perform intra-abdominal anastomosis. Also we had no major complication in our patients. No anastomosis failure or intra-abdominal collection occurred.

In general, NOSE technique for total colectomy can be safe and feasible. It can be performed even for colon cancer if total mesocolon excision is performed precisely.

Conflicts of interest

The authors declare no conflicts of interest.

Acknowledgement

We would like to thank the operation room staff to help us in performing the operations.

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