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Laparoscopic Low Anterior Resection with Distal Rectal Washout Using the New Device of Gut-clamper

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Abstract

Background: Intraoperative rectal washout is considered to be important in colorectal surgery, but it is rather difficult in laparoscopic surgery. To resolve the problem, a new device called gut-clamper have invented for complete washout of the rectum during the laparoscopic low anterior resection.

Methods: Forty patients with rectal cancer underwent laparoscopic low anterior resection by a single skilled operator.

Results: Thirty patients with rectal cancer underwent laparoscopic low anterior resection with colorectal washout using gut-clamper. There was one complication of leakage in ten cases underwent without using gut-clamper. The number of times using laparoscopic staplers was 1.9±1.0 in the cases using gut-clamper, while that was 3.4 ± 1.1 in the cases without using gut-clamper.

Conclusion: This device of gut-clamper is easy and safe as well as reasonable physically and economically for intra-operative rectal washout including laparoscopic colorectal resection.

Keywords: Laparoscopic low anterior resection; rectal washout; gut-clamper.

INTRODUCTION

Intraoperative rectal washout is considered to be important in colorectal surgery, because implantation of exfoliated malignant cells is suggested as a possible mechanism of tumor recurrence in colorectal anastomosis that might be prevented by cytocidal washout. It is widely believed that the practice of distal rectal washout before anastomosis prevents implantation of free malignant cells followed by reducing the incidence of local recurrence.[1-3]

Standard guidelines are published regarding the effectiveness of preoperative colorectal washout. Preoperative mechanical bowel preparation is the common practice, despite lack of clear evidence of benefit from meta-analysis and randomized controlled trials to support its use.[4-8] Although some authors have recommended no preparation, an empty colon is generally considered to facilitate manipulation of the bowel during laparoscopic colon and rectal surgery. It has been reported that occlusion of the rectum allow for distal rectal washout.[9] It eliminates clamp slippage and faecal spillage and improves access to the distal rectum for low anastomosis.

When considering a completely laparoscopic approach with intracorporeal anastomosis, a complete reduction of the risk of postoperative leakage might be a major issue for the laparoscopic surgeons.

In colorectal surgery, it is required a sufficient space necessary for using instruments. Besides, it is rather difficult to secure the space in laparoscopic surgery. Under such circumstances, only a few laparoscopic surgeons have been performed intraoperative distal rectal washout.

In order to resolve the problem, we have invented a new device called gut-clamper for easy and complete washout of the rectum in the laparoscopic low anterior resection. Here, we describe the new technique using this device and discuss its clinical outcomes.

PATIENTS AND METHODS

Patients

From April 2004 through December 2007, thirty patients (13 men and 17 women) with rectal cancer underwent laparoscopic low anterior resection in Nishinomiya Municipal Central Hospital, Kobe University Hospital and it affiliates by a single skilled operator. Median patients age was 71.4 years (range 66-87). To investigate the effectiveness of gut-clamper, the patients with rectal cancer underwent laparoscopic low anterior resection with colorectal washout, with or without using gut-clamper.

GUT-CLAMPER AND SURGICAL PROCEDURE

Gut-clamper is a 5 mm width, plastic belt of 20 cm long that includes two hard sticks made of stainless steel with a diameter of 3 mm and 40 mm and 45 mm having flexible belts on one ends, a joint at which sticks are joined. At least one through hole made in one of the belts, and clips the rectum by using the two sticks by using the joint as a pivot (Fig. 1). By clipping the rectum by side surfaces of the sticks, it can be clipped while the width of the rectum is pressed and widened, so that the rectum is prevented from being excessively clamped and torn. The difference of length of the two steel sticks makes the good effect. As the two steel sticks are arranged tandem, their gaps is set in the middle of the plastic belt. A distance between these two sticks is 5 mm and the two steel sticks are hooked using the hole (3 mm in diameter) by bending with V-shape at this point (Fig. 2). If it failed to determine the point of clamping, one can untie the gut-clamper by pulling the belt of the hole. Distal rectal washout was carried out with 3 liters of water before dissection of the rectum with or without using gut-clamper. All other surgical procedures were performed after the manner of standard laparoscopic low anterior resection of the rectum.

RESULTS

Thirty patients (13 men and 17 women) with rectal cancer underwent laparoscopic low anterior resection with colorectal washout using gut-clamper (Fig. 3). Ten cases (5 men and 5 women) underwent colorectal washout without using gut-clamper (Table 1).

Although there were no complications in the thirty cases with distal rectal washout using gut-clamper, there was one complication of leakage in the ten cases of distal rectal washout without using gut-clamper. Among these, four cases were impossible to complete the distal rectal washout because it was difficult to hold the forceps and tube for washout.

The number of times using laparoscopic staplers (linear cutter) was 1.9 ± 1.0 in the cases using gut-clamper, while that was 3.4 ± 1.1 in the cases underwent colorectal washout without using gut-clamper. No cases showed relapses of gut-clamper and there was no postoperative death in all cases.

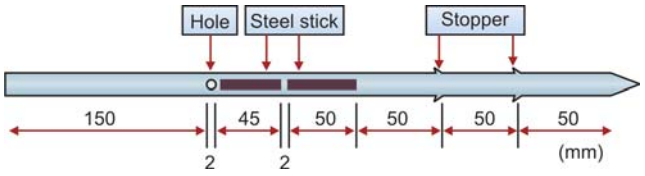

Fig. 1: *Structure of gut-clamper:* Gut-clamper is a 5 mm width, plastic belt of 20 cm long that includes two hard sticks made of stainless steel with a diameter of 3 mm and 40 mm and 45 mm having flexible belts on one ends, a joint at which sticks are joined

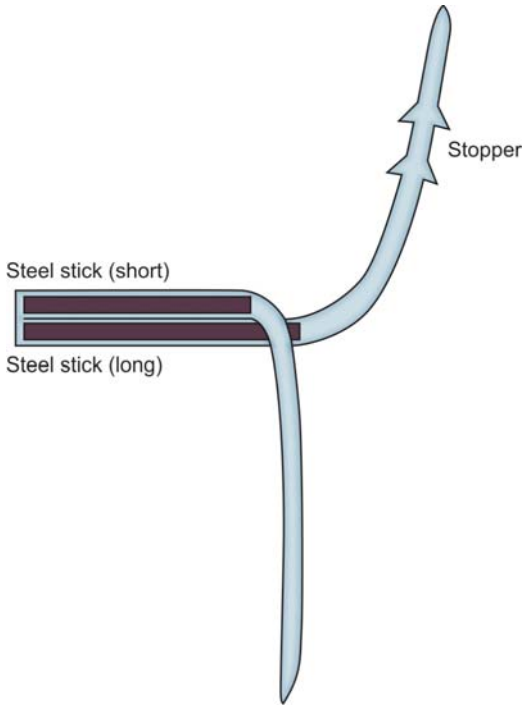

Fig. 2: *Schema of clamping using gut-clamper:* As the two steel sticks are arranged tandem, their gaps is set in the middle of the plastic belt. A distance between these two sticks is 5 mm and the two steel sticks are hooked using the hole (3 mm in diameter) by bending with V-shape at this point

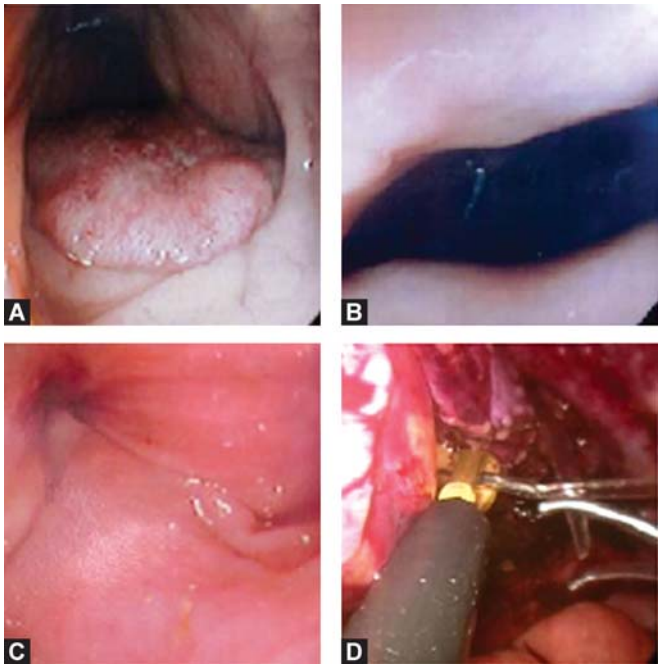

Fig. 3: *Intraoperative view after distal rectal washout using gut-clamper:* Confirming the location of the tumor, the gut-clamper was closed after distal rectal washout. Endoscopic view of rectum before closing (A), during closing (B), after closing (C) and laparoscopic view of distal rectal washout using gut-clamper (D)

TABLE 1: Advantages of gut-clamper and characteristics of the patients

	With gut-clamper	*Without gut-clamper*
Number of the cases	30	10
Age range	66-87	65-92
Mean	71.4	70.2
Sex male: female	13:17	5:5
Rate of complete washout	100	60
The number of times using stapler	1.9±1.0	3.4±1.1
Complication	none	leakage (one case)

DISCUSSION

Studies have shown that viable tumor cells exist in the lumen of the colon and rectum. Therefore, it is believed that rectal washout might have value. Nevertheless, no data conclusively demonstrate reduction of local recurrence or anastomotic implantation with rectal washout.[1] There are reported that exfoliated malignant cells have been found in the effluent of resection margins in the rectal stumps and on circular stapling devices.[10-12] In addition, the viability and metastatic potential of exfoliated malignant colorectal cells have been implicated.[11,12] As the evidence for potential anastomotic implantation, with no risk and minimal cost, it might have some utility in the management of rectal cancer, where the proximity of the anastomotic site and the cancer is close. Beside, it might reduce the microbial concentration that is associated to the leakage of anastomotic site.

In laparoscopic surgery, it is sometimes difficult to apply the same technique as the open surgery. After the first laparoscopic colectomy, a lot of laparoscopic surgical innovations for colorectal cancer have been made.[13-17] Nevertheless, there was no established method for perioperative rectal washout before the resection of the rectum in laparoscopic low anterior resection.

Here, we have introduced gut-clamper including, two hard steel stick having belts with flexibility on their one ends, a joint at which the steel sticks are joined, and one through hole made in one of the belts. As the belts with flexibility are made of a soft resin, it can be safely wound around the gut tract like a band.

The gut-clamper clips the gut tract by using the two hard steel sticks by using the joint as a pivot. Different from the case where the gut tract is tightened in a ringed manner with a string or silk thread, this clipping method has the following advantages.

When clipping, the side surfaces of the steel stick clip the gut tract, therefore, the gut tract can be clipped while the width of the gut tract is pressed and widened, so that tearing of the gut due to excessive tightening as in the case of tightening in a ringed manner does not occur.

Different from ringed manner, as it were, this linear manner of clipping using gut-clamper makes possible to reduce the number of times using laparoscopic staplers as shown in our results. As the laparoscopic staplers are easy for the liberalized gut tract, this gut-clamper is very suitable to use in laparoscopic surgery.

Moreover, when tightening the gut tract in a ringed manner, the tightened portion is constricted like a banded bundle. When observing the gut tract from the interior of the gut tract through a scope, it becomes difficult to accurately identify the resection line due to the constricted portion, therefore, extra portions may be resected in the gut tract resection. However, in the case of the gut-clamper, especially in laparoscopic low anterior resection, the gut tract is clipped by the steel sticks and the width of the gut tract is pressed and widened, and the constricted portion is reduced, so that rational resection of the gut tract could be made after the rectal washout.

Distal rectal washout has been recommended to prevent implantation of exfoliated malignant cells in the after anterior resection for rectal cancer.[18] Maeda et al have been reported that the irrigation volume determined the efficacy of rectal washout were 1.5 liters of saline irrigation appears to clear contents from cancer cells in patients with tumors below the peritoneal reflection whereas at least 2 liters is recommended for patients with tumor above the peritoneal reflection. As for laparoscopic low anterior resection, we have used much more volume for irrigation (3 liters of water). Nevertheless, only 60% were completed in the cases underwent colorectal washout without using gut-clamper, but 100% were possible to perform distal rectal washout using gut-clamper. Our data of the reduced rate of complete washout also support the benefit of gut-clamper for the proper sealing the gut tract.

Furthermore, the gut-clamper wherein lengths of the two steel sticks are made different from each other and the position of a hole made in a belt connected to the shorter steel stick, is set to match with the end of the longer steel stick when the two sticks are put together by using the joint as a pivot. This mechanism is easy and safe as well as reasonable physically and economically. This device of gut-clamper enables to shed novel lights on the new standard method for rectal cancer.

REFERENCES

1. Terzi C, Unek T, Sagol O, Yilmaz T, Fuzun M, Sokmen S, Ergor G, Kupelioglu A. Is rectal washout necessary in anterior resection for rectal cancer? A prospective clinical study. World J Surg 2006;30:233-41.
2. Agaba EA. Does rectal washout during anterior resection prevent local tumor recurrence? Dis Colon Rectum 2004; 47:291-6.
3. Sayfan J, Averbuch F, Koltun L, Benyamin N. Effect of rectal stump washout on the presence of free malignant cells in the rectum during anterior resection for rectal cancer. Dis Colon Rectum 2000;43:1710-12.

4. Jung B, Påhlman L, Nyström PO, Nilsson E, Mechanical Bowel Preparation Study Group. Multicentre randomized clinical trial of mechanical bowel preparation in elective colonic resection. Br J Surg 2007;94: 689-95.
5. Burke P, Mealy K, Gillen P, Joyce W, Traynor O, Hyland J. Requirement for bowel preparation in colorectal surgery. Br J Surg 1994;81:580-81.
6. Santos JC, Jr, Batista J, Sirimarco MT, Guimarães AS, Levy CE. Prospective randomized trial of mechanical bowel preparation in patients undergoing elective colorectal surgery. Br J Surg 1994;81:1673-76.
7. Miettinen RP, Laitinen ST, Makela JT, Paakkonen ME. Bowel preparation with oral polyethylene glycol electrolyte solution vs. no preparation in elective open colorectal surgery: prospective, randomized study. Dis Colon Rectum 2000;43: 669-77.
8. Zmora O, Mahajna A, Bar-Zakai B, Rosin D, Hershko D, Shabtai M, Krausz MM, Ayalon A. Colon and rectal surgery without mechanical bowel preparation: randomized prospective trial. Ann Surg 2003;237:363-67.
9. Edwards DP, Sexton R, Heald RJ, Moran BJ. Long-term results show triple stapling facilitates safe low colorectal and coloanal anastomosis and is associated with low rates of local recurrence after anterior resection for rectal cancer. Tech Coloproctol 2007; 11:17-21.
10. Gertsch P, Baer HU, Kraft R, Maddern GJ, Altermatt HJ. Malignant cells are collected on circular staplers. Dis Colon Rectum 1992;35:238-41.
11. Fermor B, Umpleby HC, Lever JV, Symes MO, Williamson RC. Proliferative and metastatic potential of exfoliated colorectal cancer cells. J Natl Cancer Inst 1986;76:347-49.
12. Umpleby HC, Fermor B, Symes MO, Williamson RC. Viability of exfoliated colorectal carcinoma cells. Br J Surg 1984;71: 659-63.
13. Ichihara T, Takada M, Kuroda Y. Lymphadenectomy along the middle colic artery in laparoscopic resection of transverse colon Hepato-Gastroenterol 2004;51:454-56.
14. Ichihara T, Takada M, Kuroda Y. A novel technique of finger-assisted laparoscopic surgery. Am J Surg 2004;187:285-87.
15. Takada M, Ichihara T, Kuroda Y. Comparative study of Electrothermal Bipolar Vessel Sealer and Ultrasonic Coagulating Shears in Laparoscopic Colectomy. Surg Endoscopy 2005;19: 226-28.
16. Takada M, Ichihara T, KurodaY. Identification of hiatal ligament for laparoscopic total mesorectal excision. Hepato-Gastroenterol 2005;52:1722-24.
17. Takada M, Ichihara T, Fukumoto S, KurodaY. Non-clip method using electrothermal bipolar vessel sealer in laparoscopic colectomy. Hepato-Gastroenterol 2006;53:832-34.
18. Maeda K, Maruta M, Hanai T, Sato H, Horibe Y. Irrigation volume determines the efficacy of “rectal washout”. Dis Colon Rectum 2004;47:1706-10.