

Clinical Analysis of Anastomotic Leakage After Laparoscopic Low Anterior Resection for Rectal Carcinoma

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Abstract

Objectives: To evaluate the safety of anastomotic leakage in laparoscopic low anterior resection, and the measures for prevention and treatment of leakage in laparoscopic procedure.

Method: A total of 415 patients with rectal carcinoma who accepted laparoscopic low anterior resection in our hospital were collected in this study.

Results: In 415 cases (90 in early period, 325 in late period), conversion to an open approach was required in 1 case (0.24%). Some protective measures were taken in our study, such as protective stoma, Silica gel pelvic drainage, anal drainage, and *et al.* The overall anastomotic leakage rate was 5.3% (22/415), no significant difference was found between the early and late period, being 5.6% (5/90) and 5.2% (17/325) respectively ($P = 0.885$). In early period 4/5 cases with leakage underwent re-operations for ileostomy or colostomy, while 15/17 cases with leakage in late period were cured under conservative treatments. All the 6 cases underwent laparoscopic re-operation (4 cases had ileostomy or colostomy), and there was no conversion to open procedure among them.

Conclusions: Laparoscopic re-operation is feasible and effective for anastomotic leakages which need surgical intervention, and the protective measures play an active role in reducing the re-operative rate.

Keywords: Laparoscopy; Rectal Cancer; Low Anterior Resection; Anastomotic Leakage

Introduction

Anastomotic leakage is one of the most serious postoperative complications in low anterior resection for rectal carcinoma [1,2]. The morbidity was proved to be similar between the laparoscopic procedures and the open procedures [3]. Once anastomotic leakage occurred, early diagnosis and intervention should be taken, or it might lead to severe clinical problem and even death, with a negative impact on short-term and long-term outcomes [4-6]. Traditional measure to deal with anastomotic leakage is usually open re-operation, which includes replacement of drainage and ileostomy or proximal colostomy. However, it always causes both physiological and psychological hurt to the patients. In order to avoid re-operation, we took some measures in our laparoscopic perioperative period. The present study focuses on the issues: whether the measures play an active role in the reducing the re-operation and whether it is feasible that laparoscopic procedure used in re-operation when surgical intervention is necessary.

Patients and Methods

Patients

From September 2005 to October 2014, a total of 415 rectal carcinoma cases which were performed laparoscopic low anterior resection in our hospital were collected in this study. The procedures were performed by the same surgical team. Those emergency cases because of perforation, obstruction or bleeding, extensive metastasis, ASA [7] IV or V were excluded.

Laparoscopic low anterior resection

All the included cases underwent laparoscopic surgery following the TME (Totally mesorectal excision) principle [8]. A technique using five trocars was applied, and the pneumoperitoneum of 12 - 15 mmHg was performed. It included dissection from median to lateral, ligation of the inferior mesenteric vessels close to its origin, sharp dissection of the rectum and its mesentery in pelvis, keeping the visceral pelvic fascia intact, ensuring the en bloc resection of the mesorectum (not less than 5 cm) and enough distal margin, protection of the incision routinely when taking out the specimen. If it was difficulty in exposing because of the huge mass or narrow pelvis, hand-assisted technique was applied.

Measures applied to deal with anastomotic leakage

Whether was the vessels ligated in the inferior mesenteric vessels or superior rectal vessels, assure the blood supply and free tension of the anastomosis. Separate the mesorectum as clear as possible before using the linear stapler in order to reduce the number of stapler used and trying to keep the cutting on the same plane. Place latex drainage in the presacral space after the operation, and it was pulled out after the first safe defecation. Protective stomas were performed for those who were in high risks of anastomotic leakage. Since July of 2008, some measures had been improved. Protein glue (Shanghai RAAS, Shanghai, China) was used around anastomosis after it was finished. Silica gel drainage was used instead of the latex one, and it was usually pulled out after a week. Once the leakage occurred, this kind of drainage was refit to be one that had both suction and swill. Sometimes anal drainage was placed across the anastomosis to reduce the pressure in the rectum, and protective ileostomy or colostomy was not performed.

Diagnosis of anastomotic leakage

The diagnosis depended mainly on the clinical evidence, which was complains, symptoms, the volume and nature of the drainage. The radiological examination was used when it was necessary.

Treatment of anastomotic leakage

Conservative treatment was applied when the systemic symptom was mild and the infection did not diffuse, which included fasting, local swill and suction, and anti-biotics if necessary.

Re-operation in the early stage of laparoscopic operations (operations from September 2005 to June 2008, early stage for short) was performed for replacement of drainage and ileostomy or proximal colostomy to prevent the diffusion of infection. In the late stage of laparoscopic operations (operations after July 2008, late stage for short), the indication of re-operation changed. Only when the local drainage failed and the infection diffused, the re-operation was performed to swill the abdomen and pelvis directly, replace the drainage and undergo ileostomy or colostomy if necessary, and the stoma would be closed 3 months later. In the laparoscopic re-operation, open technique was used when introducing the first trocar at the original place to prevent injury of the viscera.

Statistical analysis

Statistical analysis was performed using the chi-square test, Student's t-test, Mann-Whitney U test and Wilcoxon test. A P-value less than 0.05 was considered as statistically significant. The analysis was done by SAS 8.0 software.

Results

Patients and primary tumor characteristics

415 cases (male: female = 217: 198) were included in this study. The median age was 66 (range 20 to 85). According to the AJCC staging, 96 (23.1%) were Stage I, 137 (33.0%) were stage II, 171 (41.2%) were stage III, and 11 (2.7%) were Stage IV.

Analyze of complications

Among the 415 laparoscopic low anterior resections, conversion to an open procedure was required in 1 case, and 5 cases were performed under the hand-assisted technique. The average operative time and average hospital stay was 121.0 ± 41.3 minutes, and 15.5 ± 6.7 days respectively.

In the 30 days postoperatively, the common complications were anastomotic bleeding, anastomotic leakage, ileus, incisional infection, pulmonary infection, urinary retention, and etc. The total morbidity was 19.8%, and the morbidity of anastomotic leakage was 5.3% (22/415). No one died of complications postoperatively. In the early stage the leakage occurred in 5/90 (5.6%) cases, while in the late stage it occurred in 17/325 (5.2%) cases, no significant difference was found between the two stages (P = 0.885). As showed in table 1, there was no significant difference in the relative factors, such as sex, age, tumor stage, the distance of the tumor, the blood supply of the anastomosis, whether a protective stoma was performed and the number of the linear stapler used. There was significant difference between the leakage group and non-leakage group in term of BMI (P = 0.049).

	Leakage (n = 22)	Non-leakage (n = 393)	P-value
Sex			0.125
Male	15 (68.2)	202 (51.4)	
Female	7 (31.8)	191 (48.6)	
Age (year, mean ± SD)	66.6 ± 9.8	64.6 ± 11.9	0.383
BMI (kg/m ² , mean ± SD)	27.0 ± 1.3	26.3 ± 1.6	0.049
Tumor stage (TNM)			0.920
I	5 (22.7)	91 (23.2)	
II	8 (36.4)	129 (32.8)	
III	8 (36.4)	163 (41.5)	
IV	1 (4.5)	10 (2.5)	
Operation date			0.885
Early stage	5 (22.7)	85 (21.6)	
Late stage	17 (77.3)	308 (78.4)	
Distance from anal verge			0.149
≤7cm	14 (63.6)	188 (47.8)	
>7cm	8 (36.4)	205 (52.2)	
Blood supply			0.568
Superior rectal vessel	6 (27.3)	78 (19.8)	
Inferior mesenteric vessel	16 (72.7)	315 (80.2)	
Protective stoma (≤ 7cm, n = 202)			0.588
Yes	1 (7.1)	11 (5.9)	
No	13 (92.9)	177 (94.1)	
Number of linear stapler			0.102
≤ 3	10 (45.5)	247 (62.8)	
> 3	12 (54.5)	146 (37.2)	

Table 1: Relative factors of anastomosis, n (%).

The average hospital stay and average expense of those who had anastomotic leakage were markedly higher than that of those who did not have leakage ($P < 0.01$, Table 2).

	Leakage (n = 22)	Non-leakage (n = 393)	P-value
Hospital stay (day)	37.6 ± 9.7	14.2 ± 3.6	< 0.01
Expense (RMB)	47083.8 ± 7875.2	21970.8 ± 4995.6	

Table 2: Compare between leakage and non-leakage (mean ± SD).

Management of anastomotic leakage

Anastomotic leakage occurred in 22 cases of the present study. In the early stage, 4/5 leakage cases underwent laparoscopic re-operation, and the other 1/5 case had already underwent ileostomy in the initial operation. In the late stage, only 2/17 cases had re-operation because the leakage occurred early and infection diffused, while 15/17 cured under conservative treatments. Whether re-operations were performed, the average hospital stay in those who had leakage had no significant difference (39.0 ± 13.3 days vs 37.1 ± 8.5 days, $P = 0.697$). All the re-operations in our study were performed by laparoscopy, in early stage, 3 cases underwent ileostomy and 1 case underwent transverse colostomy. However, stoma was not performed for the two cases in late stage.

Discussion and Conclusions

Rectal carcinoma is usually thought to be intractable because of its location and anatomy. Anastomotic leakage is one of the most feared and serious early complications and may continue to cause a major clinical problem. It is reported that the leakage rate is 6.4% in low anterior resection, and a lot of them have to undergo re-operation [9]. Laparoscopic low anterior resection has been proved to be a safe procedure for rectal carcinoma, while the anastomotic leakage is still a common complication. The cause of leakage is similar as it is in the open procedure, which is related to the distance from the anal verge, the blood supply, the tension of anastomosis, Smoking, metastatic disease and etc [1,10]. The number of linear stapler used in laparoscopic surgery may also have something to do with the leakage, as someone thought that the more liner staplers were used, the higher leakage rate was found [11]. It might because that multiple cuts were difficult to be on the same plane, and led to several “dog ear”, but as there were only very few cases involved, no relevance with the liner stapler was found in the present study. Just as the other study reported [12], we also found that BMI was significantly correlated with an increased anastomotic leakage rate, this might result from the more difficult operation and/or more other co-morbidities such as diabetes mellitus in obese patients, which need further studies. The morbidity of leakage in laparoscopic procedure is also proved to be similar as it is in open procedure. Hua L., *et al.* [3] reported 6.2% in laparoscopic surgery for rectal carcinoma and had no significant difference when compared with the open group. In our study, the morbidity of anastomotic leakage was 5.3%, and the mortality was 0. But the leakage did increase the hospital stay and the expense burdens.

A defunctioning ileostomy or proximal colostomy is often performed as a purpose to prevent the anastomotic leakage in open low anterior resection, and this measure is also used in laparoscopic procedures. However, the stoma does not reduce the leakage rate, but the catastrophic effects of an anastomotic leak such as fecal peritonitis and septicemia [13,14]. In the early stage of our study, we also perform a defunctioning ileostomy or a proximal colostomy for those who had high risks of leakage (such as poor nutrition state, anastomosis below the level of peritoneal reflection and etc), but the re-operation to close the stoma cannot be avoided, which did trouble a lot both for surgeons and patients. So in the late stage, we tried some different measures for prevention: 1) Use protein glue around the anastomosis when it was finished. In this way, adhesion occurred quickly and infection was not easy to diffuse when leakage occurred. 2) Adequate pelvic drainage was valuable both in the diagnosis and treatment in the anastomotic leakage. Silica gel drainage could easily refit to be one which has both swill and suction. 3) Apply anal drainage after operation. The contraction of sphincter ani would increase the pressure in the rectum, and the anal drainage (across the anastomosis) helped in draining the feces so that it would decrease the contamination of the anastomosis. Although these measures mentioned above did not reduce the morbidity of anastomotic leakage significantly, it did has the

potential of reducing the rate of fecal peritonitis, and more cases were cured through conservative treatments, and ileostomy or proximal colostomy was unnecessary for each case.

Once the anastomotic leakage occurred, the adequate local drainage is the first choice if the infection didn't diffuse while re-operation and protective stoma are also alternatives if the infection couldn't be controlled [15]. In the late stage of our study several protective measures were adopted, and they were helpful of controlling the diffusion of the infection, and avoiding re-operation. In this stage 15 of 17 leakage cases were cured without re-operation, and the other two had laparoscopic re-operation without a stoma. The advantage of avoiding the nursing of the stoma and the re-operation for closing the stoma was obvious. But if the diffusion of infection is failed to be controlled and diffuse peritonitis develops after active conservative treatments, do not hesitate to re-operate the patients or you may miss the right operation opportunity.

The classical method in the re-operation of leakage is the swill of the infection lesion, replacement of drainage and ileostomy or proximal colostomy. As the idea of minimally invasive surgery introduced, it is worth discussing whether the re-operation can be done under laparoscopy and whether it would reduce the hurt to the patient. It was thought that the adhesion after the initial operation and the dilated intestines because of intestinal paralysis would make great trouble for laparoscopic re-operation in creating the operative space. Whereas according to our experience, the adhesion is mild after the initial laparoscopic operation, without trouble at all as long as the right time is chose. Sekimoto, *et al.* also said that the bowels were not distended and view was good if the reoperation was performed by laparoscopy timely [16]. In our study, no conversion to an open procedure was required in all 6 cases which had laparoscopic re-operation. In the laparoscopic re-operation, we can explore the abdomen and pelvis all around directly, swill the infection lesion, replace adequate drainage and choose the right position for the stoma if it is necessary, which could not only promote the cure of leakage effectively but also prevent the great hurt to the patient from the open re-operation.

Above all, anastomotic leakage is also one of the most common complications in laparoscopic low anterior resection. The protective measures adapted in laparoscopic low anterior resection plays an active role in prevention of anastomosis, treatment of leakage, and reducing the re-operation rate. Laparoscopic re-operation is a feasible and effective procedure for leakages which need surgical intervention.

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Conflict of Interest

None.

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