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ORIGINAL ARTICLE

Investigation of treatment methods in obstructive colorectal cancer

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Summary

Purpose: *The aim of this study was to explore the treatment strategies for patients with obstructive colorectal cancer at different sites.*

Methods: *Treatment strategies were adopted according to the location of colorectal cancer and the condition of the patients when they were admitted to the hospital. Among a total of 134 patients, 29 patients were subjected to stent placement to relieve the obstruction before undergoing colorectal resection, 15 patients underwent per anum ileus catheterization to alleviate the symptoms of obstruction and waited for removal of the tumor within a limited time; 39 underwent intraoperative colonic lavage and colon resection with anastomosis and the remaining 51 patients were subjected to emergency surgery due to strangulation of the bowel, perforation, septic shock or other conditions before surgery.*

Results: *Stent placement was successfully performed on 23 patients, with a success rate of 79%. Ninety-five of 134 patients (71%) had stage I anastomosis and only one case had anastomotic fistula. Infection of incision happened in 9 (7%) cases and 2 (1.5%) patients died of infection.*

Conclusions: *Individualized treatment for patients with obstructive colorectal cancer can lead to tumor resection and stage I anastomosis, thereby avoiding the suffering of second-stage surgery or colostomy.*

Key words: *colorectal cancer, intestinal obstruction, stage I anastomosis, tumor resection*

Introduction

Colorectal cancer is a common tumor. The initial symptom in some patients is acute intestinal obstruction with indications for urgent operation [1,2]. However, such patients often present fluid and electrolyte imbalance and are in very poor condition to tolerate a clean preparation. In such situations, performing emergency surgery would almost always lead to a higher rate of complications, such as anastomotic fistula, abdominal cavity infection and so on [3]. Nevertheless, many authors still try to perform stage I resection and anastomosis for left hemicolon obstruction [4,5]. It is reported that stent placement can not only relieve the tumor obstruction but also buy sufficient time for intestinal preparation [6-9], so that the patient can receive tumor resection and anastomosis when his condition improves. However, stent placement is not suitable for all of the intestinal obstructions with different locations in the colon. Per anum ileus catheterization can also temporarily relieve part of intestinal obstruction and buy time for preoperative preparation, but it is not as effective as stent placement. Moreover, it affects the patients' ability to move. For patients in whom intestinal preparation is not possible, intraoperative colonic lavage may offer a chance

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to perform stage I resection and anastomosis and gain more operation time. However, all of the above methods have their own limitations. Thus, it has become a consensus that tumor resection and stage I anastomosis is used for the treatment of intestinal obstruction caused by right hemicolon cancer, while its application for the treatment of intestinal obstruction caused by left hemicolorectal cancer is still controversial [10]. To proceed to individualized treatment according to the location of the tumor and the patients' condition on admission is the key to enhance the therapeutic outcomes.

This study was conducted to explore how to develop individualized treatment strategies for patients with colorectal cancer and intestinal obstruction according to the anatomic, pathologic and clinical manifestations and the patient's own characteristics, so as to obtain the best therapeutic results. We treated 134 obstructive colorectal cancer patients with individualized treatment strategies from September 2008 to August 2013 and the results are reported herein.

Methods

General data

A total of 134 patients including 75 males and 59 females, aged from 29 to 82 years (mean 62.8) were enrolled in this study. All patients were admitted to hospital for colorectal cancer with obstruction, among which there were 27 (20%) cases of ascending colon cancer, 24 (18%) cases of transverse colon cancer, 38 (28%) cases of descending colon cancer, 16 (12%) cases of sigmoid cancer and 29 (22%) cases of rectal cancer. In 28 (21%) patients the disease was complicated with intestinal necrosis and perforation. According to the location of the tumor and the patients' condition on admission, the patients were divided into four groups: stent placement group (N=29), ileus catheterization group (N=15), colonic lavage group (N=39) and emergency surgery group (N=51). This study was conducted in accordance with the declaration of Helsinki and after approval from the Ethics Committee of Fujian Medical University. Written informed consent was obtained from all participants.

Stent placement

For the patients with stable vital signs and without intestinal strangulation or perforation after their admission, stent placement via colonoscopy was performed. As the colonoscopy reached the lesions' site, a hard spring-guidewire was inserted through the narrow segment of the tumor, and then a pusher assembled with metal stents was slowly placed into the lesions along the wire. After the stent was slowly released at a suitable position and fully expanded, the pusher and wire were withdrawn. The patency of the stent could be monitored by endoscopic observation. If the placement was successful, excrement eduction could be observed. After the intestinal obstruction was relieved, patients could receive selective operation (Figure 1).

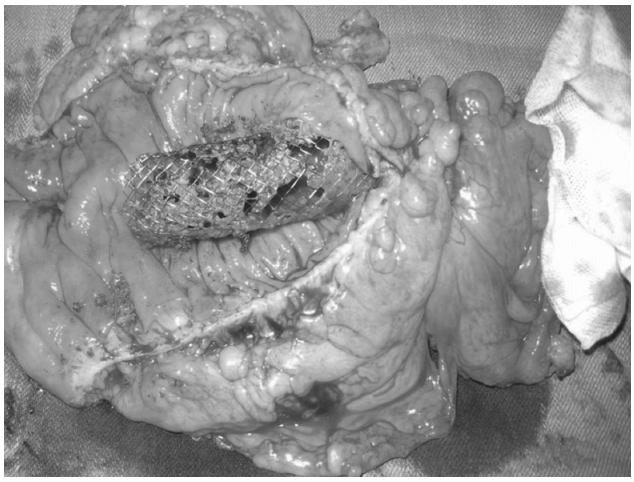

Figure 1. Stent placement in the narrow part of the tumor.

Ileus catheterization

Patients with middle-low rectal cancer and obstruction could not tolerate stent placement due to the difficulty in placement and the great anal irritation. Thus, for such patients, per anum ileus catheterization and continual colonic lavage might be used for decompression. After that, patients could undergo surgery in a limited time. With the guidance of anoscope, guidewire was inserted into the narrow part of the tumor, which was then expanded by an expansion detector along the guidewire. Subsequently, an anal intestinal obstruction catheter with a saccule at the anterior extremity (CREATE, Japan) was inserted to the proximal end of the obstruction per anum. The saccule was filled with 30-50 ml distilled water and connected to a Y joint. After catheterization, 300-500 ml of normal saline were injected through the catheter to soften the excrement for 20-30 min and then discarded. After rinsed repeatedly for several times until the rinse solution was clear, patients could be subjected to surgery after relief of the obstruction (Figure 2).

Intraoperative colonic lavage

Intraoperative colonic lavage and subsequent colon resection and stage I anastomosis was carried out directly in patients who failed or refused to have stent placement performed. After separation of the colon and mesenterium for resection, lymph node dissection was performed formally. After the distal side of the tumor was resected, the colon tissue including the tumor was set into a sterile plastic sleeve (cavity mirror wire sets) by opening an incision at the proximal side of the tu-

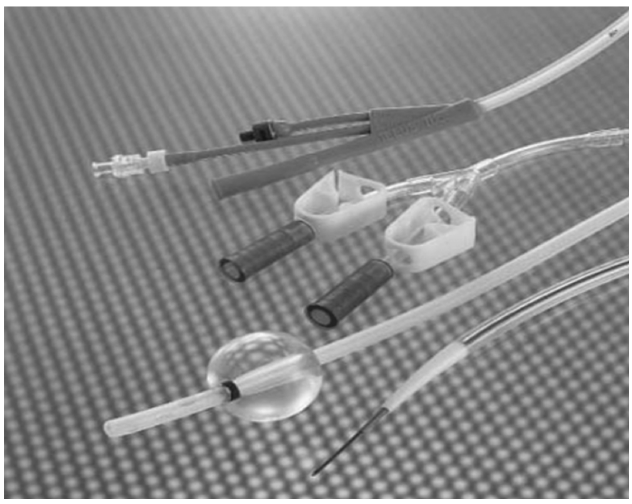

Figure 2. Catheters for per anum ileus catheterization.

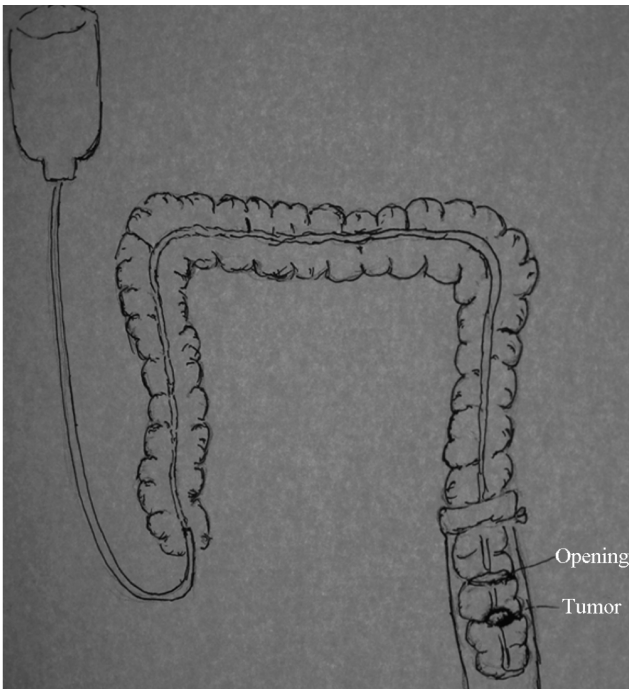

Figure 3. Intraoperative colonic lavage scheme.

mor, so as to pull the tumor out of the peritoneal cavity. Then the appendix was resected and a catheter was inserted into the appendiceal stump. Two to three liters of normal saline were injected into the colon through the catheter until the remote water flew out, followed by colonic lavage with diluted iodophor. During colonic lavage, the colon was compressed by hands to help discard the lavage solution and intestinal contents. After colonic lavage, colon tissue including the tumor was resected and stage I anastomosis was performed according to standard procedures (Figure 3).

Emergency surgery

In some cases, such as strangulation of bowel or preoperative perforation, large tumor metastases, or poor patient's general condition during colonic lavage, operation had to be carried out immediately. According to the lesions, pure colostomy or colon cancer resection combined with colostomy were performed. If the tumor was in the right hemicolon, tumor resection and stage I anastomosis could be used when the patient's general condition turned better.

Results

Stent placement and complications

Twenty-three of 29 (79.3%) patients had successful stent placement, including 18 (62%) cases with palliation of obstruction (62%) and 5 cases without. Stent placement failed in 6 (20.6%) patients. In addition, stent placement resulted in intestinal perforation in one case.

Effective rate of per anum ileus catheterization

Fifteen patients had per anum ileus catheterization performed, among which 11 (73%) cases with symptom relief and 3 (20%) cases without. One patient (7.0%) failed to get ileus catheterization.

Tumor resection and stage I anastomosis

Among the total 134 patients enrolled in this study, 95 (71%) underwent tumor resection and stage I anastomosis, 25 (19%) underwent tumor resection and colostomy and 14 (11%) were subjected to palliative colostomy.

Complications

Anastomotic fistula happened in one case (in the colonic lavage group) and was healed by conservative treatment such as continuous abdominal double pipe flushing. Incision infection happened in 9 cases, including 6 cases in the emergency surgery group, 2 cases in the colonic lavage group and 1 case in the intestinal obstruction catheterization group.

Prognosis

One patient died of postoperative abdominal infection and another one of severe postoperative pulmonary infection. Both of them were with obstructive colon cancer combined with colon perforation, belonging to the emergency surgery group (Table 1).

Table 1. The therapeutic effect of the different treatment strategies

Parameters	*Stent placement (N=29) N (%)*	*Ileus catheterization (N=15) N (%)*	*Colonic lavage (N=39) N (%)*	*Emergency surgery (N=51) N (%)*
Stage I anastomosis	28 (96.5)	15 (100)	37 (94.8)	15 (29.4)
Colostomy	-	-	2 (5.1)	37 (72.5)
Incision infection		1 (6.6)	2 (5.1)	6 (11.7)
Anastomotic fistula	-	-	1 (2.5)	-
Dead	-	-	-	2 (3.9)

Discussion

Intestinal obstruction occurs often in patients with advanced colorectal cancer, and 15-20% of the patients have acute intestinal obstruction as initial disease manifestation [1,2]. Thus, for patients with low intestinal obstruction, it should be determined whether a tumor is the reason of the obstruction. Generally, it can be identified from clinical manifestations, physical examination and complementary examinations. Among them, ultrasonography is more sensitive than X-ray exams for early detection of intestinal obstruction, but it is difficult to identify the cause and position of the obstruction due to gas interference. CT has an obvious advantage in the diagnosis of intestinal obstruction, and can identify the location of the obstruction according to the expansive image of the intestinal canal. The locations of most colon obstructions can be identified clearly with CT scan, which are often shown as thickening and narrow intestinal canal at the tumor site. Combining with X-ray barium enema with CT, colon obstructions can be diagnosed clearly.

Traditionally, the treatments of patients with obstructive colon cancer are emergency surgery, exploratory laparotomy and colostomy. However, the risk of emergency operation is significantly higher than selective operation, and colostomy brings more psychological burden to patients and reduces their quality of life. Thus, in recent years, many other methods are used for the treatment of obstructive colon cancer, such as stent placement, intraoperative lavage and ileus catheterization, so that the patient can be subjected to stage I surgery [11]. However, each method has its limitations, thus no single method can resolve all of the problems. In this regard, it is an important and critical issue to proceed to a treatment strategy for obstructive colorectal cancer according to the location of the tumors, so that most of the patients could have a resection and stage I anastomosis.

First of all, our purpose for the patients with obstructive colorectal cancer, was to change emergency surgery into selective operation as much as possible. For the patient with stable vital signs and no intestinal strangulation and perforation, we prefer stent placement under colonoscopy. After intestinal obstruction is solved, patients can undergo selective colorectal cancer surgery. Previous studies have shown this treatment strategy can achieve good results [12]. In this study, most patients (18/23) became unobstructed after stent placement and then were subjected to radical cancer resection after routine preoperative bowel preparation. For some old patients with poor general condition, stent placement is a more appropriate method of palliative care to relieve the obstruction because they cannot tolerate surgery. In addition, a new drug-eluting stent that can control the release of gemcitabine and other drugs has been studied, which may become a new choice for the treatment of malignant obstruction [13]. Previously, stent placement was performed under the guidance of X-ray exam. But with the advancement of technology, it can now be performed under the guidance of colonoscopy, making the operation more convenient. In addition, this way X-ray irradiation can be avoided for the medical staff and patients. In this study, the success rate of stent placement was 79.3%, which was lower than that in previous reports [14]. It was mainly due to tumor obstruction located in the right hemicolon, especially near the ileocecal junction, with longer route and more bending, which makes stent placement more difficult. Some tumor obstructions are very serious through which the guidewire is difficult to pass, leading to failure of stent placement. Meanwhile, certain complications may occur while attempting stent placement [15]. For some patients, although stent placement is performed successfully, the obstruction is still unrelieved because of blockage from the fecal mass at the superior segment or the unsatisfactory opening of the stent. In such a case, emergency surgery has to be carried out. In addition, stent placement is too expensive for some patients, so they prefer to have an operation performed for economic reasons. For

patients with low rectal cancer obstruction, because of inability to perform colonoscopy due to the proximity to the anus, per anum ileus catheterization was applied to lavage the rectum for alleviating the symptoms of intestinal obstruction so that operation could be carried out in a limited time. However, per anum ileus catheterization is not suitable for patients with high-located rectal cancer or colon cancer obstruction because the procedure should be performed under X-ray guidance, which may be harmful to the operators and patients. Ileus tube is inserted per anum, demanding the patient staying in bed for continuous lavage, which will cause more discomfort. In addition, since per anum ileus catheterization can not relieve the intestinal obstruction as well as stent placement, for patients with high-located rectal cancer or colon cancer obstruction, stent placement under colonoscopy is more suitable.

For patients whose stent placement failed or who refused stent placement, intraoperative colonic lavage can be performed if the general condition of the patients is not too bad. After colonic feces are cleaned up, resection and stage I anastomosis can be performed. To prevent abdominal contamination and infection of the incision, the tumor should not be resected before lavage but be packaged into a sterile plastic bag. Part of the colon should be also packaged, so that the lavage solution does not back-flow or overflow during lavage. Closed colonic lavage was undertaken in this study, which may clean feces completely and avoid contamination, resulting in low incidence rate of anastomotic fistula (1/29) and infection of incision (1/29), and almost achieving the effect of elective surgical procedures.

Generally, intraoperative colonic lavage takes 20-40 min. For patients with poor general condition and unstable vital signs, saving their life is the primary task. The treatment strategy is to relieve intestinal obstruction first, followed by tumor resection and colostomy or simple colostomy.

In conclusion, the treatment strategies for patients with obstructive colorectal cancer should be developed according to the specific conditions of the patients, so that most patients can be subjected timely to the removal of lesions and have stage I anastomosis. The incidence rates of infection of incision and anastomotic fistula do not increase compared to selective operation [16-20]. The treatment strategies adopted in this study prevented many physical and psychological problems caused by colostomy and thus improved the patient's quality of life.

Acknowledgement

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