Reoperation for Recurrent Colorectal Cancer

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ABSTRACT

Recurrence of colorectal carcinoma represents a significant challenge. As the majority of recurrences involve more than just the anastomosis, surgical resection is ordinarily a major undertaking. Curative resection may require resection of other organs and structures, resulting in complex reconstructive procedures and substantial morbidity. In addition, carefully selected patients with distant metastases to sites such as the liver and lungs may also undergo potentially curative resection. Long-term survival following curative surgery for recurrence, however, ranges from only 15 to 40%. In addition to resection for curative intent, some patients may benefit from palliative procedures designed to relieve symptoms. Surgery alone is not usually sufficient therapy in these patients. Chemotherapy and radiation therapy play a vital adjunctive role in the management of recurrent disease. This article strives to review the risk factors and patterns of recurrence, selection of individuals for resection of recurrent disease, and outcomes of surgical procedures.

KEYWORDS: Colorectal neoplasm, recurrence, surgery, metastatic

Objectives: Upon completion of this article, the reader should be able to summarize the risk factors for and patterns of recurrence in colon and rectal cancer and summarize the indications, procedures, and outcomes for surgery of recurrent colorectal cancer.

The diagnosis and treatment of recurrent colorectal cancer are among the greatest challenges for the colon and rectal specialist. The aim of this article is to review the natural history of this disease and to offer a systematic approach for the surgical management of recurrent colon and rectal cancer. The definition of locally or regionally recurrent disease is recurrence after a curative resection in the anastomosis, tumor bed, mesentery, draining lymphatics, surgical scar, or port sites.¹ Distant metastasis is the spread of the disease outside the surgical field to organs such as the liver, lungs, bones, or brain.

The reported incidence of recurrent disease after a primary curative resection ranges from 20 to 30%.¹⁻³ Recurrence rates by stage have been reported in the literature anywhere between 0% to 13% for stage 1,

11% to 61% for stage 2, and 32% to 88% for stage 3.⁴ These recurrence rates might be on the higher side because we do not perform routine second-look laparotomy, many of these recurrences are asymptomatic, and finally we do not perform routine autopsies. Eighty percent of recurrences occur within the first 2 years, with a median interval of 16 to 22 months from the index resection.⁵

PATTERNS OF RECURRENCES

Because of the confined space of the human pelvis, there is a higher incidence of local and regional recurrence for rectal cancer than for colon cancer. Although wide margins can be readily obtained for colon resections without sacrificing important structures, it is markedly

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more difficult to do so during rectal resections.⁶ The location of the primary tumor, therefore, has much to do with the patterns of recurrence. Rectal tumors tend to present with more locoregional failures, whereas colonic lesions tend to recur at distant sites.⁷ Colonic recurrences tend to manifest themselves in locations such as the retroperitoneum, peritoneum, and other organs.⁸ It is from these observations that we base our adjuvant chemotherapeutic approaches to colon cancer. Systemic chemotherapy is aimed at the systemic disease; in the case of rectal cancer, radiation is added to improve locoregional control. It is well recognized that the primary sites of metastatic disease of colon cancer are the liver and lung, but metastatic disease is not limited to these locations.⁹ The presence of anastomotic site recurrence often indicates³ coexistent systemic disease.¹⁰ Its presence should prompt a thorough evaluation of the patient. If no disseminated disease is found, the patient should be a candidate for reexcision.

It has been reported in the literature that patients presenting with obstruction as their initial symptom or with perforated tumors have an incidence of recurrence of 42% and 44%, respectively.¹¹ In a study by Obrand and Gordon, the overall recurrence rate was 27.9%, the anastomotic recurrence rate was 11.7%, and the distant metastasis rate was 14.4%.¹² The average time for recurrence was 21.3 months. Although the average time for recurrences is 2 years, the aggressiveness of the tumor may shorten this interval. Very aggressive tumors can recur within 6 months to a year.⁵

PREDICTIVE FACTORS FOR RECURRENCE

There are several theories to explain malignant recurrences: unrecognized metastasis to the lymphatic channels, shedding of cells from the primary lesion, positive margins, and mishandling of tumor during initial resection.¹³ These theories only partially explain recurrences, and until we have a better understanding, several of these predictive factors should be considered when evaluating an individual's risk of recurrence.

The site of the primary lesion is a very important factor. Rectal lesions have a higher tendency for recurrence than colonic lesions. Likewise, the lower the lesion in the rectum, the higher the incidence of locoregional recurrence. Stage is another important factor in predicting recurrence. It has been found that the locoregional failure increases as the stage of the disease increases.¹⁴ Invasion into other organs and perforation of the bowel due to cancer are also strongly associated with locoregional failure.¹⁵

Patient and tumor factors also need to be assessed. Younger patients tend to have a higher incidence of recurrence. One explanation is that for a tumor to manifest itself at an earlier age, it has to be more aggressive and have shorter mitotic times and there

must be a genetic predisposition. On the other hand, one can argue that the recurrence rates would be similar if the older population could be observed for a longer period of time.¹⁶

It is well documented in the literature that the recurrence rate increases with the stage of the primary disease. Transmural involvement of the bowel and positive nodes increase the failure rate of curative resections. Likewise, histology, grade, and size of the tumors are also important variables. Tumors with more aggressive histology and poor differentiation tend to recur more often.¹⁴ Tumors greater than 4 cm in size have also been associated with higher recurrence rates.¹⁶ All of these factors become relevant as we attempt to establish which patients are at risk and tailor our monitoring systems and follow-up regimens to identify these recurrences early at a potentially curative stage.

FOLLOW-UP AND EVALUATION FOR RECURRENCE

There is controversy about the follow-up after colon and rectal cancer surgery. Those who argue against close surveillance believe it offers little if any benefit in increasing survival¹⁷; those who favor it advocate for early recognition and possible cure of recurrences. The literature indicates that close surveillance may increase overall survival, although these practices may not prove to be cost effective.¹⁸ A thorough history and physical examination, including digital rectal examination and endoscopy, provides a good option for surveillance. Despite the emergence of computed tomography (CT), positron emission tomography (PET), and magnetic resonance imaging (MRI) scans, the symptoms of pain, constipation, and bleeding are the best predictors of signs of recurrence.¹⁹

Laboratory studies have proved for the most part to be unreliable. Although it has been reported in the literature that increases in liver function tests or alkaline phosphatase are indicators of metastatic liver involvement, there can be significant involvement of the liver without any derangement in laboratory values. Fecal occult blood testing, although inexpensive, can be very misleading. Most tumors bleed sporadically, and most of the recurrences are extraluminal and therefore do not bleed into the bowel lumen.²⁰ Carcinoembryonic antigen (CEA) is the best available marker for colorectal cancer recurrence. An increase in the CEA levels should prompt suspicion of recurrent disease. However, up to 30% of recurrences are serum CEA negative. CEA levels can also be elevated in a variety of benign and malignant disorders as well as in individuals who smoke and consume alcoholic beverages.^{21,22}

The role of colonoscopy in detecting recurrences is limited, as the majority are extraluminal.¹³ However, colonoscopic follow-up is important for identifying

metachronous lesions. In addition, preoperative clearance of the entire colon is imperative to rule out any synchronous lesions.²³ CT scan is the best modality to assess for recurrence. Although it cannot identify mucosal lesions as well as endoscopy or contrast studies, CT scan can assess the entire bowel wall and contiguous organs. It can also identify lesions in the lungs and liver, peritoneal implants, and lymphadenopathy. It should be noted, however, that normal postoperative changes, infection, or hematomas can be confused with recurrent disease.²⁴ MRI has not been used widely for the identification of recurrent disease but has proved useful in the delineation of hepatic lesions. Because of the enhanced metabolic function of malignant cells, PET scans can be useful to distinguish malignant lesions from normal postoperative changes.²⁵ Current literature shows a trend toward using PET scans to plan for possible curative resections of recurrent colorectal cancers.^{24,25}

SURGERY FOR RECURRENCE

The goal of surgery for recurrent disease is to remove the bulk of the tumor with clear margins when possible, to be synergistic with the adjuvant modalities, and to palliate in the event of incurable disease. It can be very difficult to obtain clear margins in the reoperative field, and to do so, one might embark on very radical surgery. It is at this time when the surgeon should weigh the risks and benefits and individualize each patient's treatment. Common indications for surgery of recurrent disease include obstruction, bleeding, and perforation. These are clear and obvious indications. There is no controversy in the management of these complications. It becomes more difficult when more subtle signs such as a rising CEA level, a positive PET scan, or a small lesion on a CT scan appear in an asymptomatic patient.

All patients should have a CT scan of the chest, abdomen, and pelvis to rule out any distant disease or local involvement preventing resection. CT scan— or ultrasound-guided biopsies can confirm a diagnosis. PET scans are now routinely used to complement CT scans or in cases in which CT-guided biopsies have not been helpful or are impossible.^{24,25} At our institution we use a combination of CEA levels; endoscopy; CT scan of chest, abdomen, and pelvis; and PET scan in the evaluation of patients with suspected recurrence. When bone, neural, or vascular involvement is in question, MRI is often useful.

As with any other surgical procedure, the patient has to be informed of all the risks, benefits, and expectations of the procedure. Patients should be bowel prepared because of the complexity of reoperative procedures and the high chance of accidental enterotomies in a potentially hostile abdomen. Films or any images should be present in the operating room at the time of surgery. The surgery is planned depending on the

site of the recurrence and the nature of the primary procedure. Although laparoscopic approaches can be attempted, we recommend an open procedure with a generous midline incision that can give the surgeon good exposure to examine the whole abdominal viscera. Examination of the liver by palpation and ultrasound, if available at the time of surgery, is of utmost importance. In the event of a tumor invading into or near the ureters, ureteral stent placement is recommended. Studies have shown that although stents may not prevent injury, they allow early recognition and prompt repair.²⁶

Strict surgical oncologic principles should be applied when treating recurrences. Gentle treatment of the tissues, minimal handling of the tumor, meticulous hemostasis, and wound protection are all necessary. Wounds from previous surgeries and stomas should be inspected for any abnormalities, and frozen sections should be obtained of all questionable areas. It is of utmost importance that all resections are done en bloc.²⁷ The lesions are to be resected with all contiguous organs that might be involved in the process. Resection may encompass other segments of bowel, abdominal wall, and solid organs such as pancreas, spleen, liver, and urological and gynecological structures.

SURGERY FOR RECURRENT COLON CANCER

Surgery for recurrent disease has been reported in the literature to have a 5-year survival of up to 30%.^{28,29} When recurrences are identified early, curative surgery can be performed with good results and offers the best possibility of survival.³⁰ The patient's health status needs to be assessed before embarking on any of these procedures. Invasion into other organs or nearby structures is not a contraindication for reexcision. Abdominal wall invasions can be resected and the defects easily repaired with the use of synthetic materials or myocutaneous flaps.³¹ Each patient must be treated individually. The extent of surgery depends on the health of the individual. Anastomotic recurrences should be addressed by reexcision of the anastomosis with 5-cm clear margins if possible. In the presence of disseminated disease, symptomatic anastomotic recurrences may be resected with limited mesenteric dissection to offer palliation. Isolated recurrences of the colon should be addressed depending on the site of the primary lesions. Segmental colectomy and completion colectomy are acceptable options in these situations. Blood supply to the remaining bowel should always be assessed in planning these subsequent resections. Sigmoid or upper rectal recurrences can also be managed by repeated resection with anastomosis or end stoma. Patients with unresectable pelvic lesions or widely disseminated disease with impending obstruction may benefit from a palliative stoma. Locally advanced disease can be treated with a combination of surgery and

intraoperative radiotherapy (IORT) to obtain better local control.

SPECIAL CONSIDERATIONS

Obstruction in the setting of recurrent disease should be addressed in the same way as primary obstruction without a history of malignancy. Up to 40% of patients with a history of malignancy have another cause for their obstruction.³² Obstruction related to recurrent disease carries a poor prognosis.^{11,15} Obstructions from malignancy tend to be long standing, with resulting dilated, edematous, and atonic proximal bowel. In these situations, patients might be better served with resection of the recurrent lesion, if feasible, with a proximal end stoma and Hartmann pouch or mucous fistula. At the time of laparotomy, if the bowel appears healthy and there is no fecal contamination of the peritoneal cavity, the surgeon may opt to resect the lesion and perform a primary anastomosis with or without a protecting proximal ostomy. In cases of advanced disease or carcinomatosis with unresectability, bypass or endoluminal stenting of the area of obstruction can be performed. Patients with inaccessible abdomens related to disseminated disease can also benefit from percutaneous gastrostomies to avoid laparotomy, relieve the nausea and vomiting, and provide an access for providing nutritional support. Nasogastric decompression should always be part of the management of these obstructing lesions.

Ureteral obstruction with resultant hydronephrosis has been previously documented in the literature to carry a poor prognosis, and some consider it a contraindication for surgery. Recent studies have shown that ureteral obstruction does not affect the overall survival of patients, recurrence rate, or local control of the disease after curative resections for recurrence.^{33,34} Nephrostomy tubes can be used to relieve the obstruction, but they are associated with high morbidity and leave the patients with poor quality of life. Urinary stents can be used as a first line for urinary diversion. Surgery for recurrence that involves the ureters should be planned with the assistance of a urological specialist. Any lesion involving the ureter should be resected along with the ureter segment en bloc to obtain clear margins. Depending on the location of the lesion, a partial cystectomy, total cystectomy, or nephrectomy might be indicated.⁸ Retroperitoneal tissue planes and fat need to be dissected free of tumor in these procedures.

SURGERY FOR RECURRENT RECTAL CANCER

Locoregionally recurrent rectal cancer presents a particularly vexing problem for the colon and rectal surgeon. Location within the confines of the bony pelvis and

Table 1 Recurrent Rectal Cancer Staging³⁵

T Stage	Depth of Invasion
Tr1	Submucosa or limited muscularis
Tr2	Subserosal penetration
Tr3	Full thickness into perirectal tissues
Tr4	Invasion of adjacent organs
Tr5	Pelvic bone or ligamentous invasion

proximity to vital structures and other organs limit the surgeon's ability to obtain clear margins.³⁵ In addition, most often extended resections of other organs and permanent fecal diversion are required. Although recurrence may appear as visible tumor at an anastomosis upon endoscopic evaluation, this usually represents a limited portion of the disease. Most recurrences are primarily extramural in nature, extending into the lumen later on in their growth process.¹³ An exception to this may be in the patient who has undergone local therapy for an early-stage rectal cancer. In this scenario, a limited suture line recurrence may be expected in which 80% may be cured with further surgery.

Authors have attempted to categorize patterns of recurrence based on location and depth of invasion of the neorectum. A central recurrence is one that solely involves the neorectum. This may be anastomotic or suture line. It may even represent a perineal recurrence following abdominoperineal resection. In addition to the neorectum, an anterior recurrence involves the uterus, cervix, or vagina in the female; in the male, this pattern involves the bladder, seminal vesicles, prostate, or urethra. A posterior recurrence involves the sacrum. Lateral recurrence is the most difficult as it involves neurovascular and bony structures of the lateral pelvic side walls. Finally, combined patterns are possible and actually more the norm.^{36,37}

A staging system, based on the standard T staging of primary rectal cancer, has also been described (Table 1).³⁸ Further classification schemes have utilized a combination of fixation to adjacent structures and symptoms. Suzuki et al described four potential sites of fixation: anterior, sacrococcygeal, left lateral, and right lateral.³⁹ Table 2 depicts their classification scheme. Further studies have shown that outcome is not necessarily related to the degree of fixation but is more closely

Table 2 Suzuki Staging Classification³⁶

Degree of Fixation		Symptoms	
F0	Intraluminal	S0	No symptoms
F1	One site	S1	Symptoms without pain
F2	Two or more sites	S2	Symptoms with pain

related to the presence of symptoms. Pain associated with other symptoms carried the worst prognosis.³⁹

Selection of patients for surgical therapy requires extensive evaluation to ensure that exploration is being performed to render a patient disease free. As surgery carries substantial morbidity, it should be offered only to those who will benefit. Only 25% of patients are candidates for resection of locoregional recurrence.⁴⁰ Traditionally, surgical resection is contraindicated in those with irresectable distant metastases or lateral pelvic side wall involvement, compression or infiltration of the iliac vessels, lower extremity edema, hydronephrosis, sciatic nerve or sacral involvement above S2, peritoneal carcinomatosis, and prohibitive comorbid conditions.

Surgical therapy of recurrent rectal carcinoma involves radical en bloc resection of the malignancy with all involved surrounding structures.⁴¹ The goal is to obtain disease-free margins. This often necessitates exenterative procedures, with creation of stomas for urine and stool.⁴² In addition, major reconstructive procedures with muscular or myocutaneous flaps are often required.⁴³ Therefore, these procedures often require a team of surgeons including colorectal, urological, orthopedic, neurological, and plastic surgical experts. These radical resections are further technically complicated by distortion of anatomical tissue planes from prior surgery and possibly radiation therapy. Depending on the site and extent of recurrence, anal sphincter preservation may indeed still be possible.

One thing that has become clear is that surgery alone is usually not adequate therapy. To diminish further recurrence, aggressive combined modality therapy needs to be employed. If not previously performed, external beam radiotherapy (EBRT) should be employed. IORT should also be employed if available to all areas of localized residual disease or close margins.^{37,44,45} If IORT is not available, interstitial or brachytherapy is a viable alternative.⁴⁶

Pelvic exenteration as sole therapy for recurrent rectal cancer carries a median survival of 21 to 30 months. Five-year overall survival and disease-free survival range from 9 to 50% and 0 to 25 months. Although mortality is relatively low (0 to 10%), morbidity can be substantial (10 to 87%). This results in a lengthy hospital stay ranging from 30 to 60 days. The rate of eventual local recurrence ranges from 18 to 70% and occurrence of distant metastatic disease from 40 to 60%.⁴⁷ Only in the patients in whom complete resection is obtained, with negative margins, can long-term survival be expected. Leaving behind positive margins, whether grossly or microscopically involved, carries absolutely no advantage over no therapy at all.^{13,14}

As in primary rectal carcinoma, multimodal therapy has been shown to increase resectability rates, improve the rate of obtaining disease-free margins, and increase overall survival. Combined modality therapy

results in local control rates in the range of 30 to 85%. Five-year overall survival rates are between 12 and 64%.⁴⁶ Studies involving high-dose preoperative radiation therapy have revealed a complete clinical response rate of 2 to 9% and pathological downstaging in 30 to 65%.⁴⁸ However, morbidity is substantially increased in patients undergoing combined modality therapy. This is particularly true in those treated with a combination of EBRT and IORT. Overall morbidity in this group ranges from 30 to 80%. The most significant morbidity is a high rate of peripheral nerve injury (16 to 33%), ureteral stenosis (as high as 44%), and wound complications (8 to 24%). Other complications particular to this form of therapy include sacral osteoradionecrosis and increased rates of small bowel obstruction.⁴⁹

One study compared EBRT alone (group 1) with EBRT and surgery (group 2) and EBRT, surgery, and IORT (group 3). Results of this study showed no difference in overall survival (OS), disease-free survival (DFS), or local control rate (LCR) between groups 1 and 2. All were less than 15%. However, the addition of IORT in group 3 resulted in substantial increases in OS (60%), DFS (43%), and LCR (73%) at 3 years. This difference was substantial not only in those with pathologically negative margins but also in those with positive margins. Whereas OS and LCR rates were 0% in group 2 at 3 years, in group 3 they were 52% and 45%, respectively.⁴⁹

Finally, in those who are not candidates for an attempted curative radical surgical procedure, palliative procedures may offer some benefit. Reports have indicated a short-term benefit for minimally invasive procedures such as fulguration, laser ablation, cryotherapy, and radiofrequency ablation.⁵⁰ Intraluminal stenting may also be employed.⁵¹ In addition, a diverting stoma may provide significant long-term palliation for these patients as their locoregional disease progresses. Pain control in these patients is also essential and often requires the assistance of a pain management specialist. In addition to anti-inflammatory agents and narcotics, intrathecal injection of various agents and neurosurgical procedures such as cordotomy and rhizotomy may be effective.

SURGERY FOR METASTATIC DISEASE

Liver Metastases

The most common cause of curative failure is systemic disease involving the liver, occurring in 20 to 70% of all colorectal cancer patients. Up to 30% of patients undergoing colorectal resections have synchronous hepatic metastasis.⁹ Long term survival is extremely poor, and palliative resection of liver metastases does not alter survival. The management of these lesions has been a

matter of controversy in the past, but a curative resection does result in reasonable long-term survival.

General indications for resection are less than four lesions even if bilobar, no extrahepatic disease, and obtainable resection margin of at least 10 mm.⁵² Resection must preserve a sufficient remnant of hepatic tissue for normal liver function. Finally, comorbidities must not preclude a major surgical procedure. Patients found to have a single liver lesion that is easily accessible and would not entail a significant liver resection can have excision concomitant with the colon resection. Otherwise, lesions requiring a formal liver resection usually mandate a staged operation, as combined resection is associated with increased morbidity. In these cases, the colon lesion should be resected first, adjuvant therapy instituted, and after completion of the adjuvant therapy the patient is reassessed for possible resectability of the liver lesions.⁵³

Although mortality from liver resection is very low, the morbidity may be substantial. Morbidity ranges from 13 to 40%. The most common complications are liver related, infectious, and cardiopulmonary. Although rerecurrence may occur in up to 50% of patients, 5-year survival for curative resection ranges from 22 to 49%.⁹ Repeated resection may be undertaken with similar long-term outcomes.⁵⁴ Factors affecting survival include ability to obtain disease-free margins, stage 3 primary cancer, presence of synchronous liver metastases, number of lesions, actual CEA level, and patients' age.⁹

Several modalities have been employed for the management of unresectable or difficult to reach metastatic liver disease, including systemic chemotherapy, intra-arterial chemotherapy, hepatic artery ligation or embolization, portal vein embolization, and even irradiation. Several methods of local destruction, including cryotherapy and radiofrequency ablation, may also be employed. Studies involving cryotherapy report an average median survival of 30 months with acceptable morbidity and only 25% rerecurrence at cryotherapy sites.^{2,55}

Lung Metastases

Although lung metastases may occur in 10 to 20% of all colorectal cancer patients, isolated lung metastases are rare and usually associated with disseminated disease. In fact, only 2 to 10% of all patients with lung metastases are candidates for surgical intervention. As in liver disease, palliative resection does not improve survival, and if the condition is left untreated, median survival is less than 1 year.⁵⁶

Indications for resection of these lesions are similar to the indications for liver metastasis. Solitary lesions can be surgically excised if there is control of the primary process. The patient should have no evidence of any metastatic disease and needs to be able to tolerate

a thoracotomy and lung resection. Ideally, lesions should be solitary, but if multiple they should be confined to one lung. Bilateral lesions need to be solitary and amenable to resection. Multiple lesions in both lungs are a contraindication for surgery. In fact, the literature documents a markedly lower success rate for more than two lesions.^{9,56} Pulmonary function tests and predicted pulmonary reserve should be calculated before any lung resection.⁵⁷

Surgical options are wedge resection, lobectomy, bilobectomy, or pneumonectomy depending on the anatomic location of the lesion. As in liver resection, mortality is very low. In addition, morbidity is much lower than in liver resection (2 to 12%). Five-year overall survival in these patients ranges from 14 to 78%, with rerecurrence rates ranging from 50 to 70%. However, repeated lung resection is feasible and carries approximately a 30% 5-year survival. Prognostic factors are similar to those for liver metastases.^{9,56} Finally, several studies have reported sequential resection of liver and lung metastases. Data from these studies reveal an overall 5-year survival of 25 to 30% and a rerecurrence rate of ~75%.⁵³

Ovarian Metastases

The true incidence of ovarian metastases remains unclear. Surgical and autopsy studies and combined results of synchronous and metachronous disease estimate the occurrence as 1 to 14%. Bilateral involvement accounts for the majority (50 to 70%), and occult disease may be present in upward of 25% of patients.⁵⁸⁻⁶⁰ Hematogenous, lymphatic, transperitoneal, and direct extension have all been proposed as mechanisms of spread.^{58,60} Although the presence of metastases to the ovaries generally signifies stage 4 disease, 6 to 27% of cases have disease confined to the ovaries. In addition, roughly another third have resectable disease in other areas.⁶¹ Because of the possibility of occult disease, the treatment of isolated ovarian metastases from recurrent colorectal carcinoma consists of bilateral salpingo-oophorectomy. Even if all gross disease is removed at the time of surgery, survival remains poor.⁵⁸⁻⁶⁰ The median survival is less than 18 months.⁵⁹ However, in one study, patients with resectable disease had a median survival of 48 months versus 10 months in those with residual disease.⁶¹

PALLIATIVE OPTIONS

The management of recurrent colonic malignancies is challenging. There is high morbidity and mortality related to these procedures. Although it is not a standard option, there is evidence that debulking of recurrent colorectal cancer may provide reasonable palliation and possibly diminished mortality if it can be performed with minimal morbidity.⁶²

Patients who are found to have carcinomatosis and lesions invading vital structures that might render resection attempts unsafe can benefit from intestinal bypasses. Depending on the location of the lesion, a proximal loop of bowel can be anastomosed distal to the obstruction, bypassing the unresectable area. These anastomoses should be performed in a side-to-side fashion, preventing a closed loop obstruction. Lesions located in the right colon can be bypassed with an ileotransverse colon bypass. Lesions in the transverse colon can be managed with a colo-colo or ileo-descending colon anastomosis. However, whenever possible, resection is better than internal bypass.²⁸ The rationale behind this practice is to prevent early obstruction. Lesions deemed unresectable in the left colon or sigmoid are usually palliated with an end colostomy and Hartmann pouch or mucous fistula.

Extremely high-risk patients who are too fragile to be submitted to surgical procedures might benefit from a tube cecostomy. Cecostomies in general offer poor means of palliation, as they are very difficult to manage. In addition, there is always the possibility of migration of the tube, with leakage and resultant peritonitis. These procedures can be performed as an open or percutaneous procedure under radiographic or endoscopic guidance.

Endoscopically placed colonic stents can provide palliation for obstructive lesions. Patients with advanced disease, not amenable to resection, or too sick to be submitted to surgery may benefit from stent placement. Acute obstructions can also be relieved with stents, converting an emergency operation into an elective one. Patients may then be prepared and medically optimized for surgery. Some of the complications are stent migration, perforation, and reobstruction. In appropriately chosen cases, stents provide reasonable palliation.⁵¹

The use of radiation therapy for recurrent colon cancer is limited. In cases of invasion to the retroperitoneum, abdominal wall, or pelvic wall, radiation can be employed for palliation of the local symptoms. Radiation of the abdominal viscera can cause substantial morbidity related to radiation damage of the small bowel and solid organs.^{37,44,46,48,49} When possible, recurrences should be resected, but in the case of unresectability, chemotherapy can offer a means of palliation. Despite curative resection, surgery alone is not sufficient to treat the systemic disease and must be combined with chemotherapy.⁴⁸

CONCLUSION

Although recurrence of colon and rectal carcinoma is not an uncommon event, only a minority of patients can undergo potentially curative therapy. Chemotherapy and radiation therapy, although potentially effective, are not curative. Curative surgical therapy may be undertaken in

a small group of carefully selected patients. However, these procedures are often extensive, encompassing other organs and structures, and the source of major morbidity. The task is to identify the patient who may benefit from surgical intervention at an early stage, thereby diminishing the extent of resection. Current diagnostic tools, however, are still inaccurate in achieving this goal. Future direction should focus on improvements in surveillance and adjuvant techniques to allow less morbid surgical resections. In addition, refinement in nonsurgical therapy as a means of palliation is essential in ensuring the comfort of these complex patients.

DISCLOSURE

The authors have no conflicts to disclose relative to this article.

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