

Robotic-Assisted Resection of an Abdominal Wall Colorectal Cancer Metastasis

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ABSTRACT

We report a case of a 58-y-old male with a metachronous abdominal wall metastasis secondary to colorectal cancer. The patient initially presented 2 y ago at an outside facility with stage IV (T4, N0, M1) sigmoid colon cancer with liver metastasis. Fine needle aspiration (FNA) was performed of the liver masses, located in segment 5, inferior segment 4B, and segment 2 and ranging between 1 and 3 cm in size. The patient subsequently underwent laparoscopic sigmoid colon resection with end colostomy creation. Following this, adjuvant chemotherapy was administered with five cycles of FOLFOX. Interval computed tomography (CT) scan following chemotherapy demonstrated a decrease in size of the larger liver masses. At our institution, an open total left hepatic lobectomy (hepatic segments 2, 3, and 4) and a partial right hepatectomy of hepatic segment 5 were performed. Twelve further cycles of adjuvant chemotherapy were then performed. One year after the sigmoid resection, robot-assisted colostomy closure with end-to-end, double-stapled colopectostomy was then performed. A subsequent CT identified a small right liver lesion consistent with metastasis, and as such the patient underwent further cycles of chemotherapy. Following these cycles of chemotherapy, positron emission tomography/CT demonstrated a resolution of the liver recurrence; however, a hypermetabolic lesion at the former site of colostomy within left anterior rectus musculature was evident. This was confirmed on core needle biopsy to be adenocarcinoma of colon primary. Robotic-assisted resection of the abdominal wall metastasis was successfully performed.

Key Words: colorectal cancer recurrence, abdominal wall metastasis, metastectomy, robotic.

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INTRODUCTION

Abdominal wall metastasis from colorectal cancer is rare, with recent studies quoting the incidence ranging from 1% to 2%.¹ A prospective study from the Italian registry confirmed the incidence of abdominal wall recurrences following laparoscopic colon cancer resections is <1% and similar to open studies.²

The pathogenesis of many abdominal wall recurrences after laparoscopic curative resection of colorectal cancer is

still not completely understood, and many hypotheses have been postulated. The process is likely multifactorial, but two main theories have been described: indirect contamination caused by pneumoperitoneum and direct wound contamination via the resected specimen or instruments used.³ With regard to our case, the resolution of the hepatic recurrence following chemotherapy but identification of the abdominal wall metastasis makes this an unusual presentation. We report a case of successful robotic-assisted resection of abdominal wall metastasis from colorectal primary. To the best of our knowledge, this is

the first report on robotic-assisted resection of abdominal wall metastasis from a colorectal primary.

Case Presentation

This is a 58-y-old male who initially presented 2 y ago at an outside facility with stage IV sigmoid colon cancer with liver metastasis. Colonoscopy revealed a large fungating mass at 27 cm. Fine needle aspiration (FNA) was performed of the liver masses, located in segment 5, inferior segment 4B, and segment 2 and ranging between 1 and 3 cm in size. The diagnosis of colorectal cancer was confirmed demonstrating no KRAS, NRAS, BRAF, or mismatch repair mutations. The patient subsequently underwent laparoscopic sigmoid resection with colostomy creation. The tumor was found to have an R0 resection margin, and no mesenteric invasion was observed. On pathological examination, it was 4.2 cm in size, low grade, penetrating the serosa, with no lymphovascular or perineural invasion. None of the nine lymph nodes harvested had evidence of invasion (T4, N0, M1). The patient subsequently underwent systemic chemotherapy with five cycles of FOLFOX. Interval computed tomography (CT) scan following chemotherapy demonstrated a decrease in the size of the larger liver masses. At our institution, an open total left hepatic lobectomy (hepatic segments 2, 3, and 4) and a partial right hepatectomy of hepatic segment 5 were performed. Twelve further cycles of adjuvant chemotherapy were then performed. One year after the sigmoid resection, robot-assisted colostomy closure with end-to-end, double-stapled colopectostomy was then performed. The resected tissue, including the colocolutaneous margin, was free of malignancy. A subsequent CT identified a small right liver lesion consistent with metastasis, and as such the patient underwent further cycles of chemotherapy.

Following these cycles of chemotherapy, positron emission tomography/CT demonstrated a resolution of the liver recurrence; however, a hypermetabolic lesion at the former site of colostomy within left anterior rectus musculature was evident (**Figure 1**). This was confirmed on core needle biopsy as adenocarcinoma. Based on these findings, the preoperative diagnosis was a solitary metachronous abdominal wall metastasis. Following discussion with the patient, we planned robot-assisted abdominal wall resection to include the 4-cm tumor with primary closure of abdominal wall defect, subsequently described.

The patient was positioned on the operating table in the supine position and general anesthesia was induced. The abdomen was prepped and draped in the usual sterile

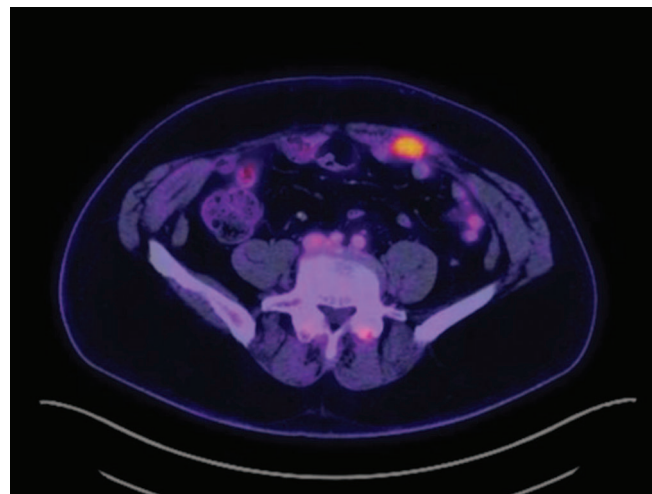


Figure 1. Positron emission computed tomography scan. The figure demonstrates a hypermetabolic lesion in the left rectus musculature. Core needle biopsy confirms this to be adenocarcinoma of colon primary.

fashion, and the optical trocar entry technique was used to enter the abdominal cavity in the left upper quadrant. Following insufflation, two additional 8-mm robotic trocars were placed, one in the supraumbilical space and the other in the right lower quadrant. The surgical robot was docked, and the instruments were inserted. Upon inspection of the abdominal cavity, there was no evidence of peritoneal metastatic disease. There was a well-demarcated tumor at the medial portion of the patient's former stoma site that could be visualized internally as a peritoneal deformity or scar (**Figure 2**). This was correlated with the preoperative positron emission tomography/CT to determine the area of resection with a planned margin of 1 cm. This was scored internally using monopolar energy. Monopolar as well as bipolar electrosurgery was

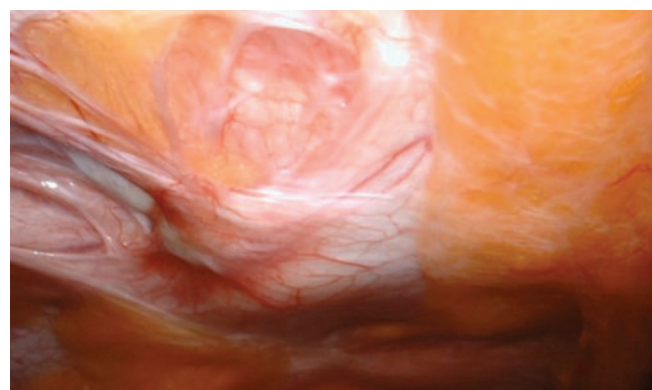


Figure 2. Abdominal wall metastasis at the medial border of the patient's former colostomy site.

used to resect the primary tumor mass. A skin incision was made at the former stoma site where the specimen was removed. Reexamination of the resection cavity demonstrated additional tissue that appeared suspicious for residual tumor, and thus, this was also circumferentially resected and removed via the same skin incision. The abdominal wall defect was then closed in multiple layers using running 2-0 barbed locking sutures. This closure was observed to be airtight (**Figure 3**). The resected specimens were characterized as adenocarcinoma (**Figure 4**), morphologically consistent with colonic origin. Margins of the resected mass were focally involved with the tumor, but these positive margins were abutting each other. Based on these findings, a diagnosis of metastatic colorectal cancer (CRC) was confirmed. The patient did well postoperatively with no complications related to the surgery and was scheduled to undergo further cycles of chemotherapy with oral fluorouracil.

DISCUSSION

Abdominal wall metastasis from colorectal cancer is rare, with a reported incidence ranging from 1% to 2%.¹ Several large case series and randomized trials comparing laparoscopic versus open colectomy for colon carcinoma have confirmed port-site recurrences well below 1%.²⁻⁴ Abdominal wall recurrence is widely accepted to result from technical complications from laparoscopic colectomy, and surgeon experience being a key determinant influencing the incidence and occurrence of abdominal wall metastasis.

Many mechanisms have been postulated to explain patterns of recurrence including direct tumor invasion, lymphatic spread, and cancer cell seeding. It was thought that

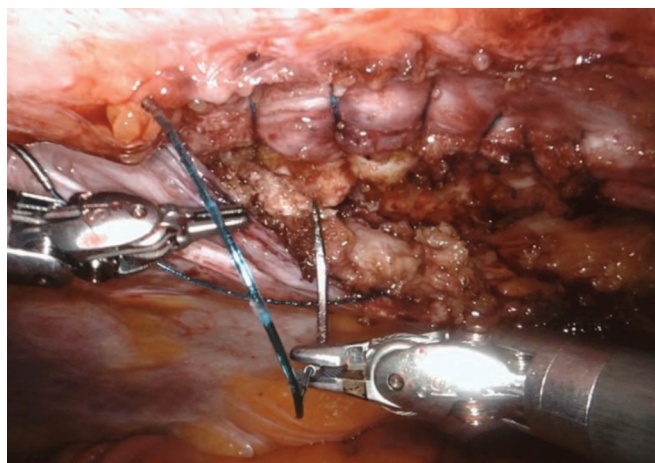


Figure 3. Airtight closure of the abdominal wall defect following resection.

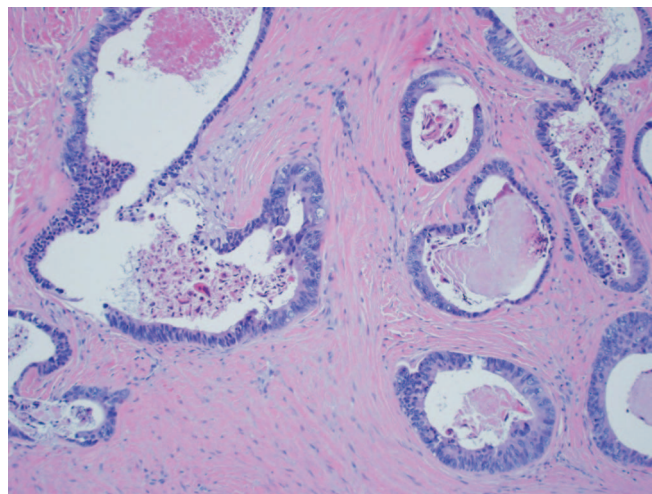


Figure 4. Hematoxylin and eosin stain (×100 magnification). The figure demonstrates a metastatic focus of conventional moderately differentiated colorectal adenocarcinoma involving the soft tissue of the abdominal wall. The malignant glands harbor luminal dirty necrosis, which is quite characteristic of colorectal cancer.

that tumor cell exfoliation during surgery may directly result in tumor cell implantation at wound sites. Experimental studies have demonstrated the tumor cells exfoliated from colorectal cancer remain viable, and oncogenesis is indeed enhanced at sites of wound healing.⁵

More recent literature alludes to tumor manipulation during surgery being the predominant factor in tumor seeding.⁶ The concept of aerosolization from CO₂ pneumoperitoneum seems to have a smaller secondary role.^{7,8} In the present case, it is possible the tumor cells were implanted into the abdominal wall from excessive tumor manipulation, resulting in seeding at the colostomy site. Furthermore, the patient presented as an emergency with bowel obstruction from the tumor, and this likely resulted in increased tissue trauma during the resection, which is associated with increased risk of tumor seeding. Koea et al.⁹ in their study presented the following clinic-pathological risk factors for abdominal wall metastasis: primary tumors that extend transmurally through the wall of the colon or rectum, lymph node metastases at presentation, and perforated primary tumor. Although our patient did not have positive lymph nodes, his tumor was noted to extend beyond the serosa.

A further interesting aspect to this case is that there was radiologic resolution of the recurrent hepatic metastasis on repeat CT imaging after the third cycle of chemotherapy. However, it was on this imaging that the abdominal

wall recurrence was found, indicating the resistance of this metastasis to adjuvant treatment. Given this observation, it was decided to proceed directly to robotic-assisted metastectomy. Performing a robotic resection in this case allowed for a robotic diagnostic laparoscopy to rule out disseminated intraabdominal metastasis. Superior visualization because of the three-dimensional capacity of the robot allows for a more precise and meticulous resection when compared with a laparoscopic or open approach from skin level.¹⁰ Further resection had to be performed to obtain an R0 margin because residual tumor appeared to be present after initial resection of the mass. This residual tumor was easily identified and visualized using the robotic approach, allowing for prompt reexcision. It is possible that adequate visualization to identify residual tumor would not have been possible from the open approach because of the residual tumor's location near the fascia and the patient's body habitus. The airtight closure of the abdominal wall layers was facilitated by this improved visualization. The robotic approach also decreases operative trauma, resulting in earlier recovery.¹⁰ Surgeon experience in performing robotic surgery is paramount in achieving a good outcome when undertaking resection for abdominal wall recurrence. We performed a PubMed search for case reports on robotic-assisted resection of abdominal wall metastasis and could find only one case from a prostate primary cancer. No cases were identified from a colorectal or other primary cancer. It is generally accepted that the optimal treatment for abdominal wall metastasis with no other distant disease is surgical resection with clear margins. Recurrence at the abdominal wall and at distant sites has a worse prognosis and resection with adjuvant chemotherapy is recommended. This case report suggests that robotic resection of abdominal wall metastasis is a viable option for single metastasis, provided careful patient selection and adequate surgeon experience is observed.

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