

Locally Advanced Sigmoid Colon Cancer Treated with Resection and Reconstruction with Bilateral Pedicled Thigh-Based Flaps

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Background	A 45-year-old male presented with locally advanced sigmoid colon cancer. The tumor demonstrated extracolonic spread involving the bladder, terminal ileum, cecum, and anterior abdominal wall. This complex case necessitated a staged en bloc resection, followed by abdominal wall reconstruction.
Summary	<p>A 45-year-old male presented with locally advanced sigmoid adenocarcinoma. The tumor involved the bilateral rectus abdominis muscles, portions of the external obliques, terminal ileum, cecum, and bladder. No evidence of metastatic disease was identified on staging scans.</p> <p>He received neoadjuvant chemotherapy before referral to our center. A multidisciplinary approach involving colorectal, urologic, and plastic surgery teams achieved curative intent. This extensive surgery involved creating an end colostomy and ileal conduit. The resulting full-thickness abdominal wall defect measured 35 × 28 cm, necessitating staged reconstruction by the plastic surgery team.</p> <p>The patient's postoperative course was uneventful, and he is currently ambulatory and undergoing rehabilitation. Notably, he remains in remission.</p>
Conclusion	This case reports the successful management of locally advanced sigmoid colon cancer invading the abdominal wall. Neoadjuvant chemotherapy enabled R0 resection with en bloc multivisceral excision and creation of diverting stomas. Complex reconstruction used bilateral thigh flaps. A multidisciplinary approach and meticulous planning were crucial for this optimal outcome.
Key Words	colorectal cancer; sigmoid; abdominal wall reconstruction

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Case Description

A 45-year-old man presented with locally advanced sigmoid colon cancer. He reported a progressively enlarging lower abdominal mass over several months. His medical history included a diverting loop colostomy for a colovesical fistula, initially attributed to complicated acute diverticulitis managed with percutaneous drainage.

An outside institution performed an initial workup and treated the persistent fistula with a bladder biopsy, which revealed colon adenocarcinoma invading the bladder. Neoadjuvant chemotherapy with FOLFOX-6 was initiated, with bevacizumab added for the first cycle. However, completion of the planned five cycles was delayed by five weeks due to neutropenia requiring G-CSF administration and insurance authorization issues. Seven months elapsed between the last chemotherapy dose and the patient's presentation at our facility.

The patient was admitted for restaging and nutritional optimization prior to curative resection of a suspected colon malignancy. Colonoscopy revealed a completely obstructing malignant-appearing mass in the sigmoid colon, approximately 15 cm from the anal verge. Biopsy and tattooing of the lesion were performed. Pathology confirmed moderately differentiated adenocarcinoma with intact mismatch repair genes (MLH1, MSH2, MSH6, and PMS2), suggestive of microsatellite stability (MSS). Notably, CEA levels were significantly elevated at 405 ng/mL. Staging CT scan of the chest, abdomen, and pelvis confirmed the mass and pockets of air indicative of prior invasion, as described previously. However, no evidence of metastatic disease was identified. Following a comprehensive workup, the urology and plastic surgery teams collaboratively planned the surgical approach.

To ensure optimal treatment, the patient's case was reviewed by a multidisciplinary tumor board. Radiation therapy was contraindicated due to several factors: the presence of a colovesical fistula, bacteremia, and fungemia. Additionally, the extensive involvement of the small intestine within the radiation field made it an unsuitable target. Given these limitations, surgery was deemed the most appropriate course of action and scheduled accordingly.

An open approach was chosen, gaining access through a subxiphoid incision. The anterior abdominal wall musculature and fascia, including bilateral rectus muscles, were dissected using LigaSure. The procedure then proceeded with an en bloc open low anterior resection, cystoprostatectomy, and abdominal wall resection. The wall resection encompassed skin, subcutaneous tissue down to the pubic symphysis, and both rectus muscles. An end-to-end ileocolonic anastomosis was fashioned for intestinal continuity. Additionally, an ileal conduit and a descending end colostomy were created and exteriorized on the right and left anterolateral abdominal wall, respectively. Due to the removal of the rectus muscles, abdominal wall reconstruction employed the remaining oblique musculature. The laparotomy was temporarily closed with ABThera, and the patient was transferred to the surgical ICU in stable condition.

A 26 cm invasive moderately differentiated sigmoid adenocarcinoma was identified. The tumor directly invaded surrounding structures, including the ileum, cecum, bladder, right seminal vesicle, abdominal wall musculature, and abdominal skin. Surgical margins were negative. However, two out of seventeen lymph nodes (2/17) harbored metastatic adenocarcinoma. Perineural and extramural large vessel invasion were also present. The final pathological staging was pT4b N1b M0.

On postoperative day 3, the patient underwent definitive abdominal wall reconstruction using bridging Strattice mesh. Bilateral pedicled myocutaneous flaps were harvested from the anterolateral thigh and vastus lateralis muscles to achieve sufficient tissue coverage. Negative pressure dressings were applied to both donor sites to promote wound healing. Three weeks following reconstruction, partial-thickness skin grafts were used to cover the thigh muscle harvest areas. The patient was discharged 35 days after the en bloc resection and remains under the co-management of colorectal and plastic surgery teams. At his 12-month follow-up, surveillance tests revealed no signs of recurrence or metastatic disease, indicating a positive clinical course.

Discussion

Colorectal cancer (CRC) remains a significant public health burden, ranking as the fourth most diagnosed cancer and the second leading cause of cancer-related deaths in the United States.¹ Following R0 resection margins, recurrence rates for colon cancer are relatively low at around 19%. However, even R1 resection significantly increases the risk of recurrence to 56%. This translates to a substantial decrease in 5-year disease-free survival, dropping from 60% after R0 resection to only 25% following R1 resection. Several factors predict poorer disease-free survival, including the need for emergency surgery, R1 resection margin, advanced tumor stage (T4), lymphovascular invasion/positive lymph node involvement, poorly differentiated carcinoma, tumor perforation, and distant metastasis. Furthermore, advanced age (>75 years) is independently associated with a worse prognosis after curative surgery for colon cancer.²

Approximately 10-20% of colon cancer patients present with locally advanced disease, particularly T4 tumors. These tumors are associated with a higher risk of incomplete resection and poorer outcomes. National Comprehensive Cancer Network (NCCN) guidelines recommend neoadjuvant chemotherapy (FOLFOX or CAPOX) for patients with nodal involvement or clinical T4b tumors. This is followed by colectomy with en bloc multivisceral resection and lymphadenectomy.³

Effective management of such complex cases requires a multidisciplinary team approach. This ensures accurate staging, meticulous treatment planning, and patient optimization for potentially aggressive curative resections.

In situations with extensive abdominal wall involvement, curative resection can create large and non-immediately closable defects. Various reconstructive techniques exist, including immediate bridging mesh or delayed complex myocutaneous flap coverage. In this case, curative resection resulted in significant abdominal wall tissue loss, including both rectus abdominis muscles. A staged reconstruction was performed, utilizing a wound vac initially followed by placement of bilateral thigh-based pedicled flaps.

Thigh-based flaps have become a mainstay for complex abdominal wall reconstruction since their introduction in 1993.⁴ This case exemplifies their utility by addressing one of the largest defects reported in the literature.⁵⁻⁷ While alternative options exist, such as free latissimus dorsi

flaps, tensor fascia lata free flaps, and pedicled rectus femoris flaps,⁶⁻⁸ they may not offer the same degree of tissue availability. Biological mesh, a well-described approach for fascial defects spanning the xiphoid to the iliac crest and pubis, carries an increased risk of hernia or bulge formation (17-56%).⁸ Notably, despite extensive tissue mobilization from the thighs, this patient experienced no functional limitations in ambulation.

Conclusion

Locally advanced colon cancer with extensive anterior abdominal wall involvement poses a significant challenge for achieving both curative resection and successful abdominal wall reconstruction. This case highlights the importance of a multidisciplinary approach and meticulous preoperative planning to optimize surgical outcomes.

Lessons Learned

This case emphasizes the importance of a two-pronged approach for managing locally advanced abdominal tumors:

- **Preoperative Optimization and Aggressive Resection:** Meticulous preoperative optimization followed by aggressive surgical resection remains the cornerstone of treatment. Achieving this requires a highly coordinated and well-planned effort by a specialized multidisciplinary team.
- **Thigh-Based Flap Reconstruction:** For large abdominal wall defects that can arise after extensive tumor removal, reconstruction using thigh-based pedicled flaps offers an excellent option with superior outcomes.

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