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Case Report

Multi-visceral resection in colonic cancer - "Boon or Bane?": exploring the role and rationale through case reports

Subbiah Shanmugam*, Suganthan Thirunavukkarasu

Department of Surgical Oncology, Government Royapettah Hospital, Chennai, Tamil Nadu, India

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***Correspondence:**
Dr. Subbiah Shanmugam,
E-mail: subbiahshanmugam67@gmail.com

ABSTRACT

Colonic cancer invading into the adjacent organs or structures is detected in 5% to 20% of all surgical interventions performed for the management of colonic cancer. These adhesions may be either due to frank tumor infiltration or due to peritumoral inflammation. Nature of these adhesions cannot be ascertained intraoperatively. Standard management entails in block resection of the diseased organ along with adjacent organ infiltration. The release of macroscopically infiltrated tissue is not recommended due to the risk of perforation, tumor seeding and the possibility of leaving residual disease (R1, R2) with high recurrence rates. We share our experience with two case reports regarding the role of multi-visceral resection in clinically diagnosed locally advanced colonic cancers adherent to adjacent structures but pathologically down staged and proved to be inflammatory adhesions and desmoplastic reaction. In both patients even adjuvant therapy was not needed. Multi visceral resection in carcinoma colon has better prognosis and overall survival, if the histopathology reveals inflammatory adhesions or desmoplastic reaction rather than direct tumor infiltration into adjacent structures. So upfront surgery may be beneficial particularly in patients where the adjacent organ involvement is really not the involvement by tumor.

Keywords: Colon cancer, Desmoplastic reaction, Multi-visceral resection, Upfront surgery

INTRODUCTION

Colonic cancer invading into the adjacent organs/structures is detected in 5% to 20% of all surgical interventions performed for the management of colonic cancer.[1] These adhesions may be either due to frank tumor infiltration or due to peritumoral inflammation. However, the nature of these adhesions cannot be ascertained intraoperatively. Therefore, the standard management entails en bloc resection of the diseased organ along with adjacent organ infiltration. Neoadjuvant treatment with chemotherapy, radiation, or a combination of both can significantly lead to downsizing of the disease thereby facilitating resection of the tumor with safe radial and circumferential margins. Surgery remains the primary modality of colon cancer treatment.[2] Recent guidelines adopted by the National Cancer Institute and the American society of colon and rectal surgeons emphasize that appropriate surgical management of these locally advanced colon cancers should include multi-visceral resection, in which the cancer and adherent structures are removed en bloc.[4]

Residual tumor is a significant predictor for survival in colon carcinomas.[1,2] The median survival of patients who undergo R1 or R2 resection is 11.6 months.[3] If poor grading or apical lymph node metastasis is detected in the resected specimen during histopathologic examination, the 12-months survival rate decreases to 7.7%. For these reasons, transection of tumor and spreading of tumor cells must be avoided during surgery. All carcinoma-bearing tissue, including the regional lymph nodes, must be removed.[5,6] Extended surgical treatment is feasible only when supported by acceptable morbidity and

mortality rates. We share our experience with two case reports regarding the role of multi-visceral resection in clinically diagnosed locally advanced colonic cancers adherent to adjacent structures but pathologically down staged and proved to be inflammatory adhesions.

CASE REPORTS

Case 1

A 40 years old male consulted for pain in the epigastrium and umbilical region and diarrhea for 6 months. Abdominopelvic contrast enhanced computed tomography (CECT) showed growth in transverse colon adherent to anterior wall of stomach (Figure 1). Colonoscopy revealed circumferential proliferative growth in transverse colon. There was no evidence of regional or distant spread. Pre operative CEA was 4.3 ng/mL. With pre-operative diagnosis of locally advanced colon cancer, diagnostic laparoscopy done which showed mass in transverse colon adherent to greater curvature of stomach and jejunum.

Procedure converted to open in view of dense adhesions with stomach. Transverse colon, greater curvature of stomach and C-loop of duodenum mobilised. Multi-visceral resection done which consisted of Segmental resection of transverse colon along with sleeve gastrectomy and wedge resection of proximal jejunum (Figure 2). Tumor removed en-bloc along with peri-colic nodes followed by colo-colic anastomosis and closure of remnant stomach. Drain tube placed in pelvis and stomach bed. Post operative period was uneventful. patient progressed with solid diet and discharged.

Post operative histopathology reported a well differentiated adenocarcinoma infiltrating into muscularis propria (Figure 3). No lympho-vascular invasion. 22 nodes dissected and all nodes found to be free of tumor. No macroscopic or microscopic tumor invasion to resected adjacent structures (stomach and jejunum). Desmoplastic reaction reported in adjacent structures. pT2N0, (0/22 nodes); R0 resection. With the result of histopathology, tumor board team decided not to perform adjuvant treatment and kept under serial clinical, imaging and CEA follow up, with no recurrence nine months after surgery.

Case 2

A 48 years old male presented with lower abdominal pain and bleeding per rectum for 5 months. Abdominopelvic contrast enhanced computed tomography (CECT) and MRI showed growth in sigmoid colon extending to proximal rectum adherent to adjacent small bowel along with 3.7×3.7 cm solid cystic lesion in interpole region of left kidney (Figure 4). There was no evidence of regional or distant spread. Pre operative CEA was 3.2 ng/ml. With pre-operative diagnosis of locally advanced colon cancer and left renal cell carcinoma (Double primary), laparotomy done. Mass found in sigmoid colon extending to upper rectum with dense adhesion to adjacent ileum at 60 cm and 100 cm from ileo-caecal junction. Multi-visceral resection done for sigmoid colon primary which consisted of anterior resection along with segmental resection of adherent ileum and 60 cm and 100 cm from ileo-caecal junction followed colo-rectal anastomosis and end to end anastomosis of distal resected segment of ileum (Figure 5).

Figure 1: Pre-operative CT.

Figure 2: Post-operative specimen.

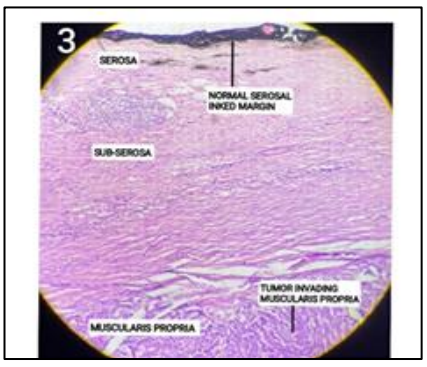

Figure 3: Post-operative histopathology.

Figure 4: Pre-operative CT.

Proximal resected ends of ileum kept as diversion double barrel ileostomy. Left radical nephrectomy done for renal tumor. In view of clinically significant nodes along para-aortic region, para-aortic nodal dissection done. Drain tube placed in pelvis. Post operative period was uneventful. patient progressed with solid diet and discharged.

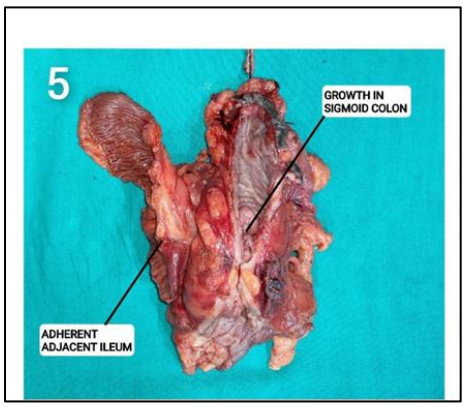

Figure 5: Post-operative specimen.

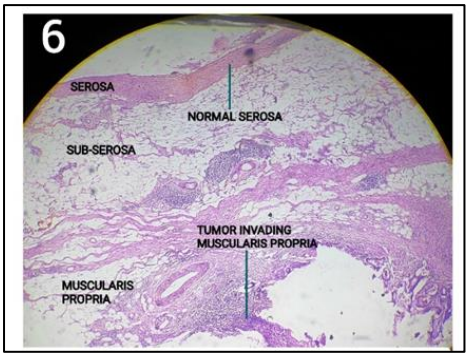

Figure 6: Post-operative histopathology.

Post operative histopathology revealed a well differentiated adenocarcinoma infiltrating into muscularis propria (Figure 6). No lympho-vascular invasion. 18 nodes dissected and all nodes found to be free of tumor. No macroscopic or microscopic tumor invasion to resected adjacent structures (Ileum at 60 cm and 100 cm from ileo-caecal junction) (Figure 7). Desmoplastic reaction reported in adjacent structures (Figure 8). pT2N0, (0/18 nodes); R0 resection. Left renal tumor reported to be clear cell carcinoma pT1aN0. Para-aortic nodes reported to be reactive.

With the result of histopathology, tumor board team decided not to perform adjuvant treatment and to be kept under serial clinical, imaging and CEA follow up and planned for ileostomy reversal.

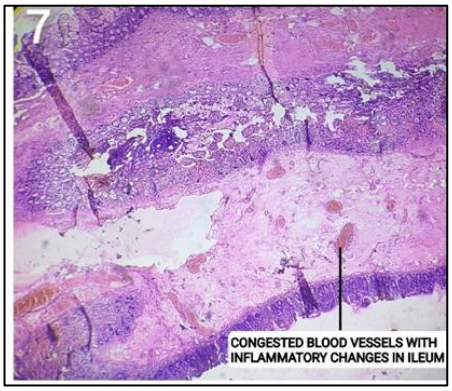

Figure 7: Post-operative histopathology.

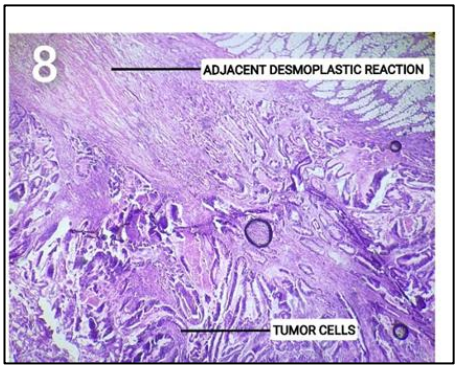

Figure 8: Post-operative histopathology.

DISCUSSION

Locally advanced colorectal cancers that invade nearby structures are seen in 5-20% of patients. An essential oncological approach for these cases involves multi-visceral en bloc resection of the affected organs and structures.[7,8] This procedure entails removing any organ or structure to which the tumor is attached. Clinical guidelines concur that proper surgical management of these advanced tumors should include extensive multi-visceral resection with curative intent, aiming for clear margins.

Differentiating between malignant infiltration and inflammatory adhesions during surgery is challenging. Surgeons might mistake inflammatory adhesions for macroscopic invasion, but only histopathological analysis

can confirm this. Consequently, the standard protocol mandates en bloc resection of the tumor along with the adjacent organ.[9,10] When deciding on surgery for patients with locally advanced colorectal cancer, one should recall Hippocrates's saying: "For extreme diseases, extreme remedies are most fitting." In our two cases, adjacent organ involvement was not due to tumor infiltration, and adjuvant treatment was unnecessary.

The desmoplastic reaction to tumors, indicating fibrous connective tissue growth around tumor cells, is a potential prognostic marker for colorectal cancer. It is categorized into immature, intermediate, and mature types based on the characteristics of the stroma and collagen. Desmoplastic reactions occur regardless of the T stage. The immune response to cancer antigens involves chemokine-induced immune cell accumulation, but the tumor microenvironment may also contain immunosuppressive factors. Understanding their interactions with antitumor immune cells is crucial. Cancer-associated fibroblasts significantly influence desmoplastic reactions and shape the tumor immune microenvironment through immunoregulatory molecules like TGFB1. These fibroblasts can recruit protumorigenic inflammatory cells, such as M2-like macrophages, impacting the antitumor immune response. Intraepithelial CD3+CD8+CD45RO+T cells and stromal M1-like macrophages are inversely related to immature desmoplastic reactions, underscoring their role in desmoplastic reaction maturity within the tumor immune environment.[11] More mature desmoplastic reactions correlate with longer overall survival and serve as strong prognostic biomarkers in colonic cancer patients, potentially predicting adjuvant chemotherapy efficacy in stage II cases.[12]

Lehnert et al found that multi-visceral resection for colon cancer revealed tumor infiltration in neighboring tissues in 45-70% of cases, with the remainder being inflammatory adhesions. Releasing macroscopically infiltrated tissue is not recommended due to risks of perforation, tumor seeding, and residual disease (R1, R2), which have high recurrence rates.[10] The effectiveness of extended resection was recognized after Sugarbaker's 1946 study on advanced colonic cancer, reporting a 56% disease-free survival rate. Subsequent studies showed survival rates of 55%, 61%, and 23% for standard colectomy, extended resection, and colectomy with attached organ release, respectively.[13]

The choice of limited resection over multi-visceral resection can depend on factors related to the surgeon and patient, such as inadequate preoperative assessment and failure to recognize neighboring structure invasion preoperatively. CT scans for locoregional staging are cost-effective and can alter treatment plans, preventing unnecessary surgeries in patients with liver metastasis or advanced metastatic disease.[14] For multi-visceral resection in colon cancer, adjacent organ infiltration rates were reported as 60.9% by Nishikawa et al, 64.5% by Eveno et al, and 55% by Gebhardt et al. Multi-visceral resection is an independent factor for postoperative complications and perioperative mortality, with morbidity and mortality rates ranging from 28.0% to 43.7%10.[10,14-17].

Younger patients are more likely to undergo radical resections, though age is not a contraindication if patients are properly selected. Multi-visceral resections are more common in women, possibly due to the complexity of genitourinary resections and reconstructions in men. Tumor location also influences the decision to perform multi-visceral resection. Tumors near the splenic flexure are less likely to be resected than those in the left colon or rectosigmoid junction. Extended resections of the liver, bile duct, and pancreas require greater technical skill to achieve clear margins.[8,18] Campos et al reported R0 resection rates of 84.4%, with 5-year survival of 64% and recurrence of 32.4%. López Cano et al found R0 rates of 85%, with a 48% 5-year survival rate. Patients with R0 resection had an 80.7% five-year cancer-related survival rate, while none with R1 or R2 resection survived for five years. The five-year locoregional tumor recurrence rate was 6.5%, and the distant metastasis rate was 24.2%. Lymphatic metastases and intraoperative tumor cell dissemination were significant prognostic factors for recurrence, metastases, and cancer-related survival.[7,8]

A meta-analysis by Mohan et al on multi-visceral resection in locally advanced colon cancer invading adjacent structures reported an overall 5-year survival rate of 50.3% (95% CI, 49.9-50.8%). Surgery for recurrence had worse outcomes than for primary tumors, with a 5-year survival of 19.5%. Early colonic cancer with inflammatory adhesion had a significantly higher 5-year survival rate of 89.8%.[19,20]

All studies conclude that R0 resection is the most important prognostic factor for survival, which can be achieved in 70-90% of cases with good planning. Multi visceral resection in carcinoma colon has better prognosis and overall survival, if the histopathology reveals inflammatory adhesions or desmoplastic reaction rather than direct tumor infiltration into adjacent structures. Incomplete resection is the main factor for poor survival and prognosis. So upfront surgery may be beneficial particularly in patients where the adjacent organ involvement is really not the involvement by tumor.

CONCLUSION

Patients with locally advanced colorectal tumors constitute a challenge for the treating team, since the most important chance of cure depends on a complete resection with free margins. Adhesions to adjacent structures do not necessarily imply tumor infiltration, but can be due to inflammatory adhesions or desmoplastic reaction. Better survival can be attained if extensive resections are performed, so lysis of adhesions is discouraged in these cases because it increases the risk of

recurrence. Multi-visceral resection can be performed with acceptable morbidity and mortality rates. Multi visceral resection in carcinoma colon has better prognosis and overall survival, if the histopathology reveals inflammatory adhesions or desmoplastic reaction rather than direct tumor infiltration into adjacent structures. So upfront surgery may be beneficial particularly in patients where the adjacent organ involvement is really not the involvement by tumor.

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