



Original Article

## The Role of HIPEC in Colon Cancer: Retrospective Analysis of 15 Cases

Naveen Gowda, <sup>MBBS</sup><sup>1</sup>, Raxith S, <sup>MCh</sup><sup>2</sup>, Vijay Kumar M, <sup>MCh</sup><sup>2</sup>

<sup>1</sup>Department of Surgical Oncology, Bharath Institute of Oncology, <sup>2</sup>Consultant Surgical Oncologist, Bharath Cancer Hospital, Mysore, Karnataka, India.

**\*Corresponding author:**

Dr. Naveen Gowda,  
Department of Surgical  
Oncology, Bharath Institute of  
Oncology, Mysore.

[aviracare7@gmail.com](mailto:aviracare7@gmail.com)

Received: 03 September 2024

Accepted: 11 September 2024

Published: 09 October 2024

DOI

[10.25259/KJS\\_7\\_2024](https://doi.org/10.25259/KJS_7_2024)

Quick Response Code:



### ABSTRACT

**Objectives:** To evaluate the outcomes of hyperthermic intraperitoneal chemotherapy (HIPEC) combined with cytoreductive surgery in patients with peritoneal carcinomatosis secondary to colon cancer treated at Bharath Cancer Hospital over one year.

**Material and Methods:** From August 2022 to August 2023, 15 patients with colon cancer and confirmed peritoneal metastasis underwent cytoreductive surgery followed by HIPEC using Mitomycin C and Oxaliplatin. Inclusion criteria consisted of peritoneal metastasis without extraperitoneal disease, good performance status, and the feasibility of achieving complete cytoreduction (CC-0 or CC-1). The Peritoneal Cancer Index (PCI) was used to assess disease burden.

**Results:** The average patient age was 56 years, with PCI scores ranging from 8 to 20. Complete cytoreduction (CC-0) was achieved in 73.3% of patients. The average operative time was 8 hours. Postoperative complications occurred in 33.3% of patients, with no perioperative or 30-day mortality. Peritoneal recurrence occurred in 20% of cases.

**Conclusion:** HIPEC, when combined with cytoreductive surgery, demonstrates promising short-term outcomes in selected patients with peritoneal carcinomatosis from colon cancer. Although the recurrence rate was relatively low, further research is necessary to confirm long-term benefits and refine patient selection criteria.

**Keywords:** HIPEC, Colon Cancer, Peritoneal Carcinomatosis, Cytoreductive Surgery, Recurrence

### INTRODUCTION

Hyperthermic intraperitoneal chemotherapy (HIPEC) has been a revolutionary advancement in the treatment of peritoneal carcinomatosis resulting from colon cancer. The use of heated chemotherapy agents after cytoreductive surgery (CRS) aims to eradicate microscopic residual disease, offering a potential improvement in survival and quality of life for patients who traditionally faced limited treatment options.

This article presents an analysis of a one-year experience involving 15 cases of HIPEC at the Department of Surgical Oncology and Robotic Surgery, Bharath Cancer Hospital. The discussion will compare our outcomes with major trials and provide insight into our patient selection criteria, which we believe are critical to achieving good outcomes.

This is an open-access article distributed under the terms of the Creative Commons Attribution-Non Commercial-Share Alike 4.0 License, which allows others to remix, transform, and build upon the work non-commercially, as long as the author is credited and the new creations are licensed under the identical terms.  
©2024 Published by Scientific Scholar on behalf of Karnataka Journal of Surgery.

### Patient Selection Criteria for HIPEC

Patient selection for HIPEC was based on the following criteria:

1. **Histologically confirmed colon cancer with peritoneal metastasis.**
2. **Absence of extraperitoneal disease**, particularly hepatic or pulmonary metastasis.
3. **Good performance status Eastern Cooperative Oncology Group (ECOG  $\leq$  2).**
4. **Feasibility of complete or near-complete cytoreduction (CC-0 or CC-1).**
5. **Adequate organ function**, including renal, hepatic, and bone marrow reserves.
6. **No significant comorbidities** contraindicating major surgery.

### MATERIAL AND METHODS

From August 2022 to August 2023, 15 patients with peritoneal carcinomatosis secondary to colon cancer were treated with CRS followed by HIPEC. The procedure was conducted using an Open-abdomen technique with chemotherapy perfusion at an average temperature of 42°C for 90 minutes. The chemotherapeutic agents used were Mitomycin C and Oxaliplatin.

### RESULTS

Over the course of one year, 15 patients with peritoneal carcinomatosis secondary to colon cancer were treated with CRS followed by HIPEC at Bharath Cancer Hospital. The demographic and clinical characteristics of the patients, surgical outcomes, postoperative complications, and short-term oncological outcomes were systematically recorded and analysed.

#### Patient Demographics

**Age and Gender:** The average age of the patients was 56 years, with a range of 45 to 68 years. The gender distribution included 9 males and 6 females. This demographic is consistent with the typical age range and gender distribution of colon cancer patients presenting with peritoneal metastasis [Table 1].

**Performance Status:** All patients selected for HIPEC had an ECOG performance status of 0–2, indicating that they were relatively fit and able to tolerate the rigorous demands of surgery and subsequent HIPEC.

#### Peritoneal Cancer Index (PCI)

**PCI Range and Distribution:** The PCI scores among the patients ranged from 8 to 20, with an average score of 15.

This metric is crucial, as it quantifies the extent of peritoneal disease and serves as a predictor of the potential success of CRS and HIPEC. Patients with a PCI score  $\leq$ 15 generally have a better prognosis and are more likely to benefit from HIPEC, which aligns with the selection criteria used in this study.

#### Surgical Outcomes

**CRS Completeness:** Out of the 15 patients, 11 (73.3%) achieved complete cytoreduction (CC-0), meaning no visible residual tumour remained after surgery. The remaining 4 patients (26.7%) had the minimal residual disease (CC-1), where small tumour nodules less than 2.5 mm in size were left behind. Achieving CC-0 is a critical determinant of long-term survival and reduced recurrence risk, underscoring the importance of meticulous surgical technique and patient selection.

**Operative Time:** The average operative time was approximately 8 hours, reflecting the complexity of the procedures, which involved extensive peritoneal stripping, multi-organ resections in some cases, and the administration of heated intraperitoneal chemotherapy.

#### Postoperative Complications

**Complication Rate:** Postoperative complications were observed in 5 out of 15 patients (33.3%). These complications included:

- **Infectious complications** (2 cases of intra-abdominal abscess, 1 case of wound infection)
- **Gastrointestinal complications** (1 case of anastomotic leak, 1 case of delayed gastric emptying)
- **Cardiovascular complications** (1 case of atrial fibrillation)
- **Renal complications** (1 case of acute kidney injury)

All complications were managed successfully with conservative treatment or minor interventions, and there were no re-operations required.

**Mortality Rate:** Remarkably, there were no perioperative or 30-day mortalities reported in this cohort. This zero-mortality rate is noteworthy, especially considering the extensive nature of CRS and HIPEC, which are associated with significant morbidity and mortality risks in some reports.

#### Recurrence and Short-Term Oncological Outcomes

**Recurrence Rate:** Within the follow-up period of one year, 3 out of 15 patients (20%) experienced disease recurrence. All recurrences were peritoneal, with no extraperitoneal metastasis observed. This recurrence rate is in line with

what has been reported in similar studies, indicating that despite aggressive treatment, peritoneal recurrence remains a challenge in this patient population.

The patients who experienced recurrence had higher PCI scores (close to 20) and were among those with CC-1 cytoreduction. This finding reinforces the significance of achieving complete cytoreduction (CC-0) for improving outcomes and reducing recurrence rates.

**Survival Outcomes:** As the follow-up period is limited to one year, long-term survival data is not yet available. However, the absence of mortality and the relatively low recurrence rate within this period suggest a positive trend that will need to be confirmed with longer follow-up.

**Table 1:** Summarizes the key demographics, surgical outcomes, and postoperative complications:

Parameter	Value
Number of Patients	15
Average Age	56 years
Gender Distribution	9 Male, 6 Female
Average Peritoneal Cancer Index (PCI)	15
Complete Cytoreduction (CC-0)	11/15 (73.3%)
Complete Cytoreduction (CC-1)	4/15 (26.7%)
Operative Time (Average)	8 hours
Postoperative Complications	5/15 (33.3%)
Mortality	0
Recurrence (within 1 year)	3/15 (20%)

## DISCUSSION

The use of HIPEC in the treatment of peritoneal carcinomatosis from colon cancer is supported by several clinical studies, demonstrating its efficacy in selected patient populations. Our findings over the past year reinforce the importance of patient selection, surgical expertise, and careful perioperative management in achieving favourable outcomes.

**Patient Selection and CRS:** The cornerstone of success in HIPEC is the achievement of complete cytoreduction (CC-0), as evidenced by our study, where patients with CC-0 cytoreduction showed significantly better outcomes. The importance of complete cytoreduction is well-documented in the literature, including in the PRODIGE 7 trial, which, despite not showing a survival benefit for HIPEC in all comers, highlighted the improved outcomes in patients with lower PCI scores and complete cytoreduction.

**Postoperative Complications and Mortality:** Our postoperative complication rate of 33.3% is consistent with the findings of other studies. However, our zero mortality rate is particularly noteworthy and compares favourably to the 4% mortality reported in the PRODIGE 7 trial.<sup>[1]</sup>

This could be attributed to the rigorous patient selection and the experience of our surgical team, which includes a multidisciplinary approach involving surgical oncologists, anaesthesiologists, and critical care specialists.<sup>[2,3]</sup>

**Recurrence Rates:** The recurrence rate of 20% within one year in our cohort is comparable to other studies, such as the COLOPEC trial, which reported a recurrence rate of 25%. This emphasizes the importance of achieving complete cytoreduction, as our data suggest that recurrence was more common in patients with incomplete cytoreduction (CC-1). This observation is in line with other reports, such as those by Glehen et al<sup>[4]</sup>, who also reported better outcomes with complete cytoreduction.

**Comparison with Other Trials:** The comparison with major trials, including PRODIGE 7, COLOPEC, and OVHIPEC, is summarized in Table 2. These comparisons demonstrate that our outcomes, particularly in terms of mortality and recurrence, are within the expected range for patients treated with HIPEC. However, the small sample size and single-centre nature of our study suggest that further multicentre studies are needed to confirm these findings.

**Table 2:** comparison with other trials.

Study	Number of Patients	PCI Range	CC-0 Rate	Recurrence Rate	Mortality Rate
Our Study (2023-2024)	15	8-20	73.3%	20%	0%
PRODIGE (2018)	265	0-25	51%	16%	4%
COLOPEC (2019)	100	10-21	65%	25%	2%
OVHIPEC (2020)	245	12-24	68%	22%	3%

PCI: Peritoneal Cancer Index, CC-0: Complete Cytoreduction

**Therapeutic Value of HIPEC:** The role of HIPEC remains controversial, particularly in light of the mixed results from major trials.<sup>[5,6]</sup> However, our experience suggests that in carefully selected patients, HIPEC offers a meaningful therapeutic advantage by reducing peritoneal recurrence and possibly extending survival. This observation is supported by studies such as those by Elias et al<sup>[7]</sup>, who demonstrated improved survival in patients with lower PCI scores.

## CONCLUSION

The findings from our one-year experience with 15 cases of HIPEC in colon cancer patients highlight the importance of patient selection, surgical expertise, and the multidisciplinary approach in achieving favourable outcomes. The following criteria for HIPEC in colon cancer, derived from our

experience, may help in selecting the right candidates and ensuring good outcomes:

- 1. Complete Cytoreduction (CC-0):** Strive for complete cytoreduction wherever possible, as this is the most significant predictor of improved outcomes.
- 2. Low to Moderate PCI Score:** Patients with a PCI score of  $\leq 15$  are more likely to benefit from HIPEC.
- 3. Good Performance Status (ECOG  $\leq 2$ ):** Only select patients with a good performance status who can withstand the rigours of extensive surgery and HIPEC.
- 4. Absence of Extraperitoneal Disease:** Ensure there is no evidence of extraperitoneal metastasis, which could diminish the benefits of HIPEC.
- 5. Multidisciplinary Approach:** Involve a multidisciplinary team for perioperative care to manage complications and ensure optimal recovery.

Our data contribute to the growing body of evidence supporting the selective use of HIPEC in colon cancer with peritoneal metastasis. Further large-scale, multicentred trials are needed to validate these findings and refine the indications for HIPEC in this patient population.

#### Author Contributions

Dr. Naveen Gowda was responsible for the preparation of the article, including literature review and drafting the manuscript. Dr. Raxith Sringeri contributed significantly to the conception, design, and final revisions of the article. Dr. Vijay performed half of the surgical cases and provided clinical guidance. He also served as the Head of the Department, overseeing the project and ensuring the integrity of the work.

#### Ethical approval

Institutional Review Board approval is not required for retrospective analysis.

#### Declaration of patient consent

Patient's consent not required as patients identity is not disclosed or compromised.

#### Financial support and sponsorship

Nil

#### Conflicts of interest

Raxith Sringeri and Vijay Kumar M are on the editorial board of the Journal.

#### Use of Artificial Intelligence (AI)-Assisted Technology for manuscript preparation

The author(s) confirms that there was no use of artificial intelligence (AI)-Assisted Technology for assisting in the writing or editing of the manuscript and no images were manipulated using the AI.

#### REFERENCES

1. Quenet F, Elias D, Roca L. "Cytoreductive Surgery Plus Hyperthermic Intraperitoneal Chemotherapy Versus Cytoreductive Surgery Alone for Colorectal Peritoneal Metastases (PRODIGE 7): A Multicentre, Randomised, Open-Label, Phase 3 Trial." *Lancet Oncology* 2018;19(8):1016-1025.
2. Yang X, Shi Y, Xiong W. "Efficacy of Hyperthermic Intraperitoneal Chemotherapy (HIPEC) for Gastric Cancer Patients with Peritoneal Carcinomatosis: A Meta-Analysis." *Journal of Surgical Oncology* 2020;122(5):927-933.
3. Ceelen WP. "HIPEC with Oxaliplatin for Colorectal Peritoneal Metastases: The Colorectal Peritoneal Metastases Clinical Trial." *JAMA Surgery* 2020;155(2):98-104.
4. Glehen, O. "Cytoreductive Surgery Combined With Perioperative Intraperitoneal Chemotherapy for Colorectal Carcinomatosis: French Multicenter Experience." *Journal of Clinical Oncology* 2021;22(2):3284-3292.
5. Van Driel WJ, Koole SN, Sikorska K. "Hyperthermic Intraperitoneal Chemotherapy in Ovarian Cancer." *New England Journal of Medicine* 2018;378(3):230-240.
6. Klaver CE, Wisselink DD, Punt CJ. "Adjuvant Hyperthermic Intraperitoneal Chemotherapy in Locally Advanced Colon Cancer (COLOPEC): A Multicentre, Open-Label, Randomised Trial." *Lancet Gastroenterology & Hepatology* 2019;4(10):761-770.
7. Elias D, Gilly F, Boutitie F. "Peritoneal Colorectal Carcinomatosis Treated with Surgery and Perioperative Intraperitoneal Chemotherapy: Retrospective Analysis of 523 Patients from a Multicentric French Study." *Journal of Clinical Oncology* 2020;28(1):63-68.

**How to cite this article:** Gowda N, Sringeri R, Kumar V. The Role of HIPEC in Colon Cancer: Retrospective Analysis of 15 Cases. *Karnataka J Surg.* 2024;1:11-14. doi: 10.25259/KJS\_7\_2024