

# Serious Postoperative Complications Affect Early Recurrence After Cytoreductive Surgery and HIPEC for Colorectal Peritoneal Carcinomatosis

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## INTRODUCTION

The prognosis of patients with peritoneally metastasized colorectal cancer has improved significantly with the introduction of cytoreductive surgery followed by hyperthermic intraperitoneal chemotherapy (CRS+HIPEC). Although a macroscopically complete resection is achieved in nearly every patient, recurrence rates are high. This study aims to identify risk factors for early recurrence, thereby offering ways to reduce its occurrence.

## METHODS

All patients with colorectal peritoneal carcinomatosis treated with CRS+HIPEC and a minimum follow-up of 12 months in April 2014 were analyzed. Patient data were compared between patients with or without recurrence within 12 months after CRS+HIPEC. Risk factors were determined using logistic regression analysis. Postoperative complications were graded according to the Serious Adverse Events (SAE) score, with grade 3 or higher indicating complications requiring intervention.

## RESULTS

A complete macroscopic cytoreduction was achieved in 96% of all patients treated with CRS+HIPEC. Forty-six of 133 patients (35%) developed recurrence within 12 months. SAE $\geq$ 3 after CRS+HIPEC was the only significant risk factor for early recurrence (OR=2.3; p=0.046). Median survival in the early recurrence group was 19.3 months, compared to 43.2 months in the group without early recurrence (p<0.001). Patients with SAE $\geq$ 3 showed a reduced survival compared to patients without such complications (22.1 vs. 31.0 months, respectively, p=0.02).

TABLE 1. Baseline Characteristics

Variable	Early Recurrence (%)	No Early Recurrence (%)	P value
Gender male	19 (41.3)	38 (43.7)	0.79
Age at HIPEC (years)	63.0 (24.3-77.9)	61.1 (37.7-77.1)	0.20
Metachronous presentation	22 (47.8)	31 (35.6)	0.17
Primary Location			
Right	21 (45.7)	26 (29.9)	0.10
Sigmoid	12 (26.1)	34 (39.1)	
Rectum	8 (17.4)	13 (14.9)	
Tumor differentiation			
Good	6 (13.0)	6 (6.9)	0.12
Moderate	20 (43.5)	46 (52.9)	
Poor	5 (10.9)	19 (21.8)	
Signet cell	5 (10.9)	3 (3.4)	
T4	22 (47.8)	44 (50.6)	0.93
N2	19 (41.3)	35 (40.2)	0.75
Neo-adjuvant chemotherapy	7 (15.2)	14 (16.1)	0.90
Adjuvant chemotherapy	38 (82.6)	66 (75.9)	0.37
Type of recurrence			
Locoregional	17 (37.0)	15 (17.1)	0.58
Systemic	15 (32.6)	8 (9.2)	
Both	14 (30.4)	13 (14.9)	

TABLE 2. Operative Outcomes

Variable	Early Recurrence (%)	No Early Recurrence (%)	P value
PCI-score	9.8 $\pm$ 5.5	8.0 $\pm$ 4.7	0.051
R-score			
1	43 (93.5)	85 (97.7)	0.34
2a	3 (6.5)	2 (2.3)	
Procedure time (minutes)	386 $\pm$ 71	367 $\pm$ 76	0.15
Blood loss (ml)	1000 (250-4000)	700 (100-6600)	0.09
SAE-grade $\geq$ 3	17 (37.0)	16 (18.4)	0.02
Intra-abdominal complication	13 (28.3)	11 (12.6)	0.03
Re-operation	8 (17.4)	11 (12.6)	0.46
Hospital stay (days)	13 (7-84)	10 (4-79)	0.003

TABLE 3. Risk Factors for Early Recurrence

Variable	Early Recurrence	No Early Recurrence	P value	Odds Ratio	95% C.I.
SAE $\geq$ 3	17 (37.0)	16 (18.4)	0.046	2.3	1.02-5.30
PCI-score	9.8 $\pm$ 5.5	8.0 $\pm$ 4.7	0.13	1.1	0.98-1.14

FIGURE 1. Kaplan-Meier Early Recurrence vs. No Early Recurrence

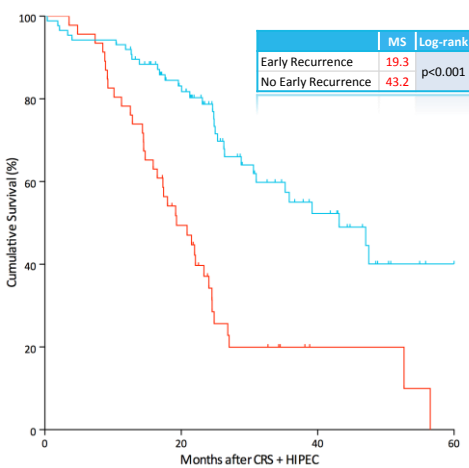
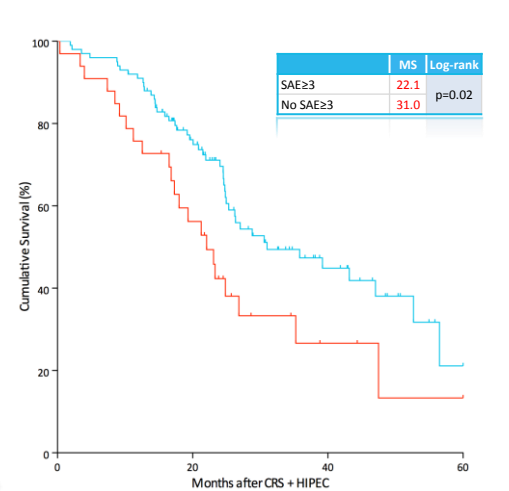


FIGURE 2. Kaplan-Meier SAE $\geq$ 3 vs. No SAE $\geq$ 3



## CONCLUSION

Early recurrence after CRS+HIPEC is associated with a significant reduction in overall survival. This study identifies post-operative complications requiring intervention as the only significant risk factor for early recurrence, independent of the extent of peritoneal disease, highlighting the importance of minimizing the risk of post-operative complications.