



PREDICTIVE FACTORS OF POST-OPERATIVE ACUTE KIDNEY INJURY AFTER CYTOREDUCTIVE SURGERY WITH HYPERTHERMIC INTRAPERITONEAL CHEMOTHERAPY IN PATIENTS WITH PERITONEAL CARCINOMATOSIS: A RETROSPECTIVE COHORT STUDY



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Introduction

Cytoreductive surgery (CRS) is a major oncological surgery which consists of extensive tumor debulking, peritonectomy, and multiple visceral resections. In hyperthermic intraperitoneal chemotherapy (HIPEC), chemotherapeutic drugs are given intraoperatively into the peritoneal cavity. Hyperthermia enhances the tissue penetration of the administered drug and the sensitivity of cancer cells to chemotherapy. In centers performing CRS-HIPEC procedures, a significant survival benefit was observed. However, the rate of post-operative complications remain high. Acute kidney injury is a post-operative complication associated with increased morbidity and mortality and may cause delay in adjuvant chemotherapy or worse, may render the patient ineligible to receive systemic chemotherapy. The identification of modifiable and non-modifiable risk factors for AKI after CRS-HIPEC was needed because this complication appears to be the strongest predictor of overall patient morbidity.

Methodology

STUDY POPULATION

The study included adult Filipino patients with peritoneal carcinomatosis from colorectal, appendiceal, gastric, gynecologic cancers, and primary peritoneal mesothelioma who underwent cytoreductive surgery with hyperthermic intraperitoneal chemotherapy between January 2012 and December 2021 at St. Luke's Medical Center Quezon City and Global City. Data were obtained retrospectively through review of electronic medical records after all eligible subjects had been identified.

DATA ANALYSIS

Determination of predictors to AKI was analyzed using univariate and multivariate statistics. Chi square test and logistic regression were used in the univariate analysis. Crude odds ratio and the 95% confidence interval was also calculated. Multiple logistic regression was utilized in the multivariate analysis, level of significance will be set at $\alpha = 0.10$.

Results and Discussion

A total of 161 patients who met the inclusion criteria were included. The highest number of patients were middle-aged (52%), females (83%), with normal body mass index (56%), with ECOG PS 1 (99%), and without comorbidities (52%). The most common malignancy gynecologic in origin (63%) with high tumor grade (58%) and were given intraperitoneal cisplatin (68%).

Elderly patients (OR 2.70 [95% CI 0.88-8.29]; $p = 0.043 < 0.05$); with comorbidities (OR 6.52 [95% CI 3.2-13.2]; $p = 0.001 < 0.05$); who given intraperitoneal cisplatin (OR 3.99 [95% CI 1.99-8.03]; $p = 0.001 < 0.05$) were all found to be at a higher risk for developing acute kidney injury after CRS-HIPEC.

Characteristics	AKI				
	No	Yes	Total	OR(CI)	p
Age					
18-35 years old	9(6)	7(4)	16(10)	0.78(0.29-2.09)	0.618
36-59 years old	40(25)	43(27)	83(52)	1.38(0.47-4.06)	0.556
≥ 60 years old	20(12)	42(26)	62(38)	2.70(0.88-8.29)	0.043*
Sex					
Male	16(10)	11(7)	27(17)	0.69(0.32-1.48)	0.339
Female	53(33)	81(50)	134(83)	2.22(0.96-5.16)	2.223
BMI					
Normal	39(24)	51(32)	90(56)	1.31(0.86-1.98)	0.207
Overweight	30(19)	40(24)	70(43)	1.02(0.54-1.92)	0.952
Obese	0(0)	1(1)	1(1)	0.32(0.26-1.11)	0.987
ECOG					
0	1(1)	0(0)	1(1)	0.04(0.01-0.99)	0.987
1	68(42)	92(57)	160(99)	0.28(0.01-1.87)	0.987
Co-Morbidities					
No	53(33)	31(19)	84(52)	0.59(0.38-0.91)	0.018*
Yes	16(10)	61(38)	77(48)	6.52(3.2-13.2)	0.001*
Medications					
No	53(33)	31(19)	84(52)	0.59(0.38-0.91)	0.018*
Yes	16(10)	61(38)	77(48)	6.52(3.2-13.2)	0.001*

Table 1. Baseline Characteristics of Peritoneal Carcinomatosis Patients under Cytoreductive Surgery with Hyperthermic Intraperitoneal Chemotherapy (CRS-HIPEC)

	AKI				
	No	Yes	Total	OR(CI)	p
Cancer					
Colorectal	15(9%)	15(9%)	30(18%)	1.17(0.32-4.30)	0.817
Appendiceal	5(3%)	5(3%)	10(6%)	1.16(0.22-6.08)	0.855
Gastric	4(3%)	3(2%)	7(5%)	0.88(0.13-5.58)	0.888
Gynecologic	38(24%)	63(39%)	101(63%)	1.93(0.61-6.18)	0.266
Others	7(4%)	6(4%)	13(8%)	0.86(0.29-2.55)	0.782
Tumor grade					
Low	10(6%)	10(6%)	20(12%)	1.00(0.42-2.40)	0.999
Moderate	21(13%)	28(17%)	49(30%)	1.33(0.47-3.78)	0.589
High	38(24%)	54(34%)	92(58%)	1.42(0.54-3.75)	0.478
Neoadjuvant Chemotherapy					
No	68(42%)	92(57%)	160(99%)	0.28(0.01-1.87)	0.987
Yes	1(1%)	0	1(1%)	0.32(0.26-1.11)	0.987
Extra-Abdominal Disease					
No	49(30%)	55(34%)	104(64%)	1.12(0.76-1.65)	0.557
Yes	20(12%)	37(23%)	57(35%)	1.65(0.85-3.21)	0.142
Chemotherapy					
Cisplatin	35(22%)	74(46%)	109(68%)	3.99(1.99-8.03)	0.001*
Mitomycin	26(16%)	13(8%)	39(24%)	0.27(0.13-0.58)	0.001*
Oxaliplatin	9(6%)	5(3%)	14(9%)	0.38(0.12-1.20)	0.009*

Table 2. Tumor and Intraoperative Variables of Peritoneal Carcinomatosis Patients under Cytoreductive Surgery with Hyperthermic Intraperitoneal Chemotherapy (CRS-HIPEC)

Conclusion

The investigation noted that advanced age and presence of comorbidities were found to be associated with the highest risk of developing post-operative acute kidney injury after CRS-HIPEC. The study also noted that the use of cisplatin as intraperitoneal chemotherapy had a higher risk of developing acute kidney injury compared to other medications. Clinicians must provide extra assessment and careful planning for these patients because they have a higher risk of developing acute kidney injury after CRS-HIPEC.

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Baseline Demographics

