Infections after colorectal cancer surgery and the patient survival

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Introduction and purpose

Colorectal cancer surgery procedures are associated with a high incidence of postoperative infectious complications. The most frequent are surgical site infections. Infections cause high morbidity, prolong hospitalization and may also be connected with short and long term postoperative survival. Interleukins IL6 and IL8 are growth factors for colorectal carcinoma. The cytokine release is caused by surgery, infections and blood transfusion. High interleukin levels in the peritoneal fluid after surgery may provide a milieu conductive to local infection and recurrence of the malignancy. We have analysed a group of patients with colorectal carcinoma surgery, postoperative infection complications and long term survival.

Methods

The study was retrospective. We followed patients with colorectal carcinoma who had elective surgery over a 28-month period (from September 2006 to December 2008). Some patients had preoperative radiotherapy and/or chemotherapy. We recorded postoperative infections in 30 days, including surgical site infections, pneumonia, urinary tract infections, central venous catheter infections and sepsis. We used definitions of infections by Centers for disease control and prevention. We followed their survival after one and after four years.

Logistic regression analysis was used to predict the probability of infection. The survival analysis was performed using the Kaplan-Meier method and differences among the patient groups were tested by the long-rank test. Prognostic factors were investigated by univariate and multivariate Cox proportional hazard model. The p-values under 0.05 (two-sided) were considered statistically significant.

Results

189 patients were included in our study. 110 were male and 79 female. The average age was 64.8 years (34 to 87 years). 116 patients had rectum resection, 64 colon and 9 recurrent cancer resection. 113 patients were treated with either radiotherapy or chemotherapy prior to surgery. 56 patients (29,6%) developed an infectious complication. 44 patients had surgical site infection (23.2%). Intraoperative blood loss was an important risk factor for infection in univariate analysis (p=0.02) and in multiple logistic regression (p=0.037, OR 2.13, 95% CI 1.05-4.32). One-year survival of the whole group was 93% and the four-year one 68%. Four-year survival was significantly higher in the group without infection (73.9%) as compared to the group with infection (54.0%). P value in log-rank test was 0.002. Multivariate analysis showed that postoperative infection was an independent factor associated with a worse survival (p=0.005, HR 2.27, 95% CI 1.28-4.01). Age, number of metastatic nodes and preoperative carcinoembryonic antigen value were also significantly associated with four-year survival, while the intraoperative transfusion (p=0.184) was not.

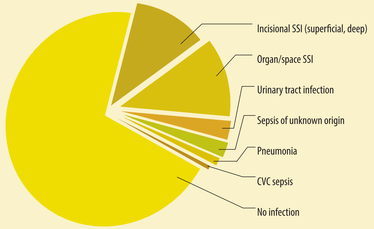

Figure 1: Groups of patients with different infections and no infection

	Univariate analysis			Multivariate analysis		
	HR	95% CI	p	HR	95% CI	p
Age(years)	1,03	1.01-1.06	0,013	1,04	1.02-1.07	0,002
ASA*II (vs I)	3,04	0.93-9.90	0,065			
ASA III (vs I)	3,85	1.09-13.65	0,037			
ASA IV(vs I)	11,07	3.04-40.29	<0.001			
Preoperative chemotherapy (yes vs no)	1,15	0.69-1.93	0,584			
Colon surgery (vs rectum)	1,08	0.61-1.92	0,786			
Recidiv surgery (vs rectum)	3,23	1.42-7.31	0,005			
Tumour stage T1 (vs T0)	1,63	0.42 - 6.30	0,479			
T2 (vs T0)	3,96	1.23-12.74	0,021			
Lymph node metastasis N1 (vs N0)	2,74	1.47-5.11	0,001	2,34	1.22-4.51	0,011
N2 (vs N0)	5,26	2.80-9.91	<0.001	5,70	2.87-11.32	<0.001
Preoperative CEA[§] (10 µg/l)	1,02	1.00-1.03	0,012	1,02	1.00-1.04	0,011
Intraoperative PRBC[¶] transfusion (dcl)	1,05	1.00-1.10	0,044	1,04	0.98-1.10	0,184
Postoperative infection (yes vs no)	2,21	1.32 - 3.71	0,003	2,27	1.28-4.01	0,005

Table: Factors affecting prognosis determined by Cox analysis

*American Society of Anesthesiologists

[§]carcinoembrionic antigen

[¶]packed red blood cells

HR=hazard ratio

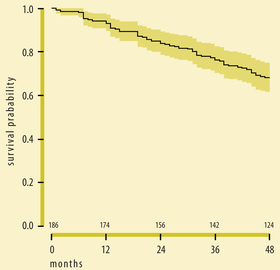

Figure 2:
Four-year survival rate in the whole group of patients after colorectal surgery

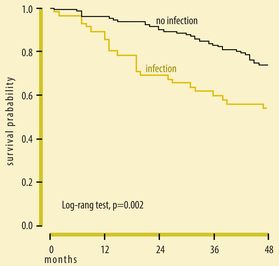

Figure 3:
Four-year survival rate in the group of patients with and without postoperative infection

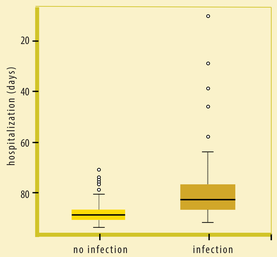

Figure 4:
Box plot (with interquartile range) of duration of hospitalization in the group of patients with infection and no infection

Conclusions

Postoperative infections after colorectal carcinoma surgery not only affect the short term results of treatment, but also the long term oncologic outcomes. The aim is to reduce the risk factors for infections as much as possible.

Key words

colorectal carcinoma, infection, survival.

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