HIPEC treatment of peritoneal carcinomatosis in colorectal and gastric cancer

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Cytoreductive surgery and HIPEC in treatment of colorectal peritoneal carcinomatosis: Experiment or standard care? A survey among oncologic surgeons and medical oncologists

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Abstract

Background
Controversy still exists regarding the position of cytoreductive surgery (CRS) combined with hyperthermic intraperitoneal chemotherapy (HIPEC) in patients with peritoneal metastasis of colorectal carcinoma. The goal of the current study was to evaluate the opinions about this treatment among Dutch oncologic surgeons and medical oncologists.

Methods
An online survey was sent to all known Dutch oncologic surgeons (n = 459) and medical oncologists (N = 363) representing the respective departments of 84 hospitals. A comparison was made between surgeons and oncologists.

Results
185 eligible responses were received from 71 hospitals, resulting in a response rate of 23% for individuals and a response rate of 85% for hospitals. Overall, 65% of respondents regarded CRS + HIPEC as effective with sufficient evidence, 29% responded that CRS + HIPEC is probably effective without sufficient evidence, and 7% of respondents regards HIPEC as probably ineffective. Medical oncologists were less convinced of the effectiveness of CRS + HIPEC than surgeons (P = 0.006). Of all the respondents, 68% indicated that they regard CRS + HIPEC as a standard treatment for patients with peritoneal dissemination of colorectal carcinoma (77% of surgeons versus 54% of oncologists, P = 0.001). Additionally, 68% of respondents regard CRS + HIPEC as potentially curative (77% of surgeons versus 54% of oncologists, P = 0.001).

Conclusions
Approximately 30% of physicians who treat colorectal carcinoma do not regard CRS + HIPEC as standard care. Surgeons appear to be significantly more in favor of this treatment than medical oncologists. This study shows that efforts should be made to improve knowledge and increase acceptance of CRS + HIPEC in colorectal cancer treatment among medical oncologists and surgeons.
Background

Until a few decades ago, peritoneal dissemination of colorectal cancer was regarded as a sign of systemic disease unsuitable for surgical treatment and was treated with palliative chemotherapy only. Following the pioneering work of Sugarbaker, the concept of treatment of peritoneal carcinomatosis has radically changed. As it was observed that in a number of patients the peritoneum was the only disease manifestation, loco regional surgical therapy was introduced in the form of cytoreductive surgery (CRS) combined with hyperthermic intraperitoneal chemotherapy (HIPEC). Ever since, HIPEC has gradually gained an established role in the treatment of colorectal cancer.

The benefit of CRS + HIPEC has been reported in the literature in a large number of patient series showing an efficacy equal to that of intraperitoneal mitomycin and oxaliplatin. Most studies are non-randomized cohort studies; the only randomized trial, that of Verwaal et al., unequivocally showed a significant survival benefit for patients treated with HIPEC compared with palliative chemotherapy. Despite the evidence, acceptance of HIPEC within the surgical and oncologic community shows a wide variation and there is an on-going debate regarding its efficacy. Controversy regarding the indications remains, which is reflected in differences in national guidelines for the treatment of colorectal cancer and differences in the numbers of patients treated between individual hospitals, regions and countries.

The goal of the current study was to investigate opinions among oncologic surgeons and medical oncologists treating colorectal cancer in the Netherlands on the role of CRS + HIPEC in the treatment of patients with peritoneal disseminated colorectal cancer.

Methods

In the period from January to March 2014, an online questionnaire (Appendix A) was sent to all registered oncologic/gastroenterologic surgeons and medical oncologists in The Netherlands. In total, 822 questionnaires were sent to 459 surgeons and 363 medical oncologists representing all 84 hospitals in The Netherlands. The questionnaire included 10 general multiple choice questions to assess opinions about the effectiveness, risk of complications, and estimated 5-year survival following CRS + HIPEC in peritoneal carcinomatosis of colorectal origin, and which malignancies with peritoneal
carcinomatosis are suitable for CRS + HIPEC. A separate question was included about the estimated risk of peritoneal carcinomatosis in T4 cancer. Additionally, three hypothetical case histories (Appendix B), derived from three clinical cases in 2013, were simultaneously presented with various treatment options. The cases were presented as if they were occurring when the respondent was responding to the survey. For surgeons, an extra multiple choice question on intraoperative decisions was included for each case. Four and eight weeks following the initial mailing of the questionnaire a reminder was send to non-respondents. The closing date of the survey was May 2014, and the results were subsequently analyzed.

Statistical analysis was performed using SPSS Statistics version 21. Comparison between surgeons and medical oncologists was performed using chi-squared analysis, with linear by linear association in the case of ordered categorical data. A separate analysis was performed using a random selected respondent per hospital to detect possible bias due to differences in response rates within hospitals.

Results

A total of 240 responses from 76 different hospitals was received; 23 respondents declined participation or indicated that a colleague would answer on behalf of them or their department. Additionally, 31 respondents indicated that they did not treat colorectal cancer patients, and one oncologist treating colorectal cancer indicated that he was not aware of the possibility of CRS + HIPEC. After exclusion of these respondents, 185 respondents from 71 hospitals were eligible for analysis, resulting in overall response rates of 23% for individuals and 85% for hospitals. The response rates for surgeons and medical oncologists were 24% and 20%, respectively. At least one response was received from 57 (68%) surgical departments (8 academic hospitals, 32 non-academic teaching hospitals, and 17 non-teaching hospitals) and 49 (58%) oncologic departments (6 academic hospitals, 26 non-academic teaching hospitals, and 17 non-teaching hospitals).

An overview of the characteristics of the respondents is given in Table 1. The majority of respondents worked in a non-academic teaching hospital (57%) and the remainder worked in an academic hospital (20%) or non-teaching hospital (23%). These proportions were not different between oncologists and surgeons ($P = 0.30$). In total, 72% of respondents were male. There were significantly more male respondents
among surgeons than medical oncologists (81 versus 58%, \( P = 0.001 \)). Eleven surgeons (10%) performed HIPEC procedures themselves, 52 (47%) and 46 (41%) surgeons indicated that they had referred 1–5 or more than 5 patients, respectively. Two surgeons responded that they had not referred patients because they had never had suitable candidates. None of the surgeons never considered HIPEC treatment. Among medical oncologists, 40 (56%) and 19 (26%) respondents had referred 1–5 or more than 5 patients, respectively. Four respondents (2%) indicated that they had never considered HIPEC treatment, and 11 respondents (6%) indicated that they had never had a suitable candidate. This distribution was significantly different between medical oncologists and surgeons \( (P < 0.001) \). Table 2 shows significant differences between surgeons and medical oncologists regarding the responses to questions on the position of CRS + HIPEC in colorectal peritoneal carcinomatosis treatment.

**Table 1, Respondent characteristics**

<table>
<thead>
<tr>
<th></th>
<th>Overall (%)</th>
<th>Surgeons (%)</th>
<th>Oncologists (%)</th>
<th>( P ) value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Response rate</td>
<td>185 (23)</td>
<td>112 (24)</td>
<td>73 (20)</td>
<td>0.15</td>
</tr>
<tr>
<td>Sex</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>133 (72)</td>
<td>91 (81)</td>
<td>42 (58)</td>
<td>0.001</td>
</tr>
<tr>
<td>Female</td>
<td>52 (28)</td>
<td>21 (19)</td>
<td>31 (43)</td>
<td></td>
</tr>
<tr>
<td>Hospital type</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Academic</td>
<td>37 (20)</td>
<td>22 (20)</td>
<td>15 (21)</td>
<td>0.30</td>
</tr>
<tr>
<td>Teaching</td>
<td>105 (57)</td>
<td>68 (61)</td>
<td>37 (51)</td>
<td></td>
</tr>
<tr>
<td>Non-teaching</td>
<td>43 (23)</td>
<td>22 (20)</td>
<td>21 (29)</td>
<td></td>
</tr>
</tbody>
</table>

Figures 1 and 2 depict estimates of the complication rate after HIPEC treatment and estimates of the 5-year survival rates, respectively, following CRS + HIPEC in CRC patients. Surgeons estimates of severe complication rates were significantly higher than those of medical oncologists \( (P = 0.02) \). The median estimated rate of complications from medical oncologists was 20–30% (IQR 10–50%) and that from surgeons was 30–40% (IQR 20–60%). Estimation of the 5-year survival rate did not differ significantly between oncologists and surgeons. The median estimate of 5-year survival was 20–30% from oncologists (IQR 20–40%) and 30–40% from surgeons (IQR 20–40%).
### Table 2, Position of HIPEC in colorectal cancer with PC

<table>
<thead>
<tr>
<th>Opinion about effectiveness and related evidence</th>
<th>Overall (%)</th>
<th>Surgeons (%)</th>
<th>Oncologists (%)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Insufficient evidence, probably not much effect</td>
<td>12 (7)</td>
<td>6 (6)</td>
<td>6 (9)</td>
<td>0.006</td>
</tr>
<tr>
<td>Insufficient evidence, probably effective</td>
<td>52 (29)</td>
<td>23 (21)</td>
<td>29 (41)</td>
<td></td>
</tr>
<tr>
<td>Sufficient evidence for its effect</td>
<td>117 (65)</td>
<td>81 (74)</td>
<td>39 (51)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Regards HIPEC as standard treatment in limited PC</th>
<th>Overall (%)</th>
<th>Surgeons (%)</th>
<th>Oncologists (%)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>123 (68)</td>
<td>84 (77)</td>
<td>39 (54)</td>
<td>0.001</td>
</tr>
<tr>
<td>No</td>
<td>58 (32)</td>
<td>25 (23)</td>
<td>33 (46)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Quantification of effect of HIPEC</th>
<th>Overall (%)</th>
<th>Surgeons (%)</th>
<th>Oncologists (%)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not very effective</td>
<td>7 (4)</td>
<td>2 (2)</td>
<td>5 (7)</td>
<td>0.001</td>
</tr>
<tr>
<td>Palliative, symptom treating</td>
<td>5 (3)</td>
<td>2 (2)</td>
<td>3 (4)</td>
<td></td>
</tr>
<tr>
<td>Palliative, life prolonging</td>
<td>46 (26)</td>
<td>21 (19)</td>
<td>25 (35)</td>
<td></td>
</tr>
<tr>
<td>Potentially curative</td>
<td>122 (68)</td>
<td>84 (77)</td>
<td>38 (54)</td>
<td></td>
</tr>
</tbody>
</table>

### Figure 1, Estimation of severe complications (%) following CRS + HIPEC
Estimation of the development of PC after T4 colorectal carcinoma resection also did not differ significantly between oncologists and surgeons ($P = 0.21$, Figure 3). The median estimate of PC risk was 20–30% (IQR 20–40%) from surgeons and 30–40% (IQR 20–40%) from oncologists.

Medical oncologists and surgeons differed in their opinion on peritoneal malignancies suitable for HIPEC treatment. Surgeons were significantly more in favor of HIPEC treatment in patients with colon cancer (99 versus 90%, $P = 0.004$), appendiceal cancer (91 versus 51%, $P < 0.001$), stomach cancer (22 versus 7%, $P = 0.008$), and pseudomyxoma peritonei (89 versus 65%, $P < 0.001$) (Figure 4). Medical oncologists were significantly more in favor of HIPEC treatment in ovarian cancer than surgeons (58 versus 42%, $P = 0.04$).
**Figure 3**, Estimation of risk for peritoneal carcinomatosis after resection of T4 carcinoma (%)

**Figure 4**, Malignancies potentially suitable for HIPEC (%)

A separate analysis with a randomly selected respondent from each of the hospital departments which responded showed similar results to those presented above (data not shown). Comparison between hospital types showed a significant difference in the responses regarding whether patients with PC of mesothelioma are suitable for HIPEC treatment; 42% of academic respondents regarded this malignancy as suitable for CRS + HIPEC compared with only 16 and 14% of respondents in non-academic teaching and non-teaching hospitals, respectively ($P = 0.002$). On the question of whether CRS + HIPEC can be regarded as the standard treatment in peritoneal metastasis of colorectal cancer, 96% of academic surgeons confirmed this statement, while only 79 and 52% of surgical respondents from non-academic teaching and from non-teaching hospitals confirmed this statement ($P = 0.003$). Similarly, significantly more academic surgeons responded that CRS + HIPEC is effective with sufficient evidence (96%) than surgeons in non-academic teaching (70%) or non-teaching (62%) hospitals ($P = 0.044$). Additionally, 0, 5, and 14% of surgical respondents from academic, non-academic teaching, and non-teaching hospitals, respectively, regarded CRS + HIPEC as probably ineffective with insufficient evidence for possible effect.

Case histories
Each of the three cases involved a patient with cecal carcinoma and no comorbidity. In the first two cases, the patient had a synchronous resectable omental metastasis, and in the third case, the patient had resectable synchronous parietal peritoneal metastasis. The first and third cases were 65 years old and the second case was 80 years old. In the first case, 22 surgeons (21%) decided not to resect the primary tumor, all of whom chose HIPEC as the postoperative treatment. 84 surgeons (79%) chose to resect the primary tumor combined with a (partial) omentectomy. The results of the postoperative treatment following resection, and the medical oncologists’ responses to the same question are shown in Table 3.

In case 2, seven surgeons (7%) selected the option of no primary resection and subsequently chose referral for HIPEC treatment. 97 respondents (93%) selected primary tumor resection. The subsequent postoperative treatment is shown in Table 3. In case 3, 40 surgeons (41%) decided not to resect the primary tumor and to subsequently refer the patient for a primary HIPEC procedure. The decisions regarding postoperative treatment following resection during the primary operation, with a comparison between surgeons and medical oncologists, is shown in Table 3.
Table 3, Postoperative treatment in case histories

<table>
<thead>
<tr>
<th>Case 1, 65 year-old male, treatment after resection of cecal cancer with omental metastasis (T3N0M1)</th>
<th>Overall (%)</th>
<th>Surgeons (%)</th>
<th>Oncologists (%)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Follow-up</td>
<td>20 (13)</td>
<td>9 (11)</td>
<td>11 (16)</td>
<td>0.50</td>
</tr>
<tr>
<td>Adjuvant chemotherapy</td>
<td>49 (31)</td>
<td>27 (32)</td>
<td>22 (31)</td>
<td></td>
</tr>
<tr>
<td>Palliative chemotherapy</td>
<td>4 (3)</td>
<td>1 (1)</td>
<td>3 (4)</td>
<td></td>
</tr>
<tr>
<td>HIPEC</td>
<td>82 (53)</td>
<td>47 (56)</td>
<td>35 (49)</td>
<td></td>
</tr>
<tr>
<td>Case 2, 80 year-old male, treatment after resection of cecal cancer with omental metastasis (T3N0M1)</td>
<td>Overall (%)</td>
<td>Surgeons (%)</td>
<td>Oncologists (%)</td>
<td>P value</td>
</tr>
<tr>
<td>Follow-up</td>
<td>99 (59)</td>
<td>57 (59)</td>
<td>42 (59)</td>
<td>0.55</td>
</tr>
<tr>
<td>Adjuvant chemotherapy</td>
<td>52 (31)</td>
<td>28 (29)</td>
<td>24 (34)</td>
<td></td>
</tr>
<tr>
<td>Palliative chemotherapy</td>
<td>6 (4)</td>
<td>5 (5)</td>
<td>1 (1)</td>
<td></td>
</tr>
<tr>
<td>HIPEC</td>
<td>11 (7)</td>
<td>7 (7)</td>
<td>4 (6)</td>
<td></td>
</tr>
<tr>
<td>Case 3, 65 year-old male, treatment after resection of cecal cancer with parietal metastases (T3N0M1)</td>
<td>Overall (%)</td>
<td>Surgeons (%)</td>
<td>Oncologists (%)</td>
<td>P value</td>
</tr>
<tr>
<td>Follow-up</td>
<td>10 (8)</td>
<td>1 (2)</td>
<td>9 (13)</td>
<td>0.09</td>
</tr>
<tr>
<td>Adjuvant chemotherapy</td>
<td>19 (15)</td>
<td>9 (15)</td>
<td>10 (14)</td>
<td></td>
</tr>
<tr>
<td>Palliative chemotherapy</td>
<td>4 (3)</td>
<td>1 (2)</td>
<td>3 (4)</td>
<td></td>
</tr>
<tr>
<td>HIPEC</td>
<td>97 (75)</td>
<td>48 (81)</td>
<td>49 (69)</td>
<td></td>
</tr>
</tbody>
</table>

Discussion

This study assessed opinions among medical oncologists and surgeons in The Netherlands regarding the position of cytoreductive surgery and HIPEC in the treatment of peritoneal carcinomatosis. Distinct differences were found between the two groups. Medical oncologists appear to be less in favor of CRS + HIPEC than surgeons as only 54% of oncologists regard CRS + HIPEC as a standard treatment for patients with peritoneal metastases of colorectal cancer, compared with 77% of surgical respondents. 68% of all physicians regard CRS + HIPEC as a potentially curative treatment, while 32% do not regard CRS + HIPEC as potentially curative. Medical oncologists seem to be less convinced of the efficacy of CRS + HIPEC than surgical oncologists.

Recently, Spiegle et al. performed a survey of physicians’ awareness of CRS + HIPEC in Ontario, Canada among 214 general surgeons and medical oncologists. Their main finding was that only 46% of physicians were aware of this treatment option for colorectal cancer patients. Additionally, they found that, in patients with pseudomyxoma, medical
oncologists were less likely than general surgeons to consider CRS + HIPEC. The authors concluded that educational programs should be initiated to increase awareness of CRS + HIPEC among patients and physicians. In The Netherlands, awareness of CRS + HIPEC is high: only one oncologist treating CRC (0.4%) indicated that he was not aware of CRS + HIPEC as a possible treatment option. This high level of awareness may partly be explained by the fact that the first randomized controlled trial of CRS + HIPEC in CRC patients was performed in The Netherlands. The high level of awareness of the existence of HIPEC unfortunately does not automatically imply sufficient and adequate knowledge of its indications and efficacy.

Although incorporated in the most recent version of the Dutch colorectal cancer treatment guideline as a treatment for patients with limited peritoneal carcinomatosis, 32% of surgical respondents do not regard HIPEC treatment as standard and this percentage increases to 46% among the medical oncologists respondents. Responses to the presented case histories seemed to reveal less difference of opinion between medical oncologists and surgeons, although there was a wide variety of chosen treatment plans between the individual respondents. Consequently, there appears to be a need for a widely accepted and communicated consensus regarding the treatment of peritoneal carcinomatosis of colorectal cancer. Current knowledge of and indications for CRS + HIPEC should be further disseminated and more uniformly applied through multidisciplinary professional and resident training programs. Special efforts should be made to improve the number of expert consultations, especially in rare malignancies, such as appendiceal carcinoma, and pseudomyxoma peritoneal or peritoneal mesothelioma. Aside from the fact that physicians should be made more aware of the benefit of CRS + HIPEC, there should also be increased attention drawn to the mediocre results of therapeutic alternatives, such as palliative chemotherapy, on the survival rates of patients with peritoneal surface malignancies.

Implementation and diffusion of innovations in health care has been extensively researched in social science, and various considerations have been described which influence the dissemination and adoption of innovations. Future research should focus more on individual factors which prevent the acceptance among health professionals of CRS + HIPEC as a treatment for patients with various peritoneal surface malignancies, and the specific interventions which could be used to control these factors. There should be increased attention to the current knowledge about the treatment of peritoneal surface malignancies in the curricula for oncologic surgeons and medical oncologists.
Additionally, there should be an increase in disease- and treatment-specific information on peritoneal surface malignancies in the multidisciplinary cancer guidelines. Increased attention, for example using specific peritoneal surface malignancy sessions or specific oral presentations, in multidisciplinary congresses may also aid in the further dissemination of current knowledge of peritoneal surface malignancy treatment.

Although many (inter)national guidelines still do not mention CRS + HIPEC, in recent years, an increasing number have incorporated this treatment option. However, indications and clinical recommendations are frequently not well defined. In the most recent Dutch multidisciplinary colorectal cancer guideline, in addition to the statement that selected patients with peritoneal carcinomatosis of colorectal origin are eligible for CRS + HIPEC, additional selection criteria have been specified: restriction of peritoneal dissemination to a maximum of 5 out of 7 abdominal regions, the possibility of achieving complete cytoreduction, and the absence of distant metastases. Furthermore, in patients with synchronous peritoneal dissemination diagnosed intraoperatively, the guidelines recommend that a primary tumor resection should not be performed. Despite this advice, 79 and 60% of surgical respondents to this survey chose to resect the primary tumor in a 65-year-old patient with resectable omental or parietal peritoneal metastases, respectively.

The response rate to this survey is comparable to those of previous surveys performed in similar groups of respondents. However, this study may be limited by the response rate of 23% for individual responders. Although all medical oncologists and surgeons currently treating colorectal cancer in The Netherlands were contacted, the respondents to our survey may be a selection of physicians with a clear opinion of or a special interest in the treatment of peritoneal surface malignancies. The respondents, however, represent 85% of the contacted hospitals, and several respondents indicated that their answers represented the policy of their respective departments. The responses received had a sufficient geographical spread across the country and had a satisfactory distribution of academic, teaching and non-teaching hospitals. Furthermore, there were no differences in these distributions between surgeons and oncologists. A multidisciplinary team approach is nowadays standard practice in colorectal cancer treatment leading to a broad consensus among cancer specialists working in the same hospital. This further substantiates the results of our survey as representative of the current opinions of Dutch physicians about HIPEC treatment for CRC patients.
Conclusions

Although CRS + HIPEC is currently advised in the Dutch guideline for the treatment of colorectal cancer, approximately 30% of physicians who treat colorectal carcinoma still do not regard this treatment as the standard of care. Surgeons appear to be significantly more in favor of this treatment than medical oncologists. This study shows that efforts should be made among medical oncologists and surgeons to improve knowledge and increase acceptance of CRS + HIPEC in colorectal cancer treatment.
Chapter 5

References

Appendix A

Questions
1. Do you treat patients with colorectal carcinoma?
   Yes / No

2. Are you familiar with the HIPEC treatment in patients with peritonitis carcinomatosis of colorectal carcinoma?
   Yes / No

3. Have you ever referred a patient with peritoneal carcinomatosis of colorectal carcinoma for HIPEC?
   No, never considered. / No, but considered in some patients / No, had no candidates / Yes, about 1-5 patients / Yes, more than 5 patients

4. What is your opinion on the effectiveness of HIPEC in peritoneal carcinomatosis of colorectal carcinoma?
   Insufficient evidence of effectiveness and probably ineffective / Insufficient evidence of effectiveness, but probably effective / Sufficient evidence of effectiveness

5. The HIPEC treatment in patients with peritoneal carcinomatosis of limited colorectal cancer is:
   Ineffective / Palliative, treating symptom / Palliative, life prolonging / potentially curative

6. Do you consider HIPEC in patients with limited peritoneal carcinomatosis (PC) of colorectal carcinoma (CRC) as the standard treatment?
   Yes / No

7. How do you assess the five-year survival rate (%) in a patient with peritoneal carcinomatosis CRC treated with complete cytoreduction + HIPEC?
   between:
   0-10 / 10-20 / 20-30 / 30-40 / 40-50 / 50-60 / 60-70 / 70-80 / 80-90 / 90-100
8. Which of the following malignancies with peritoneal metastases are, to your idea, eligible for HIPEC?
None of the following / Colon / appendix / stomach / mesothelioma / ovarian / pancreas / pseudomyxoma / sarcoma / other:

9. How do you assess the complication rate (%) (Grade 3 or higher (Clavien Dindo)) after a HIPEC treatment?
between:
0-10 / 10-20 / 20-30 / 30-40 / 40-50 / 50-60 / 60-70 / 70-80 / 80-90 / 90-100

10. How do you assess the risk of developing peritoneal carcinomatosis after resection of T4 colorectal malignancy?
between:
0-10 / 10-20 / 20-30 / 30-40 / 40-50 / 50-60 / 60-70 / 70-80 / 80-90 / 90-100
Appendix B

Case histories

Only for medical oncologists:

11. CASE 1: 65 year old male patient without co morbidity, with cecal carcinoma (preoperative staging: T3N0M0). Intraoperatively the surgeon saw a resectable metastasis in the omentum of approximately 1 cm. He decided to resect the primary tumor and to perform a (partial) omentectomy. Postoperative staging: T3N0M1, radically removed. What do you recommend this patient postoperatively?
Followup / adjuvant chemotherapy / palliative chemotherapy / Referral for a HIPEC treatment

12. CASE 2: What do you recommend to a patient 80 year old patient (instead of 65), which is otherwise identical as case 1?
Followup / adjuvant chemotherapy / palliative chemotherapy / Referral for a HIPEC treatment

13. CASE 3: 65 year old male patient without comorbidity, with cecal carcinoma (preoperative staging: T3N0M0). Intraoperatively the surgeon saw a few resectable metastases in the parietal peritoneum adjacent to the tumor. He decided to remove the primary tumor and metastasis. Postoperative staging: T3N0M1, radically removed. What do you recommend this patient postoperatively?
Followup / adjuvant chemotherapy / palliative chemotherapy / Referral for a HIPEC treatment

Only for surgeons:

11. CASE 1: 65 year old male patient with no comorbidity, with cecal carcinoma (preoperative staging: T3N0M0). You operate case 1 electively. Intraoperatively you see a resectable metastasis in the omentum of approximately 1 cm. What are you going to do?
Remove only the primary tumor with anastomosis construction / Remove only the primary tumor without anastomosis construction / Remove primary tumor anastomosis construction, plus (partial) omentectomy / Remove primary tumor without anastomosis construction, plus (partial) omentectomy / Construction of a colostomy, without an resections / Stop the operation without intervention
If you have chosen for a resection in the previous question, then regard it as an a radical resection with postoperative staging T3N0M1.

12. What do you recommend this patient postoperatively?
Follow-up / adjuvant chemotherapy / palliative chemotherapy / Referral for a HIPEC treatment

13. CASE 2:
What would you do in case of a 80-year-old patient (instead of 65), which is otherwise identical as case 1?
Remove only the primary tumor with anastomosis construction / Remove only the primary tumor without anastomosis construction / Remove primary tumor with anastomosis construction, plus (partial) omentectomy / Remove primary tumor without anastomosis construction, plus (partial) omentectomy / Construction of a colostomy, without any resections / Stop the operation without intervention

If you have chosen for a resection in the previous question, then regard it as an a radical resection with postoperative staging T3N0M1.

14. What do you recommend this patient postoperatively?
Follow-up / adjuvant chemotherapy / palliative chemotherapy / Referral for a HIPEC treatment

15. CASE 3: 65-year-old male patient with no comorbidity, with cecal carcinoma (preoperative staging: T3N0M0). You operate case 3 electively. Intraoperatively some resectable metastases are seen in the parietal peritoneum adjacent to the tumor. What are you doing?
Remove only the primary tumor with anastomosis construction. / Remove only the primary tumor without anastomosis construction. / Remove primary tumor with anastomosis construction, plus resection of metastases on parietal peritoneum / Remove primary tumor without anastomosis construction, plus resection of metastases on parietal peritoneum / Construction of a colostomy, without any resections. / Stop the operation without intervention

If you have chosen for a resection in the previous question, then regard it as an a radical resection with postoperative staging T3N0M1.
16. What do you recommend this patient postoperatively?
Follow-up / adjuvant chemotherapy / palliative chemotherapy / Referral for a HIPEC treatment