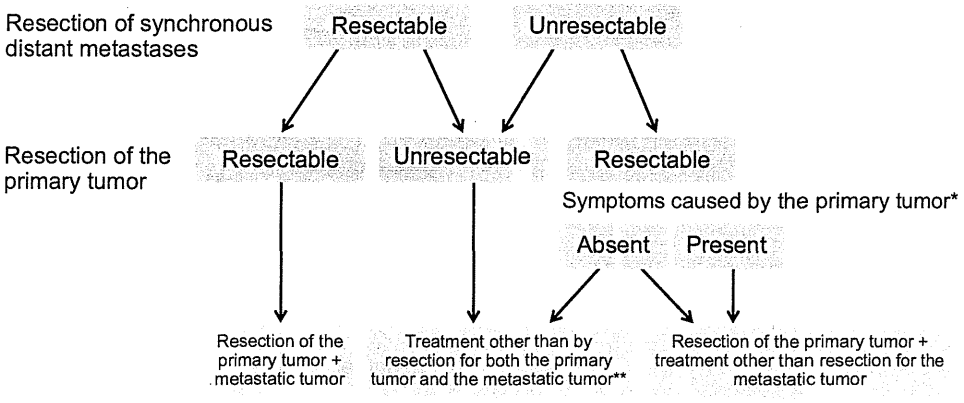


Fig. 3 Treatment strategies for Stage IV colorectal cancer

* Symptoms caused by the primary tumor: Symptoms caused by events such as massive bleeding, severe anemia, penetration / perforation, and stenosis.
** Treatment other than by resection: Palliative surgery for the primary tumor, chemotherapy, radiotherapy; see "treatment strategies for hematogenous metastasis".

Table 9 Incidence of synchronous distant metastasis of colorectal cancer

National registry of patients with cancer of the colon and rectum of the JSCCR: patients in years 2000–2004

	Liver	Lung	Peritoneum	Other sites				
				Bone	Brain	Virchow	Other	Total
Colon cancer	11.8 %	2.2 %	5.7 %	0.3 %	0.0 %	0.1 %	1.3 %	1.8 %
No. of patients 15,391	1,815	338	875	47	6	23	205	281
Rectal cancer	9.5 %	2.7 %	2.6 %	0.5 %	0.0 %	0.1 %	1.1 %	1.7 %
No. of patients 10,221	970	273	266	49	5	6	112	172
Total no. of patients	10.9 %	2.4 %	4.5 %	0.4 %	0.0 %	0.1 %	1.2 %	1.8 %
25,621	2,785	611	1,141	96	11	29	317	453

③ Cases accompanied by distant metastasis to multiple organs

- Typically, these cases involve metastasis to the liver or lungs.
- If it is safe and simple to remove the primary lesion and the metastasized lesions in the liver or lungs, resection should also be considered [35, 36] (CQ-7).

④ Adjuvant therapy subsequent to the resection of distant metastasis

- The efficacy and safety of adjuvant chemotherapy after resection of distant metastases in colorectal cancer have not been established, and no randomized controlled trials have been implemented regarding whether or not this extends survival [37, 38] (CQ-8). Ideally, appropriately planned clinical trials should be conducted.

Chapter 3: Treatment strategies for recurrent colorectal cancer (Fig. 4)

- The purpose of treatment of recurrent colorectal cancer is improvement of prognosis and the patient's QOL.
- Treatment methods include surgery, systemic chemotherapy, arterial infusion chemotherapy, thermal coagulation therapy, and radiotherapy.
- An appropriate treatment method is selected with the informed consent of the patient, taking into consideration a variety of factors, for example prognosis, complications, and QOL expected after treatment.
- If recurrence is observed in a single organ and complete surgical resection of the recurrent tumor(s) is possible, resection is strongly considered.
- If recurrence is observed in more than a single organ, resection can be considered if the recurrent tumors in all of the organs are resectable [35, 39]; however,

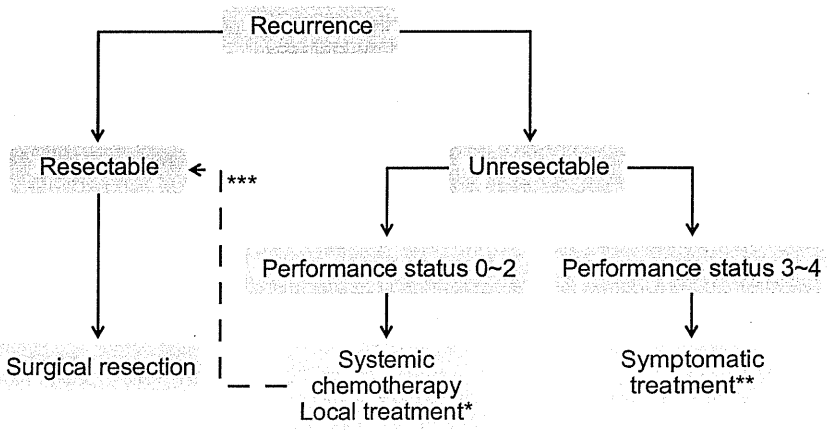


Fig. 4 Treatment strategies for recurrent colorectal cancer

In principle, surgical treatment is indicated for recurrence limited to 1 organ, but it is considered for recurrence in 2 or more organs, if the lesions are resectable.

* Local treatment includes hepatic arterial infusion therapy, thermal coagulation therapy, and radiotherapy.

** Best supportive care (BSC).

***Recurrence may become resectable after successful chemotherapy.

there is no consensus on the effects of treatment (CQ-7).

- Some authors believe that resection of liver or lung metastases should be performed only after a specific period of observation to rule out occult metastases [40].
- Systemic chemotherapy is effective with regard to cases of inoperable liver metastasis, with some cases indicating that curative resection may become possible [41, 42] (CQ-9).
- Treatment methods for hematogenous metastases are discussed in Chapter 4 "Treatment strategies for hematogenous metastases").
- Local recurrences of rectal cancer take the form of anastomotic recurrences and intrapelvic recurrences.

(1) Resection is considered for resectable recurrences.
(2) Radiotherapy and systemic chemotherapy, either alone or in combination, are considered for unresectable recurrences.

Comments

[Local recurrence of rectal cancer]

① The extent of spread of the recurrent tumor is evaluated by diagnostic imaging, and resection is considered only for patients in whom complete resection can be expected, after taking into consideration such factors as the pattern of recurrence, symptoms, and physical findings (CQ-10).

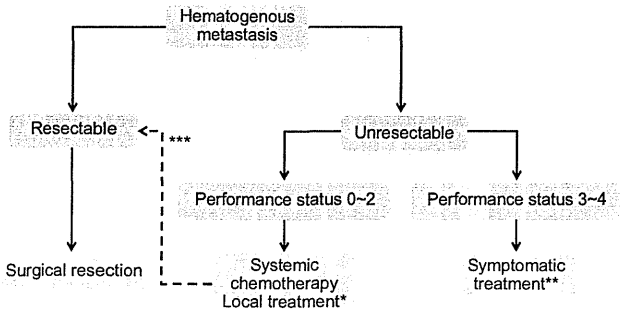
Chapter 4: Treatment strategies for hematogenous metastases (Fig. 5)

1. Treatment strategies for liver metastases

- Treatment of liver metastases is broadly divided into hepatectomy, systemic chemotherapy, hepatic arterial infusion therapy, and thermal coagulation therapy.
- Hepatectomy is recommended for liver metastases when curative resection is possible.
- Hepatectomy consists of systematic resection and partial (non-systematic) resection.
- Indication criteria for hepatectomy

(1) The patient is capable of tolerating surgery.
(2) The primary tumor has been controlled or can be controlled.
(3) The metastatic liver tumor can be completely resected.
(4) There are no extrahepatic metastases or they can be controlled.
(5) The function of the remaining liver will be adequate.

- Systemic chemotherapy is considered for patients with unresectable liver metastases whose general condition can be maintained at a specific level or higher (PS 0 to PS 2).
- Thermal coagulation therapy consists of microwave coagulation therapy (MCT) and radiofrequency ablation (RFA).
- If the patient's general condition is poor (PS $\geq$ 3), or there is no effective chemotherapy, best supportive care (BSC) is provided.



* Local treatment includes hepatic arterial infusion therapy, thermal coagulation therapy, and radiotherapy.
** Best supportive care (BSC).
***Recurrence may become resectable after successful chemotherapy.

Fig. 5 Treatment strategies for hematogenous metastases

Comments

[Hepatectomy]

① There is evidence of the efficacy of hepatectomy for patients who have controllable extrahepatic metastases (mainly lung metastases) in addition to liver metastases [35, 36, 39, 43] (CQ-7).
② The efficacy of systemic chemotherapy and hepatic arterial infusion therapy after hepatectomy has not been established (CQ-8).
③ The safety of preoperative chemotherapy for resectable liver metastases has not been established (CQ-11).

[Treatment methods other than resection]

① Systemic chemotherapy is performed for patients with unresectable liver metastases (CQ-9).
② In cases of inoperable liver metastasis, the primary lesion should, ideally, be managed if hepatic arterial infusion therapy or heat coagulation therapy is being used (CQ-17, CQ-12).
③ Heat coagulation therapy is advantageous in that it is minimally invasive, in addition to having been reported as improving local control and long-term survival in some cases [44, 45]. However, there have not yet been any studies or reports of long-term prognosis involving sufficiently cumulative case studies; consequently, its efficacy has not been established. There is a high incidence of recurrence in comparison with resection, however, and long-term survival is reported to be poor [46], so it is not recommended as an alternative to surgical resection [47] (CQ-12).

2. Treatment strategies for lung metastases

- Treatment of lung metastases consists of pneumonectomy and systemic chemotherapy, and radiotherapy.
- Pneumonectomy is considered if the metastatic lung tumor is resectable.
- Pneumonectomy consists of systematic resection and partial (non-systematic) resection.

Indication criteria for pneumonectomy

(1) The patient is capable of tolerating surgery.
(2) The primary tumor has been controlled or can be controlled.
(3) The metastatic lung tumor can be completely resected.
(4) There are no extrapulmonary metastases or they can be controlled.
(5) The function of the remaining lung will be adequate.

- Systemic chemotherapy is considered for patients with unresectable lung metastases whose general condition can be maintained at a specific level or higher.
- Even if the patient cannot tolerate surgery, stereotactic body radiotherapy is considered if the primary tumor and extrapulmonary metastases are controlled or can be controlled and the number of lung metastases less than 5 cm in diameter is no more than three [48].
- If the patient's general condition is poor, appropriate BSC is provided.

3. Treatment strategies for brain metastases

- Brain metastases are often detected as part of a systemic disease, and surgical therapy or radiotherapy is considered for lesions for which treatment can be expected to be effective.
- The optimum treatment method is selected after considering the patient's general condition and status of other metastatic tumors, and after evaluating the size and location of metastatic brain tumors and the number of brain lesions.
- Radiotherapy is considered for patients with unresectable metastases.

[Surgical therapy]

Indications for brain resection [49]

(1) The patient has a life expectancy of at least several months.
(2) Resection will not cause significant neurological symptoms.

(3) There are no metastases to other organs or they can be controlled.

[Radiotherapy]

- The purpose of radiotherapy is to relieve such symptoms as cranial nerve symptoms and intracranial hypertension symptoms, and to prolong survival time by reducing locoregional relapse.
- Whole-brain radiotherapy is considered for patients with multiple brain metastases and for patients with a solitary brain metastasis for which surgical resection is not indicated.
- Stereotactic irradiation is considered when the number of brain metastases is about no more than three or four and the maximum diameter of each metastasis does not exceed 3 cm.

4. Treatment strategies for hematogenous metastases to other organs

- Resection is also considered for other hematogenous metastases, for example the adrenal glands, skin, and spleen, if they are resectable. However, patients with such metastases often have metastasis to more than one organ, and chemotherapy or radiotherapy is often indicated.

Chapter 5: Chemotherapy

- Chemotherapy consists of adjuvant chemotherapy to prevent postoperative recurrence and systemic chemotherapy to treat unresectable colorectal cancer.
- Commonly used anticancer drugs that have been approved for the indication of colorectal cancer and are covered by Japanese National Health Insurance are:

Oral drugs	5-FU, tegafur, UFT, doxifluridine (5′-DFUR), carmofur (HCFU), S-1 (S), UFT + leucovorin (LV), capecitabine (Cape), regorafenib, among others
Injection drugs	5-FU, mitomycin C, irinotecan (IRI), 5-FU + *l*-leucovorin (*l*-LV), oxaliplatin (OX), bevacizumab (Bmab), cetuximab (Cmab), panitumumab (Pmab), among others

1. Adjuvant chemotherapy

- Postoperative adjuvant chemotherapy is systemic chemotherapy that is performed after surgery to prevent recurrence and improve the prognosis of patients who have undergone R0 resection [50].

General principles of indications for adjuvant chemotherapy

(1) Stage III colorectal cancer (colon and rectal cancer) for which R0 resection has been performed. See CQ-8 for Stage IV resection cases.
(2) The function of major organs is maintained. The following guidelines are provided.

- Bone marrow: Peripheral blood WBC count >3500/mm^3; platelet count >100,000/mm^3
- Liver function: Total bilirubin <2.0 mg/dL; AST/ALT <100 IU/L,
- Renal function: Serum creatinine concentration no higher than the upper limit of the normal at the institution.

(3) Performance status (PS) of 0 or 1.
(4) The patient has recovered from postoperative complications, if any.
(5) The patient has provided written informed consent.
(6) The patient has no serious complications (especially, no intestinal obstruction, diarrhea, or fever).

- For age, see CQ-13.
- For patients who have Stage II colorectal cancer with a high risk of recurrence, the indications for adjuvant chemotherapy are considered after obtaining informed consent [51, 52] (CQ-14).

Recommended therapy (listed in the order of the date of their coverage by Japanese National Health Insurance)

- 5-FU + *l*-LV [note]
- UFT + LV
- Cape
- FOLFOX
- CapeOX

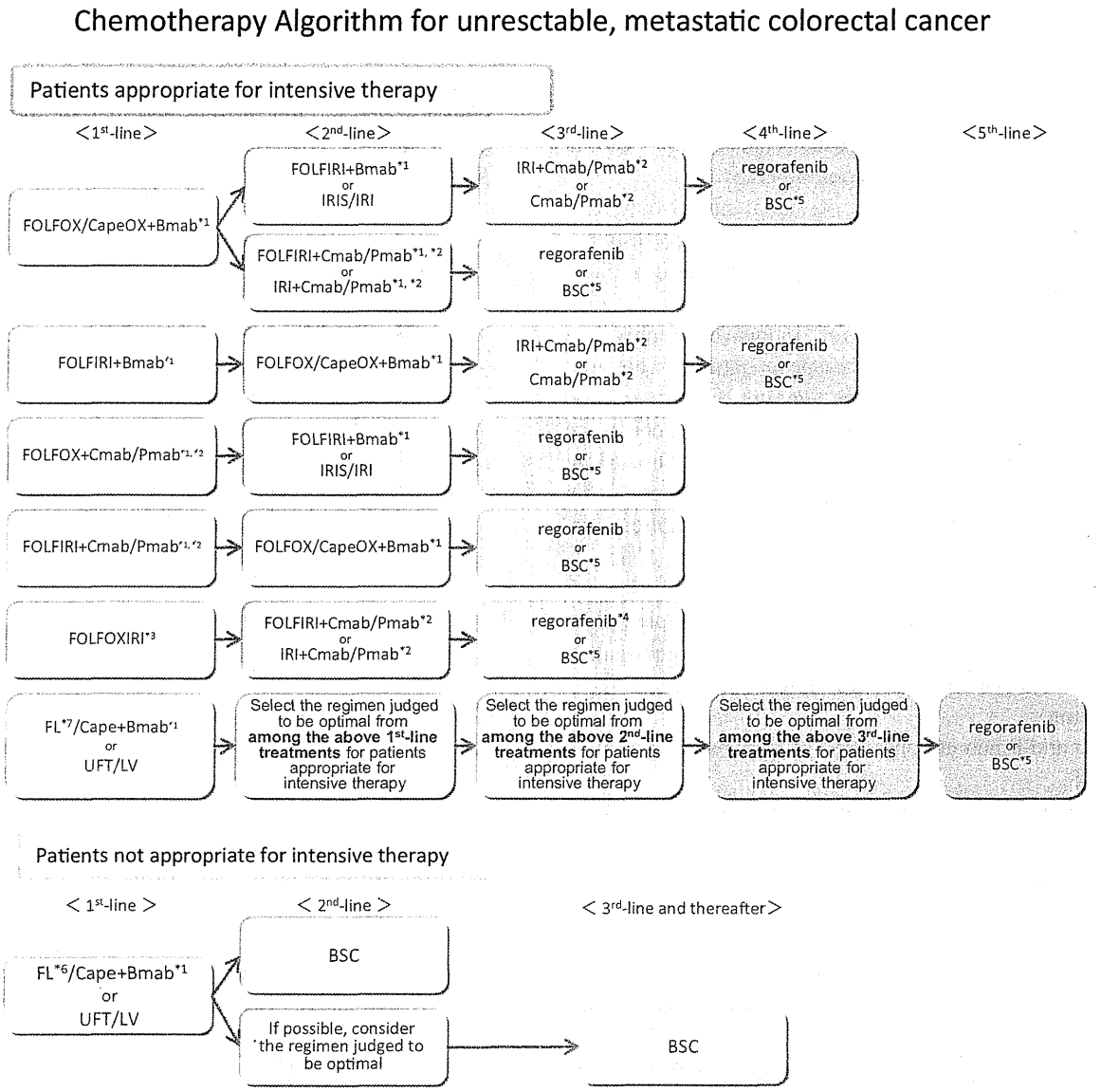
Recommended administration period (CQ-15)

- In principle, the administration period is 6 months.

Note The Roswell Park Memorial Institute (RPMI) method of 5-FU + LV therapy as adjuvant chemotherapy (drip infusion of *l*-LV 250 mg/m^2 administered for 2 h; intravenous infusion of 5-FU 500 mg/m^2 slowly administered within 3 min at 1 h after the start of administration of *l*-LV; once-weekly administration for 6 consecutive weeks followed by a 2-week rest period, 3 cycles every 8 weeks [53])

2. Chemotherapy for unresectable unresectable colorectal cancer (Fig. 6)

- In best supportive care (BSC) without any chemotherapy, median survival time (MST) for patients with unresectable colorectal cancer has been reported to be approximately 8 months. Although their MST has been



*1: Combination with molecular target drugs, such as Bmab or anti-EGFR antibodies, etc., is recommended, but for patients who are not candidates, chemotherapy alone is carried out.

*2: KRAS wild-type only is indicated.

*3: Refer to note 4.

*4: It is stated in the regorafenib package insert that efficacy and safety of this drug have not been established for use in first-line and second-line chemotherapy.

*5: PS2 and above are indicated.

*6: Infusional 5-FU+/-LV

Note: "/", (slash) means select one of the listed regimens.

Note: BSC means best supportive care.

Clinical guidelines for colorectal cancer, for physician use (Kanehara & Co., Ltd)

Fig. 6 Chemotherapy for unresectable colorectal cancer

extended to approximately 2 years as a result of recent chemotherapy, unresectable colorectal cancer is still difficult to cure.

- The purpose of chemotherapy is to prolong survival time and control symptoms by delaying tumor enlargement.

- Randomized controlled trials among PS 0 to PS 2 patients have resulted in significantly longer survival time in chemotherapy groups than in the BSC groups that did not receive anticancer drugs [54–56].
- Initially unresectable colorectal cancer may become resectable after successful chemotherapy.
- Ideally, patients should be divided into two groups and their treatment policy selected according to whether or not they are appropriate for intensive therapy.
- Patients not appropriate for intensive therapy are defined according to the two aspects patient factors and tumor-related characteristics. Patient factors include patients with a preference for avoiding the occurrence of serious adverse events or those believed to be unable to withstand OX, IRI, or molecular target drugs during first-line treatment because of severe complications. Tumor-related characteristics includes cases of multiple-organ (or multiple) metastases, in which it is considered unlikely that resection will be possible in the future, or patients determined as having asymptomatic, slow progression (those with limited risk of rapid deterioration).
- Cmab and Pmab are only used in response to wild-type KRAS.
- Combination with molecular target drugs, for example Bmab or anti-EGFR antibodies, etc., is recommended, but for patients who are not candidates, chemotherapy alone is conducted.

General principles underlying the indications for systemic chemotherapy

(1) Clinical diagnosis or histopathological diagnosis has been confirmed.
(2) The metastatic or recurrent tumor can be confirmed by imaging.
(3) Performance status (PS) is 0 to 2.
(4) The function of major organs is maintained (administration guidelines are given as 1–3, below).

1 Bone marrow: peripheral blood WBC count >3500/mm^3; platelet count >100,000/mm^3
2 Liver function: total bilirubin <2.0 mg/dL; AST/ALT <100 IU/L
3 Renal function: serum creatinine concentration no higher than the upper limit of the normal range at the institution.

(5) The patient has provided written informed consent.
(6) The patient has no serious complications (especially, no intestinal obstruction, diarrhea, or fever).

First-line therapy

- The following are regimens whose usefulness has been demonstrated in clinical trials and that are available as initial therapy covered by Japanese National Health Insurance.

(1) Patients appropriate for intensive therapy

- FOLFOX [note 1] [57, 58] +Bmab [54]
- CapeOX [note 2] + Bmab [59, 60]
- FOLFIRI [note 3] [61, 62] +Bmab [63, 64]
- FOLFOX + Cmab/Pmab [65, 66]
- FOLFIRI + Cmab/Pmab [67, 68]
- FOLFOXIRI [note 4] [69]
- Infusional 5-FU + *l*-LV [70, 71] +Bmab [72, 73]
- Cape [74, 75] + Bmab [76]
- UFT + LV [77–79]

(2) Patients not appropriate for intensive therapy

- Infusional 5-FU + *l*-LV + Bmab [72, 73]
- Cape + Bmab
- UFT + LV

Secondary therapy

- The following regimens are considered as chemotherapy for 2nd-line treatment (CQ-16).

(1) Patients appropriate for intensive therapy
(a) When patient has become refractory or intolerant to the first-line regimen, including OX
- FOLFIRI [61] +Bmab [80]
- IRIS [note 5] [81]
- IRI [82]
- FOLFIRI (or IRI) + Cmab/Pmab [82, 83]

(b) When the patient has become refractory or intolerant to the first-line regimen, including IRI
- FOLFOX [61, 84] + Bmab [80, 85]
- CapeOX [note 2] [86] + Bmab [80]

(c) When the patient has become refractory or intolerant to the first-line regimen, including 5-FU, OX, and IRI
- IRI + Cmab/Pmab [87]
- Cmab/Pmab [88–91]

(2) Patients not appropriate for intensive therapy

- BSC
- If possible, consider the regimen judged to be optimum

3rd-line and thereafter

- The following regimens should be considered for 3rd-line and thereafter treatment
- IRI +Cmab/Pmab [87]
- Cmab/Pmab [88–91]
- Regorafenib [92]

Comments

① Careful attention is required when using IRI to treat patients with constitutional jaundice, such as that caused by Gilbert's syndrome, or to treat patients with high serum bilirubin values. Relationships between genetic polymorphisms of enzymes that metabolize IRI and toxicity have been suggested (attached Side Memo 2).

② Although hepatic arterial infusion therapy results in a good response for liver metastasis, no survival benefit has been demonstrate in comparison with systemic chemotherapy [93] (CQ-17).

Note 1 FOLFOX—infusional 5-FU + *l*-LV + OX
Note 2 CapeOX—Cape + OX
Note 3 FOLFIRI—infusional 5-FU + *l*-LV + RI
Note 4 FOLFOXIRI—Infusional 5-FU + *l*-LV + IRI + OX
Note 5 IRIS—S-1 + IRI

Chapter 6: Radiotherapy

- Radiotherapy is used to treat patients with locally advanced rectal cancer, either as adjuvant therapy after surgery, to prevent recurrence, or before surgery, to reduce tumor volume and preserve the anal sphincter, and also as palliative care to relieve the symptoms and prolong the survival of patients with unresectable colorectal cancer who have symptomatic lesions.

1. Adjuvant radiotherapy

- Adjuvant radiotherapy is classified into three categories, according to the timing of surgery and radiation therapy: preoperative radiotherapy, intraoperative radiotherapy, and postoperative radiotherapy.
- The purpose of adjuvant radiotherapy is to improve local control and the survival of rectal cancer patients. The purpose of preoperative radiotherapy includes improving anal sphincter preservation and improving resection rate. However, insufficient evidence of improved survival has been found to make this the objective of adjuvant radiotherapy.
- Preoperative radiotherapy is indicated for patients with T stage clinically diagnosed as "invasion depth cT3 (SS/A) or deeper or cN-positive"; postoperative radiotherapy is indicated for patients with T stage pathologically diagnosed after surgery as "invasion depth cT3 (SS/A) or deeper or pN-positive, where the existence of a surgical dissection plane positive (RM1) or penetration of the surgical dissection plane by the cancer (RMX) is unclear"; and intraoperative radiotherapy is indicated for "surgical dissection plane positive (RM1) or penetration of the surgical dissection plane by the cancer (RMX) is unclear".
- Radiotherapy is delivered with a linear accelerator, with electron beams being used for intraoperative radiotherapy and photon beams for external radiotherapy.

Comments

① Preoperative radiotherapy (CQ-18)

1) Preoperative radiotherapy has the following advantages: seeding during surgery can be prevented by inactivating lesions with irradiation; a high percentage of tumor cells are normo-oxic and radiosensitive, because blood flow to the tumor is maintained; there is little damage to the digestive tract, because the small bowel is not fixed within the pelvic cavity, thereby resulting in low radiation-induced delayed toxicity, which means a less toxic postoperative setting; improvement in R0 resection and anal sphincter preservation can be expected because of tumor size reduction [94].
2) Preoperative radiotherapy has the following disadvantages: early-stage patients may be subjected to overtreatment and postoperative complications may increase.
3) Twelve phase III clinical trials of preoperative radiotherapy (without chemotherapy) have been reported [94], and in 5 of these trials local control was significantly higher in the group that received preoperative radiotherapy than in the surgery alone group. However, improved survival was observed in 1 trial only [95].
4) Two meta-analyses of radiotherapy revealed improved local control compared with surgery alone, and improved survival in the groups that received doses of 30 Gy or more. However, there is controversy about whether survival is improved [96, 97].
5) Trials of short-course radiotherapy with 5 Gy per fraction have been conducted, mainly in Europe [95, 98]. Because the late effects of radiation depend on fraction size, long-term follow-up for late adverse effects,

for example anal dysfunction and bowel dysfunction, is necessary.

6) In the Dutch CKVO 95-04 trial, which compared preoperative radiotherapy (25 Gy delivered in five fractions in 1 week) + TME and TME alone to investigate the significance of adding short-course radiotherapy to TME, 5-year and 10-year local control were significantly higher in the combination therapy group, but 5-year and 10-year survival were not significantly different in the two groups [98–100]. The incidences of sexual dysfunction and bowel dysfunction were higher in the preoperative radiation combination therapy group than in the surgery-alone group [101, 102].
7) The effect of preoperative radiotherapy in reducing the size of the primary tumor may enable sphincter preservation. When the purpose of the preoperative radiotherapy is sphincter preservation, it is desirable to perform surgery after allowing an appropriate period for the tumor to decrease in size (6 to 8 weeks after the completion of radiotherapy) [103].
8) In Europe, four randomized controlled trials, including the EORTC trial, were performed to investigate the usefulness of adding chemotherapy to preoperative radiotherapy. The incidence of acute-phase adverse events was significantly higher in the preoperative chemoradiotherapy groups, but pathologic complete response (pCR) was significantly higher than in the preoperative radiotherapy alone groups. In two trials, the exception being the short-course radiotherapy trials, local recurrence was significantly lower in the preoperative chemoradiotherapy group, and sphincter preservation and survival were not significantly different in the two groups [104–107].
9) In a randomized controlled trial that compared preoperative and postoperative chemoradiotherapy, there was no significant difference in the 5-year survival but local recurrence and incidence of grade 3 or higher adverse events were significantly lower in the preoperative chemoradiotherapy group. Among the patients for whom abdominoperineal resection (APR) was considered necessary at the time of enrollment, the percentage of patients for whom sphincter preservation was possible was significantly higher in the preoperative chemoradiotherapy group [108].
10) A randomized controlled trial of 5-FU versus Cape combination chemotherapy for preoperative chemoradiotherapy indicated that the two drugs had the same level of efficacy and safety [109, 110]. NCCN guidelines allow the use of either 5-FU or Cape as standard combination chemotherapy for preoperative chemoradiotherapy. The indications and use of Cape as an adjuvant therapy for rectal cancer, however, have not been approved for use under health insurance in Japan. It is believed possible to try using it, within an appropriate volume range, and with the permission of the ethics committee, for appropriate selected cases.
11) In randomized controlled trials into the efficacy of adding OX to pyrimidine fluoride as combination chemotherapy for preoperative chemoradiotherapy, OX increased harmful phenomena in three tests and had no efficacy with regard to pCR ratio, localized control ratio, and survival [109, 111–113]; moreover, in one test, although harmful phenomena were no different and no analysis of disease-free survival was conducted at the primary endpoint, the pCR ratio was significantly higher [114].

2. Palliative radiotherapy

a. Intrapelvic lesions (CQ-19)

- The purpose of palliative radiotherapy for intrapelvic lesions is to relieve symptoms such as pain, hemorrhage, and bowel movement disorders caused by intrapelvic tumors.
- The target volume includes the tumor that is causing the symptoms.

[Dose and fractionation]

- A total dose of 45 to 50 Gy is administered in 1.8 to 2.0 Gy fractions.
- Depending on the patient's general condition, for example performance status, and the severity of the symptoms, radiotherapy may be completed more quickly with a larger fraction size, for example 30 Gy in 10 fractions over 2 weeks.

b. Extrapelvic lesions

(1) Bone metastases

- The purpose of palliative radiotherapy for bone metastases is to achieve pain relief, prevent pathological fractures, and prevent and treat spinal cord paralysis.
- The target volume includes the metastatic bone lesions causing the symptoms.

[Dose and fractionation]

- Local field radiotherapy, for example 30 Gy in 10 fractions and 20 Gy in 5 fractions, is widely performed.

(2) Brain metastases

- Hematogenous metastases are discussed in Chapter 4 "Treatment strategies for hematogenous metastases".

[Dose and fractionation]

- When whole brain radiotherapy is performed, 30 Gy in 10 fractions is the standard treatment. If long-term survival is expected, fractionated radiotherapy, for example 37.5 Gy in 15 fractions and 40 Gy in 20 fractions, is considered.
- When stereotactic radiosurgery is performed, a peripheral dose of 16 to 25 Gy is delivered in a single fraction.

Chapter 7: Palliative care

- Palliative care is a general term for palliative treatment of a variety of mental and physical symptoms related to cancer.
- Palliative care extends from the time the cancer is diagnosed until the end stage, and different care should be provided depending on the disease stage and symptoms.
- In principle, cancer treatment should be performed under conditions in which symptom relief is achieved [115], and palliative care should be started at the same time as surgical treatment and chemotherapy.
- Palliative care to improve the QOL of patients with end-stage colorectal cancer includes:

(1) Pain relief
(2) Surgical treatment
(3) Chemotherapy
(4) Radiotherapy
(5) Counseling for psychiatric symptoms

Chapter 8: Surveillance after surgery for colorectal cancer

1. Surveillance for recurrence after curability A resection of colorectal cancer

(1) Consideration should be given to periodic endoscopic examination for recurrence at the site of local resection or anastomosis in pStage 0 (pTis (M) cancer) cases. Surveillance for recurrence in other organs is not necessary.

(2) pStage I–pStage III cases should be surveyed for recurrence in the liver, lungs, local area, anastomosis, lymph nodes, peritoneum, etc. The following points should be noted:

- In principle, the duration of surveillance is 5 years after surgery, but surveillance examinations should be scheduled at shorter intervals during the first 3 years after surgery.
- It should be noted that there is a higher incidence of lung metastasis and local recurrence in rectal cancer than in colon cancer.
- As a general rule, the duration of surveillance for anastomotic recurrence is until 3 years after surgery.
- The following is an example of a surveillance schedule after curative resection of Stage I to Stage III colorectal cancer that was designed on the basis of the results of a retrospective investigation of such factors as the common sites and incidence of recurrence and the efficacy of treatment and clinical practice in Japan (Fig. 7).

2. Surveillance after curability B resection of colorectal cancer and after resection of recurrent tumors.

(1) The same surveillance method as for Stage III colorectal cancer is used. It should be noted that recurrence and re-recurrence are common in organs previously operated on.

(2) In cases allocated curability B due to R1 resection, close surveillance schedule should be planned for organs in which residual cancer is suspected.

3. Surveillance of metachronous multiple cancer
   - Colonoscopy is performed for surveillance of metachronous multicentric colorectal cancer.

Comments

① Purpose of surveillance

- The purpose of surveillance is to improve the patient's prognosis by early detection and treatment of recurrences. Meta-analyses of RCTs conducted in Europe and the United States have shown that surveillance after curative surgical resection of colorectal cancer contributes to improving the likelihood of resection of recurrent tumors and to improving the prognosis [116–120] (CQ-20-1).

② Recurrence rate, sites of recurrence, times of recurrence

- The results of the project study by the JSCCR are shown in Figs. 8, 9 and Tables 10, 11, 12, 13. The subjects were patients who underwent curative resection of colorectal cancer between 1991 and 1996 at the 14 institutions that participated in the project, and the follow-up period was 6–11 years.

Years/months after surgery	1 year				2 years				3 years				4 years				5 years			
	3m	6	9	12	3	6	9	12	3	6	9	12	3	6	9	12	3	6	9	12
Colon cancer and RS cancer																				
Interview and examination	●	●	●	●	●	●	●	●	●	●	●	●		●	●			●		●
Tumor marker	●	●	●	●	●	●	●	●	●	●	●	●		●	●			●		●
Chest CT		●		●		●		●		●		●		○	●			○		●
Abdominal CT		●		●		●		●		●		●		○	●			○		●
Colonoscopy				●								●								
Rectal cancer																				
Interview and examination	●	●	●	●	●	●	●	●	●	●	●	●		●	●			●		●
Tumor marker	●	●	●	●	●	●	●	●	●	●	●	●		●	●			●		●
Digital rectal examination		●		●		●		●		●		●								
Chest CT		●		●		●		●		●		●		○	●			○		●
Abdominal and pelvic CT		●		●		●		●		●		●		○	●			○		●
Colonoscopy				●				●				●								

●: Performed for Stage I to Stage III colorectal cancer.
○: Performed for Stage III colorectal cancer. Can be omitted in Stage I and Stage II colorectal cancer.
Diagnostic imaging of the chest: CT is desirable, but plain chest X-ray is acceptable.
Diagnostic imaging of the abdomen: CT is desirable, but abdominal ultrasound is acceptable.

Fig. 7 An example of a surveillance schedule after curative resection of pStage I to pStage III colorectal cancer

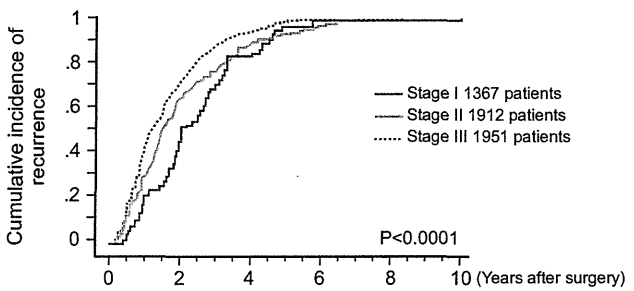


Fig. 8 Graph of cumulative incidence of recurrence according to stage (project study by the JSCCR: patients in years 1991–1996)

(1) Times and sites of the recurrences (Fig. 9, Tables 10, 12, 13).

- More than 80 % of the recurrences were detected within 3 years after surgery, and more than 95 % of the recurrences were detected within 5 years after surgery.
- The overall incidence of recurrence more than 5 years after surgery was less than 1 %.
- Among lung recurrences, 5 % of recurrences were detected more than 5 years after surgery.
- More than 95 % of the anastomotic recurrences were detected within 3 years after surgery.
- Local recurrence and lung recurrence were more frequent for rectal cancer than for colon cancer.
- There have been reports of recurrence after curative resection in Europe and the United States showing that approximately 50 % of recurrences were detected within 1 year after surgery, that approximately 70 % of the recurrences were detected within 2 years after surgery [121, 122]; and that for most patients recurrence was detected within 5 years after surgery [122].

(2) Characteristics of recurrence according to pStage (Fig. 8, Tables 10, 11)

1. pStage I

- The incidence of recurrence of pT1 (SM) cancer was approximately 1 % for both colon and rectal cancer.
- Overall recurrence of pT2 (MP) cancer was 6.4 %; it was 5.0 % for colon cancer and 8.3 % for rectal cancer.
- Two thirds of the recurrences were detected within 3 years after surgery; overall recurrence more than 5 years after surgery was less than 0.2 % among all patients.

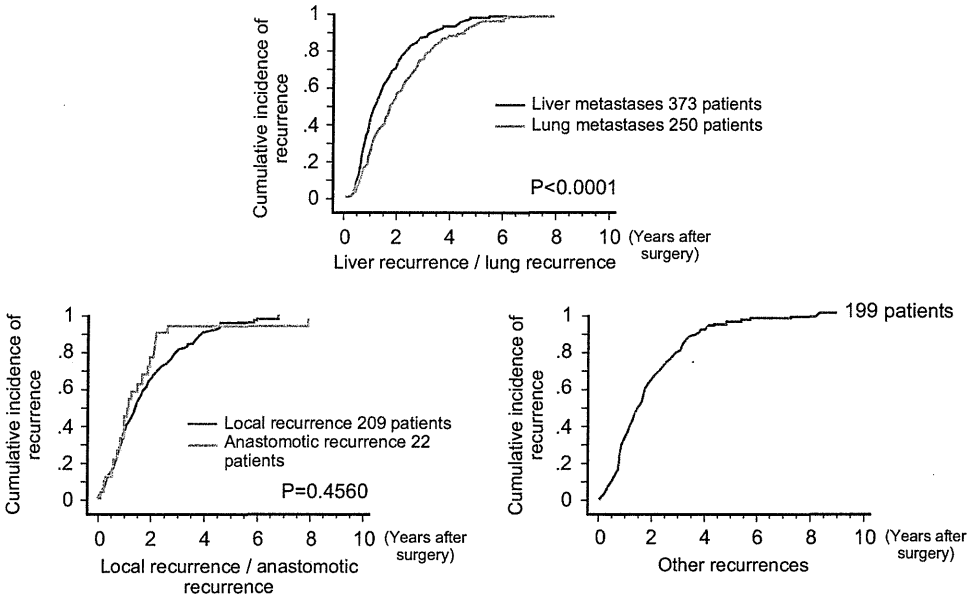


Fig. 9 Graph of cumulative incidence of recurrence according to the site of recurrence (project study by the JSCCR: patients in years 1991–1996)

Table 10 Recurrence after curative resection of colorectal cancer according to stage, and cumulative incidence of recurrence according to number of years after surgery

Stage (no. of patients)	Incidence of recurrence (no. of patients with recurrence)	Cumulative incidence of recurrence according to number of years after surgery (cumulative no. of patients with recurrence)			Percentage of patients experiencing recurrence more than 5 years after surgery among all patients (no. of patients)
		3 years	4 years	5 years	
I (1,367)	3.7 % (51)	68.6 % (35)	82.4 % (42)	96.1 % (49)	0.15 % (2)
II (1,912)	13.3 % (255)	76.9 % (196)	88.2 % (225)	92.9 % (237)	0.94 % (18)
III (1,957)	30.8 % (600)	87.0 % (522)	93.8 % (563)	97.8 % (587)	0.67 % (13)
All (5,230)	17.3 % (906)	83.2 % (753)	91.6 % (830)	96.4 % (873)	0.63 % (33)

Project study of the JSCCR: patients in years 1991–1996

2. pStage II, pStage IIIa, and pStage IIIb

- The incidence of recurrence increased with Stage.
- 78 to 90 % of recurrences were detected within 3 years after surgery, and the overall incidence of recurrence more than 5 years after surgery was less than 1 % among all patients.

③ Surveillance of metachronous multiple primary cancer

- A past history of colorectal cancer, irrespective of stage, is a risk factor for metachronous colorectal cancer [123].
- The recommended period between colonoscopy ranged from 1 to 5 years, depending on the report [124].
- The need for surveillance targeting multiple cancers should be determined by distinguishing hereditary colorectal cancer [125]. There is little evidence of a need for periodic minute examinations for cancer in other organs after surgery for sporadic colorectal cancer (CQ-20-2).

Clinical Questions

CQ-1: What are the indication criteria for additional treatment after endoscopic resection of pT1 (SM) [26]? (Fig. 10)

① Surgical resection is preferable when the vertical margin is positive. (Recommendation/Evidence level 1C)

② If any of the following findings is observed during histological examination of the resected specimen, intestinal resection with lymph node dissection is considered as an additional treatment. (Evidence level B)

(1) Depth of SM invasion ≥1000 μm
(2) Vascular invasion positive
(3) Poorly differentiated adenocarcinoma, signet-ring cell carcinoma, or mucinous carcinoma [126]
(4) Grade 2/3 budding at the site of deepest invasion [126]

Note)

- "Vertical margin-positive" means that carcinoma is exposed at the submucosal margin of the resected specimen.
- Depth of SM invasion is measured by the method described in Side Memo 1 (Fig. 11).
- Vascular invasion consists of lymphatic and venous invasion (Figs. 12, 13, 14).
- The method of assessing budding is described in Fig. 15.

The principle for treatment of pT1 (SM) carcinomas, which are invasive carcinomas, is intestinal resection with lymph node dissection. However, some pT1 (SM) carcinomas have a very low risk of metastasis, and the purpose of these criteria is to minimize the need for additional resections that eventually result in overtreatment of such patients. Although no diagnostic methods enable prediction of lymph node metastasis (pN) without fail, the risk of metastasis can be used as a basis for determining whether or not to perform additional treatment.

Table 11 Recurrence of Stage I colorectal cancer (RS cancer was counted as colon cancer)

Stage I	No. of patients	No. of patients with recurrence	Recurrence (%)	*p* value
Tumor location				
Colon	891	24	2.7	0.0056
Rectum	476	27	5.7	
Depth of tumor invasion				
SM	714	9	1.3	<0.0001
MP	653	42	6.4	
Tumor location and depth of tumor invasion				
Colon				
SM	528	7	1.3	0.0024
MP	363	17	4.7	
Rectum				
SM	186	2	1.1	0.0005
MP	290	25	8.6	

Project study of the JSCCR: patients in years 1991–1996

Table 12 Recurrence according to site of first recurrence after curative resection of colorectal cancer, and cumulative incidence of recurrence according to number of years after surgery

Site of first recurrence	Incidence of recurrence (no. of patients with recurrence including overlaps)	Cumulative incidence of recurrence according to number of years after surgery (cumulative no. of patients with recurrence)			Percentage of patients experiencing recurrence more than 5 years after surgery among all patients (no. of patients)
		3 years	4 years	5 years	
Liver	7.1 % (373)	87.9 % (328)	94.1 % (351)	98.7 % (368)	0.10 % (5)
Lung	4.8 % (250)	78.0 % (195)	88.8 % (222)	94.8 % (237)	0.25 % (13)
Local	4.0 % (209)	80.9 % (169)	90.4 % (189)	96.2 % (201)	0.15 % (8)
Anastomotic	0.4 % (22)	95.5 % (21)	95.5 % (21)	95.5 % (21)	0.02 % (1)
Other	3.8 % (199)	79.4 % (158)	91.0 % (181)	95.5 % (190)	0.17 % (9)
All (5,230)	17.3 % (906)				

Project study of the JSCCR: patients in years 1991–1996

Table 13 Comparison of recurrence of colon cancer and rectal cancer according to the site of the first recurrence (RS cancer was counted as colon cancer)

Site of recurrence	Colon cancer (3583 patients)	Rectal cancer (1647 patients)	*p* value
Liver	7.0 % (252)	7.3 % (121)	NS
Lung	3.5 % (126)	7.5 % (124)	$p < 0.0001$
Local	1.8 % (64)	8.8 % (145)	$p = 0.0001$
Anastomotic	0.3 % (9)	0.8 % (13)	$p = 0.0052$
Other	3.6 % (130)	4.2 % (69)	NS
All	14.1 % (506)	24.3 % (400)	$p < 0.0001$

Project study of the JSCCR: patients in years 1991–1996

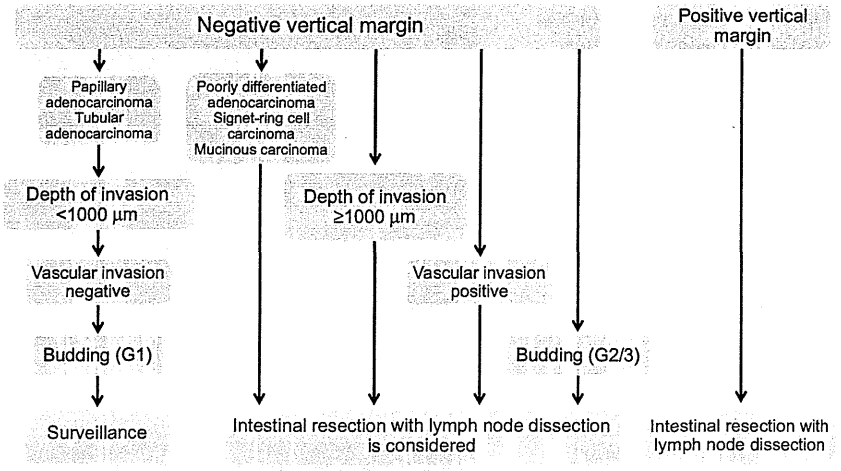


Fig. 10 Treatment strategies for pT1 (SM) cancer after endoscopic resection

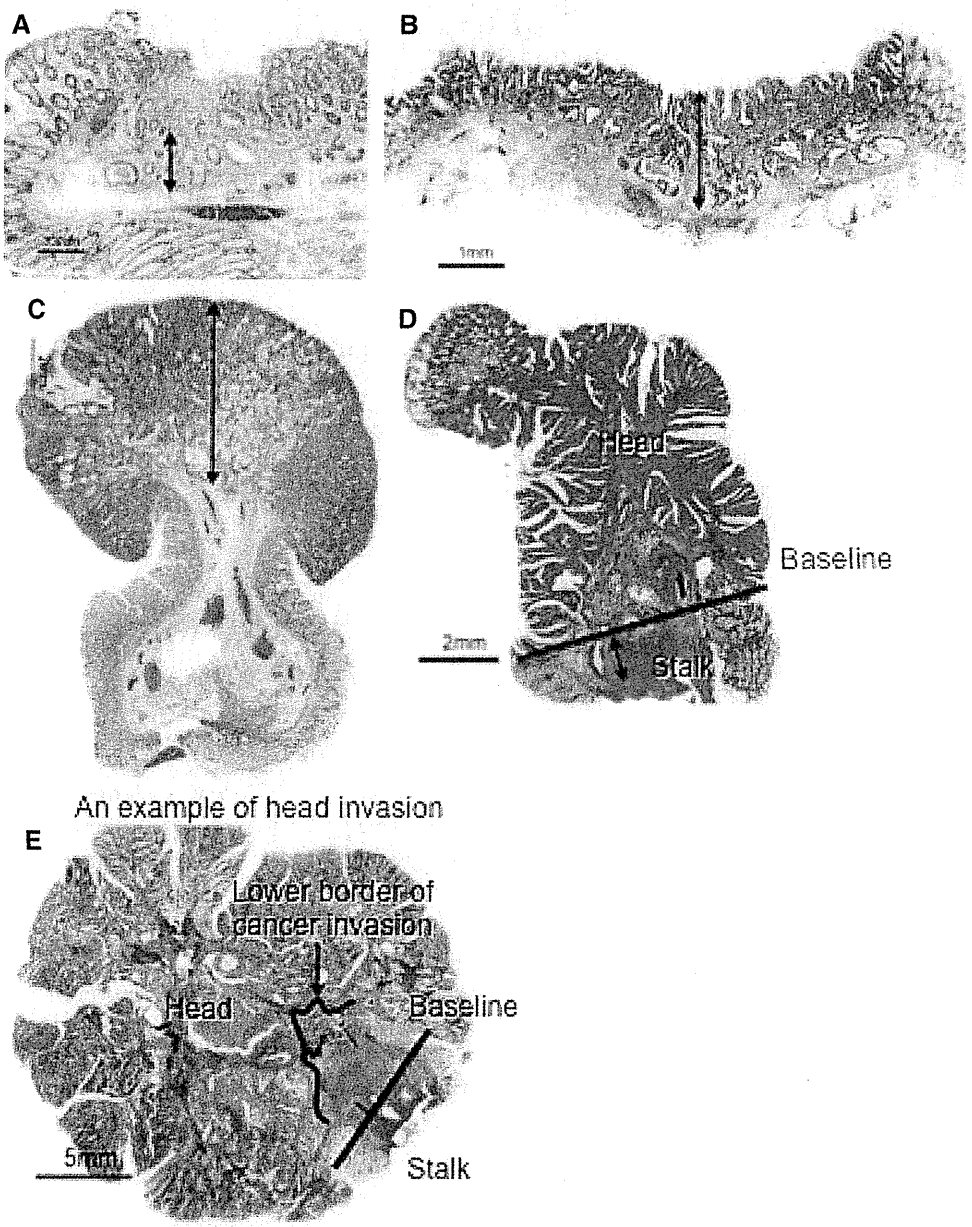


Fig. 11 Method for measuring depth of SM invasion. **a** When it is possible to identify or estimate the location of the muscularis mucosae, depth of SM invasion is measured from the lower border of the muscularis mucosae. **b**, **c** When it is not possible to identify or estimate the location of the muscularis mucosae, depth of SM invasion is measured from the surface layer of the muscularis mucosae. (**b**) Sessile lesion; (**c**) pedunculated lesion. **d** For pedunculated lesions with a tangled muscularis mucosae, depth of SM invasion is measured as the distance between the point of deepest invasion and the reference line, which is defined as the boundary between the tumor head and the stalk. **e** Invasion by pedunculated lesions that is limited to within the head is defined as "head invasion"

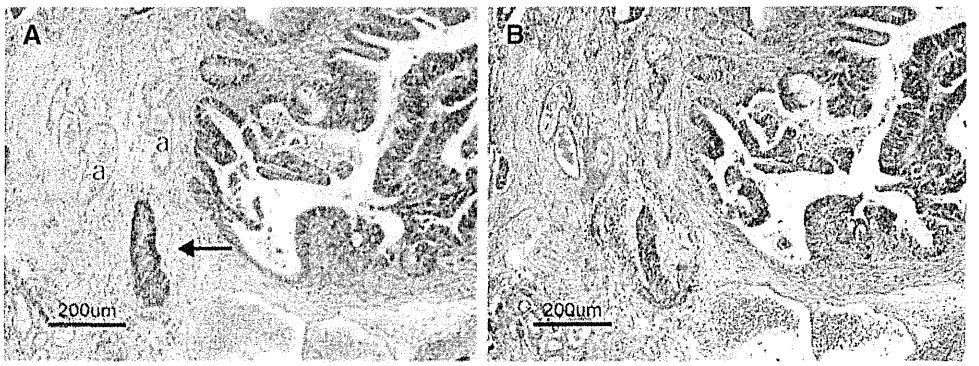


Fig. 12 Venous invasion (*arrow* in **a**). **a** Located in the vicinity of an artery (*a*). **b** Elastic fibers in the vein wall have become clear as a result of Victoria blue staining

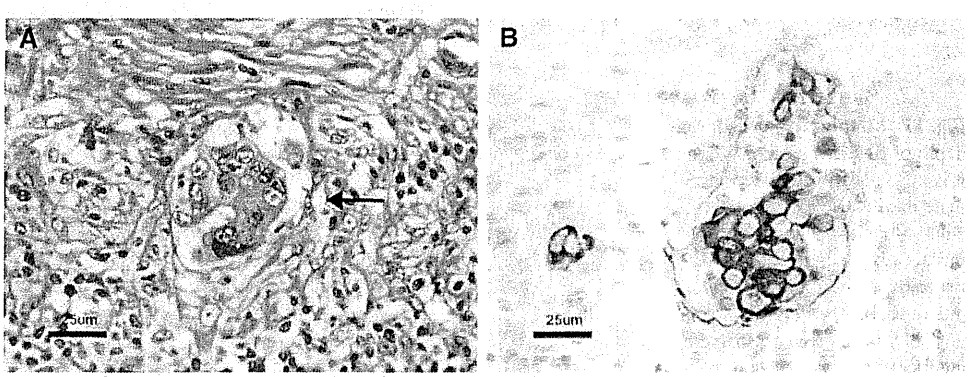


Fig. 13 Lymphatic invasion (*arrow* in **a**). **a** A cancer cell nest is visible in the interstitial space. **b** Double staining for cytokeratin and D2-40. Cancer cells are stained *brown*, and the lymphatic endothelium is stained *purplish red*

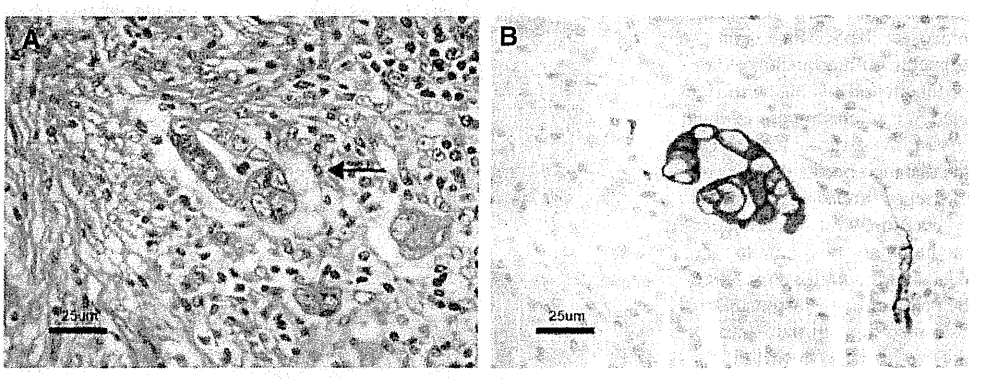


Fig. 14 Space formed by artifacts during preparation of the specimen (*arrow* in **a**). **a** A cancer cell nest is visible in the interstitial space. **b** Double staining for cytokeratin and D2-40. The interstitial space is D2-40-negative

Factors such as the depth of submucosal invasion (SM invasion depth) [127], histological type, for example poorly differentiated adenocarcinoma, signet-ring cell carcinoma, and mucinous carcinoma [126], the presence of a poorly-differentiated area and muconodules at the site of deepest invasion, budding, and vascular invasion, have been reported to be risk factors for regional lymph node metastasis by pT1 (SM) carcinoma [126, 128].

These criteria for determining whether additional treatment is indicated were prepared on the basis of 3 criteria for performing additional intestinal resection of pT1 (SM) carcinoma described in the "Japanese Classification of Colorectal Carcinoma" (2nd edition, 1980):

(1) obvious intravascular carcinoma invasion;
(2) poorly differentiated adenocarcinoma or undifferentiated carcinoma; or
(3) massive carcinoma invasion extending to the vicinity of the margin [129].

The description of "massive carcinoma invasion" in the 4th edition of the "Japanese Classification of Colorectal Carcinoma" was revised to a more specific description in the 5th edition (1994): "Invasion deeper than 'very shallow invasion' (e.g., invasion exceeding approximately 200 μm to 300 μm)" [130].

Subsequent case series studies in Japan have shown that "200 μm to 300 μm" can be extended to 1000 μm

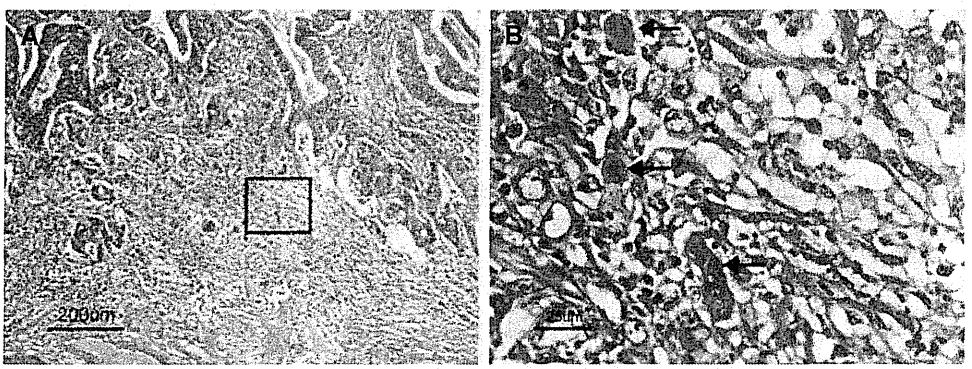


Fig. 15 Budding (*arrow* in **b**). A cancer cell nest consisting of 1 or fewer than 5 cells that has infiltrated the interstitium at the invasive margin of the cancer is seen. **b** Is the *square area* in **a**

Table 14 Depth of invasion of SM cancer and lymph node metastasis (modified from Ref. [127])

SM invasion distance (μm)	Pedunculated		Non-pedunculated	
	Number of lesions	*n* (+) (%)	Number of lesions	*n* (+) (%)
Head invasion	53	3 (5.7)		
$0 < X < 500$	10	0 (0)	65	0 (0)
$500 \leq X < 1{,}000$	7	0 (0)	58	0 (0)
$1{,}000 \leq X < 1{,}500$	11	1 (9.1)	52	6 (11.5)
$1{,}500 \leq X < 2{,}000$	7	1 (14.3)	82	10 (12.2)
$2{,}000 \leq X < 2{,}500$	10	1 (10.0)	84	13 (15.5)
$2{,}500 \leq X < 3{,}000$	4	0 (0)	71	8 (11.3)
$3{,}000 \leq X < 3{,}500$	9	2 (22.2)	72	5 (6.9)
$3{,}500 \leq X$	30	2 (6.7)	240	35 (14.6)

The incidence of lymph node metastasis among patients with a depth of invasion of 1000 μm or above was 12.5 %

All 3 lymph node metastasis-positive patients with head invasion were ly positive

[131]. According to the results of the project study by the JSCCR, the incidence of lymph node metastasis for colorectal carcinoma with an SM invasion depth of 1000 μm or more was 12.5 % (Table 14) [127, 131]. However, not all cases with submucosal invasion deeper than 1,000 μm necessarily require additional surgery. Approximately 90 % of patients with a depth of invasion of 1000 μm or more did not have lymph node metastasis, and it is important to determine whether additional treatment is indicated after sufficiently considering other factors in addition to depth of SM invasion, for example whether other risk factors for lymph node metastasis are present, the physical and social background of the patient, and the patient's wishes. As consensus has not yet been achieved within the Guideline Committee, indicators of strength of recommendation in the treatment criteria provided above have not been disclosed. Because budding was demonstrated to be an important risk factor for lymph node metastases in the project study by the JSCCR, additional intestinal resection has been added to the list of factors that should be considered according to the previous edition. Furthermore, project research is currently in progress into other histopathological factors. Multi-center joint research projects have produced reports providing results from consideration of the appropriateness of these criteria [132–134]. None of the guidelines in other countries includes depth of invasion or budding as criteria for additional treatment.

CQ-2: What are the criteria for selecting endoscopic resection with regard to lesions with a maximum diameter of 2 cm or greater?

- Accurate preoperative endoscopic diagnosis is essential in endoscopic resection with regard to lesions with a maximum diameter of 2 cm or greater, and whether resection by EMR, piecemeal EMR, or ESD is indicated is determined after taking the operator's skill in performing endoscopic resection into consideration. (Recommendation/Evidence level 1B)

Side Memo 1

■ Method for measuring depth of SM invasion (Fig. 11)
When it is possible to identify or estimate the location of the muscularis mucosae, depth of SM invasion is measured from the lower border of the muscularis mucosae of the lesion, irrespective of macroscopic type.

- When it is not possible to identify or estimate the location of the muscularis mucosae, the depth of SM invasion is measured from the surface of the lesion. The phrase "possible to identify or to estimate" means that there is no "deformity", i.e., disarray, dissection, rupture, fragmentation, etc., of the muscularis mucosae as a result of SM invasion. If a deformed muscularis mucosa is used as the baseline of the measurement, the depth of SM invasion may be underestimated. Although judging whether there is a "deformity" is not always straightforward, if a desmoplastic reaction is present around the muscularis mucosae, it is assumed to be "deformed."
- For pedunculated lesions with a tangled muscularis mucosae, depth of SM invasion is measured as the distance between the point of deepest invasion and the reference line, which is defined as the boundary between the tumor head and the stalk (the boundary between the tumor area and the non-tumor area in the mucosa). Invasion by pedunculated lesions that is limited to within the head is defined as "head invasion."

■ Method for assessing vascular invasion (Figs. 12, 13, 14)

- Attention to arteries is a key factor in assessing venous invasion. Venous invasion is highly likely when a circular, semicircular, or oblong cancer cell nest with regular margins is located in the vicinity of an artery and distant from the main lesion. Such a cancer cell nest surrounded by venous wall structures (for example internal elastic membrane or perivascular smooth muscle) can be regarded as indicative of venous invasion. However, the venous wall structures are often displaced or obliterated by the cancer cell nest, and it is difficult to recognize in hematoxylin and eosin stained sections.
- The presence of cancer cells and cancer cell nests in the interstitial space suggests lymphatic invasion. A space filled with lymph and lymphocytes is especially likely to be a lymph vessel. When endothelial cells are identified around the space, the space can be regarded as a lymph vessel. However, it is often difficult to identify endothelial cells in specimens stained with hematoxylin and eosin, and spaces may be artifacts created during the process of preparing the specimen.
- As stated above, evaluation of vascular invasion, which is an important indicator for determining treatment strategies for SM cancer, is often difficult for hematoxylin and eosin stained specimens. Special staining methods are useful for evaluating vascular invasion, for example elastica van Gieson staining or Victoria blue staining for venous invasion, and D2-40 immunostaining for lymphatic invasion.

■ Method for the assessing tumor budding (Fig. 15)

[Definition of tumor budding] [126] A cancer cell nest consisting of 1 or less than 5 cells that infiltrates the interstitium at the invasive margin of the cancer.

[Grade of budding] After selecting one field in which the number of budding is greatest, the number of buddings is counted in a field measuring 0.785 mm^2 observed through a 20× objective lens (WHK 10× ocular lens). Depending on the number of buddings, grade of budding is defined as:

Grade 1: 0 to 4
Grade 2: 5 to 9
Grade 3: 10 or more

- The incidence of lymph node metastasis for Grade 2/3 tumors is significantly higher than for Grade 1 tumors. A multi-center study conducted by the Budding Investigation Project Committee (2005–current) of the JSCCR in which Grade 1 was defined as "low grade" and Grade 2/3 as "high grade" showed that "high grade" is an independent predictor of lymph node metastasis.

CQ-3: What cautions should be noted when using colorectal ESD to implement endoscopic resection of colonic lesions?

- When ESD is being considered for use in cases of "early-stage malignant tumors", accurate preoperative endoscopic diagnosis and the level of skill of the operator with regard to endoscopic resection should be considered before deciding to proceed. (Recommendation/ Evidence level 1B)

CQ-4: Is laparoscopic surgery for colorectal cancer effective?

- According to randomized controlled trials held overseas and the Cochrane Database of Systematic Reviews, the safety and long-term outcome of laparoscopic surgery for cases of colonic and RS cancers are similar to those for open surgery. Because D3 dissection is difficult under laparoscopic conditions, laparoscopic surgery for cStage II—cStage III disease should be implemented when it is considered that the individual surgical team is sufficiently experienced. Laparoscopic surgery is also difficult for patients with transverse colon cancer, for severely obese patients, and for patients with severe adhesions.

- The efficacy and safety of laparoscopic surgery for rectal cancer has not been established. Ideally, appropriately planned clinical trials should be implemented. (Recommendation/Evidence level 1B)

CQ-5: Resection of the primary tumor for patients with unresectable distant metastases

- The efficacy of primary tumor resection for cases with unresectable distant metastases differs depending on such individual factors as symptoms caused by the primary lesion, the state of distant metastasis, the patient's general condition, etc.
  ① If symptoms exist, as a result of the primary tumor, which are difficult to control using other therapy, and the resection is not significantly invasive, primary tumor resection and early systemic chemotherapy is recommended. (Recommendation/Evidence level 1C)
  ② For cases in which no symptoms are caused by the primary tumor, however, the efficacy of resecting the primary tumor has not been established.

CQ-6: In cases where peritoneal dissemination is noted, is it effective to resect peritoneal dissemination at the same time as the primary lesion?

- The efficacy of resecting peritoneal dissemination has not been proved. Some cases of long-term survival have been reported in which localized dissemination (P1, P2) was resected with the primary tumor, suggesting that if the resection is not significantly invasive peritoneal dissemination should be resected at the same time as the primary tumor. (Recommendation/Evidence level 2D)

CQ-7: What are the indications for resection for cases in which metastasis is simultaneously noted in the liver and the lungs?

- The efficacy of resection for patients who have liver and lung metastases at the same time has been shown, and thus resection should be considered for patients with resectable liver and lung metastases. However, there are insufficient data to determine the indication criteria for surgery. It is necessary to obtain informed consent after informing the patient of the rather low cure rate and the absence of outcome predictors. (Recommendation/Evidence level 2D).

CQ-8: Is adjuvant chemotherapy effective subsequent to distant metastatic lesion resection?

- The efficacy and safety of adjuvant chemotherapy subsequent to distant metastatic lesion resection in cases of colorectal cancer have not yet been established. Ideally, appropriately planned clinical trials should be implemented. (Evidence level C)

CQ-9: Is resection of liver/lung metastasis effective, if it becomes possible as a result of the effects of chemotherapy?

- Resection should be performed for cases in which chemotherapy has successfully made localized metastasis to the liver or lungs operable. (Recommendation/Evidence level 2D)

CQ-10: What are the surgical indications in cases of local recurrence of rectal cancer?

- Resection should be considered for local recurrence of rectal cancer when R0 resection is considered possible. (Recommendation/Evidence level 2D)

CQ-11: Is preoperative adjuvant chemotherapy effective in cases of operable liver metastasis?

- The efficacy and safety of preoperative chemotherapy for resectable liver metastases has not been established. It should be evaluated in properly designed clinical trials. (Evidence level D)

CQ-12: Is heat coagulation therapy effective with regard to liver metastatic lesions?

① There are few reports indicating the efficacy of heat coagulation therapy; it is, therefore, not recommended as a first choice of treatment. (Recommendation/Evidence level 1C)
② Because heat coagulation therapy is accompanied by a high risk of local recurrence in cases of liver metastasis, resection should be initially considered wherever possible.

CQ-13: Is postoperative adjuvant chemotherapy effective for patients aged 70 or over?

- Even for patients 70 years old or older, postoperative adjuvant chemotherapy is recommended if their PS is good, if the function of their major organs is adequate, and if there are no complications that may be a risk for performing chemotherapy. (Recommendation/Evidence level 1A)

CQ-14: Should postoperative adjuvant chemotherapy be conducted for Stage II [26] colorectal cancer?

- The usefulness of postoperative adjuvant chemotherapy for Stage II colorectal cancer has not been proved, and

it is recommended not to routinely administer adjuvant chemotherapy to all patients with Stage II colorectal cancer. (Recommendation/Evidence level 1A)

CQ-15: Is the appropriate duration of postoperative adjuvant chemotherapy 6 months?

- Although no definitive conclusion regarding the duration of postoperative adjuvant chemotherapy has been reached, the current standard duration of treatment by 5-FU-based adjuvant chemotherapy is 6 months. (Recommendation/Evidence level 1A)

CQ-16-1: Is bevacizumab administration effective as second-line chemotherapy?

- Combination chemotherapy using bevacizumab is effective as second-line chemotherapy, irrespective of whether bevacizumab was administered as part of initial therapy. (Recommendation/Evidence level 2B)

CQ-16–2: Is administration of molecular target drugs (anti-EGFR antibodies) effective as second-line chemotherapy?

- For wild-type KRAS cases, treatment with anti-EGFR antibodies (cetuximab and/or panitumumab) is effective. (Recommendation/Evidence level 2C)

Side Memo 2

■ IRI and UGT1A1 genetic polymorphism

SN-38 is an active metabolite of IRI and the UGT1A1 gene encodes an intrahepatic metabolizing enzyme which converts the active form SN-38 to the inactive form SN-38 G. Among patients who are double heterozygotes for *6 and *28 or homozygotes for *6 or *28 of the UGT1A1 gene, the glucuronic acid conjugation capacity of UGT1A1 is known to be reduced and metabolism of SN-38 to be delayed, and serious adverse drug reactions, for example neutropenia, may occur as a result. It is especially desirable to test for a UGT1A1 genetic polymorphism before administering IRI to patients with a high serum bilirubin level, elderly patients, patients whose general condition is poor (e.g., PS2), and patients for whom severe toxicity (especially neutropenia) developed after the last administration of IRI. On the other hand, because IRI toxicity cannot be predicted with certainty on the basis of the presence of a UGT1A1 genetic polymorphism alone, it is essential to monitor patients' general condition during treatment and to manage adverse drug reactions carefully, irrespective of whether a genetic polymorphism is detected.

CQ-17: Is hepatic arterial infusion therapy effective in cases of liver metastases?

- Comparisons between hepatic arterial infusion therapy using fluoropyrimidine alone and systemic chemotherapy showed no clear difference in survival. The effectiveness of hepatic arterial infusion therapy in comparison with systemic chemotherapy using multi-drug combination has not been established. (Recommendation/Evidence level 1C)

CQ-18: Is preoperative chemoradiotherapy effective in patients with rectal cancer?

- In the USA and Europe, although preoperative chemoradiotherapy has reduced the incidence of local recurrence in comparison with TME-only, reports suggest that it has not contributed to improved survival. In Japan, where surgical methods differ from the USA and Europe, the efficacy of preoperative chemoradiotherapy has not been established with regard to rectal cancers for which the lower margin of the tumor is closer to the anus than the peritoneal reflection. (Evidence level B)

CQ-19: Is chemoradiotherapy effective for unresectable locally advanced and locally recurrent rectal cancer?

① In cases of locally advanced and locally recurrent rectal cancer determined likely to become R0 resectable as a result of tumor shrinkage after treatment, it is recommended that chemoradiotherapy, with the objective of resection, be used as opposed to radiotherapy alone. (Recommendation/Evidence level 1B)
② Chemoradiotherapy should also be taken into consideration where the objective is relief of symptoms. (Recommendation/Evidence level 1C)

CQ-20-1: Is surveillance subsequent to curative surgery for colorectal cancer effective?

- It has been suggested that the efficacy of surveillance is its contribution to improving prognosis by enabling early detection of recurrence, and, as such, regular postoperative surveillance is desirable. (Recommendation/Evidence level 1A)
- However, an optimum surveillance protocol incorporating a health-economical perspective has not been sufficiently established.

CQ-20-2: Is surveillance of multiple cancers (multiple colorectal cancer or other organ cancer) effective subsequent to curative surgery for colorectal cancer?

① Metachronous colorectal cancer occurs more frequently in cases of colorectal cancer resection than in the general population, and, as such, regular endoscopic examination of the colon is recommended. (Recommendation/Evidence level 1B)

② There is no indication that post-surgical surveillance targeting multiple cancers is effective. The appropriate course of action is to educate the patient regarding the need for regular cancer examinations and recommend periodic checkups. (Recommendation/Evidence level 2C)

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